

FORECASTING INDUSTRIAL PRODUCTION INDEX BASED ON EXPECTATIONS FROM BUSINESS TENDENCY SURVEY

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Presentation content

- The index of production introduction.
- Business tendency survey introduction.
- Quantification method introduction.
- MSW index methodology.
- Forecasting results “in sample” and “out of sample”.

Introduction-IOP

- The estimate of change in manufacturing gross value added is calculated by collecting the following information from industrial firms:

- 1) Monthly revenue deflated PPI
- 2) Physical quantity of products
- 3) Hours of work

Combining these indicators is based on international recommendation for each 4 digit branch.

Introduction-BTS

- Business Tendency Survey is a qualitative survey that is employed monthly by NSO of OECD countries.
- The survey is filled by the firms' managers and the questions are focused on economic variables of their firms in different time dimensions.
 - 1) Questions about the past (retrospective)
 - 2) Questions about the present
 - 3) Questions on expectation(prospective)

Introduction-BTS

- The respondents to the BTS are asked to answer the questions in 5 different scales:
 - 1) A lot above the normal for the season
 - 2) above the normal for the season
 - 3) Remained unchanged for the season
 - 4) Below normal for the season
 - 5) A lot below normal for the season

Qualitative survey- advantage

- The main advantage of the qualitative surveys such as the BTS survey is the speed of the process.
- This quick process enables the results from the BTS survey to precede the quantitative results from the Index Of Production by few months.
- The first step in processing the qualitative survey is to quantify the answers.

Quantification types

- There are two types of quantification methods:
 1. Aggregate quantification- uses the aggregate results that are published by the NSO and assumes homogeneity between the firms.
 2. Micro quantification- uses the panel data of the answers and assumes heterogeneity between the firms.

MSW Model

- In this research I applied the micro quantification method that was developed by J. Mitchell, R. J. Smith and M. Weale .
- In contrast to the well known Net Balance aggregate quantification method, the MSW method gives different scores for each firm.
- This MSW non parametric method is based on the “Law Of Large Numbers” and on the “Law Of Iterated Expectation”

MSW Model

- The researches assume that there is a joint conditional cumulative density function between $j(i)$ $j=(1,2,3)$ and to the change in the Index Of Production (x) .

The Model-Example

year	(t-1)month	$j(t-1)$ =Firm answer	$x(t)$ =IOP change
2011	1	up	4%
2011	2	up	2%
2011	3	No change	1%
2011	4	down	0%
2011	5	up	4%
2011	6	up	5%
2011	7	up	6%
2011	8	down	-2%
2011	9	down	-3%
2011	10	No change	0.5%
2011	11	No change	-1%
2011	12	up	3%

The Model-Example

The conditional expectation when $j=1$:

