

# **Sentiment and uncertainty fluctuations and their effects on the Euro Area business cycle**

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## 1. Introduction

Several factors may have contributed to the *Great Recession* that hit the global economy after the Financial Crisis: slumps in housing markets, pro-cyclical fiscal austerity policies, monetary policy impotence in a zero lower-bound environment, high commodity prices, general lack of demand and adverse supply conditions.

We will focus on an additional factor that has not received a lot of attention. We take as starting point the idea that *macro-economic sentiment* (or confidence) and *macroeconomic uncertainty* are two factors that actually may have played a major role in the Great Recession.

## 1. Introduction

Is it possible that negative consumer and producer sentiment and a perception of increased uncertainty, have contributed significantly to the deep and prolonged recession in many countries?

The recent financial crisis and recession -in this interpretation- is marked by a large negative shock to sentiment and a substantive increase in uncertainty.

In a similar fashion it could be asked if positive sentiment and low uncertainty may have played a positive role during the Great Moderation period of 2001-2007.

## 2. Economic sentiment and uncertainty

While Keynes (1936) himself attached crucial importance to both sentiment and uncertainty, these variables did not enter into the mainstream macro-economic analysis that has been developed since then.

That sentiment and uncertainty did not receive a lot of attention, relates on the one hand to their subjective nature: it is hard to define, measure or build conceptual models with these subjective variables.

These concepts also do not feature in modern mainstream macroeconomics as they imply departing from a number of crucial paradigmata of *Neo-Classical economics* (rational expectations/inter-temporally optimizing agents/efficient markets/Walrasian General Equilibrium).

## 2. Economic sentiment and uncertainty

- The term "*animal spirits*" was used by Keynes to capture the idea that aggregate economic activity might be driven in part by waves of optimism or pessimism.
- Keynes' animal spirits are influenced by Keynes notion of "*long-run expectations*", i.e. how economic agents perceive economic conditions to evolve in the long-run.
- Akerlof and Shiller (2009) provide a recent, comprehensive account of animal spirits which they define as the psychological forces that explain why agents behaviour may deviate from the rational, representative agents in the mainstream macroeconomic models, and why the economy does not behave in the manner predicted by these models.
- Five aspects of animal spirits are highlighted: (i) the role of confidence, (ii) the desire for fairness, (iii) the presence of corruption and bad faith, (iv) the effects of money illusion, (v) the role of stories in affecting behaviour.

## 2. Economic sentiment and uncertainty

We need to distinguish between *risk* and *uncertainty*.

- In case of risk, the numerical probabilities in a decision problem are given objectively and agents are able to use stochastic calculus to determine optimal actions given their risk aversion profile.
- In case of uncertainty no objective information about probability distributions is known and agents instead will have to form subjective probabilities about uncertain events. "The Unknown Unknown"
- Keynes analysis of economic uncertainty and its effects centers around the notion of *fundamental uncertainty* and its effects on economic agents.
- Dequench (1999) defines Keynes' fundamental uncertainty as "situations in which at least some essential information about future events cannot be known at the moment of decision because this information does not exist and can not be inferred from any existing data set."

## 2. Economic sentiment and uncertainty

- Keynes' fundamental uncertainty is directly related to Minsky's "Knightian uncertainty" and Alchian's "radical uncertainty" and "sheer ignorance“
- Note also that fundamental uncertainty is linked to liquidity preference.
- A high level of economic uncertainty can dampen economic activity via its impact on investment, consumption and employment. When uncertainty is perceived to be high, households and businesses may take a wait-and-see approach, i.e. to postpone action until uncertainty is resolved.
- Bloom (2009) develops a structural framework to analyze the impact of uncertainty shocks. Macroeconomic uncertainty shocks produce a rapid drop and rebound in aggregate output and employment.

### 3. Sentiment and uncertainty in the Euro area

- Aim of this paper is to analyse the effects of sentiment and uncertainty fluctuations on the Euro area business cycle.
- To do so we of course need a gauge of sentiment and uncertainty in the Euro area.
- The European Commission provides for each country in the EU a set of sentiment indicators that are calculated using information from business and consumer surveys, *The Joint Harmonised EU Programme of Business and Consumer Surveys*.
- In it four surveys are conducted on a monthly basis in the following areas: *industry, construction, consumers, retail trade and services*.

### 3. Sentiment and uncertainty in the Euro area

- The surveys pose questions concerning trends in production, selling prices, employment, expectations etc.
- Answers are given according to a three-option ordinal scale: "increase" (+), "remain unchanged" (=), "decrease" (-). Balances are constructed as the difference between the percentages of respondents giving positive and negative replies. They could be considered as a proxy of sentiment.
- For each surveyed sector, the Commission calculates sentiment/confidence indicators as arithmetic means of answers (seasonally adjusted balances) to a selection of questions closely related to the reference variable they are supposed to track.
- The heterogeneity of economic sentiment surveys reflects the dispersion of expectations and can be interpreted as a gauge of macroeconomic uncertainty:

$$unc_t = \sqrt{[frac(+) + frac(-) - (frac(+) - frac(-))^2]}$$

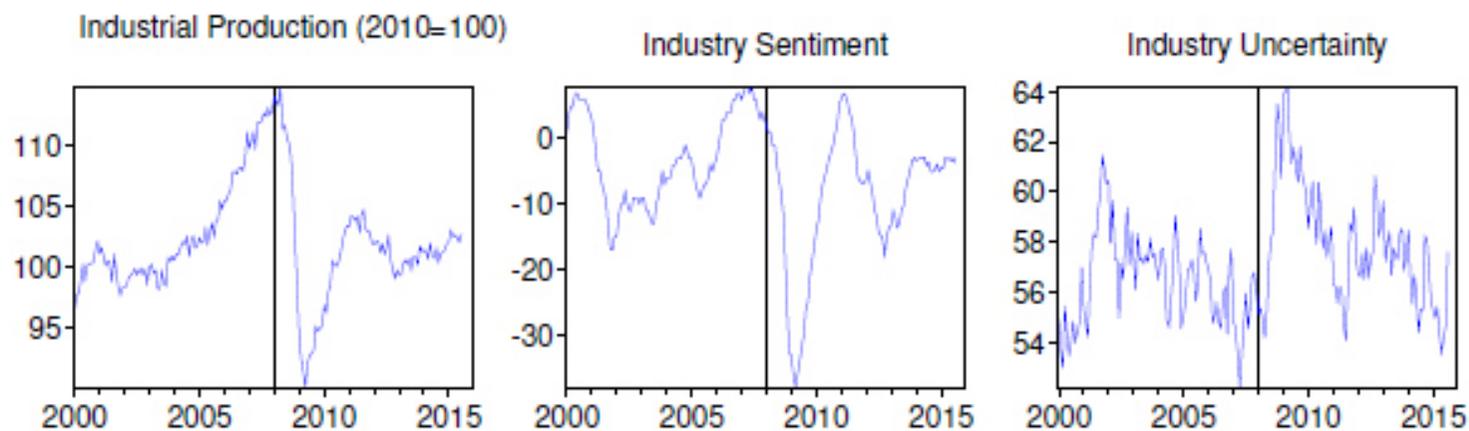


Figure 1: Industrial Production, Industry Sentiment, Industry Uncertainty. Euro Area 2000:1-2015:8.

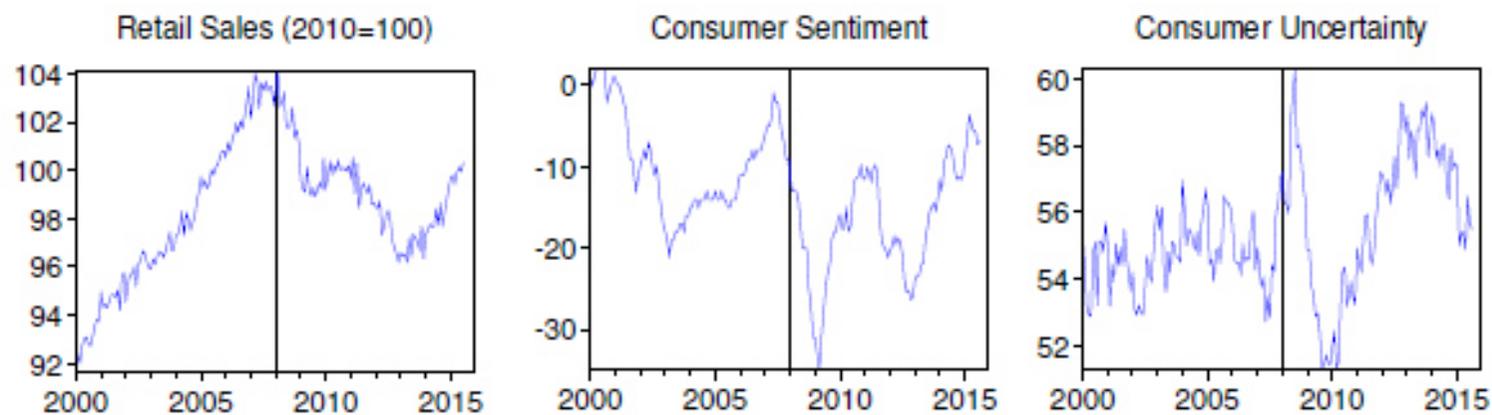


Figure 2: Retail Sales, Consumer Sentiment, Consumer Uncertainty. Euro Area 2000:1-2015:8.

