A New Composite Measure of FDI Attractiveness: Global FDI Country Attractiveness (GFICA) Index

Riadh Ben Jelili

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Abstract

Drawing out the main conclusions from the theoretical and empirical literatures, the aim of our modest contribution is to provide an explanation of why some countries are more attractive for foreign investors than others and what underlies the relative attractiveness failure of some countries. Therefore, a composite index that adequately describes a host country's attraction for FDI is constructed. This index, henceforth referred to as "GFICA Index", considers all identified foremost, measurable and comparable aspects that affect FDI decision. The index, ranking a set of 111 countries, representing 92% and 95% of the world inward FDI flows and stocks respectively, according to their attractiveness for receiving inward FDI, is structured so as to provide the possibility of conducting detailed strength and weakness analyses for countries in general and Arab countries in particular> Indeed, 18 Arab countries are part of the sample representing more than 95% and 98% of the total inward FDI flows and stocks into the Arab region respectively. These analyses can be used by policy-makers to draw conclusions on how to improve the country's attraction for inward FDI.

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1. Introduction

Along with the deepening international economic and financial integration over the last two decades, the 2000s saw a significant increase in foreign direct investment (FDI) to developing countries. The upward trend has been reversed in 2008, following the global economic slowdown that started in the end of 2007. However, developing and transition economies, which proved relatively immune to this global turmoil, did better than developed countries and continued to absorb nearly half and 6 per cent of global FDI flows respectively. In these countries FDI continue to be the most important source of foreign financing, by far surpassing inflows of official development assistance, and other types of private capital inflows. In comparison, the record of FDI in Arab countries is poor. Indeed, the region attracted only 2.8% of global inward FDI flows and 6.3% of the FDI flows to developing countries according to the latest World Investment Report from UNCTAD (WIR, 2012) in spite of the adoption and implementation of substantial reform programs in most of the Arab countries covering stock market modernization and liberalization, state owned firms' privatization, regulatory and legal improvements. It is, therefore, quite legitimate to ask whether or not Arab countries might be missing out and should include financial and others incentives to attract FDI as part of a development strategy.

A review of the empirical literature on FDI determinants suggests that expected positive externalities of FDI depends on a multitude of factors, such as the level of technology used in domestic production in the host country, the level of education of the host country workforce, the level of financial sector and institutional development, etc. All these factors and more contribute to whether the host country in question can attract and hence benefit from FDI. Obviously this multitude of factors is impossible to capture in a single economic model or regression analysis. Drawing out the main conclusions from this empirical literature, the aim of this modest contribution is to provide an explanation of why some countries are more attractive for foreign investors than others and what underlies the relative attractiveness failure of the Arab countries. Therefore, a composite index that adequately describes a host country's attraction for FDI is constructed. This index, henceforth referred to as "GFICA Index", considers all identified foremost, measurable and comparable aspects that affect FDI decision. The index, ranking a set of 111 countries, representing 92% and 95% of the world inward FDI flows and stocks respectively, according to their attractiveness for receiving inward FDI, is structured so as to provide the possibility of conducting detailed strength and weakness analyses for countries in general and Arab countries in particular. Indeed, 18 Arab countries are part of the sample representing 95% and 98% of the total inward FDI flows and stocks into the Arab region respectively. These analyses can be used by policy-makers to draw conclusions on how to improve the country's attraction for inward FDI.

The data series selection process does not depend only on the question of what is necessary and most adequate to assess FDI attractiveness, data availability is also considered as a constraint in order to maximize our country sample. We detect 60 different indicators as adequate proxies for the FDI key drivers categorized according to three major axes or pillars:

1. **Prerequisites or initial conditions:** including 23 different sub-indicators covering macroeconomic stability, financial structure and development, public governance and business environment;

2. **Underlying factors or factors motivating FDI:** 27 factors are detected as adequate proxies to explore the FDI key decisions of multinational enterprises (MNEs) and covering the following considerations: market access and market potential, human and natural resources, cost components and physical infrastructures.

3. **Differentiation and Agglomeration economies:** The term agglomeration economies' is used in urban economics to describe the benefits that firms obtain when locating near each other. This concept relates to the idea of economies of scale and network effects. These effects are considered by detecting 10 different factors as proxies to the differentiation and agglomeration economies affects.

