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The Ease of Doing Business Index as a tool for Investment location decisions

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Abstract

The *Ease of Doing Business Index* (EDBI) uses 41 variables to compare the business environment of different countries. It is widely used by policy makers, researchers and multinational companies. This paper aims to assess EDBI's consistency and validity in representing the business environment by using factor analysis. It is found that the EDBI presents a limited consistency and descriptive power of a country's business environment. The consequence of these findings is that multinational firms should handle carefully the EDBI in their investment decisions.

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1. INTRODUCTION

Investment location decisions rely on a huge quantity of information about the variables that determine the attractiveness of a business environment. This information influence the formation of managerial perceptions on the revenue and costs associated with an investment. Therefore, a smart decision on the location of a Greenfield investment or on which firm to buy depends on the reliability of the information collected.

The *Ease of Doing Business Index* (EDBI[i]) is a source of information on the business environment (laws, regulations and other costs of doing business) of about 180 countries. Its importance arises from its theoretical logic and widespread use by managers, researchers and policy-makers. It is seen as a reliable source of information for many international reports such as the World Competitiveness Yearbook, the Global Competitiveness Report or the Index of Economic Freedom. It is referred by a huge quantity of academic papers (670 by 2007, according to Doing Business[ii]), thus helping researchers to better explain investment decisions, and its results are closely monitored both by national governments and other public bodies, and by international organizations such as the OECD or the European Commission (Djankov, 2009).

Given its relevance, the objective of this paper is to validate, in statistical terms, the framework of the EDBI and to assess whether it is reliable to represent the country business environment. The paper applies the approach for the construction of composite indicators of Nardo, Saisana, Saltelli, Tarantola, Hoffman & Giovannini (2005) and it complements previous analysis by Hoyland, Moene, & Willumsen (2008, 2009), where the uncertainty in the ability of the indicators to capture the underlying business environment and a too literal interpretation of the index by economic agents are discussed, and by the Independent Evaluation Group (WB, 2008) focussed on the scope, transparency and information sources of the EDBI. Essentially, it addresses two questions: First, whether the chosen indicators are conceptually adequate to represent the underlying sub-indicators; Second, the ability of the indicators to represent the economic phenomenon of business environment.

The paper presents, in the next section, the literature on investment location decisions that theoretically confirms the EDBI. The following section acquaints the methodology for evaluating indicators while section 4 applies it to EDBI and analyses the results. Section 5 presents general conclusions.

2. INVESTMENT LOCATION DECISIONS

Consider a firm deciding where to locate an investment. A neo-classical decision-maker attempts to maximize the present value of the difference between revenue and costs when answering these questions. For this end it must collect substantial information and, by assuming a discount rate from the expected inflation, the desired rate of return and the presumed associated risk, it can calculate a net present value for the investment. If managers can only achieve a bounded rationality and elements of organizational behaviour are considered, then the decision making process is affected by perceptions about past decisions and present and future conditions when information is collected and when the decisions to invest is made (Aharoni, 1999).

Whatever the case, the decision to invest and where to locate the investment depends on the decision-maker's expectations about the value of both revenue and costs for the available alternatives. Caves (1996), Dunning (1998) and Blonigen (2005) survey the literature on FDI determinants. Among these is the business environment of a jurisdiction, which directly affects the operating costs and the potential revenue of a future investment. The collection of information on the business environment of potential location choices is thus crucial in the formation of expectations on revenue and costs.

The EDBI summarises, in a single indicator, a set of multi-dimensional cost-related variables that form the business environment of a jurisdiction. The business environment comprises a set of variables related with the legal and regulatory system, the functioning of the labour market, the tax code or the access to credit, thereby influencing the efficiency concern of managers in terms of cost-minimization. Although the areas presented in the EDBI are only cost-related, and therefore have a null effect on location decisions such as acquisitions explained by asset-seeking strategies and oriented to the revenue side, the index assesses the progress of countries overtime, and thus influences the decisions of both multinational companies and policy makers.

