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**WORKING PAPER No. 227**

**THE COMPOSITE INDICATOR OF ECONOMIC ACTIVITY IN MOZAMBIQUE (ICAE):  
FILLING IN THE KNOWLEDGE GAPS TO ENHANCE PUBLIC-PRIVATE PARTNERSHIP (PPP)**

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## TABLE OF CONTENTS

RÉSUMÉ .....	4
SUMMARY .....	4
I. INTRODUCTION .....	5
II. THE ICAE AS AN INSTRUMENT OF KNOWLEDGE.....	11
III. METHODOLOGY AND DATA FOR THE COMPUTATION OF THE MOZAMBIQUE ICAE.....	15
IV. THE COMPUTED ICAE AND ITS ASSESSMENT.....	20
V. CONCLUDING REMARKS .....	24
APPENDIX: FIGURES TAKEN FROM THE MAIN REPORT .....	25
BIBLIOGRAPHY.....	35
OTHER TITLES IN THE SERIES/ AUTRES TITRES DANS LA SÉRIE.....	36

## **RÉSUMÉ**

L'examen par les pairs et les partenariats public/privé ont besoin de transparence pour exister. La transparence consiste à partager les informations sur l'économie, ses performances et l'influence des politiques. L'indicateur composite de l'activité économique (ICAE) du Mozambique est un outil d'information, dont l'élaboration repose sur une méthodologie éprouvée de construction d'indicateurs du cycle d'activités entre pays coutumiers des évolutions cycliques. La mise au point de cet indicateur a été en partie motivée par la nécessité d'instaurer un dialogue constructif entre les acteurs locaux des secteurs privé et public, en leur apportant un outil commun d'information sur la performance et les perspectives à court et à moyen termes de l'économie, et la manière dont les politiques peuvent influencer ces résultats. Grâce à sa comparabilité avec d'autres indicateurs dans les pays des principaux partenaires étrangers, publics et privés, du Mozambique, l'ICAE devrait aussi largement faciliter un examen constructif par les pairs, dans le cadre du NEPAD et au-delà.

## **SUMMARY**

Peer review and public-private partnerships hinge on transparency. Transparency is about commonly shared knowledge about the economy, its performance, and the way policy influences it. The Composite Indicator of Economic Activity in Mozambique (ICAE) is a tool of knowledge whose construction is based on an established methodology in the construction of business cycles indicators amongst countries that have such tradition. Its construction was primarily motivated by the need to enhance constructive dialogue between domestic private and public sector agents in Mozambique, by providing them with a common tool of knowledge about the long-term and short- to medium-term performance and prospects of the economy, and how this relates to policy. Due to its comparability with similar indicators that exist for the country economies of key Mozambique foreign private and public sector partners, the ICAE is also a potentially useful tool of constructive peer review, within the NEPAD framework and beyond.

## I. INTRODUCTION

This paper summarises the principal results of the study for the construction of the Composite Indicator of Economic Activity (ICAE) in Mozambique. It is organized into five sections. The rest of this Introduction explains the background and highlights the principal results of the study. Section II discusses the relevance of the ICAE as a knowledge tool in face of existing information and knowledge gaps about the performance of the economy amongst public and private partners in Mozambique. Section III outlines methodological aspects and briefly explains the data used in the development of the ICAE. Section IV explains in some detail the results of computation and forecasts of the ICAE and compares it to the South African coincident indicator to identify some relationship between the performance of the economies of Mozambique and South Africa. Section V draws concluding remarks and highlights further work.

### I.1. Background

The study was undertaken for the Development Centre of the Organization for Economic Co-Operation and Development (DC-OECD), and was initiated in November 2001 as part of the Mozambique Pilot Project on Public Private Partnerships. A Steering Committee of the project supervised the study and facilitated the cooperation of the local partners, namely the various government departments, business organizations, and representatives of international development finance institutions and bilateral donor agencies represented in Mozambique. The Development Centre of the OECD provided financial support and facilitated technical backstopping to the study by opening channels of communication and organizing contacts between the consultant and specialists involved in related work at the OECD (namely the Statistics Directorate and the Division for Non-Members in the Economics Department) and the Research Department of the Banco de Portugal. In Mozambique the project's Steering Committee organized an

informal seminar involving participants from the public sector (government officers and managers from public enterprises) and the private sector. As the study was concluded and the first full results were produced, the Steering Committee also organized a launching seminar in Maputo, attended representatives of the private sector, members of Government, representatives of bilateral and multilateral donors, diplomatic missions, and staff and consultants from the DC-OECD.

The objective of the Mozambique Pilot Public-Private Partnership (PPP) project is to strengthen the relations between the public and the private sector in the development process in the country. Dialogue between the government and the business community in Mozambique started in the mid-1980s as the country embarked on a free market economy after just about a decade of the authorities' experimenting with a socialist regime. Initially the dialogue was almost one-way as in the past, but as it became two-ways it turned acrimonious<sup>1</sup>.

Upon an assessment of the experience of PPP dialogue and practice, Mozambican partners in government and the business community concluded that there is a substantial gap in information and knowledge that works as a handicap to improved business and policy dialogue, decision making and performance. In particular, it was perceived that both the dissemination and use of economic statistics in Mozambique are still not sufficiently supportive of the developmental aims and activities of public-private partnerships. Based on perceptions and little-shared objective knowledge, debate amongst partners would inevitably remain acrimonious with little constructive substance. They thus sought the assistance of the DC-OECD that resulted in the present study.

In coordination with the project's Steering Committee the DC-OECD hired a consultant and assigned him with the following tasks. First, review the national statistical system and its products with view to using them in the development of a quantitative framework for tracking and assessing the medium-and short-term performance of the economy of Mozambique. Second, devise means of making the results of the study available to PPP partners, and the procedures for regularly updating them. An over-riding guideline was that the work should help improving transparency and the sharing of knowledge amongst PPP partners about the past and the likely future performance of the economy, as this is seen as a positive factor in the development of a constructive PPP dialogue and business initiatives.

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1. Seven Annual Private Sector Conferences have so far taken place (the latest of which in March 2003), jointly organized by the Confederation of Economic Associations – CTA and the Government (Ministry of Industry and Trade).

## I.2. Principal Results of the Study

The results of the study that is hereby summarized include:

- 1) A methodology for the computation, regular updating and forecasting of an Indicator of Economic Activity in Mozambique (ICAE);
- 2) The computed monthly ICAE covering the period from January 1991 to June 2002 (an update will cover the period up to December 2002); and
- 3) Forecasts of the ICAE for the period between July and December 2002, with extensions up to March 2003 (the update will include forecasts up to June 2003).

The computed and forecast indicators are presented in Figure 1. In addition to the cyclical indicator in the form of deviations from trend computed as  $C_{\%} = \left( \frac{TC}{T} - 1 \right) * 100$ , the figure reproduces the long-term trend (T), as well as the trend-cycle (TC) which is a combination of trend and the short-and-medium term fluctuation (C). Figure 2 presents the cyclical indicator in an index form with base 100, as  $C_{100} = C_{\%} + 100$ , to conform and make it comparable to the usual presentation of business-cycle indicators. In the form presented in Figure 1.2 the ICAE can be read directly as the degree, in percentage, of departure of monthly activity from the corresponding long-term trend level. Thus when the indicator reaches value 5.0 on the vertical scale it means that in that particular month activity was cyclically 5.0 per cent higher than its long-term trend level. The equivalent value for the ICAE in the form presented in Figure 2 would be 105.0. The lines coded \_FOR in these figures represent the forecasts of the indicator, performed in the manner explained further below in this paper.

Figure 1. Actual and Forecast Indicators of Economic Activity in Mozambique

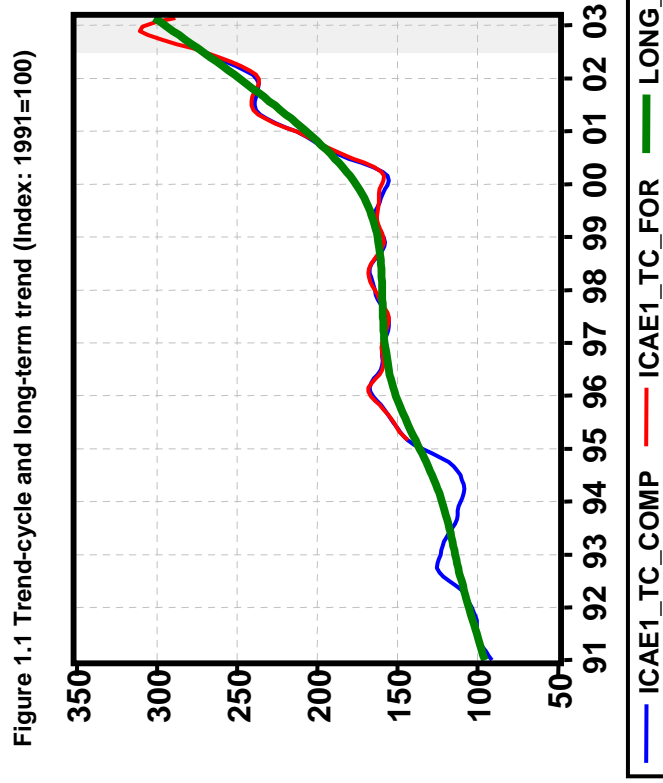


Figure 1.1 Trend-cycle and long-term trend (Index: 1991=100)