Several databases are used with annual data ranging generally from 1980 to 2012 including fundamentally but not exclusively GeoDist database of CEPII, WDI database of the World Bank, Institutional Profiles Database of the DGTPE-France, Worldwide Governance Indicators of the World Bank, The Conference Board Total Economy Database, WIPO database, UNCTAD STAT database, WTO database, ILO database, World Federation of Exchange database, CDIS, DOTS, FAS, IFS and WEO databases of the IMF.

To smooth fluctuation most series or factors are averaged over a period of the last three years. The index structure is based on three levels (See Figure 1): the first is the level of the three pillars (prerequisites, underlying factors, and differentiation and agglomeration economies); the second level consists of data series or sub-factors, which are aggregated from the level three data series.

The index calculation methodology used follows the approach of Nardo *et al*, (2005) and can be divided into four steps: consistency analysis, normalization, weighting and aggregation[3].

[3] Nardo, Saisana, Saltelli, Tarantola, Hoffman and Giovannini (2005): Handbook on constructing composite indicators: Methodology and user guide, OECD Statistics Working Paper STD/DOC2005

Table 1: Countries covered

Africa (23)	Angola, Benin, Botswana, Burkina Faso, Cameroon, Central African Republic, Chad, Cote d'Ivoire, Ethiopia, Gabon, Ghana, Kenya, Madagascar, Mali, Mauritius, Mozambique, Namibia, Nigeria, Senegal, South Africa, Tanzania, Togo, Uganda
Arab Region (18)	Algeria, Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Qatar, Saudi Arabia, Sudan, Syria, Tunisia, United Arab Emirates, Yemen
Asia (18)	Azerbaijan, Cambodia, China, Hong Kong, India, Indonesia, Iran, Israel, Japan, Kazakhstan, Korea Rep., Malaysia, Nepal, Pakistan, Philippines, Singapore, Thailand, Vietnam
Australasia (2)	Australia, Australasia
Eastern Europe (14)	Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Turkey, Ukraine
Latin America (16)	Argentina, Bolivia, Brazil, Chile, Colombia, Dominican Republic, Ecuador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, Venezuela
North America (2)	Canada, United States
Western Europe (18)	Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom

2. GFICA Index Structure

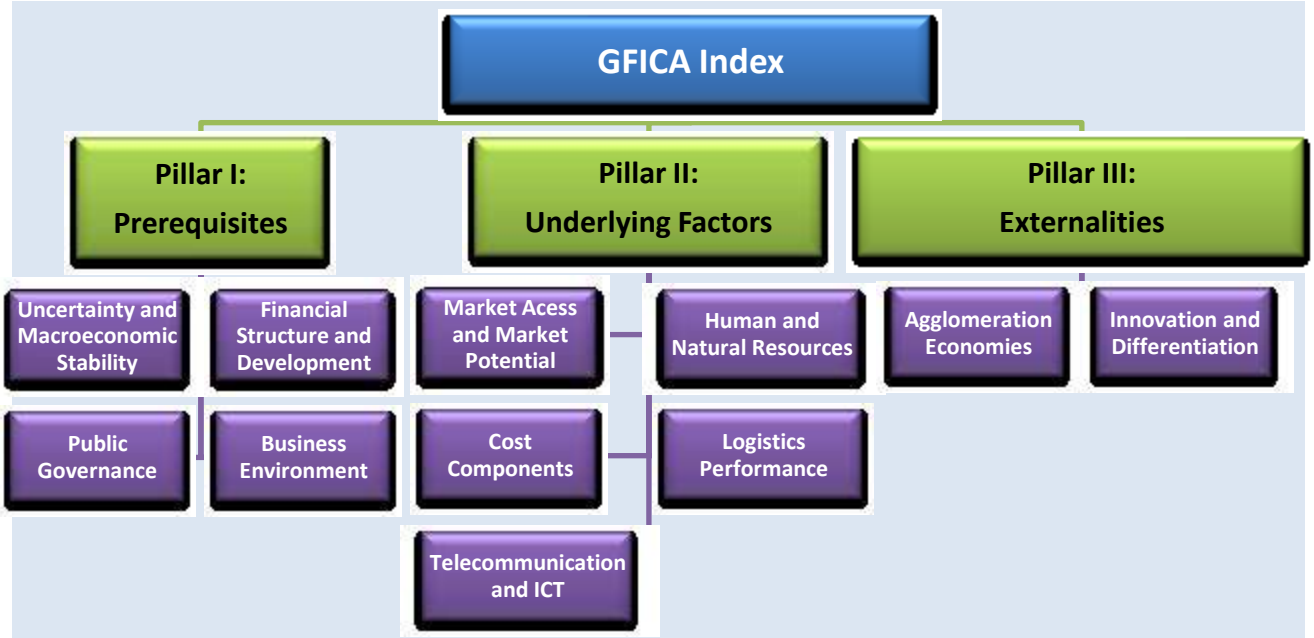
Without being familiar with the socioeconomic environment in various host countries, an investor cannot make rational FDI allocation decisions. Investors overcome potential knowledge deficits and gather data to analyze the determinants they consider important before allocating to a particular country. However, this country due diligence is time-consuming and costly. Additionally, the pace of economic development of many emerging and developing countries makes the selection of those that support foreign direct investment activity more and more cumbersome. GFICA index could be considered as a guide for foreign investors to solve the problem of where to allocate their capital. The aim of the index is also to point out the leverage factors to improve FDI attractiveness of Arab countries and constitutes as such a valuable policy tool available for economic policy makers in the region[4].

