E-GOVERNMENT IMPACT ON THE DOING BUSINESS RANKINGS AND NEW BUSINESS OWNERSHIP RATE: AN ANALYSIS OF THE DYNAMICS BASED ON COUNTRIES'S INCOME FROM 2008 TO 2014

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ABSTRACT

The level of e-government readiness or development is widely unequal between countries. One of the main variables that explain this difference is the income level of the country. This paper aims to measure the impact of change of e-government index (and its composing sub-indexes) in the ease of doing business and the rate creation of new business in different groups of countries, categorized into high, middle and low income countries. The study used a panel data design, with four points (years 2008, 2010, 2012 and 2014), in three change periods (2008/2010, 2010/2012 and 2012/2014), collecting data from various databases: Doing Business Report by World Bank, United Nations E-Government Survey, Corruption Perception Index by Transparence International and World Bank Entrepreneurship Survey. The data was joined and analyzed with non-parametric correlation and stepwise regression. The models had good predictive power for upper and middle income countries, but not for low income, indicating that different models should be applied to understand e-government relationship with outcome variables, according to the income level and e-government development level. Suggestions for future research are also presented.

KEYWORDS

Electronic Government; Entrepreneurship; Corruption; income level

1. INTRODUCTION

Many authors point out that research on e-government is growing, but not mature. Although the volume of publications is growing, the first relevant articles only appeared in the 90's, and did not receive much importance until the early 2000's (Almeida et. al, 2014). However, with the consolidation of the Internet and its widespread use to conduct business, and to provide contact between government and the taxpayers and citizens, the e-government became a very important topic, both in theory and in government policy (Morgesson & Mithas, 2009; West, 2000).

As it is common in all new areas of research and new phenomena, there are currently various definitions of what would be the electronic government. West (2000) defines e-government as "the use by the public sector of the Internet and other digital devices to deliver services, information and democracy itself." As stated by Lao and colleagues, (2008) e-Government is the process of connecting citizens to the government so that they can have access to information and services offered by government agencies. Howard (2001) defines e-government as the application of tools and e-commerce techniques to create the interface with the public, focusing on cost reduction, increased efficiency and economies of scale.

Although e-Government has diverse formal definitions, all definitions clearly acknowledge that e-government encompasses more than the use of information technology (IT) in the government. Much before the "invention" of Internet in the late 1980s, various governments were already using IT systems (Norris and Kraemer 1996; Brown 1999). Nevertheless, the consolidation of the World Wide Web, and its associated technologies and tools, made possible for the government to connect with its citizens in a new manner. More recent e-Government technologies are also able to provide a more through contact between business and the government (Moon, 2002).

However, there are numerous ways to classify the electronic government activities. To Graafland-Essers and Ettedgui (2003 apud Carrizales, 2008) the prospect of e-government is divided into three different operating levels: government to citizen (GTC), government to business (GTB), and government to government (GTG). In turn, Pascual (2003 apud Carrizales, 2008) describes four main forms of action for the e-Government: citizens, businesses, government officials and government agencies. This nomenclature is also still described as Government-Citizen (G2C), Government to Business (G2B), Government-to-Employee (G2E) and Government-to-Government (G2G).

According to Carrizales (2008) the implementation of strategies of e-government solutions can have goals or different focuses: (1) E-Organization: efficiency of internal governance and effectiveness; (2) E-Services: external efficiency and effectiveness in service delivery; (3) E-Partnering: efficiency and external effectiveness in working with public and private organizations; and (4) e-democracy: citizen participation in government decision-making. The concept of e-Democracy has a prominent place in the literature on e-government, as the concept indicates the use of technology to increase participation in government, including citizen participation in the formulation of laws and prioritization of public policies (Carrizales, 2008).

Today electronic government is configured as the primary means of communication and interaction between citizens, businesses, society and government, being an important governance implementation tool, receiving large investments from public funds, which have

been employed without a clear idea the real benefit of these initiatives in terms of results and externalities of these programs (Dunleavy, Margetts, Bastow and Tinkle, 2007).

