The Contribution of Open Government to Prosperity of Society

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ABSTRACT

The study finds that open government does not only have effect on economic prosperity, but on social capital and environment through the mechanisms of Rule of Law and Control of Corruption. The role of Rule of Law and Control of Corruption are emphasized in this study, because of their significance in mediating open government and prosperity. Unless mechanisms like regulation formulation, law enforcement and control of corruption are not put into practice; open government itself will not be a driving force to a prosperous society.

Introduction

Open government is a subject that is intensely interesting to society and academics. Open government makes data transparent and channels the flow of value and expertise from and to government and its citizens. Unlike companies which make goods, government produces public goods, such as education and health infrastructure (Noveck, 2012). Researchers have begun empirical studies on the effect of open government on society, such as economic welfare and governance. Yet no statistical study exists to prove the relationship between open government and social wellbeing, such as social capital or environment. Recent additions to open government, such as the Access to Information Law in China and India (Relly & Sabharwal, 2009); the launch of the Open Government Partnership in 2011 under the Obama administration; and the creation of the Latin-American network (*Red Latinoamerica por la Transparencia Legislativa*) in 2012, encourage government to promote transparency by engaging with citizens to fight against corruption and to strengthen governance. One of the most important commitments of the Open Government Partnership is to “have robust anti-corruption policies, mechanisms and practices, ensuring transparency in the management of public finances and government purchasing and strengthening the rule of law” (McDevitt & Marin, 2016, pp. 1). As an instance of regional movement toward open government and transparency, the Latin-American network

works as a legislative mechanism that links government and civil society organizations to promote transparency, access to information, and thus provide accountability. The initiatives foster transparency of information to the public which gains their interest and participation and straightens social and political issues, such as detecting corruption or strengthening regulation formulation.

According to worldwide initiatives, open government should serve to improve the wellbeing of the public via regulation mechanisms and communication platforms. Against the limitations of previous studies, mentioned in section 2, this study used the prosperity index from the Legatum Prosperity Institution to discover two main points: first, to investigate whether open government has a positive and direct effect on social welfare, in particular social capital and environment; and, second, whether mechanisms such as Rule of Law and Control of Corruption play a vital role in bridging the two variables.

Open government

Although there is no single definition of open government, several researchers relate the term to information access and civic participation. Meijer, Curtin, and Hillebrandt (2012, pp. 13) define openness of government as “the extent to which citizens can monitor and influence government processes through access to government information and access to decision-making arenas”. Heckmann (2011 pp. 1) states that “Open Government

is about improving transparency, and thereby accountability, in all public affairs". As such, it can improve the opportunities of citizens to influence political decisions. Information is the key ingredient for civic participation and information dissemination is how a government or other political institution accurately informs its citizens about its actions and processes (Bellver & Kaufmann, 2005; Calland & Bentley, 2013; Kolstad & Wiig, 2009; Kopits & Craig, 1998; Lindstedt & Naurin, 2010; Relly & Sabharwal, 2009). The active engagement of citizens can bring public trust, decrease disillusionment with politics (Heckmann, 2011), and improve the implementation and outcome of policies (McDermott, 2010). The contribution of individuals will "refine feedback for policy learning; stimulate diverse approaches to problem solving; and bring human and other resources to bear key challenges" (Noveck, 2015 pp. 158). Noveck states that the society should demand a more open-source government and foster civic participation and collaboration for a transparent society. Fundamentally redesigning, not just reforming, government institution's work shall challenge the government to open up to new forms and through this the government will find new ways of dealing with complex issues and generate wider insights (Noveck, 2015).

Much research has been done on open government in relation to economic development, politics and technology, especially Information and Communication Technology (ICT). ICT plays an important role in open government by enabling information flow to and from the people. By taking advantage of information dissemination citizens can influence political decisions and detect corruption, thus enhancing government accountability (McGee & Gaventa, 2011; Michener & Bersch, 2013). Not only do citizens receive data, but they can express their opinions and exchange ideas by using ICT and social networking sites. These tools have made information dissemination and communication easier between the government and the public (Bertot, Jaeger, & Grimes, 2010; Chen, Pan, Zhang, Huang, & Zhu, 2009; Krishnan & Teo, 2012; Murillo, 2015; Relly & Sabharwal, 2009). In the studies above open government is essential regarding political engagements including democracy, public participation, optimal decision-making, and prevention of corruption (Banerjee & Chau, 2004; Cho & Choi, 2004; Elbahnasawy, 2014; Eschenfelder, 2004; Obama, 2009; Rosendorff & Vreeland, 2006; Von Haldenwang, 2004; Wong & Welch, 2004). However, open government by itself is not enough (Lindstedt & Naurin, 2010).

