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Abstract

This paper evaluates the real-time performance of the growth rate of the DSE-ECRI Indian leading index for exports for predicting cyclical downturns and upturns in the growth rate of Indian exports. The index comprises the 36-country real effective exchange rate and leading indices of India's 17 major trading partners. Leading indices of India's major trading partners were developed at the Economic Cycle Research Institute and forecast the onset and end of recessions in overall economic activity in these economies. The results show that the real-time performance of the growth rate of the leading index of Indian exports has been creditable in the last seven years since its construction in 2001. In conjunction with the DSE-ECRI Indian Leading Index, designed to monitor the domestic economy, the exports leading index forms a sound foundation for a pioneering effort to monitor Indian economic cycles.

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1. Introduction

With greater globalization of the Indian economy, policy makers, businesses and financial analysts have been closely tracking the external sector, especially exports, which have grown significantly of late relative to GDP. Since exports growth affects fluctuations in overall economic growth, it is essential to employ an accurate and reliable tool for forecasting cycles in exports. In this paper we describe how a leading index of the domestic economy (Dua and Banerji, 2001a, 2004a) can be complemented by such a measure – the leading index for exports (Dua and Banerji, 2001b, 2004b) – whose growth rate can predict the timing of cyclical swings in the growth rates of real exports, price of exports, and the product of the two, the total value of exports. The leading index for exports was constructed using data from 1975 through 1998 and its real-time performance since its introduction in 2001 has also been creditable.

The leading indicator approach to business and economic forecasting is based on the premise that market-oriented economies experience cyclical fluctuations. The leading indicator approach predicts the timing of the cyclical upswings and downswings that make up the business cycle.

Since Indian exports are driven largely by the business cycles of other countries that are the export destinations, they are typically not in sync with the domestic Indian business cycle. Thus, the leading index of the domestic Indian economy (Dua and Banerji, 2001a, 2004a) constructed in the late 1990s should not be expected to be a good predictor of the external sector. Rather, a separate, specialized leading index was needed to forecast Indian exports cycles.

This paper discusses the performance of the growth rate of the Indian leading index for exports constructed in 2001 to forecast the cyclical swings in the growth rate of the total value of exports[1]. Section 2 discusses the rationale and methodology of construction of the index. Section 3 describes the construction of the index and the turning points of its growth rate. Section 4 provides an evaluation of the predictive value of the growth rate of the index using lead profiles, i.e., a graphical depiction of the leads in strictly probabilistic terms, which aids meaningful comparisons between the index and the reference cycle. It also assesses the performance of the leading exports index in real time since its introduction in 2001. Using lead profiles, Section 5 evaluates the performance of the DSE-ECRI Indian Leading Index,

[1] In this paper we limit our analysis to the growth rate of total value of exports. Results for the growth rate of real exports and the price (unit value) of exports are available on request from the authors.

both before and after liberalization, showing how the opening up of the economy significantly improved its performance. Section 6 summarizes and concludes the paper.

2. Rationale and Methodology

The construction of the leading index for exports is based on the premise that peaks and troughs in the business cycle and/or growth rate cycle[2] in the domestic economy are likely to influence imports from trading partners. For any economy, these cyclical upswings and downswings can be predicted by leading indices some months in advance, while long leading indices have leads that are a few months longer. These cyclical changes in domestic demand also influence the demand for imports. This implies that a leading index of a trading partner can provide useful information on exports of any exporting country. This notion can be extended to a group of countries importing goods from an exporting country. Thus, a weighted average of the leading indices of the importing countries can be used to predict fluctuations in the exporting country's exports (Moore, 1976; Klein and Moore, 1978, 1980).

In addition to cyclical fluctuations in the economies of a country's trading partners, exchange rate movements are also a vital harbinger of future exports. Of course, cyclical expansions in the trading partners' economies would herald an increase in the given country's exports. If, however, the value of its currency rises, the net impact on its exports will be blunted or offset by the erosion in price competitiveness. Therefore, exchange rate fluctuations must also be taken into account, along with cyclical factors in a country's trading partners, to accurately predict cyclical swings in exports.

Both the exchange rate index and the composite long-leading index[3], which have roughly similar lead times, have cyclical movements around a trend that determine the cyclical movements of future exports. Note, however, that the multi-country composite long-leading index is itself a weighted average of several composite indices. The real exchange rate index represents a composite exchange rate and has completely different units from the leading index. The two therefore cannot be combined by simply using a weighted average. Instead, a composite index procedure is used that is especially designed to combine the movements of a number of such heterogeneous cyclical time series. Given the difference in

[2]Business cycles are fluctuations in the level of aggregate economic activity while growth rate cycles are upswings and downswings in the growth rate of economic activity (Burns and Mitchell, 1946; Moore, 1982; Klein, 1998). These concepts are analysed in the Indian context in Dua and Banerji (1999, 2001a, 2004a) while Chitre (1982, 1986) based his analysis on cycles defined as alternating periods of above-trend and below-trend growth.

[3] Long-leading indices have a longer lead compared to the conventional indices.

units as well as the cyclical volatility of the exchange rate index and the composite leading index, it is important to ensure that the variable that moves in wide swings does not have a larger influence on the movements of the combined index than one which typically moves in narrow swings. This is achieved by standardization, i.e., adjusting the amplitudes of the two components by dividing each by its own historical cyclical volatility, in order to express the cyclical movement of each component in units of its own cyclical volatility. The two standardized components are then aggregated, and the trend and the amplitude of the combined series are adjusted to optimize cyclical performance.

