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# PREDICTING DOWNTURN: ARE TENDENCY SURVEYS A GOOD ESTIMATOR OF RETAIL ACTIVITY IN CROATIA?

*This paper examines the power of business and consumer survey indicators in predicting retail activity in Croatia. A brief overview of business and consumer surveys is presented, followed by the conceptual logic behind their use in predicting related macroeconomic variables. Detailed elaboration of methodology used is presented next. The main model used for the analysis is a bivariate vector autoregression VAR together with causality tests, impulse response function analysis and variance decomposition. Results have revealed that a statistically significant relationship exists between consumer sentiment indicator and retail activity variable. To an immense surprise, that relationship turned out to be negative. Possible explanations for such an unexpected result are suggested.*

*Keywords: Business and consumer survey, vector autoregression model, retail activity*

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### Introduction

*Business survey indicators* are numerical scores constructed on the base of expert opinion of leading managers in business sector about the expected movement of key variables (sales, level of stock, etc.) representing the activity of the respective business sector. *Consumer survey indicators* are constructed following the same underlying idea. Their sample consists of households whose member's asses the economic position of the household for a certain time period. Both indicators are available months in advance before the official statistics data.

Business and consumer survey indicators are often used as a standalone measure indicating the respondent's level of optimism (or pessimism) for a certain time period[1]. However, this simple use is of rather limited value hence, different applications have also been considered. This research seeks to address one of these possible extensions.

Basic research question addressed here by the authors concerns the ability of business and consumer survey indicators to *predict* the movement of macroeconomic variables for the retail sector. Prior research suggests that such link is plausible (e.g. Ludvingson, 2004). If respective indicators have the predictive power regarding the macroeconomic variables then they can be used as *leading indicators* for the respective variables. They can substantially contribute to earlier detection of positive or more importantly negative trends in the economic activities of the sector. Croatian economy is currently witnessing a strong downturn in economic activity and the retail sector is among the most hardly hit by the current crisis. Early warnings about possible negative trends in retail sector have proven to be farsighted (Broz et al., 2008a). Sector has witnessed negative monthly growth starting from July 2008 which was in sharp contrast with previous trend (Broz et al., 2008b). The decline in retail activity continued throughout 2009 (for example, a drop of 19.3% in real turnover on year-to-year basis was recorded in May; the drop was mainly caused by 56.5% of drop in sales of motor vehicles (Broz et al., 2009)) and into 2010. While the data indicates less negative changes on monthly bases, year-to-year data still indicate substantial drop in retail activity (first five months in 2010 had a 6.1% drop in real turnover in reference to the same period in 2009) (Broz et al., 2010) .

Differentiating from other Croatian retail trade sector studies (e.g. Anić, 2002), this paper aims at anticipating changes in the retail trade sector using several business and consumer survey indicators. Such early detection of shifts in trend could provide policy decision makers as well as management of the companies

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[1] Indicators' components measure optimism (pessimism) for past quarter/year, the current level, or measure expectations for future quarter/year

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with valuable information months before the official results of Central Bureau of Statistics become available. This paper presents an exploratory endeavor in proving the existence of the link between the movement of tendency survey indicators (both from business and consumer side of the market) and fluctuations of macroeconomic variables for the retail sector in Croatia. Ideally, one would expect to find a certain degree of correspondence in direction and magnitude of both series. Considering that there is no firm theoretical model behind the empirical analysis presented in this paper, no prior assumptions about the endogeneity (exogeneity) of variables in the model were made. It is of interest to see whether retail trade results can be anticipated by BCS indicators. On the other hand, it is also of our interest to question if the perceptions and expectations of consumers and managers (embodied in BCS indicators) indeed have rational foundations in real economic activity.

The remainder of the paper is organized as follows. In the next section we provide a brief overview of tendency survey research with special emphasis on Croatian retail sector. Furthermore, the logic behind the use of tendency survey indicators as predictive indicators for the macroeconomic variables is laid out. Methodology section followed by Empirical Analysis and Results section is next. The last section summarizes the findings.