The theoretical relevance of the areas included in the EDBI was presented in several studies coordinated by Simeon Djankov and is confirmed by the FDI literature. The former address the effects of the legal system (Djankov, La Porta, Lopez-de-Silanes & Shleifer, 2002a), the regulation of entry of firms (Djankov, La Porta, Lopez-de-Silanes & Shleifer, 2002b; Djankov, 2009), the regulation of labour markets (Djankov, La Porta, Lopez-de-Silane, Shleifer & Botero, 2003), procedural time costs on trade (Djankov, Freund and Pham, 2006), creditor protection through the legal system and information sharing institutions (Djankov McLiesh & Shleifer, 2007), corporate taxes (Djankov, Ganser, McLiesh, Ramalho & Shleifer, 2008a), debt enforcement contracts (Djankov, Hart, McLiesh and Shleifer, 2008b) and investors protection (Djankov, La Porta, Lopez-de-Silanes and Shleifer, 2008c). The later presents explanations of location decisions based on the will to minimize operational costs or on a transactional costs approach. The implementation of business facilitation measures in order to provide firms with a better environment for their investments gained relevance during the 1990's, especially in the context of regional integration agreements. When intra-regional transaction costs are reduced and national policies have some degree of coordination in order to form a level playing field for businesses, national jurisdictions tend to rely more heavily on these measures to differentiate from each other when competing for investment (UNCTAD, 1999, p. 124). Among them, government promotion through lower taxes and fiscal incentives (Devereux and Griffith, 1998; Gorg, 2005), an efficient legal system (Buch, Kleinert, Lipponer and Toubal, 2005), easy-to-comply regulatory procedures (Hajkova, Nicoletti, Vartia and Yoo, 2006), lower barriers to entry (Alesina, Ardagna, Nicoletti and Schaintarelli, 2005) and lower labour costs and union membership (Bellak, Leibrecht and Damijan, 2007; Ondrich and Wasylenko, 1993) have a positive effect on investment inflows.

3. METHODOLOGY

The construction of the EDBI global index involves 10 indicators (areas) that quantify unobservable variables such as *"Starting a Business"*. It results from the aggregation of sub-indicators around each of the indicators (annex 1 shows the structure of the EDBI). The conceptual model of EDBI assumes that all sub-indicators equally contribute to the construction of the indicators and, consequently, to the overall index. The EDBI report (WB, 2008) refers, without explaining in detail, that tests of multivariate statistics

applied to the index have shown that no changes were needed. The same report concludes that this proves the robustness of the EDBI in what concerns the equal weighting methodology.

A way to test the EDBI's conceptual model is to find out if a different structure would produce more robust results than the framework with equal weights. Two techniques may be used to analyse the correlation between the different variables included in the index. In both cases, the aim is to verify the adequate number of indicators and the appropriateness of the index structure to the phenomenon allegedly represented by the EDBI (Nardo et al., 2005).

The first technique uses factor analysis based on a linear model with y observable variables ϕ_i (corresponding to the sub-indicators) that are function of x factors Ψ_j (corresponding to the indicators), where κ_{ij} and ε_i typify the factor loadings associated respectively with factors Ψ_j and the residuals.

$$\phi_j = \kappa_{i1}\Psi_1 + \kappa_{i2}\Psi_2 + ... + \kappa_{ix}\Psi_x + \varepsilon_j \quad (1)$$
$$(i = 1..x; j = 1..y)$$

The analysis assumes that factors Ψ_i and residuals ε_j are not correlated, the residuals have null mean and that the variance of factors is unitary and the variance of the residuals does not have any restrictions.

Factor analysis explains the covariance and correlation between the variables that comprise the index and its application estimates a factorial model by using principal components, where the common factors to one sub-indicator help in explaining its variance. This is achieved by computing commonalities.

The sphericity test of Bartlett (Snedecor & Cochran, 1967) and the measure of Kaiser-Meyer-Olkin (KMO) allow us to consider the inexistence of correlation between the variables and it also verifies the adequacy of the sample for the application of factor analysis. The figures in Table 1 confirm the adequacy of the data although the value obtained in the KMO measure is very close to the threshold of suitable data (0.5).

