JOURNAL
OF EUROPEAN ECONOMY
Vol. 2 (№ 1). March 2003
Publication of Ternopil Academy of National Economy

Timotej JAGRIČ,
Sebastjan STRAŠEK

FORECASTING ECONOMIC ACTIVITY IN A TRANSITION ECONOMY AS A LEADING INDICATOR APPROACH*

Abstract

The future income level is of central importance for a transition economy. Since the level of income is strongly related to aggregate economic activity, the measurement of future activity demands appropriate forecasting model. To construct such model it is necessary to select an indicator of economic activity, as well as a group of variables that, when adjusted, construct the composite (CLI) and diffuse (DLI) leading indicators that forecast the reference series. We develop a model where NBER method is modified with elements of Stock-Watson approach. The model is applied then on a small transition economy (Slovenia). The ex-post analysis suggests that in the period from 1992 to 2001, CLI and DLI forecast all turning points of aggregate economic activity. The average lead-time was 8 years, which is comparable with the performance of leading indicators in other countries.

JEL classification:

C32, E32

Jagrič Timotej, Department of Quantitative Economic Analysis, University of Maribor, Faculty of Economics and Business, Maribor, Slovenia.
Strašek Sebastjan, Department of Economic Policy, University of Maribor, Faculty of Economics and Business, Maribor, Slovenia.

* This project was financed by the National Science Foundation grant V5-0382-585. The authors would like to thank Department for Macroeconomic Analysis of the Central Bank of Slovenia, Statistical Office of Republic Slovenia and Institute of Macroeconomic Analysis and Development for their help in the process of developing the database.

Key words:

bond, business cycle, composite index, diffuse index, forecast, Granger causality, investor, leading indicator, level of income, price, securities, visible cycle, share, spectral analysis, stock exchange, structural changes, time series, invisible cycle, cause and effect.

I. Introduction

The future income level is of central importance for a transition economy. Since the level of income is strongly related to aggregate economic activity, the measurement of future activity demands appropriate forecasting model. For many years the system of leading, coincident and lagging economic indicators has been widely used in OECD countries. The system was developed in 1930's by the National Bureau of Economic Research (NBER). For recent advances in the field of leading indicators one may consult Lahiri and Moore (1991), Zarnowitz (1992) and Stock and Watson (1993).

The system of leading indicators is an indispensable tool for macroeconometric research: it complements macroeconomic policy analyses using large-scale models, which by their nature cannot be adapted to new information quickly. Since Slovenia has passed a period of disintegration of Yugoslavia and the radical economic reform that followed, we believe it is time to construct a system of business cycle indicators. The need for the system is present despite the fact that the available data cover a short time span and are dominated by impacts of the market economic reform.

Our goal in this paper is to present construction of composite leading indicator and diffuse index of a small open transition economy – Slovenia. We develop a model, where NBER method is modified with elements of Stock-Watson approach. To the best of our knowledge, it is the first indicator constructed for Slovenia. In the paper we develop the methodology of constructing the composite and diffuse index, we explain our choices in the construction process, and present our outcomes.

The remainder of the paper is organized as follows: after introduction, we describe in Section II methodological aspects. Section III discusses results and comments on the fundamental findings. Section IV contains the conclusions.

II. Methodological Aspects

The design of composite (CLI) and diffuse (DLI) index of leading indicators has a long tradition starting with the work of Moore and Shishkin in 1967. The main purpose of this approach is to address a problem that is particularly

serious in developing countries. Economic time series, in particular real gross domestic product (GDP), are reported with important time lags. In addition, the series are revised frequently to incorporate new information. This leaves policy makers and investors without objective measures of the current situation and direction of economic activity.

The two most commonly used methodologies to construct leading indicators are NBER and Stock-Watson (1989) (SW) approach. The former is based on the work by Moore and Shishkin (1967), while the latter adds an econometric foundation to the NBER approach. Both of them rely on an abstract concept of economic activity, which is referred as «the state of the economy». The state of the economy is an unobservable variable that must be estimated from several available series. The estimate of the unobservable state of economy is called a composite index of coincident indicators, and is a measure of economic activity used by these approaches. Leading indicators aim to forecast the behaviour of this composite index of coincident indicators.