### Literature review and conceptual framework

Business and consumer surveys constitute an elementary part of all relevant macroeconomic research of economic cycles. The origins of tendency surveys dates back to 1949 and are related to German Institute for Economic Research – IFO (Institut für Wirtschaftsforschung) who's methodological principle was soon accepted in most of the European nations. In 1960, institutions that conduct surveys across Europe founded CIRET (*Centre for International Research on Economic Tendency Surveys*) with a common goal of developing a consistent system of monitoring and short-term predicting of economic activity (Čižmešija, 2008). Next year the European Commission started the *Joint Harmonized EU Programme of Business and Consumer Surveys*. Surveys were first administered in the manufacturing sector in 1962 on monthly basis. Other sectors of economy were to follow soon; surveys in Retail sector began in 1984. Periodical modifications in the methodology were introduced in an effort to enhance predictive possibilities of the survey results with respect to the macroeconomic variables (European Commission, 2007).

Main reasons for quick dissemination and widespread popularity of survey testing were their simplicity and early availability of the results. Basic drawbacks

of survey testing lie in the fact that they represent subjective assessments of the participants[2] and as such have no major foundation in the economic theory. As a result, most of the research that uses tendency survey indicators is of an exploratory and empirical nature and does not ground its hypothesis in strong economic theory. Christopher et al. (1994; pp. 1397) in their paper indicate (based solitary on empirical correspondence between the variables) that they "take as given…that the *sentiment* forecasts *spending*" and then turn to methodological issues of their own analysis. Despite continuous improvements and rigorous methodology it has been proven that participants of the survey have a tendency to overemphasize real changes in the economy (e.g. Kokoszczynski et al., 2006; Vosgerau, 2010).

Surveying in Croatia started with a time span of some 30 years after the EU. First survey was conducted in the manufacturing sector by the Privredni Vjesnik Center for Business Research and Croatian Chamber of Economy, with the expert help from German IFO. Surveying in Croatia, as well as in the EU is not administered by the Central Bureau of Statistics but by independent organizations specialized in monitoring economic cycles. Survey methodology is not exact in each country but with slight modifications in an effort to better encompass peculiarities of each economy.

Surveying in retail sector in Croatia began in third quarter of 1995 and the resulting indicator is called *Retail Trade Confidence Indicator (RTCI)*. Since the sample is composed of managers from the retail sector enterprises, a claim can be made that the survey results reflect, in a way, expectations of the participants on the supply side of the retail sector. Opinions from the demand side of the retail sector are included through the consumer survey. The main goal of the consumer survey does not differ from the goal of the business survey. Consumer survey started in April 1999 by the efforts of the Croatian National Bank. In the beginning, survey was administered on quarterly basis and from May 2005 they are conducted each month. Consumer survey results are used in constructing three distinct indicators: Consumer Confidence Index (CCI), Consumer Sentiment Index[3] (CSI) and Consumer Expectations Index (CEI). Consumer Sentiment Index, for example, is calculated in the following way:

$$CSI = \frac{B_{FS} + B_{ES} + B_S}{3} \qquad (1)$$

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[2]  Data collected by the surveys is considered qualitative instead of quantitative. The reason is because respondents do not give exact quantitative data (sales, level of stock etc.) but rather assign qualities (such as "normal", "higher than normal", etc.) to the value of quantitative variables.

[3]  Formulas for the remaining indexes are omitted because subsequent testing did not reveal a statistically significant relationship between them and the respective macroeconomic variables.

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Where  stands for seasonally adjusted balance of answers about the financial situation of the household in the past 12 months,  stands for the seasonally adjusted balance of answers about the overall economic situation in the country in the past 12 months and stands for the seasonally adjusted balance of answers on the question concerning respondents' opinion about the suitability of acquiring durable goods at the time when the survey was administered[4].

As literature review in the following sections will show, Personal Consumption (PC; a component of GDP) is the macroeconomic variable most frequently hypothesized to be interrelated to survey indicators for retail sector. Additionally, since Central Bureau of Statistics of Republic of Croatia regularly collects and issues data on overall Retail Trade Volume (RET), this variable will also be used in the analysis with the same role as the Personal Consumption. RET presents the summated value of all retail transactions in the Republic of Croatia and is a good macroeconomic indicator of activity in retail sector[5].