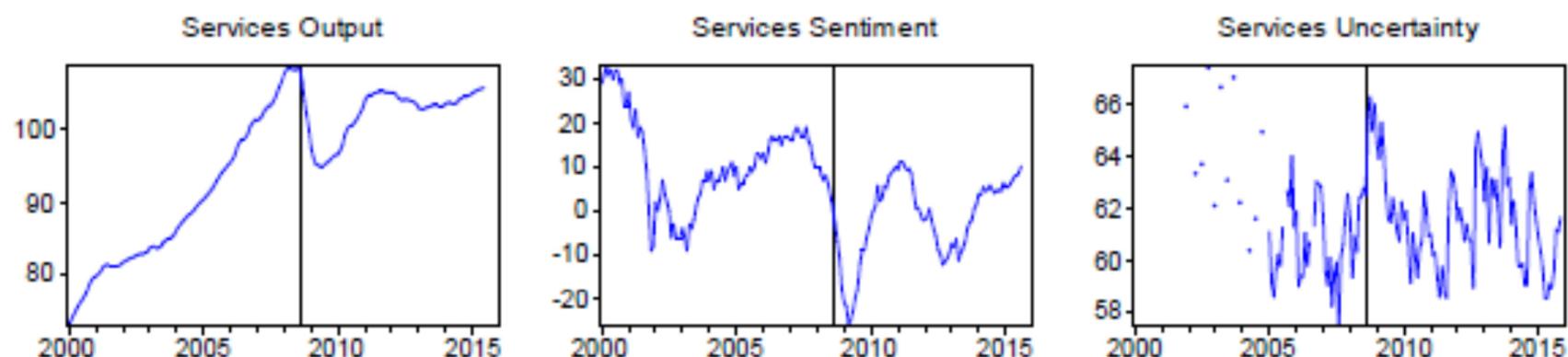


Figure 3: Services Output, Services Sentiment, Services Uncertainty. Euro Area 2000:1-2015:8.

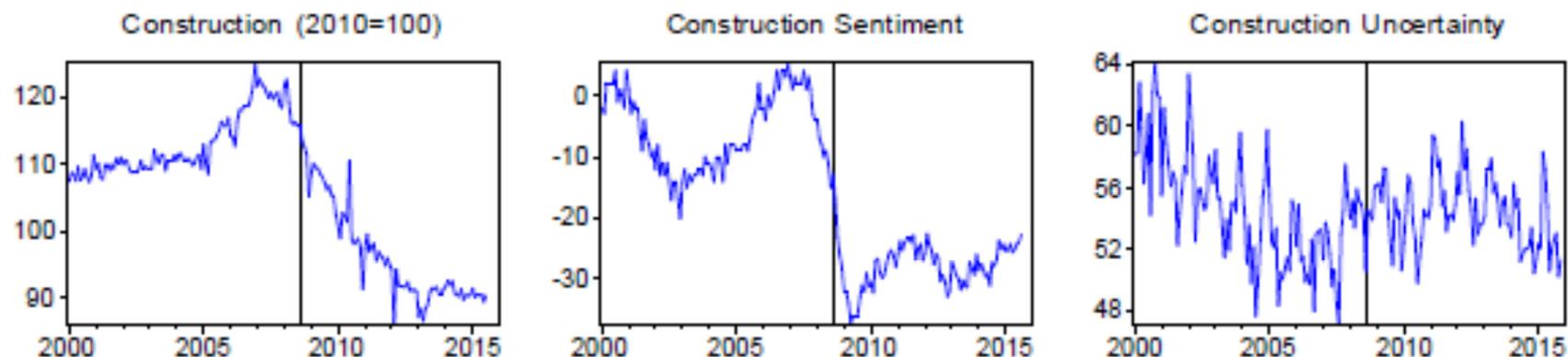


Figure 4: Construction Output, Construction Sentiment, Construction Uncertainty. Euro Area 2000:1-2015:8.

### 3. Sentiment and uncertainty in the Euro area

- To analyse the effects of sentiment and uncertainty shocks on economic activity in the Euro area a vector autoregression (VAR) model is used:

$$y_t = A_1 y_{t-1} + A_2 y_{t-2} + \dots + A_n y_{t-n} + B x_t + e_t$$

where  $y$  is a vector of endogenous variables,  $x$  is a vector of exogenous variables,  $A$  and  $B$  are matrices of coefficients to be estimated, and  $e$  is a vector of innovations.

- Sample period: 2000:1-2015:8
- We will use the Impulse-Response-Functions to assess the effects of sentiment and uncertainty shocks on output and use in-sample forecasting exercises to assess the forecasting accuracy of the VAR models with sentiment and uncertainty.

### 3. Sentiment and uncertainty in the Euro area

- For each sector of the Euro Area economy: industry (*INDU*), consumers/retail trade (*RETA*), services (*SERV*) and construction (*BUIL*), a VAR model of output, economic sentiment and uncertainty is estimated:

$$y_t^{INDU} = [INDU.EA, ESI.INDU.EA, UNC.INDU.EA]$$

$$y_t^{RETA} = [RETA.EA, ESI.CON.S.EA, UNC.CON.S.EA]$$

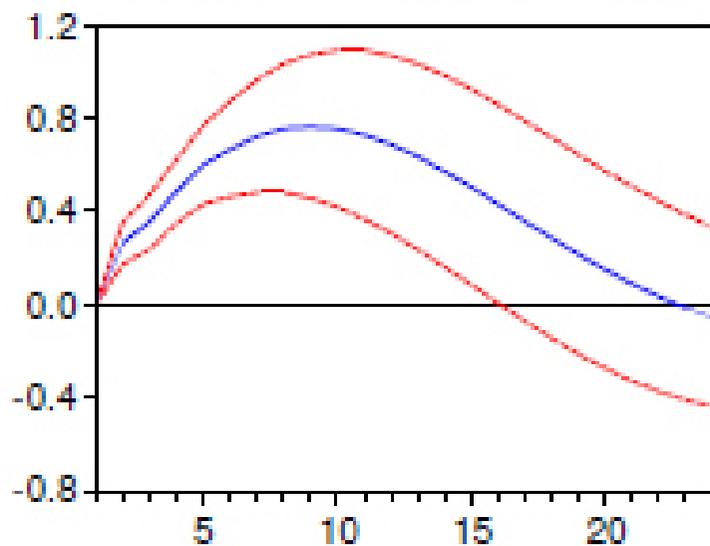
$$y_t^{SERV} = [SERV.EA, ESI.SERV.EA, UNC.SERV.EA]$$

$$y_t^{BUIL} = [BUIL.EA, ESI.BUIL.EA, UNC.BUIL.EA]$$

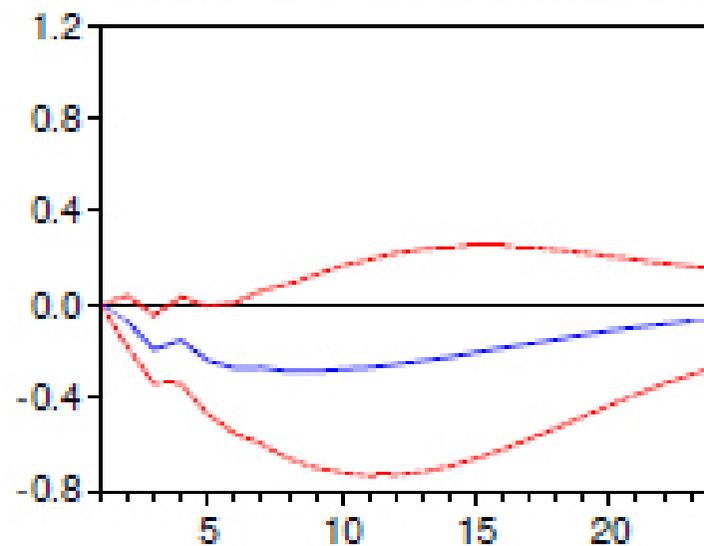
- IRFs can be used to assess the effects of sentiment and uncertainty shocks on output.