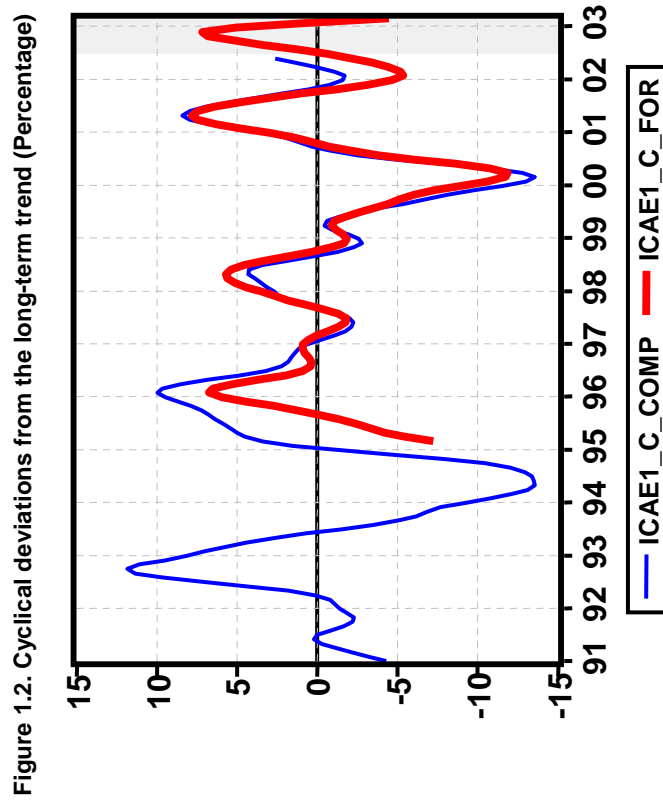
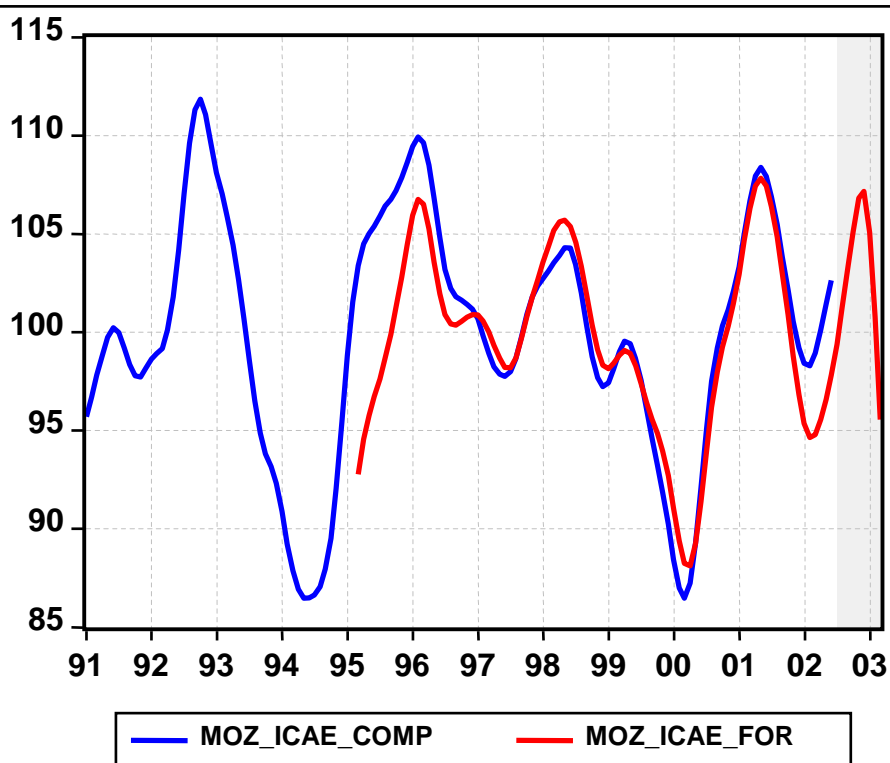


Figure 1.2. Cyclical deviations from the long-term trend (Percentage)

Figure 2. Mozambique Cyclical Indicator of Economic Activity (Base=100)



The results suggest that long-term growth in Mozambique remained strong in 2002 and is likely to continue to be so. However, there remains a substantial amount of short-to-medium-term volatility. Subsequent to the financial distress of early 2001 and the ensuing monetary tightening imposed by the Bank of Mozambique, the economy entered the second half of that year in a cyclical downturn that aborted the recovery from the recession that started in the first half of 1999. The year 2002 started with real activity in a strong growth mood, if just below the long term trend (catching up only towards mid-year). However, activity once again turned downwards towards the end of the year. It is thus estimated that medium-term annual growth in real sector activity (on a trend-cycle basis), which in 2001 was 32 per cent compared to 2000 (a strong recovery from the recession that started in 1999 and was aggravated by flooding of southern Mozambique in 2000), may in 2002 have halved to around 15 per cent. By the end of 2002 the economy was facing another, and rather strong cyclical downturn, which according to our forecasts may continue at least during the first quarter of 2003<sup>2</sup>. In effect, the ongoing downturn may be more than a short-term event, as there are indications that the medium-to-long term growth outlook is itself either slowing severely or, indeed, turning negative.

2. In an extensive interview (in the fax paper *vertical*, numbers 251 and 252 of 7 and 9 February 2003, with the title "*Falta de liquidez e procurement ensombraram 2002*" — which in English reads "*Liquidity and procurement constraints cast dark shadow on 2002*"), Mr. Salimo Abdala, the President of the Commercial Association of Mozambique (a traders' association) and Deputy-President of the Confederation of Business Associations, CTA, said that "In the last part of the year (2002) there was a very strong recession".

Table 1 shows the business and growth cycle events in Mozambique between January 1991 and December 2002. On average, as typical of many business cycles, periods of recovery have tended to last longer than periods of recession. In this case the results show that in 54.2 per cent of the time (78 out of total 144 months) economic activity in Mozambique was cyclically upwards. However, this pattern seems to have been strongly so in the first half of our study sample. During the second half, periods of recessions (or aborted recovery) have tended to dominate the business cycle events.

**Table 1. Mozambique Business Cycles: Jan. 1991 - Dec. 2002**

Cycles	Recession		Recovery	
	Trough	Duration in months	Peak	Duration in months
I	?	?	Oct-92	? 22
	May-94	19	Feb-96	21
II	Jun-97	16	May-98	11
	Mar-00	22	May-01	14
III	Feb-02	9	?	10 ?
TOTAL		66		78
144		45.8%		54.2%

Source: Computed by the author from actual and forecast ICAE (see Tibana, 2003).

## II. THE ICAE AS AN INSTRUMENT OF KNOWLEDGE

### II.1. Existing Information and Knowledge Gaps

There has been a large information and knowledge gap about the medium- and short-term performance of the economy of Mozambique, as well as about how it relates to perceived long-term developments. These gaps exist because in Mozambique statistical services lack the capabilities and the versatility to generate and disseminate information relevant for business and policy decision making, of quality that is commonly accepted and validated, in a timely and transparent manner. The traditional aggregate measures of activity or output such as GDP are both too time aggregated (annual) and late to come (up to eighteen, and in a recent past up to twenty-four months). This makes them less relevant and even useless to proactive business and policy making. On the other hand, individual sectoral and branch indicators of activity which are more frequent (monthly or quarterly) are not satisfactory as pointers of the long-term trends and the short-to-medium term cyclical behaviour of the whole economy, because by themselves they mainly reflect developments in narrow sectors or branches.

The under-development of the statistical services is matched by the virtual non-existence of (public or private) economic analysis and forecasting services capable of offering alternative outlooks of the performance of the economy in a transparent and commonly shared framework to both the public and the private partners. Because of the mostly public-good nature of information and knowledge, and because of the smallness of the private sector, there is little incentive for the emergence of independent organizations of economic analysis and forecasting. Budgetary limitations and lack of experience and vision also limit the scope for public institutions such as university research centres engaging in such activities. The same occurs with business organizations, as they spend most of their resources and effort lobbying, while developing little knowledge basis and foundation work for alternative policy development (and even for effective lobbying).

This situation has not facilitated the dialogue between the domestic private and the public sectors, as well as between these and the foreign bilateral and multilateral donors, development and finance agencies. While the government and (to some extent) foreign partners (in particular multilateral development and financial institutions and large foreign direct investors) have emphasized long-term developments, local businesses (in particular representatives of small and medium sized enterprises, labour unions and the civil society) have focused attention on the short- and medium-term. Economic and policy analysis has also failed to provide the meaning of apparently high rates of growth as reported by official GDP and relatively substantial inflows of foreign investment, and the notably slow improvement, and even perceived deterioration, of social conditions in the country.

Based mostly on perceptions and weak and non-transparent information and knowledge, there has therefore been increasing entrenchment of views about the process of economic and social development in the country, acrimony in dialogue between private and public sector partners, and large informational and knowledge gaps subsist. Meanwhile (and partly aggravated by the resulting greater noise in the information and dialogue) domestic and foreign investors have found it difficult to make informed business decisions that relate to the actual performance and prospective developments of the economy. Public policy making has also not been helped<sup>3</sup>.