Numerous researches were conducted with an effort to evaluate predictive abilities of indicators regarding the macroeconomic variables. The results, although mixed, show that some indicators do poses predictive capabilities. Caroll et al. (1994) state that past values of CSI have adequate predictive power for assessing the movement of PC in contrast to often used variables such as interest rates and unemployment. However, the marginal benefit of CSI in reference to contracting variables is much harder to determine. Kim (2000) found similar evidence for South Korea but based on business survey indicators. His research confirmed strong correlation between GDP growth rate and business survey indicators[6] which lead the GDP by several quarters.

Klein and Lediray (2002) have analyzed survey participants by age, sex, type of job, country of residence etc. in an attempt to determine which group of participant's best predicts PC. The results did not single out a group with the best prediction record but have shown that various groups have good predictions depending on the period when the survey was administered. Gautier and Braun (2002) looked at finding the relationship between the consumer survey results and Household Spending in France. The short term relationship was found to be very weak. Authors hypothesized that the finding can be attributed to less for-

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[4]  Balance (*B*) is defined as the difference between percentages of positive and negative responses to individual survey questions. More detailed analysis of the methodology of business and consumer surveys can be found in Čižmešija (2008)

[5]  Sector of Distributive trade (of which the major part is Retail trade) in Croatia participates with 17,9% in overall number of employees, 36,1% in total number of enterprises and sector contributed to 10,9% of total GDP in 2007 (HGK, 2008).

[6]  Bank of Korea (administrator of the Business test in Korea) does not calculate a composite index from the survey questions.

mal "economic calculus" of households in contrast to firms which go through a more scrutinizing process of formal budgeting. Easaw et al. (2005) conducted a research in UK assessing the ability of indicators of Consumer Sentiment to predict Household Consumption, after removing the effects of labor income growth. Results have shown that Consumer Sentiment Indicators have relatively weak predictive power in assessing the Household Consumption. Much stronger relationship was found between Consumer Sentiment Indicators and durable goods consumption (component of Household Consumption) independent of the labor income growth. Authors also indicate that these results are rather similar to the results obtained from the analysis of the USA data.

**Methodology**

Data for the analysis in this paper were obtained from two sources. Consumer Survey indicators were obtained from the Croatian National Bank while Retail Trade Data and Personal Consumption data were obtained from the Central Bureau of Statistics. Since the time span of the series used in the analysis is not aligned, the analysis has started from the first period covering the data for both series in the pair, setting the observed time span to 1999Q2-2008Q4.

Survey Indicator data are of quarterly frequency and range in closed interval of [-100,100]. A rise or fall in the value of the indicator is simply interpreted as an overall (expected) expansion or contraction of business activities (business survey) of household consumption patterns (consumer survey). All observed data are seasonally adjusted using Dainties method. Dainties method was proved to be optimal for seasonal adjustment of business and consumer survey results because it does not necessitate revision of past data when adding new observations (European Commission, 2005; Šošić et al., 2007). Analyzed macroeconomic series are recorded as *year-to-year growth rates* on quarterly basis as well.

In previous research studies about predictive power of indicators conducted in Croatia only simple econometric methods were used, such as correlation analysis, analysis of coincidence of time series direction of movement and Granger causality test based on the linear regression model (e.g. Čižmešija, 2001; Lang, 2001). The broad usage of these models can be argued by the fact that the European Commission recommended their application, and additionally the time span of the series was not sufficient for more advanced econometric methods. Currently available time span of the data allows more advanced methods to be used. Hence, in this paper the main model for the analysis will be a bivariate vector autoregression model (VAR) together with the causality tests, impulse re-

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sponse function analysis and variance decomposition as standard components of VAR modeling.

VAR models in this paper are based on the least squares method and since the variables entering the model are time series the main assumption of the analysis is that the series are stationary. Therefore, Augmented Dickey-Fuller unit root test was conducted for each variable.

### Empirical Analysis and Results

Empirical testing started with seven pairs of variables[7], but the results have shown that statistically significant relationship exist only between one pair of variables; Croatian Retail Trade Volume (RET) and the Consumer Sentiment Index (CSI).

Unit root test results for the two variables of interest are reported in the following table.

*Table 1:*

### ADF TEST RESULTS

| Variable | ADF value Constant and trend included | ADF value Constant included | ADF value Nor constant nor trend included |
|---|---|---|---|
| RET | -3.0261*** (0) | - | - |
| ΔRET | - | - | - |
| CSI | -2.1782*** (0) | - | - |
| ΔCSI | - | - | - |

Note: Δ denotes the first difference operator. Optimal number of time lags is determined using Schwarz Information Criterion and is presented in parenthesis. One, two and three asterisk(s) indicate not being able to reject the null hypothesis at the 10%, 5% or 1% significance level.