According to Harrison & Sayago (2013) in democratic regimes citizens delegate the authority for decision making, and in this context the transparency and accountability are essential conditions to check and ensure public consent about what is running. Within the context of information, transparency and accountability, public participation is central to the perception of fairness in decision making and government legitimacy. For this reason, recently, governments around the world have taken steps to become more transparent, flexible and participatory. Therefore, intensification of efforts is critical to measure and evaluate how countries provide government information to their citizens, promote public participation, receive and investigate complaints of citizens. (World Justice Project, 2015).

Therefore, implementation of e-government presence has been widely defended in most of the world, since it allows transparency in government acts and spending, and also may reduce total costs, and even provides more services, that are available outside the brick and mortar official government buildings (Brunetti & Weder, 2003). In addition, the sharing of governmental information could potentially improve the perception of corruption, contributing also to a more interesting atmosphere to conduct business. This was the objective of the original work of Andersen (2009) using a panel of 149 countries with two data points when he used secondary data to compare the e-Government improvement and the result on control of corruption.

Nevertheless, although widely assumed a positive effort, the extent of success in the implementations of e-government have always been very different in the globe. Therefore, the e-readiness concept was created to provide a unified framework to evaluate the breadth and depth of the digital divide between more and less developed or developing countries during the late 1990s (Hanafizadeh et al, 2009). Nevertheless, with the initial intent of providing a single framework, in the following years a great number of e-readiness measures have been developed (Grigorovici et al., 2003).

Hanafizadeh et al. (2009) state that the first efforts to define the e-readiness were carried out in 1998 by the Policy Project of Computer Systems (CSPP), to define the degree to which the community is prepared to participate in a networked world (CSPP, 1998). However, even with the initial intention of providing a single frame in the following years a large number of e-readiness measures have been developed (Grigorovici et al., 2003). The measures used very different definitions of e-readiness and different methods of measurement and evaluations with large differences in their objectives, methods and results (Bridges.org, 2005). Hanafizadeh et al (2009) proposed a measurement model of e-readiness, based on the convergence of several indicators of e-readiness: comprise the following dimensions: infrastructure and access, access to and use of ICT by households and individuals, -business, e-education, e-government presence, all composed by a set of indicators.

Since the level of e-government use and sophistication of the solutions is widely uneven throughout the world, and as an initiative to measure the progress of adoption of e-government solutions in different countries the United Nations have created an index known as E- Government Readiness Index. This was the official term several editions of the United Nations' e-government report (2003, 2004, 2005, 2008). Since 2009, the term employed is E-Government Development Index.

This index consists of three indexes: Human Capital Index, Telecomm Infrastructure Index and Online Service Index (UN, 2014).

The current version of the Human Capital Index (as of 2014) is a compound index, consisting of the adult literacy rate, the gross enrollment ratio, expected years of schooling and mean years of schooling. The HCI index is a weighted average composite of the four indicators (UN, 2014).

The Telecommunication Infrastructure Index is a composite index of five primary indices pertaining to the country infrastructure capacity, so that they relate to the delivery and services - government. The composite value is an arithmetic mean of Z scores of the variables related to the number of Internet users, telephone lines, mobile subscriptions, wireless broadband subscription and fixed broadband.

The online services index (OSI) is a composite indicator measuring the use of ICT by governments to deliver public services at national level, while assessing the technical features of national websites as well as e-government policies and strategies applied in general and by specific sectors for delivery of services.

While the basic model has remained consistent since the first edition of the Survey, the components of the OSI have evolved to have an increased emphasis on e-participation features and evidence of open data initiatives on national websites given evolving expectations about transparency and participation in public affairs (UN, 2014).

