

Which is More Durable: BRICs or MISTs?

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BRICs and MISTs, are earmarked to catch up with and replace some of the current members of G-20 from 2020 to 2050. A multiple regression equation with the three Global Innovation Index (GII) variables of Rule of Law, High Tech Imports and School Life Expectancy is used to examine whether the two groups retain their membership. Testing the variables at three different expected levels of growth does not yield results that coincide with the original BRIC and MIST classifications. China is always grouped together with Mexico and S. Korea to be joined by Brazil if it can increase its GI inputs by 10% and 20%. The lower development group comprises Indonesia, Turkey and, surprisingly, the highly ranked BRIC members Russia and India.

Field of Research: International Business

1. Introduction

Ever since Jim O'Neill (2001) coined the acronym BRICs followed by MISTs a decade later, there has been increased interest in the prediction that these countries will start replacing the G-7 countries from 2020 to 2050. Many developing countries consider it very prestigious to be associated with the G-7 countries (UK, the US, France, Germany, Italy, Japan and Canada) that at one point represented 50% of the "net worth" of the world economy. Since 2001, various countries have been striving to be included among the BRICs. In fact, South Africa has been added to this group by some authors, which has changed the acronym to BRICS. Our study is based on the original four-country classification of BRICs and excludes South Africa. The prediction by Goldman Sachs that BRICs, followed by MISTs, have the potential to replace some of the current members of G-20 is predicated on the assumption that the grouping of the countries itself is robust. Hence, studies that explore the stability of the groups are useful. Goldman Sachs predicted that China and India, respectively, will become the dominant global suppliers of manufactured goods and services, while Brazil and Russia will become similarly dominant as suppliers of raw materials (O'Neal, 2001). Since the establishment of these two acronyms, there has been a lot of discussion regarding who should be included in which group and which group is more likely to achieve its potential of joining and replacing some of the developed economies. In addition to the continuing debate regarding group membership, the original classification was predominantly based on the size of GDP and population. While GDP and population are important macro variables that influence the capacity of a country regarding economic growth, there are other important determinants of growth. In modern economies, GDP growth is itself the result of improvements in other factors rather than being an engine of development. Hence, there is an opportunity to contribute by investigating whether the current groupings hold if other variables are considered. While there are studies that are concerned with which countries are to be added to which group, there are no existing studies that investigate the stability of the groups based on our literature search.

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Therefore, the purpose of this exploratory research is to examine whether the BRIC and MIST countries retain their membership in these groups by going beyond consideration of net worth and size of population. One such important factor that continues to be the engine of development is innovation. Given the importance and the impact of innovation on the development of a country, examining how the BRICs (Brazil, Russia, India and China) compare with MISTs (Mexico, Indonesia, S. Korea and Turkey) regarding their innovative capabilities is useful.

In the next section, we introduce and review the concept of innovation as an agent of economic development. The paper continues with the Methodology section that is based on the Global Innovation Index (GII) followed by identification of the BRIC and MIST countries. The Findings section presents the results of multiple regression analyses using selected GII variables and their impact on the BRICs and MISTs. Conclusions and limitations are provided at the end of the paper.

2. Literature Review

In the last two decades, there has been an increased awareness and appreciation of innovation (Drazin and Schoonhoven, 1996) as a means to create and maintain sustainable competitive advantage and as a key element of business success (Johannessen, Olsen and Lumpkin, 2011). The traditional resource based view asserted that competitive advantage rested on basic core values like quality, cost and timeliness (López, 2005; Lee, 2009). However, as a result of increasing global competitiveness and technological advances, innovation has become an important additional factor in creating and sustaining competitive advantage in a rapidly changing business environment (Johannessen et al., 2001; Lee, 2009). Innovation is the main determinant of economic growth within modern capitalism. Recognition of the relationship between innovation, economic dynamism and high rates of growth constitutes the very foundation of today's innovation theory (Papaioannou, 2011). Unfortunately, managing the risky and complex process of innovation has been challenging (Hollins, 2000; Bueno et al., 2008) and not always handled well.