To evaluate the predictive ability of the growth rate of the leading index for exports, a reference chronology that dates the downturns in the export sector is required. For this, a single or composite time series is used as the "target" variable and its turning points are determined. These turning points apply to contemporaneous economic activity. For a leading index to be useful, its turning points must precede those of the reference series. The first step in this analysis is therefore to determine the turning points of the reference series and the historical turning points of the leading index.

The methodology described above is applied to the Indian economy. Dua and Banerji (2001b) construct a leading index – used in level and growth forms – and evaluate it with reference to the levels and growth rates of three target variables – real exports, price of exports, and the product of the two, the total value of exports. The present paper summarizes the results with respect to the growth rate of the total value of exports and examines the out-of-sample performance of the growth rate of the leading export index in predicting Indian exports growth in the years since the index was developed.

3. *DSE-ECRI Leading Index for Indian Exports*

The leading index for the level of future Indian exports comprises the Real Effective Exchange Rate (REER) and a 17-country long leading index. The REER index (RBI, 1993) used is based on export weights and official exchange rates from January 1975 to February 1992 with base 1985=100. From March 1992, FEDAI indicative rates are used and the base moves to 1993-94=100.

The REER index is basically the weighted average of the bilateral nominal exchange rates of the home currency in terms of foreign currencies adjusted by domestic to foreign relative local-currency prices. The exchange rate of a currency is expressed as the number of units of Special Drawing Rights (SDRs) that equal one unit of the currency (SDRs per currency). A fall in the exchange rate of the rupee against SDRs therefore represents a depreciation of the rupee relative to the SDR. Similarly, a rise in the exchange rate represents appreciation of the rupee. The NEER and REER indices are based on bilateral export weights and total trade (exports plus imports) weights. The number of countries used is 36 that represent 65%-70% of total exports/trade during 1975 and 1991. Given that 36 countries are used, the weights are normalized accordingly for constructing REER and NEER indices for India. The large number of countries smoothens out the year-to-year variations in the share of any country and ensures that the pattern of trade is representative over a long span of time.

The 17-country index is a weighted average of the Economic Cycle Research Institute (ECRI) long leading indices for 17 economies that trade with India. The 17 countries are the U.S., Canada, Mexico, Germany, France, the U.K., Italy, Spain, Switzerland, Austria, Sweden, South Africa, Japan, Korea, Taiwan, Australia and New Zealand, which collectively account for about half of India's total exports. The weights used in the 17-country long leading index are the percentages of India's exports accounted for by each of these countries in 1995, according to the IMF's Direction of Trade Statistics.

The growth rate in the leading exports index is used to predict movements in the growth rate in exports. The economic rationale is simple. The leading exports index has two basic components – the exchange rate, which determines price competitiveness, and the 17-country long leading index covering the export markets, which determines the cyclical movement of demand in the consuming countries. It follows that both these variables predict the movements in exports.

Our analysis focuses on the growth rate of the leading index to predict the growth rate of the total value of exports. The reference chronology of the exports growth rate is determined using the procedure described in the previous section. The turning points are evaluated relative to those of the leading index. An update of results from Dua and Banerji (2001b) using data through the end of 2005 are reproduced in Table 1, which shows the leads/lags between the growth rates of the exports leading index and Indian exports. The main findings were as follows.

Downswings in the growth rate of nominal exports are shown as the periods from a peak to the following trough, and the corresponding periods marked off by shaded areas (Figure 1). The growth rate of the leading index led the growth rate of the total value of exports at 100% of peaks and troughs, with the average lead being 8 months at peaks and 11 months at troughs (Table 1)[4]. This is similar to the results reported in the earlier study (2001a) using data from 1975 through 1998. Thus the index has retained its leading property in the 21st century, when data is extended to include additional 7 years compared to the earlier study.

4. *Evaluation of the Leading Exports Index: Lead Profiles*

The hallmark of a cyclical leading indicator is the property that its cyclical turning points lead cyclical turning points in the economy. However, there are no well-known methods to test whether these leads are statistically significant. Furthermore, the leading index for exports covers a small number of cycles. Thus the evaluation of its cyclical leads at turning points by parametric statistical methods is not easy. The need to make a heroic assumption that the probability distribution of the leads has a standard functional form also precludes the use of parametric tests of statistical significance. The solution is a series of non-parametric statistical tests, which yield the lead profile (Banerji, 2000).

The lead profile is a graphical depiction of the leads in strictly probabilistic terms, which aids meaningful comparisons between two indices or an index and the reference cycle. It can be graphically represented in bar charts or "lead profile charts". The question answered by this chart is whether the difference between the leads of the two indices (or an index and the reference cycle) is statistically significant. The procedure underlying the charts is described in detail in the appendix.

The advantage of lead profile charts is that these use as input just the information on the length of the leads at each turning point. However, by gleaning statistical inferences from the data rather than relying solely on averages, and by displaying the results graphically, they afford additional insights into the significance of leads.