In what respect information and knowledge is insufficient or deficient critically matters for business decision-making and management, as well as for content and quality of government economic policies. For instance, it is widely believed that Mozambique's economic growth as measured by the change in GDP has over the last ten or twelve years been quite strong. However, it is not clear how much of this aggregate growth reflects long-term trends and how much are deviations from this that result from cyclical and irregular factors. Similarly, it is important to understand what factors dominate the long-term trend and what mostly influences the cyclical short- to medium-term fluctuations. For instance, it is well known that overall growth as measured by GDP in Mozambique is said to have been strongest in 1997-99. Yet recorded foreign trade during the period covered by this study (i.e. 2000, before the coming of Mozal exports of smelted aluminium) shows no substantial change in the level of exports in the years 1997-98. The suggestion is therefore that to the extent that it has actually occurred, the extraordinary growth recorded in the official GDP data for 1997-99 either was not taking place in real sector activity, or was hardly supply (export) led. The implication would then be that by 1999, after more than ten years of stabilization and structural adjustment (of which seven in a peaceful environment) the economy had not established any solidly export oriented real activity, despite the existence of substantial natural and labour resources<sup>4</sup>.

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3. Political tensions compound the situation. For instance, the latest (2003) government budget was passed by Parliament without any debate of matters of substance as opposition members of parliament drummed the tables and shouted over governments ministers as they presented the budget statement and laws, and the ruling party used the majority vote to rubber stamp them (pretty much like in the old times, with no scrutiny from any opposition). It was left to the journalists to convey the substance of the approved documents to the public and the business community by airing minister's interviews about them. This was certainly not an assuring way to businesses that the policies had been properly scrutinized and likely to be implemented in a disciplined manner.
  4. One major qualification should be made to this conclusion, and this relates to the role of the informal sector and what the ICAE does capture or not about its activities. For instance, most informal (or underground) economy is not recorded in official real sector statistics on which the ICAE is based. Further, the ICAE does not include in its component series a number of important financial variables that would usually capture an element of the real economy activities in the informal sector that are not captured by real sector official statistics (see the following section). This issue will be addressed in later updates of the ICAE when the indicator will be broadened to include financial sector variables in its set of component series. Finally, it is known that government statisticians when computing national accounts make some judgement about the extent of the informal sector (including the all important peasant farming sector of the rural economy).

## II.2. The Informational Content and the Component Series of the ICAE

Like most coincident indicators of economic activity in countries where the practice of their computation has been established, the Mozambique ICAE is a measure of short- to medium-term directions and intensity of change in economic activity in the country. It is a measure of the cycles around the long-term trend of economic activity that, while not measuring their levels, gives an indication of the direction and rate of output, value added or incomes in the short- to medium term<sup>5</sup>.

The present version of the computed Composite Indicator of Economic Activity in Mozambique covers a period of more than eleven (11) years, from January 1991 to July 2002. It is based on a combination six component economic series that register the activities and outputs of key sectors of real economic activity in the country, namely:

- Electricity consumption, for all kinds of uses in the economy;
- Commodity exports, which serve as a demand outlet for the outputs of key agricultural and industrial activities;
- Commodity imports, which reflect a substantial part of both the final consumption demand and the intermediate and capital imports demand of the economy;
- Port/harbour operations/activities, which process both domestic, national, regional and international trade entering or crossing Mozambique;
- Activities of the rail transport system, which ferries the domestic, national, regional and international goods;
- Manufacturing production of key commodities (such as cement which already enters the ICAE, and others to be included as the available data is scrutinized and admitted).

The type of data used in the construction of the ICAE is part of a set common in similar work in a number of countries for which short- to medium-term composite or coincident indicators of economic activity have been developed. A principal difference lies in the fact that in those other places the set of components series often includes also valuable qualitative information from regular business surveys on economic activity. In Mozambique there is no such information. Another substantial difference is that in other cases the indicator combines both real sector and financial sector data, whilst the indicator computed in this study focuses on real sector data. Finally, given the pervasiveness of the informal sector and the underground economy in the country, there is a likelihood that the ICAE will fail to capture some of the real sector activities that take place in these segments of the economy. Thus the ICAE for Mozambique should be taken as it is: an indicator that captures mainly (although not exclusively) the activity in the formal real sector of the economy.

This focus on the real sector was a deliberate choice grounded on three reasons: First, the fact that the real sector of the economy of Mozambique is the least well and consistently captured by the available official and aggregate statistics, and the one on which much disagreement concerning its actual performance has abounded. This suggests that it is with respect to this aspect of the economy that there is a larger

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5. Subject to the qualifications in the previous footnote.

information and knowledge gap, thus presenting more scope for the study to add more value to the existing information and knowledge basis. Second, aggregate real sector data is precisely the one that is most untimely to come by in official statistics (often taking more than a year to be made available). This makes the real sector the most relevant area of priority in the development of an composite indicator of economic activity based on selected higher frequency data (in this case monthly series) that is sufficiently representative and relatively easy to update within a quarter. Third, and not least important, given the limited pool of real sector data, it was going to prove hard to find real sector leading indicators for the Mozambique ICAE. It was thus thought adequate to keep the most relatively readily available, reasonably systematic and widely cross-checked financial data as a reserve from where to develop potential short- to medium-term leading indicators for forecasting the ICAE.

### III. METHODOLOGY AND DATA FOR THE COMPUTATION OF THE MOZAMBIQUE ICAE

#### III.1. Methodology

This study that resulted in the ICAE applies methods and techniques of business and growth cycle analysis to short- to medium-term performance of the economy of Mozambique. The methods applied are standard in countries where the tradition of developing these indicators has been established, with innovations to accommodate for the limitations imposed by the availability of data<sup>6</sup>.

A key methodological approach of the construction of coincident or composite activity indicators involves the use of a reference series to check and validate the computed Indicator<sup>7</sup>. Usually this reference series is quarterly GDP, or quarterly or monthly industrial output (where industry is sufficiently large for its cyclical performance to be representative of the performance of the whole economy). In Mozambique neither of the two series is available (nor have we any other valid substitute). Thus, for the evaluation of the quality and informational content of the computed indicator, we have focused on the assessment of its relationships with a set of key financial variables that are assumed, either on the grounds of economic theory or from experience elsewhere, to have effects on short-term economic activity<sup>8</sup>. In the specific case of Mozambique these financial variables include lending interest rates, nominal exchange rates, and real credit (for working capital finance).

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6. In Sub-Saharan Africa, we know of no other country apart from South Africa where such tradition has been established. Recent empirical attempt to study business cycles in Africa and compare them with developed country cycles is by Rand and Tarp (2002). We do however find a major difference between our study and theirs. In particular, they characterize Sub-Saharan business cycles on the basis series of industrial production. Given the smallness of the industrial sector in African-type economies, it is unlikely that these indicators will be a fair reflection of the cycles of the overall economy (unlike in developed economies). Our study puts a premium on developing more aggregate indicators of activity that can, in as transparent manner as possible, capture as much as possible the overall economic performance of these countries. Further, given the importance of the non-industrial sectors in the African economies, business cycle indicators solely based on this sector are likely to fall into major credibility questions amongst PPP domestic partners as to their value for assessment of overall economic performance and policy making.
  7. See for instance Faqi and Nilsson (2001) and OECD (2001).
  8. While highly convenient, the existence of a reference series is not an over-riding condition for the construction of composite indicators. Alternatives can be found, and this is demonstrated in the work of Nilsson (2002) as part of OECD work in support of the Bank of Lebanon. While we have not followed necessarily the same procedures, ours was an attempt on another route to achieving similar results in a similarly difficult context in terms of data availability.

All the six (6) individual indicators used in the construction of the Composite Indicator of Economic Activity in Mozambique are quantitative. Four (4) are physical quantities, and two (2) are money quantities expressed in US dollars.

The frequency of the variables used is monthly (or, if of lower frequency, where somehow interpolated into monthly), and are available in raw form (i.e. containing the seasonal component).

It was considered that each original series is decomposed into the following components:

*Trend (T)*: the long-term trend component of the series;

*Cycle (C)*: the short- to medium-term cyclical component of the series;

*Trend-Cycle (TC)*: the combination of the long-term trend and the short-to-medium term cyclical components;

*Seasonal (S)*: The within-year fluctuations around the trend-cycle that recur in a very similar way in the same period or time of observation of the year;

*Irregular (I)*: The residual component that remains after the removal of the seasonal and the trend-cycle components, including any identified trading day and holiday effects (if the later are not taken into account separately).

Thus the methodological steps taken in the construction of the Composite Indicator are the following:

- Step 1*: All original data were converted from their original units into index numbers (with base on their average level in 1991: average (1991.Jan-Dec.=100)), so that they reduce to a similar scale of measurement;
- Step 2*: Seasonal adjustment, treatment of outliers, separation of the irregular component from the seasonally adjusted series, and the derivation of the trend-cycle series of each of the individual variable as a Henderson Moving Average;
- Step 3*: Aggregation of the individual trend-cycle series into a composite trend-cycle indicator. This step used a variety of procedures that resulted in alternative trend-cycle measures. One procedure consisted in deriving "sub-sector" trend-cycle series using a simple average procedure. These were then aggregated into the overall trend-cycle composite indicator using weights derived from GDP shares of the sectors of the economy represented by those sub-sector composite indicators. The other procedure consisted in applying principal component analysis (PCA) on the original six trend-cycle series to derive the weights used to aggregate them into the trend-cycle composite indicator.

