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Relevance of country-level competitiveness indexes in Asian economies: a critical review

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ABSTRACT

This paper investigates popular country-level competitiveness indexes, analyzes their structural validity and assesses their ability to explain performance of economies and firms in key Asian economies. Time series cross correlation technique has been used to identify (a) presence of relationship between indexes, (b) presence of relationship between an index and macroeconomic performance of the country and (c) presence of relationship between an index and firm-level performance in the country. Analysis shows issues with the construct of indexes, presence of a large number of interdependent variables and significant presence of subjective data points collected through opinion polls, leading to a lack of robustness. It is also found that indexes do not correlate with each other in time series analysis. Indexes are able to explain macroeconomic performance of a nation, but they fail to relate to firm-level performance, suggesting reducing practical applicability of the indexes. Practitioners who utilize country-level competitiveness indexes for policy decisions or business decisions will be find the results insightful.

Contribution/ Originality
This is to confirm that the paper titled, "Relevance of Country-level Competitiveness Indexes in Asian Economies: A Critical Review", submitted to Asian Journal of Empirical Research is our original work, written by us completely during 2016-17. All raw data used in the research and detailed statistical analyses carried out for this work are available with us for any inspection, if required.

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1. INTRODUCTION

Competitiveness is a multi-layered economic concept that refers to the capabilities of a nation, an industry, a sector, a region, or an enterprise. The term, linked to productivity, essentially implies using available resources to generate more with less. Country level competitiveness is seen as an interlinked concept – an economy or an industry cannot be competitive unless its enterprise sector is competitive, and firms can be optimally productive only if they get the right macro and industry ecosystem. Country-level competitiveness is normally defined through factors like: (a) the political and socio-cultural environment, (b) access to resources such as agricultural wealth, minerals, infrastructure and technology, (c) human talent and social development, (d) financial competence and institutional ability to innovate and (e) leadership and entrepreneurship.

A nation's growth can be achieved either by bringing more resources, such as land, labor and capital, into the economic market system, or by adding to productivity. Since resources can be finite, productivity growth lies at the core of a nation's overall economic growth. Most nations have moved up the development ladder primarily by harnessing their available resources by increasing productivity. This endeavor requires sustained attention to providing a facilitative environment for investment and entrepreneurship. It requires shifting to more value-added production, internalizing innovation, driving skill development and research, and financing growth effectively.

According to IMD World Competitiveness Centre (WCC), an organization that has pioneered research on how nations and enterprises compete for more than two decades, countries shape the environment in which enterprises create value. Governments influence competitiveness through legislation and institutional frameworks. At the same time, contextual elements such as technological infrastructure can limit competitiveness. Business efficiency greatly contributes to competitiveness, and economic performance also plays a determinant role. While there may be no linear causality among these elements, they can create a "virtuous cycle" in which one factor feeds into – and strengthens – others. Therefore, the task is to identify an effective outcome of these interactions in order to offer a more concrete way to measure competitiveness (Garelli, 2014). IMD WCC proposes the definition of competitiveness as "the ability of a country to facilitate an environment in which enterprises can generate sustainable value".

Over past two decades multiple country-level competitiveness indexes have been developed by different organizations (including IMD WCC) and these are reviewed seriously by the governments, especially the governments of developing economies, in order to initiate appropriate economic reforms in the country and raise their respective country's competitiveness scores. However, there are unanswered questions about the correctness and appropriateness of these indexes. Is it at all possible to encapsulate tangible and intangible elements of a business and economic environment in a set of numbers? Do these numbers truly reflect the state of business environment, the opportunity, challenges, strengths and weaknesses of business organizations? Is it all right for the policy makers to use these numbers to decide on reforms agenda for the nation?

In this paper, we review a few globally known competitiveness indexes, analyze structural validity of the indexes and assess indexes' ability to explain performance of economies and firms in key Asian countries.

2. REVIEW OF LITERATURE

With growing globalization since the late 20th century, competitiveness of nations has become an important parameter for cross-border investments and trade. Apart from IMD WCC's competitive index, World Economic Forum (WEF) initiated its competitiveness project to provide a detailed assessment of the competitiveness of nations using two complementary approaches: one using the medium to long-term macroeconomic oriented Growth Competitiveness Index and the second is measuring competitiveness through the Business Competitiveness Index. Both these measures

combine hard data with information extracted from WEF's Executive Opinion Survey of leading business executives and entrepreneurs from over 100 countries. Over time, WEF restructured the indexes to a single Global Competitiveness Index (GCI). Snowdon (2006) discusses the theoretical foundations of WEF's GCI with Barro–Sala-i-Martin hybrid growth model, which proposes that in the long run, the rate of growth in the world economy is driven by technological discoveries in the leading economies and follower economies share in the innovations via a process of imitation, which is a relatively lower cost activity. This implies that the follower economies grow relatively faster and converge, at least part way, towards the leaders. The main determinant of growth and productivity of a nation is linked to basic economic features, market efficiency and innovation capability. Thus, GCI has been built as a composite index of 'Basic Requirements' (BR), 'Efficiency Enhancers' (EE), and 'Innovation and Sophistication' factors (IF). The premise is that the developed economies would have achieved high level of BR and EF and thus pursue IF, whereas the developing nations intend to improve on their BR and EF factors.

While it is true that national prosperity is manifested by the way a nation utilizes its human, capital, and natural resources, Porter *et al.* (2007) argue competitiveness is rooted most importantly in a nation's microeconomic fundamentals, contained in the sophistication of company operations, the quality of the microeconomic business environment, and the strength of clusters. Stable institutions, sound macroeconomic policies, market opening, and privatization are necessary but not sufficient. More than 80% of the variation of GDP per capita across countries is accounted for by microeconomic factors and competitive performance of the firm is significantly influenced by firm-level factors and responsible business practices (Ambastha and Momaya, 2004; Zadek, 2006). It is argued that the term competitiveness stems from the analysis of firms and it is usually well defined at the firm level (Aiginger, 2006). The vagueness of the general term, the lack of theoretical background, implicit preferences and prejudices, and finally the scope of policy recommendations made in reference to this term can be dangerous, obsessive, elusive or meaningless since there is no well-defined bottom line (Krugman, 1996). Despite such critical views, competitive advantage of nations and the competitiveness of locations have become important topics in economic policy and ranking of nations based on a composite numerical index value has attained significant interest from governments and industry bodies.

