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REGIONAL DISPARITIES IN FINANCIAL DEVELOPMENT: NEW EVIDENCE FROM THE SELECTED ASIAN COUNTRIES

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ABSTRACT

This paper introduces a new composite index of financial development across 10 Asian countries [top 10 according to World Bank Report, 2009 on the basis of GDP (PPP)], namely Japan ,China, India, South Korea, Indonesia, Thailand, Hong Kong, Malaysia, Singapore and Pakistan over the last three decades. This database is unique in that it unites a wide variety of indicators that measure the size, activity and efficiency of financial intermediaries and markets. Hence, this paper investigates the regional disparities in financial development in selected Asian countries. In this context study has been done by comparing composite indices of financial development both with respect to individual country wise different weights as well as common weights for all the countries. The analysis is based on Principal Component Analysis (PCA) for composite index formation. The findings are statistically very significant to warrant major changes in future regional policies in order to remove rising regional disparity in financial development over the Asian developing countries. This paper describes the sources, the construction and the intuition for the different indicators of financial development.

I. INTRODUCTION

The financial sector is a crucial sector of any economy, affecting its business environment, investment, economic prospects and social dimensions, including poverty. The relationship between financial development and economic growth has been a subject of great interest and debate among economists for many years. In the literature the term 'financial development' is defined as the improvement in quantity, quality and efficiency of financial intermediary services. Financial intermediary means institution that helps channeling funds between lenders to borrowers. In a broader sense financial development signifies development of the overall financial sector. The existing literature points out that a well-functioning economy needs a sound financial system for the efficient mobilization of resources. Vulnerabilities in financial sectors often result in financial crises, economic slowdowns, and fiscal costs. Financial sectors are thus important to monitor and compare across economies and over time.

Data typically available and analyses thereof, however, lack the robustness needed to comprehensively and succinctly assess countries' financial sector development. Information is scattered, disparate, often limited to measuring only the size of the financial system, not allowing other dimensions of financial sector to be easily compared over time or across countries. Furthermore, in an increasingly integrated world, where shocks transmit swiftly across boundaries, the need for comprehensive financial risk assessment data has become all the more imperative.

The past three decades have witnessed dramatic openness in many countries all over the world. In the context of Asia, advanced and emerging market economies have rapidly integrated into international capital markets and this growing globalization of markets has led to some important changes in the patterns of saving and investment. While some developing countries have been benefited from liberalization, others have not enjoyed higher economic growth or have even experienced severe financial crisis like 1997 Asian Financial Crisis in the years following liberalization. Hence, a question arises whether regional disparities exist in financial development across the Asian developing countries which could be the reason behind this differential impact of financial crisis and if so then what are the factors contributing towards the variation in the level of financial development. Considering the gap areas in the existing literature this study represents an attempt to provide a new comprehensive index for measuring financial development across 12 Asian developing countries (Thailand, Indonesia, Malaysia, the Philippines, China, India, Singapore, Korea Republic, Hong Kong, Lao PDR, Brunei and Vietnam) over the last three decades.

The proxies proposed for measuring the level of financial development are basically chosen from the conventional set of indicators used in the financial development literature. The rationale for the inclusion of a wide range of proxies is to maximize the information on financial development. In other words, diverse measures should be able to catch different functions of the financial markets. In this paper, the following proxies for financial development are employed in the empirical analysis: liquid liabilities, domestic credit, total reserves, money plus quasi money and private sector credit to society. All the proxies are taken as a ratio to GDP (gross domestic product). The analysis is based on Principal Component Analysis for financial sector development index (FSDI) formation.

The rest of the paper is organized as follows: Section II analyses the background literature and the gap areas, Section III describes the database and econometric methodology. Section IV presents the empirical results and its discussion thereof. Section V presents conclusion with policy implications.

II. Literature Review

Measuring financial development is a complex phenomenon because there is no clear-cut definition of financial development. There are various indicators of size and activity of indirect and direct finance proxy for financial sector development. Some of the important and useful indicators are discussed below:

i. The size of indirect finance: This is the broadest available indicator of financial intermediation. The size of the financial intermediaries is measured as currency plus demand and interest bearing liabilities of banks and other financial intermediaries, divided by Gross Domestic Product, generally known as liquid liabilities to GDP ratio (LLGR).

ii. The activity of indirect finance: This is measured by the

private sector credit (by deposit money banks and other financial institutions) to GDP ratio (PCGR).

iii. The size of direct finance: The stock market capitalization to GDP ratio (MCGR) is the indicator of the size of direct finance. MCGR equals the market value of listed shares divided by GDP.

iv. The activity of direct finance: The total value of the shares traded in the stock market to GDP ratio (VTGR) is an indicator of the activity of direct finance.

v. The size of the overall financial sector: The overall size measure of the financial sector is the combined measure of two size indicators. It is the financial depth to GDP ratio (FDGR).

vi. The activity of the overall financial sector: Combining the two activity measures an overall activity measure of the financial sector, i.e., the financial activity to GDP ratio (FAGR) is formed.

vii. The proxy of government's financial policy: Financial development index is constructed as a proxy of government's financial policy, i.e. financial development. It is constructed by the following types of indicators: the ratio of broad money to GDP, the ratio of bank deposit liabilities to GDP, the ratio of money cleared through clearing house to GDP, the ratio of private sector credit to GDP.