The inclusion of the e-participation component expands the research to emphasize the quality related to online presence. The questions focus on the use of the internet to facilitate government information sharing for citizens (UN, 2014). Thus, the e-participation index of a country reflects two important things: first the usefulness of the features and capabilities of e-government in a given country, and secondly, how this solution compares with other countries. The framework of e-participation is split into three main components:

• **E-information**: Allow participation by providing public information and access to information is demand or voluntarily (proactive)

• **E-consultation**: Promoting the contribution and deliberation of citizens in public policies and services

• **E-decision making**: Empowering citizens through co-design of policies and co-production of services.

Most developed nations have made greater progress in this area, especially most developed Europe, US, and South Korea and Japan, letting most of the world in a more modest state of adoption of more sophisticated e-Government (Alomari, Woods & Sandhu, 2012; Khalil, 2011). According to Dunleavy, Margetts, Bastow and Tinkle (2007) governments around the world spend billions of dollars on IT, often reaching around 1.5% of GDP annually. For example, the UK invested 14 billion pounds a year on IT operations in the public sector only in 2007. The level of e-government varies around the world, as it requires substantial investments to improve infrastructure and supply services for citizens (Ebrahim, & Irani, 2005).

A study conducted by Zhao (2011) found high correlations between GDP per capita and level of development of e-government (r = 0.69) and the telecommunications infrastructure index (r = 0.81), indicating that the level of economic development of a parents is one of the biggest factors in the development of e-government and telecommunications infrastructure.

Similarly, the study of Khalil (2011) found that GDP explains 53% of variance in the e-readiness of e-government. Importantly, the e-government was initially developed in most developed countries, leaving the other countries in a more modest status in terms of e-government solutions, and this gap between countries continues.

Because of the relationship between income and GDP and the level of e-government development, the success and quality of implementation of e-Government varies across the globe, given the substantial investment needed to enhance the infrastructure, and to provide online services to citizens (Ebrahim & Irani, 2005). Figure 1 presents the distribution of EDI throughout the world:

2014 E-Government Development Index

0   1
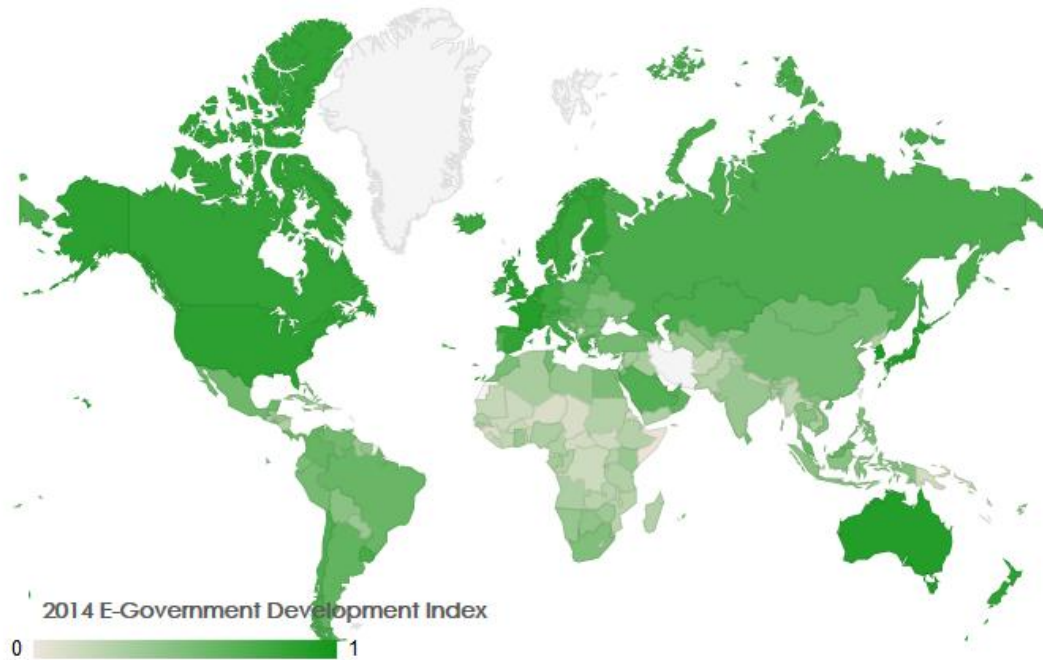
Source: E-government Development Index – U.N Data Center Tool - Chart

Figure 1. E-Government Development Index 2014 data – All 193 countries

The difference between the countries capacity of investment is usually explained by the income of the country.

