New Composite Indicators for Bulgarian Business Cycle

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Abstract

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1. Introduction

The work on this study was driven by three major factors. First, in the light of the recent 2007-2009 world economic and financial crisis many politicians and researchers became acutely aware of the need to have a reliable and strong measure of the current economic situation. Second, great debate has ensued among economic researchers and practitioners in Bulgaria regarding when the recent crisis has stared and when or whether the crisis was over. Third, the recent availability of new reliable monthly data from the National Statistical Institute (NSI) of Bulgaria lent themselves for use in this area of research. This work is also continuation on some previous work (Vesselinov, 2004, 2008).

The need for reliable measure of the current economic situation has long ago been established (Zarnowitz, 1992). The so called reference series or reference cycle is the first instrument needed to evaluate the current phase of the business cycle. The Gross Domestic Product (GDP) is one of the most important indicators of the economic development but it is available only quarterly and for our purposes we would need a monthly data. In some cases a single indicator, like the index of industrial production has been adopted as a reference series (OECD, 1997, p.7). But the majority of researchers recommend using a composite indicator (Diebold and Rudebusch, 1999, Lahiri et al, 2003, Conference Board, 2000) which is usually calculated using several monthly indicators combined in one measure.

Another goal of this study is to compare the business cycle of Bulgaria and the Euro Area. The main question here was whether the two cycles are synchronized or not and how different the timing is.

# 2. New Composite Coinciding Business Cycle Indicator (CBCI)

The data for the components of the coinciding indicator are from the online database of the Bulgarian NSI (www.nsi.bg).

The following series were considered for inclusion as components of the new CBCI: C1. Industrial production index, C2. Construction production index, C3. Turnover index in retail trade, C4. Labor (number of employed by the end of the month); C5. Income (average monthly wages and salaries), C6. Services sector (business survey of current business situation in the service sector). All series except C6 needed seasonal adjustment and they were adjusted using the X12 method. Where appropriate the components were adjusted for inflation.

In this study we use the methodology of The Conference Board (Conference Board, 2000, p.47) for constructing a composite indicator.

The dynamics of the components of CBCI is presented on Figure 1.

Figure 1. Components of CBCI
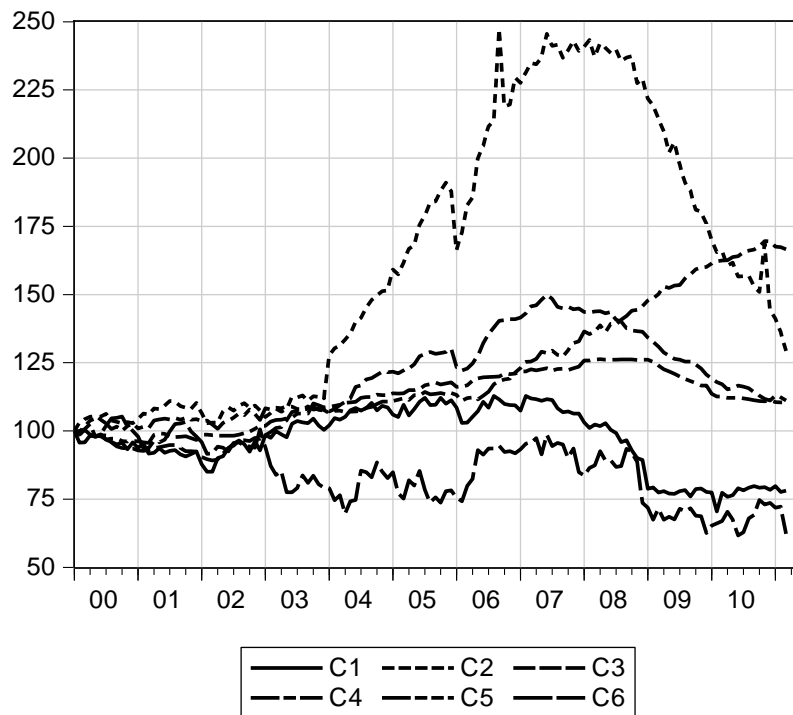
Applying the Conference Board methodology we constructed the new CBCI. We experimented with 4 different versions of the index: CBCI1: includes C1 to C4; CBCI2: includes C1 to C4, plus C5; CBCI3: includes C1 to C4, plus C6; CBCI4: includes C1 to C6; The four versions of the CBCI are presented on Figure 2.

