

Should we trust in Leading Indicators? Evidence from the Recent Recession



Katja Drechsel and Rolf Scheufele

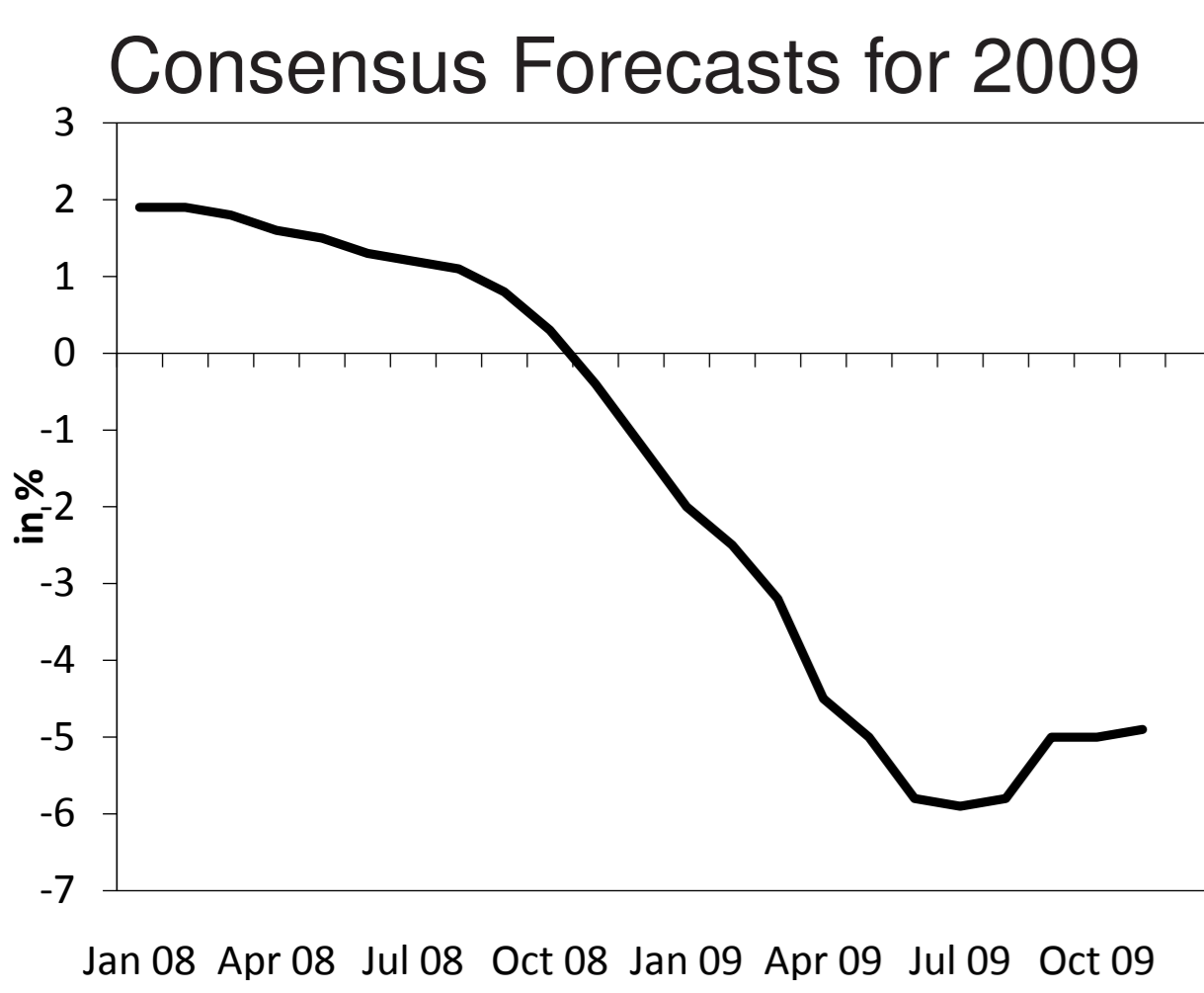
Halle Institute for Economic Research (IWH)

General Motivation

- Professional Forecasters did not anticipate the deep recession in 2008/2009 (in timing and magnitude)
- Do leading indicators contain information before the crisis?
- Have the characteristics of leading indicator forecasts changed during the recession?

Introduction

How did the Professional Forecasters in the Recent Recession?