Figure 2 shows the lead profile of the Indian exports leading index growth rate against the growth rate of the total value of exports and is based on the leads shown in Table 1. The first bar represents a test of the null hypothesis that the lead of the composite index is zero months, against the alternative that it is greater than zero, i.e. at least one month. Analogously, the second bar represents another test, of the null hypothesis that the lead is one month, against the alternative that it is greater, i.e., at least two months. Figure 2 shows that the null hypothesis of zero lead can be decisively rejected, and, in fact, the confidence level is well over 99% for leads up to 5 months, and over 95% for leads up to 7 months.

[4] The performance of the growth rate of the leading index is also creditable in anticipating turning points in the growth rates of the quantum index of exports and unit value of exports.

On the basis of these lead profiles, we conclude that the Indian exports leading Index growth rate had a statistically significant lead at cyclical turning points of the growth rate of the total value of exports.

5. The DSE-ECRI Leading Index of the Indian Economy

The DSE-ECRI Leading Index of the Indian economy was designed to monitor the domestic economy (Dua and Banerji, 2001a, 2004), before the Indian leading exports index was constructed. The two leading indexes were designed with a view that they would jointly be able to provide the outlook for the domestic economy and exports, respectively.

The construction of the domestic leading index was based not so much on statistical data fitting, but on an understanding of the fundamental drivers of the business cycle, based on the decades of business cycle research conducted around the world over many decades by the ECRI researchers. This research had helped identify good predictors of the business cycle that continued to work robustly in country after country, despite structural differences. The application of this approach in India resulted in a poor track record in the period before 1991, when the economic processes that underpin the business cycle were probably deformed by the market distortions that then characterised the Indian economy. Starting in 1991, however, as a more market-oriented economy emerged, the performance of the leading index improved dramatically.

Figure 3 shows the lead profile of the DSE-ECRI Indian leading index growth rate against the Indian growth rate cycle before 1991. It shows that the null hypothesis of zero lead cannot be rejected, and, in fact, the confidence level, at a little over 20%, does not even come close to the threshold of 95%, or even 90%.

In contrast, Figure 4 shows the lead profile of the DSE-ECRI Indian leading index growth rate against the Indian growth rate cycle since 1991. It shows that the null hypothesis of zero lead is rejected at a confidence level over 95%. In fact, the confidence level remains above 90% for a lead of at least two months.

On the basis of these lead profiles, we conclude that the DSE-ECRI Indian leading index growth rate had no statistically significant lead over the Indian growth rate cycle before 1991. In fact, it led at only 41% of turning points, exhibiting an average *lag* of two months.

But, in line with business cycle theory, as soon as a market-oriented economy began to emerge, the performance of the same leading index improved dramatically. Since 1991, it has led at 82% of turning points, with an average *lead* of two months. In fact, as the lead profile shows, it had a statistically significant lead of at least two months.

These results testify to the commendable real-time performance of the DSE-ECRI leading index since its creation in 2000. They also underscore the difficulty inherent in creating a leading index based on past performance alone in a fast-changing economy such as India. Rather, the Indian experience suggests that the creation of a leading index that is robust to structural shifts should be rooted primarily in an understanding of the key drivers of the business cycle that are remarkably constant in different countries and at different times in their economic history.

6. *Summary and Conclusions*

The findings of the study indicate that the growth rate of the DSE-ECRI leading index for exports leads the growth rate of Indian exports. The results are also robust in two senses; first, the standard deviations of the leads are typically low; also, the index growth rate continued to lead cyclical turning points in exports growth in real time, after its original development.

The lead profile analysis showed that the lead profile of the leading index of exports vs. the reference cycle of the growth rate of exports performed well. The construction of the leading index for exports in the past was beset with data limitations and other problems experienced by a developing country dominated by the public sector and import-substituting industrialisation. Nevertheless, the growth rate of the index performed reasonably well both in the "in-sample" period and the real-time "out-of-sample" period.

In the bigger picture, this exports leading index, while valuable in its own right, should also be used as a vital complement to the DSE-ECRI Indian Leading Index (Dua and Banerji, 2001b) designed to predict peaks and troughs in Indian growth rate cycles. This latter leading index had a poor historical record until the early 1990s, but its performance improved dramatically since that point, as economic liberalisation took hold. This is a telling point, because leading indicators should be expected to work only in market-oriented economies, which India has apparently become since the early 1990s, given the performance of the domestic leading index. The leading index has also shown impressive real-time performance, having been regularly available on a monthly basis since 2000, and in the public domain since 2001.

The vital point to note is that both of these leading indices, which have been available roughly since the turn of the century, have already shown their value through worthy real-time track records. This is in sharp contrast to most leading indices, which tend to be good at “predicting” past turning points, but are unable to do so “out of sample” and especially in real time. This proven performance should enhance confidence in the worth of the pair of leading indices discussed in this paper.

With cycles in the domestic and external sectors unlikely to move in sync, and exports becoming increasingly vital to India, the DSE-ECRI Indian Leading Index and the Indian Leading Exports Index, in tandem, should be able to provide accurate forecasts of cyclical turning points for the domestic economy and exports, respectively. The robustness of these leading indexes is already clear from their real-time performance in the 21st century. It is to be hoped, therefore, that this pioneering work will form a sound basis for the monitoring of Indian economic cycles in the years to some.

Appendix

This appendix describes the concept and construction procedure of the lead profile to evaluate leading indicators (see Banerji, 2000).