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[7] Both *Croatian Retail Trade Volume* and *Croatian Personal Consumption* represent macroeconomic variables for the Croatian Retail Trade Sector. Their relationship was measured versus BCS indicators concerning the same sector (*Retail Trade Confidence Indicator*, calculated by Privredni Vjesnik Center for Business Research; and *Consumer Confidence Index*, *Consumer Sentiment Index* and *Consumer Expectations Index*, calculated by the Croatian National Bank). Since only RET and CSI were found to form a statistically significant relationship, the results of all other pairs of variables are omitted.

As suggested by Dolado *et al*. (1990), the test was performed starting from the assumption that the appropriate test specification includes both drift and a trend. If trend was not proven significant, then a model implying only a drift was inspected, and so on.  Therefore, the Table should be read from left to right, meaning that the most rightward equation specification is to be considered appropriate for each series. As the null hypothesis of the ADF test implies nonstationarity, both variables can be treated as stationary. Therefore, all further analysis is continued with both variables in levels.

Before applying VAR modeling, the first step of the empirical analysis was to preview the correlation[8] between RET and CSI. This was the essential step in establishing whether CSI can, and by how many periods (quarters), be used to predict retail trade volume. Correlation analysis results are presented in Table 2.

*Table 2:*

## CORRELATION ANALYSIS

| Precedence time | Correlation coefficient |
|:---:|:---:|
| t | -0.2839 (0.0983) |
| t-1 | -0.4652 (0.0049) |
| t-2 | -0.4616 (0.0052) |
| t-3 | -0.4893 (0.0029) |
| t-4 | -0.5710 (0.0003) |

Note: p-values are given in parenthesis

Correlation analysis was restricted to only four quarters of precedence since the sole intention of business and consumer surveys is exclusively to provide a tool for *short-term* predictions of real economic activity. Moreover, it is highly unlikely that Croatian consumers could anticipate changes in the retail trade sector for more than one year ahead. Such presumption has strong support in prior

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[8] Correlation analysis is a basic and most commonly used tool in business and consumer survey analysis. It is accustomed to inspect correlation coefficients for different times of precedence of tendency survey indicators vis-a-vis reference series. What is implied by *optimal* is the highest statistically significant correlation coefficient. For empirical application of this research approach see e.g.  Gayer (2005) or consult OECD (2005) for numerous similar studies.

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empirical research (Čižmešija, 2001; 2008). It is visible from Table 2 that the optimal correlation coefficient is reached for the 4 quarter precedence of CSI. What is even more intriguing is the negative sign of the correlation coefficient, which will be elaborated in more detail further on.

A VAR system was formed with one period lag, in accordance to all conducted tests for lag specification. The results are presented in the Table 3.

*Table 3:*

## LAG SPECIFICATION TEST RESULTS

| Lag | LR | FPE | AIC | SC | HQ |
|-----|-----|-----|-----|-----|-----|
| 0 | NA | 2033.302 | 13.29314 | 13.38202 | 13.32382 |
| 1 | 45.53052* | 616.4463* | 12.09888* | 12.36551* | 12.19092* |
| 2 | 1.879808 | 729.9489 | 12.26479 | 12.70918 | 12.41819 |
| 3 | 3.441560 | 816.9907 | 12.37045 | 12.99259 | 12.58521 |
| 4 | 6.276976 | 816.8550 | 12.35760 | 13.15749 | 12.63372 |

Note: * indicates lag order selected by the criterion at 5% significance level; LR=sequential likelihood ratio test statistic, FPE=Final prediction error, AIC=Akaike information criterion, SC=Schwarz information criterion, HQ=Hannan-Quinn information criterion

Since correlation does not necessarily imply causation, we also applied the causality analysis to explore the predictive characteristics of CSI with respect to retail trade volume.