Table 1: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Test		0.580
Sphericity Test	Approx. Chi-Square	6432.493
	df	820
	Sig.	0.000

The second technique is based on *Cronbach's* alpha. It evaluates the internal consistency of the model's indicators and measures their reliability, that is, how can a given set of sub-indicators be represented by an indicator or an aggregate index (Cronbach, 1951). Although there are other methods available (Boscarino, Figley & Adams, 2004; Raykov, 1998), the *Cronbach's* is commonly applied to validate the consistency of indexes such as the EDBI.

For a number p of sub-indicators and an average correlation $\overline{r}$ between its sub-indicators, *Cronbach's* coefficient α_C is given by:

$$\alpha_C = \frac{p\overline{r}}{1+(p-1)\overline{r}} \tag{2}$$

When the sub-indicators have quite different variances, α_C requires the normalisation of its standard deviation for 1. The coefficient α_C grows with the number of sub-indicators and with the correlation of each indicator. Its value varies between 0 (sub-indicators are independent) and 1 (sub-indicators are perfectly correlated). Nunnaly (1978) suggests an acceptable reliability value of 0.7 although other authors consider that this level may be lower, around 0.5.

4. SUITABILITY ANALYSIS

Validation of the number of factors

For the estimation of the number of factors relevant to an index we use the following criteria:

a) The proportion of the overall variance associated with each eigenvalue by using the factors whose eigenvalues present a proportionally higher contribution to the explanation of total variance without exceeding 75% of the cumulative variance (Nunnally, 1978; Nardo et al., 2005).

b) To retain factors with eigenvalues greater than 1.00 (Mingoti, 2005). This limit aims to include in the analysis factors that represent, at least, the variance of one original variable.

c) To analyse the slope of the graph of factors and observe the distribution of the eigenvalues. The point at which the graph starts to flatten indicates the number of factors to extract (Hair Jr., Anderson, Tatham & Black, 1998).

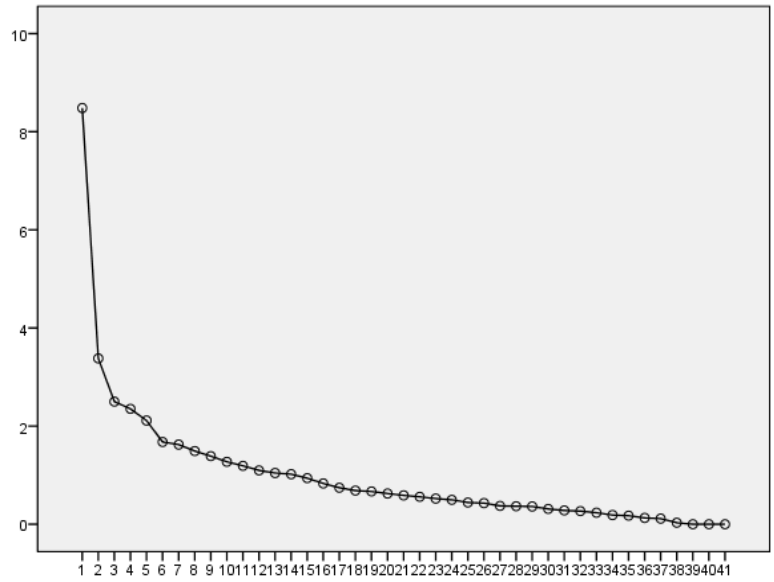
In order to compute the eigenvalues for the significant factors, a correlation matrix is built from normalised values with unit variance. The choice for the number of factors is made using the criteria of latent value (Kaiser, 1958). It results in 14 common factors with significant explanatory power (Table 2).