NBER and SW methodologies differ in the strategies used to construct the CLI and DLI. The selection of individual candidate series in the NBER approach is based on a scoring system, which weights in an arbitrary manner certain desirable characteristics that time series should have. This is done by assigning each characteristic a maximum possible score. The candidate series are then scored according to how close they are to possessing each characteristic and the final score is taken as an orientation of which to select variables. It is acknowledged though, the series selected are not always those with a higher score; this is to allow informal judgment in the selection process. Composite index is obtained by taking weighted averages of chosen series.

SW approach, however, uses time series econometric concepts, like regression analysis and Granger Causality, for the selection process. Composite index is again weighted average of selected series but the weights are estimated using econometric techniques.

In the case of Slovenia, there are some important limitations to be considered:

- time-series can cover only the period of eight years;
- Slovenia has underwent a deep transformation depression. In the process of restructuring its economy wild swings in time-series occur, which may have a significant impact on chosen indicators;
- in the observed period, Slovene economy is in the process of transforming from former semi-command socialist economy to market-oriented economy. The ownership structure is changing rapidly and hence it may have important impact on changed behaviour of investment and consumption.

Due to these facts, we were not able to fully adopt NBER approach. On the other hand, short and extremely volatile time series are not enough to exclusively rely on econometric SW approach. Therefore we decided to modify NBER

methodology by using econometric techniques which are used in SW method. With this methodology, the composite and diffuse index of leading indicators was constructed, which from an econometric standpoint, produces satisfactory forecast of aggregate economic activity. From an economic standpoint, the series that are used in composite indexes, are broadly consistent with what many economists believe is the main source of fluctuations in Slovenia.

Measuring current economic activity

Measuring current economic activity demands that the researcher addresses some crucial issues:

- definition of current economic activity;
- business cycles properties of aggregate economic activity;
- turning points of economic activity;
- main sources of fluctuations.

The reference variable is the benchmark that indicates fluctuations in the economic activity, and is the variable to be forecast. The variable must have the advantage of being a monthly reported variable, available for many countries, and measures the real sector of the economy. Real GDP is directly considered to be the relevant measure of economic activity for two reasons. The first is that it is the most commonly discussed measure of economic activity in practice and in the literature. The second is that in papers that use the SW methodology (Dias 1994), a common practice is to compare the estimated coincident indicator with real GDP to evaluate, if it accurately describes economic activity. On the other hand, GDP is not published on a monthly basis and is often revised. What is more, the aim of this paper was not to construct a perfect composite coincident indicator, but to construct CLI and DLI.

For Slovenia, the only variable, which has all the necessary attributes, is the index of industrial production (IIP). The main disadvantage of this selection is, that in Slovene economy IIP represents only 30 per cent of aggregate economic activity. This problem could be resolved if we could construct a monthly composite coincident index of current economic activity.

The results of recent studies of IIP (Jagric 2001b) suggest that in Slovenia aggregate economic activity fluctuates with average frequency of 34 months, which corresponds to the length of typical business cycle proposed by Mitchell and Burns (1946). First years of Slovenian transition were marked by typical transformation depression. This is not surprising, since Slovenian economy was hit by a series of market losses: the collapse of CMEA markets; the Gulf War and the collapse of the Yugoslav internal market. This collapse has heavily affected the economic activity and the financial position of the economy. The production was pushed down rapidly to a decline by 9.3 percent in 1991 and 6.0 percent in 1992.

The analysis showed that June 1993 was the lowest point and a start of a new cycle. This was confirmed by Mencinger (1995), who also found that in the middle of 1993 Slovenia suddenly reached the bottom of depression. The revival which followed, can be explained by increase in aggregate demand in which moderate growth of foreign demand coincided with fast growth of domestic demand. The peak was reached in January 1995. The turnaround could be attributed to Holland disease and to debt crises in Slovene economy. The peak was also preannounced by Surveys on Business Trends published by Statistical office of the Republic of Slovenia (1994), which reported on continued worsening of export demand since October 1994 (the diffuse index was steadily growing from 34 percent in October to 43 percent in December).

The end of the first cycle was reached in June 1996. After reaching it the economy improved in the second part of the year mainly due to economic recovery in Europe and improved export competitiveness. According to Institute of Macroeconomic Analysis and Development (1997) export competitiveness (measured in terms of unit labour costs in the basket of currencies) improved in 1996 by 7.3 percent after a market drop of 11.9 percent in 1995. Competitiveness improved as a consequence of increased productivity, the lower tax burden on wages and the real deprecation of the tolar.