It is true that quantitative, country-level indexes can facilitate comparison and benchmarking among countries, but Høyland *et al.* (2012) posit that international index rankings are popular, but dangerous as they stimulate rank-seeking behavior by emphasizing country differences where similarity is dominant. Analyzing a few popular indexes, they find that the rankings in the indexes appear to be misleading, not because of wrong indicators, but because the estimation of the scores ignores inherent uncertainty. On similar lines, Lall (2001) finds that developing countries' policy makers worry about national competitiveness and closely watch indexes ranking internationals competitive performance as that influences FDI in the country. However, deficiencies in the indexes exist at several levels: the definitions are too broad, the approach biased and the methodology flawed. In addition, many qualitative measures are vague, redundant or wrong. These weak theoretical and empirical foundations reduce the value of the indices for analytical or political purposes and it may be a risk to formulate policy measures based on these indicators (Berg and Cazes, 2007). In another study, Fisher (2005) reviews five popular indexes used domestically within the US and shows that the five principal indexes reviewed produce widely different rankings of the states, despite the fact that all of the organizations creating them assert that they are measuring something of critical importance to a state's economic future and its potential for growth. As an example, 34 of the 50 states can claim that they are in the top 10 in terms of business climate or competitiveness - they just have to pick the indexes that are favorable towards their states. The underlying problem with such indexes, he argues, are: none of them actually do a good job of measuring what it is they claim to measure, and they do not, for the most part, set out to measure the right things to begin with.

Significant work has also been carried out on competitiveness of Asian firms in view of rising globalization and development of standard benchmark for country-level competitiveness. Literature shows that competitiveness of Asian firms could be derived from different factors and sources than the ones typically recognized in Western economies. Tanure and Duarte (2005) posit that a large number of efficient management practices prevalent in Western economies are adopted in Asian countries ignoring the socio-cultural context of the countries, resulting in changes that may be only superficial. Therefore, it is necessary for managers to build their companies' competitiveness through management practices firmly anchored on the cultural traits of their countries, instead of looking for practices from successful companies elsewhere. Supporting this argument, Rowley and Benson (2002) in an analysis of key Asian economies find that in the context of globalization, many differences remain due to a variety of limiting factors, ranging from economic stages of development to business strategies, national culture and fixed enterprise mindsets. Similarly, based on a series of analysis of Southeast Asian countries, LaVan and Murphy (2007) illustrate relations between national culture, human development, and business and growth competitiveness.

The factors that significantly affect Asian firms' competitiveness are their regional nature of operations and the mechanisms they develop competitive advantage to deal with their key markets. Rugman and Oh (2008) find that conventional studies of international competitiveness use country-level data, but most Asian firms, barring a few Japanese and Korean firms, do not operate globally and focus primarily in a few regions, including the home country. Thus, Asian firms exploit and develop their firm-specific advantages (FSAs) regionally and vie with their regional competitors. The regional and industry effects explain most of Asian firms' performance, whereas country, firm and year effects are very minor (Rugman and Oh, 2013). Therefore, country-level analysis also needs to be augmented by analysis at the 'regional' level and specific locational determinants (Duanmu and Guney, 2009).

In summary, we see while some researchers justified the purpose of country-level competitiveness indexes, strong views have been expressed by many researchers about the theoretical validity of the construct, including the way data is collected and aggregated. It is also argued that competitiveness is well defined at firm level and at country level the definition lacks support. In the context of Asian firms, we see that the approach of Asian firms differ from their Western counterparts and hence country-level competitiveness, defined through parameters appropriate in the Western world, may mean little to them.

As outlined earlier, competitiveness indexes not only draw a lot of attention from practitioners but it also puts policy makers into action – in terms of improvement initiatives and government investments. This is especially true for developing economies who actively seek FDI to boost economic activities in their respective countries.

The critical questions that we must consider is, how these indexes reliably present the true state of business environment in a country, or more broadly, is it possible to depict the business environment through a set of numbers and if yes, how valuable these numbers are for the primary participants in economic activities – the firms? The following research questions have been framed to investigate these.

2.1. Structural validity of indexes

The three highly discussed country-level competitiveness indexes are World Economic Forum's Global Competitiveness Index (GCI), IMD WCC Ranking and the World Bank's Doing Business (DB) Ranking. While all indexes have well documented methodology behind them, we would like to question, how valid they are, what theoretical support do they have? Is it appropriate to combine a set of hard data points with a set of survey metrics to arrive at a single value? Are the surveys statistically sound? We assume that indexes are constructed and computed based on sufficient theoretical support and therefore, the null hypothesis:

H1: The competitiveness indexes are structurally valid, supported by theoretical concepts.
We test this hypothesis by analyzing the structure of the three indexes and critically reviewing the data collection and computation methodologies.

2.2. Comparative analysis of indexes

As the stated purposes of all these indexes are similar, it is expected that their findings about the business environment of a country would converge – providing a unified and concrete perspective about the country. It is true that each agency may apply their own frameworks for collecting information and aggregating them to single value, however, we expect that the broad approach and final index values should be comparable across these agencies. Therefore,

H2: The competitiveness indexes capture similar information and provide similar insights.

We test this hypothesis by comparing the final index values published by these agencies over a period for a set of Asian countries.

2.3. Relating index value with country performance

Indexes are relative measures of positive economic environment and ease of doing business in different countries. They are created from various macroeconomic trends and survey inputs received from a wide range of sources. Though the construct becomes complex with many qualitative inputs, it is expected that the index value should reflect upon macroeconomic performance of the country. Therefore,

H3: The trend of competitiveness index of a country has a positive relation with country's economic performance trend.