Another interesting topic discussed in relation to open government is economic development. Economic development is probably the most basic way to improve the standard of living in a country. The transparency of data, which is referred to as fiscal transparency in technical terms,

allows economic and political decision makers to monitor and evaluate opportunities and risks and enhance possibilities of decisions that will have a positive effect on economic and social welfare (Islam, 2006). The International Monetary Fund has stated that fiscal transparency is important for effective fiscal risk management and policy making (Cottarelli, 2012).

Open government, rule of law and control of corruption

For a well-functioning open government culture specific conditions are needed. Lindstedt & Naurin (2010) find that public conditions such as higher education and media reach are necessary for an open government to have a positive effect on the public. The Open Government Partnership emphasizes that Rule of Law act as an effective tool in implementing and accelerating development. Krishnan proved that the mechanism of Control of Corruption fully mediated the e-government maturity on economic prosperity (Krishnan, Teo, & Lim, 2013). This study investigates whether Rule of Law and Control of Corruption work as a platform between open government and the prosperity of society. The two variables measure the confidence level of the public—confidence on the perception of social order. Rule of Law measures the perceptions of agents' willingness to abide by the rules of society, police and courts; the law enforcement of contracts and property rights; and the detection of crime and violence. Control of Corruption considers public power's detection of malpractices for private gains.

Open government, social capital and environment

Social capital has been studied among various fields such as education, public health, community life, governance, and democracy (Adler & Kwon, 2002). It is closely associated with trust and network and has substantial effects beyond those of economic characteristic (Helliwell, 2006). It is an important indicator of a community's success (Whitham, 2012). If social network and trust is high it creates an atmosphere, which increases the wellbeing of the citizens (Helliwell, 2006). Moreover, Paxton (2002) in her research finds that social capital and democracy are interdependently related, meaning that social capital affects democracy and vice versa. Social capital is defined according to different scholars and their study fields, but in this study it refers to the synergy of human capital that comes into effect when the people in a community can trust one another. Environment and nature have been

considered as intangible benefits to the people which can enhance their happiness and health. For example, high air quality, ecotourism, agriculture and nature conservation brings physical and social benefits to a community, which is indirectly linked to the happiness of the people. In his study, Krishnan had proven that e-government maturity has indirect effects on environmental degradation via Control of Corruption (Krishnan et al., 2013). The idea to include environment into the social dimension of prosperity has been brought to attention only recently. Given the evidence above and ongoing studies of people's perception toward nature in accordance to their happiness, this study includes the variable, environment.

Research objectives and questions

As seen from the previous literature, open government is related to access to information, technology, civic participation, politics and economic welfare. This paper measures whether open government has an effect on prosperity; not only on economic welfare, but also on social welfare such as social capital and environment. The Open Government Index from the World Justice Project, which measures the publicized laws and government data, right to information, civic participation and complaint mechanism is the independent variable. The Prosperity Index, taken from the Legatum Prosperity Index, is the dependent variable and considers three dimensions—economic, social and political—and is measured in nine pillars: economic quality, business environment, governance, personal freedom, environment, education, social capital, safety & security, and health. This research investigates whether publicized data, citizen's right to the information and their engagement or interaction effect the flourishing and creation of wealth within a society.

The structure of the paper includes a brief description of the research model (Figure 1) and the research question will be explained followed by hypothesis. Next, a brief description of the obtained data will be given and a methodology description will follow. Based on the results obtained, the conclusion and discussion will be presented.

Research questions

The research questions are as follows:

- (1) Is open government directly associated with prosperity?

- (2) Is open government associated with prosperity through the two mediating effects: Rule of Law and Control of Corruption?
- (3) Is there a significant statistical relation between dependent and independent variables of the indexes?

Research model

Two models are formulated in this research. The first model is to investigate government transparency in 96 countries for the year 2015 by using Open Government Indicators as the independent variables. The second model is to investigate the effect of E-government development index from the United Nations on prosperity for eight consecutive years from 2008 to 2015 in the 96 countries. Both models will measure a direct effect of open government toward prosperity and an indirect effect through two mediating variables: the Rule of Law and Control of Corruption. Open government does not contribute to society unless mechanisms such as Rule of Law and Control of Corruption are put into practice effectively.