Acceleration in rate of growth of the world economy as a whole, and in particular of the European Union, enabled the Slovene economy to expand in 1997. Improved economic performance of main economic partners was the primary factor that enabled exports to grow in 1997 without increase in export competitiveness. That year the consensus between the social partners on wages has been reached in time. Thus, the mechanism for adequate income policy was adopted which succeeded to keep the rise in wages lower than the growth in labour productivity.

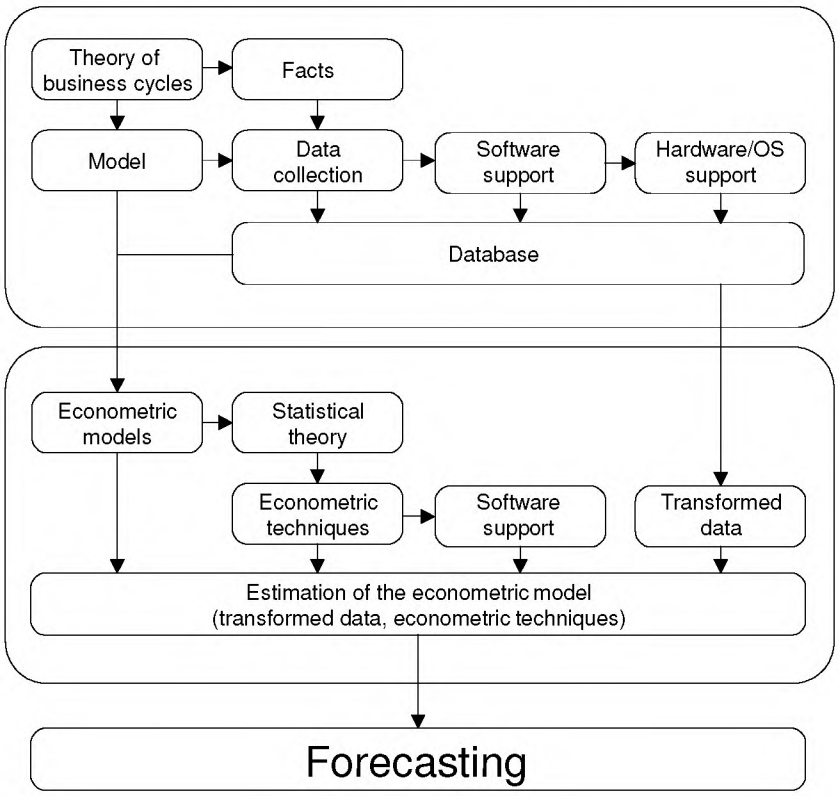
The slowdown in economic growth and export market growth in most important trading partners in the last quarters of 1997 and 1998 slowed down the growth in Slovenian exports and with some lag economic activity as well. Extremely high value of export multiplier of Slovene economy (0.6) explains the high degree of sensibility of Slovene macroeconomic activity to changes in the growth of export. The deceleration cycle in 1998 was therefore not a surprise, since contagion effects of Asian crises spread to Europe.

Database

The first step in designing the model is the development of a broad database, which should cover all crucial fields of economic activity. The development of database does not only include data collecting, but also the development of adequate information system support which is essential for data storage and processing. Software and hardware is not only functional for database characteristics, but also functional for the chosen model; hence, the whole procedure of designing the system of leading indicators was divided into two phases (Figure 1).

Figure 1:

Development Phases of Leading Indicators System



When designing the database we developed a stand-alone software application «Ekonograf», which runs on MS Windows 2000 – server operating system. The application is built modularly which enables later upgrading. The basic modules are: module for data archive, module for graphical analysis, and module for statistical analysis.

The database used in the model includes 213 time series, that corresponds to more than 20,000 single observations. To ensure sufficient transparency, the time series are classified in the following categories: mining and manufacturing, change in inventories, business and consumer confidence, construction, transport, retail, foreign trade, tourism, employment, money and banking,

prices, international liquidity, public finance, domestic final demand, foreign economic activity, paying system.

Since Slovenia became independent in October 1991, the time series start with January 1992. At the moment, the database covers the period 01/1992–08/2000. The NBER approach, however, requires at least twenty-year long observation period.

Scoring system for business cycle indicators

The ideal leading indicator should possess the following characteristics (Burns and Mitchell 1946): it must cover a time period of fifty years; it has to last at least three months; it must be smoothed; it has to be closely connected with the movement of aggregate economic activity; it must allow simple and fast updating; it should not have a seasonal component.