*Table 4:*

## CAUSALITY TEST RESULTS

| | Granger causality test | | Wald test | | |
|---|---|---|---|---|---|
| | $H_0$: CSI does not Granger cause RET | $H_0$: RET does not Granger Cause CSI | Dependent variable | RET | CSI |
| F- statistics | 3.6694 | 0.0636 | Chi- square statistics | 3.669 | 0.0141 |
| p-value | 0.01412 | 0.9061 | p-value | 0.0554 | 0.9054 |

The question of causation according to Granger comes down to analyzing how much of the current value of dependent variable ($y$) can be explained by past values of the observed variable itself. Afterwards, it is considered that the independent variable ($x$) Granger causes y if adding lagged values of $x$ can improve the explanation of $y$ (Granger, 1969). In the specific model analyzed here, Consumer Sentiment Indicator is said to Granger cause Croatian retail trade volume if the coefficients of the lagged CSI's are statistically significant. And that is exactly what the results reported in Table 4 indicate (at 5% significance level). Similarly, Wald test analyzes the joint significance of lagged endogenous variables in the model, and the obtained results undoubtedly confirm already stated conclusions (at 10% significance level). To summarize conclusions from both tests, it is clear that CSI has pronounced predictive properties regarding Croatian retail trade volume. If the relationship is observed in the opposite direction, no signs of RET "causing" CSI is found at any conventional significance level (according to both Granger and Wald test)[9].

Further on innovation analysis was conducted to explore the dynamic interactions between CSI and RET.

*Figure: 1:*

IMPULSE RESPONSE FUNCTION OF RET TO A SHOCK IN CSI



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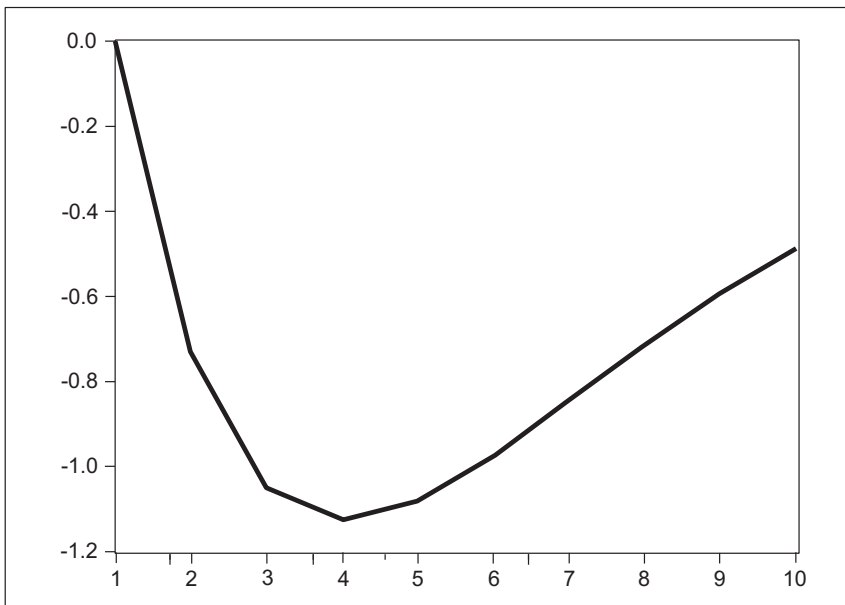
[9]   Innovation analysis also yielded similar results. RET turned out to have low explanatory power vis-à-vis future CSI movements, so further results are omitted here.

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Impulse response function shows the movement of RET change rate as a result of a unit shock in CSI. It is clear from the figure that the mentioned influence of one standard error shock in CSI is extremely persistent throughout the whole period of 10 quarters. The analyzed influence is most intensive in the third future period, which is manifested through a 1.13 percentage point's decrease in retail trade volume.

*Table 5:*

VARIANCE DECOMPOSITION OF RET

| Period | S.E. | RET | CSI |
|--------|------|-----|-----|
| 1 | 4.678811 | 100.0000 | 0.000000 |
| 2 | 5.577709 | 98.27821 | 1.721791 |
| 4 | 6.178077 | 92.39957 | 7.600425 |
| 6 | 6.398769 | 87.74678 | 12.25322 |
| 8 | 6.499923 | 85.22334 | 14.77666 |
| 10 | 6.545685 | 84.05116 | 15.94884 |

Results in Table 5 clearly show that share of CSI in the variance of RET forecasting error has continuously increased, namely from 2% in the second forecasting period to even 15.9% in the tenth future quarter. This result formally confirms the possibility of predicting cyclical movements of Croatian retail trade using consumers' perceptions and expectations.