**Step 4:** Computation of the cyclical Composite Indicator of Economic Activity (the ICAE) in the following manner: first we obtained the composite trend (T) component of the composite trend-cycle (TC) series constructed in step 3 above. For this we applied the Hodrick-Prescott filter. Then we obtained the aggregate cyclical component as a ratio of the Henderson Moving Average over the derived Hodrick-Prescott trend (i.e.,  $C=TC/T$ )<sup>9</sup>.

At the end of the four steps described above, we had in hand seven measures of the Trend-Cycle (TC), Trend (T), and Cyclical (C) performance of economic activity, each corresponding to the following alternative modes of aggregation of the component series:

**Table 2. Alternative Modes of Obtaining the Trend Cycle (TC), Aggregation Weights, and ICAE Symbols**

	Principal Component Analysis (PCA) with:		
TC1, T1, C1	No Rotation	On the six original series	ICAE1
TC2, T2, C2	Varimax Rotation		ICAE2
TC3, T3, C3	Quartimax Rotation		ICAE3
TC4, T4, C4	No Rotation	On the three sub-sector indicators	ICAE4
TC5, T5, C5	Varimax Rotation		ICAE5
TC6, T6, C6	Quartimax Rotation		ICAE6
<b>TC7, T7, C7</b>	<b>GDP sectoral shares attached to the three sub-sector indicators</b>		ICAE7
Sub-Sector Composite Indicators, weights into the ICAE7, and their original component series	COMPINDUS_TC (25%)	IELE2D12; cmntd12	
	COMPTRADE_TC (50%)	IndxxD12; indxmd12	
	COMPTRANS_TC (25%)	IOP1d12; OF1d12)	

*Note:* See Appendix 3 of the main study report for an idea of the GDP sectoral structure considered in the assignment of weights to the sub-sector composite indicators aggregated into the ICAE7.

The alternative indicators are depicted in the appended set of Figures A.2 and A.3. The Composite indicator depicted in Figures 1 and 2 is a combination indicator (by simple averaging) of all these alternative measures<sup>10</sup>.

### III.2. Data Sources and Quality

The computed ICAE for Mozambique includes variables directly measuring only the activities in the real sector of the economy. It does not include financial or monetary variables, as is common in similar composite indicators. The component series of the Mozambique ICAE are shown in Figures A.1.1 to A.1.6. Figure A.1.7 shows the sectoral

9. A number of reviewers have called our attention to the end-point problem of the HP filter. We expect to make improvements in the extraction of the long-term trend in the upcoming updates of the indicator.

10. Except for TC5 that was excluded from the combination due to its strongly idiosyncratic behaviour as compared to all other.

indicators computed in the manner explained below. More specifically, the following is the list of the series used in the construction of the Mozambique ICAE, given with the code names with which they appear in graphs and tables, followed by the description of their content:

- 1) *IELE2*: Index of electricity consumption (originally in Mega-Watts-hour, MWh);
- 2) *INDXX*: Index of commodity exports (originally in \$ million, f.o.b.);
- 3) *INDXM*: Index of commodity imports (originally in \$ million, c.i.f.);
- 4) *IOP1*: Index of port/harbour operations (originally in 1000 Metric Tonnes of total cargo handled, domestic and international, internal destination and transit);
- 5) *IOF1*: Index of volume of cargo ferried by the national rail transport system (originally in million metric tonnes-Km, domestic and international, internal destination and transit);
- 6) *ICMNT*: Index of cement production (originally in million metric tonnes).

The assessment of the data sources and overall quality was the first step in the development of this research. The findings of this analysis are contained in an earlier report from this study (*The Information Base for Public-Private Partnership in Mozambique : Review of the National Statistical System, Mimeo for the DC-OCDE, Maputo/Paris, March 2002*).

A number of characteristics of the data limit their statistical suitability for this type of study in Mozambique. These characteristics include: *i*) shortness of the time series; *ii*) frequent breaks in their trends reflecting substantial and frequent regime changes; *iii*) sharp short-term variability of individual series. The latter usually reflected an unstable institutional or policy environment and disturbances in the activities of one operator in sectors or branches characterized by highly concentrated industrial structures.

The concentration in industrial structures that is typical of many African-type economies has particular implications. While resulting in larger variability of branch or sector indicators as they reflect the activities of relatively small number of enterprises, it can in effect facilitate the development and interpretation of the type of composite indicators such as the one described in this paper. This is because the more concentrated the industrial structure of the economy, and once the activities of the few economic entities are statistically captured, the less is left out of the measurement of the overall economic activity in the country. On the other hand, there is the danger that if even only one entity is excluded, the resulting branch indicator (or even the overall composite indicator) will be a highly distorted measure of economic activity in the country. Thus while lack of complexity of the economic structures can facilitate the establishment of the tradition of building composite cyclical activity indicators in African-type economies (such as Mozambique's), it requires that the statistical service is good enough to make up for the implications of flaws in coverage that would otherwise be innocuous in less concentrated economic structures.

While noting some important deficiencies, the review of data sources and quality revealed the possibilities of using the available data for the work at hand. It was also concluded that using the available data to produce the indicator was likely to generate more consciousness about the need and importance of improving its quality and availability to PPP partners.

All the data used in this study comes from official institutions of the Republic of Mozambique. This was combined with data from reliable international sources that collect and exchange economic information and data with the national authorities (namely the IFM, from whose DOTS source we have taken data to complement the domestic trade customs information). Most monthly data from domestic sources are non-published (except, and increasingly more so, financial data). This is not because of confidentiality, but simply because it is monthly data that is not yet the focus of the dissemination effort of the national statistical system.

## IV. THE COMPUTED ICAE AND ITS ASSESSMENT

### IV.1. The Historical Series of the Computed ICAE: January 1991-July 2002

The computed alternative trend-cycle (TC), trend (T), and cyclical (C) indicators of economic activity are presented in Figures 1 and 2 at the introduction of this paper. Table 3 below reports the growth rates of trend-cycle, trend and cyclical components of economic activity in Mozambique for selected sub-periods of the sample. These sub-periods are:

- Period I: 1991-1993: War and transition to peace;
- Period II: 1994-1995: Rehabilitation and political transition;
- Period III: 1996-1999: Big-projects investment;
- Period IV: 2000-2002: Take-off growth.

The following aspects are noteworthy. First, the overall long-term growth rate of economic activity in Mozambique appears to be around 9 per cent<sup>11</sup>. Second, both the long-term trend and the trend-cycle growth that had been increasing since at least the beginning of the 1990s was by middle of the decade slowing down, virtually stagnating over the period 1996:01 – 1999:12. It was during these years that the projects were prepared and the construction started of MOZAL aluminium smelter plant and the Wit Bank Highway linking Mozambique to South Africa<sup>12</sup>. The coming into operation of these two undertakings has been the principal source of the high rates of economic growth recorded in the subsequent years.

Table 3. **Average Annual Growth Rates of Economic Activity 1991:01-2002:06 and Selected Sub-periods** (in percentage - %)

Periods and Selected Sub-Periods	Cyclical component	Long-term component	Trend-Cycle
	CGA	TGA	TCGA
All sample period: (1991:01-2002:06)	1.1	8.7	9.8
Sub-Period I: War and transition to peace (1991:01-1993:12)	1.5	8.6	10.1
Sub-Period II: Rehabilitation and Political Transition (1994:01-1995:12)	4.4	10.4	14.8
Sub-Period III: Start of big-projects (1996:01-1999:12)	-2.0	3.8	1.8
Sub-Period IV: Take-off growth (2000:01-2002:06)	3.4	15.1	18.5

Source: Author computation (Software: XLSTAT & EViews).

11. This is consistent with the results we had arrived at in the previous version of this study.

12. This is also consistent with earlier findings of this study.

With respect to the trend-cycle and cyclical measures of economic activity the following is noted. First, following a recovery from the war (and the draught that affected the country in 1989/90-1990/91), the economy grew strongly during most of the first half of the 1990s up to 1995. Overall (i.e. trend-cycle) growth was 14.8 per cent between 1994 and 1995, compared to 10 per cent in the sub-period 1991-93. Cyclically, between 1994 and 1995 activity tended to grow at around 4.4 per cent above the long-term trend. However, by the mid 1990s the economy started showing signs of exhaustion of its growth potential, with average annual trend-cycle growth falling below 2 per cent against 14.8 per cent in the previous period. Cyclically the economy entered the new century on the downside.

Given the controversy surrounding the official record on the growth of the economy of Mozambique over much of the period covered by this research, we have avoided the temptation to validate the ICAE by comparison with the officially recorded annual growth of Mozambique's GDP. In this study the assessment of the informational content and consistency of the ICAE relies on the nature and strength of its relationship with key financial variables. This approach is centred on the capacity of the computed Composite Indicator to relate in an economically meaningful way with key financial variables, and centres on the unification of the validation of the computed ICAE with the development of its forecasting framework.

#### **IV.2. Forecasts of the ICAE: Outlook to the End of 2002**

The forecasting framework for the Mozambique ICAE is based on an error-correction auto-regressive distributed lag (ADL) structure of the trend-cycle composite (the entity nearest to the observed data after purging it of the seasonal and the irregular components). Once this is forecast, a similar procedure to extract the long-term trend and the cyclical components as those applied on the computed composites are employed, namely the Hodrick Prescott filter to extract the long-term trend component from the forecast trend-cycle, and the calculation of the TC/T ratio. This forecasting framework explores the long run and short-run dynamic relationship between real financial prices (lending interest rate and real bilateral exchange rate of the Metical with the dollar), and a real financial flow variable (real credit for working capital).