Evaluation of a Leading Indicator: The Lead Profile

Testing for Cyclical Leads

It has long been recognized that leading indicators can be a valuable forecasting tool for forecasting cyclical turning points. They have, however, not always been properly evaluated. One method of evaluating leading indicators that has gained some popularity in recent years is the Granger causality test. It is thus interesting to note what Granger and Newbold (1986) have to say about the difficulty of evaluating the index of leading indicators:

> *"The index of leading indicators has become a widely quoted and generally trusted forecasting tool. However, it has been rather misinterpreted. The index is intended only to forecast the timing of turning points and not the size of the forthcoming downswing or upswing nor to be a general indicator of the economy at times other than near turning points. Because of this, evaluation of the index of leading indicators by standard statistical techniques is not easy."*

This difficulty in evaluation has often led to flawed assessments of the performance of leading indicators, not necessarily based on their ability to anticipate turning points. Part of the problem has been a lack of familiarity with the standard methods of identifying turning points. Yet, since leading indicators are meant primarily to forecast business cycle turning points, the identification of turning points in time series is a *sine qua non* for an appropriate evaluation of their forecasting performance. In fact, an objective algorithm for turning point identification, based on a systematic codification of the judgmental procedures used for decades at the NBER, was devised almost three decades ago (Bry and Boschan, 1971), shortly after the creation of the index of leading indicators. The Bry-Boschan procedure has certainly stood the test of time.

Geoffrey Moore, who helped create the index of leading indicators (Moore and

Shiskin, 1967), used the Bry-Boschan procedure extensively in the decades following its creation (e.g., Klein and Moore, 1985). Other users have included King and Plosser (1989), who provide a description of the procedure. Watson (1994) points out that the Bry-Boschan procedure provides a good way to define turning points since it is based on objective criteria for determining cyclical peaks and troughs.

The objective (though not mathematically simple) definition of turning points given by Bry and Boschan's algorithmic formulation of the classical NBER procedure makes it possible to evaluate the performance of leading indicators in terms of an objective measure of the leads of leading indicators at turning points. In that sense, the Bry-Boschan procedure permits a more appropriate evaluation of the performance of leading indicators.

Given the cyclical turning points of a potential leading indicator, it is possible to measure the lead of that indicator at each business cycle turning point. However, many leading indicators cover only a small number of cycles. Thus the evaluation of leading indicators by parametric statistical methods is usually constrained by the limited number of cyclical turning points covered by the data. In addition, the need to make a heroic assumption that the probability distribution of the leads has a standard functional form also precludes the use of parametric tests of statistical significance.

This appendix suggests a simple nonparametric test to evaluate the cyclical leads of leading indicators, and describes lead profile charts that graphically depict these leads in probabilistic terms, to aid in the selection and evaluation of leading indicators.

The Problem

A number of considerations go into the evaluation of any time series as a cyclical leading indicator. The main issue is the evaluation of the magnitude of the leads of a leading indicator compared with a reference cycle (such as the business cycle) at cyclical turns as well as their leads compared with one another when two or more series are being compared. In all of these cases, the magnitude (and even the direction) of the lead may vary from one turn to the next. The problem, then, is the statistical significance of the leads, or of the difference in leads, as the case may be.

We have cited Granger and Newbold (1986) who suggest, in effect, that standard statistical approaches to the evaluation of leading indicators may be fraught with problems. The simpler classical approach of just measuring the mean and standard deviation of the leads does not result in tests of statistical significance without an assumption that the probability distribution of the leads has a standard functional form. Thus, no tests of significance can usually be performed. Under such circumstances, simple nonparametric tests may be the most appropriate solution.

Appropriate Nonparametric Tests

Nonparametric tests are often called "distribution-free" because they do not assume that the observations were drawn from a population distributed in a certain way, e.g., from a normally distributed population. These tests also do not require the large samples needed to reliably estimate parameters of distributions assumed in parametric tests. Such tests should therefore be uniquely suited to testing the significance of leads, which may be small in number, and for which the probability distribution function is quite unknown.

Since the leads in question are differences in timing at cyclical turns (between a pair of indicators, for example), the appropriate nonparametric tests are those applicable to matched pairs of samples. The most powerful tests in this class assume interval scaled data (like temperature in degrees Celsius) where equal intervals at any point in the scale imply equal differences. Leads measured in months or quarters are at least interval scaled, so such tests can be used with data on leads.

The most appropriate test to assess the significance of leads within this class is the Randomization test for matched pairs. This test has a power-efficiency of 100%, because it uses all the information in the sample (Siegel, 1956), but it does not lend itself to manual computation for sample sizes greater than about nine pairs. In such cases, a simple computer program can be used.

The Randomization Test for Matched Pairs

The Randomization test (Fisher, 1935) is a simple and elegant way to test the significance of leads. The first step is to calculate the difference in timing at turns, that is, the leads of one indicator over another, or over the business cycle turning points. The null hypothesis, that these differences are not statistically significant, is to be tested against the alternative hypothesis that the leads are significant.

Now, some of the differences calculated in the first step may be positive, others negative. If the null hypothesis is true, the positive differences are just as likely to have been negative, and vice versa. So if there are N differences (from N pairs of observations), each difference is as likely to be positive as negative. Thus, the observed set of differences would be just one of 2^N equally likely outcomes under the null hypothesis.

Also, under the null hypothesis, the sum of the positive differences would, on average, equal the sum of the negative differences, so the expected sum of the positive and negative differences would be zero. If the alternative hypothesis was true, and the leads were positive and significant, the sum would very likely be positive.

