TÜRKİYE CUMHURİYET MERKEZ BANKASI

REAL SECTOR CONFIDENCE INDEX FOR TURKEY

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NEED FOR A LEADING INDICATOR

- Reliable and timely information on business conditions is crucial for a Central Bank in order to formulate forward looking monetary policies.

- Especially in inflation targeting regimes, monetary policies based on demand management require accurate forecasts of the business conditions, in particular slowdowns and expansions in economic activity.

- However, no single indicator can capture the fluctuations in overall economic activities.

→ **Real Sector Confidence Index (RSCI)** was formed as a composite index in which the responses given to different questions of the Business Tendency Survey (BTS) are evaluated jointly.

BUSINESS TENDENCY SURVEY (BTS)

- Central Bank of the Republic of Turkey (CBRT) started to conduct the monthly **BTS** in 1987.

- To produce indicators that will show the short-term tendencies in the manufacturing industry, considering the assessments of the senior managers about the recent past, current situation and their expectations regarding the future course of business conditions.

- BTS became a part of the **'Joint Harmonized European Union (EU) Programme of Business and Consumer Surveys'** in 2007.

CHANGES IN BTS

➢Questions were reviewed, the questions which are not covered in the ‘Industry Survey’ of EU were excluded. Similar questions were fully harmonized and two different survey forms prepared to be conducted monthly and quarterly.

➢ The scope of the survey units was extended in collaboration with the Turkish Statistical Institute (TURKSTAT).

➢ Weighting procedure was started to be implemented in aggregating the results.

SURVEY QUESTIONS OF BTS

2 Survey Forms :

Monthly

22 Questions

- Trends, Expectations → Production
- Trends, Current, Expectations → Sales Orders (Overall, Domestic, Export)
- Fixed Investment Expenditures → Employment
- Stocks of Finished Goods
- Unit Cost (Trends, Expectations) → Selling Prices (Overall, Domestic)
- General Course of Business → Capacity Utilization Rate
- Interest Rate on Loans → Producer Price Inflation Rate