In the existing literature the degree of financial development of countries has been determined by comparing prices or quantities, specifically, interest rate spreads or stock-flow ratios in which money or debt aggregates are compared with GDP. Quantity-based indicators of financial development rely on stock-flow ratios constructed with balance-sheet stock and national-income-accounts flow variables. They are sensitive to financial innovations and to changes in institutional structure and regulatory or statistical classifications. Their ability to reveal the level of broad-based financial development thus is unstable over time and uneven across countries. According to Levine (1992), empirical work should focus on developing indicators of the provision of financial services, not simply measuring the size of the financial system. On the other hand, price-based indicators go more directly to the heart of financial efficiency by relating it to the narrowness of the equilibrium level of the spread between the social rate of return on physical (and human) capital and the real net rate of return on financial saving.

Creane (2003) argued that an ideal index of financial development should include regulatory issues. After assessing financial sector development in the MENA region, Creane et al. (2003) constructed an index of financial development that encompasses six themes: monetary policy, banking sector development, regulation and supervision, non-bank financial sector development, financial openness, and institutional quality such as the strength of creditor rights. Although they have formulated such an exhaustive index, only for a subset of indicators analysis of the MENA region's performance was possible. The study of Kar et al. (2008) has employed the Principal Component Analysis to develop better index for financial development, but they have considered only the monetary aggregates as proxies of financial development.

However, these efforts are still deficient in four important aspects:

i) Lack of benchmarking: The data do not have the explicit objective of benchmarking countries in the multiple dimensions of financial sector development, rather they are mostly mere data collection exercises in a one or few, selected dimensions.

ii) Lack of a single focal point: While many data collection and analyses efforts are underway, there is not a single focal point, at least for a large cross-section of countries. Rather, data are scattered and often not easily accessible, and lack comparability.

iii) Lack of comprehensive information: There are important dimensions for which data are still missing or for which there is no systematic monitoring of them. They include access to financial services, stability and aspects such as efficiency, competitiveness, costs, as well as measures of the supporting institutional environment.

iv) Lack of proper definitions: Heterogeneous definitions, sources and caveats not well defined make it difficult to fully and correctly utilize existing data sources.

Hence, considering the gap areas in the existing literature this study tries to provide a new measure of the overall financial development to assess and compare the development of financial sector in the various Asian developing countries over three decades. In this context study has been done by comparing composite indices of financial development both with respect to individual country wise different weights as well as common weights for all the countries.

III. Database and Methodology

The analysis is based on Principal Component Analysis (PCA) for Financial Sector Development Index (FSDI) formation. The weights for index construction will be extracted by PCA. The method of principal components is a special case of the more generalized method of Factor Analysis. The aim of the method of principal components is the construction out of a set of variables, X_j's (j = 1,2....k) of new variables (P_j) called principal components, which are linear components of the X's:

$P_1 = a_{11} X_1 + a_{12} X_2 + \ldots + a_{1k} X_k$
$P_2 = a_{21} X_1 + a_{22} X_2 + \ldots + a_{2k} X_k$
. . . .
. . . .
. . . .
. . . .
$P_k = a_{k1} X_1 + a_{k2} X_2 + \ldots + a_{kk} X_k$

The a's, called loadings, are chosen so that the constructed principal components satisfy two conditions:
a. The principal components are uncorrelated (orthogonal) and

b. The first principal component P_1 absorbs and accounts for the maximum possible proportion of the total variation in the set of all X's, the second principal component absorbs the maximum of the remaining variation in the X's and so on.

This method is appropriate in two cases:
1. When the number of explanatory variables which should, on a priori grounds, be included in a function, is very large relative to the size of sample. But even with a large sample, if the number of explanatory variables is large, the computations become difficult and the reliability of the estimates may not be possible to assess sensibly due to the loss of degrees of freedom and of inter-correlation of the X's.

2. The method of principal components has been suggested as a solution of multicollinearity.

The method is also being used in the field of index numbers.

The Method Outlined
Stage 1: The problem is to obtain estimates of the a's (loadings) with which we will be able to transform the X's into orthogonal artificial variable, the principal components. After estimating these coefficients, the next step is to conduct some test of significance to decide whether the estimates, â's are

statistically significant. Finally, we must establish some rule of decision, some criterion, on the basis of which to decide how many of the principal components to retain into the analysis.