Expected and Realized Quarterly Growth Rates for GDP (Year-on-year):

Time period	Forecast horizon							
	2008				2009			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
2008 Q1	1.3	1.6	1.3	1.4	1.6	1.7	1.9	1.9
Q2	2.6	2.2	1.7	1.7	0.6	1.2	1.6	1.8
Q3	2.6	1.7	1.2	0.9	-0.1	0.7	1.0	1.3
Q4	2.7	1.9	0.8	-0.2	-1.9	-1.8	-1.2	-0.3
2009 Q1		0.8	-1.7		-4.1	-3.6	-3.0	-1.0
Q2		0.8	-1.8		-6.9	-6.6	-6.0	-3.7
Q3					-6.7	-5.9	-4.9	-2.1

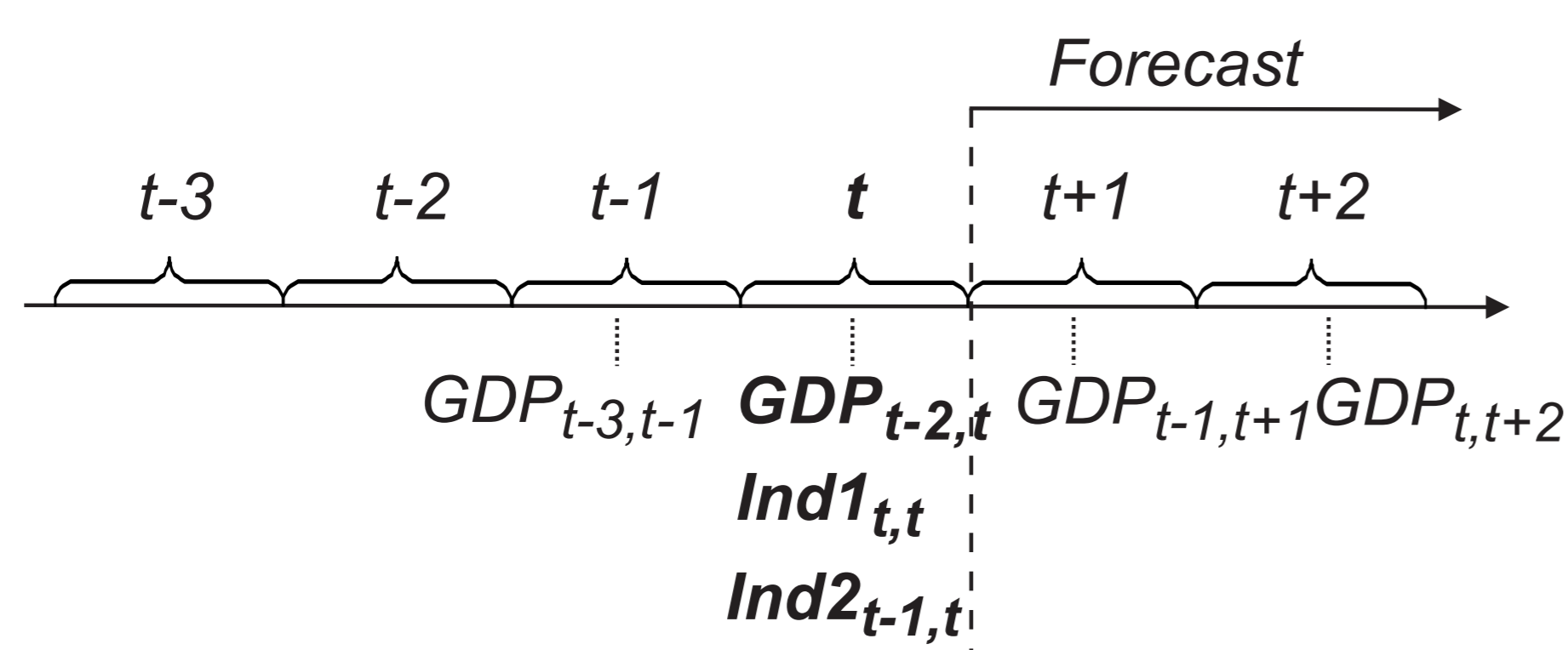
Source: Consensus Economics, Mean Forecast.