The purpose of GFICA index is to measure and study, in an ongoing manner, 8 world regions' attraction as FDI destinations by means of quantitative indicators, while at the same time comparing each group performance with an extended group of different countries and relevant geographical areas. This study shall be carried out on a yearly basis, thus enabling the monitoring of each country's development with respect to different categories considered to cover the most important axes that MNEs bear in mind when making investment decisions. The index aggregates and provides the requisite information for FDI allocation decisions. Of course, this information should not be considered as a substitute for investors' own efforts to build up country knowledge and experience; it can only facilitate this process and support the initial due diligence stage. The results shall obviously serve as a support tool in assessing the reasons boosting or slowing down foreign investment in a considered region of the world.

The attractiveness analysis benchmarks the attractiveness of 111 countries to receive FDI allocations representing more than 95% of the world inward FDI stocks and covers a total of 60 indicators structured around 11 FDI key drivers covering three pillars which aim to group together the main sources of competitive advantage that internationalization offers to MNEs: Prerequisites indicators, Underlying Indicators and Externalities Indicators. The three pillars, shown in figure 1, are described below. The ranking provides the evidence for which factors a considered region/country stands behind and has to improve them in order to become more attractive.

[4] Dhaman Index is derived from GFICA Index with the permission of its author Riadh Ben Jelili who is the sole copyright holder.

Figure1: GFICA Index Structure



2.1. Prerequisites

The prerequisites or required prior conditions axe includes those basic features that enable investors to identify and exploit the sources of competitive advantage of the other two axes. It consists of 23 indicators grouped into the following categories:

A. Uncertainty and Macroeconomic Stability:

***Uncertainty Factors**:*

In macroeconomic applications, the term uncertainty is used mainly in two senses: there is the statistical meaning of uncertainty in a measurement or value due to the dispersion of repeated occurrences in the face of the same prediction, and then there is the epistemological meaning of uncertainty in the opposite sense from likelihood or from strength of belief. Used in the second sense, uncertainty is a measure of doubt about a single event being true or real (von Furstenberg, 1988[5]). More precisely, in the context of attractiveness analysis, uncertainty limits and casts doubt on what stabilization policies and defense mechanisms of an economy can accomplish. Given the irreversible nature of FDI, macroeconomic uncertainty also causes an increase in uncertainty about future profits, raising the value of waiting and thus delaying investment decision. It's approximated by 4 indicators:

1. Real GDP growth volatility;
2. Inflation Rate;

[5] von Furstenberg G, M., 1988, "Uncertainty in Macroeconomics: A Survey of its Treatment", *The Geneva Papers on Risk and Insurance*, 13, pp.5-11.

3. Real effective exchange rate volatility;

4. Number of exchange rate crisis, crisis being defined as in Frankel and Rose (1996): a depreciation of the (average) nominal exchange rate that exceeds 25 percent, and exceeds the preceding year's rate of nominal depreciation by at least 10 percent.

