COMPOSITE LEADING INDICATOR FOR TURKISH ECONOMIC ACTIVITY

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Abstract

This paper focuses on the construction of a composite leading indicator (CLI) for Turkish economic activity to provide earlier signals of turning points between expansions and slowdowns. For this analysis, Index of Industrial Production (IIP) is used as an indicator of economic activity and a broad set of economic indicators related with IIP are analyzed to find leading indicators that perform well both in forecasting and tracking cyclical developments of the economic activity. From the broad set of series, seven of them are selected as leading indicators. The selected indicators constitute a balanced subset of demand, supply and policy variables. While constructing CLI, growth cycle approach is used and the cyclical pattern of the series are obtained by eliminating seasonal, irregular and trend components via TRAMO/SEATS and HP filter. Selected leading indicators are combined into a composite leading indicator using the optimal weights derived from principal component analysis. It is found that CLI is anticipating the IIP and it performed well both in tracking and predicting previous turning points of IIP.

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1. INTRODUCTION

Economic growth is the main determinant of the robustness and prosperity in the economy. Due to these properties, the issue of economic growth has been a central concern of countries for a couple of centuries. There are many theories and studies concerning characteristics, sources and the pattern of the economic growth. In most of the studies, it is observed that economic activity exhibits two types of changes. One of them is the upward trend, indicating long-term changes and the other, shorter-term oscillations representing temporary changes. There has always been an interest in measuring long-term trends in economic growth itself partly because analysts of business cycles are interested in measuring deviations from long-term trends. Business cycles can be defined as fluctuations of economic time series around its trend value, after seasonal fluctuations have been removed. Early detection of business cycle turning points has always been a major concern to policy makers, businessmen and investors. Clearly, early recognition would allow them to trigger countercyclical policy measures. There exists an extensive literature which attempts to find reliable forecasting tools for business cycle turning points, from the early landmark study by Burns and Mitchell (1946) to the more sophisticated of Stock and Watson (1989).

An efficient way to predict business cycle turning points is to use leading indicators. Leading indicators are data series that tend to lead business activity. However, experience in many countries have shown that, it is not reliable to use one economic indicator for short term forecasting because some of the leading series may produce false signals of future changes. In order to provide a more comprehensive measure of economic activity, composite leading indicators have been developed in many countries. The composite leading indicators are based on a basket of economic indicators that show a leading relationship with the economic activity. Composite leading indicator enables government and businesses to track the economy's performance and forecast this performance over the near term.

The aim of this paper is to construct a composite leading indicator to forecast economic activity in Turkey. Because of the variability in the growth rate of Turkish economic activity, the growth cycle approach is used in this study[2]. Growth cycle phases refer to expansions and contractions relative to a long run trend. Therefore, the concepts of expansions and contractions are referred to periods of acceleration and slow down of the rate of growth of the series along their long run trend.

[2] The OECD also uses growth cycle approach when producing composite leading indicators for many countries.

The paper is organized as follows. Section 2 discusses and proposes an economic activity indicator to be used as a reference series and describes the potential leading indicators that are to be brought in relation with it. Section 3 sets out the cyclical characterization of the reference series and of the potential leading indicators considered and section 4 tackles the construction of the composite index and its use as an economic activity indicator. Finally, the main conclusions of the work are drawn in section 5.

2. THE REFERENCE SERIES AND DESCRIPTION OF THE POTENTIAL LEADING INDICATORS

2.1 The Reference Series

The aim of the composite leading indicator approach is to provide a measure of economic activity that can help us to predict and to monitor changes in the economy. In this point of view, the preliminary step is to choose a proxy for the economic activity which is called reference series. The reference series is the benchmark that indicates fluctuations in the economic activity. Generally, Gross Domestic Product (GDP) or Index of Industrial Production (IIP) is used as a measure of economic activity. GDP is probably the most obvious choice for the reference series since it has the advantage of a wider coverage than the industrial production. However, it is available on a quarterly basis with two quarters delay and it is subject to significant revisions. In this study, IIP is chosen as the reference series, which has the advantage of being a monthly reported variable with two months delay and measures the real sector of the economy. IIP covers a significantly great proportion of industrial production and it is thought that the cyclical component of IIP is a useful proxy for the fluctuation of the overall economic activity. (403 items from 918 establishments which represent 70 percent of total industrial production value have been used for the calculation of IIP). Melnick and Golan (1991) for Israel, Kim (1996) for Korea and Taiwan, Agenor et al. (1997) for a group of 12 developing countries are also used IIP as a measure of economic activity in their studies.