The maximum number of principal components is equal to the number of the X's. However, only a small number of principal components is usually retained in the analysis.

Stage 2: Having found the â's, computed the P's (principal components) and having decided how many principal components to retain in our analysis, we proceed with the regression of Y on these principal components

$$Y = \hat{y}_1P_1 + \hat{y}_2P_2 + \ldots\ldots\ldots\ldots + \hat{y}_mP_m \qquad (m < k)$$

Stage 3: From the â's and the ŷ's we may find that the original values of the estimated coefficients of the original model transferring back from the P's into the standardized X's.

Method for Estimation of Loadings of the Principal Components

1. First step is to calculate the simple correlation coefficients between the k explanatory variables. These correlation coefficients are arranged in a Correlation Table where the main diagonal includes units and the Correlation Matrix is symmetrical.
2. The next step is to sum each column (or row) of the Correlation Table, obtaining k sums of simple correlation coefficients:
3. The sum total of the column (or row) sum is computed and its square root is taken.
4. Finally we obtain the loadings ($\hat{a}_{ij}$'s) for the first principal component P_1 by dividing each column (row) sum by the square root of the grand total.
5. The sum of the squares of the loadings of each principal component is called the latent root (or Eigen value or characteristic root) of this component and will be denoted by λ with the subscript of the principal component it refers. For example the latent root of the first principal component P_1 is

$$\lambda_1 = [\text{latent root of } P_1] = l_1^2 + l_2^2 + \ldots\ldots\ldots + l_k^2 = a_{11}^2 + a_{12}^2 + \ldots.. + a_{1k}^2$$

Thus the first principal P_1 is

$$P_1 = l_{11}Z_1 + l_{12}Z_2 + \ldots.. + l_{1k}Z_k$$

The second principal component P_2 is computed as follows:
A new 'residual correlation table' is formed from the original one, by removing the part of the total variation which has been absorbed by P_1. This is achieved by subtracting from each element the product l_il_j (i=1,… k; j=1,… ,k). The remaining residual correlations are found in a similar way, that is by subtracting l_il_j from each simple correlation coefficient. From this table we compute the loadings of of the second principal component.

$$P_2 = l_{21}Z_1 + l_{22}Z_2 + \ldots.. + l_{2k}Z_k$$

The third and subsequent principal components are extracted by repeating the above process. We stress that the maximum number of principal components is the number of the X's. Usually however, a small number of principal components is retained in the analysis.

The decision on the number of P's to be extracted and retained in the analysis is discussed below.

We select Kaiser's criterion for the number of principal components to be extracted.

Kaiser's criterion:
Only principal components having latent root greater than one are considered as essential and should be retained in the analysis. In other words, we retain P_m if $\lambda_m > 1$.

There are several studies where PCA has been used to measure regional disparity in several areas. The study by **Granger et al. (2008)** compared the gap between supply and need for liver transplantation among the geographic regions of France by applying Principal Component Analysis. Particularly, Principal Component Analysis was applied to identify regional patterns in the gap between supply and need. **Soares et al. (2001)** adopted the methodology of Principal Component Analysis to classify the levels of socio-economic development of a country's territory, in order to support regional development policy. Construction of composite index for socio-economic development was based on a wide number of demographic, economic, health, education, employment and culture indicators.

The study by **Quadrado et al. (2001)** dealt with the development of inequality with respect to educational facilities in Spain during the period 1964–1974. They applied the partial common principal component model (PCPC) to estimate the unknown weights associated with the variables included in Theil's second measure of inequality (where inequality was assumed to be multidimensional). **Ozaslan et al. (2004)** examined the problem of regional disparities in Turkey applying to the economic and social development indicators. Social and economic development index (SEDI) was formed by applying Principal Component Analysis so as to deal with the variables which are interdependent in nature. **Das (1999)** examined the existing variability of inter-state development by identifying the indicators responsible for socio-economic diversity. The study used Principal Component Analysis to construct a composite index of socio-economic development for several Indian states. The study by **Jaba et al. (2009)** identified the regional profile of Romania induced both by the existing resources and the level of development by applying Principal Component Analysis. Regional disparities in socio-economic development of Poland were diagnosed by **Warsaw (2009)** with the help of Principal Component Analysis.

The most serious hurdle has been the lack of a consistent set of data on every variable over a reasonable period of time. For the present purpose, we use five important financial development variables across the selected Asian countries [top 10 according to World Bank Report, 2009 on the basis of GDP (PPP)], namely Japan ,China, India, South Korea, Indonesia, Thailand, Hong Kong, Malaysia, Singapore and Pakistan over the last three decades.