The concept of innovation is not easy to define (Harmancioglu, et al., 2009; Johannessen, et al., 2011). Zaltman et al. (1973) provided one of the earlier definitions of innovation as "any idea, practice, or material artifact perceived to be new by the relevant unit of adoption". Different authors have used a variety of factors and approaches to measure innovation at different levels, such as the firm or the country level. Garcia and Calantone (2002) report that the terms "radical, incremental, really-new, imitative, discontinuous, architectural, modular, improving, and evolutionary" have been used to define innovation. Johannessen et al. (2001) have suggested that "the picture that emerges from these diverse approaches underscores the point that a multitude of factors are interacting to induce innovation in economic life". Lee (2009) concluded that "although each factor remains important, it is unlikely by itself or as part of a group to provide a sustainable competitive advantage". This study is based on the definition provided by Prahalad and Mashelkar (2010) that "An innovation is the implementation of a new or significantly improved product, a new process, a new marketing method, or a new organizational method in business practices, workplace organization, or external relations". It forms the basis of the Global Innovation Index (GII) developed by INSEAD (2007). The GII recognizes the key role of innovation as a driver of economic growth and prosperity and acknowledges the need for a broad horizontal vision of innovation that is applicable to both developed and emerging economies,

with the inclusion of indicators that go beyond the traditional measures of innovation, such as the level of research and development in a given country.

3. Methodology

The approach adopted in this study is based on the Innovation Input Sub-Index of the Global Innovation Index (GII) that is the simple average of five pillar scores. We exclude the Output Innovation Sub-Index because the Input sub-index is more instrumental in determining the potential achievements of the N11 countries. The five pillars and the composite variables that constitute the Input sub-index are as follows:

- 1) Institutions - Political (3), Regulatory (3), Business Environment (3)
- 2) Human Capital & Research - Education (5), Tertiary Education (6), R & D (3)
- 3) Infrastructure - ICT (4), Energy (4), General Infrastructure (3)
- 4) Market Sophistication - Credit (4), Investment (4), Trade & Competition (5)
- 5) Business Sophistication - Knowledge workers (4), Innovation Links (5), Knowledge Absorption (4)

To elaborate, the Institutions pillar is made up of the political, regulatory and environment composite variables. The numbers in brackets represent the individual variables that constitute the different composite variables. For example, the political composite variable consists of political stability, government effectiveness and press freedom.

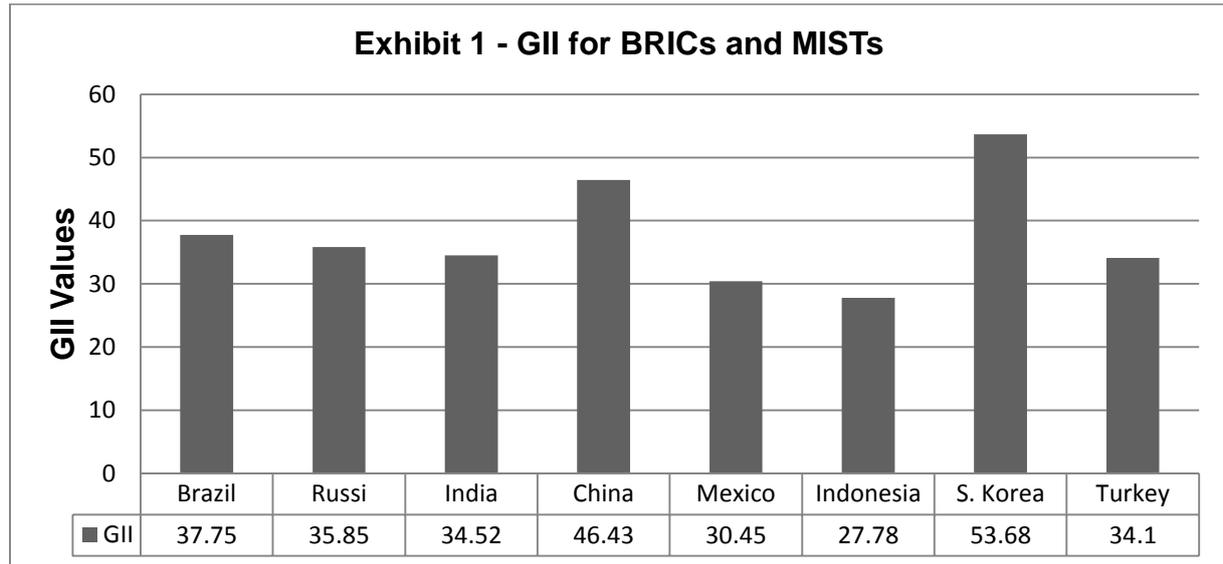
Our methodology differs from previous studies mainly in two aspects. Firstly, we go beyond the O'Neill (2001) grouping of countries that is based on net wealth of nations and size of population by considering innovation as a predictor variable of economic development. Secondly, our study uses multiple regression analyses to determine the level of innovation rather than the simple arithmetic average of the variables used in measuring GI.