Figure 1 shows the overall research model measuring i) the direct effect of open government to prosperity and ii) the indirect effect of the open government to prosperity through two mediating variables.

Figure 2 shows the direct effect of the four Open Government Indexes to the nine prosperity indicators, and Figure 3 shows the indirect effect through the mediating variables: Rule of law and Control of corruption. Figure 4 shows the model when using the e-government development index as the independent variable.

Hypothesis formulation

Relating open government to prosperity

Open government secures the citizens' rights to information and thus improves accountability for disclosed information. Information itself enables citizens to formulate preferences among policy options, agencies to administer laws and regulations and government to engage in "the mechanisms of accountability that freshen democracy" (Bimber, 2003, p. 11). Therefore,

Figure 1. Research model.

Figure 2. The relationship of open government to prosperity.

Figure 3. The relationship between open government and prosperity through rule of law and control of corruption.

open government encourages civic engagement and participation in decision making (Meijer et al., 2012). Governmental institutions can post problems and expect innovative ideas and solutions from citizens. These have proven to be highly beneficial (Haeffliger, Monteiro, Foray, & Von Krogh, 2011). Therefore the first hypothesis is as follows:

Hypothesis 1. Open Government is positively related to prosperity.

Relating open government to prosperity through the mediating effect of Rule of Law and Control of corruption.

Krishnan has proven that the Control of Corruption is an effective mechanism when talking about the relationship of e-government maturity and economic prosperity and environment degradation (Krishnan et al., 2013). Among many researches that confirm open government to be positively related to economic wealth and business quality, Lindstedt and Naurin (2010) state that transparency of information is not enough. Wijnhoven also agrees with the idea and emphasizes the importance to the people's motivation for participation in order to fulfill the aim of open government (Harrison & Sayogo, 2014; Wijnhoven, Ehrenhard, & Kuhn, 2015). Given these statements we

Figure 4. The relationship of E-government index to prosperity through rule of law and control of corruption.

conclude that mechanisms such as the Rule of Law and Control of Corruption work as a catalyst (canal) through which open government data is useful to the public. Therefore the second hypothesis is as follows:

Hypothesis 2. Open Government is positively related to prosperity with the mediating effect of Rule of law and Control of corruption.

Relating open government to social capital and environment.

High income is often associated with economic prosperity. Economic prosperity can be linked to social well-being in that it corresponds to the overall life satisfaction of individuals. Citizens of high level income abide by rules and laws and enjoy economic prosperity, which is positively related to health and financial development (Bittencourt, 2011; Thomas & Frankenberg, 2002). This research investigated whether other than economical social welfare benefits from open government. From the previous literature, this study assumes that high social trust in the community will lead to a better life for individuals and increase their confidence and level of satisfaction. Clearly due to the difference in economic and

political development, countries will differ in the level of social capital as well. The third hypothesis is as follows:

Hypothesis 3. Social capital and environment are positively related to open government.

Data description and method

Archival data from the World Justice Project Worldwide Governance Indicators and Legatum Prosperity were used. The World Justice Project measures, in eight indexes, the extent to which a country adheres by the Rule of Law in practice. The eight indexes measured are constraints on government powers, absence of corruption, open government, fundamental rights, order and security, regulatory enforcement, civil justice and criminal justice. From this dataset, the study considered the open government index, which is measured in four pillars, as suitable for the research. The Worldwide Governance Indicators include six dimensions of governance: voice and accountability, political stability and absence of violence/terrorism, government effectiveness, regulatory quality, rule of law and control of corruption.

¹Rule of Law in the Worldwide Governance Indicators is different from the Rule of Law in the World Justice Project. The former reflects the perception of the agency to abide by rules of society and rights, whereas the latter is the general practice of a country to prevent corruption, wrong doing etc.

²Afghanistan, Albania, Argentina, Australia, Austria, Bangladesh, Belarus, Belgium, Belize, Bolivia, Botswana, Brazil, Bulgaria, Burkina Faso, Cambodia, Cameroon, Canada, Chile, China, Colombia, Costa Rica, Ivory Coast, Croatia, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Ethiopia, Finland, France, Georgia, Germany, Ghana, Greece, Guatemala, Honduras, Hungary, India, Indonesia, Iran, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Lebanon, Liberia, Macedonia, Madagascar, Malawi, Malaysia, Mexico, Moldova, Mongolia, Morocco, Nepal, Netherland, New Zealand, Nicaragua, Nigeria, Norway, Pakistan, Panama, Peru, Philippines, Poland, Portugal, Republic of Korea, Romania, Russia, Senegal, Serbia, Sierra Leone, Singapore, Slovenia, South Africa, Spain, Sri Lanka, Sweden, Thailand, Tunisia, Turkey, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Venezuela, Vietnam, Zambia, Zimbabwe.