To test this hypothesis, we analyze the trends in key macroeconomic data and compare the same with respective trend in index values for a given country. In addition, we also investigate the relationship between trend in stock market activities and index trends, as stock market activities are fair indicators of economic activities in the country.

2.4 Relating index value with firm performance in the country

Indexes are relative measures of positive economic environment and ease of doing business in different countries. They are created for the businesses and economies so that organizations can utilize the information and decide on their business policy and investment decisions and thus, create value for stakeholders. Therefore, there should be strong correlation between a county's competitiveness index and the performance of the firms operating in the country. It is true that a firm has its own internal factors that contribute its performance but a positive development in country competitiveness should correlate with positive firm performance. Therefore,

H4: The trend of competitiveness index of a country has a positive effect on firm performance in the country.

To test this hypothesis, we select representative Asian firms from Forbes 2015 Fab 50 list and compare their performance over a period with the changes in competitiveness index of their respective home country. The reason for choosing Forbes Fab 50in this analysis is that these firms have strong core competence, are highly promising, have sound business model and intrinsic value and therefore, only a negative external environment can impact their performance adversely.

3. METHODOLOGY AND DATA

Hypothesis H1 is tested through qualitative analysis of structural components of different indexes and methodology for data collection and computation. Information is collected from respective sources for carrying out the review and no statistical analysis is used for this.

To test hypotheses H2, H3 and H4, we utilize time series cross correlation technique, which identifies correlation between two time series data with a defined lag. The cross-correlation function (*ccf*) of two time series is the product-moment correlation as a function of lag, or time-offset, between the series. If we consider *N* pairs of observations on two time series, the sample cross covariance function, *ccvf*, is given by following equations (Chatfield, 2004):

$$c_{uy}(k) = \frac{1}{N}\sum_{t=1}^{N-k}(u_t - \bar{u})(y_{t+k} - \bar{y}), \quad [k = 0, 1,\ldots(N\text{-}1)] \text{ and}$$
$$c_{uy}(k) = \frac{1}{N}\sum_{t=1-k}^{N}(u_t - \bar{u})(y_{t+k} - \bar{y}), \quad [k = -1, -2,\ldots-(N\text{-}1)]$$

where *N* is the series length, $\bar{u}$ and $\bar{y}$ is the sample means, and *k* is the lag.

The sample cross-correlation function (ccf) is the ccvf scaled by the variances of the two series:

$$r_{uy}(k) = \frac{c_{uy}(k)}{\sqrt{c_{uu}(0)c_{yy}(0)}}$$

where $c_{uu}(0)$ and $c_{yy}(0)$ are the sample variances of u_t and y_t .

The variance of the cross-correlation coefficient under the hypothesis of zero correlation is approximately $1/N$ where *N* is the length of the series. The coefficients are also asymptotically normal. This confidence interval relies on several simplifying assumptions and it can be computed from the sample size alone. For a two-tailed test, the approximate critical values at the 95% level are $\pm 2/\sqrt{N}$ and at 99% level they are $\pm 2.58/\sqrt{N}$.

For hypothesis H2, the comparative analysis of index values are carried out for five key Asian economies, Japan, South Korea, Singapore, China (Mainland) and India. We compare IMD WCC Index and WEF GCI values over 10 year period, 2006-2015. Sufficient data points are not available for World Bank DB Ranking and it has been excluded from statistical analysis.

To test hypothesis H3, we deploy two separate tests. We test for time series correlation between one of the representative indexes, IMD WCC Index for a country and the performance of the country's stock market. We look at trading volume and market capitalization of all stocks in Shanghai Stock Exchange, India's National Stock Exchange and Japan Stock Exchange Group (JPX) and these data points are cross-correlated with the country's index value over a period of 15 years, 2000-2015.

Subsequently, we also test time series correlation between IMD WCC Index and key macroeconomic parameters of the countries, namely, GDP per capita, Outward FDI, Inbound FDI and export volume. As a country's competitiveness should have strongest correlation with these factors, we restrict our analysis to these four factors and analyze the data for all the five Asian countries: Japan, South Korea, Singapore, China (Mainland) and India.

Finally, to test hypothesis H4, we evaluate time series correlation between IMD WCC Index and individual firm performance of select companies from these Asian countries. The lists of the companies, who figure in Forbes Fab 50, are mentioned in Table 1.

Table 1: List of Forbes' Asia's fab 50 firms chosen for study

Country	Company	Market Value (end of 2015)	2015 Sales Revenue	Industry
China	Baidu	$52.2 B	$7.9 B	Internet Software / Services
China	China Hongqiao Group	$5.3 B	$5.9 B	Aluminum
China	Great Wall Motor	$14.9 B	$9.9 B	Motor Vehicles
China	Gree Electric Appliances	$23 B	$22.7 B	Electronics / Appliances
China	Inner Mongolia Yili	$19.7 B	$8.8 B	Agricultural Commodities / Milling
China	Kangmei Pharmaceutical	$11.9 B	$2.6 B	Pharmaceuticals: Major
China	Lenovo Group	$14 B	$46.3 B	Computer Processing Hardware
China	Netease	$18.2 B	$1.9 B	Internet Software / Services
China	New Hope Liuhe	$5.6 B	$11.4 B	Agricultural Commodities / Milling
China	Qingdao Haier	$14.6 B	$14.4 B	Electronics / Appliances
China	Sunac China Holdings	$3.2 B	$4.1 B	Real Estate Development
China	Tencent Holdings	$180.1 B	$12.8 B	Internet Software / Services
China	Yunnan Baiyao Group	$12.9 B	$3.1 B	Pharmaceuticals: Major
India	HCL Technologies	$20.5 B	$5.2 B	Information Technology Services
India	HDFC Bank	$43.2 B	$9.8 B	Regional Banks
India	Lupin	$13.3 B	$2.1 B	Pharmaceuticals: Generic
India	Sun Pharma Industries	$34.2 B	$4.5 B	Pharmaceuticals: Major
India	Tata Consultancy Services	$76.3 B	$15.5 B	Information Technology Services
India	Tata Motors	$21.4 B	$42.6 B	Motor Vehicles
India	Tech Mahindra	$7.2 B	$3.7 B	Information Technology Services
Singapore	Avago Technologies	$33.4 B	$4.3 B	Semiconductors
Singapore	CWT	$0.9 B	$12 B	Trucking
South Korea	Amorepacific	$23.3 B	$3.7 B	Household / Personal Care
South Korea	LG Household & Health Care	$10.5 B	$4.4 B	Household / Personal Care

Information related to indexes, including actual values are sourced from the websites of IMD WCC, World Bank and WEF. Macroeconomic performance data for each of the country are sourced from UN's UNCTAD database. Stock market performance data for each of the stock exchanges are sourced from the respective websites of stock exchanges. Financial performances of the representative Forbes Fab 50 companies are sourced from Forbes website.