Higher income countries tend to invest more in e-government and also to be easier to do business than countries on low income. In addition, corruption tends to be higher on poorer countries. Therefore, the present article hopes to shed some light on the relationship between e-government and some variables, in different contexts, specially related to the income of the country. We have used the U.N classification of countries in high income, upper middle income, lower middle and low-income groups to test the difference between relationships between groups, and test for differences on the impact of e–government improvement in each group of countries.

This article is divided in four parts. This part has presented a brief literature review about e-government and the inequality between countries in the level of development, the second part explains the methods, and databases employed, while the third present the analysis of the data and the main discussion. The conclusions are presented in the fourth and last part.

2. METHOD

We employed a panel data design in this study. Panel data means that a variable is measured more than once for the same subject, in different time periods. Hsiao (2003) indicates that panel data have been increasing popular due to a greater availability of data in this format, which is more able to answer substantial questions than a single set of indicators measured in a single point time, usually found in cross sectional data. Although the use of panel data does not support the implication of causality, it certainly gives a stronger support in making assumptions about causality and directions of observed effects in many research areas.

The study can be classified as a non-experimental, since it uses survey data. The data used in this study is secondary, that is, other researchers or organizations collected it. All data and databases selected in this study are widely employed in many researches and were collected and compiled by internationally recognized institutions, such as World Bank, United Nations and others, which contribute to the validity and reliability of the data.

In addition, the study can be classified as a correlational study, since it is conducted to determine the relationship between variables (MARCZYK et al, 2005) The statistical analysis were performed with the software: SPSS 20.0 (IBM), employed to compute non-parametric correlations, data input, analysis and treatment.

Data was obtained for four nonconsecutive years (2008, 2010, 2012 and 2014). The databases used were Doing Business Report in the years 2008, 2010, 2012 and 2014, compiled by the World Bank (World Bank, 2014), UN e-government survey 2008, 2010, 2012 and 2014 (UN, 2014) and GEM 2008, 2010, 2012 and 2013(2014 report was not available by the date of collection). All data were imported and treated in Microsoft Excel 2010.

The Doing Business Report provides a quantitative measure of regulations for starting a business, dealing with construction permits, employing workers, registering   property, getting credit, protecting investors, paying taxes, trading across borders, enforcing contracts and closing a business—as they apply to domestic small and medium-size enterprises (World Bank, 2009). The indicators are usually composed by a combination between number of procedures, time needed to perform some business crucial tasks like registering a business, closing it, exporting and importing, income tax rate, access to credit, labor costs and many other indicators. Most of those indicators, in theory, could benefit from a well-developed e-govern strategy mainly in reducing time required, and the overall cost (Gil-Garcia & Pardo, 2005).

Also from World Bank, another database used in the analysis, the World Bank Group Entrepreneurship Survey measures entrepreneurial activity in over 100 developing and industrial countries over the period 2000-2014. The database includes cross-country, time-series data on the number of total and newly registered businesses, collected directly from Registrar of Companies around the world.

Finally, the last report utilized was the Corruption Perception Index (CPI), published since 1995 by Transparency International, ordering the countries of the world according to "the degree to which corruption is perceived to exist among public officials and politicians". The Corruption Perceptions Index (CPI) measures the perceived level of public-sector corruption in 180 countries and territories around the world (Transparency International, 2010).