The second step, therefore, is to sum the differences, assigning positive signs to each difference; then to switch the signs systematically, one by one, to generate all the outcomes which result in sums as high or higher than that observed. If there are R such outcomes, then the probability of the observed outcome (or a more extreme outcome) under the null hypothesis is ($R/2^N$). In other words, the null hypothesis can be rejected at the 100(1-($R/2^N$))% confidence level.

An example of the manual computation involved is provided below.

Leads of a hypothetical leading indicator over business cycle troughs

The leads at troughs of this indicator compared to the business cycle troughs are 12, 4, 1, 0 and -27 months. The last figure represents a lag of 27 months. Although the convention is to use negative numbers for leads, and positive numbers for lags, it is simpler for the purpose of this exposition to think of leads as being positive, because we are, in general, concerned with the significance of leads, not lags.

The first step is to drop the zero-month lead from the analysis; keeping this observation would make no difference to the results, as is evident from the procedure for the Randomization test. Then N = 4, and the 4 observations are (12, 4, 1, -27), which add up to a sum of S = -10.

This sum S is now compared with the sums computed by starting with all positive numbers, and switching signs one by one so that the sums are in descending order until our sum of S = 10 is reached:

12	4	1	27	Sum = 44
12	4	-1	27	Sum = 42
12	-4	1	27	Sum = 36
12	-4	-1	27	Sum = 34
-12	4	1	27	Sum = 20
-12	4	-1	27	Sum = 18

-12	-4	1	27	Sum = 12
-12	-4	-1	27	Sum = 10
12	4	1	-27	Sum = -10 = S

Since R = 9 sums out of 2^4 (i.e., 16) possible combinations are greater than or equal to -10, the probability of such an outcome under the null hypothesis ("leads not significant") is 9/16 = 0.5625, so that the null hypothesis can be rejected only at the 100 (1-0.5625)% = 43.75% level of confidence. Hence, the null hypothesis is not rejected for leads at troughs.

Lead Profiles

So far, the discussion has focused on the confidence level at which the null hypothesis ("leads not significantly different from zero") can be rejected in favor of the alternative hypothesis ("leads significantly greater than zero months"). Now, even if it is established that the leads are significantly greater than zero months, it might be interesting to know how much greater than zero months the leads are likely to be – for example, whether the leads are also significantly greater than one month.

This is easy to determine. All one needs to do is to subtract one month from each of the differences in timing at turns (already calculated in the first step of the Randomization test). Then, as before, one finds the confidence level at which the null hypothesis is rejected in favor of the alternative hypothesis that the difference in timing at turns significantly exceeds one month.

In this way one can also determine the confidence levels for the hypotheses that the leads exceed 2,3,4, …. K months – simply by subtracting 2,3,4, …. K respectively from the original differences before performing the Randomization test. We call this full set of confidence levels a "lead profile".

The lead profile is a graphical depiction of the leads in strictly probabilistic terms, that aids meaningful comparisons between the indices. It can be graphically represented in bar charts or "lead profile charts". The question answered by this chart is whether the difference between the leads of the two indices is statistically significant.

The advantage of lead profile charts is that these use as input just the information on the length of the leads at each turning point. However, by gleaning statistical inferences from the data rather than relying solely on averages, and by displaying the results graphically, they afford additional insights into the significance of leads.

Another major advantage of lead profiles lies in the explicit statistical inferences that can be made about the significance of leads without making any assumptions about the probability distribution of leads, or any restrictions on sample size. These inferences can be made about the leads of a given cyclical indicator over a reference cycle, such as a set of business cycle turning points. They can also be made about the leads of one cyclical indicator over another, to assess whether one has significantly longer leads than the other. Moreover, it is convenient to put lead profiles in the form of bar charts, for easy and effective visual appraisal of the significance of lengths of leads.

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Table 1

Turning Points of Growth Rate of Leading Index of Exports vis- à- vis Growth Rate of Total Value of Exports

Total Value of Exports, Growth Rate		Leading index of Exports, Growth Rate		Lead(-) OR Lag(+)	
Troughs	**Peaks**	**Troughs**	**Peaks**	**Troughs**	**Peaks**
11/1978		07/1976		-28	
	05/1979		04/1978		-13
05/1980		04/1980		-1	
			01/1983		extra
		08/1985		extra	
	02/1987		04/1986		-10
05/1988		09/1987		-8	
	02/1989		12/1988		-2
02/1990		06/1989		-8	
	02/1993		07/1991		-19
05/1994		11/1992		-18	
			03/1994		extra
		07/1995		extra	
	02/1996		01/1996		-1
05/1998		10/1997		-7	
	02/2000		01/1999		-13
11/2001		01/2001		-10	
			05/2002		extra
		03/2003		extra	
	02/2004		01/2004		-1

	troughs	***overall***	***peaks***
Average	-11	-10	-8
Median	-8.0	-9.0	-10.0
Percent Lead	100	100	100
Std. Deviation	8.9	7.9	7.2

Figure 1

Growth Rate of Leading Index of Exports vs. Growth Rate of Total Value of Exports
(Shaded areas represent downturns in the growth rate of total value of exports.)