4. Identifying the BRIC and MIST Countries

It is estimated that BRICs will overtake G-7 economies by 2027 (Foroohar, 2009). The four BRIC countries are developing rapidly and their combined economies could exceed the combined economies of the current richest countries of the world by 2050. These four countries currently account for more than a quarter of the world's land area and more than 40% of the world's population (Dali, 2006). The BRIC thesis posits that China and India will become the world's dominant suppliers of manufactured goods and services, respectively, while Brazil and Russia will become similarly dominant as suppliers of raw materials. Due to lower labor and production costs, many companies also cite BRICs as a source of foreign expansion opportunity (McGroarty, 2013).

Jim O'Neill of Goldman Sachs has been trying to move beyond the concept of developing markets and identify the next level of "growth markets" in the last dozen years. To be considered a growth market, he has chosen the requirement that the economy must be at least one percent of global GDP. He has decided to call the four BRIC economies, as well as four of the so-called Next 11 (N11) economies, Indonesia, Korea, Mexico and Turkey as Growth Economies. O'Neill (2011) predicts that "the increase in GDP of Indonesia, South Korea, Mexico and Turkey,

or MIST, will be similar to that of the US and the Euro Area”. The GII for BRICs and MISTs are presented graphically in Exhibit 1.



5. Findings

Based on nearly 60 variables across 15 composite factors, the Input sub-index makes the task daunting and, perhaps, unnecessarily complicated for our purposes. Hence, we are guided by the construction of the globalization index that uses practical proxies to calculate it. Furthermore, the number of countries (8) in our sample also necessitates identifying a manageable group of parsimonious variables for statistical reasons. Consequently, we have selected 12 variables based on the collective judgment of several colleagues who are experienced teachers of international marketing and other international courses. The resulting 12 variables and the data for the eight countries are presented in Table 1. We have also included GDP and GDP/capita as reference points for the economic size of each country and as an indication of the starting point for the predictions by O’Neal (2001).

Cluster analysis with all 12 variables separated the eight countries into two groups comprising S. Korea and Russia in one group and the remaining six countries together but does not provide a compact grouping. This result mixes the BRIC and MIST countries and fails to produce expected groups of four countries. Hence, we conclude that the 12 variables are not collectively good predictors of the BRIC and MIST grouping.

Next, we conduct a series of multiple regression analyses to determine the most efficient equation to explain the GII of the 12 countries. We are seeking an equation with the smallest number of significant variables that has the highest explanation power indicated by the adjusted coefficient of determination, R^2_{adj} . After many attempts, we identified the following equation with three variables where the beta values are .38, .27 and .10 with an excellent $R^2_{adj} = .98$.

$$GII = .29(\text{Rule of Law}) + .22 (\text{High Tech Imports}) + .26(\text{School Life Expectancy}) \text{ Eq. 1}$$

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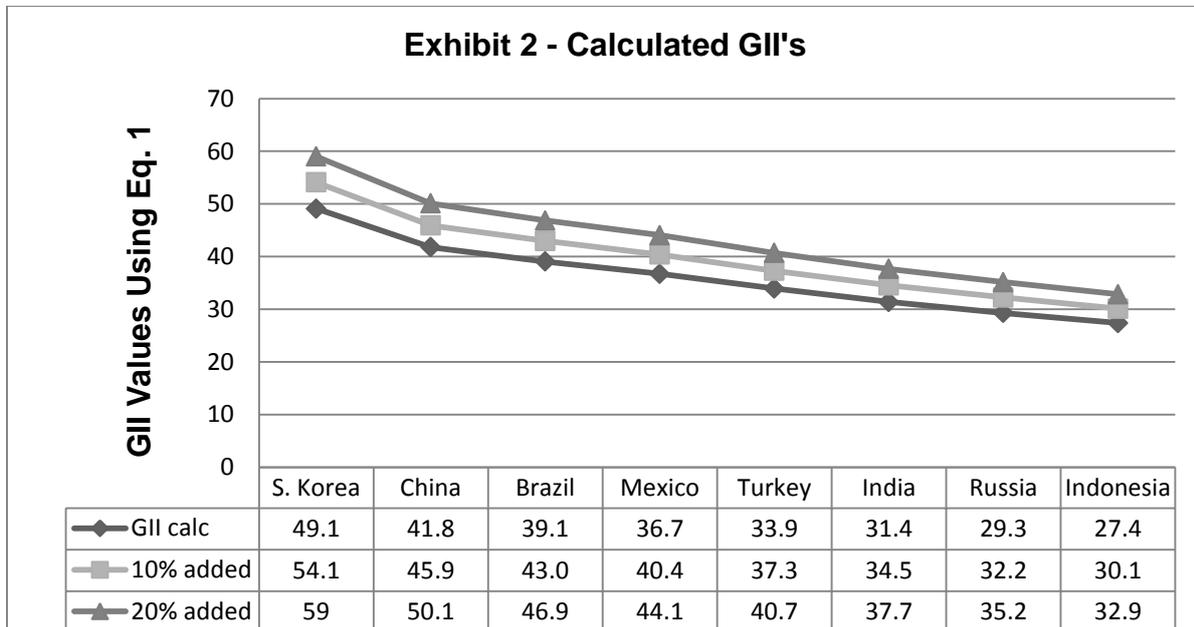
Table 1: GII and Selected Innovation Input Data