2.2 Potential Leading Indicators

A useful leading indicator of economic activity should have the following properties: First, the series must be easily and quickly available and not subject to major revisions that would change earlier conclusions based on them. Second, the cyclical movements in the indicator should precede the reference series with a predictable relationship. Third, the lead time of the

indicator must be long enough to give policy makers time to react. Besides these statistical properties, indicators should also have economic significance. Economic significance relates to the economic reasoning behind why a selected variable could have a leading relationship with the economic activity. For this reason, firstly, the main sources of economic fluctuations have to be determined in order to select potential leading indicators. Hence, it is assumed that, fluctuations in economic activity can be due to supply, demand or policy shocks. A supply shock, any changes in production goods, resources and/or costs, directly affects the production side of the economy. Demand shocks are related with any change occuring in demand factors and policy shocks follow from decisions made by macroconomic authorities, such as changes in money supply, the exchange rate and fiscal policy. In accordance with this classification, the potential leading indicators used are set out below:

Supply Side Indicators:

- Capacity utilization rates
- Production amounts of selected industrial goods
- Wholesale price index (WPI)
- Imports
- Consolidated budget items
- Expectations related with supply side

Demand Side Indicators:

- Consumer Price Index (CPI)
- Exports
- Sales of selected industrial goods
- Cost of living indices for wage earners
- Construction statistics
- Consolidated budget items
- Expectations related with demand side

Policy Indicators:

- Monetary aggregates
- Exchange rates (Dollar, euro and 1$+0.77€ exchange rate basket)
- Real exchange rates
- Interest rates

For the comparison of the reference series and the potential leading indicators, cyclical component of the series is used. The statistical procedures used for obtaining cyclical component of the series, are given in the following section.

3. CYCLICAL CHARACTERISATION OF THE SERIES

3.1 Identification of the Cyclical Component of the Series

The business cycle can be defined as continual ups and downs of business activity that occurs around the long-term trend after seasonal adjustment. As it can be derived from the definition that business cycle requires identification of the components. The value of economic time series is comprised of four components: the trend, cyclical variation, seasonal variation, and irregular movement. The trend component represents the long-run movement in the series whereas the cyclical variation captures the cycles arising from business cycle fluctuations. The seasonal variation picks up seasonal patterns that are more or less constant over the years and the irregular movement represents the non-systematic pattern of the series. In analyzing business cycles, firstly, seasonal adjustment is done for the series that show a marked seasonal pattern over the year. Seasonal component of the series is eliminated with TRAMO/SEATS[3] procedure. It decomposes unobserved components in time series following the so-called ARIMA model based (AMB) method and it offers much lower risk of over- and under-adjustment than the ad-hoc filters since it produces a specific adjustment procedure for each individual time series. TRAMO/SEATS has several advantages, since the program can identify and correct for, (i) intervention-variable type effects, such as outliers, (ii) special effects such as trading day and working day, (iii) moving holiday effect (Muslim festivals of Sacrifices and Ramadan for Turkey) and (iv) national holidays.

After eliminating seasonal component, the elimination of the long-term trend is needed to observe the cyclical fluctuations. But there are different approaches in detrending techniques. Selecting the appropriate detrending method is related with

- the properties of a trend (whether it is deterministic or stochastic),
- the relationship between the trend and cyclical component (they are correlated or not),
- the assumption made about the trend (statistically based or economic based detrending method).

[3] TRAMO/SEATS ("Time Series Regression with ARIMA noise, Missing Observations and Outliers" / "Signal Extraction in ARIMA Time Series") is a model-based method developed by Gomez, Maravall and Eurostat (1996).

The general opinion in the business cycle literature is that the trend component has a stochastic structure rather than a deterministic structure. In this study, Hodrick-Prescott (HP) method is used for detrending of the series. HP filter is a powerful extractor of a stochastic trend which is uncorrelated with the cyclical component. It has both economic and statistical base and it is a symmetric filter. Flexibility and ease of use are some advantages of it. However, it has also some disadvantages related with the parameter controlling the smoothness of the trend component.