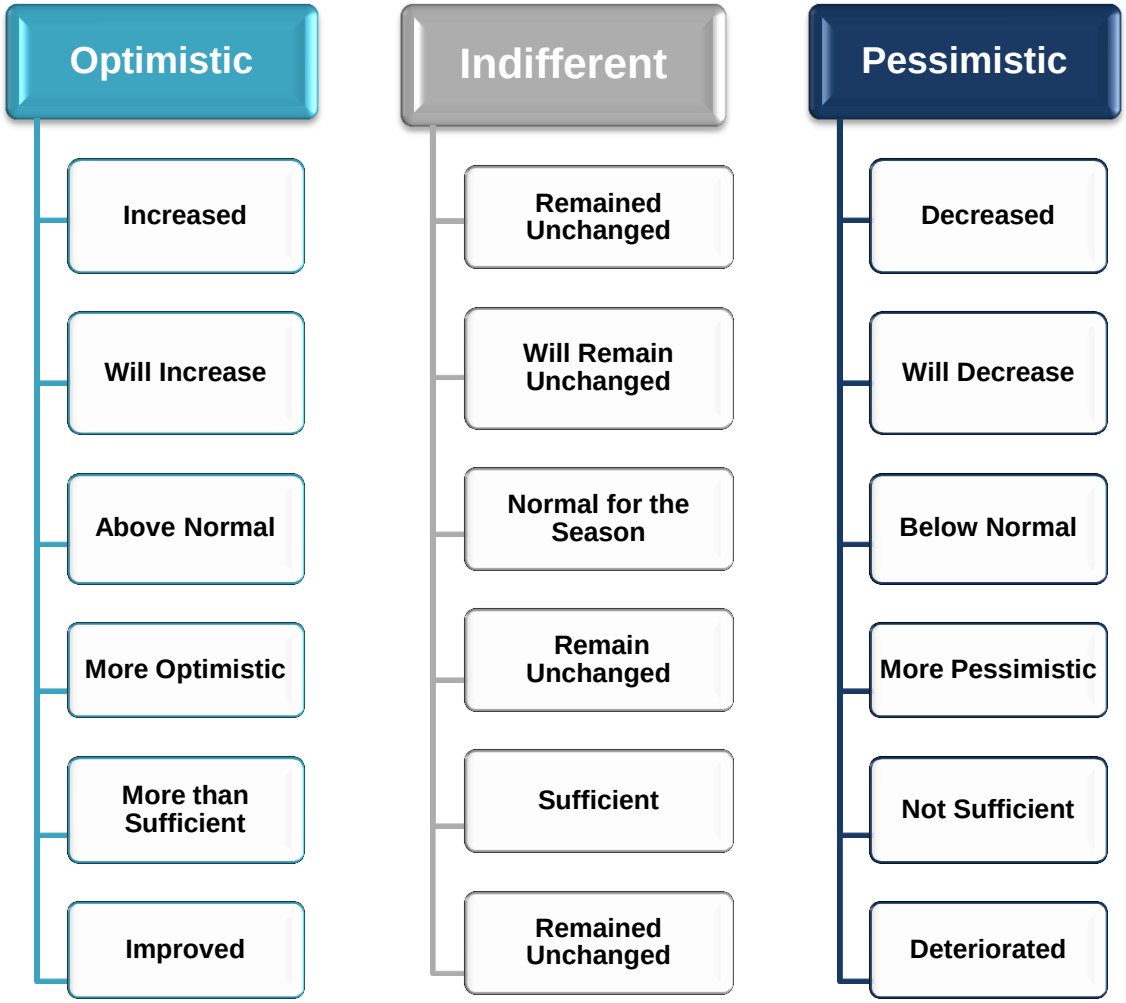
Quarterly

January, April, July, October

28 Questions

- Factors Limiting Production
- Level of Production Capacity
- Period of Production Assured by Sales Orders
- Competitiveness (Domestic, Inside EU, Outside EU)

RESPONSES OF BTS



Balance: The difference between the **weighted** percentage of **'optimistic'** and **'pessimistic'** responses

COMPONENTS OF RSCI

RSCI(*) is a summary indicator which is constructed by the joint evaluation of responses given to different questions of BTS for the purpose of tracking the general views of the real sector representatives about general economic outlook.

- **Diffusion indices (DI)** for these questions are calculated by adding up 100 to the aggregated balance values.
- Principal component analysis to choose optimal weights illustrated that scores have approximately **equal weights**.
- **RSCI** is computed by taking the arithmetic average of these sub-indices.

(*) Based on: Ece Oral, Dilara Ece and Türknur Hamsici (2005) *'Building Up a Real Sector Business Confidence Index for Turkey'*, Central Bank Review. 5.1, 23-54

INTERPRETATION OF RSCI

RSCI is interpreted as follows:

RSCI =100: A stable outlook to the economic activities.

RSCI >100: An optimistic outlook to the economic activities

RSCI <100: A pessimistic outlook to the economic activities

REVISING THE RSCI

- **Study in 2013**

  Emine Meltem Baştan, Gülsüm Çınar Dolgun and Özgül Atılgan Ayanoğlu (2013) *'Improving the Real Confidence Index for Turkey as a Leading Macroeconomic Indicator'*

- **Revisions in BTS in 2007**
  - Sample coverage
  - Questions
  - Aggregation and weighting