In our study we extended the use of criteria employed by NBER adding some elements of Stock-Watson approach in the scoring system. The scoring of each series reflects our desire not only to make as explicit as possible the criteria for selecting indicators but also to increase the amount of information available to the user in order to aid in evaluating their current behaviour.

The scoring plan includes five major elements: economic significance, statistical adequacy, promptness of publication, smoothness, and Granger causality. When the subheads under these elements are counted, ten different properties of series are rated in all. This list of properties provides a view of many different considerations relevant to an appraisal of the value of a series for the analysis of current business cycle.

A high score for economic significance is accorded with to a series that succeed to measure a variable that has an important role in the analysis of business cycle movements. A series that represents a strategic process more broadly is rated higher than the one more narrowly defined. Such broadly defined series is also less likely to shift as a result of technological developments, changing consumer tastes, and other similar factors.

Statistical adequacy reflects the requirement that a series continue to measure the same economic process during future business cycle fluctuations when selected indicators are used to test thoroughly the current usage. The main element that has the highest weight is the length of time-series. This characteristic of a time series is important due to demands of the used X11ARIMA program (Statistical Office Canada, 1999). The other elements are: type of reporting system, coverage of time unit, measure of revisions, availability of descriptive material, and comparability throughout the period.

Forecasting a leading indicator for short-run business cycle can be useful only if it is up to date. Series that are released promptly, therefore, are assigned higher scores than those that lag in publication.

The smoothness criterion is the same as in the original NBER scoring plan. Since the start of a new cyclic phase can be discerned more promptly and smoother in a series than in irregular one, smoother series are given higher ratings. As we use exclusively monthly series, only MCD (months of cyclic dominance) value was used to measure the smoothness. The MCD value is reported by X11ARIMA program.

Conformity of an indicator to past business cycles and timing of its turning points relative to those in aggregate economic activity are obviously essential qualities in an indicator. Since for Slovenia the time-series can only cover a period of up to eight years, we could not apply the NBER approach of a probability test. Therefore, we used a criterion based on Granger causality (Jagric 2000a, Jagric 2001a). This enabled us to introduce econometric testing into the scoring system. Econometric testing was performed on all series in the database two times. First, we tested the series for the whole period and in the second step for the period from 01/1997 to 08/2000. This was necessary, since we found that many series have changed their characteristics in the beginning of 1997.

III. Results

The described scoring system is a basic methodological step in forecast. Scoring procedure may be performed in two different ways: the first possibility is, that only a group of potential leading indicators selected from researcher's experience is applied in the scoring procedure; and the second possibility is, that all time-series are applied in the scoring procedure. Since for Slovenia the system of leading indicators was not yet developed, and since database does not include time-series (which are usually good leading indicators) we decide to score all time-series. In the phase of scoring the graphical analysis was used which enabled us to compare reference dates with changes in movement of selected time-series. The total score of time-series, theoretical lead-time, and the results of graphical analysis, were than used to form the potential group of leading indicators.

The list of leading indicators

The list of potential leading indicators comprises 39 time-series from database. The assigned scores must be considered rough rather than precise measure of the relative usefulness of different series in analysing short-term business conditions and prospects. Moreover, the scoring plan for each indicator contains information not revealed by the over-all score alone. Since the scores assigned to each of the considered factors indicate particular merits and limitations of series, the detailed results are of great assistance in the final selection.

The average lead-time is determined by Granger test of causality, where two criteria were used: the value of adjusted determination coefficient, and

Akaike information criteria. The average lead-time is only an estimate of actual lead-time for selected time-series. Therefore, we have to employ exact graphical analysis when we deal with final selection of leading indicators. Special emphasis in graphical analysis is laid to analysis of trend-cycle component in time-series, which is estimated with X11ARIMA program. A reliable leading indicator has to oscillate with the same or similar frequency as the reference series. If this condition is not fulfilled, the selected indicator cannot forecast all turning points in reference series.

The scoring system we have used, ensure that the selected indicators have the best characteristics among all time-series in database. They cover different fields of economic activity:

- business and consumer confidence (consumer confidence indicator),
- construction (average net wages),
- labour market (the share of over-hours in gross wages, employment (manufacturing),
- monetary sector (monetary aggregate M2), real effective exchange rate (production prices), index of production prices (manufacturing),
- foreign activity (OECD leading economic indicator for the EU, OECD leading economic indicator for Italy),
- paying system (incomes of enterprises - financial intermediation).