In this paper, the following proxies for financial development are employed in the empirical analysis: broad money, claims of private sector, domestic credit, total reserves and private sector credit to society. All the proxies are taken as a ratio to GDP (gross domestic product). The data are obtained from the International Financial Statistics (IFS) Year Books of I.M.F. and the World Bank web site. The analysis is based on Principal Component Analysis for financial sector development index (FSDI) formation. The basic limitation of the conventional method of construction of composite index is that, while combining the financial development indicators, they either give subjective ad hoc weights to different indicators or leave them unweighted. Since there is every possibility for the indicators to vary over time and space, assignment of equal ad hoc weights could lead to unwarranted results. To overcome these limitations, we have employed the well-known multivariate technique of factor analysis from which follows the required weights (De and Ghosh, 2005). In the PCA approach, the first principal component is that linear combination of the weighted variables which explains the maximum of variance. The multivariate statistical method of principle components analysis is a very useful tool for reducing the number of variables in a data set and for obtaining useful one, two or three dimensional views of a multi-dimensional data set.

Principal components analysis provides a summary of several characteristics based on a certain quality and allows the user

to make an abstraction from the common characteristics of the variables. With this feature, the PCA is a technique capable of revealing, observing and defining common and fundamental meaning or information essence covered by several data sets with different dimensions.

The constructed principal components must satisfy two conditions: (a) the principal components are uncorrelated and (b) the first principal component absorbs and accounts for the maximum possible proportion of the total variation in the set of variables. The method of PCA can be applied by using the original variables or the standardized variables.

In our present study we have formed the composite index by the help of standardized method only, as this process involves unit free measurement. The study applies first principal component to capture the maximum proportion of the variance of the original variables.

In order to evaluate the appropriateness of factor analysis that is to assess whether the variables are significantly and sufficiently correlated with each other so that their number can be reduced by applying the factor analytic model we have found the correlation matrix for all variables, and we also have computed some statistics, including the Bartlett test of sphericity and the Keiser–Meyer–Olkin (KMO) measure of sampling adequacy.

Variables :

1. Domestic Credit to pvt. Sector. (DOMC) [Amiruddin et al. (2007), Hermes and Lensink (2003) etc.]

Domestic credit to private sector refers to financial resources provided to the private sector, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establish a claim for repayment. For some countries these claims include credit to public enterprises. [I.M.F.]

Closely associated with the situation of the public finance, the change in the share of **domestic credit going to private sector has** a positive impact on growth, but at the same time some researchers have shown that, the indicator for volume of domestic credit to private sector was found to have a diffuse negative influence on the growth rate. In the region, most experiences of banking sector liberalization in the nineties led to a boom of credit for consumption and non tradable activities. In turn, the crises that followed the financial bubbles determined the pattern of stop-and-go growth which has been an unfortunate characteristic of Latin America during the nineties which severely limited the average growth rate (ECLAC, 2000). Studies like Habibullah and Eng (2006), Omran and Bolbol (2003) have shown that DOMC accelerates economic growth, whereas, Tang (2006) has empirically examined the impact for 14 APEC countries and found no significant impact of DOMC on growth.

2. Claims of private sector to GDP has a positive impact on growth in many literature.

3. Total Reserves. [Huang (2006) etc.]
Total reserves comprise holdings of monetary gold, special drawing rights, reserves of IMF members held by the IMF, and holdings of foreign exchange under the control of monetary authorities. The gold component of these reserves is valued at year-end (December 31) London prices. Data are in current U.S. dollars.

Source International Monetary Fund, International Financial Statistics and data files.

This ratio is not frequently used in literature. Huang (2006) has shown that total reserves have a significant positive effect on growth.

4. Broad Money)[Murinde and Eng (1994), Sinha and Macri (2005) etc. **]**

Broad money comprises the sum of currency outside banks, demand deposits other than those of the central government, and the time, savings, and foreign currency deposits of resident sectors other than the central government. This definition is frequently called M2; it corresponds to lines 34 and 35 in the International Monetary Fund's (IMF) International Financial Statistics (IFS). The change in the money supply is measured as the difference in end-of-year totals relative to the level of M2 in the preceding year. Studies have shown a positive effect of broad money on growth of some countries and negative for some others.

4. Pvt. Sector credit to GDP. (PSC) [King and Levine, (1993a, b); Gregorio and Guidotti (1995); Demetriades and Hussein (1996); Beck et al. (2000), Ghirmay (2004), Huang (2006), Fan et al. (2009) etc.]

This is actually the ratio of bank credit to the private sector to nominal GDP. This indicator is frequently used to assess the allocation of financial assets. This ratio is related to the quantity and efficiency of investment and hence to economic growth (Gregorio and Guidotti 1995). James Ang (2008) has shown the positive impact of PSC on GDP, but Shahbaz (2009) has found that this positive impact is true for long run only and not for short run in the context of Pakistan economy.

Most of the above indicators signify a positive effect on economic growth in various literatures, but still there are some controversies regarding signs of some of them.

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