A Brief Literature Review:

- Performance of leading indicators (**German perspective**):
 - Forecasting GDP: Hinze (2003), Dreger and Schumacher (2004), Kholodilin and Siliverstovs (2006)
 - Forecasting industrial production: Breitung and Jagodzinski (2001), Fritsche and Stephan (2002), Benner and Meier (2004), Dreger and Schumacher (2005), Robinzonov and Wohlrabe (2009)
- Performance of leading indicators (**International perspective**):
 - Stock and Watson (2003a) and many others ...
- Performance of leading indicators at **turning points** and in **recessions**
 - Döpke (1999), Fritsche and Kuzin (2005), Stock and Watson (2003b)

Leading Indicator Models

- Forecasted variables: GDP and Industrial Production (IP)
- Indicator Variables:
 - Financial indicators:** interest rates, interest rate spreads, monetary aggregates, stock prices, stock return volatilities, commodity prices, exchange rates
 - Surveys:** Ifo (core- and sub-indices), ZEW, PMI, EC consumer surveys and business sentiment
 - Real economy:** employment, unemployment rate, vacancies, inflation rates, wage rates, new orders
 - Composite leading indicators:** Early bird, FAZ-Indicator, OECD leading indicators
- Regression Setup:
 - Large set of leading indicators: 99 for quarterly and 78 for monthly
 - Total sample period for GDP: 1991Q1-2009Q2 and for IP: 1991m1-2009m6
 - Total sample $T = R + P$, Rolling window: constant in-sample size R , P forecast errors



Regression model:

$$Y_{t+h}^h = \alpha + \sum_{i=1}^{p+l} \beta_i Y_{t-i} + \sum_{j=k}^{q+k} \gamma_j X_{t-j} + \varepsilon_{t+h}^h$$

where Y is GDP or IP and X is the leading indicator

- Sequential lag selection according to AIC
- h-step ahead forecasts
- Forecast Combination:
 - Individual indicator forecasts are aggregated according to:

$$\hat{Y}_{t,t+h}^h = \sum_{i=1}^n \omega_{i,h} \hat{Y}_{i,t,t+h}^h \quad \text{with} \quad \sum_{i=1}^n \omega_{i,h} = 1$$
 - Weighting procedure: equal, AIC and R^2 as well as the median

Forecast Performance Measures

Forecast Evaluation

- Relative Root Mean Squared Forecast Error (RMSFE) are computed relatively to the AR model:

$$\text{relative RMSFE} = \frac{\sqrt{\sum_{t=T_1}^{T_2-h} (Y_{t+h}^h - \hat{Y}_{t,t+h}^h)^2}}{\sqrt{\sum_{t=T_1}^{T_2-h} (Y_{t+h}^h - \hat{Y}_{0,t+h}^h)^2}}$$

- Relative MAFE are computed in a similar way
- Giacomini and White's (2006) test for conditional predictive ability
 - Allows to compare nested as well as nonnested models
 - Forecast combination schemes can be considered as well
 - Requirement: rolling (or fixed) estimation window
- Chow-type tests for comparing the relative forecasting performance before and during the crisis

Results

- Analysis of the precrisis sample: 2000Q2 2007Q4

Indicators with the Greatest Forecast Accuracy (RMSFE):

	h=1	h=2	h=3	h=4
1 ESI	0.81*	DLNVAC 0.80*	ECCS5 0.87*	DLNVAC 0.79**
2 IFO-EXP	0.86	ECCS5 0.82*	DLNDAX 0.89	ECCS5 0.90**
3 DIFO-C	0.87	DLNDAX 0.88	ECCS1 0.94**	DLNDAX 0.94**
4 IFOMV-EXP	0.91	ESI 0.93	DLNHWWAX 0.95	DLNEX 0.98**
5 PMI	0.91	med 0.95	IFO-C 0.96**	IFO-C 0.99

Relative RMSFE with conditional pairwise test of equal forecast accuracy.