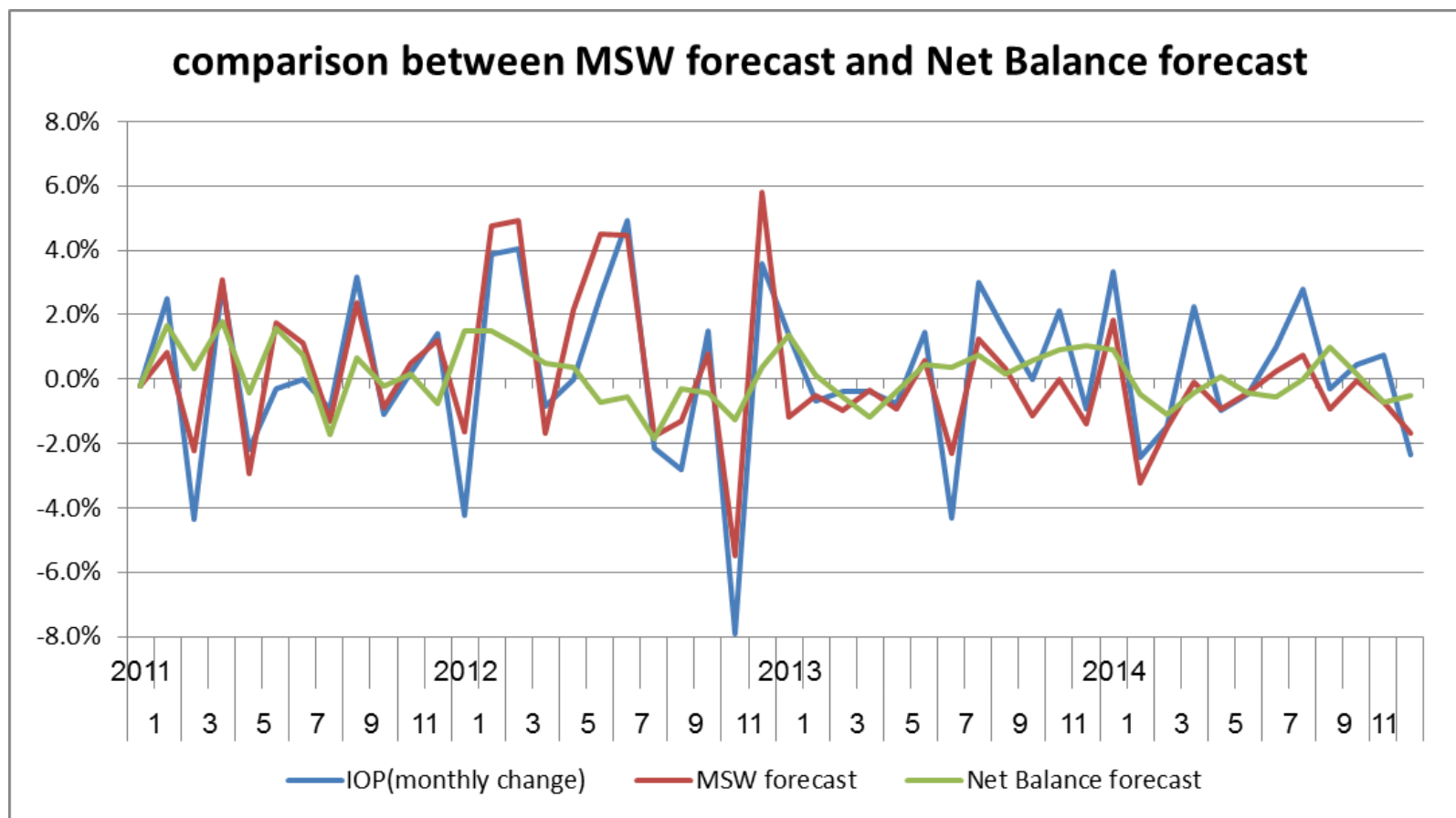
- $E(X_t | j = 1_{i(t-1)})$

year	(t-1)month	j(t-1)=firm answer	IOP change =x(t)
2011	1	up	4%
2011	2	up	2%
2011	5	up	4%
2011	6	up	5%
2011	7	up	6%
2011	12	up	3%
average			4%