Macroeconomic Stability:

Macroeconomic stability basically means a mix of external and internal balance approximated by the following indicators:

5. Current account deficit to GDP ratio;

6. Fiscal balance to GDP ratio;

7. General government gross debt to GDP ratio.

B. Financial Structure and Development:

The evaluation of financial structure and development covers the following indicators of financial size and depth:

1. Ratio of broad money to GDP (M2 to GDP);

2. Domestic credit to private sector (% of GDP);

3. Market capitalization of listed companies to GDP.

C. Public Governance:

The quality of public governance is evaluated by using the Worldwide Governance Indicators Database produced by Daniel Kaufmann, Aart Kraay and Massimo Mastruzzi[6]. These indicators combine the views of a large number of enterprise, citizen and expert survey respondents in industrial and developing countries. They are based on 31 individual data sources produced by a variety of survey institutes, think tanks, non-governmental organizations, international organizations, and private sector firms. Six dimensions of governance are covered:

1. Voice and Accountability

2. Political Stability and Absence of Violence

3. Government Effectiveness

4. Regulatory Quality

[6] See http://info.worldbank.org/governance/wgi/index.aspx#doc for more information regarding the adopted methodology.

5. Rule of Law
6. Control of Corruption

D. Business Environment:

The business environment is covered by the following set of 7 indicators:

1. Starting a Business
    - 1.1. Number of Start-up procedures
    - 1.2. Time required to start a business
2. Dealing with Construction Permits
    - 2.1. Number of procedures to have the permits
    - 2.2. Time required to have the permits
3. Registering Property
    - 3.1. Number of registration procedures
    - 3.2. Time required for registering property
4. Getting Electricity
    - 4.1. Number of procedures to get electricity
    - 4.2. Time required for getting electricity
5. Getting Credit
    - 5.1. Strength of legal rights
    - 5.2. Depth of credit information
6. Protecting Investors
    - 6.1. Extent of disclosure index
    - 6.2. Extent of director liability index
    - 6.3. Ease of shareholder suits index
    - 6.4. Strength of investor protection index
7. Enforcing Contracts
    - 6.1. Number of procedures
    - 6.2. Time required

2.2. The Underlying Factors

This axe includes the key aspects that MNEs take into account when making investment decision conditional upon fulfilling the prerequisites factors. These aspects have been grouped in 4 categories: Market access and potential, Human and natural resources, costs components and physical infrastructures.

E. Market Access, Size and Potential

One of the reasons behind FDI is access to new markets that enables the increase of MNEs' turnovers. Investments in a particular country can represent an attempt to gain access to its internal market, or to facilitate access to other markets of other countries. These are the factors shown by means of the following indicators:

1. Real per capita domestic demand,
2. Domestic demand volatility,
3. Trade performance Index
4. Trade to GDP ratio,
5. Applied Tariff
6. Trading Across Borders Index
    - 6.1. Documents to export (number)
    - 6.2. Time to export (days)
    - 6.3. Documents to import (number)
    - 6.4. Time to import (days)

F. Human and Natural Resources

Natural resources:

1. Total natural resources rents (% of GDP)

Human resources:

1. Labor Productivity Average Growth,
2. Mean years of schooling (adults),
3. Expected Years of Schooling (of children)
4. Human Development Index (HDI) value

G. Cost Components

1. Labor tax and contributions (% of commercial profits)
2. Total tax rate (% of commercial profits)
3. Time to prepare and pay taxes (hours)
4. Average cost to export and import (US$ per container)

H. Logistics Performance

1. Customs efficiency and border clearance performance
2. Trade and transport infrastructure performance
3. International shipments performance
4. Logistics quality and competence
5. Tracking and tracing performance
6. Timeliness
7. Road density (km of road per 100 sq. km of land area)
8. Air transport index:
    - 8.1. Tone-Kilometers Performed passengers, freight and mail (international and domestic) performed on scheduled services
    - 8.2. Passenger-Kilometers Performed (millions, international and domestic)

I. Telecommunication and ICT

1. Fixed (wired)-broadband subscriptions
2. Fixed-telephone subscriptions per 100 inhabitants
3. Percentage of Individuals using the Internet
4. Mobile-cellular telephone subscriptions per 100 inhabitants

2.3. Agglomeration Economies and Differentiation

The term "agglomeration economies" is used, as in urban economics, to describe the benefits that MNEs obtain when locating near each other (agglomerating). This concept relates to the idea of economies of scale and network effects. While the differentiation axe refers to the factors that provide MNEs access to scarce resources enabling them to differentiate their products, strategies or process from the competition and, , as a result, to develop or sustain a competitive advantage in the markets in which they operate.