4. RESULTS AND DISCUSSION

Analysis and statistical tests shows that hypotheses H1, H2 and H4 find limited support while

hypothesis H3 finds support. The following sections discuss the results in detail. Statistical tool, SPSS has been used to conduct cross correlation analyses.

4.1. Structural validity of indexes

Tables 2, 3 and 4 list the high-level components of the three indexes, WEF GCI, World Bank DB Ranking and IMD WCC Index respectively.

WEF GCI (WEF, 2016) has three major components – (a) Basic Requirements, which comprises of factors involving public and private institutions, infrastructure, macroeconomic environment, health and primary education, (b) Efficiency Enhancers, which comprises of factors involving higher education and training, goods and labor market efficiency, financial market development, technology readiness and market size, and (c) Innovation and Sophistication Factors like business sophistication and R&D innovation. One of the unique feature of WEF GCI is that the weightage of each of the three major components vary within a range depending on the current state of the country. For example, a country with a low competitiveness will have relatively higher weightage on basic requirements whereas an advanced country will have relatively higher weightage on innovation and sophistication.

Table 2: Components of world economic forum global competitiveness index (GCI)

WEF GCI Components	
Basic Requirements - 20%-60%	**Efficiency Enhancers - 35%-50%**
1. Institutions - 25%	6. Goods Market Efficiency - 17%
Public Institutions	Competition
Property Rights	Domestic Competition
Ethics and Corruption	Foreign Competition
Undue Influence	Quality of Demand Conditions
Government Efficiency	7. Labor Market Efficiency - 17%
Security	Flexibility
Private Institutions	Efficient Use of Talent
Corporate Ethics	8. Financial Market Development - 17%
Accountability	Efficiency
2. Infrastructure - 25%	Trustworthiness and Confidence
Transport Infrastructure	9. Technological Readiness - 17%
Electricity and Telephony Infrastructure	Technological Adoption
3. Macroeconomic Environment - 25%	ICT Use
4. Health and Primary Education - 25%	10. Market Size - 17%
Health	Domestic Market Size
Primary Education	Foreign Market Size
5. Higher Education and Training - 17%	**Innovation & Sophistication Factors - 5%-30%**
Quantity of Education	11. Business Sophistication - 50%
Quality of Education	12. R&D Innovation - 50%
On-the-job Training	

World Bank DB Ranking (World Bank, 2016) has 10 key components involving starting a new business, dealing with construction permits, getting electricity, registering property, getting credit, paying taxes, protecting minority investors, trading across borders, enforcing contracts and resolving insolvency. Each of these components is evaluated through multiple factors, many of which are subject to perception or lacks robust data.

Table 3: Components of World Bank's doing business ranking

WB DB Ranking Components
1. Starting a Business Procedures (number), Time (days), Cost (% of income per capita), Paid-in min. capital (% of income per capita)
2. Dealing with Construction Permits Procedures (number), Time (days), Cost (% of warehouse value), Building quality control index, Quality of building regulations index, Quality control before construction index, Quality control during construction index, Quality control after construction index, Liability and insurance regimes index, Professional certifications index
3. Getting Electricity Procedures (number), Time (days), Cost (% of income per capita), Reliability of supply and transparency of tariff index, Total duration and frequency of outages per customer a year, Mechanisms for monitoring outages, Mechanisms for restoring service, Regulatory monitoring, Financial deterrents aimed at limiting outages, Communication of tariffs and tariff changes, Price of electricity (US cents per kWh)
4. Registering Property Procedures (number), Time (days), Cost (% of property value), Quality of the land administration index, Reliability of infrastructure index, Transparency of information index, Geographic coverage index, Land dispute resolution index
5. Getting Credit Strength of legal rights index, Depth of credit information index, Credit registry coverage (% of adults), Credit bureau coverage (% of adults)
6. Paying Taxes Payments (number per year), Time (hours per year), Total tax rate (% of profit), Profit tax (% of profit), Labor tax and contributions (% of profit), Other taxes (% of profit)
7. Protecting Minority Investors Strength of minority investor protection index, Extent of conflict of interest regulation index, Extent of disclosure index, Extent of director liability index, Ease of shareholder suits index, Extent of shareholder governance index, Extent of shareholder rights index, Extent of ownership and control index, Extent of corporate transparency index
8.Trading Across Borders Time to export: Border compliance (hours), Cost to export: Border compliance (USD), Time to export: Documentary compliance (hours), Cost to export: Documentary compliance (USD), Time to import: Border compliance (hours), Cost to import: Border compliance (USD), Time to import: Documentary compliance (hours), Cost to import: Documentary compliance (USD)
9. Enforcing Contracts Time (days), Cost (% of claim), Procedures (number), Quality of judicial processes index
10. Resolving Insolvency Recovery rate (cents on the dollar), Time (years), Cost (% of estate), Outcome, Strength of insolvency framework index, Commencement of proceedings index, Management of debtor's assets index, Reorganization proceedings index, Creditor participation index

IMD WCC Index (IMD, 2016) has four highest-level components: (a) Economic Performance – consisting of performance of domestic economy, international trade, international investment, employment and prices, (B) Government Efficiency – consisting of factors related to public finance, fiscal policy, institutional framework, business legislation and societal framework, (c) Business Efficiency - consisting of measures like productivity and efficiency, labor market, finance, management practices, attitudes and values and (d) Infrastructure – consisting of basic, technology and scientific infrastructure, health, environment and education measures. Under each of these, there are a large number of parameters, totaling to 341 parameters that constitute the IMD WCC Index. As with the other two indexes, IMD WCC Index has several parameters that do not have robust data.