From the six indexes, the study considered rule of law¹ and control of corruption as the mediating variables. The Legatum Prosperity Index measures the wealth creation and wellbeing of a nation across nine pillars from economic quality to governance, social capital and environment. The study included all nine pillars in the study, since all of them represent a significant phenomenon in the community. The data have been used in numerous studies and it also provides other advantages such as easy reproducibility; the ability to generalize the results arising from large datasets (Kiecolt & Nathan, 1985). We analyzed 96 countries in total. The lists of countries analyzed in this study are mentioned at the bottom of this paper.²

For the independent variable the Open Government Index from the World Justice Project (WJP) was used. The Open Government Index, which is the first effort to measure government openness based on the general public's experiences and perceptions worldwide measures four pillars: Publicized law and data; Right to information; Civic participation; and Complaint mechanisms. The data for the two mediating variables are indicators from the Worldwide Governance Indicators: Rule of law and Control of corruption. The Worldwide Governance Indicator is a project from the World Bank Development Research Group. Finally, the dependent variable will be taken from the Legatum Prosperity Index, which is measured by nine pillars. The Legatum Institute is an international think-tank and educational charity and has the opinion that prosperity is the fundamental building block of human flourishing. People can achieve their opportunity to discover and fulfil their potential through the driving forces of the relationship between wellbeing and wealth creation (The Legatum Prosperity Index, 2016).

The Open Government Index scores are referred to the General Population Poll (GPP) and Qualified Respondent's Questionnaires (QRQs). The GPP survey is first-hand information of randomly selected people in each of the 96 countries asking their perceptions and experiences regarding their access to government information; participation in local government; the quality provided to them to make complaints; whether they have access to agency budget without payment; and whether communities can gather and provide their opinions to congressional officers. The Qualified Respondents' Questionnaires (QRQs) are polling data from 2,500 surveys from 23 experts from directories of law firms, universities, and research organizations including non-governmental organizations in civil and commercial law, criminal law, labor law, and public health. They respond to closed-ended perception questions and several hypothetical scenarios. Completed surveys were mapped across the four dimensions and codified so that

they fall between 0 and 1. Both the GPP and QRQs were equally computed and, in cases where one data source is better suited to the measurement of a certain concept, it was adjusted (The Open Government Index, 2015).

The Worldwide Governance Indicator is a measurement of various data sources combined that define corruption among public officials, public trust in politicians and diversion of public funds. Values for this measurement run between -2.5 and 2.5 , with the higher values corresponding to higher rules of laws and better control of corruption (Kaufmann, Kraay, & Mastruzzi, 2011).

The Legatum Prosperity Index measures wealth and social wellbeing across nine pillars that the institute thinks are representative to the definition of prosperity. Initially the nine pillars were categorized from 104 variables drawn from sources of international organizations such as the United Nations, World Bank, International Monetary Fund and World Health Organization and non-governmental organizations such as Amnesty International, Transparency International by reviewing more than 200 literature review that matched the definition of wealth and social wellbeing. The 104 variables were consulted among academics and policy experts for reliability and credibility and the correct form in which to express the variables. They were then distributed across the nine pillars. The uniqueness of the data is that it includes both objective and subjective variables. The subjective variables are useful in that they capture the people's perception about how they feel about their living standards and they allow measuring the lives of people living in materially less developed countries. The value ranges between 1 and 100, the higher value corresponding to higher wealth and social wellbeing. The measurement and definition of the variables are given in Table 1, Table 2 and Table 3. A further detailed description of variables is in the Appendix.

The E-government Development Index weighs the average of normalized scores of Online Service Index (OSI), Telecommunication Infrastructure Index (TII) and Human Capital Index (HCI). Each index has its own definitions that make up the E-government index. They are described in detail in Table 1 (The United Nations E-Government survey, 2016).

