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DISCERNING 'TURNING POINTS' WITH CYCLICAL INDICATORS: A FEW LESSONS FROM 'REAL TIME' MONITORING THE 2008–2009 RECESSION

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The cyclical indicators approach has been used for decades but the last recession has once more rekindled an interest for them throughout the world. Several new techniques and indicators were introduced in recent years but the actual quality of these 'newcomers' was not well established. During the last recession, performance of such 'veterans' as indexes by The Conference Board, ECRI, ISM, PhilFed, OECD, etc. has also not been checked in a comprehensive and comparable manner. Another problem with cyclical indicators is that their usage in real time has not yet been fully clarified. Contemporary global economic life is measured in days and hours, but most common economic indicators have inevitable lags of months and sometimes quarters (GDP). Is it possible for a leading indicator (which is monthly in most cases) to be timely? Moreover, the real-time picture of economic dynamics may differ in some sense from the same picture in its historical perspective, because all fluctuations receive their proper weights only in the context of the whole. Therefore, it's important to understand whether the existing indicators are really capable of providing important information for decision-makers. In other words, could they be useful in real-time? What does the experience of the last recession tell us in this regard? This paper answers these questions for the USA as well as for Russia.

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1. Introduction. The 2008–2009 recession as a 'crash-test' for various leading indicators

The cyclical indicators approach has been used for decades since [Burns & Mitchell, 1946] but in the wake of the last recession, the interest for it has been rekindled all over the world. Just for the USA alone, several new techniques and indicators were introduced in the past years (see, for example, [Evans et al., 2002], [Crone, 2006], [Chuavet and Hamilton, 2006], [Chuavet and Piger, 2008], [Novak, 2008], [Aruoba et al., 2009], [Wildi, 2009], [Stock and Watson, 2010b]) but the real quality of these 'newcomers' was not well established. During the last recession, the performance of such 'veterans' as indexes by The Conference Board, ECRI, ISM, PhilFed, OECD, etc. has also not been validated in comprehensive and comparable manner.

Another problem with cyclical indicators is that their usage in real time has not yet been fully clarified. Contemporary global economic life is measured in days and hours, but most common economic indicators have inevitable lags of months and sometimes quarters (GDP). Is it possible for a leading indicator (which is monthly in most cases) to be timely? Moreover, the real-time picture of economic dynamics may differ in some sense from the same picture in its historical perspective, because all fluctuations receive their proper weights only in the context of the whole. Therefore, it's important to understand whether the existing indicators are really capable of providing important information for decision-makers. In other words, could they be useful in real-time? What does the experience of the last recession tell us in this regard?

To answer this question we have to examine a series of more narrow ones. Among them: was the last recession expected? Did the leading indicators really give signs of the beginning and (separately) the end of the recession in advance? Why could the experts hardly recognize the turning points in real time? Could and would a turning points' forecasting be entirely objective?

In our paper all of the problems are examined for two countries: Russia and the USA. Originally, we started our research with Russia[1] and then added the USA as a country which is more traditional and more vital for business

[1] See [Smirnov, 2010a] and [Smirnov, 2010b].

experts and academics. Such 'doubling' of analyses allows us to get more broad and convincing conclusions.

In Section 2 we cite some officials – just to remind of the situation as it was on the eve of the recession. The methodological approaches to detecting turning points in real time are discussed, the literature is surveyed and a simple 'rule of thumb' for comparisons of various cyclical indicators is suggested in Section 3. Then, we take a look at whether the cyclical indicators gave signals in advance in the USA (Section 4) and in Russia (Section 5). In Section 6, we ascertain a gap between indicators' signals and experts' diagnosis (especially in their recognition of the recessions) and discuss the reasons for it. In final Section we make the conclusions.

2. Was the last recession expected?

The USA: unexpected financial turbulence followed by unexpected contraction of real economy

If one should look at 2007 from the current moment in time he will easily see the signals of a forthcoming crisis. There were two most prominent signs: a) permanently (since the beginning of 2006) decline of the real-estate market; and b) negative (since July 2006) spread between long-run and short-run interest rates. Right now one could say that the last means that there were some important investors who had begun to prepare their portfolios for a serious recession. But at the moment the common point is different. The majority of politics, businessmen, and experts thought that the fall of the reale-state was only a correction at a local sector, and negative interest spread was attributed to the heightened demand from China and oil-exporters countries for long US government bonds (those countries really needed such an instrument to sterilize their huge positive trade balance).

So one should not be too surprised that the financial turmoil which came from sub-prime mortages market was unexpected on the part of Federal Reserve. It can be seen quite well from the comparison of three successive FOMC statements released during only ten days in August 2007:

> *FOMC statement, August 7, 2007: "...[T]he economy seems likely to continue to expand at a moderate pace over coming quarters, supported by solid growth in employment and incomes and a robust global economy…*

The Federal Open Market Committee decided today to keep its target for the federal funds rate at 5–1/4 percent".

FOMC statement, August 10, 2007 (three days later): "In current circumstances, depository institutions may experience unusual funding needs because of dislocations in money and credit markets… The Federal Reserve will provide reserves as necessary through open market operations… at rates close to the Federal Open Market Committee's target rate of 5–1/4 percent".

FOMC statement, August 17, 2007 (seven more days later): "Financial market conditions have deteriorated, and tighter credit conditions and increased uncertainty have the potential to restrain economic growth going forward. In these circumstances, although recent data suggest that the economy has continued to expand at a moderate pace, the Federal Open Market Committee judges that the downside risks to growth have increased appreciably".

But despite all this deterioration in financial markets, the Federal Reserve avoided lowering its target for the federal funds for over a month – until September 18. At that time, the Federal Reserve made its first step in a long run of its anti-crisis decisions and lowered the rate by 50 basic points. The reasoning behind it was the following:

FOMC statement, September 18, 2007: "Economic growth was moderate during the first half of the year, but the tightening of credit conditions has the potential to intensify the housing correction and to restrain economic growth more generally. Today's action is intended to help forestall some of the adverse effects on the broader economy that might otherwise arise from the disruptions in financial markets and to promote moderate growth over time".

As one may see, the Federal Reserve still hoped to fix the financial turbulence without allowing it to wound the real economy. One would also remember that Dow Jones touched its historical maximum during the session on October 11, 2007. It means that it was not just the Federal Reserve that was so optimistic! And even a quarter later, in January 2008 Federal Reserve insisted:

FOMC statement, January 22, 2008: "Today's policy action (lowering of the federal fund rate by 75 basic points. – S.S.), combined with those taken earlier, should help to promote moderate growth over time and to mitigate the risks to economic activity."

It is now well known that the Great Recession begun at that moment while the Federal Reserve still hoped "to promote moderate economic growth over

time". So the contraction in real sector was quite unexpected by policy makers in the USA, wasn't it?

Russia: "a haven of stability"

On January 23, 2008 just one day after the mentioned Federal Reserve's decision, Alexei Kudrin, the Russian Finance Minister, easily admitted to the 'global crisis' but refused any risk for Russian economy in his interview which was taken during the World Economic Forum in Davos. He said:

"In the past few years, Russia has managed to achieve economic stability piling up substantial international reserves, which play the role of an airbag. I believe Russia will soon be the focus of attention as a haven of stability… As a country with substantial reserves, Russia could help soothe the global crisis" (World Economic Forum in Davos, January 23, 2008; http://en.rian.ru/russia/20080123/97602999.html).

Andrei Klepach, Russian deputy economy minister, was the first official who recognized the beginning of the recession in Russia. On December 12, 2008 (almost three months after Lehman Brothers bankruptcy!) he said:

"The recession has already begun and, I'm afraid, it won't end in two quarters" (http://rbth.ru/articles/2008/12/15/151208_recession.html).

As the recession was confessed three months after it had started it was unexpected by policy makers, wasn't it?

3. Data and methods

Using cyclical indicators in real-time: statement of the task

Of course policy makers' optimism may be attributed to their fears of self-realized forecasts (economic agents may reduce their activity being guided just by 'official' predictions and hence the recession scenario would be realized). But what did the existing cyclical indicators show on the eve of the crisis? Were there signs of recession visible in advance or not? The answer to this question is not as simple as it seems, because these indicators, just like all other financial and economic indicators, tend to fluctuate. Therefore, one must decide whether these fluctuations are just white noise or do they contain an important signal about changes in the trajectory of economy as well. In other words, one must extract middle-run changes in the trajectory resting upon only a few observations.

Statistical methods used for detecting turning points: a survey

There were tens of resourceful researches devoted to cyclical turning points dating and prediction. We'll only enumerate a few formal methods which have been applied to this problem:[2]

– Regression analyses: [Alexander and Stekler, 1959], [Hymans, 1973], [Stekler and Schepsman, 1973], [Vaccara and Zarnowitz, 1978], [Wecker, 1979], [Auerbach, 1982], [Kling, 1987], [Huh, 1991], [Stock and Watson, 1992], [Broyer and Savry, 2002], [Stock and Watson, 2003], [McGuckin and Ozyildirim, 2004], [Kholodilin and Siliverstovs, 2006], [Nilsson and Guidetti, 2008];

– Spectral analyses: [Hymans, 1973], [Sarlan, 2001];

– Dynamic factor model: [Stock and Watson, 1989], [Huh, 1991], [Stock and Watson, 1992], [Diebold and Rudebush, 1996], [Kim and Nelson, 1998], [Matheson, 2011];

– Principal components: [Stock and Watson, 1999], [Evans et al., 2002], [Stock and Watson, 2002];

– VAR in its various modifications: [Canova and Ciccarelli, 2004], [Dueker, 2005], [Galvão, 2006], [Paap et al., 2009], [Dueker and Assenmacher-Wescheb, 2010];

– Macroeconomic models: see [Watson, 1991], [Del Negro, 2001];

– Various statistical "diagnostics" rules adopted from engineering, informatics, biology, medicine and other sciences (even from earthquakes forecasting): [Neftci, 1982] and the followers ([Palash and Radecki, 1985], [Diebold and Rudebush, 1989], [Huh, 1991], [Koening and Emery, 1994], [Diebold and Rudebush, 1996]);[3] [Mostaghimi and Rezayat, 1996]; [Birchenhall et al., 1999]; [Keilis-Borok et al., 2000]; [Qi, 2001]; [Andersson et al., 2004], [Andersson et al., 2006]; [Wildi, 2009]; [Berge and Jordà, 2011];

– Markov regime-switching models: [Hamilton, 1989], [Lahiri and Wang, 1994], [Hamilton and Perez-Quiros, 1996], [Layton, 1996], [Layton, 1998], [Layton and Katsuura, 2001], [Koskinen and Öller (2004)], [Chauvet and Piger, 2003], [Chauvet and Piger, 2008], [Levanon, 2010];

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[2] We tried to list the references for each group in their chronological order but scarcely the task is solved without drawbacks and omissions.

[3] See also critics of assumptions of Neftci's method in [Emery and Koening, 1992].

– Various modifications of probit and logit models:[4] [Nazmi, 1993], [Mostaghimi and Rezayat, 1996], [Estrella and Mishkin, 1998], [Birchenhall et al., 1999], [Chin et al., 2000], [Layton and Katsuura, 2001], [Dueker, 2002], [Chauvet and Potter, 2002], [Peláez, 2005], [Leamer, 2007], [Novak, 2008], [Kauppi and Saikkonen, 2008], [Harding and Pagan, 2010];

– Many other more or less formal methods as well as their combinations: [Jun and Joo, 1993], [Anderson and Vahid, 2001], [Sephton, 2001], [Camacho and Perez, 2002], [Price, 2008].

As recessions are very rare events, it's difficult to estimate parameters by traditional statistical methods. And more: all these methods usually need a long statistical time-series and some 'true' set of peaks and troughs for historical 'learning period' to estimate parameters of the models. These assumptions are more or less fulfilled for the USA with their high quality statistics and the NBER's conventional list of business cycle turning points.[5] In many other countries (especially in emerging countries and Russia in particular) the quality of statistics is much worse and there are no common views on dating of cyclical turning points. But even for the USA the situation is not entirely clear. In most cases the 'in-sample' results for such models are much better than 'out-of-sample'; hence the quality of any such model in real time is under great doubt. And more, if an expert monitors business cycles in real time it's not enough for him to know that somewhere in the past somebody has suggested a "really good" approach for forecasting turning points and a "really good" filter for extracting the necessary information. Such an expert is obviously needed in regular (no less than monthly) publications of an indicator, which is based on this 'correct' approach and this 'good' filter. Without such publications, nobody would use these scientific results in real time.

The trouble is the usual absence of such publications: it's not a typical task for an academic to produce a regular statistical newsletter or even a figure for the next month published via internet. Exclusions are not numerous. For the USA we know: [Evans et al., 2002] (based on [Stock and Watson, 1999] and

[4] Usually the probability of a *recession* is an output of such models (as well as markov regime-switching models and many others). But in [Nazmi, 1993] and [Lahiri and Wang, 1994] the probability of expansion is estimated.

[5] Usually the NBER's dating of turning points is considered indisputable. As far as we know only [Stock and Watson, 2010b] and [Berge and Jordà, 2011] have studied the validity of this dating by statistical procedures.