The shortcoming of selected indicators is the absence of three indicators, which are usually used in the OECD countries: retail inventories, index of stock exchange, and prices of primary commodities. Retail inventories were not included, since Statistical Office of the Republic of Slovenia does not collect these data on a monthly basis. The prices of primary commodities were not selected for two reasons: first, we found significant relationship between reference series and primary commodities for the period 1997–2001 only; second, significance was found in this period only when high price changes occurred.

Index of leading indicators usually includes index of stock exchange. The idea behind this variable is that asset prices contain information about future movements in real variables, and in particular that asset prices significantly signal future movements in industrial production. Empirical data (IMF, 2000) suggest that asset prices fluctuations have remained substantial and highly correlated with business cycle in industrialised countries. Empirical support for the hypothesis that stock prices affect consumption via its leading indicator properties in regards to the growth of labour incomes is provided by Poterba and Sanwick (1995). Estimates of the magnitude of this effect vary considerably across countries and highly depend on the type of asset in question. Stock returns also led to the growth in output in several emerging countries (Mauro, 2001). There is extensive empirical evidence that asset price changes tend to have significant predictive power on output growth (Christoffersen and Slok, 2000). Furthermore, Filer, Hanousek and Campas (1999) using Granger causality test, find evidence of a positive and significant relationship going from stock market development to economic growth, particularly for less developed countries.

We tested stock variables and found out that there was no strong link with industrial production in Slovenia. There are some plausible explanations for this finding. The effect from asset prices to real economic activity may come through a number of different channels. In Slovene economy, some of them differ significantly vis-à-vis developed economies. The development of the Slovenian capital market has been marked by privatisation and indirect central bank interference in market movements. A special feature of privatisation process in Slovenia was the distribution of privatisation vouchers in nominal value SIT 567 million (corresponding to about 40% of the social capital of companies undergoing ownership transformation) to more than 2 million citizens in October 1993, the individual value of vouchers depending on the citizen's age. The vouchers could have been used for purchase of shares of the employer, the shares of Authorized Investment Companies, purchase of shares in public sale and purchase of any other shares offered for sale against vouchers. The behaviour of 2 million stockowners is in line with the way they got stocks: they sell whenever they need liquidity, no matter how the price is moving. Therefore, the behaviour of stockholders does not respond to their macroeconomic situation; so the link of stock movements with industrial output is week or non-existent.

The second reason why asset prices yield no information for future developments in the real economy lies with the Bank of Slovenia. Given the small monetary area and, consequently, limited possibility of the Bank to neutralize any big-scale adverse effects of capital inflows on the exchange rate, the Bank required as of February 1997, that non-resident portfolio transactions to be channelled through custody accounts with fully licensed domestic banks. Pursuant to revision in July, the requirement exempted committed long-term portfolio investment of at least seven years. The introduction of compulsory custody accounts for foreigners substantially reduced their interest in portfolio investment, which by then had been the main driving force on Ljubljana Stock Exchange. The uncertainty has made domestic investors more hesitant too. After the introduction, the turnover slumped sharply. The ratio of share, bond and short-term security turnover in total turnover changed dramatically. Share turnover dropped from above three-quarters to 56% of total turnover. Domestic investors moved from the stock exchange market to the short-term security market where Bank of Slovenia's bond issue coupons represented the majority of the turnover.

Along with the impact of privatisation and custody accounts, emerging equity markets have underwent internationalisation recently. This has taken several forms. The Ljubljana Stock Exchange is confronted with the situation where some companies have issued depositary receipts that subsequently can be traded on a foreign exchange in parallel with the local exchange. Hence, investors are so becoming concerned that liquidity is drying up and that the price determination is increasingly moving offshore. In this way asset prices are loosing information about future developments in real economy.

Composite and diffuse index of leading indicators

The forecast of economic activity is based on calculation of SLOLEI composite and diffuse index. The main steps followed by the NBER in compiling the composite indexes are to compute the standardized and weighted average changes, to modify the average changes and to accumulate these changes into an index. Due to procedure it is reasonable to expect that composite index will be less volatile than single indicator and reference series (Niemira and Klein, 1994).