J. Presence of Multinationals

1. Number of multinationals from 24 OECD countries
2. Inward FDI stock share to World Inward FDI stock
3. Total Number of BITs accumulated to the considered year

K. Innovation and Differentiation

1. Market Sophistication Index
2. Business Sophistication Index
3. Knowledge index
4. Share in total design applications (direct and via the Hague system)
5. Share in total trademark applications (direct and via the Hague system)
6. Share of total patent applications in world total (direct and PCT national phase entries)
7. E-Government Index.

3. Normalization and Consistency Analysis

3.1. Normalization

In order to make the cross-sectional data series comparable and to realize index aggregation, the raw data has to be converted into a common range. The rescaling method is used to normalize sub-indicators to such a range by the following linear transformation:

- if the concerned sub-indicator influence positively the attractiveness for investors:

$$y_{c,i} = 99 \times \left[\frac{x_{c,i} - min(x_c)}{max(x_c) - min(x_c)}\right] + 1$$

- if the concerned sub-indicator influence negatively the attractiveness for investors:

$$y_{c,i} = 99 \times \left[\frac{max(x_c) - x_{c,i}}{max(x_c) - min(x_c)}\right] + 1$$

$y_{c,i}$: normalized value of category *c* and country *i*
$x_{c,i}$: raw data value of category *c* and country *i*
$min(x_c)$: minimum raw data value of category *c* within the sample
$max(x_c)$: maximum raw data value of category *c* within the sample

For every individual sub-indicator, 100 represents the best score and 1 represents the worst.

3.2. Consistency Analysis

High quality tests are important to evaluate the reliability of data supplied in a research study as a first step of consistency analysis of the indices prior to computing composite variables and fitting explanatory models. Cronbach's alpha is a commonly employed statistic used to determine the internal consistency, so the considered statistic increases as the inter-correlations among a set of sub-indicators included in the analysis increase. A high Cronbach's alpha (greater or equal to the acceptable threshold value 0.7) is an indication that the considered set of indices proxy the desired key variable well.

The other two measures commonly used for consistency purpose are related to factor analyses or data reduction and summarization: the Haiser-Meyer-Olkin measure of sampling adequacy (MSA), based on the partial correlations among the input variables, and the Bartlett's test of sphericity used to test the hypothesis that the correlation matrix is an identity matrix (the indices are correlated in the population). The first measure should be greater or equal to 0.5 to proceed with factor analysis, and the test value of the second measure should be below the 0.05 significance level.

Table 2: Consistency analyses results

Key Drivers	Cronbach's Alpha	Kaiser-Meyer-Olkin Measure (MSA)	Bartlett's Test
1. Uncertainty and Macroeconomic Stability	0.617	0.613	0.000
2. Financial Structure and Development	0.345	0.668	0.000
3. Public Governance	0.832	0.909	0.000
4. Business Environment	0.970	0.619	0.000
5. Market Access, Size and Potential	0.661	0.724	0.000
6. Human and Natural Resources	0.692	0.679	0.000
7. Cost Components	0.609	0.548	0.000
8. Logistics Performance	0.933	0.922	0.000
9. Telecommunication and ICT	0.896	0.760	0.000
10. Presence of Multinationals and BITs	0.653	0.407	0.000
11. Innovation and Differentiation	0.861	0.777	0.000

The reliability test statistics for the sub-indicators used to assemble the ten key drivers are all above the Nunally's cut-off value of 0.7 except the two key drivers Financial Structure/Development and Cost Components. In addition to the limited number of sub-indicators available for the concerned key drivers, detailed analyses of the inter-item correlation matrix reveal relatively low correlations between the items. It's well known that a decrease in the number of indicators and a low average inter-item correlation are associated with a decrease in α. Furthermore, good values for all key drivers for the MSA and Bartlett's Test are obtained (MSA values greater than 0.5 and p-values for Bartlett's Test less than 0.05). Accordingly, from the above results it's possible to perform a valid factor analysis.