Especially interesting is the fact that statistical analysis resulted in negative relationship between the two observed variables. This result comes from the fact that while CSI is increasing (meaning higher consumer sentiment), the rate of change of RET is decreasing. We provide several tentative explanations for these unexpected findings. First of all, Croatian retail sector experienced significant structural changes starting from 1998 which resulted in increasing internationalization, concentration and overall growth of the sector (e.g. Anić, 2002; Anić & Nušinović, 2003; Anić & Jovančević, 2004; Brčić-Stipčević & Renko 2004; Segetlija 2005). This growth was in part supported by increased use of financial products that enable differed payment (GfK, 2010a) and growth in new retail space openings such as shopping centers (Vouk et al., 2008). It is possible that retail traffic is showing diminishing growth rates due to decreased influences from

the process of internationalization and concentration (8 out of 15 major regional[10] retailers already operate in Croatia and Croatian retail market is the fifth (out of 11) most concentrated in the CEE region (GfK, 2010b)). Further constraint to growth came from decreased credit activity from the banks and subsequent rise in interests (Broz et al., 2008a; Broz et al., 2009). Also, alternative investment possibilities were available for households to allocate their disposable income which could significantly affect retail spending. Stock market index CROBEX for example was surging in recent years with double figures annual growth rates (e.g. ZSE, 2004; ZSE, 2005) and possibly absorbing significant amount of disposable income which is highly related to consumer spending and retail sector activity. This explanation has support in economic theory having in mind that households have a general tendency to allocate smaller and smaller proportions of disposable income to retail consumption with higher level of economic development (Denona Bogović, 2002). Pischke (1995) indicates that aggregate consumption tends to be very smooth over the years in contrast to variation in income. CSI, on the other hand, is much less robust and characterized by higher volatility. Uncertainty could be also accountable for high short-term impact on the volatility of the Indicator (Pellissier, Fusari, 2007). To adjust this impact a different weighting of indicator items has been suggested. Also incorporating findings from the field of cognitive psychology about the risk/uncertainty perception into the design might improve the predictive properties of the indicators (Bovi, 2006).

## Conclusion

This paper aims at detecting the capabilities of Business and Consumer Survey Indicators to serve as leading (predictive) indicator of related macroeconomic variables. The analysis has revealed that significant relationship exist between Retail Trade Volume and Consumer Sentiment Indicator. A bivariate VAR model with one quarter lag was formed. It was found that indeed CSI improves the explanation of future retail trade movements using both Granger and Wald test. Such conclusions were corroborated by the persistent influence of a unit shock in CSI on retail trade, observed by impulse response function analysis. Likewise, the share of CSI in the variance of Croatian retail trade volume forecasting error has ascended up to a respectable share of 16.9% in the tenth future quarter. What strikes as odd is a negative relationship observed between CSI and RET. It is a consequence of diminishing growth of RET and higher fluctuation of CSI. Retailing sector in Croatia was experiencing above average rates of

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[10] Central and Eastern Europe

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growth in last few years. The negative relationship might very well indicate that the growth in retail sector is slowly decreasing and nearing to moderate levels that is present in developed countries, namely in the EU, despite the unchanged Consumer Sentiment. Further research should address these issues. This paper is based on the assumption of simple linear relationship between BCS indicators and retail trade. Recent advances have shown that the relationship of interest can also be assessed in a nonlinear fashion (e.g. Desroches and Gosselin, 2004). Further research should definitely take such findings into account.

Main scientific contribution of this paper lies in novel usage of presented statistical model in analyzing tendency survey data for Croatian economy. Tendency survey indicators are available to policy decision makers and business manager's months before the official macroeconomic data and they should be included in their analysis of future trends since the relationship between the variables has been found. However, the exact nature of the relationship seems rather unclear and is certainly an interesting field for further research and a more in-depth extension of the current analysis. Furthermore, a regional cross country survey (e.g. for CEE countries) would certainly be an interesting extension and would certainly shed additional light to the nature of the relationship between the analyzed variables. Retailing sectors in those countries are experiencing somewhat similar development patterns as the Croatian one. One of the major drawbacks of the analysis is rather short time span of the available data with significant volatility which could have an effect on the direction of the relationship. Once new data becomes available a new test of the relationship would be in order as an additional check of the current analysis. Our paper has shown the potential for the usage of tendency survey results in policy makers and business manager's decisions but further research is in order to clarify the exact nature of the relationship between tendency survey and retail activity.