[Fisher, 2000]); [Chauvet and Hamilton, 2005]; [Chauvet and Piger, 2008]; and [Wildi, 2009]. For Russia it is [Smirnov, 2006].

Rules of thumb: a survey

In practice, an expert observes a wide spectrum of cyclical indicators. One of them is constructed as an 'optimal' in some statistical sense; others summarize the information from Business Tendencies Surveys (BTSs); and third are completely empirical (like most of composite leading indicators), etc. If an expert intends to compare their behavior in real time and to reveal the ones which are possibly useful – for decision makers in highly uncertain situation with unknown ('open') date of the successive turning point – he has no other way but to analyze very simple statistical measurers of those indicators and then to apply to them some rule of thumb.

Those measures found in literature are: a) changes in an indicator's level over a time span (one or several months, quarters, etc.); this is the most common way; b) diffusion indexes or dispersions of components of the composite indicators (this approach is typical for more early papers: [Moore, 1954], [Broida, 1955], [Alexander, 1958]; see also [Harris and Jamroz, 1976], [Chaffin and Talley, 1989], [Dasgupta and Lahiri, 1993]; [Novak, 2008]; recent papers [Stock and Watson, 2010a] and [Stock and Watson, 2010b] with their 'heat charts' also belong to this tradition).

As we decided to stint ourselves to only analyze the aggregated indexes and not their components we looked at the changes measures. The rules of thumb proposed before are:

– Two consecutive quarters of GDP decline (2Q or "Okun's rule"). Many have investigated this popular rule and remained unsatisfied (see: [Watson, 1991]; [Boldin, 1994], [Camacho and Perez, 2002], [Leamer, 2008], [Jordà, 2010], [Harding and Pagan, 2010]);

– Decline after N-month (quarters) span[6]: [Alexander and Stekler, 1959]: N from 1 to 7; [Vaccara and Zarnowitz, 1978]: 6 months span decline; [McNees, 1987]: a half a year decline;

– Two, three, four, etc. months of *consecutive* decline of a cyclical indicator (2CD, 3CD, 4CD). See: [Vaccara and Zarnowitz, 1978], [Keen, 1983],

[6] By the N-th month the index has at least returned to the level of N months earlier.

[Palash and Radecki, 1985], [Koenig and Emery, 1991], [Del Negro, 2001], [Tanchua, 2010], and others;[7]

– Various kindred rules: [Keen, 1983]: "two consecutive months of negative and *decelerating* growth"[8]; [Palash and Radecki, 1985]: " a *peak* for two or more subsequent months"; [Koenig and Emery, 1991]: "the percentage difference between the current value of the CLI and its maximum value over the preceding twelve months"; "the percentage gap between the current value of the CLI and a twelve-month moving average of past values"; [9]

– 'Accumulated' measures: [Boldin, 1994]: three-out-of-four months of decline; [Filardo, 1999]: four out of five months; [Altissimo et al., 2010]: the percentage of synchronous movements (movements in the same direction) for a target indicator and predictors of this indicator;[10]

– The "3-D" rule: the duration – depth – diffusion for recent moments in comparison with their historical "standards" (see [The Conference Board, 2001]);[11]

– Other thresholds' rules, e.g.: 50% for PMI; 0% for PhilFed; 50% for some probabilities of recession; –0.7 for the Chicago Fed National Activity index,[12] etc.

The main shortcomings of the most popular rules are well known. All quarterly rules are not suitable for real-time analyses simply because of low frequency and large publication lags. 'The number of consecutive months of decline (NCD)' rules generate false signals too often if N = 2 or 3 (especially for Russian economy with its high volatility); more prolonged periods of uninterrupted decline (growth) are very rare, and hence this rule may generate a lot of missed turning points. At last, 3D (duration – depth – diffusion) rule is not applicable to our multi-countries and multi-indicators real-time analyses because of: a) short history of many "new" leading indicators (for the USA

[7] The rule of two consecutive months of "high" probability of the recession was offered in [Jun and Joo, 1993], [Nazim, 1993] and [Chauvet and Piger, 2008].

[8] Statistical data on growth rates for three consecutive months are needed to be aware that those rates have declined at decelerating rates for two consecutive months.

[9] [Zarnowitz and Moore, 1982] supposed to monitor sequential signals of recession and recovery generated by a pair of indexes – leading and coincident growth rates. It's a good idea, but it had no followers for thirty years!

[10] In general form this non-parametric measure of synchronization was introduced in [Pesaran and Timmermann, 1992].

[11] Strictly speaking the "3-D rule" requires: a) the six-month growth rate (annualized) of the CLI to fall below –3.5; and b) the six-month diffusion index to be lower than 50 percent. But all the figures (–3.5%, 50%, 6 months) are retrieved from historical dynamics!

[12] See [Brave, 2009].

as well as for Russia); b) relatively frequent methodological revisions for some "old" indicators; and also c) short history of business cycles movements *per se* (of course we mean Russia in this context). All these factors hamper statistical estimation of threshholds for each "D".

Our 'rule of thumb'

As it was stated above, we need to extract the middle-run changes in the trajectory (changes in cyclical wave) resting upon only a few observations. Many authors suppose (and we agree), that the minimum time span that is required before we may speak about cyclical decline (growth) is 6 months. We assume that negative/positive cyclical wave is really under way if a cyclical indicator is declining/growing in five (minimum) months out of six.

Designating a negative monthly change with –1 and positive monthly change with +1, we may affirm that the sum for a six months span would be between –6 and +6. If all six changes have the same sign, the sum is equal to –6/+6; if only five changes have the same sign and one change has another sign the sum is equal to –4/+4. If the sum is –2, 0 or +2 we may conclude that no definite direction is observed.

The total number of combinations of six binary values is $C(6,2) = 2^6 = 64$. As there are six combinations with five identical directions and one "other" and only one combination with all six identical directions we may conclude that the probability of 'five (minimum) out of six' sequence of symmetrically distributed random variable is equal to 7/64 = 11%.

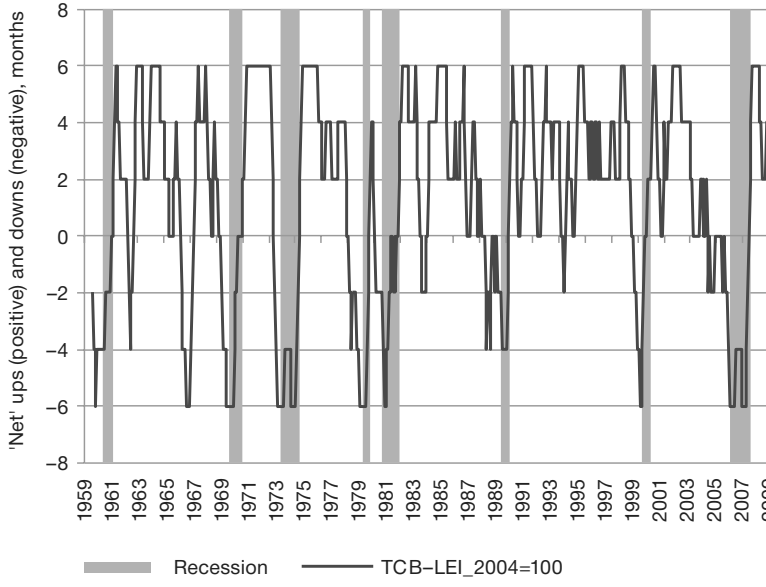
In more formal terms, we may say that in testing a null-hypotheses of no change in trajectory (with an alternative hypothesis of negative/positive tendency) by our "five (minimum)out of six" rule we have a probability of Type I error (erroneous rejection of null hypothesis or a false turning point) equal to 11%. It's only slightly more than the usual threshold in statistical check of hypothesis.[13]

For the subsequent comparisons, we decided to count a 'net' number of months (from a 6 month span) when a cyclical indicator changed in 'proper' direction ('down' before a peak and 'up' before a trough). If an indicator drops during all six last months it equals to –6; if it drops five times and rose only

[13] Incidentally, we may calculate probabilities of false turning point for various NCD rules. For N = 2 it is equal to $1/2^2 = 25\%$; for N = 3 it is equal to $1/2^3 = 12.5\%$; and for N = 4 it is equal to $1/2^4 = 6.25\%$. Obviously the 2CD rule will give a lot of false signals. It is less obvious for 3CD and 4CD rules but in any case those rules are not sufficient because of their short time spans.

once to –4; if there are four downs and two ups to –2, etc. It may be easily shown (see Chart 1) that such an index really pertains to the NBER's history of business cycles. For example, as concerns for the Leading Economic Indicator (LEI) by The Conference Board each recession of the last half century was evidently accompanied by a slump of the score of the LEI to minus 4 or even less. [14]

Chart 1. 'Net' number of Months (from a 6 months span) with ups or downs



Though the charts for other cyclical indicators are not so good in the long-run, we want to compare different cyclical indicators by this criterion for their movements during the 2008–2009 recession – as it looked in real time. We assumed that an indicator with 'high' absolute score on the eve of a turning point had some anticipatory trend in proper direction and since it was possibly useful for predictions in real time. On the contrary, an indicator with 'low' score showed only chaotic oscillations and hence was rather useless for predicting a turning point.

[14] One must also pay attention to 'false' signals in 1962 and 1966 which were accompanied by a sharp decline in real GDP *growth rates*. Sometimes they were treated as true recessions (see [Palash and Radecki, 1985, p. 39]). There also were extensive stabilization measures undertaken at those moments (see [Shiskin, 1970, pp. 108–109]).

Peaks and troughs

According to an old tradition, the turning points (peaks and troughs) for the USA business cycles are defined and announced by the NBER's Business Cycle Dating Committee. This process has very long lags. For example, the peak of December 2007 was announced only in December 2008 (12 months later) and the trough of June 2009 – only in September 2010 (15 months later). One must agree that these are not in 'real time'.

Fortunately we do not have to date a turning point in real time but rather to predict an inevitable approach of such turning point (in fact, leading indicators are usually constructed with this idea in mind). It means, that for our research we have to compare the behavior of various cyclical indicators – according to their historical vintages – in some suburb of turning points as they are dated now (!) by NBER's committee. It could be said that an expert or a decision maker does not need an index which leads to some other index – maybe 'coincident' but subject to several revisions in the future – but an index which makes it possible to predict the approaching of a turning point which would be approved at some point in the future. That is why we used December 2007 and June 2009 for our comparisons (the peak and the trough of the last American cycle as dated by NBER). We suppose that various cyclical indicators had to point to an imminent turn of the economy but we don't strive for the exact dating of those turning points.

As far as Russia is concerned, there is no common procedure for dating turning points. For this paper we defined May 2008 as a peak and May 2009 as a trough for the last Russian recession resting upon the dynamics of quarterly GDP and the monthly 'basic branches' coincident index.[15] In addition to the peak we suggest to consider the brink in September 2008: only after the Lehman Brothers' bankruptcy in the middle of the month, Russian economy finally dropped into a deep recession.[16]

Real-time analyses and data vintages

All cyclical indicators are usually revised because of revisions of initial statistical data, re-estimation of seasonal adjustments and general improvement of methodology. All these reasons are quite natural and hence undisputable but they cause a doubling of perception: one view may be visible in real-

[15] Weighted average of physical output indexes for industry, agriculture, construction, transportation, retail trade, and wholesale trade.

[16] One may find more details for our dating procedure in Appendix 3.

time (with preliminary data) and quite a different one – in historical retrospective (with revised data and adjusted methodology). This problem is well known; it was dealt with from time to time by various authors (e.g. see: [Alexander, 1958], [Stekler and Schepsman, 1973], [Hymans, 1973], [Zarnowitz and Moore, 1982], [Diebold and Rudebush, 1991], [Koenig and Emery, 1991], [Boldin, 1994], [Koenig and Emery, 1994], [Lahiri and Wang, 1994], [Filardo, 1999], [Diebold and Rudebush, 2001], [Camacho and Perez, 2002], [Filardo, 2004], [McGuckin and Ozyildirim, 2004], [Chauvet and Piger, 2008], [Leamer, 2008], [Nilsson and Guidetti, 2008], [Paap et al., 2009], [Hamilton, 2010] and others). The most common conclusion to these papers is that the final version of cyclical indicators draws a favorable picture and hence one may be misled if he puts himself in the hands of the revised historical time-series.

On the other side [Hymans, 1973], [Boldin, 1994], [Lahiri and Wang, 1994], [McGuckin and Ozyildirim, 2004] pointed that real-time data are also useful (as a rule they mentioned historical versions of the modern LEI by The Conference Board). Our aim here is to check the real-time qualities of several cyclical indicators during the last recession; this way we are not interested in their historical merits as they look now.

We couldn't investigate all historical data vintages and all the movements of all available cyclical indicators. This procedure would be too costly and time-consuming. Rather, we analyzed only those time-series (vintages) which had corresponded to the moments of cyclical turning points. Of course, in real time nobody knew that the economy is just around the corner. But did the indicators tell us that this change is approaching? In other words, our aim would not be to predict the exact moment of a turning point in real time, but rather to reveal a change of cyclical trajectory to the opposite direction.