Response to Nonfactorized One Unit Innovations  $\pm 2$  S.E.

Response of INDU\_EA to ESI\_INDU\_EA

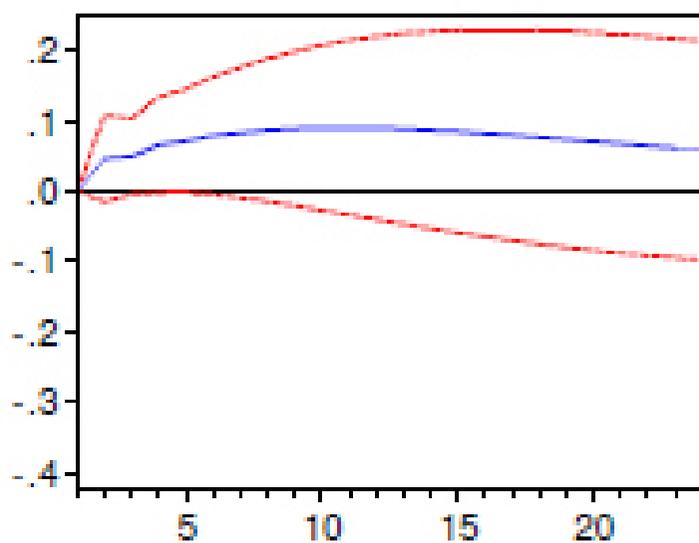


Response of INDU\_EA to UNC\_INDU\_EA

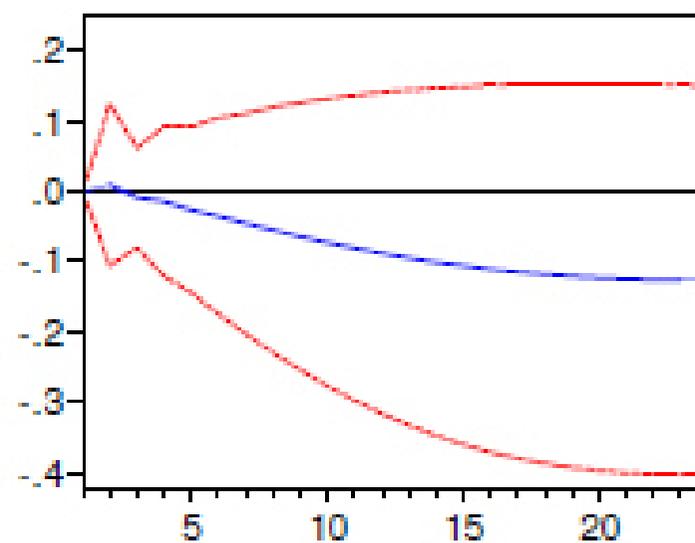


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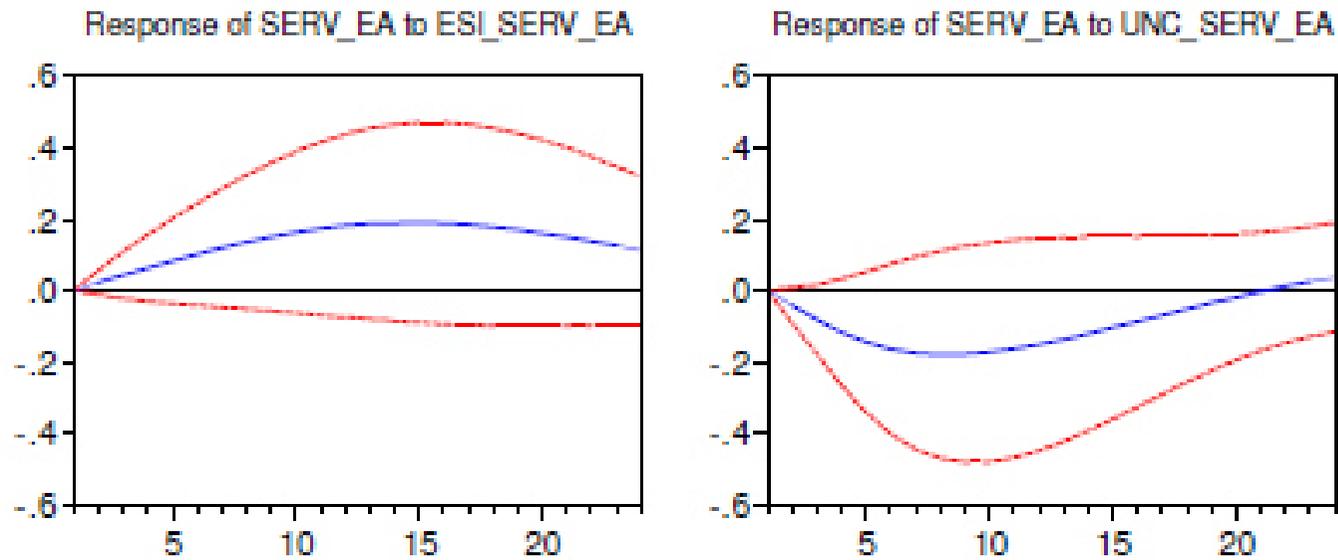
Response of RETA\_EA to ESI\_CONS\_EA



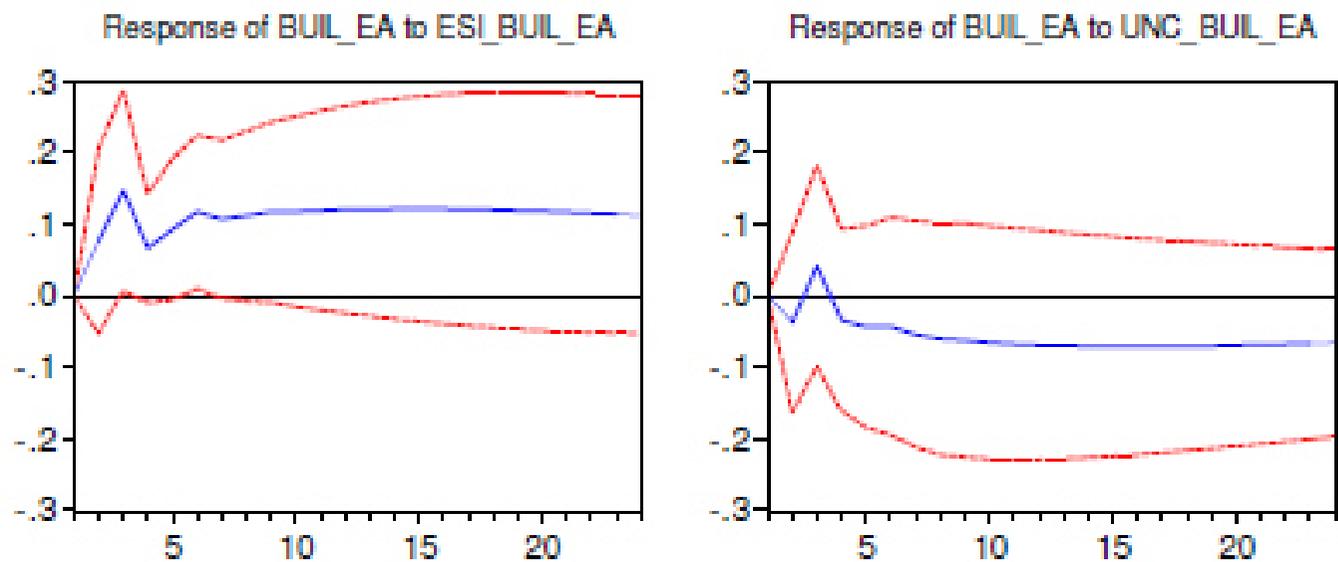
Response of RETA\_EA to UNC\_CONS\_EA



Response to Nonfactorized One Unit Innovations  $\pm 2$  S.E.