Table 4: Components of IMD WCC index

IMD WCC Index Components
Factor 1: Economic Performance
1.1 Domestic Economy
Measures related to Size (13 measures), Growth (6 measures), Wealth (2 measures) and Forecasts (4 measures)
1.2 International Trade (26 measures)
1.3 International Investment
Measures related to Investment (16 measures) and Finance (2 measures)
1.4 Employment (8 measures)
1.5 Prices (7 measures)
Factor 2: Government Efficiency
2.1 Public Finance (12 measures)
2.2 Fiscal Policy (13 measures)
2.3 Institutional Framework
Measures related to Central Bank (7 measures) and State Efficiency (7 measures)
2.4 Business Legislation
Measures related to Openness (7 measures), Competition and Regulations (9 measures) and Labor Regulations (4 measures)
2.5 Societal Framework (12 measures)
Factor 3: Business Efficiency
3.1 Productivity And Efficiency (11 measures)
3.2 Labor Market
Measures related to Costs (5 measures), Relations (6 measures) and Availability of Skills (13 measures)
3.3 Finance
Measures related to Bank Efficiency (8 measures), Stock Market Efficiency (8 measures) and Finance Management (4 measures)
3.4 Management Practices (9 measures)
3.5 Attitudes And Values (7 measures)
Factor 4: Infrastructure
4.1 Basic Infrastructure (25 measures)
4.2 Technological Infrastructure (23 measures)
4.3 Scientific Infrastructure (24 measures)
4.4 Health And Environment (26 measures)
4.5 Education (17 measures)

It is apparent that all the indexes are evaluating similar factors to arrive at a single set of values of countries. While World Bank DB Ranking is more focused on regulatory environment of a business establishment, the other two indexes look at all aspects from economic environment to infrastructure and resource availability. However, there are a few questions:

Expectation of Utopian business environment: The questions and factors in each of the indexes look for a Utopian business environment that render all resources and facilities to the firms interested in running business in a country. However, businesses rarely need hundreds of favorable macro factors to flourish. Especially, in the context of Asian economies, an unfavorable environment is taken care of by innovative management practices and a lot more firm-specific advantages that the firms nurture over time. Therefore, it may be a futile exercise to develop an index that target for an impossible business and economic environment.

Combining interdependent factors to arrive at a composite index: A large number of measures in any of these competitiveness indexes directly influence other measures - they are not "independent" measures. Therefore, when they are combined, their explanatory power does not improve and in fact may distort the overall index value. In fact, it can be safely suggested that a lesser number of factors can as well explain the competitiveness of a country.

Qualitative inputs obtained from survey feedback: On detailed analysis, we find that nearly 60% of all the factors that constitute an index are qualitative inputs gathered through opinion polls and surveys. While it is not clear what were the sample sizes and who were the target participants for these surveys, doubts may be raised on validity of the data points, as some of the survey questions appear speculative in nature. For example, WEF conducts executive surveys to ask participants to indicate "public trust in politicians" on a 1-7 scale.

Numerical data lacking robustness: For many data points, even where we have numeric data, the value can differ significantly based on situation. For example, World Bank's DB Ranking has a parameter for time it takes to start a business in a country. This data, even if a country's statistical office publishes, would be a range and not a fixed number. Averaging the range to a number will lead to loss of information. Eventually, the final aggregate index may mean very little when there are several such factors constituting the index. The same argument applies for averaging of survey feedback, which in itself could be speculation.

None of the three indexes studied in this paper address these issues and therefore we reject hypothesis H1. The competitiveness indexes, widely used by businesses and governments need structural improvements. It is believed that a smaller set of factors can explain the character and capability of a country from a business and economic perspectives and it is not necessary to collect a large number of non-robust, subjective, interdependent inputs to demonstrate complete coverage.

4.2. Comparative alignment of index values

In the previous section, we have seen that the indexes essentially try to measure the same features of a country's business and economic environment while they apply different constructs and methodology to arrive at the final index value. Therefore, it is expected that for a country the index values should correlate well with each other. Figure 1 depicts the trend of IMD WCC Index and WEF GCI for three developed Asian countries – Japan, South Korea and Singapore. WEF GCI data is available only from 2006 onwards.

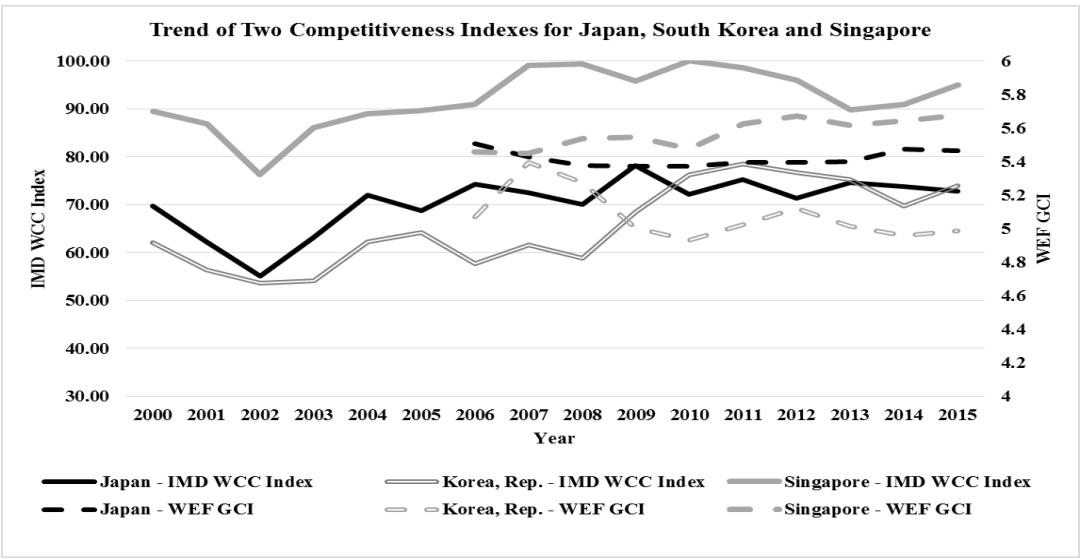

Figure 1: Trend of IMD WCC Index and WEF GCI for Japan, South Korea and Singapore

In Figure 2, we show the trend of IMD WCC Index and WEF GCI for two developing Asian countries – China (Mainland) and India.

