PART II

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 be associated with exports to and imports from respective trading partners. For any economy, these cyclical upswings and downswings can be predicted by leading indices, typically six to nine months in advance. These cyclical changes in domestic demand also encompass 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 a country and a weighted average of the leading indices of these countries can be used to predict fluctuations in that country's exports (Moore, 1976; Klein and Moore, 1978, 1980).

In addition to the cyclical fluctuations in a given country's trading partners, movements in the exchange rate are also a vital harbinger of future exports. It is of course expected that a cyclical expansion in the economies of the trading partners would herald an increase in exports of a given country. If, however, this is accompanied by a depreciation in the currencies of the trading partners, the net impact on the given country's exports will be ambiguous since the expansionary impact will be partly or wholly offset by the increasing cost of imports faced by the trading partners. In other words, exchange rate fluctuations must also be taken into account along with cyclical factors in a given country's trading partners to accurately gauge current and future exports of the country.

In a study of U.S. exports, Cullity, Klein and Moore (1987) combine exchange rates with conventional leading indices to predict U.S. exports. They note that exchange rates have almost half a year's extra lead over exports compared to that of leading indices.

In a more recent study, the Economic Cycle Research Institute (ECRI, 1997; Hiris et al., 1995) has constructed a leading index of U.S. exports that includes a broadly-based trade-weighted effective exchange rate index, as well as ECRI's long-leading indices of ten industrial economies that include most of the major U.S. trading partners. Long-leading indices[3] improve on the traditional leading indices by increasing the lead time to over a year, on average. That is, long-leading indices have about half a year's extra lead over traditional leading indices. This implies that exchange rates as well as long-leading indices have approximately the same lead over exports and can be combined into a composite exports leading index.

The long-leading indices of these ten countries – Canada, Japan, the United Kingdom, Germany, France, Korea, Taiwan, Italy, Australia, and New Zealand – are combined into a single index by weighting the long-leading indices for each country by their respective average share of U.S. exports over the 1989-95 period. This composite long-leading index is further combined with the 131-country trade-weighted real exchange rate index compiled by the Federal Reserve Bank of Dallas to yield the leading index for exports.

Cyclical activity in ECRI's leading index for U.S. exports is measured in growth form. This is because cyclical declines in the level of exports are rare whereas movements in their growth

rates are relatively more frequent. ECRI's leading index for U.S. exports therefore predicts growth rates in exports. Cycles are thus expressed in growth rates where the growth rate is measured by the "six-month smoothed growth rate." This smoothed growth rate is based on the ratio of the latest month's figure to it's average over the preceding twelve months, annualized and centered about six months before the latest month. Unlike the more commonly used 12-month change, it is not very sensitive to idiosyncratic occurrences 12 months earlier. A number of such advantages make the six-month smoothed growth rate a useful concept in cyclical analysis (Banerji, 1999).

The exchange rate index and the composite leading index both have cyclical movements around a trend that determine the cyclical movements of future exports. Note, however, that the multi-country composite leading index is itself a weighted average of several (in this case, 10) 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, the 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 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 the process of standardization, which involves adjusting the amplitudes of the two components by dividing each by its own historical cyclical volatility. After standardization, the cyclical movement of each component is expressed 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.[4]

To evaluate the predictive ability of the exports leading index (level or growth form), 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 choice of turning points is made by mechanical procedures supplemented by rules of thumb and experienced judgment. The initial selection of turning points employs a computer program based on the procedures and rules developed at the National Bureau of Economic Research (see Bry and Boschan, 1971). The selection of a turning point must meet the following criteria: (1) at least five months opposite movement must occur to qualify as a turning point: (2) peaks (troughs) must be at least fifteen months apart; (3) if the data are flat at the turning point, then the most recent period is selected as the turning point. These rules of thumb trace their roots to Burns and Mitchell (1946) and continue to be applied by the Economic Cycle Research Institute (ECRI). Finally, turning points must pass muster through the experienced judgment of the researcher. Turning points can be rejected because of special one-time events that produce spikes in the data, indicating turning points. Experienced judgment also excludes non cyclical exogenous shocks.

The methodology described above is applied to the Indian economy and two leading indices are constructed – one in level and the other in growth form. The usefulness of these indices are evaluated 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.

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[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 Chitre (1982; 1986) and Dua and Banerji (2000).

[3] Research on long-leading indices was pioneered by Cullity and Moore (1987). These indices have a longer lead compared to the conventional indices. To be considered a long-leading indicator, a series must have an average lead of at least 12 months at business cycle peak dates and 6 months at business cycle trough dates.

[4] Issues and procedures related to construction of composite indices are discussed in Appendix A.