Table 2: Eigenvalues and cumulative variance for the main factors

Factors	Eigenvalues			Eigenvalues after rotation		
	Total	%Var.	Cum.%	Total	%Var.	Cum.%
1	8.482	20.688	20.688	4.607	11.237	11.237
2	3.380	8.244	28.932	3.135	7.647	18.884
3	2.498	6.093	35.025	3.106	7.576	26.460
4	2.352	5.737	40.762	2.718	6.630	33.090
5	2.113	5.154	45.916	2.389	5.828	38.918
6	1.677	4.090	50.006	2.381	5.808	44.726
7	1.624	3.960	53.967	2.327	5.675	50.401
8	1.492	3.640	57.607	2.099	5.121	55.521
9	1.388	3.385	60.992	1.795	4.379	59.900
10	1.273	3.104	64.096	1.720	4.195	64.096
11	1.191	2.904	67.000			
12	1.097	2.675	69.676			
13	1.044	2.545	72.221			
14	1.020	2.487	74.708			
15	0.939	2.291	76.999			
16	0.832	2.028	79.027			

The column "*Cum%*" shows that 14 factors account for 74.71% of the total cumulative variance. Given that the *Ease of Doing Business Index* is a model with only 10 factors, it loses about 10% of its explanatory power. Looking now at Figure 1 it can be observed a steep slope between factors 1 and 2, followed by a slowdown in the following factors, when the marginal contribution to the explanation of variance is further reduced. By following the above criteria we eliminate the remaining factors from the point where the accumulated variance exceeds 75% and where the eigenvalues are greater than 1 (Table2).

Figure 1: Eigenvalues for the sub-indicators of EDBI



Additionally, we compute the part of the variance that is explained by common factors in more than one of the underlying sub-indicators (commonality). This measure is given by the sum of the square of the correlation coefficients of the factors (Table 3).

When measuring the commonalities values we get information about the capacity of the aggregate index to capture the variance of each of the sub-indicators (Spearritt, 1996). Higher commonality values indicate better chances of the sub-indicators to become good representatives of a particular phenomenon. As an acceptable range, we consider a maximum value of 1 (total variance explained by common factors) and a default value of 0.50 (50% of variance explained by common factors). The application of this rule to table 3 shows that there is no need to get rid of any of the sub-indicators. The average value of the communalities is 0.747 and none of the sub-indicators have a commonality value below the default limit of 0.5.

A first conclusion may now be reached. Despite the fact that the chosen sub-indicators do not raise significant problems in the measurement of the variance explained by common factors (indicators), the EDBI restricts the number of factors in 30% (a reduction from 14 to 10 indicators). In this way, there is a reduction in the explanatory power associated with the absent factors and implying that the phenomenon of Doing Business is underrepresented by the EDBI.

Table 3 : Commonalities of the sub-indicators EDBI

SI	Com.	SI	Com.	SI	Com.
1	0.656	15	0.798	29	0.936
2	0.664	16	0.627	30	0.689
3	0.773	17	0.781	31	0.878
4	0.728	18	0.79	32	0.771
5	0.654	19	0.813	33	0.789
6	0.699	20	0.76	34	0.883
7	0.815	21	0.699	35	0.719
8	0.727	22	0.739	36	0.632
9	0.676	23	0.939	37	0.687
10	0.595	24	0.645	38	0.625
11	0.975	25	0.741	39	0.666
12	0.74	26	0.771	40	0.663
13	0.694	27	0.777	41	0.816
14	0.673	28	0.928		

Correspondence between the EDBI's and the factor model

In order to validate the EDBI's structure, we have to consider a framework with the same number of factors (10). This reduction from 14 to 10 results in a decrease of the total variance explained to 64.1% and of the commonality of each sub-indicator. The matching process between the conceptual and the statistical model will determine the need to remove any sub-indicator.

The first step is to optimise the distribution of sub-indicators. This can be done through a process of orthogonal rotation that improves the interpretation of the results obtained at the factorial level (Kline, 1994). In order to maximise the number of sub-indicators per factor and determine the best match between the areas of EDBI's and the factors' model, we test varimax and quartimax rotation methods. By using the criteria of maintaining the larger number of sub-indicators, we opt for the quartimax rotation. Then, the correspondence between both models is made based on the weight (factor loading) applied to each factor (shaded areas in Table 4).