Econometric tests (Alberola-Lopez and Martin-Fernandez, 2003) showed that there is no significant difference between the four time series. Following the principle of parsimony we selected the version with fewest components as the final version of the CBCI. Thus the final indicator has only four components: C1 to C4.

Figure 2. Four Versions of CBCI
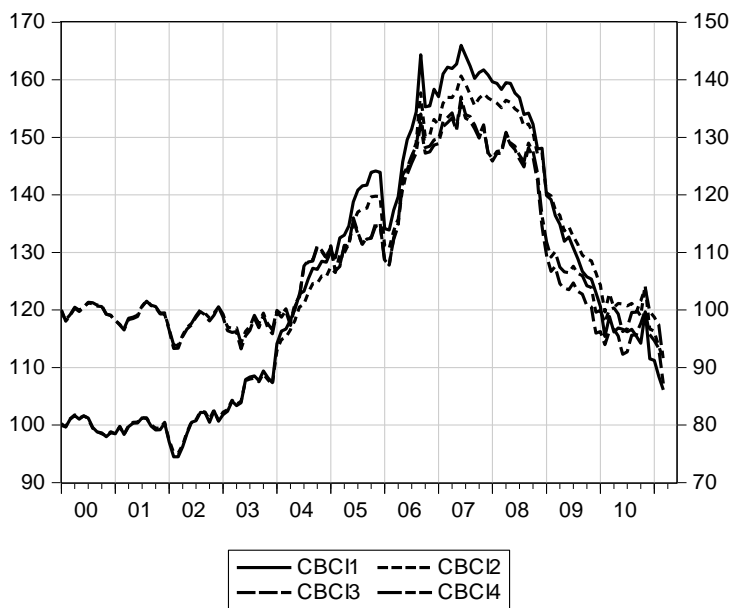
Before we employ the new index we tested its quality. First and foremost, we checked the correspondence between the new coinciding indicators and GDP. We converted the monthly CBCI in quarterly series by taking the quarterly averages and compared them to GDP. The results are presented on Figure 3.

Figure 3. GDP and CCBI
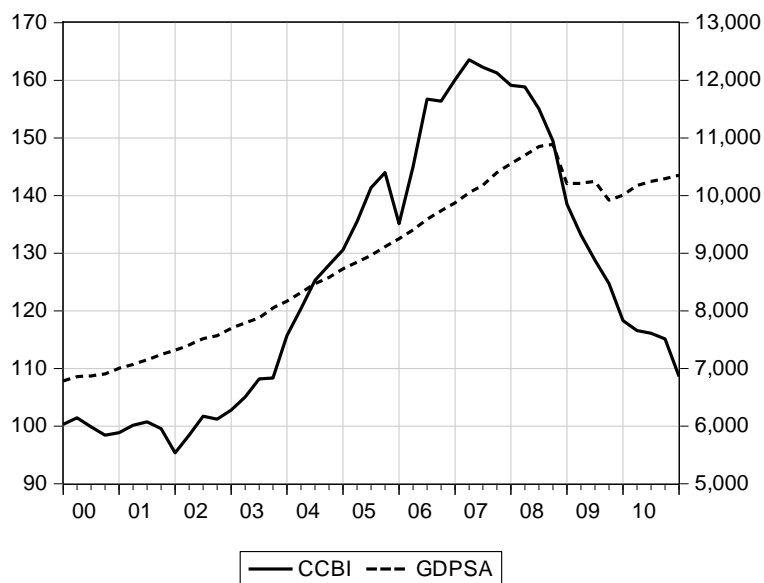
As expected the new coinciding indicator resembles to a certain extend the dynamics of GDP, seasonally adjusted in constant prices of 2000.