- Analysis of the crisis sample: 2008Q1 2009Q2

Indicators with the Greatest Improvements Relative to the Benchmark

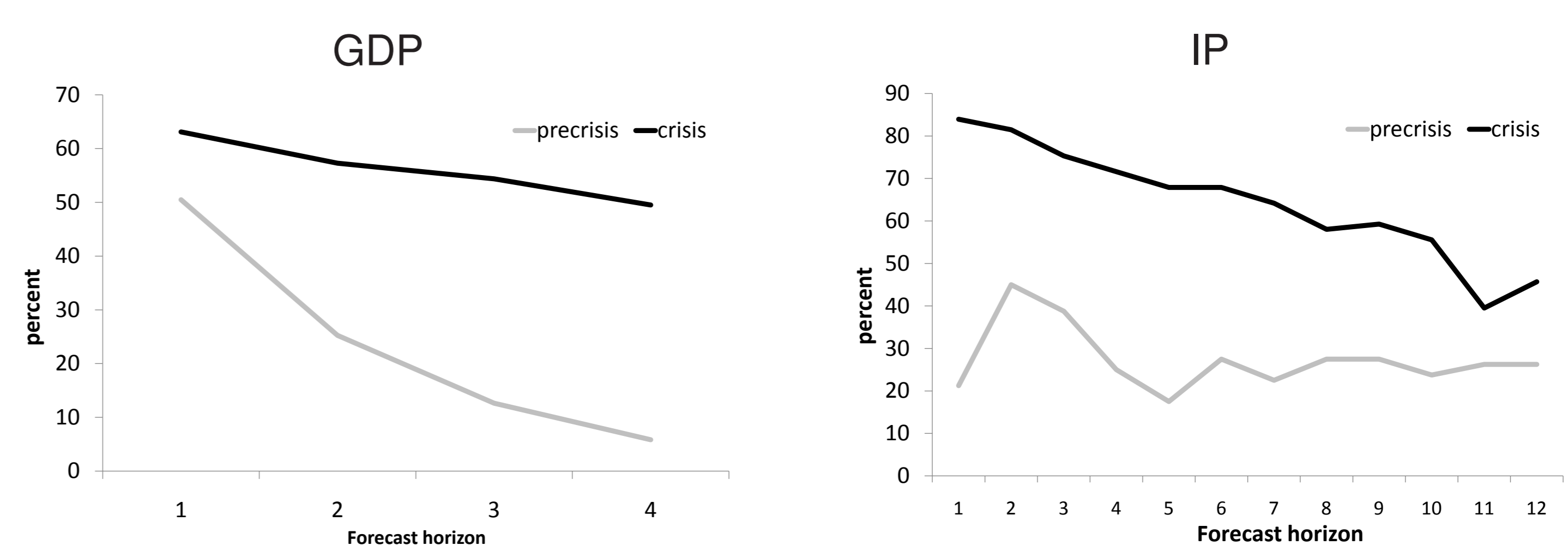
	h=1	h=2	h=3	h=4
1 IFO-EXP	-5.72***	SPREAD-BA -5.71***	SPREAD-BA -5.21***	SPREAD-BA -3.98***
2 IFOM-EXP	-5.47***	DLNFAZ -4.51***	ECCS5 -3.94***	ECCS5 -3.55***
3 DORDERI	-5.01***	IFO-EXP -4.05***	DLNFAZ -3.47***	DLNCPX -3.37***
4 IFOMV-EXP	-4.99***	DIFO-C -3.93***	SPREAD-C-G -3.00***	SPREAD-C-G -2.86***
5 IFO-WC	-4.95***	SPREAD-C-G -3.72***	DIFO-C -2.95**	DLNVAC -2.86***

Absolute RMSFE gains against the benchmark AR model. With significance levels (Break Test).

- Survey indicators offer great improvements for short horizon
- Performance of the spreads between BBB and AA corp. non-financial bond yields dominate for longer horizons. Also the spread between corporate and government bond yields displays considerable improvements
- Consumer prices yield improvements at a longer horizon
- FAZ-indicator improves substantially
- Forecast combination schemes do only slightly better than the benchmark
- Results for IP:
 - ESI, ifo survey and EC consumer surveys are also relevant indicators in the precrisis
 - In addition, stock prices and commodities do best at all forecast horizons
 - Forecast combination increases the performance significantly
 - Performance of OECD leading indicators increases considerably in the crisis
 - At longer horizons, the spread between 10Y-3M and between corporate and government bond yields show high forecast accuracy

Performance of Indicator Forecasts

Percentage of Leading Indicator Forecasts that Offers Accuracy Gains Against the Benchmark



Conclusion

- Ifo, ESI and OECD leading indicators contribute to a significant improvement of the forecasts before as well as during the crisis
- While financial variables are not significantly better than the benchmark in the precrisis (exception: stock prices), especially risk spreads and stock returns are useful indicators in the crisis
- Simple forecast combinations are significantly better than individual indicator forecasts in the whole period