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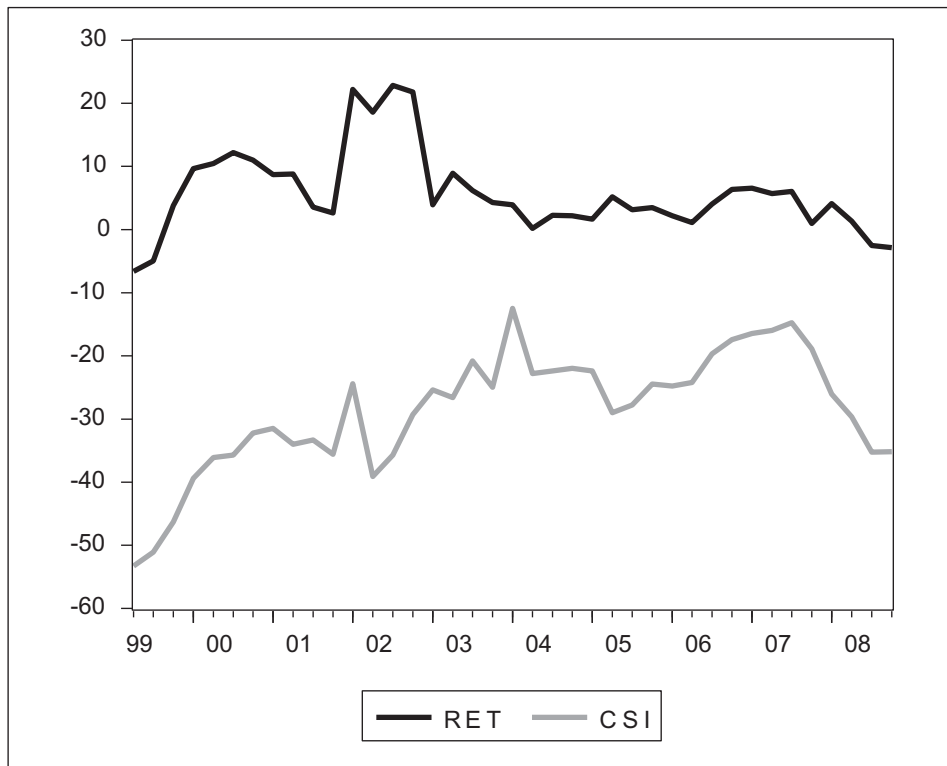
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**Appendix: Graphical presentation of CSI and RET**

P. SORIĆ, M. MARKOVIĆ: Predicting Downturn: Are Tendency Surveys a Good Estimator of Retail Activity in Croatia
EKONOMSKI PREGLED, 61 (9-10) 559-575 (2010)

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# PREDVIĐANJE PADA: JESU LI KONJUNKTURNA ISTRAŽIVANJA DOBAR PROCJENITELJ KRETANJA TRGOVINE NA MALO U HRVATSKOJ?

## Sažetak

Ovaj rad analizira mogućnost anticipiranja konjunkturnih kretanja trgovine na malo u Republici Hrvatskoj primjenom konjunkturnih testova i testova potrošača. Prikazan je kratak pregled sustava konjunkturnih testova i testova potrošača u Hrvatskoj, i objašnjena je logička podloga za korištenje konjunkturnih indikatora u makroekonomskoj prognostici. Procijenjeni bivarijatni VAR model iznjedrio je test uzročnosti te analizu impulsnog odziva i dekompoziciju varijance prognostičke pogreške. Rezultati analize potvrdili su postojanje statistički značajnog odnosa između indeksa raspoloženja potrošača i obujma trgovine na malo. Na iznenađenje autora, procijenjeni odnos je negativan, što se dodatno analizira u radu te nude ekonomska objašnjenja takvog fenomena.

Ključne riječi: konjukturna istraživanja i ankete pouzdanja potrošača, vektorska autoregresija, trgovina na malo