Turning Points of the Bulgarian Business Cycle
The main purpose of constructing a coinciding indicator is to use it for determining the turning points of the business cycle. The classical methodology for this purpose was defined by Bry and Boschan (Bry and Boschan 1971). We tested the current applicability of the

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classical methodology on the U.S. coinciding indicator published by OECD (OECD 2011). According to the official dating of the US business cycle by NBER after year 2000 there were two recessions: March - November, 2001 and the "Great Recession" December, 2007- June, 2009. With the Bry & Boschan method and the OECD indicator for US we were able to match almost exactly the official turning points of the US business cycle (see Figure 4).

Figure 4. Confirming US Business Cycle Turning Points with the Bry-Boschan Method
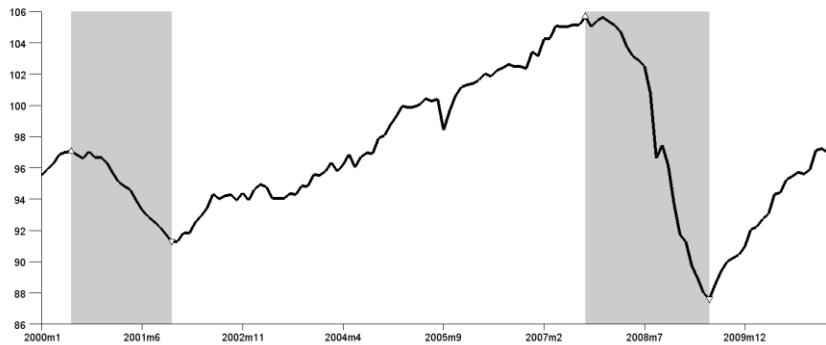
This result gave us the confidence to use the Bry-Boschan method further in the study. We also tested the Hodrick-Prescott filter (Hodrick and Prescott 1997) as another way of determining the cycle phases and the growth cycle for the US business cycle. Unfortunately, the results for the US reference series did not confirm the official NBER turning points and we decided not to use the Hodrick-Prescott filter in our study.
We applied the Bry-Boschan method to the new CCBI for Bulgaria for the period January 2000 – March 2011. The results are presented on Figure 5 and Table 1.
According to the classical Bry-Boschan method there were two periods of recession. First recession: July, 2001 to February, 2002, and second recession starting in June, 2007 and still continuing by March, 2011. Obviously according to this measure, the latest recession in Bulgaria had started very early, at the same time as the "great recession" in the U.S. but did not end in 2009 and in fact the economy is in recession at least by March, 2011.
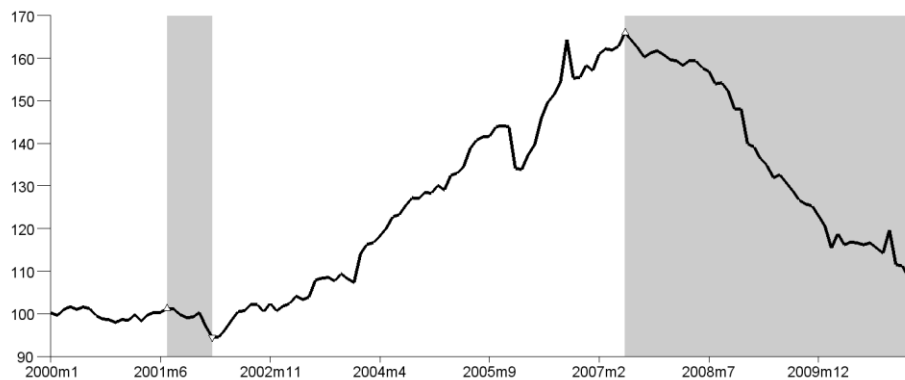
**Figure 5. Bulgarian Business Cycle 2000 – 2011**

Table 1. Bulgarian Business Cycle 2000 – 2011

Recession			Duration (months)
No.	**Peak**	**Trough**	
1.	July, 2001	February, 2002	8
2.	June , 2007	Still in recession by March, 2011	At least 46

3. Comparison of Bulgarian and Euro Area business cycles

European business cycle analysis is based on the reference series for Euro area (17 countries) published by OECD (OECD 2011). The Bry-Boschan method applied to this reference series gave us three recessions for the Euro area (Table 2 and Figure 6).