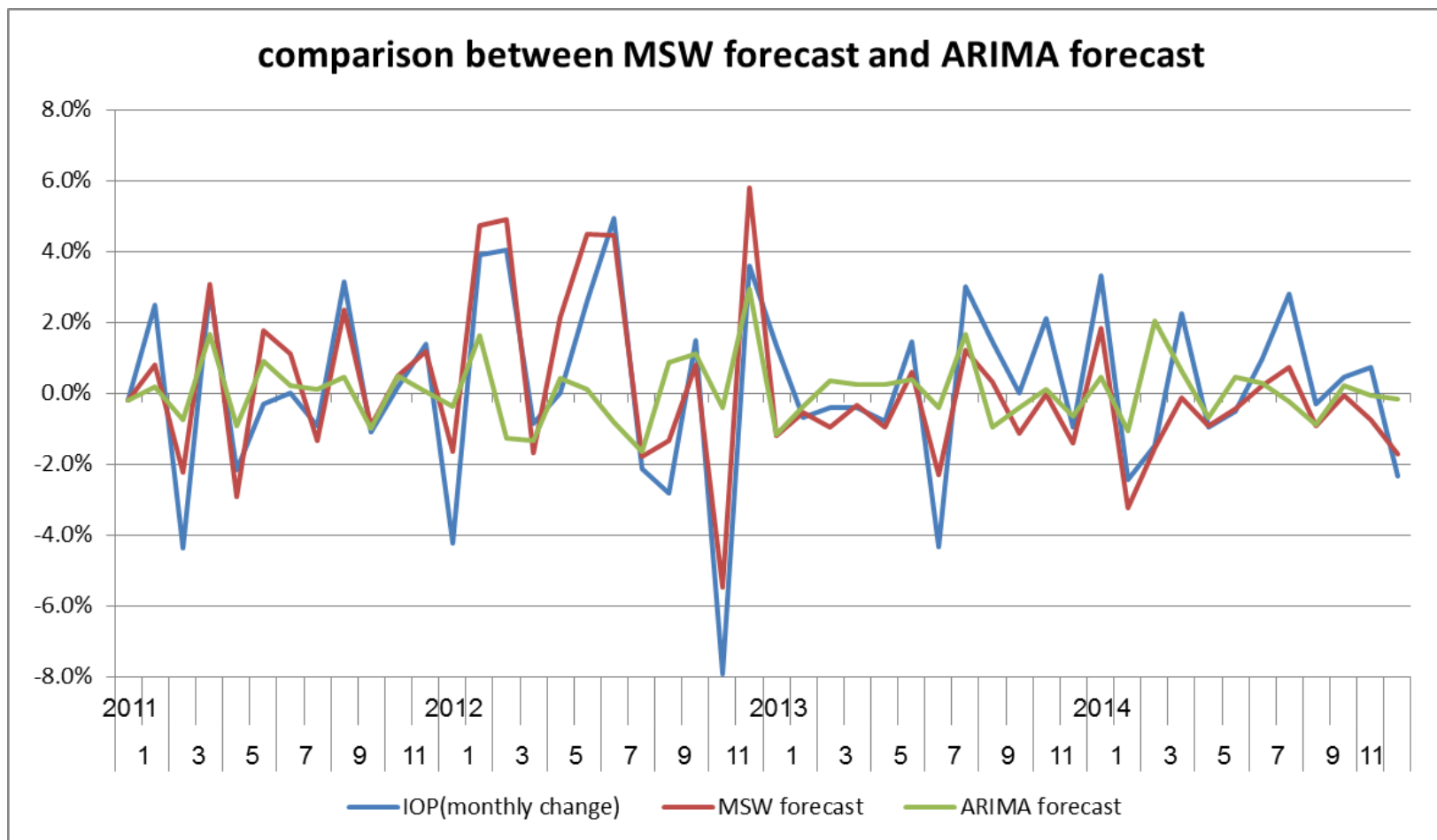
MSW Model

- For every firm, the conditional expectation is calculated.
- The joint conditional expectation is stationary so the conditional expectation that was calculated on the basis of 2011-2012 is relevant also for 2013.