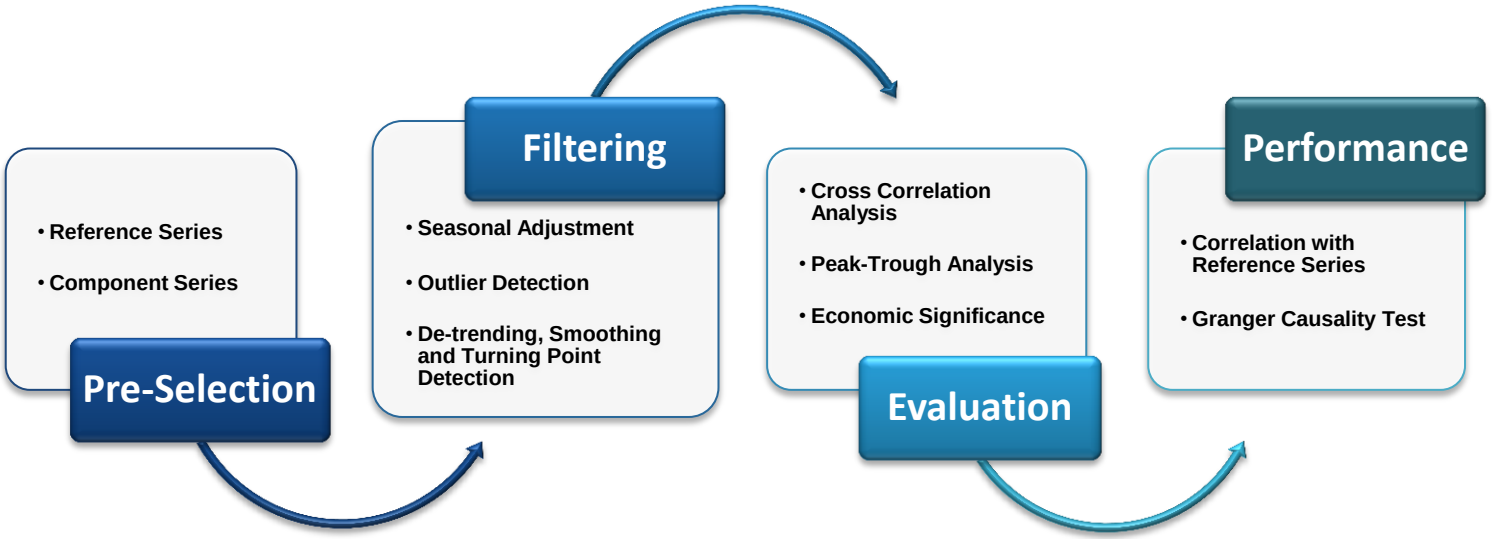
- **Purpose**
  - to review the components of the existing RSCI
  - to test its performance as an indicator of business cycles in Turkey
  - to construct the index with fewer variables while preserving its quality

- **Methodology**
  - OECD System of Composite Leading Indicators (CLI)
  - OECD Cyclical Analysis and Composite Indicators System (CACIS)

- **Period**

  January 2007- January 2013 (73 months)

METHODOLOGY



PRE - SELECTION

Pre-Selection

- Reference Series
- Component Series

- **Reference Series**

  - **GDP** series are available on a **quarterly** basis with a **lag of one quarter**
  - **Industrial Production Index (IPI),** released **monthly** and **more timely**
  - The **high correlation** coefficient between **GDP** and **IPI** for Turkey also confirms a strong relationship (0.98 for January 2005 - December 2012).
  - Both seasonally adjusted and unadjusted **IPI** series are used

- **Component Series**

  - **Diffusion indices (DI)** derived from the responses of BTS questions are used
  - Both seasonally adjusted and unadjusted **DI** series are used
  - Responses to **monthly** questions are taken into consideration

FILTERING

Filtering

- **Seasonal Adjustment**
- **Outlier Detection**
- **De-trending, Smoothing and Turning Point Detection**

➢ Seasonality is identified by TRAMO SEATS method in Demetra +

➢ Outliers are identified and replaced by the estimated values by TRAMO program in CACIS

➢ Hodrick - Prescot (HP) filter is applied to all series twice, firstly for removing the trend and secondly for smoothing the de-trended series

➢ Cyclical turning points of DI and IPI are identified by simple version of Bry-Boschan algorithm

➢ 4 turning points in seasonally unadjusted series and 3 turning points in seasonally adjusted series of IPI are detected

EVALUATION

Evaluation

- **Cross Correlation Analysis**
- **Peak-Trough Analysis**
- **Economic Significance**

- **Cross Correlation Analysis:**
  - *Correlations between DI*
  - *DI and year-on-year changes of IPI*
  - *De-trended series of DI and IPI*

➢ High correlations between DI for total, export and domestic sales orders as well as production

➢ **'Average unit cost'** and **'selling prices'** have low correlations with IPI