Response to Nonfactorized One Unit Innovations  $\pm 2$  S.E.



### **3. Sentiment and uncertainty in the Euro area**

- In case of industrial production, retail sales, services and construction the impulse response functions suggest quite strongly that positive sentiment shocks have a positive effect on real activity and positive uncertainty shocks have a negative effect on real activity; the estimation of this last relation is however subject to more imprecision if one considers the confidence intervals.

#### **4. Using sentiment and uncertainty in forecasting economic activity**

- If sentiment and uncertainty do matter in explaining real activity fluctuations, one would also expect sentiment and uncertainty shocks to contribute in forecasting real activity.
- To check the contribution of sentiment and uncertainty to forecast future output, 3 types of evidence are studied:
  - (i) Granger-causality tests (6 months) between activity and sentiment and uncertainty, (ii) a variance error decomposition of the estimated VAR models, (iii) an in-sample forecast exercise (August 2008 as starting period) in which the forecasting performance of the estimated VAR models is compared with a naive forecasting rule.

Table 1: Granger causality Tests

<i>Industrial Production</i>	F-Statistic (p-value)
<i>ESI.INDU.EA</i> does not Granger Cause <i>INDU.EA</i>	12.33 (0.00)
<i>UNC.INDU.EA</i> does not Granger Cause <i>INDU.EA</i>	3.14 (0.01)
<i>Retail Sales</i>	
<i>ESI.CONS.EA</i> does not Granger Cause <i>RETA.EA</i>	4.61 (0.00)
<i>UNC.CONS.EA</i> does not Granger Cause <i>RETA.EA</i>	1.84 (0.10)
<i>Services</i>	
<i>ESI.SERV.EA</i> does not Granger Cause <i>SERV.EA</i>	1.10 (0.36)
<i>UNC.SERV.EA</i> does not Granger Cause <i>SERV.EA</i>	0.85 (0.53)
<i>Construction</i>	
<i>ESI.BUIL.EA</i> does not Granger Cause <i>BUIL.EA</i>	5.06 (0.00)
<i>UNC.BUIL.EA</i> does not Granger Cause <i>BUIL.EA</i>	0.42 (0.86)

Table 2: Error Variance Decompositions

	own	sentiment	uncertainty
<i>Industrial Production</i>			
3m	75.3	21.8	2.9
12m	37.6	54.2	5.2
24m	35.7	58.5	5.8
<i>Retail Sales</i>			
3m	98.2	1.8	0.1
12m	89.9	8.9	1.2
24m	84.8	10.9	4.3
<i>Services</i>			
3m	97.5	1.3	1.2
12m	88.8	8.7	3.5
24m	81.8	14.7	3.5
<i>Construction</i>			
3m	97.3	2.4	0.3
12m	93.7	5.0	1.3
24m	89.9	8.1	2.6

Table 3: Forecasting performance at 3, 12 and 24 months horizons. Euro Area: VAR model vs naive output forecasting model.

	VAR	Model		NAIVE	Model		
	RMSE	MAPE	Theil	RMSE	MAPE	Theil	DM test (p-value)
INDU							
3 mth	0.971	0.719	0.005	2.958	2.243	0.014	-1.37(0.17)
12 mth	9.261	7.627	0.046	15.836	14.864	0.076	-4.91(0.00)
24 mth	7.272	5.651	0.036	16.190	15.938	0.077	-9.72(0.00)
RETA							
3mth	0.669	0.465	0.003	0.543	0.437	0.003	0.52(0.60)
12 mth	1.192	0.985	0.006	2.573	2.169	0.013	-3.79(0.00)
24 mth	1.004	0.817	0.005	3.269	3.003	0.016	-8.26(0.00)
SERV							
3 mth	3.027	2.38	0.014	2.294	1.371	0.011	-1.70(0.09)
12 mth	8.303	7.190	0.040	12.788	11.524	0.061	-4.41(0.00)
24 mth	6.688	5.412	0.033	15.357	14.954	0.073	-9.49(0.00)
BUIL							
3 mth	0.836	0.590	0.004	2.407	1.734	0.011	-1.64(0.10)
12 mth	2.0568	0.973	0.009	6.955	5.772	0.03	-5.22(0.00)
24 mth	2.664	1.411	0.012	11.169	9.593	0.050	-5.21(0.00)

#### **4. Using sentiment and uncertainty in forecasting economic activity**

- The null-hypothesis that sentiment/uncertainty Granger do not cause real activity is rejected in most cases.
- The variance error decompositions suggest that sentiment and uncertainty shocks do contribute in explaining output fluctuations.
- The in-sample forecasting exercise around the Financial Crisis suggests that the VAR model with sentiment and uncertainty outperforms a naïve (“no-change”) forecasting model in particular with a longer forecasting horizon.

## **5. Sentiment and uncertainty in individual countries**

We repeated the exercises in the case of four country cases: Greece, Germany, France and the UK to check if results obtained in case of the entire Euro area aggregate also would carry over to individual member states (and the UK as a reference of non Euro area countries).

Greece stands out as a country that was most severely affected by the Great Recession, Germany as a country that was also affected but recovered quicker than most Euro area countries, France stands more or less for the Euro area average experience.

Interestingly, the findings presented earlier for the Euro area aggregate are essentially mirrored in all four cases.

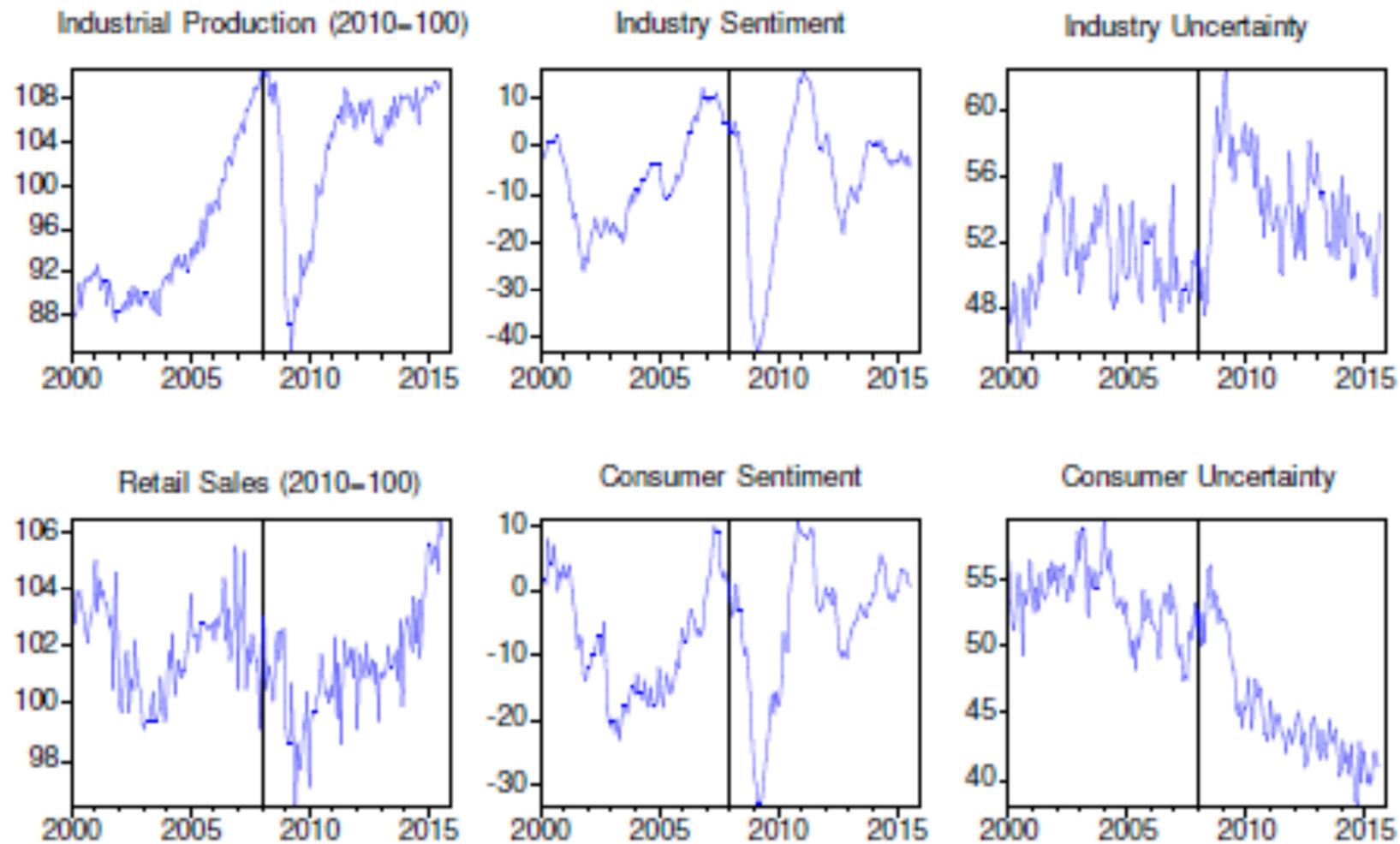
## Conclusions

Conventional economics seems to struggle with accounting for the recent Global Financial Crisis and Great Recession and its dramatic effects.