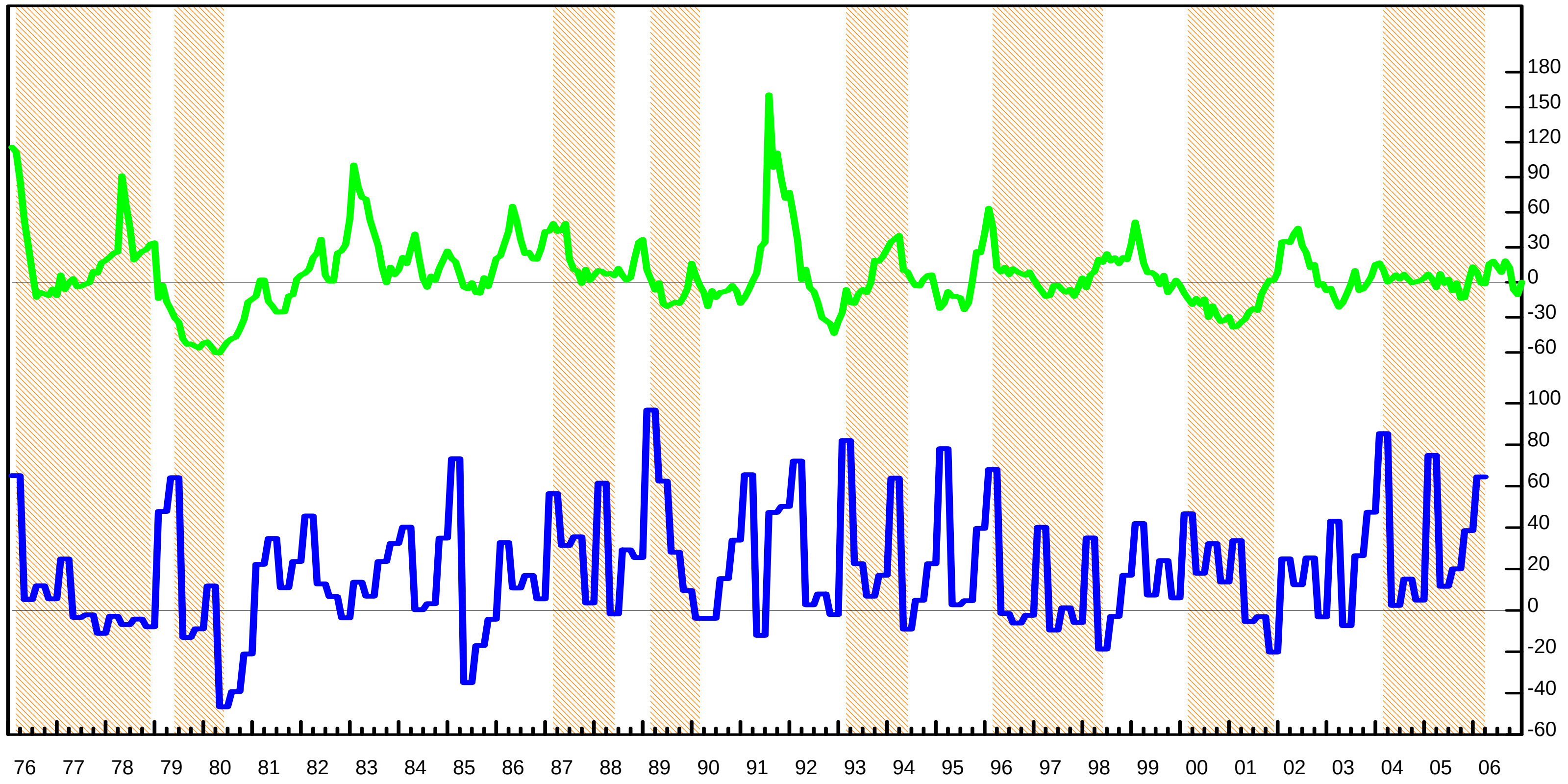


Figure 2

Lead Profile: Growth Rate of Leading Index of Exports vs. Growth Rate of Total Value Index of Exports