It is very important to note that this article starts from a different perspective as adopted by previous works by Almeida, Zouain & Mahecha (2013). While in this article the relative position of the country in the e-government rankings was compared to the entrepreneurial rate, the ease of doing business and other indicators, this article follows a different approach, trying

to quantify the change (improvement/decline) of the indicators, and positions of the countries on the ranking, to predict the improvement on the dependent variables.

That is, does the improvement on the level of e-government also improves the ranking on the doing business dimensions, or any of the other dependent variables as corruption perception, or the creation of new business? Even though the concepts are related, they are different, since the first example does look at the relative position, while the second examines if a change (improvement) does also improve other indicators, suggesting a causation effect.

3. ANALYSIS

After the consolidation, test for errors, and visual inspection, we tested the distribution of the data by means of the Kolmogorov-Smirnov one-sample test. The null hypothesis of this test states that the distribution is normal, and p-values higher than 0.05 indicate that the data has an approximately normal distribution, and therefore suited to undergo tests and procedures that require the normality to provide adequate results (HAIR et al, 2010).

The results indicate that the majority of the variables tested do not have a normal distribution. The descriptive statistics for all time intervals, 2008/2010, 2010/2012 and 2012/2014 divided by country groups are presented in the table 1:

Table 1. Descriptive Statistics of change statistics of the main variables of the study

	Income Group		
	Low and Lower middle income	Upper middle income	Higher Income
	Mean	Mean	Mean
Ease of Doing Business Rank	140,73	85,80	30,76
E gov ranking	131,86	85,55	40,91
Egov Index	,30	,48	,70
Human Capital Index	,57	,79	,90
E Participation Index	,14	,24	,49
Online service index	,23	,38	,63
InfraStructure Index	,10	,27	,58
Corruption Perception Index	2,84	3,63	6,65
Total early-stage Entrepreneurial Activity (TEA)	19,89	14,36	7,69
Established Business Ownership Rate	13,63	8,09	6,40
New Business Ownership Rate	11,54	6,54	3,32

NOTE: All variables show difference on a p=0.005 – ANOVA
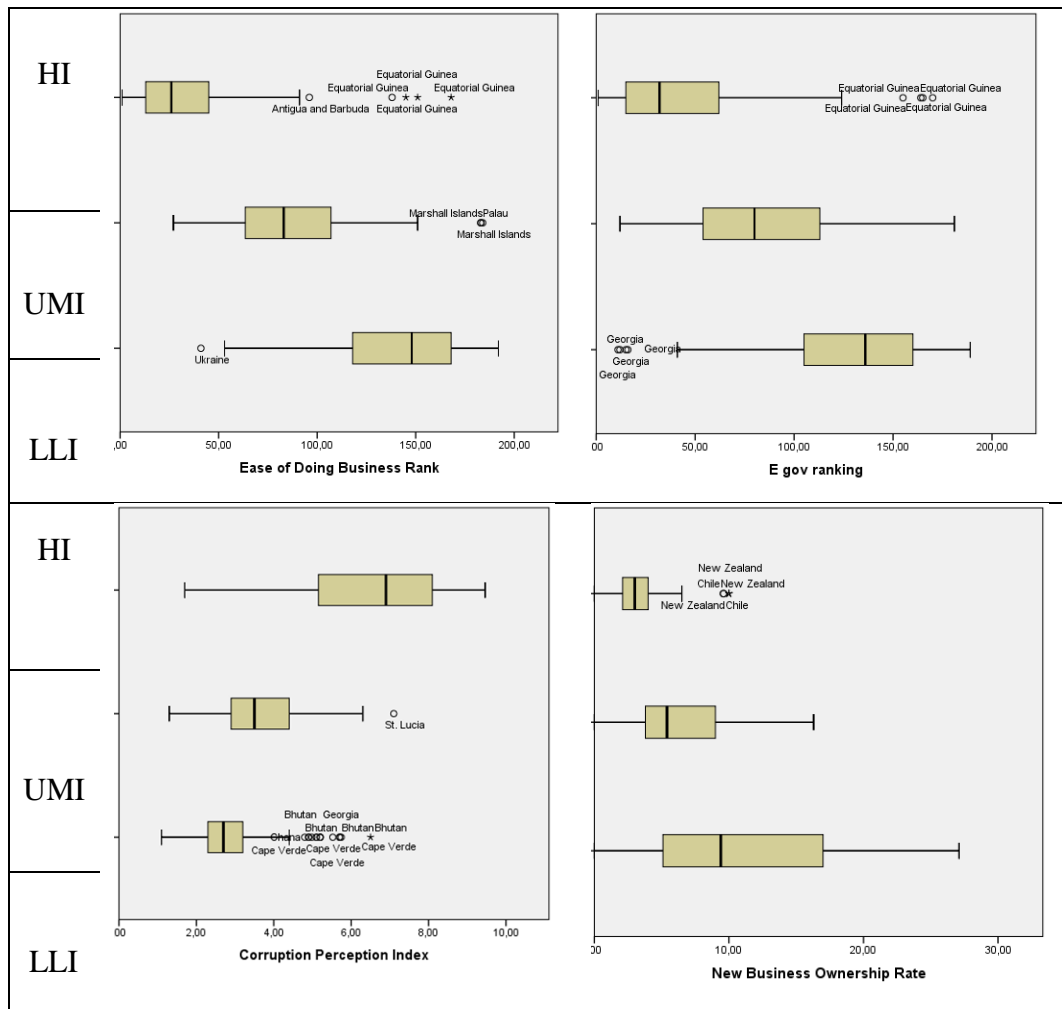**Source: Prepared by the authors**