Figure 6. Euro Area (17 countries) Business Cycle 2000 – 2011
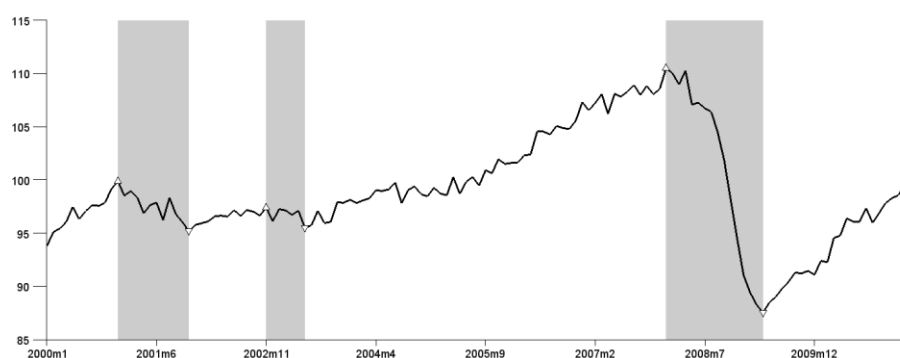
Table 2. Euro Area (17 countries) Business Cycle for 2000 – 2011

| Recession			Duration (months)
No.	**Peak**	**Trough**	
1.	December, 2000	November, 2001	12
2.	November, 2002	May, 2003	7
3.	January, 2008	April, 2009	16

The first recession for the period is December 2000 to November 2001, and the second recession is November 2002-May 2003. The last, "Great Recession" for Europe lasted from January, 2008 to April, 2009. As compared to the US it started later and ended earlier. Before joining the EU in 2007 Bulgarian business cycle was somewhat lagging the EU cycle since the first recession in Bulgaria for the period started 7 months later that the EU first recession. Bulgaria missed the second recession for the area in 2003. But six months after joining EU Bulgaria fell into the "Great Recession" and had not recovered by the end of March 2011, while the EU as a whole recovered by April 2009. The Bulgarian "Great Recession" started 6 months earlier than the EU, and continued at least two years more. It is possible some changes may occur in the dating of the cycle for the end of the "Great Recession" when the data for the rest of 2011 become available.

4. **New Leading Business Cycle Indicator**

The idea of the leading cycle indicator is to predict the turning points of the business cycle and give early warnings for impending recessions. The leading time should be at least 3-6 months if not more.

We constructed the new leading indicator for Bulgaria using the same methodology as the new coinciding indicator described earlier. The difference here is the new component series. There are 6 component series for the leading indicator: Comp1: Business climate in industry, Comp2: Business climate in construction, Comp3: Business climate in retail trade, Comp4: Business climate in in services, Comp5: Vacancies, Comp6: Bulgarian Stock Exchange index (SOFIX). All series are monthly data or average monthly data (e.g. SOFIX) for January 2000 – March 2011. The first four series are published by the Bulgarian National Statistical Institute, the vacancies are published the National Employment Agency and SOFIX is published by the Bulgarian Stock Exchange. The dynamics of the six components are presented on Figure 7.