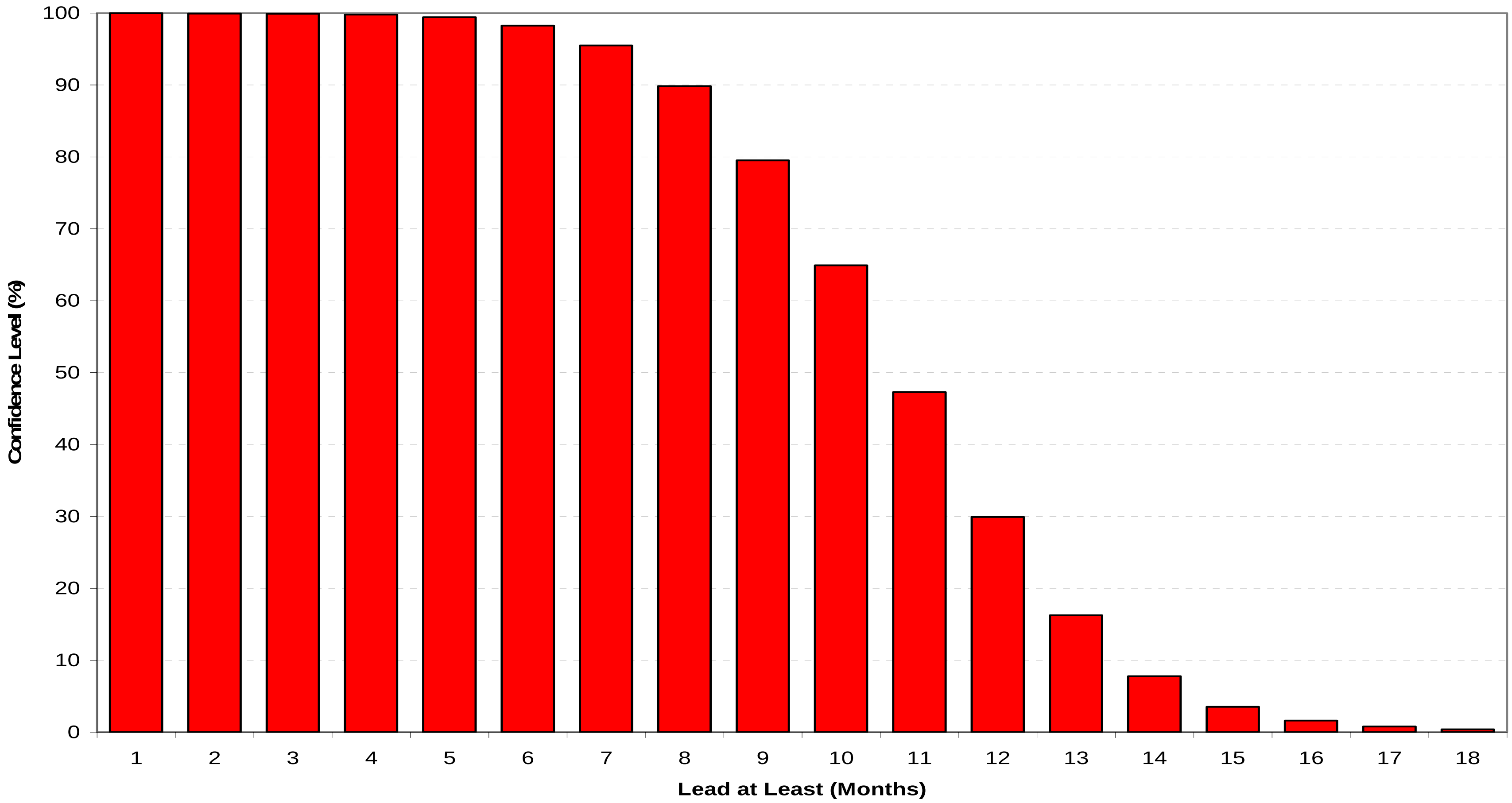


Figure 3

Lead Profile: Growth Rate of DSE-ECRI Indian Leading Index vs. Indian Growth Rate Cycle Before 1991