After detrending, because of significant irregularity, some series contain high variation which needs smoothing. In order to reduce the likelihood of false signals, the irregular component in the series is eliminated by TRAMO/SEATS procedure. Thus, cyclical component of the series is obtained, by removing trend and irregular components from seasonally adjusted series.

3.2 Cyclical Behaviour of the Reference Series and the Potential Leading Indicators

The first phase of the analysis is the determination of the cyclical pattern and the turning points of the reference series. In dating turning points of the reference series, known as the reference chronology, two criteria, minimum distance between two peaks or two troughs and the minimum height of the extremum are used. In determining turning points a RATS program written by K.A.Kholodilin (2000) is used.

Figure 1 plots the reference series along with cycles and turning points identified. Decreasing and increasing periods of the reference series are represented by the shaded and unshaded areas respectively.

Figure 1: Cyclical Chronology of the Reference Series, IIP

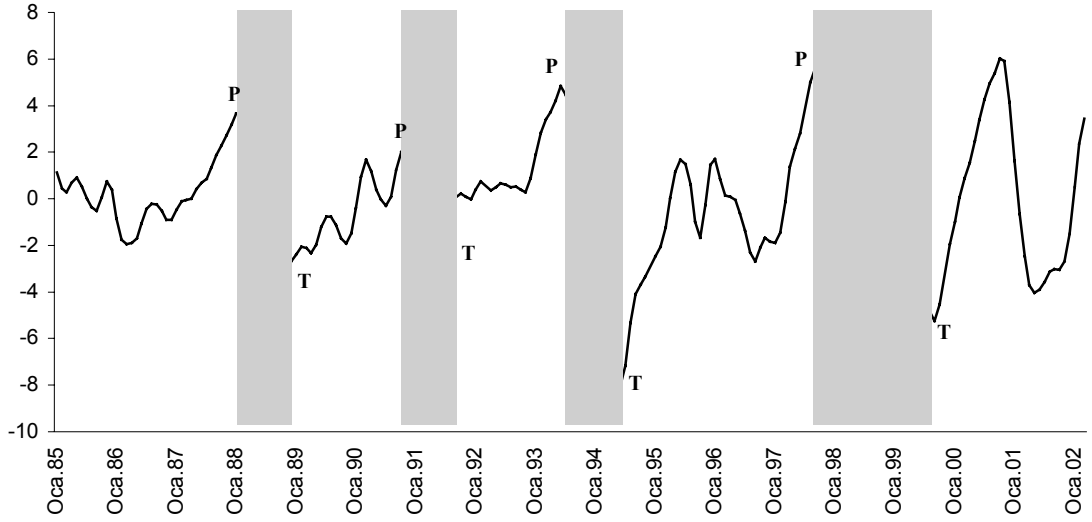


Table 1 provides detailed information concerning the turning points and the duration of the phases.

Table 1: Cycles of IIP (1985:01 - 2002:03)

Turning Points		Duration in Months	
Peak	**Trough**	**Deceleration**	**Acceleration**
February-1988	December-1988	10	22
October-1990	August-1991	10	22
June-1993	June-1994	12	19
October-1997	September-1999	23	13
October-2000	June-2001	9	-
	Mean	12.8	19
	Median	10	20.5

IIP displays five complete cycles over the period 1985:01 – 2002:03.

i. ***February 1988 – December 1988 Recession****:* In this period, national debt was preferred in order to reduce external deficit and this caused an increase in interest rates and then an increase in inflation. Consequently, Turkish lira was devalued and real wages decreased. Several precautions were taken into account on February 1988, and all these precautions were demand restrictive. Restricted demand, high inflation and devalued Turkish lira caused a decline in the economic activity in this period.

ii. ***December 1988 – October 1990 Recovery:*** 1989 was a preparation year for improving economic conditions. In that year, the capital account was liberalized and the Turkish policy makers started to slow down the depreciation rate of Turkish Lira to control the inflation. Also, import tariffs were lowered to support imports. In this period, increased imports and domestic demand supported the economic activity.

iii. ***October 1990 – August 1991 Recession****:* With the beginning of the Gulf Crisis, expectations worsen and the Turkish economic activity affected negatively with the War started on December 1990.