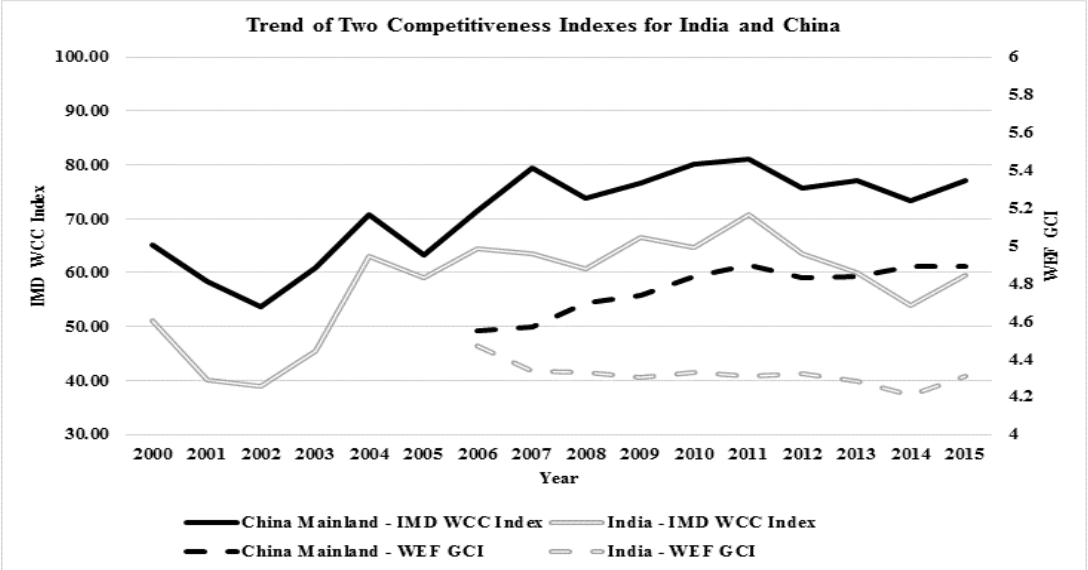

Figure 2: Trend of IMD WCC Index and WEF GCI for China and India

Time series cross correlation output between IMD WCC Index and WEF GCI with zero lag for 10 years' data is shown in Table 5. We find that there is no positive correlation between these two time series for any of the five countries. In fact, for South Korea it shows a negative correlation. The results indicate that these two indexes are not in alignment, and we reject hypothesis H2. The indexes, though meant to measure the same thing, do not correlate and thereby strengthens our question on the construct of these indexes.

Table 5: Cross Correlation between IMD WCC Index and WEF GCI

Cross Correlation between IMD WCC Index and WEF GCI [a]			
Country	**Cross Correlation**	**Std. Err**	**Lag**
China – Mainland	0.317	0.316	0
India	0.460	0.316	0
Japan	0.016	0.316	0
South Korea	-0.616	0.316	0
Singapore	-0.307	0.316	0

[a:] Analyzed for available data between 2006 and 2015

4.3. Explanatory power of index values

Our third question on the indexes is about their ability to explain business and economic performance in Asian countries. Table 6 shows the cross correlation between stock market performance in three countries (Japan, China and India) and IMD WCC indexes in these countries. Results indicate in all cases, except one parameter, we have cross correlation significant at 99% confidence level.

Time series cross correlation between macroeconomic factors and IMD WCC indexes in the five Asian countries are shown in Table 7. We find that except for Inbound FDI in developed Asian countries, all other parameters significantly correlate to the respective country's index, either at 95% confidence level or at 99% confidence level. The explanation we can think of for lack of correlation for inbound FDI in Japan, South Korea and Singapore is that these being developed nations, the inbound FDI in these countries have not grown significantly over the years.

Table 6: Cross correlation between country's IMD WCC index and stock exchange market performance

Cross correlation between country's IMD WCC index and stock exchange market performance [a]			
Stock Market and Parameter	**Cross Correlation**	**Std. Err**	**Lag**
Shanghai Stock Exchange; Trading Volume [b]	0.891**	0.258	0
National Stock Exchange, India; Trading Volume [c]	0.696**	0.250	0
Japan Exchange Group (JPX); Trading Volume [d]	0.660**	0.250	0
Shanghai Stock Exchange; Market Capitalization of Stocks [e]	0.862**	0.258	0
National Stock Exchange, India; Market Capitalization of Stocks [f]	0.715**	0.250	0
Japan Exchange Group (JPX); Market Capitalization of Stocks [g]	0.396	0.250	0

[a:] Analyzed for all available stock market information between 2000 and 2015; [b:] Natural logarithm of Trading Volume (100 million RMB); [c:] Natural logarithm of Trading Volume (10 million INR); [d:] Natural logarithm of Trading Volume (million Yen); [e:] Natural logarithm of Market Capitalization of all Stocks at the end of the year (100 million RMB); [f:] Natural logarithm of Market Capitalization of all Stocks at the end of the year (10 million INR); [g:] Natural logarithm of Market Capitalization of all Stocks at the end of the year (million Yen).
** - 99% confidence level

The results in Table 7 show that IMD WCC demonstrate reasonably good interrelation with macroeconomic outcome as well as business activities represented by stock markets. Therefore, we fail to reject hypothesis H3 and conclude that at least one of the indexes in this study is in a position to explain economic and business performance at country level.