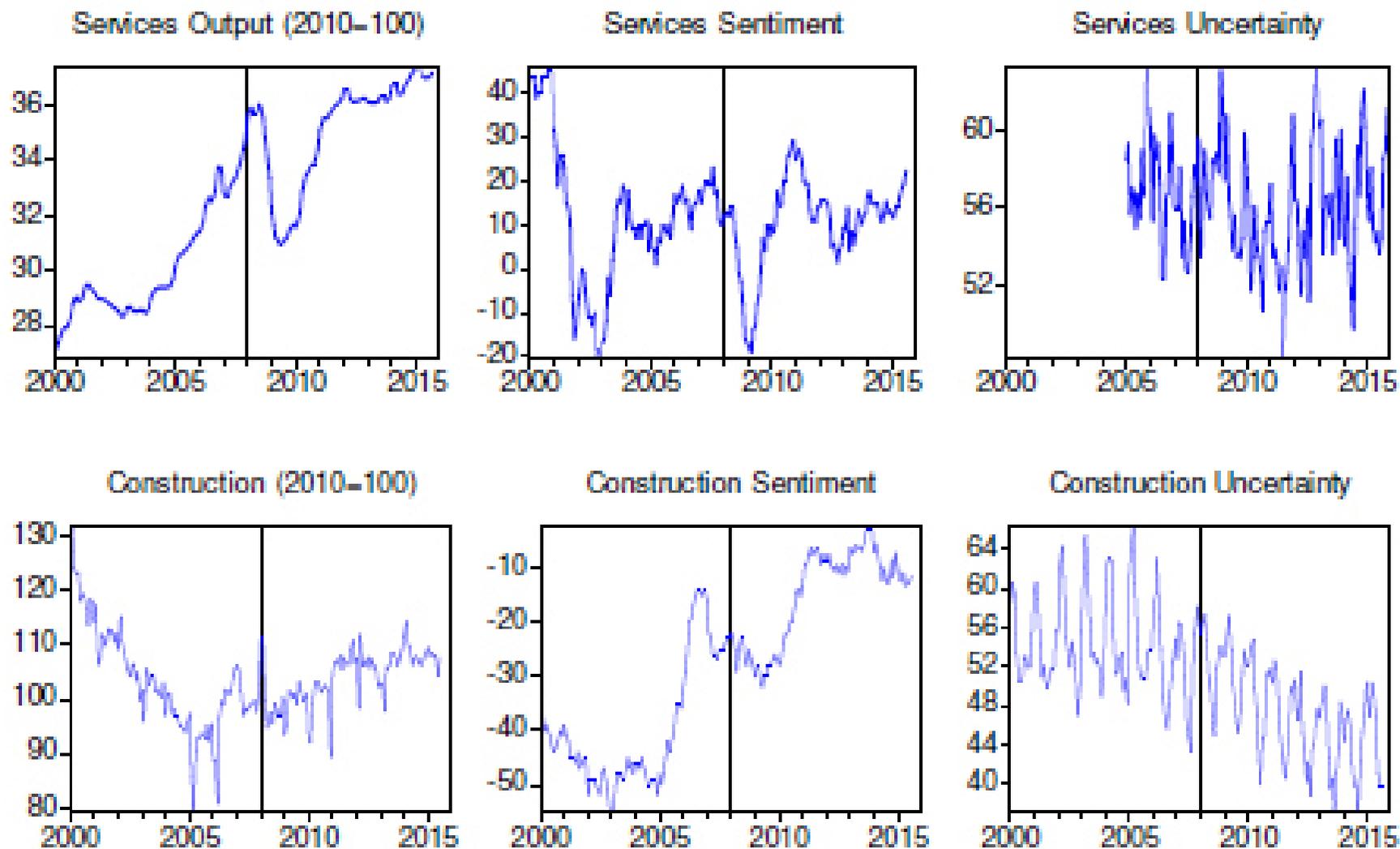
This paper addressed the question whether sentiment and uncertainty could have been factors that have been overlooked in the analysis of the Global Financial Crisis and Great Recession.

To do so, we constructed VAR models of economic activity, sentiment and uncertainty for the Euro Area during the period 2000-2015.

We showed that sentiment tends to have a positive impact on economic activity while uncertainty tends to depress uncertainty.

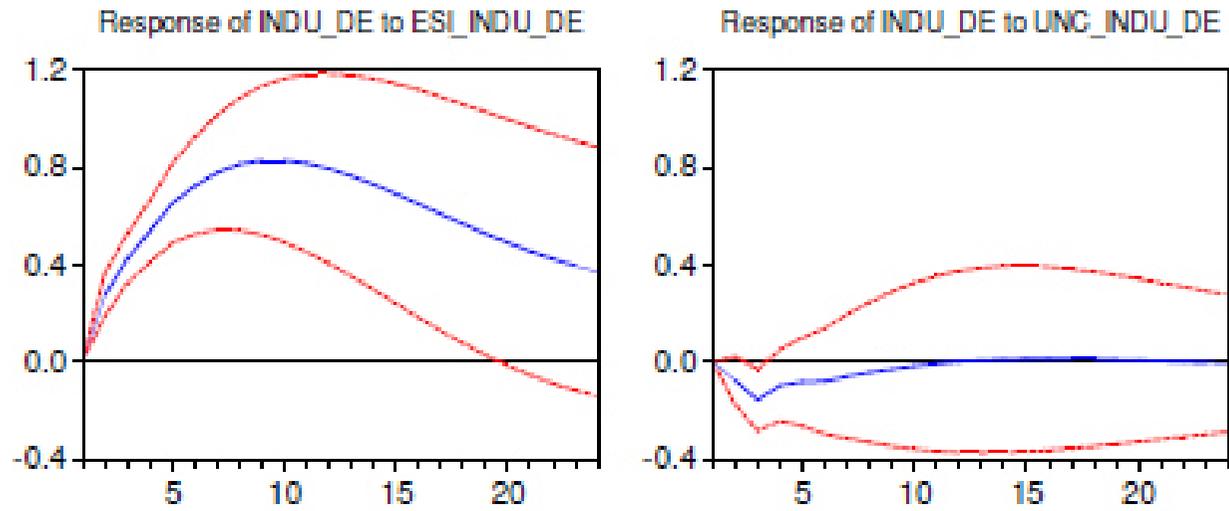


•Figure 6: Output, Sentiment and Uncertainty. Germany, 2000:1-2015:8.