The results presented in table 1 are useful for understanding the dynamics of e-government and Doing Business Dimensions and how the variables are different depending on the country

income level. Most variable are not favorable for lower income countries, with exception of new and stablished business ownership, and entrepreneurship rate. On the other side, the rankings of Doing Business is on average is 140 for poorer countries, while move developed countries have in average the 30th position on the rank. Human Capital, E-participation, online services, follow this trend showing an important gap on the implementation of e-government and its composing indexes between the three groups.

The figure 2 shows the distribution of the data for the rankings, divided by income level of the countries, and the main variables of interest are presented: Ease of doing business rank, e-government ranking, corruption perception index and new business ownership rate. The data aggregates all four years observed. It means that each country is plotted four times (if available in each of the graphs).

Legend: HI – High income, UMI – Upper Middle Income, LLI – Low and Lower Income
Source: Prepared by the authors

Figure 2. Distribution of data from the main variables of the study

Concerning the countries that have improved (or worsened) their ranking, the Table 2 contains the best and worst performers in e-government ranking in the period 2012 to 2014:

Table 2. Best and Worst Performers on E-Government Ranking 2008/2014

	10 Best Performers (Improvement in E-government ranking 2012 to 2014)							
	2008/2010		2010/2012		2012/2014		Average for the Period	
Country	Δ in E-Government Ranking	Δ in Easy of Doing Business Rank	Δ in E-Government Ranking	Δ in Easy of Doing Business Rank	Δ in E-Government Ranking	Δ in Easy of Doing Business Rank	Δ in E-Government Ranking	Δ in Easy of Doing Business Rank
Russian Federation	3	-1	-3	-32	-58	0	-19,3	-11,00
Ukraine	3	13	7	14	-56	19	-15,3	15,33
Kosovo	6		-2		-42		-12,7	
Philippines	4	12	-12	10	-41	7	-16,3	9,67
Greece	0	-3	-9	-4	-39	-3	-16,0	-3,33
Costa Rica	4	12	-4	6	-38	-23	-12,7	-1,67
Italy	2	11	7	-6	-31	-9	-7,3	-1,33
Jamaica	6	4	7	19	-30	1	-5,7	8,00
Poland	-2	12	-8	2	-30	-5	-13,3	3,00
Uzbekistan	0	-22	16	4	-25	9	-3,0	-3,00
	Mean Rank Displacement (negative values mean improvement)							
	2,6	4,2	-0,1	1,4	-39,0	-0,4	-12,2	1,7
	10 Worst Performers (Decline in E-government ranking 2012 to 2014)							
	2008/2010		2010/2012		2012/2014		Average for the Period	
Country	Δ in E-Government Ranking	Δ in Easy of Doing Business Rank	Δ in E-Government Ranking	Δ in Easy of Doing Business Rank	Δ in E-Government Ranking	Δ in Easy of Doing Business Rank	Δ in E-Government Ranking	Δ in Easy of Doing Business Rank
Grenada	1	7	-19	-24	53	3	11,7	-4,7
Bangladesh	-12	-8	15	16	51	-2	18,0	2,0
St. Lucia	17	8	-1	2	48		21,3	5,0
Syrian Arab Republic	1	14	-10	-6	41	8	10,7	5,3
Maldives	-2	-3	-6	3	37	-1	9,7	-0,3
Nigeria	12	14	-4	12	37	-21	15,0	1,7