Burns (1969) observed that a business cycle expansion does not imply that every underlying economic activity is expanding nor does a business cycle contraction mean that every firm has decline sales. He further observed that economic activity has two types of cycles, seen and unseen. One cycle is in the fluctuation of aggregate measure itself and consequently is seen. But the second cycle – diffusion cycle – exists in the distribution of components within that aggregate based on the number of expanding or contracting segments. This unseen cycle is important because it helps to monitor and forecast the path of the seen cycle.

This concept of diffusion is made operational by defining it as a time-series representing the percentage of components within an aggregate that are expanding. The major limitation with diffuse index is that its volatility can make interpretation difficult. Therefore, we lengthen the span of time over which the diffuse index is calculated (we used a span of six months). Although this method reduces the volatility, we lose some observations. By applying such filter we also have to be aware of a phase-shift in the cyclic component in the index.

To evaluate the performance of the composite and diffuse index of SLOLEI, we use the ex-post analysis. We observed the behaviour of indexes in the period from 01/1992 to 12/2000. The selected period is 4 months longer than the period covered in the database.

Figure 2 documents the behaviour of composite index and reference series. Reference data were determined with trend-cycle, which was estimated with X11ARIMA. Considering the analyses of cyclical behaviour of reference series, two full-length cycles could be identified. The movement of composite index confirmed this too. As the first reference point we chose March 1993, where the turning point in the reference series was found. The composite index forecast this point 10 months in advance. The second reference point (January 1995) forecast 9 months in advance. The lowest point in November 1995 was signalled 7 months in advance. A swing which followed could not be interpreted as a classical business cycle, hence it was not detected by composite index. The peak in May 1998 was forecast 7 months in advance and the lowest point in March 1999, 6 months in advance. In June 2000, the peak was reached, which was forecast by the composite index 11 months in advance. Therefore, we may

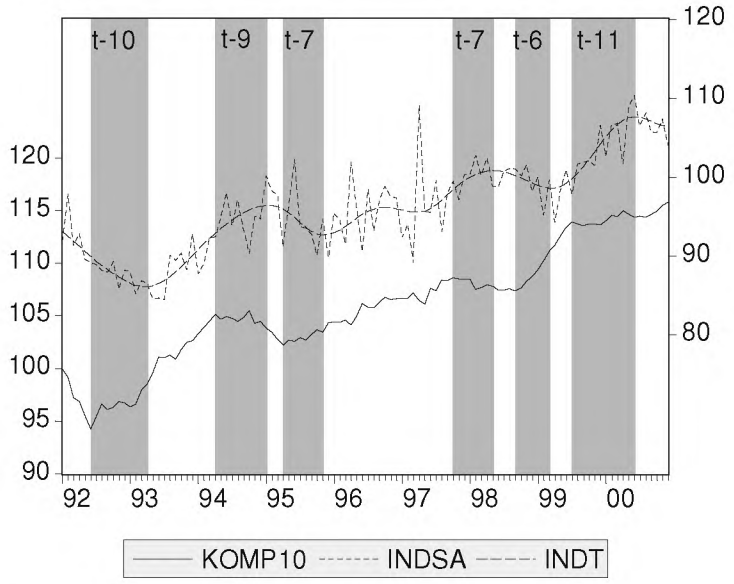
summarize that in the observed period our composite index successfully forecast all turning points in the movement of reference series.

The analysis of composite index shows high correlation with reference series, which is also confirmed with spectral analysis (Figure 3). We can isolate one spectral peak only. Its frequency is 3/100, which corresponds to the frequency of the spectral peak found in the analysis of reference series. Based on our assumptions, we may conclude that statistically significant cyclic component is present. The length of the average cycle is 33.3 months. The spectrum is smoother in comparison with reference series. This finding confirms our presumption about characteristics of the composite index.

The results of diffuse index also confirm our expectations. Its original values are highly volatile. Therefore, in further analysis we used a six-month average of diffuse index. Figure 4 shows comparison of selected diffuse index with the movement of composite index. Two differences were found: first, in the period from November 1995, to May 1998, an additional peak was detected by diffuse index (Figure 4 and Figure 5); second, the movement of diffuse index in last 12 months forecast a next turning point more clearly.