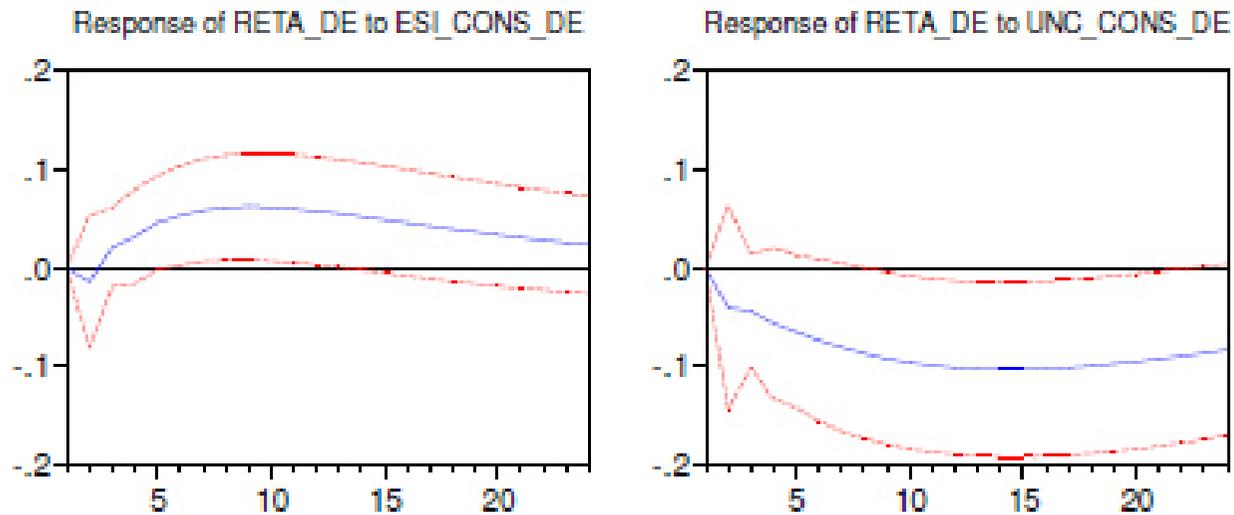


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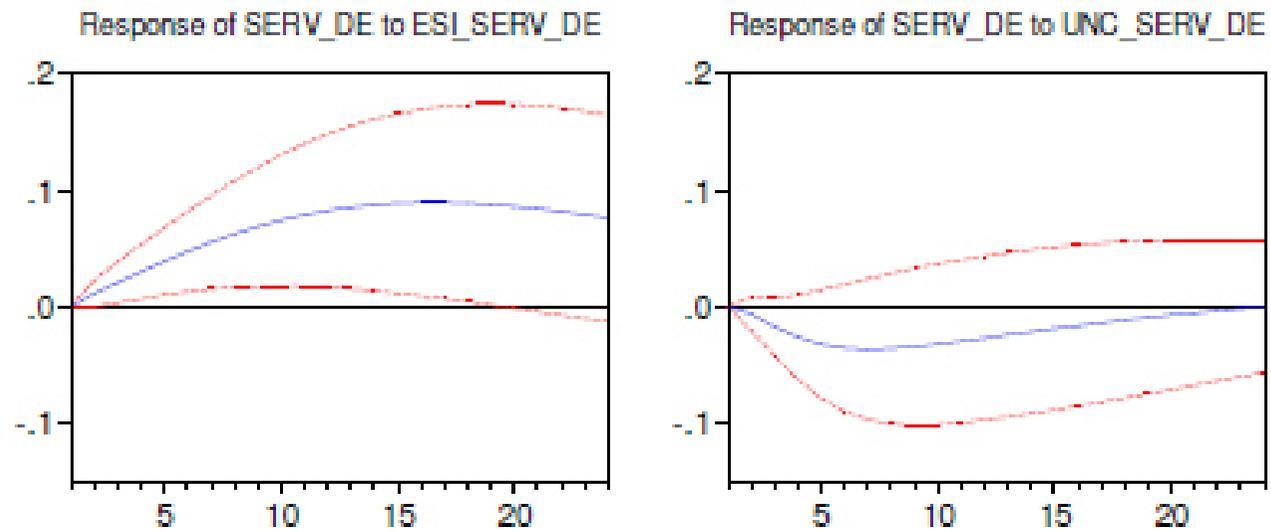
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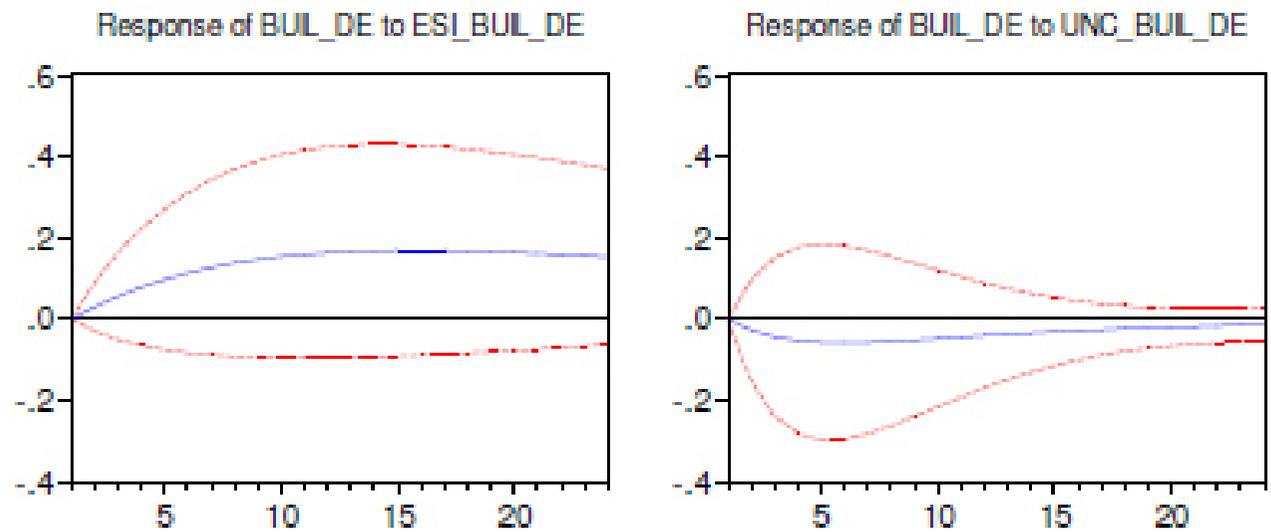
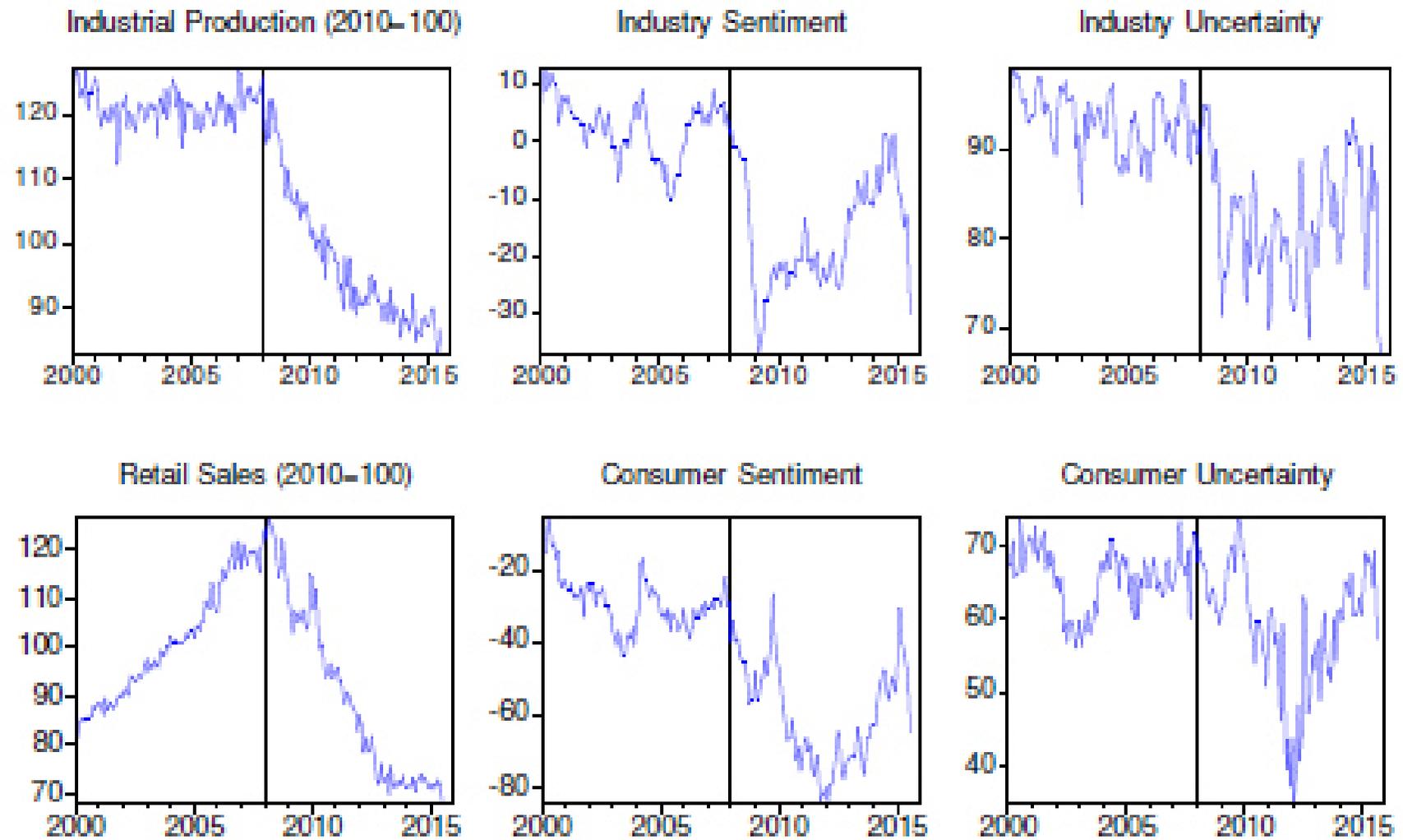
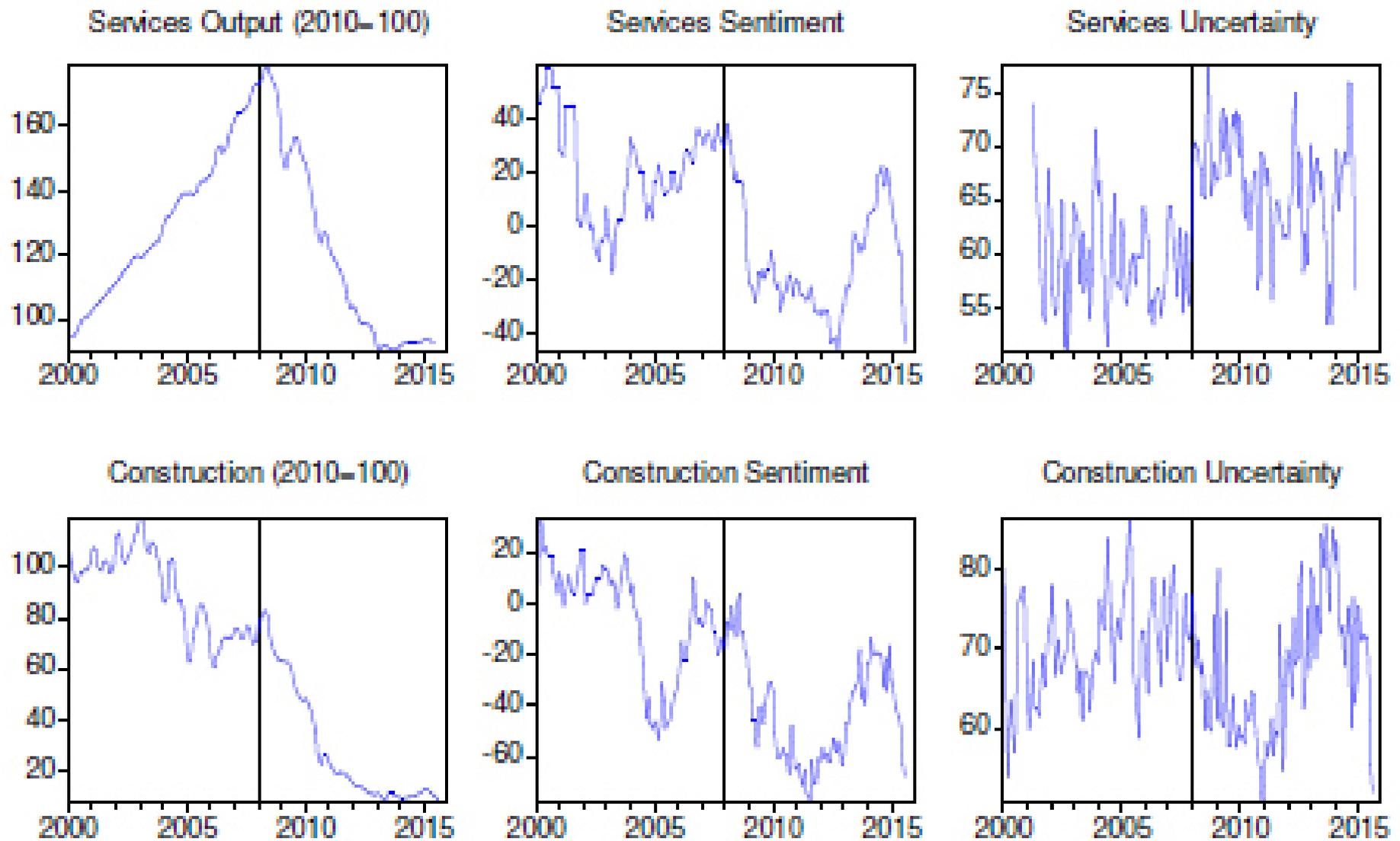