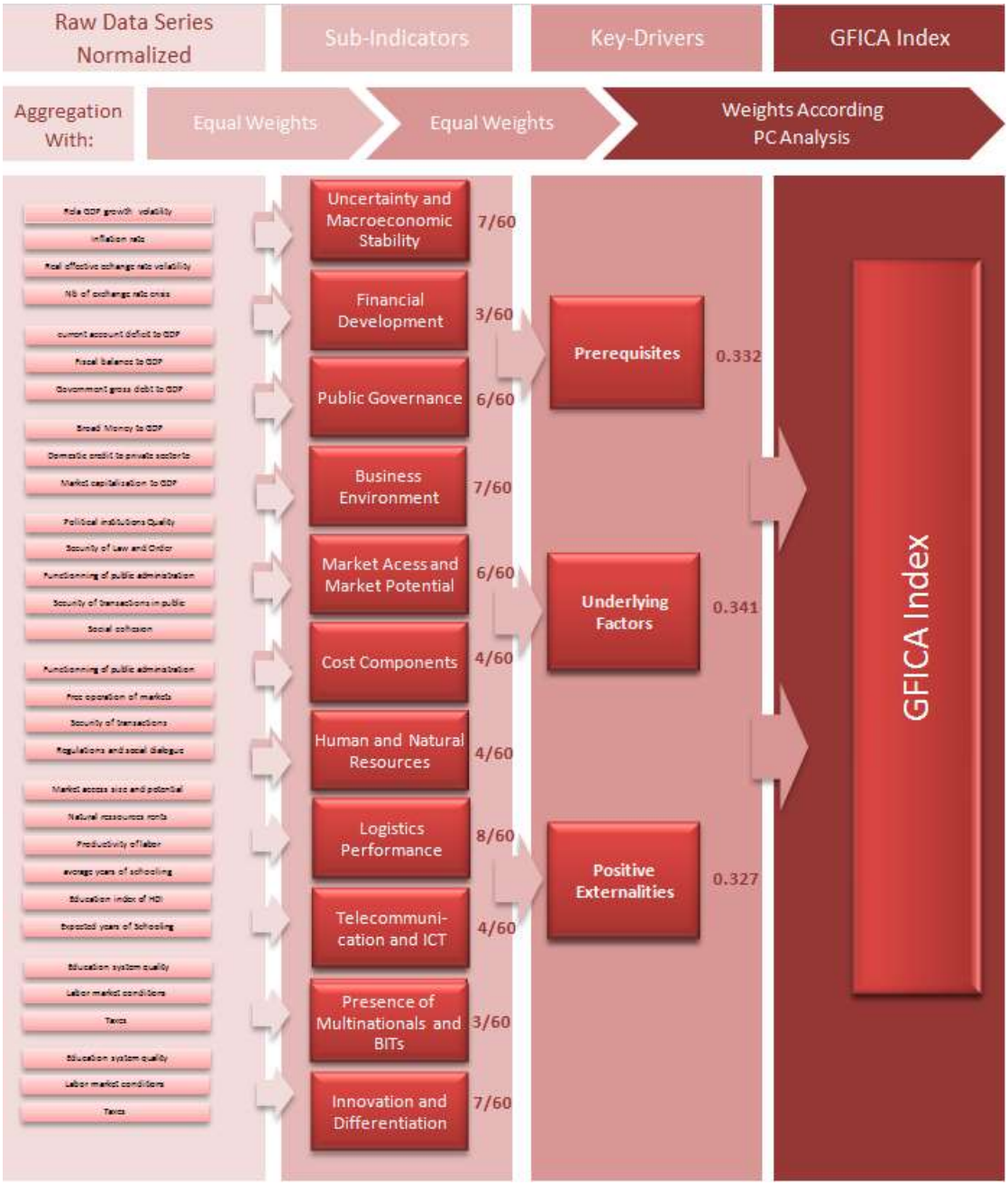
4. Weighting and Aggregation

4.1. Weighting

After calculating the performance scores for each sub-items on the lowest level, and before the aggregation can be conducted, the weightings of the index items have to be determined. Two schemes are followed:

1. On the lowest level, index items are aggregated with equal weights, i.e. the weights are derived from the number of components that are aggregated. At the key drivers level (10 key drivers), weights are attributed according to the number of items and so are the weights attributed to the three axes as exposed in Figure 2:

Figure 2: Equal Weights Aggregation Scheme



2. Equal weights are used at the lowest level; key drivers are aggregated with weights attributed according to the number of items and finally weights determined by factor analyses are used on the level of the three axes.

