CONSTRUCTION OF A COMPOSITE INDEX: METHODOLOGICAL ISSUES IN MEASURING ASIAN FINANCIAL CRISIS

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This study is about the A5 (Indonesia, South Korea, Malaysia, Thailand and Philippines) countries during the Asian Financial Crisis of 1997. A financial crisis is a wide spread episode measured through a conglomerate of many factors. The attempt to explain such a complex phenomenon in terms of a single (variable) indicator would be partial and simplistic. Moreover, these variables tend to be correlated and they possess common information.

This paper has developed a methodology for the construction of a composite index that captures crisis. The composite index that is based on a large number of variables, involves a three stage procedure, through Granger causality, correlation and Principal Component Analysis.

Key words: Currency Crisis, Financial Crisis, Causality Test, Principal Component Analysis, Correlation and Composite Index.

INTRODUCTION

The decade of the 1990s was certainly marked by a rather unusual number of financial and economic crises such as the Mexican Peso Crisis of 1994-95, the Asian Crisis of 1997. While the different types of crises could range from the "garden variety" currency crises to rather esoteric real estate bubbles, studies of such crises exhibit empirical and theoretical commonalties. The literature distinguishes three varieties of financial crises: currency crises, banking crises, and debt crises. The analysis in this study is primarily focused on currency crises.

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Our task at hand is to analyze and measures the financial crisis in the A5 countries[1] during 1997. A financial crisis is often characterized by an episode of intense foreign exchange market pressure. This phenomenon is known as a currency crisis and can be defined simply as an episode in which a country experiences a substantial nominal devaluation or depreciation. This criterion, however, would exclude instances where a currency came under severe pressure but the authorities successfully defended it, by intervening heavily in the foreign exchange market, by raising interest rates sharply, or by both. Extant approaches have sometimes constructed an index of speculative market pressures [Kaminsky, Reinhart and Lizondo (1998), Edison (2000), Goldstein, Kaminsky and Reinhart (2000)].

The indices that have been developed in the earlier studies suffer from three problems:

1. Conceptually they include only exchange related variables[2] and not other relevant variables that are crucial for international trade and international finance.
2. The extant studies do not use a causal framework as a methodology for the selection of variable.
3. Empirically they do not use more evolved statistical tools such as Principal Component Analysis for constructing a composite index.

Our paper is a part of larger study that looks into a new approach to measure and analyze international financial crisis. A crucial part of the study is to develop a new composite Index of Crisis. This index is based on a large number of variables and involves a three stage procedure which shall be discussed later.

The study consist of twelve sections section 1 talks about introduction, section 2 about rationale, section 3 about conceptual issues, section 4 about methodology, section 5 talks about causality test, section 6 about correlation matrix, section 7 principal component analysis, section 8 composite index, section 9 result and analysis, section 10 analysis of index of crises, section 11 about graphical interpretation and finally section 12 contains conclusion.

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[1] Malaysia, Philippines, Korea, Thailand and Indonesia.

[2] Weighted average of ER changes, Weighted average of RER changes, Reserves changes and Interest rate changes.

RATIONALE

An attempt to explain a wide spread and complex phenomenon in terms of a single dependent variable would be incomplete and partial, where dependent variables which represents the crisis is itself a conglomerate of many factors. Since it is a complex phenomenon it cannot be represented by one single variable. Moreover, these variables tend to be correlated. Thus, the ordinary regression framework results in the problem of mulicollinearity. Therefore an essential methodology is to measures the phenomenon of the crisis with the help of composite indices, which would adequately represent the complex phenomenon. This applies to both the cause and the effects of a crisis.

Among an array of factors which are quoted by different studies, as being related to crisis we would like to conduct a causality test to determine which of these factors causes are and which are the effects. In the further part of our larger study we have constructed indices for both causal variables and impacted variables so as to relate them in a regression framework, after having addressed the problem of multicollinearity. However for the present paper we concentrate on the index of the impacted variable, namely, the index of crises.

The final selection of variables is done on the basis of an elaborate procedure, which ensures that the variables which are entering in the construction of the index of crisis are the variables that are theoretically relevant, as they are drawn from extant studies and empirically sound as they are tested for causality. In addition they are appropriate because they have been checked for data redundancy.

CONCEPTUAL ISSUES

Prior Procedure

Several steps were undertaken as a part of the larger study to ensure the above considerations:

1. A literature survey of empirical and conceptual studies was undertaken[3]. On the basis of a literature survey we had arrived at a data set consisting of a large number of crises variables (30 variables including financial and macroeconomic variables).

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[3] Moreno (1995) , Berg and Pattillo (1999) and Frankal and Rose (1996)