iv. ***August 1991 – June 1993 Recovery:*** Economic uncertainty was ended with the early elections held on October 1991. New government was constructed on November 1991 and policies to improve economic activity were implemented. Improvement in economic activity was achieved by expanding domestic demand

via increasing real wages. It was also supported with the external developments. In June 1992, Black Sea Economic Cooperation, was formed and this increased Turkey's importance in this area. Also in 1992, Gulf War ended. All these developments were resulted with recovery of economic activity in this period.

v. ***June 1993 – June 1994 Recession:*** Due to unsustainable nature of fiscal policy and external deficit, the Turkish economy experienced a major crisis in early 1994. The crisis prompted the authorities to put together a stabilization program which involves deep cuts in discretionary government spending. High inflation, devalued Turkish Lira and high interest rates combined with restricted domestic demand contracted the economy in this period.

vi. ***June 1994 - October 1997 Recovery:*** After the crisis, exports responded quickly to the exchange rate advantages and to the slack domestic demand. By the end of the second quarter of 1994, inflation acceleration started to decline. With, high interest rates and the expectation of much lower depreciation rate, short-term capital began to flow back and reserves were rebuilt again. Economy rebounded in this period.

vii. ***October 1997 – September 1999 Recession:*** In July 1998, the Turkish government started another disinflation program. The program achieved some improvements concerning the inflation rate. However, the Russian crisis in August 1998, elections in April 1999 and the devastating earthquake in August 1999 affected Turkish economy negatively.

viii. ***September 1999 – October 2000 Recovery*:** Government started another program after the elections in April 1999. Interest rates declined as a result of this economic program and this led to a burst in consumption. Expectations and improvements in economy supported the economic activity in this period.

ix. ***October 2000 – October 2001 Recession:*** Economic activity went into recession in this period due to the financial crisis started in banking sector in November 2000 and the crisis occurred in February 2001. Consequently, Turkish lira depreciated and interest rates increased. This caused a recession in the domestic demand in this period.

After determining the reference chronology, cyclical properties of the economic time series are investigated. First, economic indicators are summarized as countercyclical, procyclical or acyclical by the help of cross-correlation analysis. The series is defined to be procyclical (countercyclical) with the movement of the cyclical component of IIP if contemporaneous cross-correlation is positive (negative). The series is acyclical, if the cyclical component of

the series is uncorrelated with the cyclical component of IIP. In Table 2, the cyclical properties of the potential leading indicators are summarized.

Table 2: Cyclical Properties of Potential Leading Indicators

Procyclical	Countercyclical	Acyclical
• Production of selected industrial goods	• WPI	• Consolidated budget items
• Imports	• CPI	
• IIP (Sub sectors)	• Exports	
• Capacity utilization rates	• Interest rates	
• Monetary aggregates	• Cost of living indices for wage earners	
• Construction statistics	• Exchange rates	
• Sales of selected industrial goods		

In general sense, relations between the reference series and the economic time series are found to be feasible. Consolidated budget items are found to be acyclical. This can be due to consolidated budget items do not show proper cyclical pattern. An unexpected result is obtained in exports, rather than procyclical it is found to be weakly countercyclical.

Further analysis is carried out and economic time series are classified as leading, lagging or coincident indicators using Granger causality test and peak-trough analysis. A good leading indicator, is expected to Granger cause the reference series and to give early signals for the turning points of the reference series. By using these two analysis, economic indicators are classified as leading, lagging or coincident and this classification is given at the Table 3.

Table 3: Leading Characteristics of the Indicators

Leading	Lagging or Coincident
• Production of selected industrial goods	• WPI
• Monetary aggregates	• CPI
• Construction Statistics	• Exports
• Sales of selected industrial goods	• Imports
• Interest rates	• IIP (Sub sectors)
• Expectations	• Capacity utilization rates
	• Cost of living indices for wage earners
	• Exchange rates

The above classification is just for a general case. For example, except from imports of intermediate goods, import sub items are coincident indicators. Likewise, WPI, CPI, exchange rates, exports, imports, sub-items of IIP and capacity utilization are found to be coincident or lagging indicators. On the other hand, in the general sense, monetary aggregates, interest rates, expectations, production of selected items, construction statistics are found to be leading indicators.