When we look at firm-level performance and their relationship with their respective country index, we find that there is no correlation. Table 8 shows the results of cross correlation for 24 firms' financial performance with their country level index. Except for LG Household and Healthcare (South Korea), Baidu (China) and China Hongqiao Group (China), no other firm's financial performance (measured through net margin) has any time series correlation with country's IMD WCC Index.

Table 7: Cross correlation between country's IMD WCC index and macroeconomic performance

Cross Correlation between Country's IMD WCC Index and Macroeconomic Performance			
Country and Macroeconomic Parameter	**Cross Correlation**	**Std Err**	**Lag**
China - Mainland; GDP Per Capita [b]	0.689	0.258**	0
India; GDP Per Capita [b]	0.653	0.258*	0
Japan; GDP Per Capita [b]	0.561	0.258*	0
South Korea; GDP Per Capita [b]	0.721	0.258**	0
Singapore; GDP Per Capita [b]	0.602	0.258*	0
China - Mainland; Outward FDI Per Capita [b]	0.701	0.258**	0
India; Outward FDI Per Capita [b]	0.628	0.258*	0
Japan; Outward FDI Per Capita [b]	0.521	0.258*	0
South Korea; Outward FDI Per Capita [b]	0.844	0.258**	0
Singapore; Outward FDI Per Capita [b]	0.546	0.258*	0
China - Mainland; Inbound FDI Per Capita [b]	0.797	0.258**	0
India; Inbound FDI Per Capita [b]	0.632	0.258*	0
Japan; Inbound FDI Per Capita [b]	-0.150	0.258	0
South Korea; Inbound FDI Per Capita [b]	0.308	0.258	0
Singapore; Inbound FDI Per Capita [b]	0.488	0.258	0
China - Mainland; Export Per Capita [b]	0.786	0.250**	0
India; Export Per Capita [b]	0.594	0.250*	0

Japan; Export Per Capita [b]	0.676	0.250**	0
South Korea; Export Per Capita [b]	0.851	0.250**	0
Singapore; Export Per Capita [b]	0.735	0.250**	0

[a:] GDP and FDI data analyzed for the period 2000-2014, Export data analyzed for the period 2000-2015; [b:] In USD. * - 95% confidence level, ** - 99% confidence level

Based on these results we reject hypothesis H4 and conclude that country-level competitive indexes fail to demonstrate any significant relationship with individual firm performances, even when we take some of the best and high potential firms in the country for the analysis. The reason for choosing these firms was to minimize the impact of industry level factors and firm level factors in the analysis.

Table 8: Cross correlation between country's IMD WCC index and Forbes' Asia's Fab 50 Firms' Performance

Cross Correlation between Country's IMD WCC Index and Firm-level Performance [a]			
Country, Company and Firm-level Parameter	**Cross Correlation**	**Std. Err**	**Lag**
China; Baidu; Net Margin %	0.652	0.354*	0
China; China Hongqiao Group; Net Margin %	0.707	0.354*	0
China; Great Wall Motor; Net Margin %	0.240	0.354	0
China; Gree Electric Appliances; Net Margin %	-0.397	0.354	0
China; Inner Mongolia Yili; Net Margin %	0.117	0.354	0
China; Kangmei Pharmaceutical; Net Margin %	0.230	0.354	0
China; Lenovo Group; Net Margin %	-0.346	0.354	0
China; Netease; Net Margin %	0.041	0.354	0
China; New Hope Liuhe; Net Margin %	0.266	0.354	0
China; Qingdao Haier; Net Margin %	-0.385	0.354	0
China; Sunac China Holdings; Net Margin %	0.265	0.354	0
China; Tencent Holdings; Net Margin %	-0.027	0.354	0
China; Yunnan Baiyao Group; Net Margin %	-0.282	0.354	0
India; HCL Technologies; Net Margin %	-0.667	0.316	0
India; HDFC Bank; Net Margin %	-0.175	0.316	0
India; Lupin; Net Margin %	-0.171	0.316	0
India; Sun Pharma Industries; Net Margin %	0.493	0.316	0
India; Tata Consultancy Services; Net Margin %	-0.098	0.316	0
India; Tata Motors; Net Margin %	-0.227	0.316	0
India; Tech Mahindra; Net Margin %	0.530	0.316	0
Singapore; Avago Technologies; Net Margin %	0.063	0.333	0
Singapore; CWT; Net Margin %	0.573	0.333	0
South Korea; Amorepacific; Net Margin %	0.347	0.333	0
South Korea; LG Household & Health Care; Net Margin %	0.882	0.316**	0

[a:] Analyzed for all available annual company data between 2000 and 2015. * - 95% confidence level, ** - 99% confidence level

4.4. Explaining the unexplained competitiveness - performance gap

The above sections highlight that the selected representative index, IMD WCC Index, demonstrates strong interrelationship with key macroeconomic factors and level of business activities in select Asian countries. However, issues exist with the structure of the indexes and the way data points are gathered and aggregated; there is lack of correlation among indexes and indexes do not relate to individual firm performances. In summary, the key issues with the indexes are as follows.

Interdependent input factors with high level of bivariate correlation: As large number of constituent

factors that have interrelationship, combination leads to a value that conveys little. In addition, most of the indexes measure a large number of parameters and combine them to single index – leading to further loss of meaning.

Subjective assessment on nearly 60% of input factors: More than half of the inputs come from opinion polls conducted on questionable sample that may or may not have sufficient information to provide a reliable input. While, it is true that we have to look at subjective inputs, the survey methodology and parameter identification should be rigorous. As identified by Høyland *et al.* (2012), estimation of the scores ignores inherent uncertainty, resulting in unreliable numbers.

Assumption on growth trajectory of the country: WEF GCI assigns different weightages on different segments during computation, depending on country's current position on growth trajectory. It is assumed that countries first achieve basic requirements, then move on to efficiency enhancers and finally pursue innovation factors. However, this can be questioned, as for example, it may be possible for a country to achieve higher R&D innovation even when there are issues with basic requirements like corporate ethics.