The match between the two models is performed by eliminating one sub-indicator at a time and computing the loss in explained variance (in comparison with the use of all sub-indicators). Annexe 2 lists the sub-indicators that are dispensable for the description of the variance of the indicators and the respective loss of explanatory power. It also shows that in all indicators of the EDBI's model exists at least one sub-indicator that does not contribute to explain the phenomena of doing business. As a result of these matches, the loss of explanatory power varies between 39% and 92% (Annexe 2) and 80% of the indicators have losses of explanatory power above 70%. And 40% of the indicators are dependent on only one of the sub-indicators while 90% are dependent on one or two sub-indicators. Moreover, even the sub-indicators used in explaining the variance of the indicators show some fragility: four of these sub-indicators present factor loadings below the default value of 0.5. The setting of a load-factor at the default value of 0.30 would mean that some events would no longer be represented ("*Getting Credit*", "*Protecting Investors*" and "*Closing a Business*").

Table 4 : Correspondence between the EDBI model and the factor model

Conceptual Model			Factor Model									
IND	DES(SI)	SI	1	2	3	4	5	6	7	8	9	10
SB	**Procedures (number)**	1						0.62				
	Time (days)	2						0.43		0.63		
	Cost (% of income per capita)	3			0.33	0.49			0.31	0.35		
	Min. capital (% of income per capita)	4			0.69							
DCP	**Procedures (number)**	5	0.33				0.64					
	Time (days)	6	0.34							0.62		
	Cost (% of income per capita)	7										0.70
EW	**Difficulty of Hiring Index**	8		0.78								
	Rigidity of Hours Index	9		0.72								
	Difficulty of Firing Index	10		0.60								
	Rigidity of Employment Index	11		0.95								
	Firing costs (weeks of wages)	12									0.69	
RP	**Procedures (number)**	13										0.50
	Time (days)	14								0.59		
	Cost (% of property value)	15			0.61							
GC	**Legal Rights Index**	16			-0.54							
	Credit Information Index	17	-0.34		-0.48		0.41					-0.32
	Public registry coverage (% adults)	18					0.48					
	Private bureau coverage (% adults)	19	-0.47		-0.47							-0.33
PI	**Disclosure Index**	20						-0.70				
	Director Liability Index	21			-0.36		-0.47					
	Shareholder Suits Index	22			-0.67							
	Investor Protection Index	23			-0.51			-0.58			0.32	
PT	**Payments (number)**	24	0.44									
	Time (hours)	25					0.49					
	Profit tax (%)	26							0.73			
	Labor tax and contributions (%)	27		0.40			0.60				-0.30	
	Other taxes (%)	28				0.90						
	Total tax rate (% profit)	29				0.90						
TAB	**Documents for export (number)**	30	0.77									
	Time for export (days)	31	0.88									
	Cost to export (US$ per container)	32							0.74			
	Documents for import (number)	33	0.81									
	Time for import (days)	34	0.88									
	Cost to import (US$ per container)	35	0.30						0.66			
EC	**Procedures (number)**	36	0.41		0.46							
	Time (days)	37						0.53			0.34	
	Cost (% of debt)	38				0.50					0.31	
CB	**Time (years)**	39	0.49									
	Cost (% of estate)	40							0.42			0.45
	Recovery rate (cents on the dollar)	41	-0.65									

The most-penalized indicator is "*Protecting Investors*" because it looses 92% of the explanatory value of its sub-indicators and it relies only on the sub-indicator "*Investor Protection Index*" as a descriptive

variable of the variance of the phenomenon. The indicators whose variance is more adequately explained are "*Employing Workers*" and "*Trading Across Borders*" where there is a loss of only 39%. In both cases only one of its sub-indicators is disqualified.

The correspondence level between both models confirms the shortcomings of the EDBI index structure. It implies a low level of robustness for the indicators in EDBI´s model and its use results in a substantial loss of explanatory power by the sub-indicators. Furthermore, it reveals the need to implement changes in the composition of the indicators (alternative aggregation of sub-indicators to minimise the loss of information) and to reverse some sub-indicator values (when there is a negative correlation).