After evaluation of potential leading indicators according to Granger causality test, cross-correlation and peak-through analysis, the series which show turning points well in advance of the reference series cycles are chosen as leading indicators. Among the potential series, a total of seven series are selected which lead the reference series, reflect minimal variance around the turning points and have high cross-correlation with the reference series. The selected indicators constitute a balanced subset of demand, supply, and policy variables. The list of final components is as follows:

-Import of intermediate goods

-Discounted treasury auctions interest rate

-Production amount of electricity

-CBRT Business Survey question related with export possibilities

-CBRT Business Survey question related with employment

-CBRT Business Survey question related with new orders received from domestic market

-CBRT Business Survey question related with stocks of finished goods

Import of intermediate goods, production amount of electricity and expectations about employment are all supply side indicators. Import of intermediate goods is an important indicator for IIP, since intermediate goods are critical inputs for production. Production amount of electricity is another plausible supply indicator, since approximately, 50 percent of the electricity that is produced is used by industry. Importance of employment in economic activity is obvious; if more is to be produced, more workers must be used in production. Hence, expectations about the changes in employment reflects the expectations in the output. Expectations about export possibilities, stocks and new orders are all demand side indicators and discounted treasury auctions interest rate is a policy indicator. Discounted treasury auctions interest rate represents the cost of production, and has countercyclical relation with IIP. Discounted treasury auction preferred to the interest rates of three, six and twelve months time deposits, since it has a longer lead duration.

Table 4 gives information on the behavior of leading indicators over time including the duration of the corresponding lead and a summary of the cyclical behavior of the indicators.

Table 4: Performance of the Leading Indicators

A. Leads at peaks, in months

	Date of Peak							
Series	Feb. 1988	Oct. 1990	June 1993	Oct. 1997	Oct. 2000	**Mean**	**Median**	**Std. Dev.**
Import of intermediate goods	NA	-1	-1	0	-2	-1.0	-1.0	0.8
Discounted treasury auctions interest rate	-12	-8	0	-8	-6	-6.8	-7.4	4.4
Production amount of electricity	-2	0	-4	4	-8	-2.0	-2.0	4.5
CBRT Business Survey Ques. 2	NA	-7	-10	-1	-7	-6.3	-7.0	3.8
CBRT Business Survey Ques. 11	NA	-3	0	-1	-6	-2.5	-2.5	2.6
CBRT Business Survey Ques. 12	NA	-7	-1	-2	-6	-4.0	-4.0	2.9
CBRT Business Survey Ques. 13	NA	-6	-2	-2	-7	-4.3	-4.3	2.6

B. Leads at troughs, in months

	Date of Trough							
Series	Dec. 1988	Aug. 1991	June 1994	Sept. 1999	Oct. 2001	**Mean**	**Median**	**Std. Dev.**
Import of intermediate goods	1	0	0	-6	-1	-1.2	0.0	2.8
Discounted treasury auctions interest rate	-7	-4	0	-9	-7	-5.4	-7.0	3.5
Production amount of electricity	0	3	0	-1	-7	-1.0	0.0	3.7
CBRT Business Survey Ques. 2	-7	-8	-3	-9	-9	-7.2	-8.0	2.5
CBRT Business Survey Ques. 11	-4	-6	-1	-9	-8	-5.6	-6.0	3.2
CBRT Business Survey Ques. 12	1	-2	-1	-9	-7	-3.6	-2.0	4.2
CBRT Business Survey Ques. 13	0	-7	-1	-9	-7	-4.8	-7.0	4.0

-NA indicates the series are not available for that period.

From the table it can be seen that, demand side indicators have longer lead time which give more useful signal, even though it increases the standard deviation. On the other hand, the shortest lead time belongs to supply side indicators. This implies that economic growth responds more quickly to the supply shocks than the demand shocks.

4. CONSTRUCTION OF A COMPOSITE LEADING INDICATOR

After selecting leading indicators, they are combined into a composite leading indicator (CLI) in order to bring efficiency by increasing the reliability of a CLI. Since each cycle has its unique characteristics and features in common with other cycles, no single cause explains the cyclical fluctuation over a given period. Different indicators have different performance for different cycles. Therefore, it is more plausible to include many possible causes of the cyclical changes by using all potential indicators as a group. In this study, principal components

method is used as the aggregation procedure. Before applying this method, all series are normalized[4] to ensure that their cyclical movements have the same amplitude. Otherwise, the series with the greatest amplitude in their cycles would dominate the cyclical pattern of the composite indicator.