Indexes' lack of relevance in the context of individual firm performance: While governments, policymakers and business media accord high level of importance to competitiveness indexes, for individual firms, these indexes may not mean much. The primary reason could be that many components of an index are insignificant for an individual firm's business. This supports some of the earlier research that competitiveness is rooted most importantly in microeconomic fundamentals (Porter *et al.*, 2007; Aiginger, 2006).

Characteristics of Asian businesses: Asian businesses have several unique FSAs that outweigh or nullify the requirement of country-specific advantages. Therefore, firms with an adverse external environment may also achieve growth and profitability at par with international competitors. In other words, as identified by Rugman and Oh (2008), some disadvantages in Asian countries perceived by Western analysts as bottlenecks may not be seen so by the Asian firms. In such a situation, a competitiveness index, designed by Western analysts has limited relevance for Asian firms.

5. CONCLUSIONS

Country-level competitiveness indexes draw significant amount of attention from the governments, policymakers, businesses and media. While organizations that develop and publish these indexes insist on appropriate methodology, questions are raised on their robustness as well as their applicability, especially in the Asian context.

This paper identifies conceptual and methodological problems that surround competitiveness indicators and the risks of formulating policy based on these indicators. It is difficult to build global indicators that capture all the complexity of different business and economic environments, the impact of national legal systems, resources and capabilities, the outlook of the prevailing political dispensations and how they interact with myriad of policy variables. This leads to issues with construction of a national competitiveness index. In addition, we notice a number of conceptual issues in the structure of indicators and the way inputs, especially subjective inputs, are captured and aggregated.

We also find lack of alignment between different indexes. Indexes do not cross correlate. Thus, while conceptually the indexes are representing the business and economic environment of the country, in reality they represent different perspectives, supporting our question raised on structure, data collection and aggregation techniques.

When we look at relevance of one of the indexes to performance, we see strong time-series correlation with macroeconomic performance of the country. However, at the firm level there is no

relation between the index and firm performance. As a result, the explanatory power of indexes becomes weaker and policymakers need to exercise caution while considering competitiveness index values as benchmarks. Therefore, it may be appropriate to develop benchmarks that provide contextual, actionable insights specific for a country, region, rather than a single global framework with structural flaws.

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References

Aiginger, K. (2006). Revisiting an evasive concept: Introduction to the special issue on competitiveness. *Journal of Industry, Competition and Trade*, *6*(2), 63-66. *view at Google scholar* / view at publisher

Ambastha, A., & Momaya, K. (2004). Competitiveness of firms: review of theory, frameworks, and models. *Singapore Management Review*, *26*(1), 45-61. *view at Google scholar*

Berg, J., & Cazes, S. (2007). *The doing business indicators: measurement issues and political implications*. International Labour Office, Geneva. *view at Google scholar*

Chatfield, C. (2004). *The analysis of time series, an introduction*. sixth edition. Chapman & Hall/CRC, New York. 333 pp. *view at Google scholar*

Duanmu, J. L., & Guney, Y. (2009). A panel data analysis of locational determinants of Chinese and Indian outward foreign direct investment. *Journal of Asia Business Studies*, *3*(2), 1-15. *view at Google scholar* / view at publisher

Fisher, P. S. (2005). *Grading places: what do the business climate rankings really tell Us?*. Washington: Economic Policy Institute. *view at Google scholar*

Garelli, S. (2014). *The fundamentals and history of competitiveness. In IMD World Competitiveness Yearbook* (pp. 488-503). Lausanne: IMD World Competitiveness Center. *view at Google scholar*

Høyland, B., Moene, K., & Willumsen, F. (2012). The tyranny of international index rankings. *Journal of Development Economics*, *97*(1), 1-14. *view at Google scholar* / view at publisher

IMD (2016). *IMD world competitiveness centre online database*. Retrieved from https://worldcompetitiveness.imd.org/.

Krugman, P. (1996). Making sense of the competitiveness debate. *Oxford Review of Economic Policy*, 12(3), 11-25. *view at Google scholar* / view at publisher

Lall, S. (2001). Competitiveness indices and developing countries: an economic evaluation of the global competitiveness report. *World Development*, *29*(9), 1501-1525. *view at Google scholar* / view at publisher

LaVan, H., & Murphy, P. J. (2007). Southeast Asian culture, human development, and business competitiveness. *Journal of Asia Business Studies*, *2*(1), 14-22. *view at Google scholar* / view at publisher

Porter, M. E., Ketels, C., & Delgado, M. (2007). The microeconomic foundations of prosperity: findings from the business competitiveness index. *The Global Competitiveness Report 2007–2008*, 51-81. *view at Google scholar*

Rowley, C., & Benson, J. (2002). Convergence and divergence in Asian human resource management. *California Management Review*, *44*(2), 90-109. *view at Google scholar* / view at publisher

Rugman, A. M., & Oh, C. H. (2008). The international competitiveness of Asian firms. *Journal of Strategy and Management*, *1*(1), 57-71. *view at Google scholar*

Rugman, A. M., & Oh, C. H. (2013). Why the home region matters: location and regional multinationals. *British Journal of Management*, *24*(4), 463-479. *view at Google scholar* /

view at publisher

Snowdon, B. (2006). The enduring elixir of economic growth. *World Economics*, *7*(1), 73-130. *view at Google scholar*

Tanure, B., & Duarte, R. G. (2005). Leveraging competitiveness upon national cultural traits: the management of people in Brazilian companies. *The International Journal of Human Resource Management*, *16*(12), 2201-2217. *view at Google scholar* / view at publisher

WEF (2016). *World economic forum the global competitiveness index.* Retrieved from http://reports.weforum.org/global-competitiveness-report-2015-2016/.

World Bank (2016). *Doing business database.* Retrieved from http://data.worldbank.org/data-catalog/doing-business-database.

Zadek, S. (2006). Responsible competitiveness: Reshaping global markets through responsible business practices. *Corporate Governance: The International Journal of Business in Society*, *6*(4), 334-348. *view at Google scholar* / view at publisher