Figure 2:

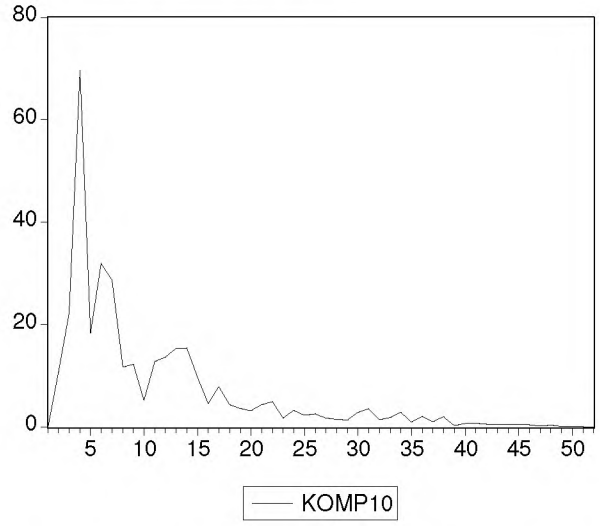
Slolei (composite index) and reference series



Note: KOMP10 – SLOLEI composite index (1992:01=100);
INDSA – Reference series (1992:01=100) – deseasoned;
IND92T – Reference series (1992:01=100) – trend-cycle.

Figure 3:

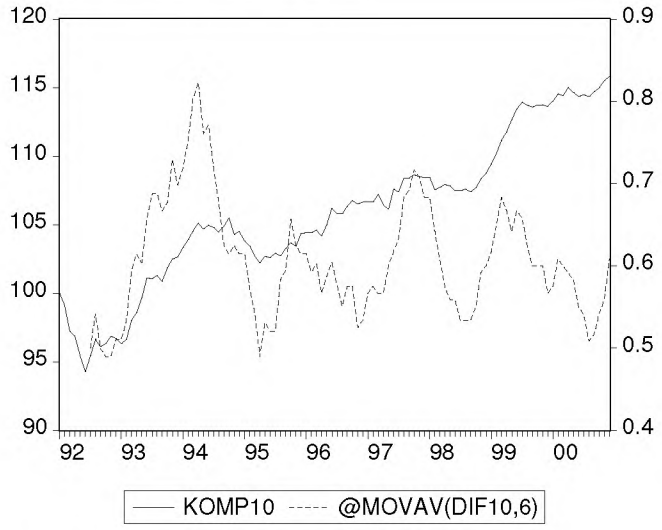
Diagram of spectral density



Note: True frequency is calculated by dividing x-axes value by 100.

Figure 4:

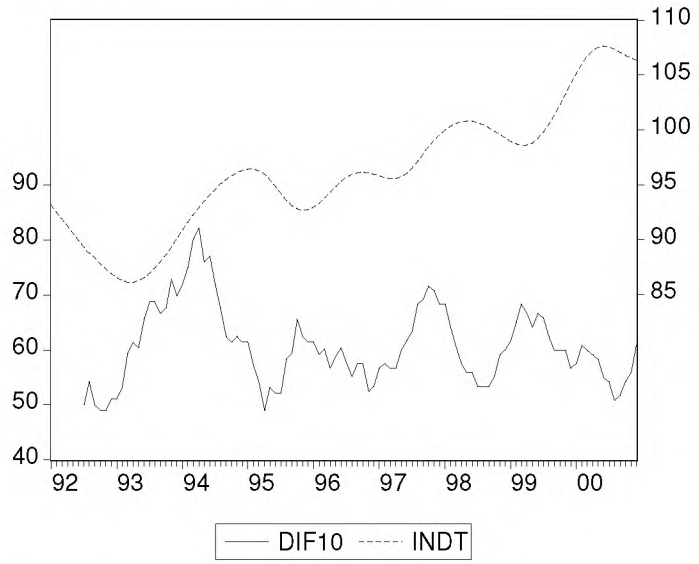
Composite and Diffuse Index



Note: KOMP10 – Composite index;
@MOVAV(DIF10.6) – Diffuse index (six months average).

Figure 5:

Diffuse index and reference series



Note: DIF10 – Diffuse index (six months average);
INDT – Reference series (1992:01=100) – trend-cycle.

IV. Conclusion

The performance of the model, which we develop, suggests that the methodological novelties that we introduce into the original model produce reliable forecast of future economic activity. This paper presents the list of Slovenian cyclic indicators and description of a scoring plan with all modifications that have been developed to help in evaluation and selection of indicators. More than two hundred series have been evaluated. This study is concerned chiefly with the series quality as leading indicators of business expansion and contractions. It is limited to the role of economic time series as indicators of short run movements in aggregate economic activity and may not be relevant to their other uses.