	Brazil	Russia	India	China	Mexico	Indonesia	S.Korea	Turkey
GII	37.75	35.85	34.52	46.43	30.45	27.78	53.68	34.10
Pol. Stability	54.25	21.70	13.21	29.72	22.17	24.06	52.36	18.87
Rule of Law	49.53	23.58	55.66	45.28	33.96	34.43	82.55	58.02
Start Business	00	72.12	73.08	64.42	92.31	55.75	87.50	95.19
Schl Life Xpect	59.04	59.77	36.76	44.19	57.67	54.20	76.58	45.78
Tertiary	37.99	78.59	13.31	24.63	27.35	23.57	100	38.80
RD Expend	22.1	20.84	15.99	29.26	7.31	.48	65.81	14.39
ICT Access	42.37	55.88	18.78	37.48	34.77	26.01	76.05	46.63
Infrastructure	42.34	32.18	48.32	63.31	36.68	42.45	41.16	31.29
Exports	2.50	20.70	12.80	19.61	20.82	19.71	45.21	15.73
RD Bus.Xpend.	47.35	74.10	34.89	85.13	55.79	4.40	89.79	48.60
Unv Collaborat	54.91	44.48	45.63	59.78	45.40	52.71	61.35	39.52
Hi Tech Imports	42.46	31.47	25.88	77.94	54.00	15.00	50.40	23.61
GDP/cap. (2010)	6882	9833	1061	3463	8972	1724	21,602	6005
GDP (2010)	2087	1371	1256	4667	1009	419	1071	440
GDP (2020)	2194	2554	2848	12630	1742	752	1508	740

GDP in billion US\$, GDP/capita in US\$. Both in constant 2006 US\$.

Cluster analysis using these three variables based on the data from Table 1, puts China, Mexico and S. Korea in the higher development group with Brazil, Russia, India, Indonesia and Turkey in the other group. The calculated GII for each country based on Eq. 1 using the original data from Table 1 are presented in Exhibit 2. Again, we have BRICs and MISTs mixed between the groups and have failed to form the groups as originally suggested. S. Korea continues to be at the top of the more developed group in spite of the fact that it is originally included in the MIST group that was rated behind the BRICs. Mexico is included in the higher group on the strength of the importance of High Tech Imports. China is in the high group as suggested by its original inclusion as a BRIC country. Contrary to the proposed BRICs, cluster analysis with the three variables from Eq. 1 does not align Brazil, Russia and India in the high economic group. Brazil presents an interesting case as its calculated GII would place it in the top four, validating the original BRICs grouping. However, cluster analysis marginalizes Brazil on the basis of its comparatively low rating in terms of Hi Tech Imports. In fact, improving this variable by as little as 10% results in clustering Brazil with S. Korea, China and Mexico in the high group.