➢ **'Stocks of finished goods'** have very low correlations with IPI

- **Peak - Trough Analysis:**

➢ Applied both to seasonally adjusted and unadjusted series of DI and IPI

SUMMARY STATISTICS FOR DI

Summary Statistics for Seasonally Unadjusted Diffusion Indices

Series Name	Targeted	Missed	Av.Lead	Std.Dev.	Corr. at Peak	Median Lead	Std.Dev. from Med.
1-Production (trend of last three months)	4	0	6	5.52	0.824	6	5.52
2-Total orders (current month)	3	1	2	2	0.94	2	2
3-Export orders (current month)	3	1	1.5	1.5	0.948	1.5	1.5
4-Monthly stocks of finished goods (current month)	4	1	3.33	2.49	0.688	4	2.58
5-Production (trend of next three months)	4	0	5	4.72	0.834	3	6.35
7-Total employment (next three months)	3	0	5.33	4.71	0.915	2	5.77
11-Total orders (last three months)	4	0	6.5	5.55	0.83	6	5.57
12-Export orders (next three months)	3	0	6.67	5.91	0.834	3	6.95
17-Total orders (next three months)	4	0	5.25	5.13	0.829	3	6.93
18-Export orders (last three months)	4	0	4.5	5.5	0.838	1.5	6.26
19-Domestic orders (current month)	4	1	5.33	4.5	0.941	5	4.51
20-Domestic orders (last three months)	4	0	6.25	5.26	0.782	6	5.27
21-Domestic orders (next three months)	4	0	8.5	6.54	0.831	9	6.56
23-Investment expenditures (next twelve months)	3	1	1	2	0.876	1	2
28-General economic situation (compared with previous month)	4	0	5	4.72	0.79	3	6.35
Reference series: Industrial Production Index	4	0	0	0	1		

SUMMARY STATISTICS FOR DI - SA

Summary Statistics for Seasonally Adjusted Diffusion Indices

Series Name	Targeted	Missed	Av.Lead	Std.Dev.	Corr. at Peak	Median Lead	Std.Dev. from Med.
1-SA Production (trend of last three months)	2	0	2	0	0.844	2	0
2-Total orders (current month)	2	0	0.5	0.5	0.97	0.5	0.5
3-Export orders (current month)	2	0	0	1	0.981	0	1
4-Monthly stocks of finished goods (current month)	3	1	4.5	0.5	0.615	4.5	0.5
5-SA Production (trend of next three months)	2	0	4	1	0.89	4	1
7-SA Total employment (next three months)	2	0	3.5	1.5	0.93	3.5	1.5
11-SA Total orders (last three months)	2	0	2	0	0.857	2	0
12-SA Export orders (next three months)	3	0	6	4.24	0.854	3	5.2
17-SA Total orders (next three months)	2	0	7	4	0.886	7	4
18-Export orders (last three months)	3	0	3.67	4.64	0.835	2	4.93
19-Domestic orders (current month)	3	0	3.67	3.77	0.964	1	4.62
20-SA Domestic orders (last three months)	2	0	2.5	0.5	0.836	2.5	0.5
21-SA Domestic orders (next three months)	2	0	4	2	0.899	4	2
23-Investment expenditures (next twelve months)	2	0	-0.5	0.5	0.906	-0.5	0.5
28-General economic situation (compared with previous month)	2	0	7	3	0.848	7	3
Reference series: Seasonally Adjusted Industrial Production	3	0	-1.67	2.05	0.946		

SELECTING THE COMPONENTS OF RSCI

According to OECD CACIS User Guide:

- Only series with correlation at peak > 0.5
- Drop series missing more than 30 % of all turning points
- Drop series having average lead and peak lead < 2
- Average lead should not be too different than the median lead
- Standard deviation from the mean or the median should be low

Selection Criteria of RSCI:

- **'Stocks of finished goods'** have low correlations with IPI
- DI missing to capture any turning points are excluded
- Capturing the turning points of the reference series with a lead is considered
- Median leads are taken into account together with average leads
- Standard deviation from the mean or the median is considered
- Economic significance is considered

ECONOMIC SIGNIFICANCE

Evaluation

- **Cross Correlation Analysis**
- **Peak-Trough Analysis**
- **Economic Significance**

There must be an economic rationale for expecting a leading relationship with the reference series.

According to the 'Handbook of Business Tendency Surveys' of OECD, since the main aim of BTS is to capture the dynamics of the decision in business cycles, questions regarding **production, demand** and **general business conditions** are considered the main components of the decision process.

CONSTRUCTING THE FINAL RSCI

Remaining Series:

Production, Total Orders, Domestic Orders	**Last 3 Months**
Production, Total Orders, Domestic Orders , Export Orders, Total Employment	**Next 3 Months**
General Course of Business	