4. Did the leading indicators give signals in advance in the USA?

Leading indicators for USA economy

There are a lot of cyclical indicators for the USA based on very different concepts and techniques. For the surveys of their behavior during various American business cycles one may see: [Alexander, 1958], [Hymanis, 1973], [Stekler and Schepsman, 1973]; [Stock and Watson, 1989]; [Emery and Koening, 1992], [Nazmi, 1993], [Boldin, 1994], [Lahiri and Wang, 1994], [Mo-

staghimi and Rezayat, 1996], [Filardo,1999], [Birchenhall et al., 1999], [Del Negro, 2001], [Diebold and Rudebush, 2001], [Filardo, 2004], [Peláez, 2005], [Chauvet and Piger, 2008], [Harding and Pagan, 2010], [Hamilton, 2010], [Levanon, 2010], [Berge and Jordà, 2011]. Usually, the LEI (Leading Economic Indicator) by The Conference Board (or its predecessors) were the focus of researchers' attention. ECRI's coincident, leading and long-leading indicators were studied in: [Layton, 1996], [Layton, 1998], [Layton and Katsuura, 2001]. The cyclical properties of PMI by ISM (previously named NAPM) were analyzed in: [Torda, 1985], [Harris, 1991], [Dasgupta and Lahiri, 1993], [Estrella and Mishkin, 1998], and especially in [Koenig, 2002]. One may also see [Nakamura and Trebing, 2008] for PhilFed usefulness; [Novak, 2008] for State coincident index; [Nilsson and Guidetti, 2008] for OECD CLI; [Brave, 2008], [Brave, 2009] and [Brave and Butters, 2010] for Chicago Fed National Activity Index.

For our purposes, we chose more than a dozen well-known and regularly available indicators (see Appendix 1). Almost all of them are monthly. There are only two exceptions in our list: first, daily Aruoba-Diebold-Scotti (ADS) index, and second, Weekly Leading Index (WLI) by ECRI. For comparability with other indicators we took ADS index for the last day of each month and WLI for the last week of each month.[17]

Predicting the 'peak' of December 2007

'Real-time' picture for all selected indicators on the eve of the recession is shown on Chart 2 and most general notes are summarized in Table 1. The preliminary conclusions are quite obvious. The most well known coincident (not leading!) indicators based on business surveys' (ISM-PMI and PhilFed-GAC) as well as less known (and also coincident) state diffusion index (PhilFed-StateDI1) and National Activity index by ChicagoFed (CFNAI-MA3) gave the most drastic signal for the economical drop in real time. Three composite leading indexes (by OECD, ECRI and The Conference Board) also gave strong reasons for anticipations of decline. At last, the new indicator by Marc Wildi – which had not been introduced at the moment – could clearly point to the recession. All other indicators gave little ground for predicting a recession at its very threshold.

[17] ECRI also has a monthly composite leading index but it is not available for non-subscribers.

Chart 2. The USA Cyclical Indicators and Their Y-o-Y % Changes (Differences) as They Were on the Threshold of the Peak of December 2007

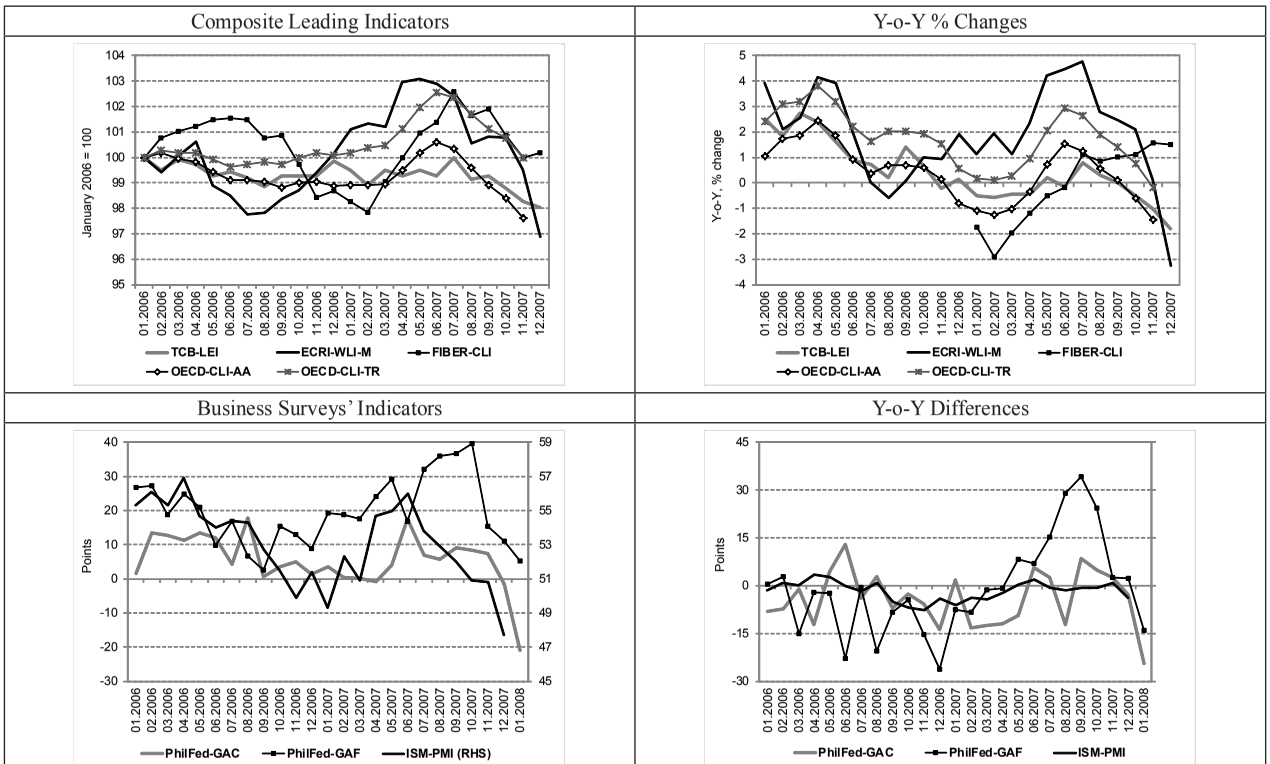
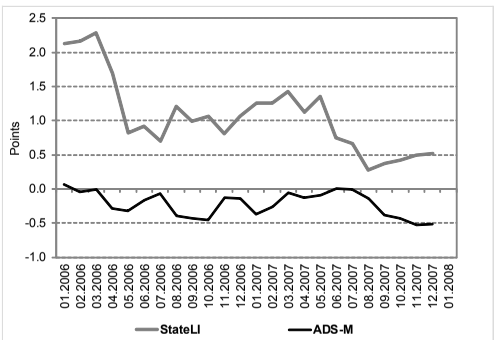
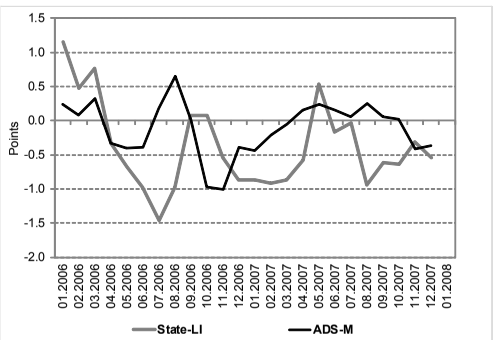
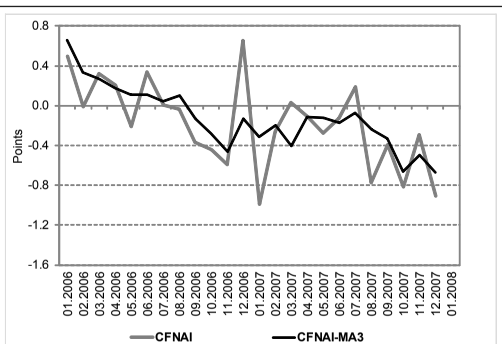
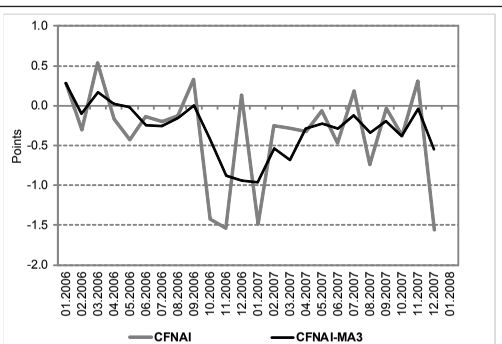
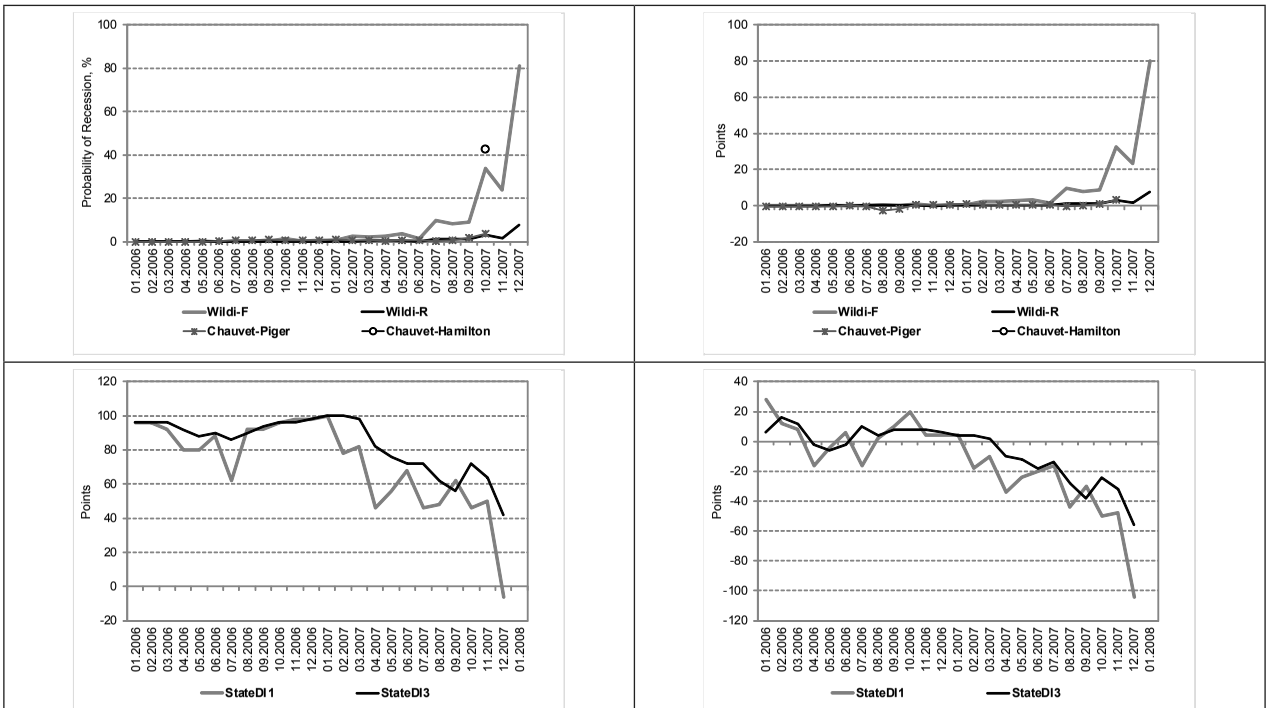


Chart 2 continued

Econometrically Retrieved Cyclical Indicators	Y-o-Y Differences
	
	



Note: See Appendix 1 for sources and comments.

Table 1. The USA: 'Net' Score of Ups and Downs on the Threshold of the Peak of December 2007 (a 6 months span)

Indicator	Date of release	Initial Index		Y-o-Y		Anamnesis
		R–T	R	R–T	R	
						Composite Leading Indicators
TCB-LEI	18.01.08	–2	–4	–4	–4	The real-time net score for the initial TCB-LEI is not too impressive; for the Y-o-Y % changes it is more significant. The TCB-LEI dropped below the 'support level' of the two-years flat trend in November-December of 2007.
ECRI-WLI-M	NA	NA	–4	NA	–4	The real-time values of the ECRI-WLI-M are not available to us. The net score for the historical time-series and for their Y-o-Y % changes is quite high. But the declines of the ECRI's index in the second half of 2006 were almost of the same magnitude and no recession following them. Only in December 2007 the index fell below the mid 2006 level.
FIBER-CLI	NA	NA	0	NA	+2	Real-time values of the FIBER-CLI are not available to us. The net score for the historical time-series is quite low and the net score for their Y-o-Y % changes is, in fact, positive. Despite the FIBER-CLI does have slightly negative dynamics since August 2007 it is not very stable; 2007 levels are still higher than 2006 because of a sharp drop at the turn of 2006-2007.
OECD-CLI-AA	11.01.08	–4	–4	–4	–2	The real-time net score for the OECD-CLI-AA (as well as for its Y-o-Y % changes) is quite high (note that the net score for the revised % changes is lower). The negative trend for the indicator and its % changes is obvious in spite of the fact that only November figure (not December figure as in almost all other cases) is available at the moment.
OECD-CLI-TR	11.01.08	–4	–4	–4	–4	The general picture for the OECD-CLI-TR is the same as for the OECD-CLI-AA but the drop is slightly less visible as the figure for November 2007 is still higher than the ones at the beginning of the year (for OECD-CLI-AA it is lower).
						Business Surveys' Indicators
PhilFed-GAC	17.01.08	–4	–2	–4	–4	The real-time net score for the PhilFed-GAC (as well as for its Y-o-Y differences) is quite high. The sharp drop of the index in January 2008 to the minimum level since 2001 is also very impressive (one additional observation is available for the index if one should compare it with any other indicator except the PhilFed-GAF).