Consistency test between indicators and its sub-indicators

A consistency test between indicators and its sub-indicators was also carried out so that the above conclusions could be confirmed. The value obtained for *Cronbach's* global coefficient α_C was 0.638. Since the individual values of the coefficient alpha (computed after the removal of each sub-indicator) are also below the limit of 0.7, the results confirm the low reliability of the EDBI. Table 5 presents the results and shows the exclusion of some sub-indicators (7, 16, and 17) leading to improvements in the index, but with low consistency gains.

Table 5: Results of *Cronbach's* alpha for the sub-indicators EDBI

SI	VEIRS	ICCT	AC	SI	VEIRS	ICCT	AC	SI	VEIRS	ICCT	AC
1	100.262	0.365	0.616	15	101.015	0.327	0.620	29	98.971	0.433	0.611
2	104.662	0.143	0.634	16	116.146	-0.397	0.672	30	98.463	0.459	0.609
3	97.662	0.502	0.606	17	113.145	-0.262	0.663	31	97.874	0.491	0.606
4	105.710	0.091	0.638	18	107.392	0.009	0.644	32	102.348	0.259	0.625
5	103.852	0.183	0.631	19	114.213	-0.310	0.666	33	97.244	0.524	0.604
6	100.731	0.341	0.618	20	111.572	-0.189	0.658	34	97.194	0.527	0.604
7	106.392	0.058	0.640	21	114.850	-0.339	0.668	35	100.254	0.366	0.616
8	100.216	0.368	0.616	22	111.954	-0.207	0.659	36	102.899	0.231	0.627
9	102.870	0.232	0.627	23	114.626	-0.329	0.668	37	104.885	0.132	0.634
10	100.834	0.336	0.619	24	101.844	0.284	0.623	38	100.125	0.373	0.616
11	98.288	0.469	0.608	25	101.408	0.307	0.621	39	99.935	0.382	0.615
12	104.026	0.174	0.631	26	102.725	0.240	0.626	40	101.406	0.307	0.621
13	102.842	0.234	0.627	27	108.155	-0.028	0.646	41	121.088	-0.614	0.687
14	103.791	0.186	0.630	28	101.804	0.286	0.623				

Legend: SI, sub indicators; VEIRS, Variance of scale after a indicator removal; ICCT, indicator correlation with scale; AC, Alfa of Cronbach.

Table 5 also presents the Pearson correlation coefficient between each sub-indicator and the global indicator without its contribution (ICCT). This information is relevant when we want to implement a strategy to reduce the number of dimensions, because it evaluates if the contribution of each sub-indicator is sufficiently effective to justify its use. The criteria to validate sub-indicators follow McHorney, Ware, Lu & Sherbourne (1994), where it is stated that the relationship between each sub-indicator and the aggregate

indicator should be greater than 0.4. Table 5 shows that, in the case of EDBI, there are sub-indicators that do not meet this requirement. Thus, in some situations the consistency measure of some sub-indicators results in a low contribution to the explanation of the variance (of the aggregate index).

The *Cronbach* approach for the sub-indicators is complemented with the consistency analysis of each of the indicators (areas) defined in EDBI's model. The aim is to validate the factor analysis results and to verify how the partial indicator or the global index represents each sub-indicator. Table 6 shows the results. Assuming a default value of 0.5 (higher than the one suggested by Nunnaly, 1978), it appears that only 40% of the indicators in the index are considered effective in representing the phenomenon described by the EDBI.

Regarding the homogeneity of the representation of the same scale (the global index or the indicators), it can be seen that 90% of the indicators contain one or two sub-indicators that seem to represent a different scale or indicator. That is, when these indicators are excluded, there is an increase in the value of coefficient alpha. The only indicator where all sub-indicators are considered on the same scale is *Registering Property* (*RP*). However, this indicator presents a poor coefficient alpha (0.391) in what concerns its overall consistency.

The *Cronbach's* analysis follows the previous conclusions by exposing some inconsistencies in the choice of sub-indicators made in the EDBI. This inconsistency is reflected in the higher heterogeneity of the scales and the lower reliability of the representation given by the indicators of the Ease of Doing Business.