The real interest rate is meant to capture the real cost of capital and is deemed to influence investment demand which is bound to have a bearing in the creation of the productive potential of the economy. The real exchange rate is meant to capture relative price movements with implications for medium- and long-term demand and output. In the short and medium term, the availability and utilization of credit for working capital financing is assumed to be a determinant of capacity utilization. Thus the forecasting framework is built around a conceptualization that, while obviously a reduced form, is not completely devoid of economic intuition about the determinants of trend-cycle and cyclical behaviour of economic activity.

The financial indicators prepared and used in the forecasting exercise are:

- *INDRFP1 (or RINT)*: Index of the real price of domestic currency denominated financial liabilities (the average real lending interest rate, across all maturities and the sectors of economic activity, originally in percentage per annum);
- *INDRFP2 (or RER)*: Index of the real exchange rate (of the Metical against the dollar, originally in units of MTs per dollar, corrected by the inverse of the relative Mozambique to US prices, where the Mozambique price is the aggregate CPI, and the US price is the price of the US industrial goods).
- *ICRUWK*: Index of the real volume of credit utilized for working capital financing.

These variables are represented in the attached Figures A.4, A.5 and A.6.

The results from the estimation of the ADL model for the trend-cycle level of activity in Mozambique confirm our *a priori* beliefs and expectations. In particular:

- 1) The effects on activity of changes in the key financial variables, and the shocks to activity itself, are significant and can be felt more than twelve (12) months after taking place;
- 2) There is a significant negative effect of the real lending interest rate, as well as a significant positive effect of the real credit utilized for working capital finance, on activity; these effects are detected despite the obvious difficulties of the single equation framework, knowing that there is a demand/supply mutual effect between these two variables; and
- 3) There is a significant and positive effect of the real exchange rate on activity.

In evaluating the model for the forecasting framework we have focused on its stability. For this we generated and looked at the recursive residuals and coefficients of the key financial variables. Generally the model is relatively stable for a substantial portion of the estimation sample, given the parsimonious specification and estimation techniques; in particular, we cannot visualize any substantial breakdown in recursive residuals and most of the coefficients in the last years of the sample. There are recognizable simultaneity problems however that have not been dealt within the single equation model and not instrumented estimation procedure. Nonetheless, the results are quite in line with the main predictions of the theory, the structure of the economy and the institutional characteristics of markets in Mozambique.

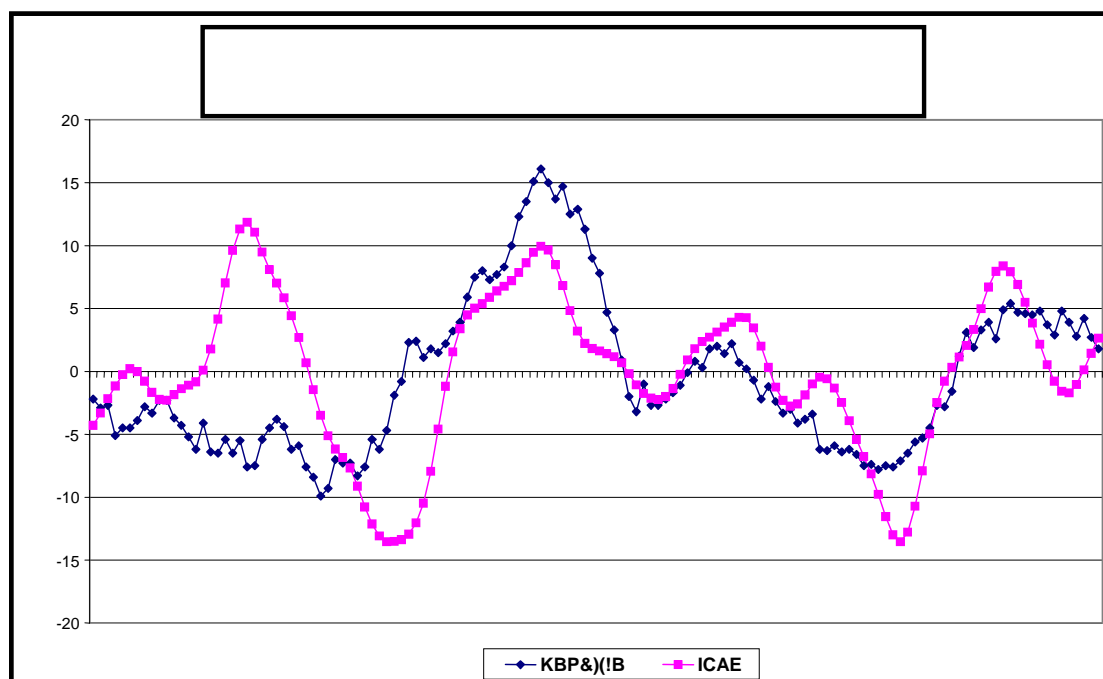
### **IV.3. Comparing the Mozambique ICAE and the South African Coincident Indicator**

The theoretical and empirical literature on the regional and international business cycles linkages is vast<sup>13</sup>. However, it coincides in stressing the importance of trade in goods and services, financial flows, and specialization. While it is not the object of this paper to analyze in detail the actual mechanism of the relationship between Mozambique and South African business cycles, a visual comparison between the two shows that they are clearly strongly correlated. This is shown in Figure 3 that depicts the Mozambique ICAE and the South African coincident indicator.

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13. For instance: Backus *et al.* (1992), Kose and Riezman (1999), Blankenau (1999), Buckle *et al.* (2002), Helbling and Bayoumi (2003), Imbs (2003).

Figure 3. South African Coincident Indicator (t-12)  
and Mozambique ICAE (t)



In this picture, the South African coincident indicator is lagged twelve (12) months. Apart from the potential evidence on the linkages between the economies of Mozambique and South Africa, on a first cut (i.e., on the pure statistical evidence shown in the picture), this would suggest that the South African indicator could be a useful statistical leading indicator to Mozambique's ICAE. Both aspects (i.e. the implications for the analysis of linkages, and the usefulness of the South African indicator as a leading indicator to Mozambique's) will in future be explored for their importance for policy making and assessment of economic performance in Mozambique.

## **V. CONCLUDING REMARKS**

Dialogue between the government and the business community in Mozambique started in the mid-1980s as the country embarked on a free market economy after a decade of socialist experimentation. The partners eventually recognized the value of transparency in policy dialogue, but tools of knowledge were (and still are) scarce, as both private and public institutions of economic analysis and forecasting are either very weak or non-existent.

The willingness to make the policy dialogue more fruitful to public-private partnership in development and the support of a leading international organization with reputation for independence and technical expertise (the OECD) has paved the way to the development of one particularly useful tool of knowledge, the Composite Indicator of Economic Activity in Mozambique (ICAE). This indicator, which allows for the assessment of the short- to medium term performance of the economy and the way policy relates to it, is transparent to the domestic PPP partners. It also bears the particular characteristic of conforming comparability with regional and other international partner economies. Thus, in addition to being useful to enhanced public-private partnerships, domestic and international, it is a potentially useful instrument of peer review, within the NEPAD framework and beyond.