Table 1 continued

Indicator	Date of release	Initial Index		Y-o-Y		Anamnesis
		R–T	R	R–T	R	
						Composite Leading Indicators
PhilFed-GAF	17.01.08	+2	+2	–2	0	This indicator was not very useful for detecting turning points in real time. This means that managers felt fine with their current situation but could hardly predict business cycle's turning points.
ISM-PMI	02.01.08	–6	–2	0	0	In real time it gave a serious signal for the beginning of the 2008 recession: the net score for the index in December 2007 was equal to –6 (the possible minimum) and its level was the least since 2003.
						Econometrically Retrieved Cyclical Indicators
StateLI	–	NE	+2	NE	0	The StateLI was introduced only in June 2010 so there was no information in real time. Revised time series doesn't give a useful signal about the approaching recession: net score of the StateLI is positive because the index had grown for four months before December 2007. In addition, the StateLI itself remains positive which points to a continuation of economic growth (the StateLI predicts the six-month growth rate of the coincident index).
ADS M-Index	–	–4	0	–2	–2	The ADS index was introduced only in December 2008 so we took the December 5, 2008 release (almost a year after the event) as a 'quasi' real-time data. Net score of the index in December 2007 is quite satisfactory (–4) but a signal for the recession is hardly clear: the ADS index usually fluctuates in the interval [0,–0.5] since February 2006.
CFNAI	22.01.08	0	0	0	0	Although the net scores for December 2007 for CFNAI and CFNAI-MA3 were pure, a 'risky' expert could forecast an approaching recession as the level of the indicator had an evident negative tendency after the end of 2005. On the other side, there were several false signals of recession in the past just around the current levels of CFNAI or CFNAI-MA3.
CFNAI-MA3	22.01.08	–2	–2	0	–2	

Table 1 continued

Indicator	Date of release	Initial Index		Y-o-Y		Anamnesis
		R–T	R	R–T	R	
						Composite Leading Indicators
Wildi-F	–	NE	–2*	NE	–2*	Those indexes ("the probability of a recession in the current month") were presented by Marc Wildi (ZHAW-IDP Institute) in June 2009. The net scores are not impressive but 'quasi' real-time "fast" index gives a strong signal: 81% probability of a recession. Though the 'reliable' one is only equal to 8%.
Wildi-R	–	NE	0	NE	–2*	
Chauvet-Piger	01.01.08	–2*	–6*	–2*	–6*	The revised time-series are much better than the real-time estimates. The evident shortage of this indicator is the only available October 2007 figure in January 2008 (not December figure as in almost all other cases). For real-time analyses the two months additional lag is too much.
Chauvet-Hamilton	01.01.08	NA	NA	NA	NA	The real-time series are not available. The revised series begins from October 2007, so it's not enough to tell anything about predicting quality of this indicator.
StateDI1	26.01.08	0	–4	0	–4	Net score for DI1 and DI3 is not too high in December 2007. However, one may note that the DI1 was below 50% since July 2007. In historical perspective this threshold always lead the peaks dated by NBER.
StateDI3	26.01.08	–4	0	–2	–2	

Notes: * – as the indicator grows with increasing likelihood of a recession, we changed the sign of the net score to the opposite for comparability with other indicators in our table

NA – not available; NE – not exists; R–T – real time (January 2008); R – revision of January 2011. See Appendix 1 for the decryption of indexes' abbreviations.

A negative net score means that the number of downs – during a 6-months span before a turning point – is greater than the number of ups; for a positive score the opposite is the case.

Predicting the 'trough' of June 2009

Four indexes (see Chart 3 and Table 2) gave the most prominent signals for the end of the recession in real time (July 2009). They are: ISM-PMI, ADS M-Index, CFNAI-MA3, and the new indicator by Marc Wildi (WILDI-F). On the other hand, their signals were not indisputable. The ISM-PMI was still below 'critical' 50% level (in fact it was even below 45% level); the ADS M-Index had given a sudden leap some months ago (in October 2008) so it was too risky to rely on the index to a full extent; theCFNAI-MA3 was still much lower than the "–0.7 threshold"; and one from the pair of the Wildi's indexes (WILDI-R) still showed high probability of a recession (94%).

The growth of the index of anticipated business conditions (PhilFed-GAF) was not very stable (net score for a 6 months span is only +2) but was very impressive in its scale (more than 60 points). On the contrary, the index of current business conditions (PhilFed-GAC) which had been quite informative before the recession in the end proved to be practically useless before the recovery.

All composite leading indexes (by OECD, ECRI, The Conference Board, and FIBER) as well as the state leading index (StateLI) by FRB of Philadelphia began to grow as of April 2009 and hence before the trough of the crisis. One may decide for himself whether a strong growth of the leading indicators during three consecutive months was really enough to believe the Great Recession was at its end.

5. Did the leading indicators give signals in advance in Russia?

Leading indicators for Russian economy

As cyclical indicators for Russia are less known than for the USA, we compiled a full list of twelve available Russian indexes (see Appendix 2). A brief overview of them suggests that only five are meaningful for evaluation and comparison with each other: one is a 'classical' Purchasing Managers' Index (PMI); three correspond well to ordinary logic of Composite Leading Indexes (CLI); and one is similar to the European Commission's confidence index. All others are not fully suitable for business cycle monitoring simply because there are no available, comparable, and regularly published monthly figures for them.

Predicting the 'peak'/'brink' of February/May/ September 2008

The only indicator which produced a definite signal for the recession in real time was the Purchasing Managers' Index (PMI) by Markit Economics (see Chart 4 and Table 3). It has declined since February 2008 and after June the negative tendency became quite clear; in August-September Markit-PMI fell below 50, the level which is usually considered as a critical one.

Composite Leading Index (CLI) by Development Center (one of the Russian think-tanks) dropped to the seven-years minimum in September but the recession was doubtful as there was no recession in Russia seven years ago. Industrial Confidence Index (ICI) by Higher School of Economics (HSE) was even worse: the index fell for several months before September but the amplitude of these fluctuations was quite ordinary and gave no reasons to forecast the beginning of a recession.

At last, Composite Leading Indexes (CLI) by OECD was completely useless in real time – both in amplitude adjusted and in trend restored forms. In fact, they rather pointed to a growth, not decline of the economy. Note, that for the revised CLIs the opposite is the case: the OECD's CLIs in their present state gave the alarm signal not only for September 2008 but for May 2008 also. One may guess that the radical revision of the OECD's CLI for Russia made in February 2010 (it included a new set of components) was the main cause of the improvement.

One way or another, there was not any indicator which could point to the peak of February/May 2008 in real time.

Russia: predicting the 'trough' of May 2009

CLI by DC, PMI by Markit, and ICI by HSE all gave more or less clear signal for the forthcoming trough in real time. The most definite warning came from CLI by DC but PMI by Markit and ICI by HSE were also acceptable. This can't be said for CLIs by OECD: in real time they rather pointed to a further decline of the Russian economy not to its bottoming. The picture changed significantly after the revision in February 2010, but the question about the usefulness of OECD's CLIs for Russia is still open (for example the revised indexes did not give proper signals for deceleration of the growth in Summer and Autumn 2010).

Chart 3. The USA Cyclical Indicators and Their Y-o-Y % Changes (Differences) as They Were on the Threshold of the Trough of June 2009