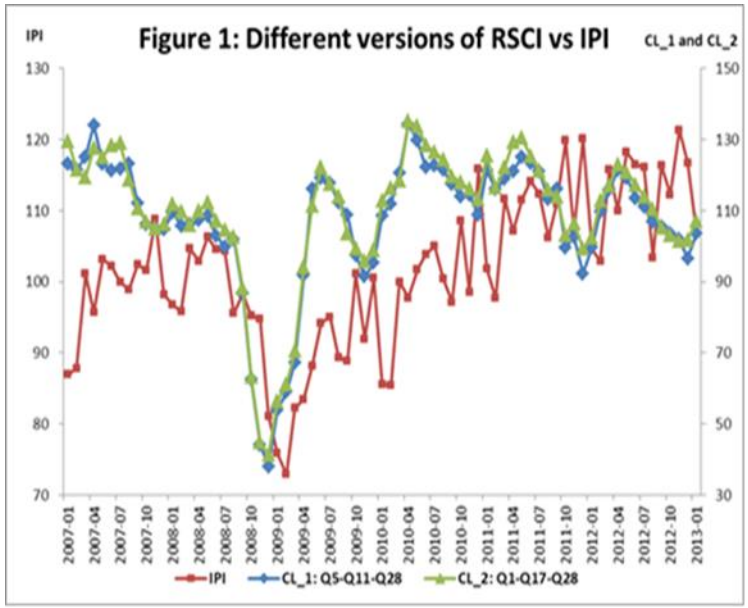
Constructing the Final RSCI:

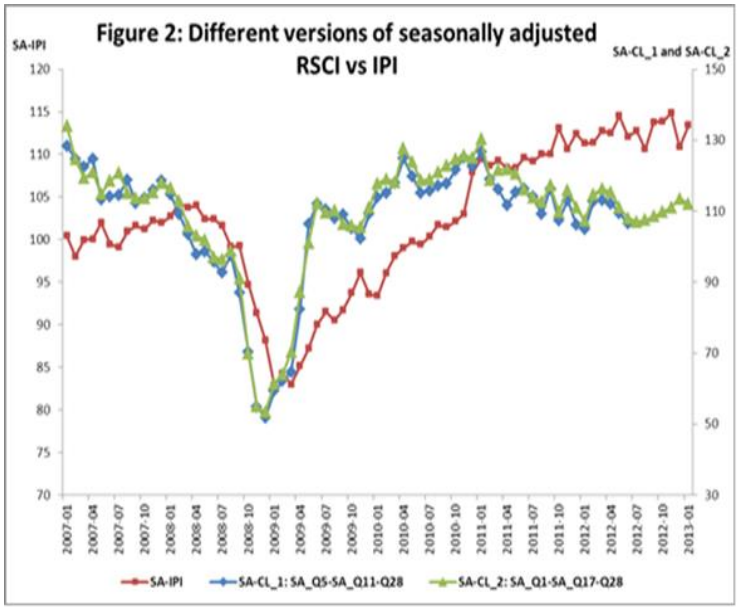
- **Production** series are directly related to IPI and have good statistical properties
- **Total sales orders,** indicator of **demand** conditions, cover both export and domestic orders, export orders do not have good statistical properties
- **General course of business** question is unique and have good statistical properties

ALTERNATIVES OF RSCI

Two Different Versions of CI:

CI_1	**Production - next 3 months**	**Total orders - last 3 months**	**General course of business**
CI_2	**Production - last 3 months**	**Total orders - next 3 months**	**General course of business**





RESULTS

- CI_1 and CI_2 exhibit similar performances
- Other country examples, OECD and EU Commission analysis showed that CI constructed from BTS questions mainly cover *production for future tendency*, *total order books for current situation* and *stocks of finished goods* for its immediate respond to changes in economic activity.
- Questions of *'total sales orders for the current situation'* and '*stocks of finished goods'* are eliminated due to poor statistical properties

✓ Question of production for the next 3 months included

✓ Question of total sales orders for the last 3 months included to cover past evaluations

✓ General course of business included due to economic significance and performance

PERFORMANCE OF RSCI

Performance

Correlation with Reference Series

Granger Causality Test

- ✓ High correlation with the new RSCI (CI_1) and y-o-y change in reference series (IPI): 0.65
- ✓ Hypothesis of no causality between CI_1 and IPI is rejected

	Number of Lags	P Value
CI_1 does not Granger cause IPI	4	0.0002
SA_CI_1(*) does not Granger cause SA_IPI	4	0.00000002

(*) SA implies that the series is seasonally adjusted

CONCLUSION

It is possible to construct the RSCI only with the questions of

- Expectation of production for the next 3 months
- Assessment of total sales orders for the last 3 months
- General course of business

It has the leading capability of the developments in economic activities

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THANK YOU

CENTRAL BANK OF THE REPUBLIC OF TURKEY
STATISTICS DEPARTMENT