Table 5: Forecasting performance at 3, 12 and 24 months horizons. Germany: VAR model vs naive output forecasting model.

	VAR	Model		NAIVE	Model		
	RMSE	MAPE	Theil	RMSE	MAPE	Theil	DM test (p-value)
INDU							
3 mth	1.637	1.280	0.008	2.121	1.733	0.010	-0.52(0.61)
12 mth	3.787	3.457	0.020	17.107	16.485	0.084	-4.59(0.00)
24 mth	2.866	2.434	0.015	17.016	17.116	0.083	-8.64(0.00)
RETA							
3mth	1.781	1.704	0.009	1.925	1.843	0.010	-3.71(0.00)
12 mth	1.660	1.502	0.008	1.912	1.756	0.010	-2.25(0.03)
24 mth	1.374	1.097	0.007	1.636	1.377	0.008	-2.97(0.00)
SERV							
3 mth	0.826	2.069	0.012	1.003	2.422	0.014	-1.43(0.15)
12 mth	2.293	6.587	0.034	4.424	12.282	0.064	-4.09(0.00)
24 mth	1.988	5.717	0.030	5.040	14.825	0.072	-9.04(0.00)
BUIL							
3 mth	1.665	1.410	0.009	3.224	3.200	0.017	-4.96(0.00)
12 mth	2.468	1.946	0.013	5.691	4.963	0.030	-2.72(0.01)
24 mth	3.256	2.330	0.016	8.357	7.223	0.044	-4.00(0.00)

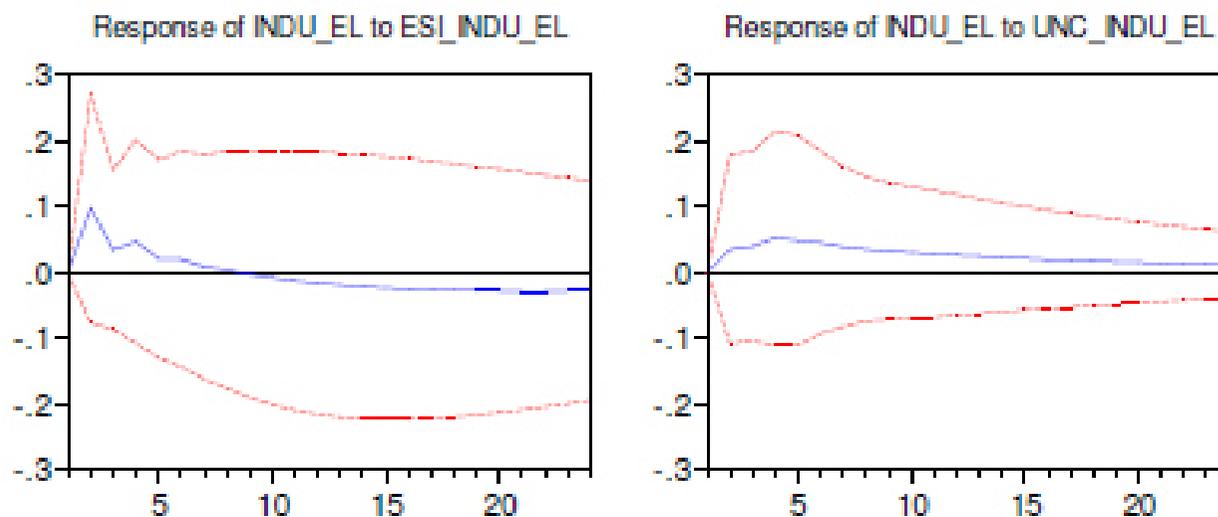


•Figure 6: Output, Sentiment and Uncertainty. Greece, 2000:1-2015:8.