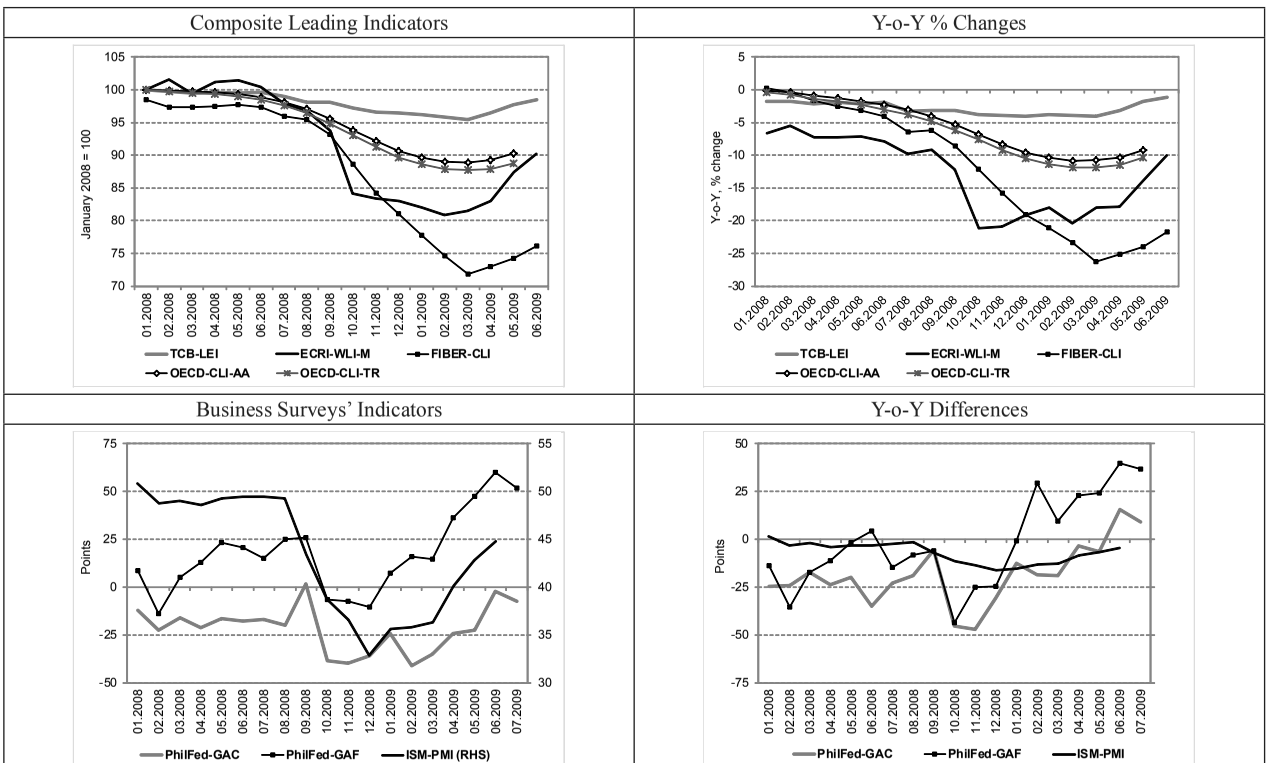


Chart 3 continued

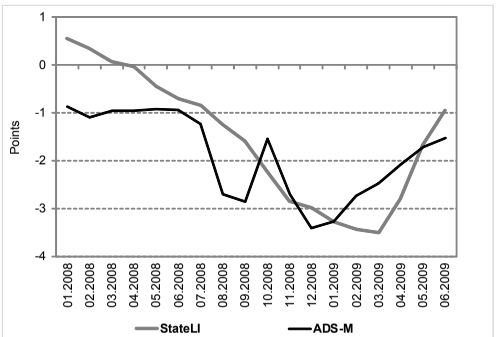
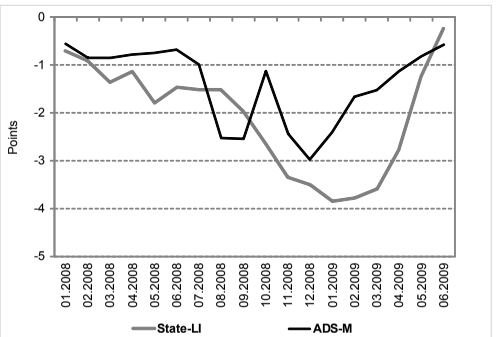
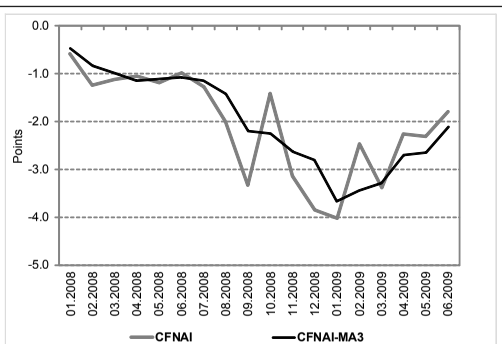
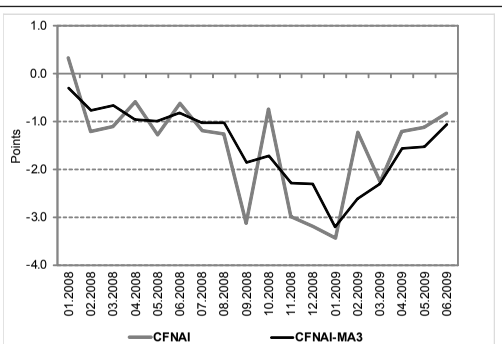
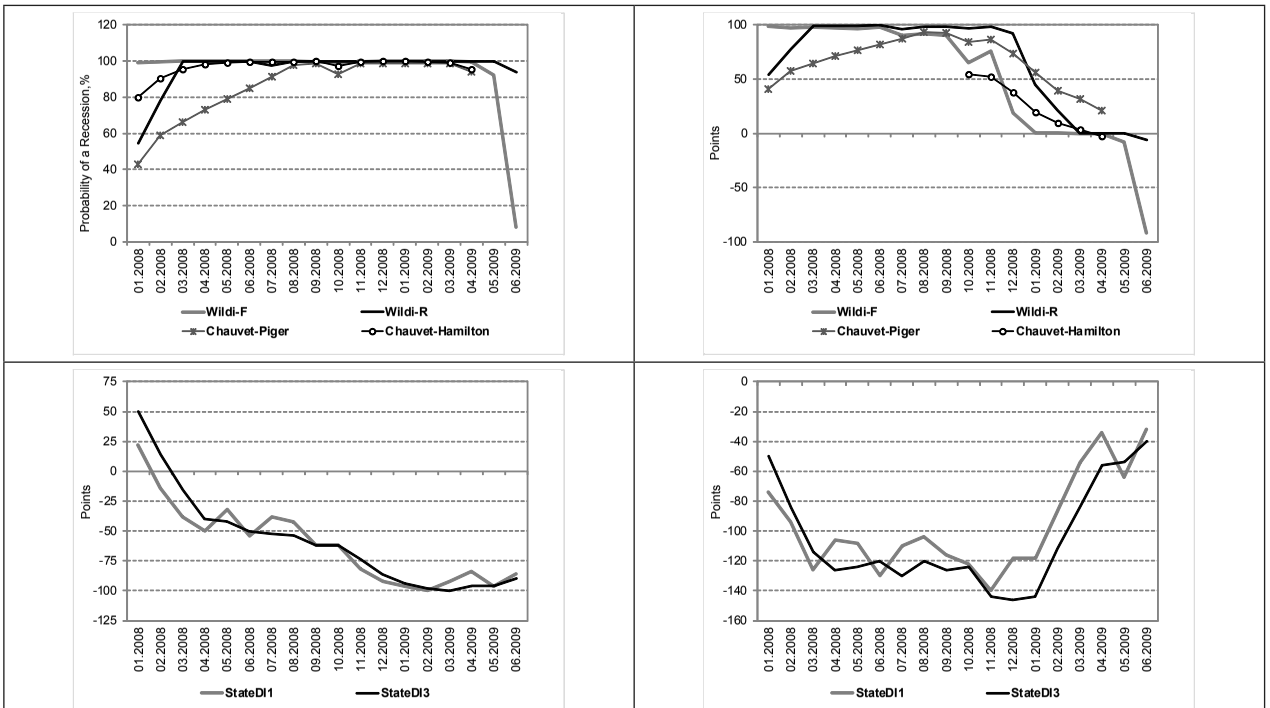
Econometrically Retrieved Cyclical Indicators	Y-o-Y Differences
	
	

Chart 3 continued



Note: See Appendix 1 for sources and comments.

Table 2. The USA: 'Net' Score of Ups and Downs on the Threshold of the Trough of June 2009 (a 6 months span)

Indicator	Date of release	Initial Index		Y-o-Y		Anamnesis
		R-T	R	R-T	R	
						Composite Leading Indicators
TCB-LEI	20.07.09	0	0	+2	+2	The real-time net score for the initial TCB-LEI and for the Y-o-Y % changes is not significant for a 6 month span. But the TCB-LEI rose during all the last three months since April 2009.
ECRI-WLI-M	NA	NA	+2	NA	+4	Real-time values of the ECRI-WLI-M are not available to us. The net score for the historical time-series is not very impressive; the net score for their Y-o-Y % changes is higher. The ECRI-WLI-M rose during all the last three months since April 2009.
FIBER-CLI	NA	NA	0	NA	0	Real-time values of the FIBER-CLI are not available to us. The net scores for the historical time-series and their Y-o-Y % changes are quite low. But the FIBER-CLI rose during all the last three months since April 2009.
OECD-CLI-AA	10.07.09	–2	0	0	0	The real-time net score for the OECD-CLI-AA as well as for its Y-o-Y % changes is quite low. Since only May figure was available at the moment one had only two months of growth since April 2009.
OECD-CLI-TR	10.07.09	–2	–2	0	0	The general picture for the OECD-CLI-TR is the same as for the OECD-CLI-AA.
						Business Surveys' Indicators
PhilFed-GAC	16.07.09	+2	+2	–2	–2	The real-time net score for the PhilFed-GAC (as well as for its Y-o-Y differences) is not high. The value of the index in July 2009 (one additional observation is available for the index) is still below zero.
PhilFed-GAF	16.07.09	+2	+2	+2	0	The real-time net score for the PhilFed-GAF (as well as for its Y-o-Y differences) is not high either. But the overall growth since December 2008 is quite impressive (more than 60 percent points).
ISM-PMI	01.07.09	+6	+6	+6	+6	In real time it gave a serious signal for the end of the 2008 recession: net score for the index in July 2009 was equal to +6 (the possible maximum). At the same time its level was still below 50 points.
						Econometrically Retrieved Cyclical Indicators
StateLI	–	NE	0	NE	+4	The State LI was introduced only in June 2010 so there was no information in real time. Revised time series doesn't give significant net score for a 6 month span but since April 2009 began a strong growth of the index.

Table 2 continued

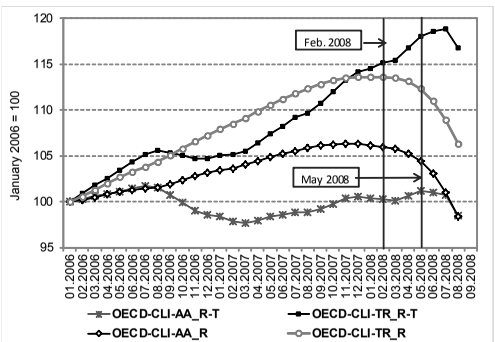
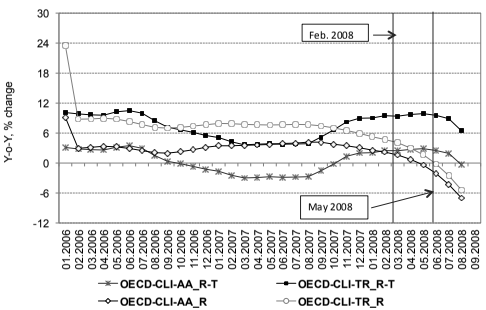
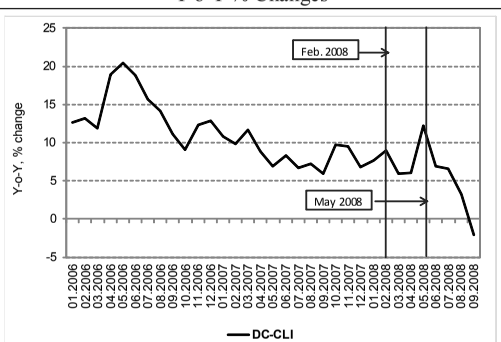
Indicator	Date of release	Initial Index		Y-o-Y		Anamnesis
		R-T	R	R-T	R	
						Composite Leading Indicators
ADS M-Index	16.07.09	+6	+6	+6	+6	The net score of the index in June 2009 is quite satisfactory (+6) but some sudden fluctuations (e.g. in October 2008) hamper definite conclusions.
CFNAI	21.07.09	0	+2	+2	+2	CFNAI-MA3 gives a quite prominent signal for the recovery in historical perspective as well as in real time.
CFNAI-MA3	21.07.09	+4	+4	+4	+4	
Wildi-F	–	NE	+2*	NE	+6*	Those indexes ("the probability of a recession in the current month") were presented by Marc Wildi (ZHAW-IDP Institute) in June 2009. They give a strong but not an indisputable signal: a 'fast' estimate gives only 8% probability of a recession in June 2009 (a drastic drop from the May 92% level); at the same time a 'reliable' index is equal to 94% (a high probability of a recession).
Wildi-R	–	NE	+4*	NE	+6*	
Chauvet-Piger	01.07.09	+2*	0	+4*	+6*	Revisions made the trajectory of the indicator better. In real time, the last probability of a recession (for April 2009) was 94%. It's too much to declare the end of the recession.
Chauvet-Hamilton	01.07.09	NA	+2*	NA	+6*	In real time, the last known figure at the moment was for April 2009 (after all revisions it became equal to 96% probability of a recession). Nothing pointed to the definite end of the recession.
StateDI1	26.07.09	0	–2	+2	+6	Now it's quite obvious that the StateDI1and StateDI3 have pushed from the bottom up to this moment. But who could be so wise then, with indexes so close to –100?
StateDI3	26.07.09	–2	–4	+6	+6	

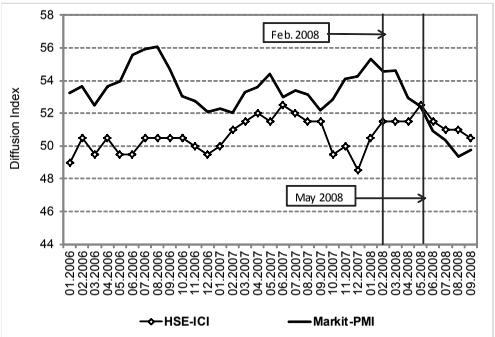
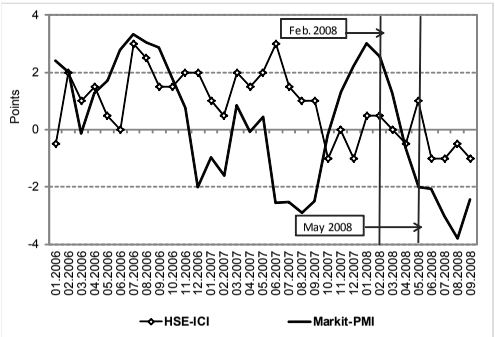
Notes: * – as the indicator grows with increasing likelihood of a recession, we changed the sign of the net score to the opposite for comparability with other indicators in our table

NA – not available; NE – not exists; R–T – real time (July 2009); R – revision of January 2011. See Appendix 1 for the decryption of indexes' abbreviations.

A positive net score means that the number of ups – during a 6-month span before a turning point – is greater than the number of downs; for a negative score the opposite is the case.

Chart 4. Russian Cyclical Indicators and Their Y-o-Y % Changes (Differences) as They Were on Threshold of the Peak/Brink of February/May/September 2008

OECD Composite Leading Indicators	Y-o-Y % Changes
	
DC Composite Leading Indicator	**Y-o-Y % Changes**
This indicator exists only in the form of Y-o-Y % changes	

Business Surveys' Indicators	Y-o-Y Differences
	

Note: See Appendix 2 for sources and comments.

Table 3. Russia: 'Net' Score of Ups and Downs on the Threshold of the Brink of September 2008 (a 6 month span)

Indicator	**Date of release**	**Initial Index**		**Y-o-Y**		**Anamnesis**
		R-T	**R**	**R-T**	**R**	
						Composite Leading Indicators
OECD-CLI-AA	10.10.08	–2	–6	–2	–6	The real-time net score for the OECD-CLI-AA (as well as for its Y-o-Y % changes) for the brink of September 2008 is quite low. It's even worse for the "formal peak" of February 2008 (0) and for the "peak" of May 2008 (+2). Visual analyses easily confirms that there was no useful signal from the indicator in real time. The picture became radically different after revisions. Net score for the revised OECD-CLI-AA and its % changes is equal to –6 (the possible minimum) for September 2008 and gives strong signals for May and February as well (especially for % changes).

Table 3 continued

Indicator	Date of release	Initial Index		Y-o-Y		Anamnesis
		R-T	R	R-T	R	
OECD-CLI-TR	10.10.08	+4	–6	–2	–6	The general picture for the OECD-CLI-TR is the same as for the OECD-CLI-AA: no useful signal in real-time and very strong and clear signal after revisions. Note that the net scores for all OECD's indicators were calculated using the last point available in real time. Usually, the publication lag for these indicators has one additional month in comparison to all other indicators.
DC-CLI	20.10.08	NE	NE	–2	NR	Net score for the index is only –2 but the DC-CLI has dropped for the last four months since June 2008 and in September its level was at a minimum for seven years. So one could suppose that some serious problems for Russian economy are on the way. The dynamics of the index in May or in February gave no signs of such risks.
						Business Surveys' Indicators
Markit-PMI	01.10.08	–4	NR	–4	NR	In real time it gave a serious signal for the beginning of the recession. Although the net score for September 2008 was equal only to –4 one could observe a clear tendency for the declining after January 2008. Besides, in August 2008 the index dropped below the critical 50% level for the first time since November 2004. There was no alarm signal in February or May 2008.
HSE-ICI	07.10.08	–4	NR	–2	NR	Although the net score for HSE-ICI is –4 in September 2008 it's difficult to imagine that somebody could insist that this indicator predicted an inevitable recession: its drop at the end of 2007 was more impressive but Russian economy continued to grow.