In sample forecast



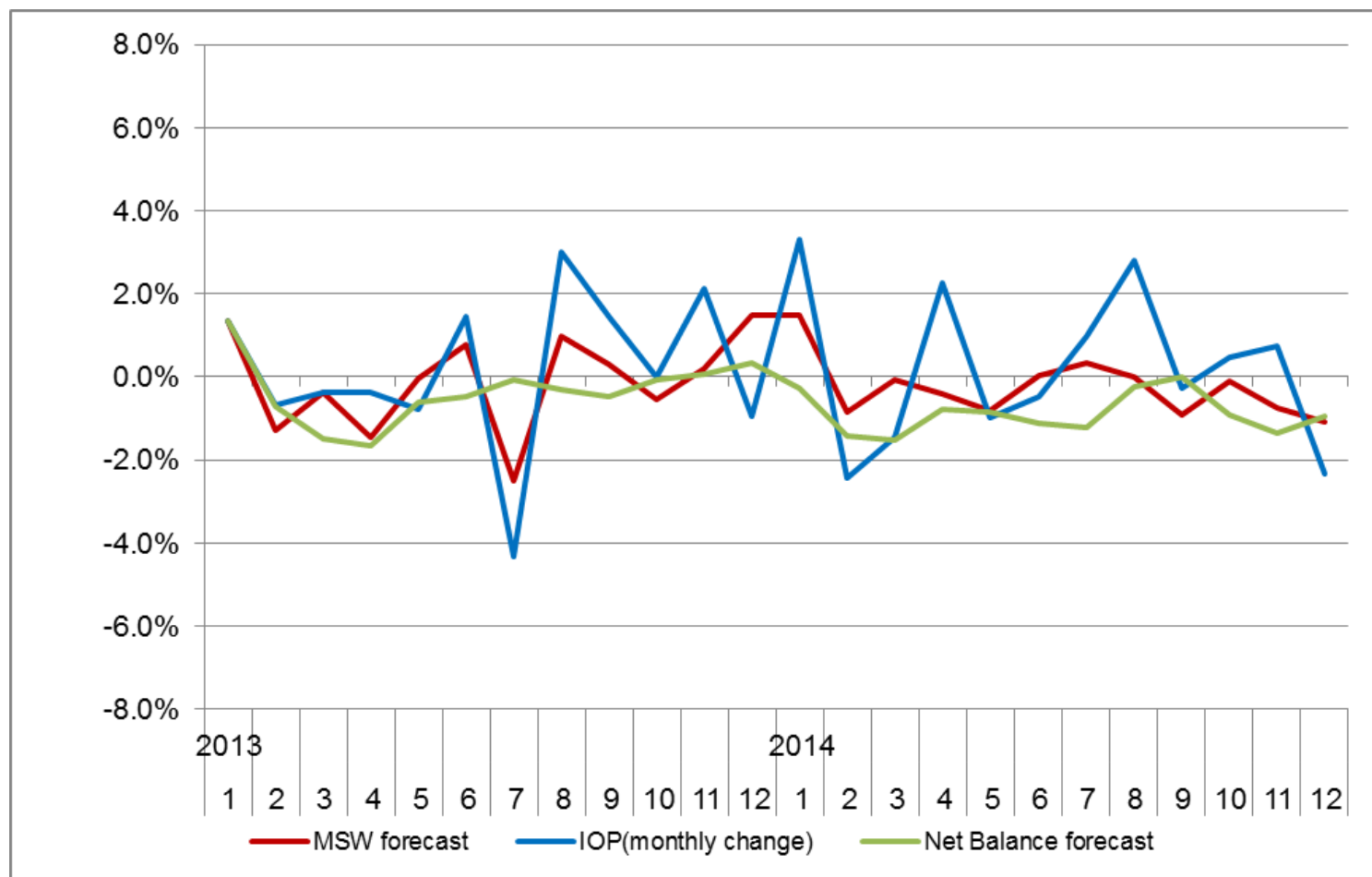
In sample forecast



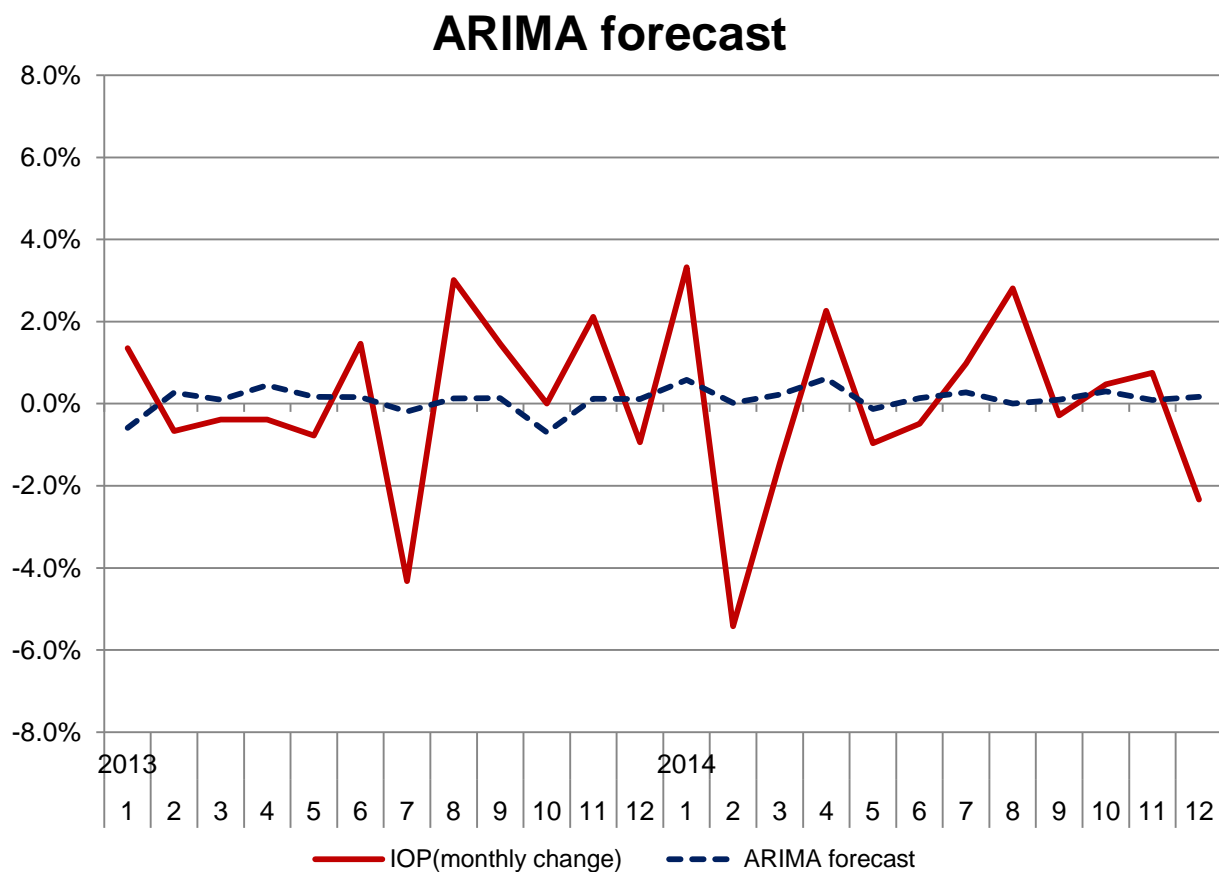
In sample forecast summarizing table

Probability to forecast the IOP direction(logistic)	Average absolute error	Standard deviation	Pearson correlation to IOP change	Forecast type
		2.6%	100%	Index Of Production
96%	0.8%	2.2%	92%	MSW
67%	1.9%	0.9%	33%	Net Balance
68%	1.8%	0.95%	35%	ARIMA

Out of sample



Out of sample



Out of sample summarizing table(2013-2014)

Probability to forecast the IOP direction(logistic)	Average absolute error	Forecast type
80%	1.3%	MSW
69%	1.6%	Net-Balance
46%	1.6%	ARIMA

Out of sample summarizing table(2013)

Probability to forecast the IOP direction(logistic)	Average absolute error	Forecast type
86%	1.1%	MSW
77%	1.4%	Net-Balance
66%	1.5%	ARIMA

ENCOMPASSING TEST

- Forecast encompassing tests are used to determine whether one of a pair of forecasts contains all the useful information for prediction
- $\Delta x_{t+1} = \theta_1 \hat{x}_{MSW} + \theta_2 \hat{x}_{Net-Balance} + \epsilon$
- This regression is analyzed with the limitation:

$$\theta_1 + \theta_2 = 1$$

Encompassing tests show that the aggregate forecasts are contained in the MSW forecast.

Concluding comments

- The number of business expectations surveys increased sharply due to the rational hypothesis theory.
- In most cases the reporters are asked to fill their expectations in a qualitative scale so that the reporters feel more confident to give their forecasts.
- In order to quantify the qualitative answers, economists use a few methods. Most of the methods use the aggregate results and assume homogeneity between the reporters.

Concluding comments

- In this research we applied methodology that was developed by Mitchell(2005) that uses the panel data and assume heterogeneity between the firms.
- The MSW method enables us to give forecast that outperforms the aggregate method forecasts and the Arima forecast “in sample” and also “out of sample”.

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Thank you!



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