When using factor analysis, each component is assigned a weight according to its contribution to the total variance in the data to insure that the resulting summary indicators account for a large part of the cross-country variance of the considered sub-indicators.

Cronbach's α over the considered three axes is 0.91 and consequently underlines the quality of data selection for all the countries. The MSA value is 0.708 and Bartlett's Test of sphericity is significant at 0.000. Table 3 presents the results of the Principal Component Analysis (PCA). One single component is extracted (only one eigenvalue greater than 1) representing more than 89% of the total variance of the considered indicators.

Table 3: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.677	89.241	89.241	2.677	89.241	89.241
2	.227	7.561	96.802			
3	.096	3.198	100.000			

Extraction Method: Principal Component Analysis.

The high Cronbach's α and MSA value, and extracting only one factor explaining such a large part of the data variance, mean that the key axes are adequate joint proxies for a single latent factor. They are unidimensional and express only one characteristic. This is an indication of an appropriate choice of key drivers to assess FDI attractiveness for the considered countries. The FDI attractiveness is excellently measured by using the three criteria - prerequisites, underlying factors and agglomeration-differentiation factors- as proxies.

The PCA analysis also generates the communalities or the total influence on a single observed item from all the factors associated with it (in this case only one factor is generated). It's equal to the squared factor loading related to the observed indicator and is the same as R^2 in multiple regression. These communalities, described in Table 4, are used to calculate the weights for the three key drivers (the square of the factor loading represents the proportion of the variance of the indicator explained by the factors):

Table 4: Weights for the three key axes

	Component	Communalities	Weight
1. Prerequisites Factors	0.940	0.884	0.330
2. Underlying Factors	0.967	0.935	0.349
3. Agglomeration-Differentiation Factors	0.927	0.859	0.321

The results exposed in Table 4 illustrate that the underlying factors receive the highest weight and constitutes the strongest determinant of FDI activity followed by the prerequisites factors. They also show a small difference with respect to an equal weighting scheme (0.333 for each key driver).

4.2. Aggregation

Additive methods, geometric aggregation and non-compensatory multi-criteria analysis constitute the main three classes of aggregation methods. We focus on the linear and geometric methods as the most adequate for the purpose of FDI attractiveness analysis.

Linear aggregation assigns base indicators proportionally to the weights. It's useful when all sub-indicators have the same measurement unit, which is our case:

$$Index\ Value_i = \sum_{q=1}^{Q} w_q y_{q,i}, \text{ where } 0 \leq w_q \leq 1 \text{ and } \sum_q w_q = 1$$

Index value$_i$: index value of country i
$y_{q,i}$: normalized value of category q and country i
w_q : weight of category q

However, geometric aggregation rewards those countries or those sub-indicators with higher scores. A shortcoming in the value of one indicator can be compensated by a surplus in another. Compensability is constant in linear aggregation, while it is smaller in geometric aggregation for the sub-indicators with low values. It means that countries with low scores in some sub-indicators would benefit from linear aggregation:

$$Index\ Value_i = \prod_{q=1}^{Q} y_{q,i}^{w_q}, \text{ where } 0 \leq w_q \leq 1 \text{ and } \sum_q w_q = 1$$

5. Statistical Validation of the Results

This section compares the explanatory power of all the combinations presented in the previous section. By explanatory power we mean the strength and directionality of the linear relation between the proposed FDI attractiveness index and the actual FDI activity in the particular countries measured either by inward FDI flows or stocks. The Pearson correlations for each index calculation method are presented in Table 5:

Table 5: Pearson Correlations with Inward FDI Stocks

Index Calculation Method	**Correlation with Log FDI Inward Stocks (Two-tailed significance level)**
Method 1: Proportional weight and geometric aggregation	**0.776 (0.000)**
Method 2: Equal weight and geometric aggregation	0.747 (0.000)
Method 3: Equal weight and arithmetic aggregation	0.747 (0.000)

Considering these findings, the most adequate method for measuring the attractiveness of a country for FDI activity is method 1.