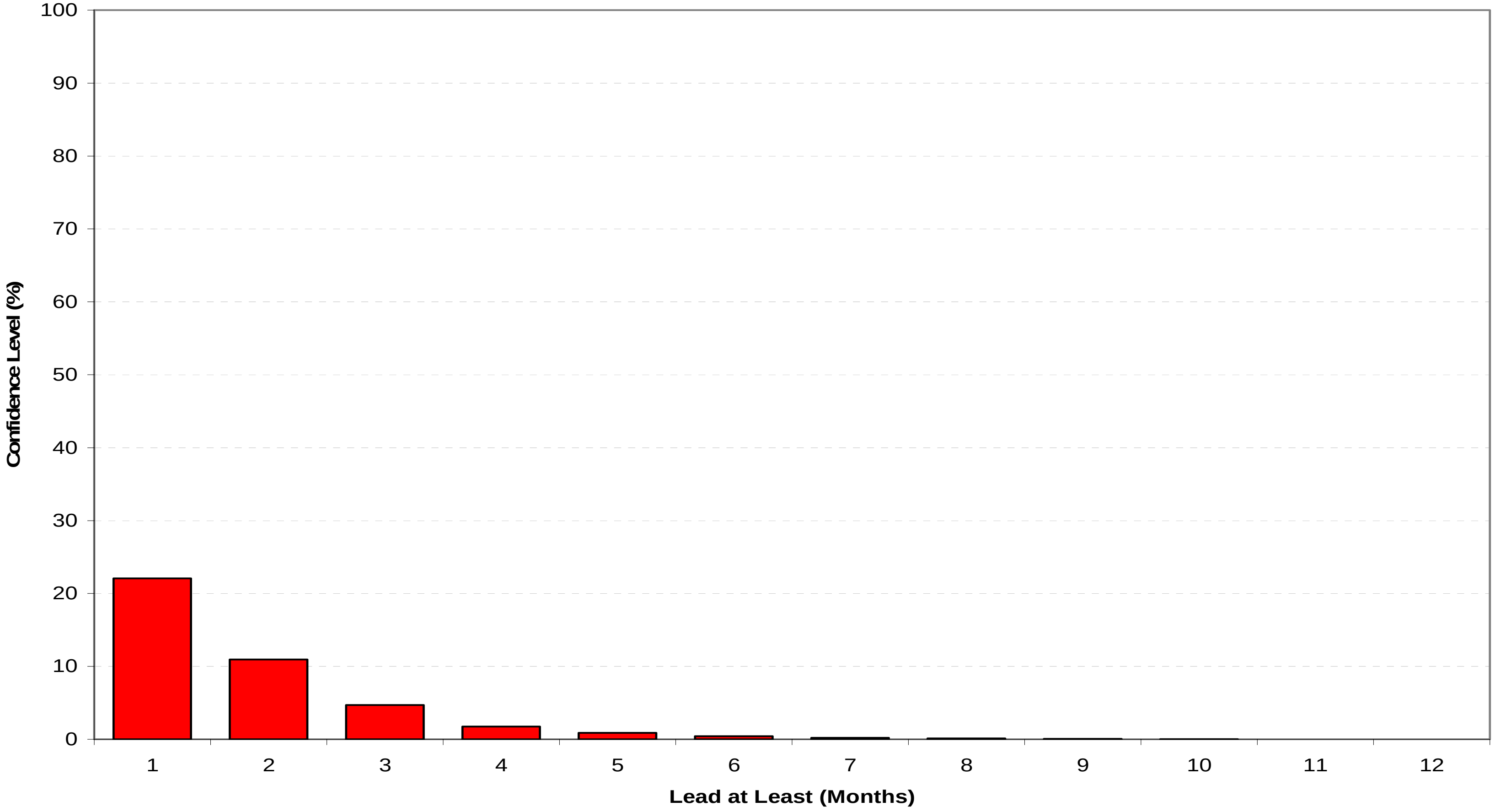
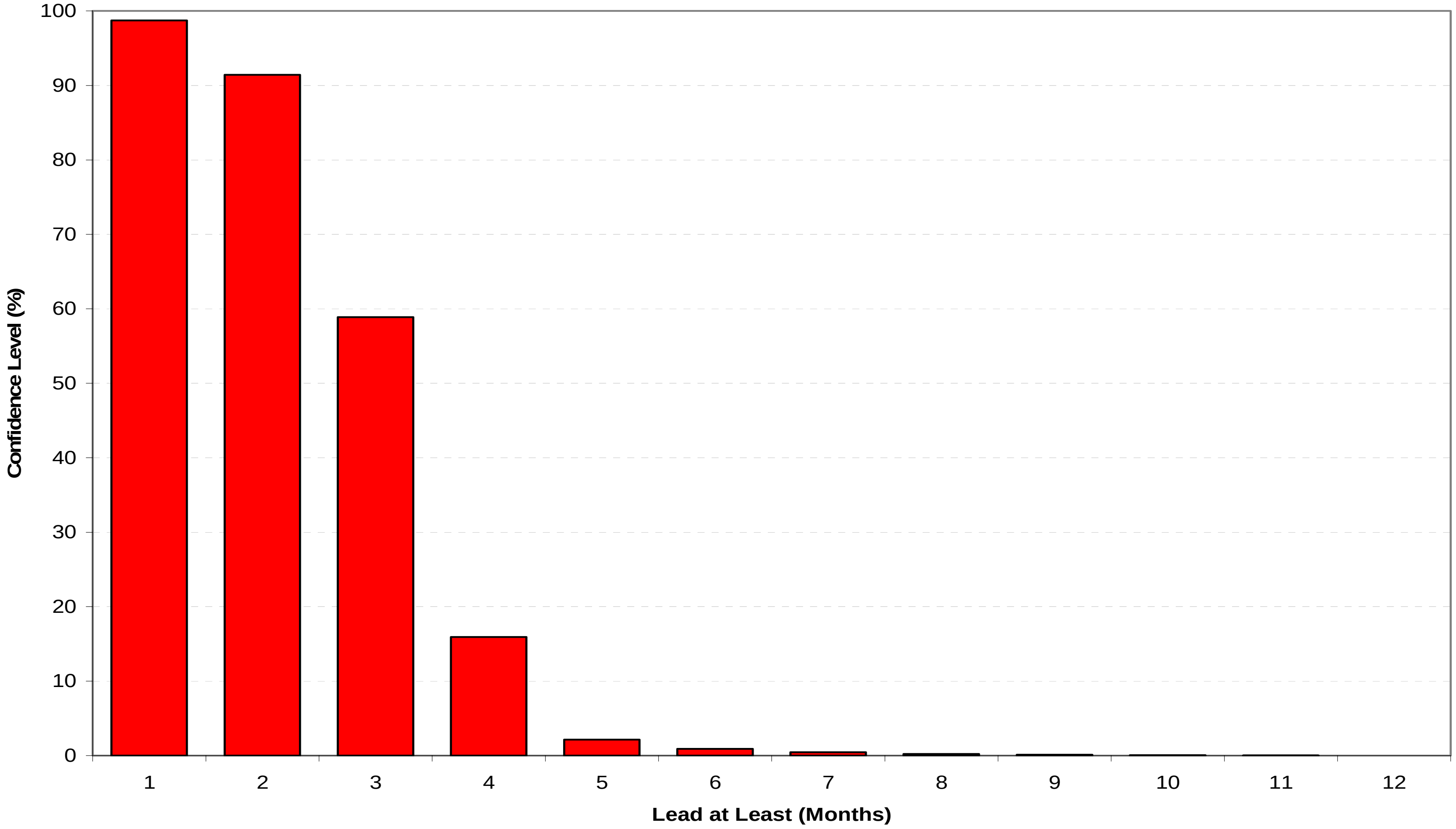


Figure 4
Lead Profile: Growth Rate of DSE-ECRI Indian Leading Index vs. Indian Growth Rate Cycle Since 1991



*Complete list of working papers is available at the CDE website:
http://www.cdedse.org/worklist.pdf