The method of principal components involves the construction of new variables P_j (j = 1,…,k) called principal components, which are linear combinations of the original variables X_i (i = 1,...,n)

$$P_j = a_{j1}X_1 + a_{j2}X_2 + \ldots + a_{jk}X_n, \qquad j = 1,2,\ldots,k$$

The new variables (P_j) are uncorrelated among themselves and maximum number of new variables (X_i) that can be formed is equal to the number of original variables ($k \leq n$). The weights (a_{ij}) applied to the original series in the construction of the principal components which are known as "factor loadings" are estimated in such a way that the principal components satisfy the following properties:

(i) they are uncorrelated (orthogonal)

(ii) the first principal component (P_1) has the greatest possible variance, the second principal component (P_2) has the greatest possible variance among those which are not correlated with the first and so on, until the last principal component absorbs all the remaining variance not accounted for by the preceding components.

In practice, the composition of the first component reflects the greatest possible proportion of the variability associated with the original variables so it represents the best linear combination of the indicators. On the basis of this, when constructing the composite indicator of economic activity, weights proportional to the factor loadings of the first principal component of the set of variables are used. Table 5 shows the factor loadings and the weights that represent the optimal linear combination of selected leading indicators.

Table 5: Factor Loadings and Weights of the Leading Indicators

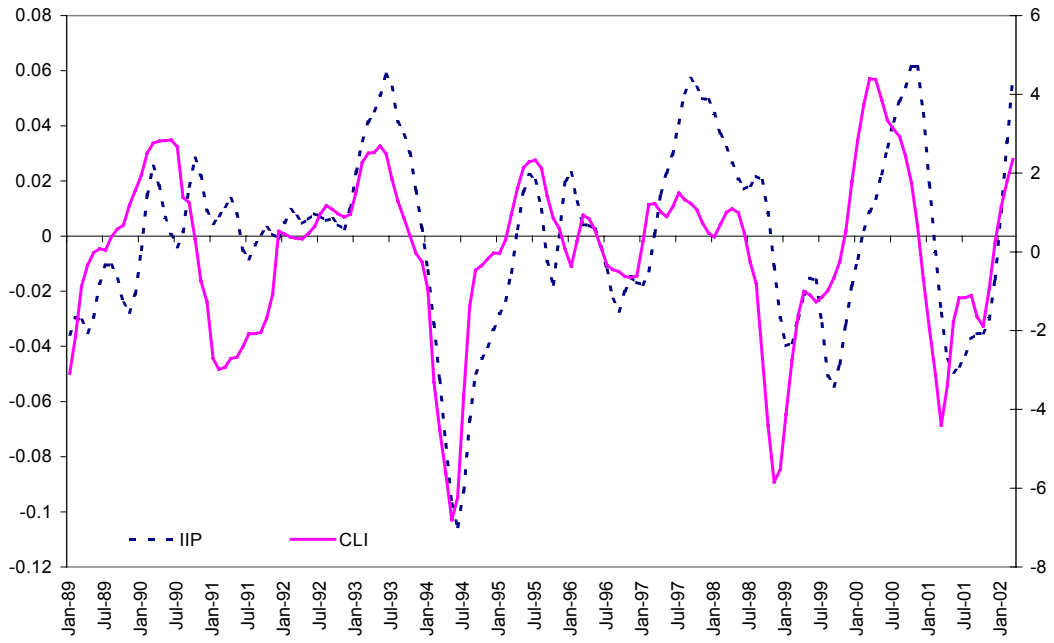
Leading Indicators	Factor Loadings	Weights
Import of intermediate goods	0.35	0.13
Production amount of electricity	0.28	0.11
CBRT Business Survey Ques.12 (Total amount of employment)	0.45	0.17

[4] Normalization is done according to the formula : $(C-\mu_C)/\sigma_C$ where C is the cyclical component of the individual leading indicator and μ_C and σ_C are respectively its mean and standard deviation.