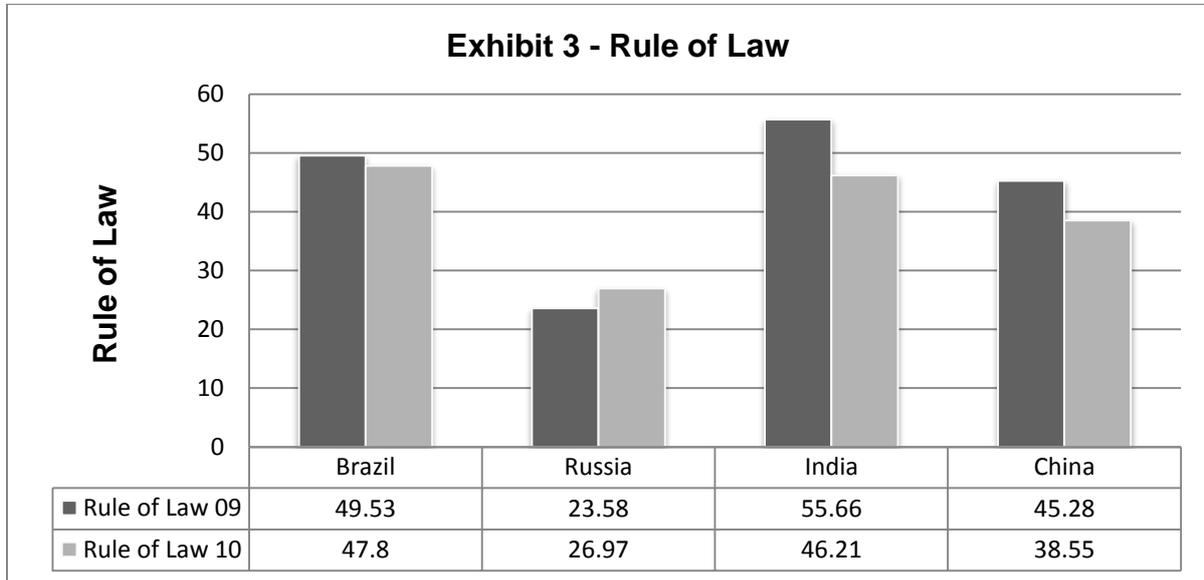
The analyses so far have been based on the past data from Table 1. However, the purpose of the BRIC and MIST classification is to suggest which countries would develop in the future to take over the existing developed countries. Therefore, we conduct cluster analysis to examine the results based on a ten percent increase in the three variables. The resulting groups are: Brazil, China, S. Korea and Mexico in the high group and India, Russia, Indonesia and Turkey in the other group (see Exhibit 2). Brazil and China have been included among the more developed group as well as two MIST countries, Mexico and S. Korea. BRIC countries Russia and India continue to be included in the lower group with the MIST countries Indonesia and Turkey. Clearly, the original MIST and BRIC classification is not being justified even when a 10% increase is assumed for all three variables in Eq. 1.



We digress at this point to briefly discuss the feasibility of increasing any one of the variables in Eq. 1 by 10 or 20%. The Organization for Economic Co-Operation and Development (OECD) has noted that changing course on something as intangible as “innovation” is no easy task. High tech Imports and, to a lesser degree, School Life Expectancy are more likely to be controlled and changed by governments. They are likely to require less time to achieve than Rule of Law. In our opinion, which is shared by our panel of experts, Rule of Law is very difficult to change. It requires more time as well as involving social, cultural and even economic variables beyond the political will of the government. Exhibit 3 depicts the nature of the change in Rule of Law for BRICs from 2009 to 2010. The original classification of the BRIC countries was based on rapid economic growth. For example, Brazil’s GDP/capita was predicted to increase by 879% from 2006 to 2050!

In the spirit of fast economic development that underlines the BRIC acronym, we will investigate the impact of a 20% increase, which should favor the classification of BRIC countries. We consider 20% to be a modest increase relative to the increases in GDP/capita, such as 897%, predicted by Goldman Sachs.

Classification of the eight countries based on a 20% increase is the same as an increase of 10% that was reported previously. Two MIST countries (Mexico and S. Korea) are grouped with Brazil and China, which are BRIC countries. Once again, the original groupings suggested by Goldman Sachs are not consistent. The finding that Mexico and S. Korea are being grouped together with other BRIC countries is in agreement with the debate that followed the coining of the term BRICs.



Jim O’Neill (2006) stated that in 2001 when the BRIC acronym was created, Mexico was not considered, but today it has been included among the MISTs because the country is experiencing the same factors that the other BRIC countries present. Furthermore, According to O’Neill et al. (2005), Mexico and South Korea were the only other countries comparable to the BRICs, but their economies were excluded initially because they were considered more developed, as they were already members of the OECD.