5. CONCLUSIONS

The EDBI is a widespread index, used by a large number of economic agents. In that sense, it should be a tool as confinable as possible. Our study aimed to verify the validity and consistency of the indicator set presented in the EDBI as a representation of its underlying observable variables. Previous studies had found that the rankings based on the EDBI hide the weak discriminating powers of the indicators to distinguish the economies (Hoyland et al., 2008). We have followed the approach of Nardo et al. (2005) in concurrently analysing the adequate number of indicators and the appropriateness of the index structure to the business environment phenomenon.

The results suggest the existence of problems in the structure of the EDBI, particularly in its consistency. A robust index should be composed of indicators that capture the variance associated with the set of variables of origin. The EDBI, by reducing the number of indicators from 14 to 10, does not ensure the transfer of this variance for a more aggregate level without significantly reducing its explanatory power.

In addition, there is evidence of different levels of consistency among the indicators, with 90% of them depending on just 1 or 2 sub-indicators while other sub-indicators are not needed to explain the phenomena they are supposed to represent. This is especially the case of *"Protecting Investors"* and *"Closing a Business"*. The indicators which have proved more consistent are "*Employing Workers"* and *"Trading Across Barriers"*.

Table 6: Analysis of the indicator consistency

I	VE	α_C	SINor	VEIRS	ICCT	CAIR
SB	6.128	0.463	Z(1)	3.722	0.364	0.291
			Z(2)	3.973	0.290	0.367
			Z(3)	3.679	0.378	0.277
			Z(4)	4.882	0.056	0.578
DCP	3.926	0.354	Z(5)	2.199	0.245	0.181
			Z(6)	2.213	0.239	0.193
			Z(7)	2.513	0.130	0.408
EW	12.294	0.742	Z(8)	8.045	0.573	0.670
			Z(9)	8.564	0.466	0.711
			Z(10)	8.408	0.498	0.699
			Z(11)	6.570	0.922	0.522
			Z(12)	10.295	0.156	0.815
RP	4.057	0.391	Z(13)	2.374	0.222	0.315
			Z(14)	2.350	0.231	0.298
			Z(15)	2.333	0.237	0.285
GC	6.098	0.459	Z(16)	4.567	0.124	0.515
			Z(17)	3.095	0.569	0.046
			Z(18)	5.042	0.012	0.607
			Z(19)	3.491	0.430	0.211
PI	8.522	0.707	Z(20)	6.018	0.306	0.752
			Z(21)	5.477	0.437	0.678
			Z(22)	5.862	0.343	0.732
			Z(23)	3.686	0.999	0.279
PT	11.253	0.560	Z(24)	8.495	0.302	0.514
			Z(25)	8.109	0.376	0.479
			Z(26)	10.036	0.034	0.627
			Z(27)	9.653	0.097	0.603
			Z(28)	8.098	0.379	0.478
			Z(29)	6.621	0.706	0.306
TAB	20.581	0.850	Z(30)	15.056	0.583	0.835
			Z(31)	13.665	0.800	0.793
			Z(32)	16.093	0.435	0.862
			Z(33)	14.061	0.736	0.806
			Z(34)	13.653	0.802	0.792
			Z(35)	15.795	0.476	0.854
EC	4.003	0.376	Z(36)	2.278	0.240	0.244
			Z(37)	2.253	0.250	0.225
			Z(38)	2.472	0.169	0.382
CB	.912	-3.432	Z(39)	0.962	-0.535	-2,159
			Z(40)	0.588	-0.440	-4,803
			Z(41)	2.363	-0.797	0.307

Legend: SI, sub indicators; VEIRS, Variance of scale after a indicator removal; ICCT, indicator correlation with scale; AC, Alfa of Cronbach.

At an aggregate level, the EDBI reveals a limited descriptive power of the phenomenon *Doing Business*. The consistency measure is below the appropriated values considered by the literature and it is clear that the representation of some underlying variables (sub-indicators) exceeds the scales (indicators) considered by the EDBI.