CBRT Business Survey Ques.2 (Export possibilities compared to previous month)	0.29	0.11
CBRT Business Survey Ques.11 (Amount of monthly stocks of finished goods)	-0.41	0.16
CBRT Business Survey Ques.13 (The amount of new orders received from domestic market)	0.45	0.17
Discounted treasury auctions interest rate	-0.39	0.15

Composite leading indicator is formed by combining leading indicators with the indicated weights. Figure 2 shows the cyclical pattern of the constructed CLI and IIP. As it can be seen from the figure, composite leading indicator is anticipating IIP with similar cyclical pattern.

Figure 2: Cyclical Pattern of IIP and CLI



Cyclical profile of CLI reveals that turning points at troughs are much more sharper than the turns occurred at peaks. At peaks, generally, plateaus occur which make it hard to select the exact month of the turn. Hence turns at the peaks must be examined more carefully.

In addition to visual inspection, leading performance must be investigated with more sophisticated methods. Although, there is no exact method to test the significance of the leads Granger causality test, cross-correlation and peak-trough analysis are widely used techniques. Cross-correlation analysis indicates high correlation between CLI and IIP. The maximum correlation occurs at the second lag with value 0.72. For several different lags, it is found that CLI Granger causes IIP. The hallmark of composite leading indicator is the property that its

cyclical turning points lead those of the economic activity. The leading performance of the CLI is given in Table 6.

Table 6: Leading Performance of the CLI

Peak		Trough	
Date	**Number of Lags**	**Date**	**Number of Lags**
February - 1988	NA	December – 1988	NA
October - 1990	-4	August – 1991	-6
June - 1993	-1	June – 1994	-1
October - 1997	-3	September – 1999	-10
October - 2000	-7	October – 2001	-7
Mean	***-3.8***	***Mean***	***-6***
Median	***-3.5***	***Median***	***-6.5***
Std.Dev.	***2.5***	***Std.Dev.***	***3.7***

As it can be seen from the table, the turning points of the IIP are forecasted correctly by CLI. Neither any turning point is missed nor extra turning point observed. The average number of lag length for peak and trough differ from each other considerably. The average lag length for peaks is 4 months whereas it is 6 months for troughs. This indicates an asymmetric relationship between IIP and CLI.

According to the visual inspection and peak-trough analysis, troughs have longer average lead time with sharper turns. Hence, it can be concluded that turns for expansion can be anticipated more effectively than turns for recession.

5. CONCLUSION

This paper is focused on the construction of a composite leading indicator to predict cyclical pattern and the turning points of the Turkish economic activity. IIP is used as a proxy for the economic activity and an analysis is carried out with a broad set of supply, demand and policy variables. All series are adjusted for seasonal and irregular components via TRAMO/SEATS procedure. Then, Hodrick-Prescott method is used for detrending and the cyclical component is derived for each series.

Relation between the potential leading indicators and the reference series is classified according to Granger causality test, cross-correlation and peak-trough analysis. From the broad set of series, seven of them with the most desirable features are selected as the leading

indicators. Of these, two are supply side indicators (import of intermediate goods and production amount of electricity), four are demand side indicators (CBRT Business Survey Questions related with export possibilities, employment, new orders received from domestic market and stocks of finished goods) and one is a policy variable (discounted treasury auctions interest rate).

Selected leading indicators are combined into a composite leading indicator using the weights derived from Principal Component Analysis. Performance of the constructed CLI is investigated through cross-correlation, Granger causality and peak-trough analysis. It was found that CLI is anticipating the IIP with similar cyclical pattern and it performed well both in tracking and predicting previous turning points of IIP.

>From analysis some interesting results are obtained. First of all, when the leading performances of the selected leading indicators are investigated, it is observed that demand side indicators of the CLI have longer lead time which gives more useful signal. On the other hand, the shortest lead time belongs to supply side indicators. This implies that economic growth responds more quickly to the supply shocks then the demand shocks. When the cyclical pattern of the composite leading indicator is investigated, it is observed that at troughs sharper turns occur, whereas at peaks, plateaus occur. Since, plateaus make hard the selection of the exact month of the turn, sharper turns are preferred in identifying the turning points. Hence, extra attention has to paid, while deciding on the date of peaks. In addition to this, peak-trough analysis of the composite leading indicator reveals that there is asymmetric relation between IIP and the composite leading indicator, since average lag length for peaks is 4 months whereas it is 6 months for troughs. This indicates that, turns for expansion can be anticipated more effectively than turns for recession.

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