Notes: NE – does not exist; NR – no revisions; R–T – real time (October 2008); R – revision of January 2011. See Appendix 2 for the decryption of indexes' abbreviations.

A negative net score means that the number of downs – during a 6-months span before a turning point – is greater than the number of ups; for a positive score the opposite is the truth.

Chart 5. Russian Cyclical Indicators and Their Y-o-Y % Changes (Differences) as They Were on Threshold of the Trough of May 2009

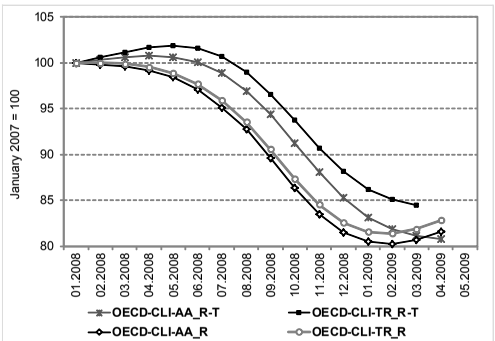
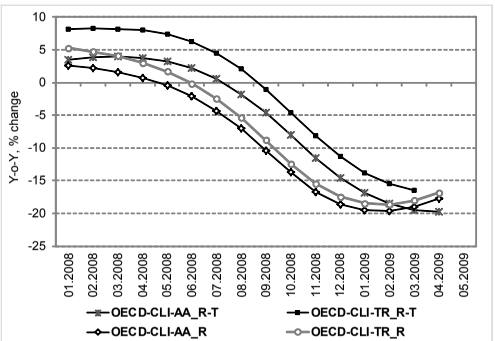
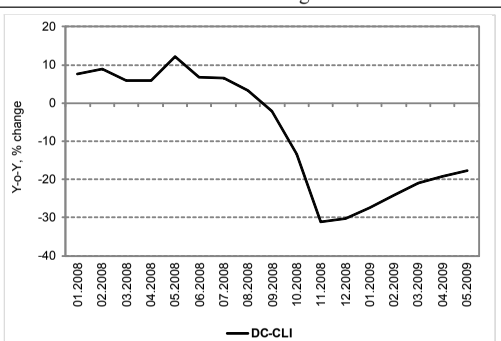
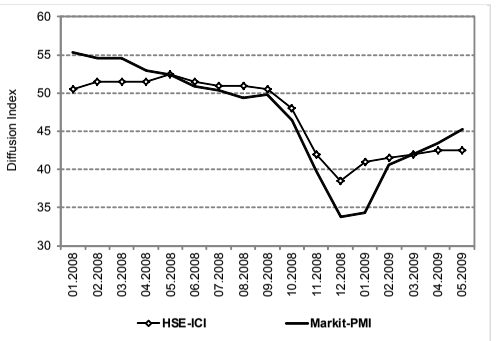
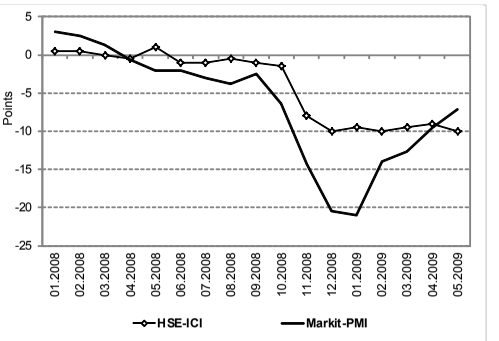
OECD Composite Leading Indicators	Y-o-Y % Changes
	
DC Composite Leading Indicator	**Y-o-Y % Changes**
This indicator exists only in the form of Y-o-Y % changes	

Chart 5 continued

Business Surveys' Indicators	Y-o-Y Differences
	

Note: See Appendix 2 for sources and comments.

Table 4. Russia: 'Net' Score of Ups and Downs of Threshold of the Trough of May 2009 (a 6 month span)

Indicator	Date of release	Initial Index		Y-o-Y		Anamnesis
		R-T	R	R-T	R	
						Composite Leading Indicators
OECD-CLI-AA	08.06.09	–6	–2	–6	–2	The real-time net score for the OECD-CLI-AA (as well as for its Y-o-Y % changes) for the trough of May 2009 is equal to –6 (the possible minimum for a 6 month span). It means that this indicator gave a definite signal of the opposite sign. After revisions the trough has revealed in the trajectory but the ascending segment of the time-series is too short to detect the trough with confidence.
OECD-CLI-TR	08.06.09	–6	–4	–6	–4	The general picture for the OECD-CLI-TR is the same as for the OECD-CLI-AA (also see notes for this indicator in Table 3).
DC-CLI	15.06.09	NE	NE	+6	NR	Net score for the index is +6. The signal for the forthcoming trough and the subsequent growth is as large as possible.
						Business Surveys' Indicators
Markit-PMI	01.06.09	+4	NR	+2	NR	In real time the indicator gave a serious sign for the end of the recession: it began to grow in January 2009 and since that moment it has risen for five months continually.
HSE-ICI	07.06.09	+4	NR	0	NR	Net score for HSE-ICI is +4 in May 2009. Hence the end of recession (the trough) in the nearest future is quite plausible.

Notes: NE – does not exist; NR – no revisions; R–T – real time (June 2009); R – revision of January 2011. See Appendix 2 for the decryption of indexes' abbreviations.

A negative net score means that the number of downs – during a 6-months span before a turning point – is greater than the number of ups; for a positive score the opposite is the case.

6. Why did the experts recognize cycle turning points in real time so rarely?

The main finding from the two previous sections is that some cyclical indicators really gave important signals about the approaching turning points during the 2008–2009 recession in real time but those signals were, for the most part, not entirely definite (this concerns the USA as well as Russia). Since the indexes didn't give an obvious signal some final 'diagnosis' by an expert who could weight all 'pros' and 'cons' and propose his personal conclusion were obviously needed. But if one remembered what the experts told us in real time, one would probably be surprised by a high degree of experts' caution.[18]

In particular, experts usually predict the 'slowing of growth' just before the drop of the economy. Three expressive examples illustrate this point:

– January 2007, Edward Leamer (UCLA): "The models say that a recession is coming soon. The mind says otherwise" ([Leamer, 2007, p. 2]);

– November 2007, ECRI's "U.S. Cyclical Outlook": "Given the size of the shocks hitting the economy, it is critical that ECRI's leading indexes do not switch to a recessionary track"; "The absence of such a combination has also been key to avoiding wrong recession calls" (p. 2). Later (on December 21, 2007 – ECRI Weekly Update): "Still, given the positive export growth outlook and room for further policy action, a recession is not inevitable" (p. 1);

– Late February 2008 (the recession has already begun at that moment), Victor Zarnowitz (a guru in the field of business cycles): "Some pundits mistake the fears for facts and believe the recession is already with us" ([Zarnowitz, 2008, p. 2]).

In fact, it's not difficult to find more quotations like these; this point of view was common (see Table 5).

Forecasting of the trough (and succeeding recovery) for the USA during the last recession proved to be much better in spite of the fact that for cyclical indicators the period of their improvements close to the trough was much shorter than the period of falling close to the peak. Earlier, many authors have noted that it's less difficult to predict the end of a recession than to predict its beginning (see: [Fels and Hinshaw, 1968], [Hymans, 1973], [Chaffin and Talley, 1989], [Koenig and Emery, 1991], [Koenig and Emery, 1994], [Fintzen and Stekler, 1999], [Anas and Ferrara, 2004]).

[18] [Fels and Hinshaw, 1968] wrote about the 1957 peak: "Many were noncommittal, others optimistic" (p. 30). Not much has changed since then. [Fintzen and Stekler, 1999] have studied similar issues based on polls of professional forecasters near the beginning of 1990 recession.

Table 5. News Releases for Various Cyclical indicators in Real Time

Indicators	Date of release	Diagnosis in real time	Notes
			The USA: The peak of December 2007
TCB-LEI	18.01.2008	"Increasing risks for further economic weakness; economic activity is likely to be sluggish"	For several months in 2008 TCB wrote "weak activity" or "weakening activity"; they wrote about *contraction* of the economy in November 2008 (!) for the first time ("Economy is unlikely to improve soon, and economic activity may contract further"); and mentioned the word *recession* ("The recession that began in December 2007 will continue into the new year; and the contraction in economic activity could deepen further") only in December 2008 just after the NBER had announced the peak of December 2007.
ECRI-WLI-M	20.12.2007	"…[T]he leading indexes are not yet in a recessionary configuration, thus a recession can still be averted."	Due to ECRI's publication policy, the monthly news releases titled "U.S. Cyclical Outlook" are available only to subscribers. We used the news release for November 2007 (not for December) which is free on their web-site. We also couldn't trace the history of their outlooks during 2008. According to some information from the internet "ECRI suddenly stated that we [the USA] were on the recession track" on March 28, 2008.*
OECD-CLI	11.01.2008	"November 2007 data indicate a slowdown in all major seven economies except the United States, Germany and the United Kingdom where only a downturn [of growth rates] is observed."	OECD gives the following clarifications: "Growth cycle phases of the CLI are defined as follows: expansion (increase above 100), downturn (decrease above 100), slowdown (decrease below 100), recovery (increase below 100)." And more: "The above graphs [of CLIs] show each countries' growth cycle outlook based on the CLI which may signal turning points in economic activity approximately six months in advance." In other words, in January 2008 OECD waited for downturn of the USA economic growth rates in the mid of 2008 only; in February 2008 their expectations were the same. They changed their growth cycle outlook to "moderate slowdown" in March and then to "slowdown" in May 2008. Hence, they waited for a moderate contraction of the economy (not a drop of growth rates!) not until after the autumn 2008 (March plus half a year).

Table 5 continued

Indicators	Date of release	Diagnosis in real time	Notes
PhilFed-GAC & PhilFed-GAF	17.01.08	"The region's manufacturing sector weakened in January, as evidenced by negative readings of the indexes for activity, new orders, shipments, employment, and average hours worked… Firms' expectations for future activity have deteriorated sharply over the past three months."	PhilFed stated a weakening timely but connected this (quite naturally) only to manufacturing of one FRS district. They never told anything about a recession in the overall USA economy.
ISM-PMI	02.01.08	"A PMI in excess of 41.9 percent, over a period of time, generally indicates an expansion of the overall economy. Therefore, the PMI indicates that the overall economy is growing [in December 2007] while the manufacturing sector is contracting."	The conclusion about the growth of the overall economy was held by ISM for ten months up to November 3, 2008 (a month and a half after the Lehman Brothers bankruptcy!). At that moment, ISM mentioned a recession for the first time: "…[T]he PMI [for October 2008] indicates contraction in both the overall economy and the manufacturing sector." NBER announced the December 2007 peak only one month later.
StateLI	–	–	The State LI was introduced in June 2010 so there was no information in real time.
ADS	–	–	The ADS index was introduced only in December 2008. There are no regular news releases for this index up to this time.
CFNAI & CFNAI-MA3	22.01.08	"The three-month moving average, CFNAI-MA3, decreased to –0.67 in December from –0.50 in November. This negative value suggests that growth in national economic activity was below its historical trend."	According to their rule of thumb "a CFNAI-MA3 value below –0.70 following a period of economic expansion indicates an increasing likelihood that a recession has begun". Hence, it was just a bit (0.03) and not enough to announce the increased likelihood of a recession.
Wildi-F & Wildi-R	NA	–	Those indexes were presented later (in June 2009). There are no regular news releases for them up to this time.
Chauvet-Piger	–	–	There are no regular news releases for this index up to this time.

Table 5 continued

Indicators	Date of release	Diagnosis in real time	Notes
Chauvet-Hamilton	–	–	There are no regular news releases for this index up to this time. But on December 16, 2007 Prof. Chauvet wrote in her (with Kevin Hassett) article in *The New York Times*: "According to the model, the probability that the American economy was in a recession in October, the last month for which we have data, was only 16.5 percent. This is high enough to make us nervous about the future, but it is low enough that we can be fairly sure that if a recession is going to be visible in the data, it did not begin until November at the earliest. Given the many uncertainties surrounding the implosion of the housing sector, it is certainly possible that the economy is headed for dark times… But as to the factual question of whether we are in a recession given the data in hand, the unambiguous answer is no". Unfortunately, if one adhered to the rule of "two months probabilities greater than 50%", he couldn't diagnose the beginning of a recession until March 2008. Two months additional lag in data is too much for real-time analyses!
StateDI1 & StateDI3	26.01.08	–	Monthly news release contains quantitative information only; there are no qualitative judgments in it.
			The USA: The trough of June 2009
TCB-LEI	20.07.09	"The recession will continue to ease; and the economy may begin to recover."	The three months before (in April) The Conference Board predicted: "the contraction in activity could become less severe"; in July they mentioned the possibility of a recovery for the first time; in August they stated that the recession was bottoming out. Thereby, the predictions of the trough by TCB were more or less timely but they were hardly "leading", and were rather "coincidental"!
ECRI-WLI-M	17.04.09	"Business cycle recovery [is] on the horizon"	As the July issue of the "U.S. Cyclical Outlook" is not available to us, we looked at the April one. In this document they wrote: "[In the February issue]… we mentioned the possibility that they [the leading indexes] may have landed on «the canyon floor – in which case a business cycle recovery may soon be at hand.» One may agree that ECRI succeeded in predicting the recovery in advance.