Table 2: Grouping of Countries Based on Eq. 1

Country	Original data	10% Increase	20% Increase
Brazil	2	1	1
Russia	2	2	2
India	2	2	2
China	1	1	1
Mexico	1	1	1
Indonesia	2	2	2
S. Korea	1	1	1
Turkey	2	2	2

(1) Indicates higher GII grouping, (2) indicates lower GII grouping

6. Conclusions and Limitations

In all three of our analyses, China, Mexico and S. Korea are included in the more developed group (Table 2). This finding is not consistent with the original BRICs classification as it retains only China in the higher group and promotes Mexico and S. Korea out of the lower development MIST group. While the promotion of S. Korea to this high potential group is not surprising, Mexico’s higher rating is significant. South Korea is at the top of the group as a result of having the highest score for Rule of Law and School Life expectancy and ranking third in High Tech Imports. Mexico compensates for its relatively weak performance in Rule of Law by performing well in Hi Tech Imports and School Life Expectancy. China joins them predominantly on the basis of its very high rating on Hi Tech Imports. As noted earlier, Brazil joins the group if it can achieve improvements of 10 and 20%, especially in High Tech Imports. Special attention must be given to China as it is the only original BRIC

country that is consistently confirming its predicted level of economic development. In fact, academics and experts have suggested that China is in a league of its own compared to the other BRIC countries (Mohan, R. 2009). As David Rothkopf (2009) wrote in *Foreign Policy*, "Without China, the BRICs are just the BRI, a bland, soft cheese that is primarily known for the wine [sic] that goes with it. China is the muscle of the group and the Chinese know it. They have effective veto power over any BRIC initiatives because without them, who cares really? They are the one with the big reserves. They are the biggest potential market".

As suggested by the on-going debate regarding where to include Mexico and S. Korea, it is not clear that the original BRIC and MIST groupings are infallible. Our results based on Eq. 1 coincide with this debate and indicate that lead by China, Mexico and S. Korea belong in a separate group with, possibly, Brazil joining them. Based on this study, there is little doubt that Russia, India, Indonesia and Turkey belong together with lower potential to achieve the dream compared to the other group. The inclusion of Indonesia and Turkey in the lower group is consistent with their original MISTs classification. However, Russia and India, which were included among the BRICs based on the size of their economy and population, drop out of the high group. Russia suffers from low levels of Rule of Law and Hi Tech Imports, both of which are well below the eight country average. India struggles with a very low level of Hi Tech Imports and below average School Life expectancy.

In conclusion, the multiple regression equation that explains the GII with only three variables is very efficient as suggested by the high R^2_{adj} (.98). The findings are also very robust in terms of grouping the eight countries as the groups do not change when the three variables are increased by 10% as well as 20%. Mexico and S. Korea consistently join China as members of the higher development group with Brazil showing potential based on Rule of Law and School Life Expectancy. Contrary to the original classification, Russia and India cannot maintain their BRICs membership and are grouped with the lower development countries of Indonesia and Turkey.

It is one thing to group countries by some economic factors, such as Goldman Sachs, or by some other parameter, such as GII in this study, but it is yet another matter to predict what might happen in the future extending to 2050. In 2007, Goldman Sachs revised its projections and predicted that "from 2007 to 2020, India's GDP per capita in US\$ terms will quadruple", and that the Indian economy will surpass the United States (in US\$) by 2043, rather than by 2050 (Narayanan, 2007). However, the difficulty of predicting the future or grouping countries is fraught with the unexpected and the unpredictable as reported in *The Economist*, "Last week China reported its slowest growth in three years. India recently recorded its weakest performance since 2004. Brazil has virtually stalled. Recently, IMF sharply cut its growth forecast for three of the four so called BRICs; only Russia was spared" (*The Economist*, July 21, 2012). Surely, the predictions of Goldman Sachs in 2001 do not seem to hold at this point and new revisions are likely to be forthcoming. We do not intend to suggest in this study that the groupings in Table 2 are fool-proof but only that the existing GII data do not support the extant BRICs and MISTs classification. The choice of GII to measure economic development and to group countries, the decision to select this specific group of 12 variables and not using longitudinal data may be criticized. We acknowledge all of these points as limitations of this study. However, in our opinion, the most important limitation of the study is assumptions about which country is capable of changing any of the three variables in Eq. 1 and by

how much in the future. Simple time series projections of these variables must heed the “ceteris paribus” assumption since the future is not likely to be a continuation of the past in the case of the variables that are being analyzed here. However, studies of this nature are still useful in indicating the *relative* positions of countries under constrained conditions.

As would be expected, countries that have done better along the three variables included in Eq. 1 have relatively higher calculated GII scores. While the three-variable equation ($R^2_{adj} = .98$) suggest excellent goodness-of-fit, it could potentially under- or over-estimate the GII scores of some countries since there is no way to compensate for low scores in the three variables by performing well in areas that are not included in Eq. 1. As well, it is important to note that Eq. 1 is applicable to these eight countries and it may not be valid in calculating GII scores for other countries.

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