## APPENDIX: FIGURES TAKEN FROM THE MAIN REPORT

Figure A.1.1. Index of Electricity Consumption: Jan.91-June.02

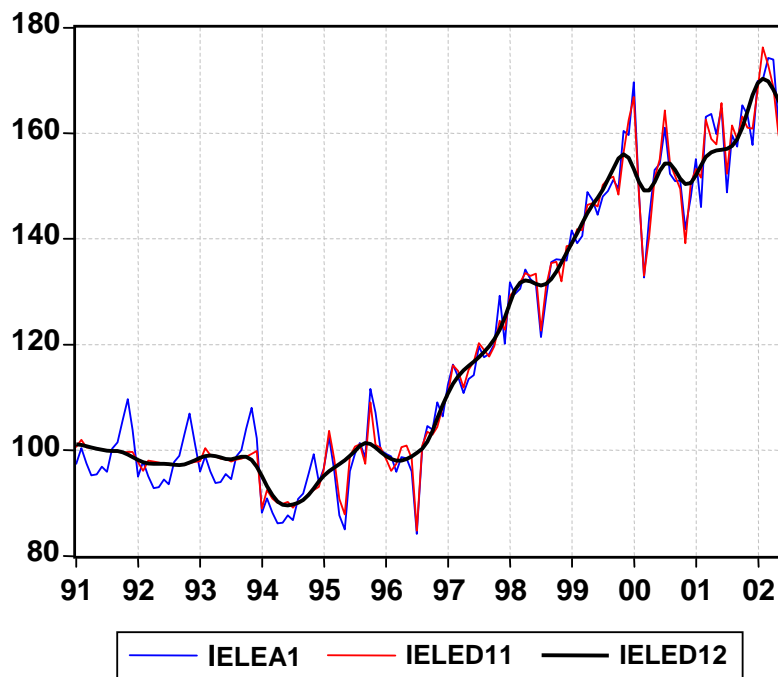


Figure A.1.2. Index of Cement Production: Jan.91-June.02

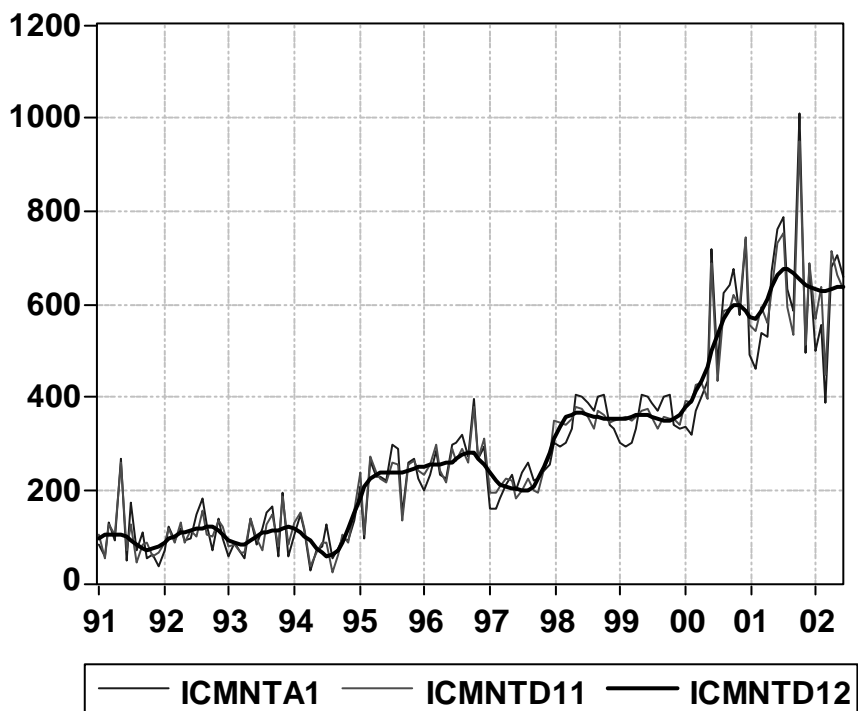


Figure A.1.3. Index of Export Earnings: Jan.91-June.02

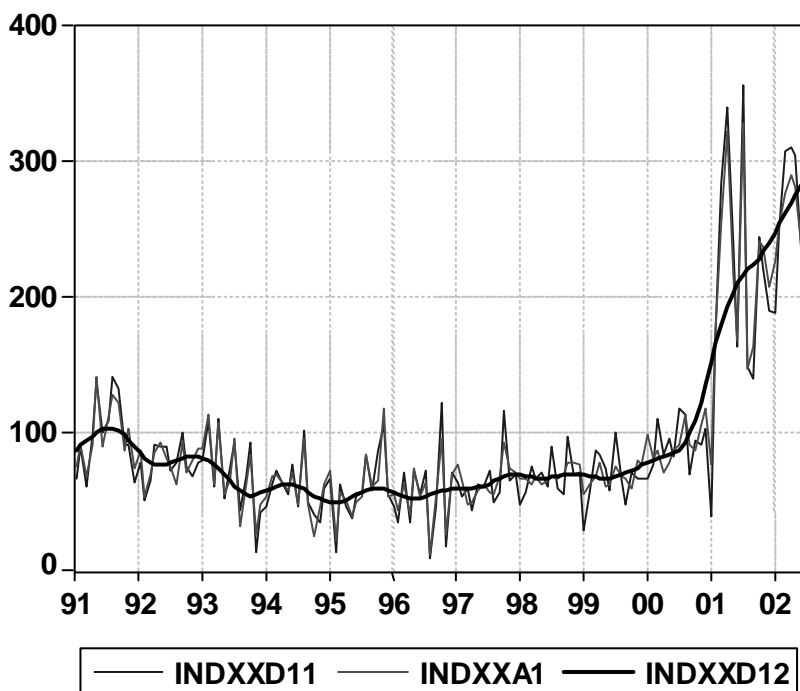


Figure A.1.4. Index of Imports: Jan.91-June.02

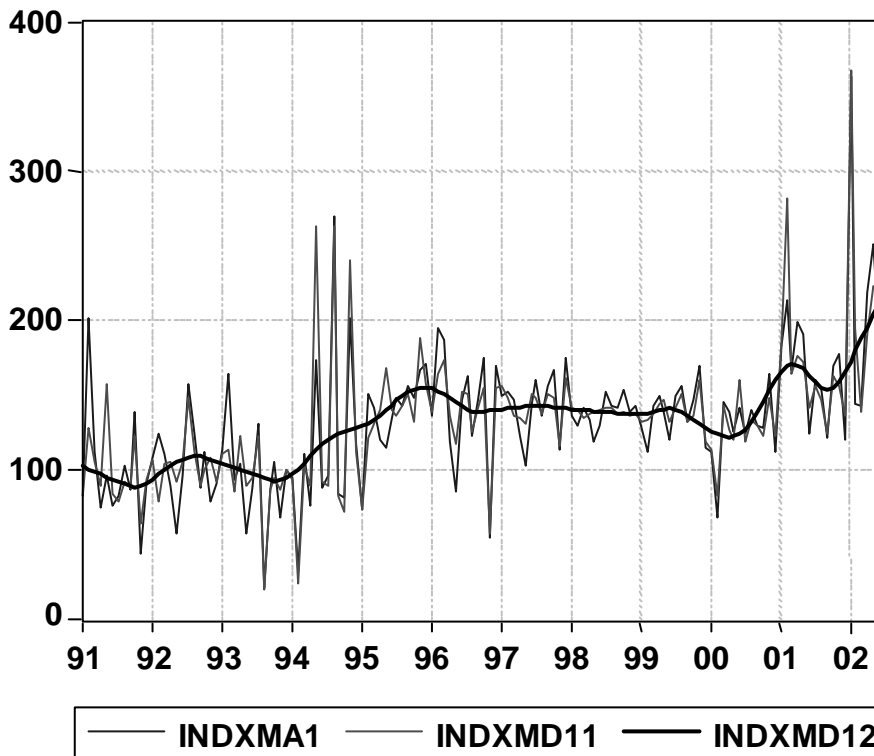


Figure A.1.5. Index of Rail Cargo Transport: Jan.91-June.02

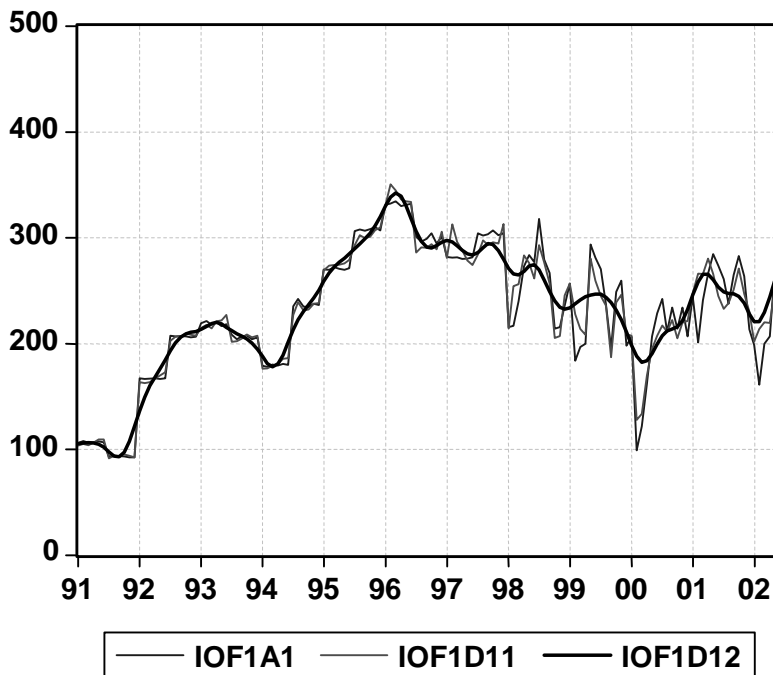


Figure A.1.6. Index of Port/Harbor Activity: Jan.91-June.02