Saudi Arabia	-2	-12	1	-17	37	-5	12,0	-11,3
Marshall Islands	10	1	-2	-38	33	-4	13,7	-13,7
Antigua and Barbuda	14	-41	-7	-6	32	11	13,0	-12,0
Dominica	5	-11	-23	-32	32	37	4,7	-2,0
	Mean Rank Displacement (negative values mean improvement)							
	4,4	-3,1	-5,6	-9,0	40,1	2,9	13,0	-3,0

Source: Prepared by the authors

For the 10 worst performing countries, they have lost on average 40 positions in the e-government ranking in the 2014/2012 period, and 13 positions on the 2014-2008 period, during the same time they have an average improvement of 3.0 positions.

Although the top 10 performers have reached in average 39 positions of improvement in 2014/2012 for e-Government Rank, in the same period the position in EoDB remained stable (improved on average only -0.4 positions). In all periods, the top performers improved on average 12 positions while the worst performers lost in average 13 positions per year.

Subsequently, the Spearman's correlation coefficient was employed to compute the relationship between the variables for all the countries in the database. Usually when the relationship between two variables is not normal bi-variate or when one is measured at a ordinal level the more widely used Pearson coefficient may not be the best estimative of the correlation of the variables (Miles & Shevlin, 2001). The table 3 contains the analysis:

Table 3. Spearman correlation between variables

Income Group			ΔEase of Doing Business Rank	ΔE gov ranking	Δ Corruption Perception Index	Δ New Business Ownership Rate
Low and Lower middle income	Spearman corr.	ΔEase of Doing Business Rank	1,000	-,103	-,096	-,103
		ΔE gov ranking		1,000	-,133	-,060
		Δ Corruption Perception Index			1,000	-,150
Upper middle income	Spearman corr.	Δ Ease of Doing Business Rank	1,000	-,008	-,093	-,054
		Δ E gov ranking		1,000	-,087	-,037
		Δ Corruption Perception Index			1,000	,069
Higher Income	Spearman corr.	Δ Ease of Doing Business Rank	1,000	,030	,112	,211[*]
		Δ E gov ranking		1,000	-,044	,011
		Δ Corruption Perception Index				,059

** sign. correlation at 0.01 level   * sign. correlation at 0.05 level.

Source: Prepared by the authors

The non-parametric correlation analysis indicate that there is no correlation between the improvement (or decline) of the position of doing business dimensions and the improvement (or decline) of e-government ranking or entrepreneurial outcomes for most countries. The change of e-government ranking did not correlate with any outcome variable, the same being with the perception index. The only statistically significant correlation was found between the change in the easy of doing business rank variable and the new business ownership rate, and only for higher income countries. In all other countries, the same effect was not found. The change in the perception of corruption did not seem to be related to any changes in the levels of e-government indexes, ranking position or doing business position either.