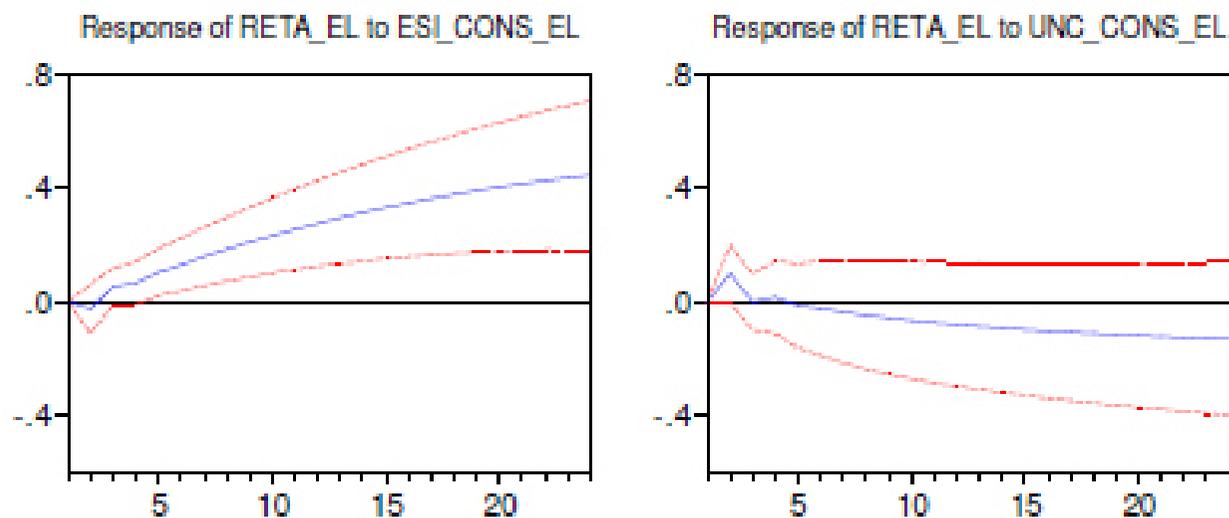


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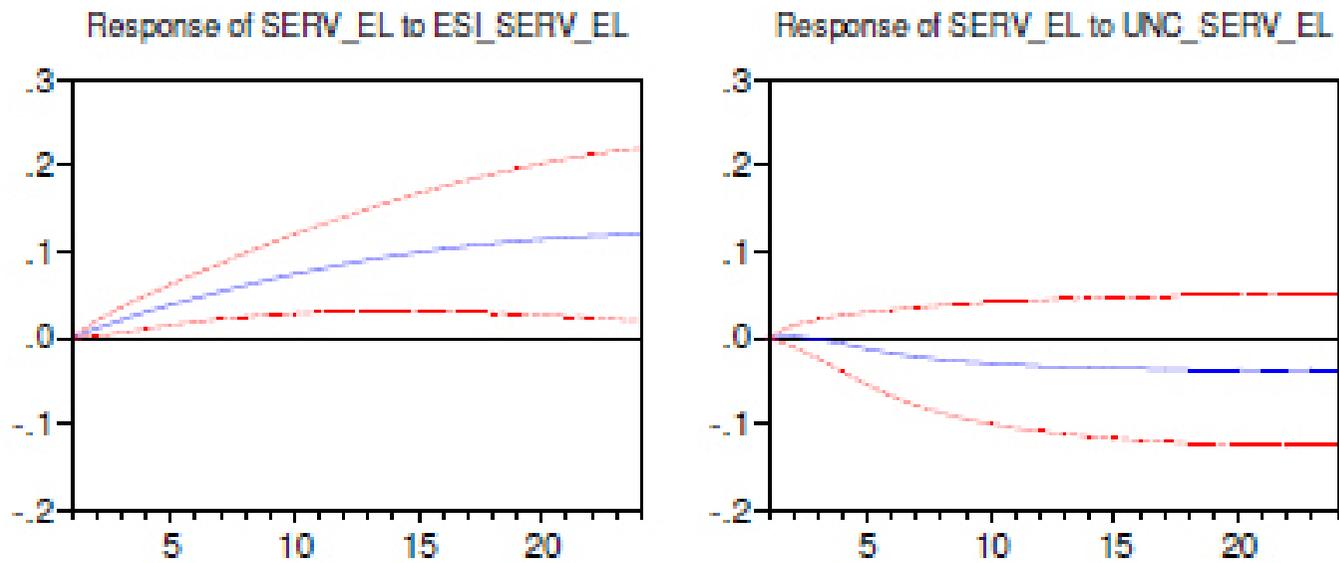
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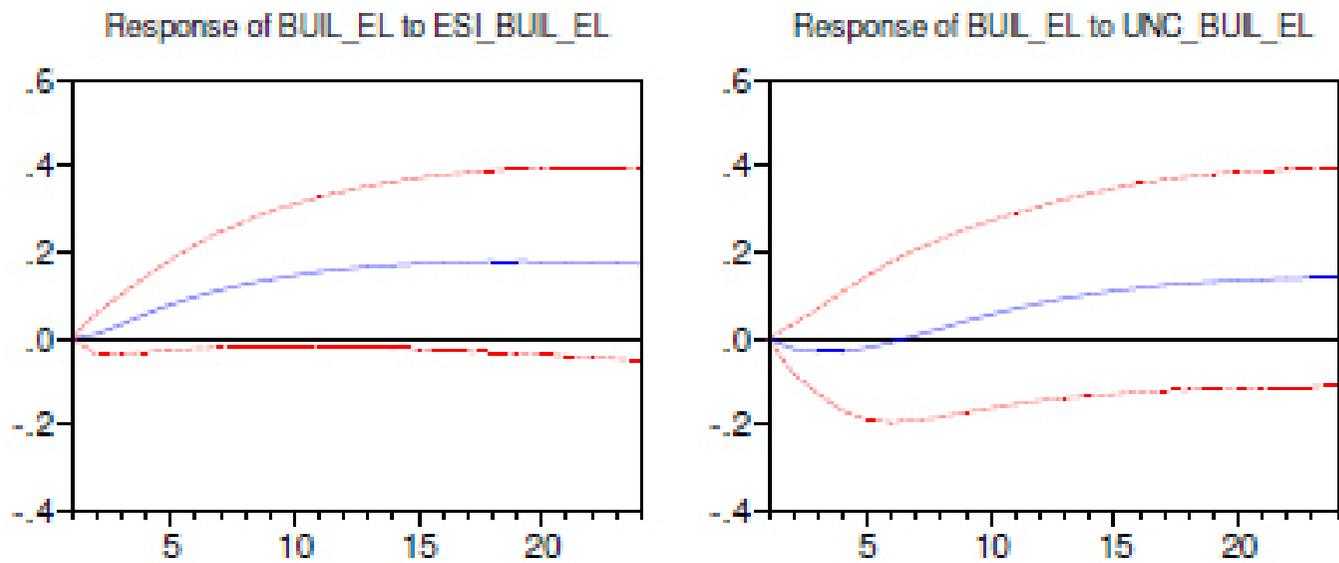


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	VAR	Model		NAIVE	Model		
	RMSE	MAPE	Theil	RMSE	MAPE	Theil	DM test (p-value)
INDU							
3 mth	0.983	0.631	0.004	3.926	3.310	0.017	-3.93(0.00)
12 mth	2.251	1.630	0.010	10.800	9.186	0.047	-5.37(0.00)
24 mth	1.878	1.432	0.009	14.913	13.396	0.066	-7.97(0.00)
RETA							
3mth	3.845	3.099	0.016	3.481	2.910	0.015	0.62(0.54)
12 mth	5.714	4.637	0.025	12.005	9.739	0.052	-3.97(0.00)
24 mth	5.515	4.720	0.025	16.644	14.144	0.072	-5.25(0.00)
SERV							
3 mth	0.246	0.498	0.003	1.224	2.629	0.014	-2.65(0.01)
12 mth	2.650	3.862	0.027	6.393	14.537	0.075	-4.59(0.00)
24 mth	2.068	3.862	0.027	9.655	23.745	0.114	-5.63(0.00)
BUIL							
3 mth	0.615	0.886	0.005	5.037	7.205	0.036	-3.15(0.00)
12 mth	4.018	5.174	0.033	7.957	12.244	0.060	-3.84(0.00)
24 mth	4.275	7.470	0.040	16.880	32.797	0.137	-4.25(0.00)