The list of ten leading indicators we have chosen confirms our expectations we had formed in the analysis of cyclic movements of reference series. In particular, indicators suggest foreign economic activity which showed strong relationship with reference series. We find it important that more than a half of selected indicators are also present in leading indicators for the OECD countries. Time-series shorter than three years represent a serious problem. In that case

the characteristics of cyclic component of such time-series are not determined with high reliability.

The forecasting power was also tested with ex-post analysis. We found that in observed period the composite and diffuse index forecast all reference points. As it is expected, the diffuse index oscillates stronger than the composite index, hence diffuse index forecast a swing also in the period 1995–1998, nevertheless the latter cannot be characterised as a classical business cycle (spectral analysis also didn't find any swing in this period). There are, however, numerous structural changes going on in Slovenia and such composite leading indicator should be closely followed and re-estimated as more data becomes available in order to capture ongoing changes in transition process.

References

1. Burns, A., F., «New Facts on Business Cycles», *The Business Cycles in a Changing World* (New York: NBER, 1969), pp. 54–100.
2. Burns, A.F. and Mitchell, W.C., *Measuring Business Cycles* (New York: NBER, 1946).
3. Christoffersen, P., Slok, T., «Do Asset Prices in Transition Countries Contain Information About Future Economic Activity?», 2000, IMF Working Paper 103.
4. Dias, F.C., «A Composite Indicator for the Portuguese Economy», Portugal: Banco de Portugal, *Estudios e Documentos de Trabalho Working Papers*, 1994, 18–19, p. 1–20.
5. Filer, R., Hanousek, J. and Campous N., «Do Stock Markets Promote Economic Growth?», *William Davidson Institute Working Papers*, 1999, 267.
6. International Monetary Fund, *World Economic Outlook*, October, 2000.
7. Institute of Macroeconomic Analysis and Development, *Slovenian Economic Mirror*, 1997, 6, p. 3–8.
8. Jagrič, T., «Business Cycle Indicators – Analysis of Monetary Indicators» (Maribor: *Bilten EDP*, 2000a, 2–3), p. 30–57.
9. Jagrič, T., «Money, Aggregate Economic Activity and Granger Causality Test», *Our Economy*, 2001a, 5–6, p. 67–89.
10. Jagrič, T., «Analysis of Cyclical Component of Aggregate Economic Activity in Slovenia», (Ljubljana: *IB review*, 2001b, 1), p. 4–22.
11. Lahiri, K. and Moore, G. H., *Leading Economic Indicators: New Approaches and Forecasting Records* (Cambridge: Cambridge University Press, 1991).
12. Mauro, P., *Stock Returns and Output Growth in Emerging and Advanced Economies* (*IMF Working Paper*, 2000, 89).

13. Mencinger, J., The Macroeconomic Framework in E. Lah (Ed.) *Some Features of the Slovenian Financial System Development*, (Ljubljana: The Bank Association of Slovenia, 1995).
14. Moore, G. H. and Shiskin, J., *Indicators of Business Expansions and Contractions* (New York: National Bureau of Economic Research, 1967).
15. Niemira, M. P. and Klein, P. A., *Forecasting Financial and Economic Cycles* (New York: Wiley & Sons, 1994).
16. Poterba, J., Samwick, A., «Stock Ownership Patterns, Stock Market Fluctuations, and Consumption» (Broking Institution: Brookings Papers on Economic Activity, 1995, 2), p. 295–397.
17. Statistics Canada, *X11ARIMA version 2000* (Ottawa, Canada, 1999).
18. Statistical Office of the Republic of Slovenia, *Surveys on Business Trends* (Ljubljana, 1994).
19. Stock, J. H. and Watson, M. W. Business Cycles, Indicators, and Forecasting *Studies in Business Cycles*, 28 (Chicago: The University of Chicago Press, 1993).
20. Stock, J. H. and Watson, M. W., «New Indices of Coincident and Leading Economic Indicators» *Macroeconomics Annual* (National Bureau of Economic Research (U.S.), 1989).
21. Zarnowitz, V., *Business Cycles: Theory, History, Indicators, and Forecasting* (Chicago: The University Press of Chicago Press: NBER, 1992).