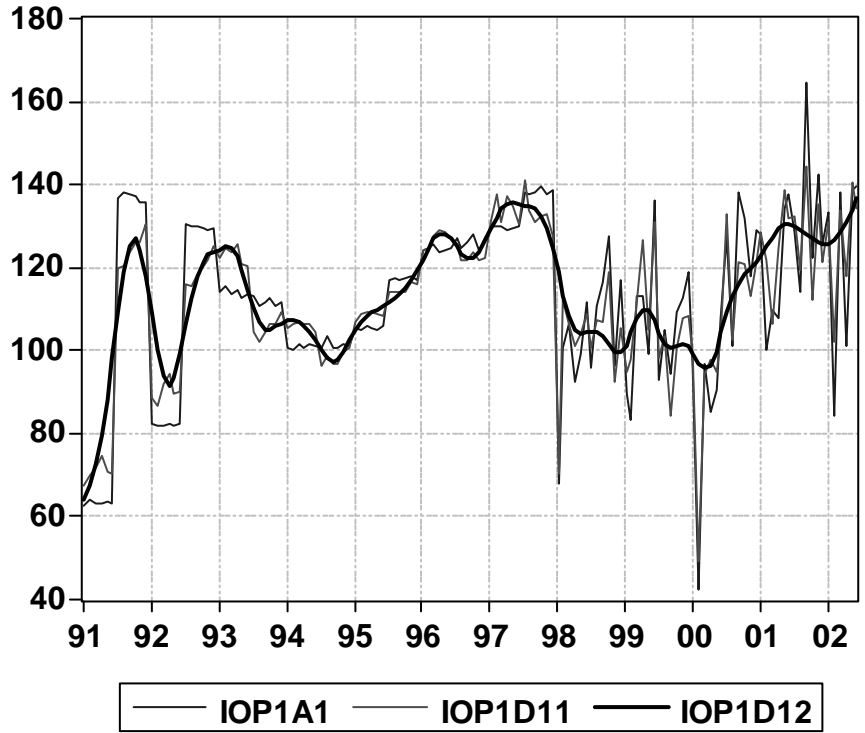


Figure A.1.7. Sub-Sector Composite Indicators

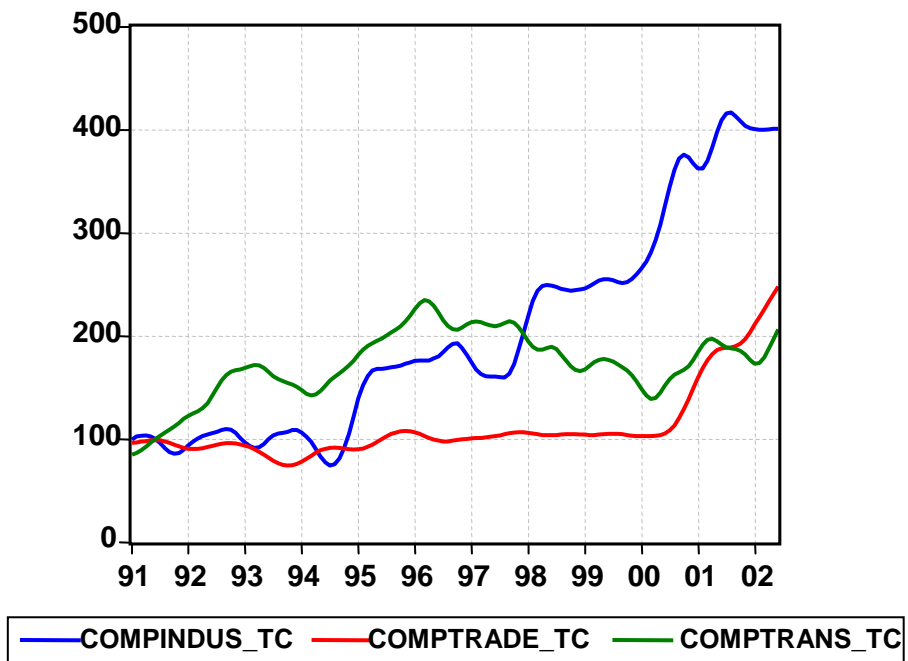


Figure A.2.1. Composite Trend-Cycle Indicators of Economic Activity

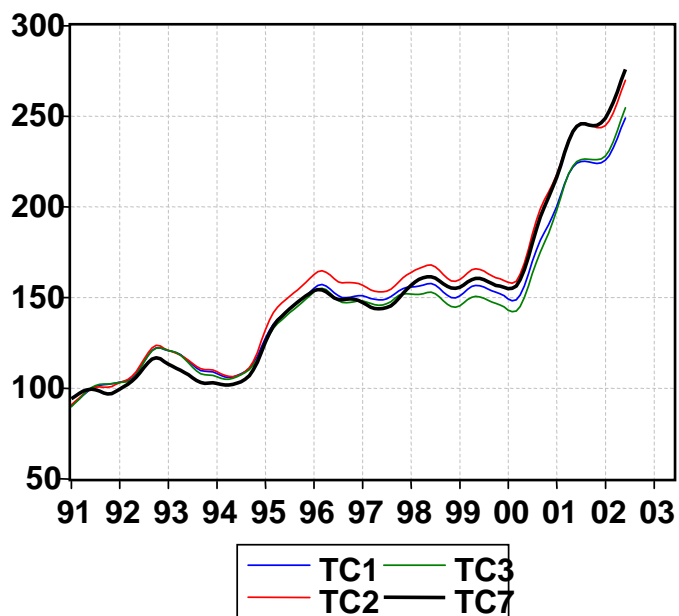


Figure A.2.2. Composite Trend-Cycle Indicators of Economic Activity

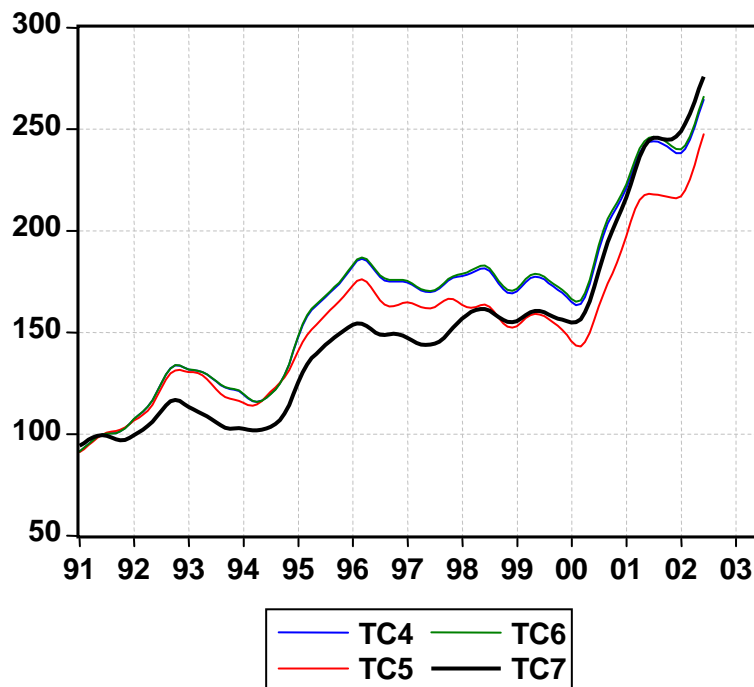


Figure A.3.1.a. Composite Trend Indicators of Economic Activity

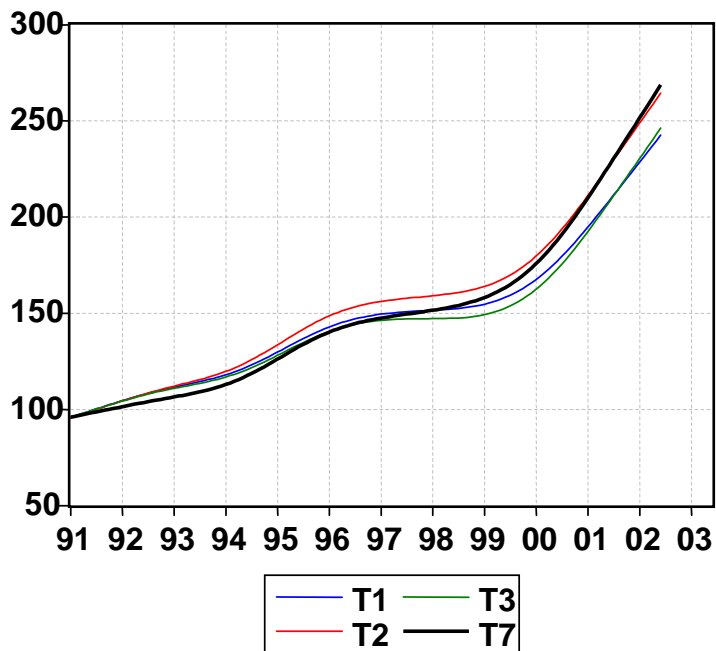


Figure A.3.1.b. Composite Cyclical Indicators of Economic Activity

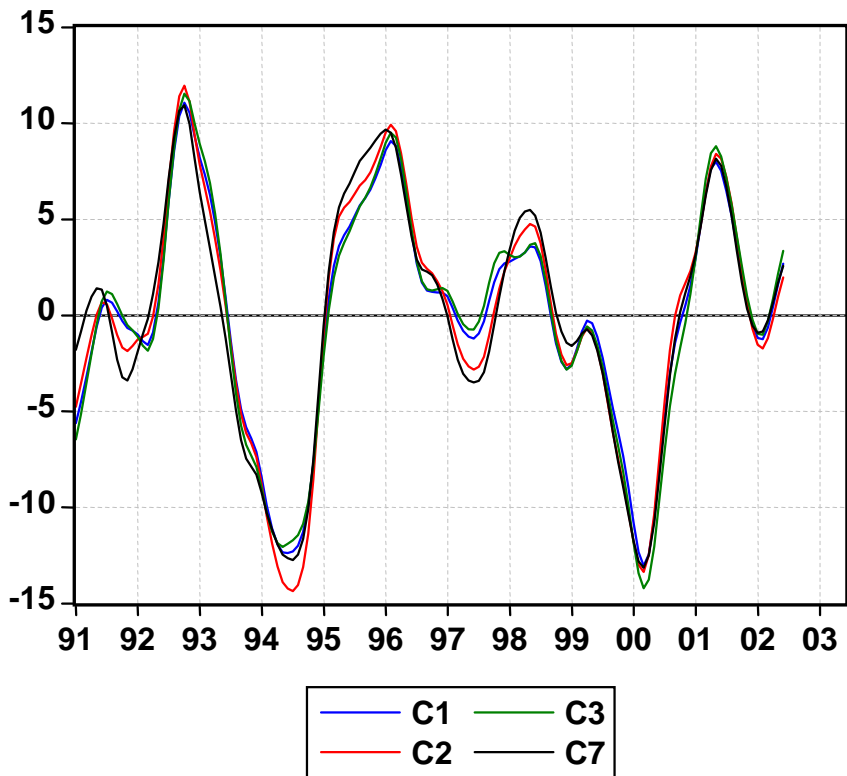