Table 5 continued

Indicators	Date of release	Diagnosis in real time	Notes
OECD-CLI	10.07.09	"Possible trough"	The sequence of OECD's growth cycle outlooks was the following: "slowdown" (June 8)/ "Possible trough" (July 10)/ "[Definite] trough" (August 7). The outlook is quite good except for the fact that OECD presumes a six month lag between CLI and economic activity and this time we could observe a lag around zero.
PhilFed-GAC & PhilFed-GAF	16.07.09	"…[D]eclines in the region's manufacturing sector continued this month, although declines were not as large as those registered over most of the first half of the year… Future indicators suggest that firms expect improvement in conditions over the next six months, and for the third consecutive month, the number of firms expecting increases in employment over the next six months is larger than the number expecting declines."	Today one may easily interpret this passage as a prediction of a trough. In real time PhilFed didn't give a more explicit outlook for the overall economy.
ISM-PMI	01.07.09	"A PMI in excess of 41.2 percent, over a period of time, generally indicates an expansion of the overall economy. Therefore, the PMI indicates growth for the second consecutive month in the overall economy, and continuing contraction in the manufacturing sector. "	The diagnosis for the trough in the overall economy seems almost perfect. Of course it depends decisively on the critical level of 41.2. In real time, one had to decide whether to trust the 'rule of thumb' which had shown itself as not very effective on the eve of the recession. One may also notice that the critical level was slightly revised from 41.9 since December 2007; but this is barely important.
StateLI	–	–	The State LI was introduced in June 2010 so there was no information in real time.
ADS	16.07.09	–	There are no regular news releases for this index up to this time.

Table 5 continued

Indicators	Date of release	Diagnosis in real time	Notes
CFNAI & CFNAI-MA3	21.07.09	"Index shows economic activity improved in June"	In real-time, it wasn't more than the increase of the index in June (from -2.3 in May to -1.8). Only three months later, when the CFNAI-MA3 improved to a level greater than –0.7 (-0.63 in September) they noted for the first time since the early months of the recession: "For the four previous recessions, the first month when the CFNAI-MA3 was above –0.7 coincided closely with the end of each recession as eventually determined by the National Bureau of Economic Research". Hence, this time their diagnosis was delayed for a quarter.
Wildi-F & Wildi-R	18.06.09	"Signals of an imminent recovery in the US"	There are no regular news releases for the indicators; the conclusion was formulated in the Weldi's blog**
Chauvet-Piger	1.07.09	–	There are no regular news releases for this index up to this time.
Chauvet-Hamilton	1.07.09	–	There are no regular news releases for this index up to this time. But on February 28, 2009 Prof. Chauvet wrote in her (with Kevin Hassett) article in *The New York Times*: "According to a model developed by one of us… the chance that we will be in recession in March is 92 percent, in April 85 percent, and so on (minus about 8% each time –S.S.)... The good news is that the odds of this recession lasting into the fourth quarter of 2009 are below 50 percent". In fact, the probability dropped below 50% in July and August 2009. It's really not bad. The trouble is that this became known only in September-October.
StateDI1 & StateDI3	26.07.09	–	Monthly news release contains quantitative information only; there are no qualitative judgments in it.

Table 5 continued

Indicators	Date of release	Diagnosis in real time	Notes
			Russia: The peak of May 2008
Markit-PMI	02.06.08	"…[The] growth of Russia's manufacturing sector moderated further from the buoyant pace seen in the first quarter of 2008… [PMI] signaled the slowest improvement in business conditions since last September".	Deceleration of growth instead of decline – that was the diagnosis. Now it seems too optimistic, especially as PMI had fallen for 8 months to the moment.
OECD-CLI	06.06.08	"Slow expansion" (April is the last point)	Expansion (although "slow") is not a downturn in any sense. Too much optimism.
DC-CLI	18.06.08	"The probability of high growth rates (7.5–8.0% and even more) has risen even higher."	Acceleration of growth is even more probable (wrongly) than deceleration of growth which was talked about by OECD or Markit Economics.
HSE-ICI	–	–	No available news-releases for this index exist until September 2009
			Russia: The brink of September 2008
Markit-PMI	01.10.08	"PMI data… pointed to a further deterioration of business conditions faced by Russian manufacturers in September, but there were signs of possible improvement in Q4 as new orders rose compared to August and input price inflation continued a downward trend. The headline Russian Manufacturing PMI® registered 49.8, indicating a very slight contraction of the sector".	The deterioration of business conditions is stated but it is taken as something temporary. Some signs of improvement in the nearest future are (wrongly) perceived.
OECD-CLI	10.10.08	"Downturn" (August is the last point)	According to the OECD's terminology "downturn" means that the amplitude adjusted CLI is decreasing but its level is still above 100 (long run average). In other words OECD talks about decline of growth rates not decline of total output.

Table 5 continued

Indicators	Date of release	Diagnosis in real time	Notes
DC-CLI	20.10.08	"It's too early to talk about the inevitability of a cyclical crisis (decreasing of output) but an appreciable deterioration of business conditions in real sector appears to be inevitable."	The risk of a recession does not appear to be very high. Scenario of low growth rates is considered to be more probable.
HSE-ICI	–	–	No available news-releases for this index exist until September 2009
			Russia: The trough of June 2009
Markit-PMI	01.06.09	"Although the rate of decline in manufacturing slowed further in May, the sector is still experiencing a longer and more pronounced contraction than that seen during the financial crisis of 1998".	Although PMI has risen since January it's still below 50% level (45.3% in May). Since then they've talked about less intense contraction but not about the forthcoming growth.
OECD-CLI	08.06.09	"Strong slowdown" (April is the last available point)	According to the OECD's terminology "slowdown" means that the amplitude adjusted CLI is decreasing below 100 level (long run average). In other words, OECD talks about "strong" decline of total output. This was the case in the beginning of the year but in the nearest future an economic recovery will begin.
DC-CLI	15.06.09	"To the moment we can only talk about slowing of decline, not about the beginning of the phase of cyclical growth"	The outlook is too pessimistic. In a month an increase of economy will begin not only the reduction of rates of decreasing.
HSE-ICI	NA	–	No available news-releases for this index exist until September 2009

* http://www.arcadia-asia.com/commentaries/201008-Arcadia%20Market%20Commentary.pdf.

** http://blog.zhaw.ch/idp/sefblog/index.php?/archives/25-Signals-of-an-imminent-recovery-in-the-US-June-2009.html#extended.

The reasons which have been given for this phenomenon are as follows: (1) the transition from expansion to contraction is not often sharp or distinct ([Koening and Emery, 1994]); "We cannot get away from the fact that while peaks are always led by slowdowns, slowdowns do not always lead to a business-cycle peak" ([Alexander, 1958]), p. 301); (2) timely preventive measures may preserve the economy from sliding into recession ([Stekler, 1972], [Anas and Ferrara, 2004]); (3) "…[R]ecessions are hard to predict, in part because they are a result of shocks that are themselves unpredictable " ([Loungani and Trehan, 2002, p. 3]); in other words experts have extremely weak expectations prior to a forthcoming slump; (4) The costs of making a forecast of a recession is too high ([Schnader and Stekler, 1998], [Fintzen and Stekler, 1999]); "…[T]he incentives facing forecasters may be such that they prefer to hide in the herd rather than issue outlier forecasts" ([Loungani-Trehan, 2002, p. 3]).

All these reasons are quite plausible but only the last can explain a more complex 'three-compound' paradox:

- leading indicators leads peaks more than troughs;[19]
- peaks are recognized by private experts worse than troughs;
- peaks are announced by NBER with less lags than troughs.[20]

We believe the idea of different loss functions for different errors (Type I and Type II) for different forecasters (and – separately – decision makers!) at different phases of the business cycle is the key to the riddle. [Okun, 1960], [Lahiri and Wang, 1994], [Schnader and Stekler, 1998], [Fintzen and Stekler, 1999], [Filardo, 1999], [Chin et al., 2000], [Dueker, 2002], [Anas and Ferrara, 2004], [Galvao, 2006] wrote on these issues but they are still underestimated and scarcely explored in the context of business cycles indicators. Since this topic is out of the scope of this paper, we would only like to remind that biased forecasts may be quite rational (see [Laster et al., 1997], [Stark, 1997],

[19] For a long time it's been a well-known fact (see for example [Alexander, 1958]). Forty four years ago [Shiskin, 1967] wrote: "Long leads at peaks and short leads at troughs have indeed been a characteristic of the behavior of the leading indicators during the four business cycles since 1948" (p. 45). He supposed a special "reverse-trend adjustment" to eliminate this asymmetry. This adjustment was incorporated into the methodology of the LEI for years. We ought better to recognize this phenomenon not only as a statistical distortion but a real economical fact. [Harris and Jamroz, 1976], [Paap et al., 2009], [Tanchua, 2010] confirmed that leading indicators lead peaks more than troughs. See also [Zarnowitz and Moore, 1982], [Emery and Koening, 1992].

[20] [Novak, 2008] noted that it takes longer for NBER to announce troughs than to announce peaks.

[Lamont, 2002]). The existence of 'pessimists' and 'optimists' among forecasters is also well established.[21]

Also,one may suppose that in predicting recessions we have a new implementation of the "wishful bias": experts do not forecast recession because nobody (including themselves) wishes it to begin. They hope to the last and admit that there is a recession only after it has begun instead of predicting it. And this may be true in spite of quite visible signals from the cyclical indicators in real time![22]

Another possible reason for delays in recessions' diagnostics is a psychological "dependency" of independent experts from the dating committee of the NBER which is very cautious and unhurried in its decisions (evidently, in their loss function, the Type I error (false signal) has much more weight than the Type II error (no signal)).[23]

And the last kind of a psychological "dependency" is the one from GDP dynamics. The NBER's committee states this openly:

> *"We view real GDP as the single best measure of aggregate economic activity. In determining whether a recession has occurred and in identifying the approximate dates of the peak and the trough, we therefore place considerable weight on the estimates of real GDP issued by the Bureau of Economic Analysis (BEA) of the U.S. Department of Commerce. The traditional role of the committee is to maintain a monthly chronology, however, and the BEA's real GDP estimates are only available quarterly. For this reason, we refer to a variety of monthly indicators to determine the months of peaks and troughs". (Memo from the Business Cycle Dating Committee, January 7, 2008)*

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[21] [McNees,1992] noted that one of only two persons (out of forty forecasters!) who correctly predicted the recession in July 1990 had given the same forecast since 1987 (see p. 19). Indeed, if you forecast some person to die, your forecast will come true somewhere along in the future.

[22] In March 2001 The Economist asked a tricky question: "Are the economic forecasters wishful thinkers or wimps?" ([The Economist, 2001]). In more scientific context [Ito, 1990] revealed that the forecasters working for Japan's importers predict statistically stronger exchange rate of the yen than the forecasters working for exporters (strong yen is an advantage to Japan's importers, not to exporters). [Fintzen and Stekler, 1999] noted that not only private forecasters but also Fed forecasters make the same error: they are too optimistic when a recession is coming (p. 313–314).

[23] The situation with the NBER's dating committee is probably even more complex as occasionally 'independent' experts become members of this committee. How would they recognize the beginning of a recession in their "independent expert" role if they have not recognized it in their "official persons" role? There is an evident "conflict of interests" (it's very probable that this was a real factor during the last recession)!

Belief in GDP as in the best and most comprehensive indicator of economic activity (which belongs not only to the NBER's committee member) effectively prevents from announcing the beginning of a recession if an expert observes a string of positive growth rates of GDP. The data from Table 6 show that this was the situation in the USA until the end of 2008.Only in November-December it became clear that GDP would decline in the 4th quarter of 2008 also – and this was the moment when many experts recognized the recession for the first time.[24]

Table 6. The USA: Advanced GDP Estimates by Vintages (% changes, SAAR)

Vintages	07Q1	07Q2	07Q3	07Q4	08Q1	08Q2	08Q3	08Q4
30.01.2008	0.6	3.8	4.9	0.6				
30.04.2008	0.6	3.8	4.9	0.6	0.6			
31.07.2008	0.1	4.8	4.8	–0.2	0.9	1.9		
30.10.2008	0.1	4.8	4.8	–0.2	0.9	2.8	–0.3	
30.01.2009	0.1	4.8	4.8	–0.2	0.9	2.8	–0.5	–3.8

A few words must be said about Russia. Here, an excessive optimism just before the recession was almost equally widespread as an excessive pessimism just before the recovery. Our hypothesis is that the history of business cycles (and hence of business cycle indicators) is too short for this country. That is why experts have too little experience in interpreting their data. In these circumstances they have a spontaneous propensity for extrapolation of the current situation in their comments and have rarely enough courage to forecast a radical change of tendencies – even if their indicators point to this change.