**Figure 7. Components of the Leading Indicator**
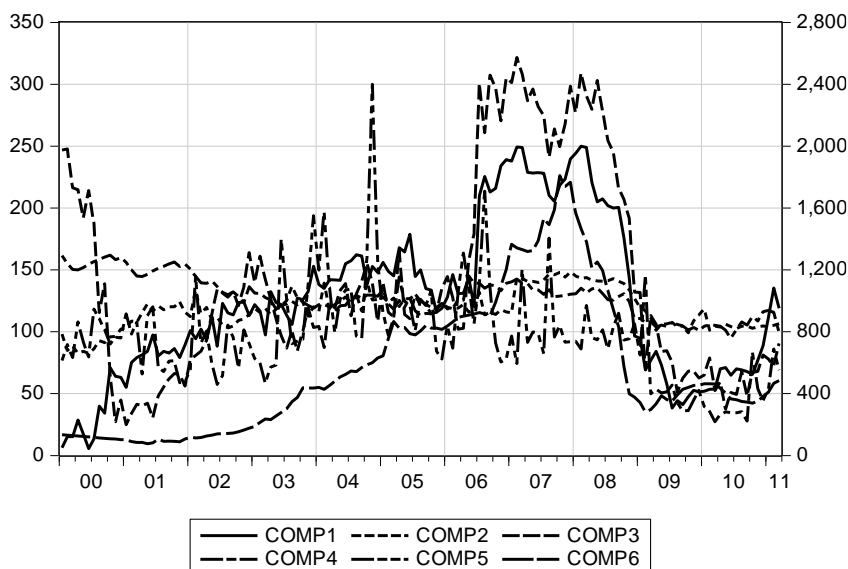
The new leading indicator was constructed using the methodology of The Conference Board (Conference Board 2000, p.47) for constructing a composite indicator.

On the next Figure 8 the coinciding and the leading business cycle indicators are presented. The Leading indicator is smoothed using the FFT transformation.

As we can see from the graph the leading indicator seems to give early warnings of the change of direction in the business cycle. However more time points are needed before we can confirm that the leading indicators is useful for practical purposes.

Figure 8. Coinciding (CBCI) and Leading (LEAD) Indicators
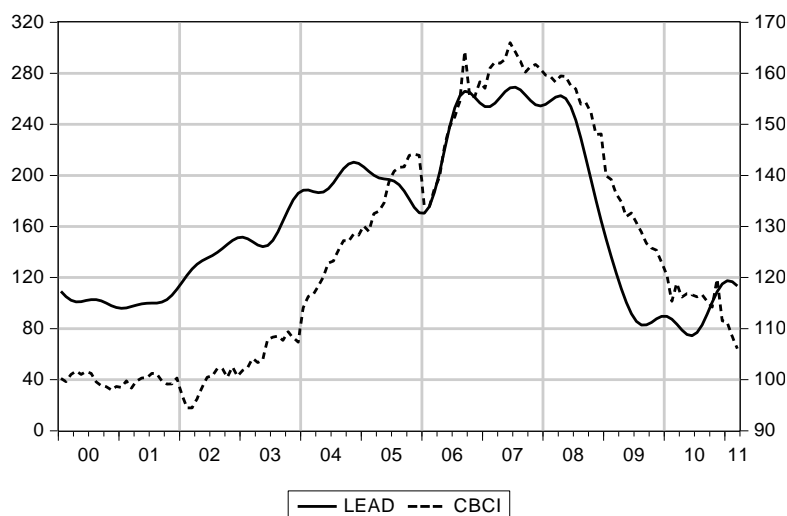
5. Conclusion

The newly created coinciding business cycle indicator for Bulgaria revealed good econometric qualities and could be used as a viable research tool. The applied Bry-Boschan method for dating of the Bulgarian business cycle gave a definitive answer for determining the turning points of the recessions for 2000-2011 period. The national business cycle seemed to be lagging the EU cycle before January 1, 2007 and was early after that. The current "Great Recession" for Bulgaria started in June 2007 and was still continuing by March 2011. It seemed to be very deep and very long and not synchronized with the European business cycle. The leading indicator gives signs that the end of the "Great Recession" for Bulgaria is may be nearing its end.

Acknowledgment

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