Figure A.3.2.a. Composite Trend Indicators of Economic Activity

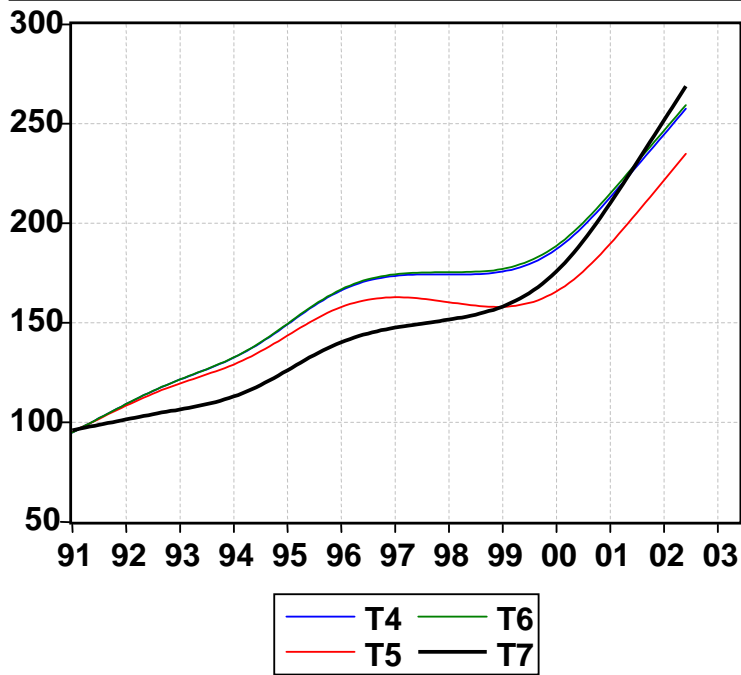


Figure A.3.2.b. Composite Cyclical Indicators of Economic Activity

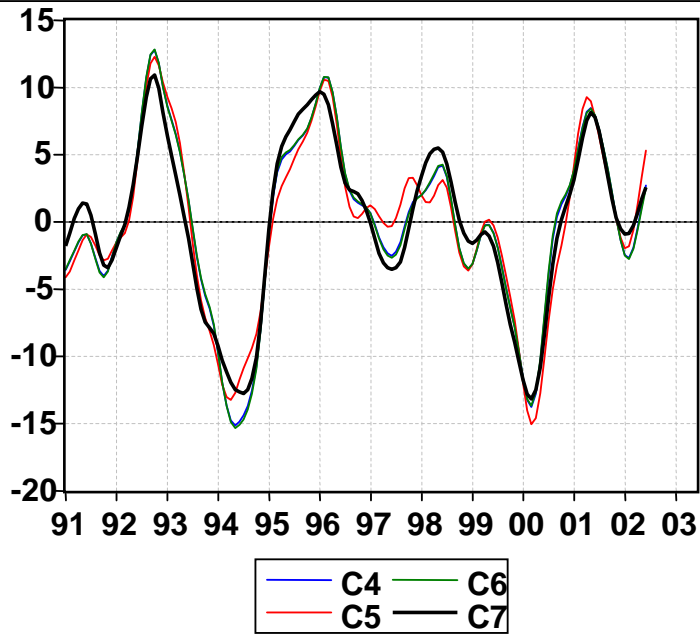


Figure A.4. Annual Interest Rates, Depreciation and CPI Inflation

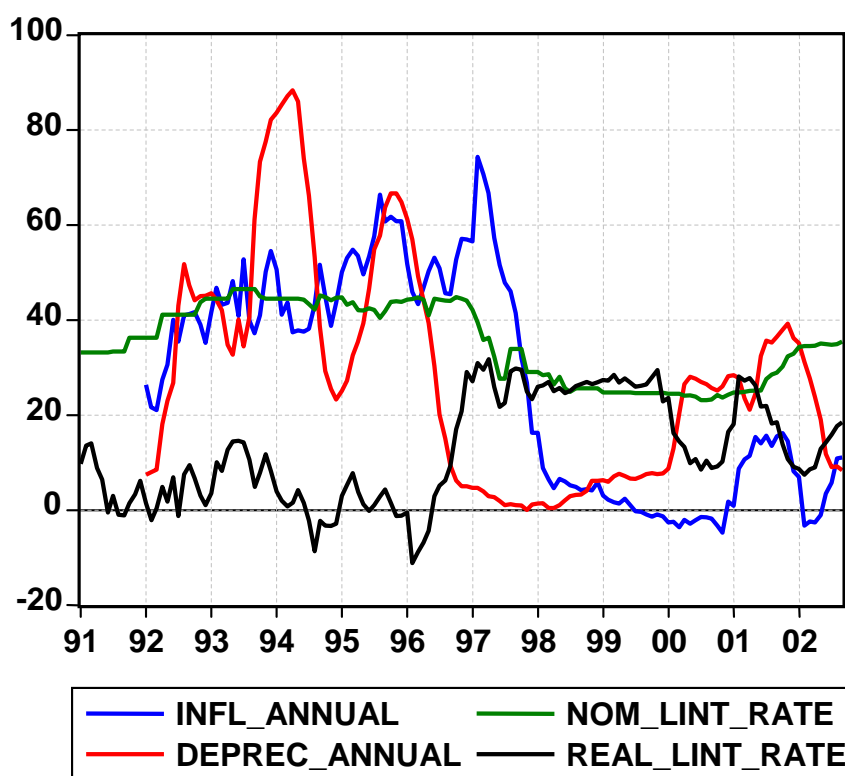


Figure A.5. Index of Credit Utilized for Working Capital Finance: 1994.Jan-2002.Sept.

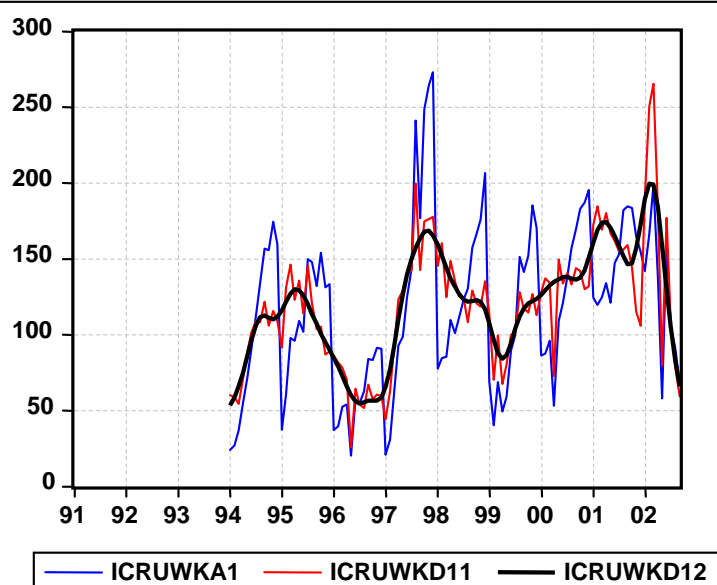
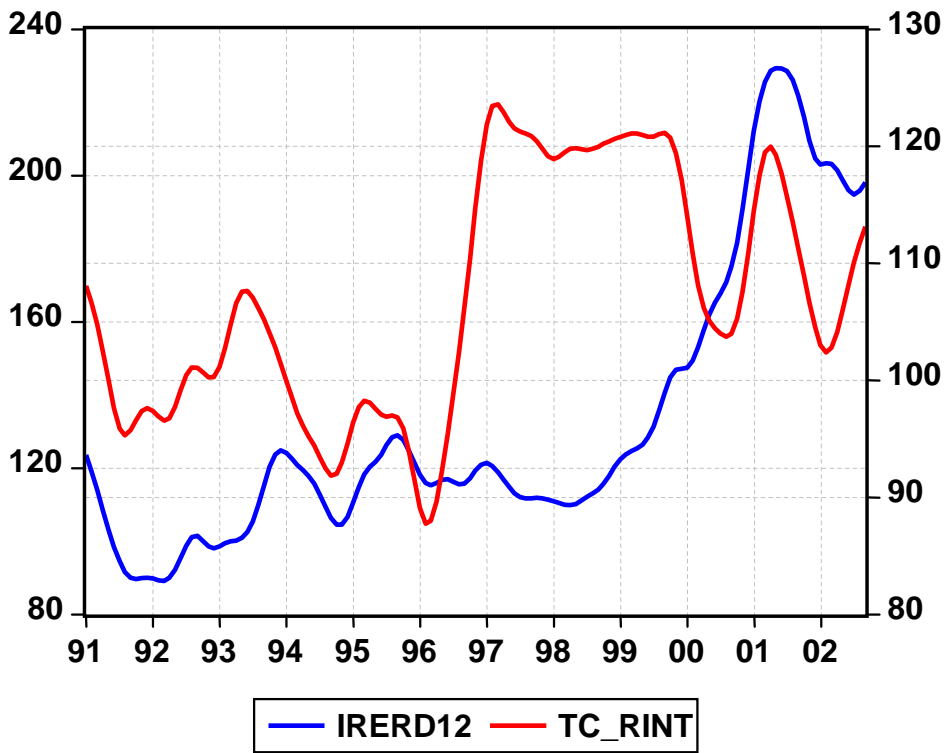


Figure A.6. Index of the Real Exchange Rate and the Real Interest Rate



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