7. Conclusions. Forecasting of turning points: could and would it be fully non-subjective?

'Historical' and 'real-time' dynamics of business cycle indicators are two different things. While all producers of cyclical indicators would ever seek to

[24] [Fintzen and Stekler, 1999] pointed to the positive preliminary GDP data for the third 1990 quarter as one of the main reasons for the failure of predicting the peak of July 1990. See [Leamer, 2008] for analysis of real-time GDP estimates during the 2001 recession. For interesting arguments against GDP as a stainless indicator in any context see [Nalewaik, 2010].

improve their indicators' 'historical' quality (and this is quite natural), only monitoring of a recession in a real time – as a crash test for automobiles – would reveal the proper worth of different indicators. With satisfaction, we may state that during the 2008–2009 recession, many cyclical indicators could be really useful in foreseeing turning points in real time: they (or their growth rates) have really changed their trajectories in the opposite direction some months before a turning point. These changes could be effectively caught by "five (minimum) out of six" rule of thumb. Especially informative indicators for the USA were: the LEI by the Conference Board, the CLIs by ECRI and by OECD, the PMI by ISM, the National Activity Index by Chicago Fed, the State Diffusion Indexes by Phil Fed and some measures of recession's probability extracted by special filters (e.g. proposed by [Wildi, 2009]). For Russia only the CLI by "Development Center" and the PMI by Markit Economics were useful.

A few more words should be said about CLIs by OECD. They were good enough for the USA but not so good for Russia. Why? The most obvious explanation is that the components of the aggregated index are selected in better composition for the USA. But we want to underline one more point. The statistical procedure used by OECD supposes intensive smoothing of the initial data. It's quite acceptable for the American economy with its well-established processes and stable inter-relations. But it is inconsistent with the unsettled and highly variable character of Russian economy.[25] In our research the CLI by OECD for Russia turned out to be over-smoothed, and hence, gave no important information for detecting turns near the end of time-series.

Comparable PMIs are also available for both countries (and not only for them) and they proved to be in the short list of "good" cyclical indicators for the USA as well as for Russia. Our analysis tells us that the trust for the critical 50% level of PMI as an adequate indicator for an increase or decrease of manufacturing sector (or 42.5% for the USA economy as a whole) is unwarranted. The 2008–2010 history showed that the existence of a definite and prolonged *tendency* of PMI – aside its absolute level – is an important factor *per se*.

The prominent alarm signal (which is not simply a change in direction mentioned in the first paragraph) from leading and other cyclical indicators hardly leads, but rather coincides. This is not bad, however. Geoffrey Moore in 1950 wrote, "If the user of statistical indicators could do no better than recognize contemporaneously the turns in general economic activity denoted by our reference dates, he would have a better record than most of his fellows."[26]

[25] And maybe of some others emerging countries?

[26] See: [Fels and Hinshaw, 1968], p. 47.

This unpretentious aim was approved by many scholars of authority (e.g.: [Moore, 1961], [Fels and Hinshaw, 1968], [Greenspan, 1973], [Chaffin and Talley, 1989], [Koenig and Emery, 1991], [Koening and Emery, 1994], [Lahiri and Wang, 1994], [Layton, 1997], [Fintzen and Stekler, 1999], [Layton and Katsuura, 2001], [Peláez, 2005], [Hamilton, 2010]). Our results confirm that in real time, an alarm signal which is synchronized with an approaching recession is the 'maximum' which one could hope for. On the other hand, it means that not only leading but also coincident cyclical indicators may be suitable for turning points detection in real time.

One of the main reasons for experts' delays in peaks recognition is their psychological "dependence" on GDP statistical news-releases. Almost nobody among experts believe in Okun's rule of two quarters of decline in real GDP *in theory* but many of them adapt their diagnosis for this rule *in practice*. But GDP has quarterly (not monthly) frequency and long publications lags! Hence, any business or political decision based on GDP would rather be delayed. Even if the 2Q rule would be ideal in historical retrospective it is far from ideal in real time.

In any case, between the moment of 'technical' calculation (and publication) of a cyclical indicator and the moment of an expert's diagnosis of a turning point (especially of a peak) some gap will always exist. Interestingly, not only in historical perspective but also in real-time, leads before peaks are usually longer than leads before troughs but the recognition of peaks is obviously more difficult and a more time consuming process than recognition of troughs. A hypothesis of a 'wishful bias' crosses one's mind as an explanation for this phenomenon: most of private experts don't want to become a messenger of bad news. On the other hand, lags for the NBER's announcements are larger for troughs, not for peaks: in the NBER's loss-function the weight of an improper dating of a trough is obviously more than that of a peak. It's evident from all this that the forecasting of turning points is dependent not only on 'objective' data and methods but rather on 'subjective' conclusions of experts and/or decision makers with their own internal loss-functions.[27]

We may ask a question: what is the nature of turning points forecasting? One may say it's a product of art [Jordà, 2010]], others may seek for formal procedures ([Leamer, 2008] and many others). We believe even the best formal procedures are only instruments for experts with all their experiences and intuitions.

[27] [Berge and Jordà, 2011] wrote: "Agents facing different preferences and constraints will make different decisions from the same reading of an index" (p. 275).

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Appendix 1. Cyclical Indicators for the USA

Indicator	Producer	Comments
Leading Economic Indicator (LEI)	The Conference Board (TCB)	No
Weekly Leading Index (WLI-M)	Economic Cycle Research Institute (ECRI)	We transformed the original indicator to monthly form: Last week of the month was taken
Composite Leading Index	FIBER	No regular news releases exist
Composite Leading Index, Amplitude Adjusted & Trend Restored (CLI-AA & CLI-TR)	Organisation for Economic Co-operation and Development (OECD)	New methodology since December 2008.
Purchasing Managers' Index (PMI)	Institute for Supply Management (ISM)	Diffusion index
Current & Future General Activity Indexes (GAC & GAF)	Federal Reserve Bank of Philadelphia (PhilFed)	Balances
State Leading Index (StateLI)	Federal Reserve Bank of Philadelphia (PhilFed)	Introduced in June 2010
Aruoba-Diebold-Scotti Business Conditions Index (ADS)	Federal Reserve Bank of Philadelphia (PhilFed)	Introduced in December 2008. We transformed the original indicator to monthly form: Last day of the month was taken
Chicago Fed National Activity Index (CFNAI & CFNAI-MA3)	Federal Reserve Bank of Chicago (ChicagoFed)	CFNAI-MA3 is a 3-months moving average
Chauvet-Hamilton's US Recession Probability Indicator (Chauvet-Hamilton)	Personal Web-site (note 1)	Introduced in 2006. No regular news releases exist
Chauvet- Piger's US Recession Probability Indicator (Chauvet-Piger)	Personal Web-site (note 2)	Introduced in August 2006. No regular news releases exist
Marc Wildi's US Recession Probability Indicator, 'Fast' & 'Reliable' (Wildi-F & Wildi-R)	Personal Web-site (note 3)	Introduced in June 2009. No regular news releases exist
State Diffusion Indexes (StateDI1 & StateDI3)	Federal Reserve Bank of Philadelphia (PhilFed)	Introduced in March 2005

Sources: Producers' web-sites.

Notes: 1) http://sites.google.com/site/crefcus/probabilities-of-recession/real-time-probabilities-of-recession; 2) http://pages.uoregon.edu/jpiger/us_recession_probs.htm; 3) http://www.idp.zhaw.ch/de/engineering/idp/forschung/finance-risk-management-and-econometrics/economic-indices/us-economic-recession-indicator.html.

Appendix 2. Cyclical Indicators for Russia

Indicator	Producer	Comments
Composite Leading Index, Amplitude Adjusted & Trend Restored (CLI)	OECD	New methodology since December 2008. Additional revision in February 2010
Composite Leading Index (CLI)	Development Center (DC)	Only in the form of Y-o-Y % changes exists. No revisions of methodology since January 2008
Composite Leading Index (CLI)	Institute of Economy (IE), Russian Academy of Science	Figures never published
Purchasing Managers' Index (PMI)	Markit Economics	No revisions since January 2004
Industrial Confidence Indexes (ICI)	Higher School of Economics (HSE)	Regular news releases only since September 2009. For straight comparability with PMI we transformed it from the balance to the diffusion index according to the formula: DI = (100+B)/2
Industrial Confidence Indexes (ICI)	Rosstat	Too short comparable time-series. Cyclical trajectory is quite similar to ICI's by HSE
Industrial Optimism Indexes (IOI)	Gaidar Institute for Economic Policy (IEP)	Introduced in October 2008 and discontinued in November 2010
Leading GDP Indicator	Renaissance Capital - New Economic School (RenCap-NES)	Too short of a history. The indicator's form (GDP forecasts for a pair of quarters) rules out its usage for detecting turning points
Business Activity Index (BIF)	"Finance." (one of Russian business journals)	Irregular news-releases. Too large of a publication lag (up to 3 months)
Business Activity Index (The Barometer)	"Business Russia" Association ("Delovaya Rossiya")	Too tangled methodology. Incomparability of neighboring observations. Short history
Business Activity Index	The Russian Managers Association & Kommersant Newspaper	Too tangled methodology. Discontinued in April 2009.

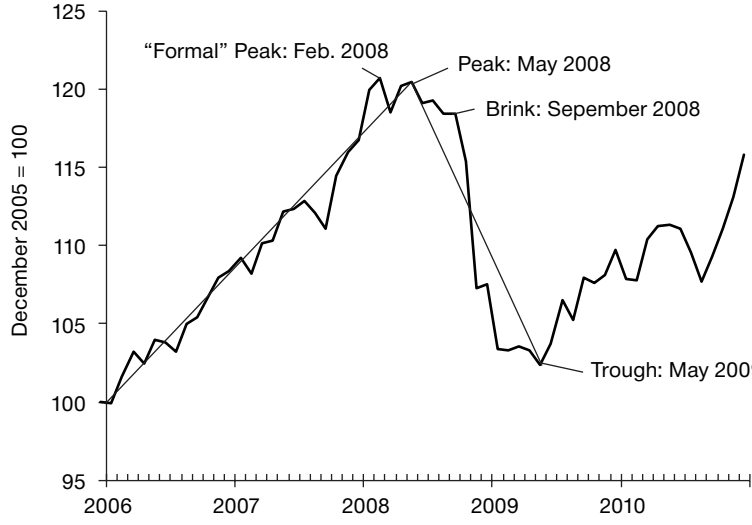
Source: [Smirnov, 2010a].

Appendix 3. Dating of the Cyclical Peak and Trough for Russia

There are four indicators which are commonly used for constructing cyclical coincident indexes for the USA: a) employees on nonagricultural payrolls; b) real personal income; c)index of industrial production; d)manufacturing and trade sales. In Russia there are no statistical data for manufacturing sales; figures for employment are very unreliable and often could not be interpreted in the short-run; and real personal income near a trough is highly dependent on the time of devaluation of the exchange rate which to a great extent is defined by Central Bank's decisions and hence usually lagging (not leading or coincident) the business cycle.

This is why we took the official "basic branches' index" as a coincident indicator for Russian business cycle. This index is a weighted average of physical output indexes for six sectors: industry, agriculture, construction, transportation, retail trade, and wholesale trade. Because officially published data are not seasonally adjusted we adjusted them ourselves using ARIMA-X12 procedure.[28] The resulting index is shown on Chart A3.1.

Chart A 3.1. "Basic Branches' Index (December 2005 = 100), Seasonally Adjusted



[28] For this we used the EViews 6 statistical package.

One may easily see that the local maximum of the index (and hence the "formal" peak) is achieved on February 2008. But we decided not to consider it as a cyclical peak because: a) we are not fully confident in all decimal points of our seasonally adjusted figures; b) according to the official data the recession (a decline of the GDP on quarter to quarter basis) in Russia began only in the third quarter of 2008. This fact concurs quite well with the peak in May but not in February 2008.

Смирнов, С. В. Распознавание поворотных точек бизнес-цикла в реальном времени: некоторые уроки рецессии 2008–2009 гг. : препринт WP2/2011/03 [Текст] / С. В. Смирнов ; Нац. исслед. ун-т «Высшая школа экономики». – М. : Изд. дом Высшей школы экономики, 2011. – 64 с. – 150 экз. (на англ. яз.).

Анализ динамики бизнес-цикла с помощью сводных циклических индикаторов практикуется в течение многих десятилетий, и последняя рецессия еще больше оживила интерес к этому подходу. По всему миру было предложено несколько новых многообещающих индикаторов, однако их реальная прогностическая сила пока не изучена. Поведение давно известных индикаторов в ходе последней рецессии также пока не проверено с помощью адекватных и сопоставимых методик. Кроме того, до сих пор плохо изучена «полезность» циклических индикаторов в «реальном времени». Современная экономическая жизнь происходит в масштабе дней и часов, но большая часть наиболее известных экономических индикаторов (например, ВВП) рассчитывается и публикуется спустя месяцы и даже кварталы. Возникает вопрос: могут ли вообще «опережающие индикаторы» быть своевременными? Более того, интерпретация тех колебаний, которые происходят в экономике сегодня, становится очевидной только спустя какое-то время, когда четко проявятся средне- и долгосрочные тенденции. В связи с этим важно понять, могут ли наиболее распространенные экономические индикаторы давать какую-либо полезную информацию для тех, кто принимает реальные решения. Другими словами: могут ли они быть полезными в «реальном времени»? Что может сказать об этом опыт последней рецессии? Данная работа исследует этот вопрос на материалах двух стран: России и США.

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Смирнов Сергей Владиславович

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(*на англ. языке*)

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