The consequences of the presented results are twofold. First, the ineffective contribution of some sub-indicators justifies its replacement in a reformulation of the EDBI. Second, investors, researchers and policy-makers should be very careful when using the EDBI as a source of information for their economic decisions.

NOTES

[i] The index is published within the Doing Business *ranking* (DB), a report by the World Bank on the conditions faced by firms to engage in business activity around the world. The DB report uses 41 variables aggregated in 10 different areas.

[ii] http://www.doingbusiness.org/features/Research-Academic-Citations.aspx

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7. ANNEXES

Annexe 1. EDBI's Structure: List of Indicators and Sub-Indicators

#I	Indicator	#SI	Sub-Indicator
SB	Starting a Business	1	Procedures (number)
		2	Time (days)
		3	Cost (% of income per capita)
		4	Min. capital (% of income per capita)
DCP	Dealing with Construction Permits	5	Procedures (number)
		6	Time (days)
		7	Cost (% of income per capita)
EW	Employing Workers	8	Difficulty of Hiring Index
		9	Rigidity of Hours Index
		10	Difficulty of Firing Index
		11	Rigidity of Employment Index
		12	Firing costs (weeks of wages)
RP	Registering Property	13	Procedures (number)
		14	Time (days)
		15	Cost (% of property value)
GC	Getting Credit	16	Legal Rights Index
		17	Credit Information Index
		18	Public registry coverage (% adults)
		19	Private bureau coverage (% adults)
PI	Protecting Investors	20	Disclosure Index
		21	Director Liability Index
		22	Shareholder Suits Index
		23	Investor Protection Index
PT	Paying Taxes	24	Payments (number)
		25	Time (hours)
		26	Profit tax (%)
		27	Labor tax and contributions (%)
		28	Other taxes (%)
		29	Total tax rate (% profit)
TAB	Trading Across Borders	30	Documents for export (number)
		31	Time for export (days)
		32	Cost to export (US$ per container)
		33	Documents for import (number)
		34	Time for import (days)
		35	Cost to import (US$ per container)
EC	Enforcing Contracts	36	Procedures (number)
		37	Time (days)
		38	Cost (% of debt)
CB	Closing a Business	39	Time (years)
		40	Cost (% of estate)
		41	Recovery rate (cents on the dollar)

Legend: #I: Indicator Id.; #SI: Sub-Indicator Id.

Annexe 2. Loss of Explanatory Power

Indicator	Sub-Indicator	SigL
Starting a Business	Procedures (number)	x
	Time (days)	x
	Cost (% of income per capita)	
	Min. capital (% of income per capita)	
	%Var	0,75
Dealing with Construction Permits	Procedures (number)	x
	Time (days)	x
	Cost (% of income per capita)	
	%Var	0,77
Employing Workers	Difficulty of Hiring Index	
	Rigidity of Hours Index	
	Difficulty of Firing Index	
	Rigidity of Employment Index	
	Firing costs (weeks of wages)	x
	%Var	0,39
Registering Property	Procedures (number)	x
	Time (days)	
	Cost (% of property value)	x
	%Var	0,80
Getting Credit	Legal Rights Index	x
	Credit Information Index	
	Public registry coverage (% adults)	
	Private bureau coverage (% adults)	x
	%Var	0,78
Protecting Investors	Disclosure Index	
	Director Liability Index	
	Shareholder Suits Index	
	Investor Protection Index	x
	%Var	0,92
Paying Taxes	Payments (number)	x
	Time (hours)	x
	Profit tax (%)	x
	Labor tax and contributions (%)	x
	Other taxes (%)	
	Total tax rate (% profit)	
	%Var	0,70
Trading Across Borders	Documents for export (number)	
	Time for export (days)	
	Cost to export (US$ per container)	x
	Documents for import (number)	x
	Time for import (days)	
	Cost to import (US$ per container)	
	%Var	0,39
Enforcing Contracts	Procedures (number)	
	Time (days)	
	Cost (% of debt)	
	%Var	
Closing a Business	Time (years)	x
	Cost (% of estate)	
	Recovery rate (cents on the dollar)	x
	%Var	0,86

Legend: SigL - Loss of Significance