Given the correlations found, the next step was to regress the variables against two main dependent variables of the study, to assess how much of the dependent variable could be explained by the change in the independent variables. The first model, to explain the new business change, could not retain any predictor, explaining less than 5% of the variance of the new business, with the e-government index, and its sub-indexes and the corruption perception for all the three groups (high income, upper middle, lower middle and low income).

The second model, tried to explain the variation in the EoDB ranking, using the e-government sub-indexes. We used a stepwise procedure, where the predictors are included one at a time, until they cannot be added anymore, using a criteria of F. We used the defaults 0.05 to enter and 0.10 to remove for the stepwise procedure, as implemented in SPSS. Four models were generated and are displayed in the table 4:

Table 4. Explicative Models for Doing Business Ranking

Income Group		R	R^2	R^2 Adjusted	Std. Estimate Error
Low and Lower middle income	1	,182[a]	,033	,029	27,74752
	2	,251[b]	,063	,054	27,38615
	3	,284[c]	,081	,067	27,18788
Upper middle income	1	,437[d]	,191	,185	15,08754
	2	,665[e]	,443	,435	12,56408
	3	,730[f]	,532	,522	11,55499
	4	,776[g]	,603	,591	10,69116
Higher Income	1	,540[a]	,292	,287	8,98298
	2	,608[h]	,370	,360	8,50580

a. Predictors: (Constant), Online service index
b. Predictors: (Constant), Online service index, Human Capital Index
c. Predictors: (Constant), Online service index, Human Capital Index, InfraStructure Index
d. Predictors: (Constant), Human Capital Index
e. Predictors: (Constant), Human Capital Index, Online service index
f. Predictors: (Constant), Human Capital Index, Online service index, E Participation Index
g. Predictors: (Constant), Human Cap Ind, Online Serv ind, E Participation Ind, InfraStructure Ind
h. Predictors: (Constant), Online service index, InfraStructure Index

The results of the regression analysis provide some empirical support to indicate that this model may be adequate and in fact account for a good explanation of the impact of the improvement of e-government on the doing business dimensions for upper and higher income countries, but not for low and lower middle income. For the latter the model 3 could explain only 6.7 % of variation in doing business ranking, using the change in the e-government indexes. For this mode, online service, human capital and infrastructure indexes were correlated, and had a negative signal, meaning that an improvement on any index would render a lower position on ranking (better). For upper middle countries, the improvement on model is evident. The model 4 explains about 52.2 % of variation in CHANGE of Doing Business Ranking, in addition in this model the e-participation index also is a significative predictor. In this model, all predictors are negative, with human capital being the strongest. For upper income countries, the model explanation was lower than previous, but still managed to explain 36% of the variation in doing business ranking, in the considered years.

4. CONCLUSIONS

The data and analysis indicate that the improvement in e-Government and its composing indexes have enough predictive power to explain the change of positions of a given country in Doing Business Ranking, but not for all income levels. The Online services and Human Capital improvements were the variables that had the most impact in the Doing Business Ranking. The change in perception of corruption between all periods considered (2008 to 2014) was not statistically associated with change in any other variable.

No relationship was found between the change in the position of Doing Business Ranking and a correspondent change in e-government ranking or entrepreneurial outcomes for most countries. The regression models provided limited empirical support to explanation of the impact of the improvement of e-government on the doing business dimensions for upper and higher income countries, but not for low and lower middle income.

This study extends previous research by using the concept of change between periods (gap years) instead of raw data and actual rank position to calculate relationship between variables. In addition, the division of countries based on their income level seemed fruitful, and more research should be done to understand why e-government improve more doing business dimensions in upper middle countries. For future research we recommend that more databases be analyzed, we also suggest more multi-country research conducted to measure directly the impacts of e-Government on a series of indicators, and challenges to the implementation and the citizens' perception of e-Government. Also, move advanced statistical techniques could be employed to deal with the current limitation of linear regression.

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