A Structural Equation Model using the STATA program was used for an empirical analysis. For the first model, using data for year 2015, the four pillars of the Open Government Index was used as the independent variable, the two indicators of the Worldwide Governance Indicator as the mediating variable and the nine pillars of the prosperity index as the dependent variables. In the second model, the independent

Table 1. Measurement of independent variables.

Measurement	Definition	Data source
Publicized laws and government data	<ul style="list-style-type: none"> laws and information on legal rights are publicly available quality and accessibility of information published by the government in print & online administrative regulations, drafts of legislation, administrative decisions, high court decisions are made accessible to public 	World Justice Project
Right to information	<ul style="list-style-type: none"> requests for information (budget figures of government officials, ombudsman report and information relative to community projects) held by a government agency are granted within a reasonable time period if information is pertinent and complete and if requests for information are granted at reasonable cost. People are aware of their right to information 	
Civic participation	<ul style="list-style-type: none"> the effectiveness of civic participation mechanisms, including the protection of the freedoms of opinion and expression whether people can voice concerns to various government officers and members of the legislature whether government officials provide sufficient information and notice about decisions affecting the community, including opportunities for citizen feedback 	
Complaint mechanism	<ul style="list-style-type: none"> ability of people to bring specific complaints to the government about the provision of public services or the performance of government officers and how government officials respond to such complaints whether people can challenge government decisions before another government agency or a judge 	
E-government development index	<ul style="list-style-type: none"> Online Service Index (OSI): Assessment of the country's e-services and e-participation portal and ministries of education, labor, social services, health, finance and environment. Telecommunication Infrastructure Index (TII): Arithmetic average of (per 100 inhabitants) estimated internet users, fixed telephone lines, mobile subscribers and fixed broadband subscribers. Human Capital Index (HCI): weighted average of adult literacy, gross enrollment ratio, expected years of schooling and average years of schooling. 	United Nations

Table 2. Measurement of mediating variables.

Measurement	Definition	Data source
Rule of law	Reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	Worldwide Governance Indicators from the World Bank Development Research Group
Control of Corruption	Reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.	

variable was replaced with the E-government Development Index of the years 2008–2015. Both estimation models consist of the following two equations: (1) the independent variable → the dependent variable, and (2) the independent variable → the mediating variable → the dependent variable.

For (1), the equation is

$$Y = \alpha_1 + \beta_1 * X$$

where Y is the dependent variable (prosperity), X is the independent variable (open government), α_1 the

Table 3. Measurement of dependent variables.

Measurement	Definition	Data source
Prosperity	Measuring, understanding and explaining from poverty to prosperity for individuals, communities and nations, which is considered as human flourishing with the opportunity of individuals to discover, fulfil and share their potential	The Legatum Prosperity Institute

intercept and β_1 the coefficient. The second equation consists of three equations.

$$M = \alpha_2 + \beta_2 * X$$

$$Y = \alpha_3 + \beta_3 * M$$

where M is the expected value of Rule of Law/Control of Corruption and all other variables correspond to the above description. After the estimation the goodness-of-fit statistics R^2 was obtained using the STATA command (Table 5 through Table 6).

Results

The Structural Equation Modeling (SEM) analysis was used, because SEM can simultaneously analyze all paths in one analysis (Chin, 1998). Table 4-1 shows the descriptive statistics for the variables.

Table 4-1. Descriptive statistics.

Variable	Min	Max	Mean	Standard Deviation
E-government index	0.13	0.95	0.53	0.20
Publicized law and government data	0.23	0.80	0.48	0.12
Right to information	0.35	0.86	0.55	0.12
Civic participation	0.21	0.90	0.61	0.15
Complaint mechanism	0.18	0.86	0.57	0.14
Rule of law	-1.99	2.07	0.10	0.99
Control of corruption	-1.34	2.29	0.07	1.00
Economic Quality	45.47	81.09	64.17	8.67
Business Environment	35.21	75.87	55.46	9.07
Governance	24.16	85.29	52.33	14.51
Education	26.35	80.98	58.27	13.69
Health	49.73	84.39	70.98	8.25
Safety & Security	37.40	85.80	67.02	10.63
Personal Freedom	21.54	91.66	61.52	16.88
Social capital	39.71	68.95	51.63	7.05
Environment	37.89	82.04	63.23	8.57

Table 4-2. Correlation matrix for open government and prosperity analysis.

	Law gov data	Right to info	Civic part.	Compliant	Rule of law	Control of corrupt	Econ	Busi	Gove	Educ	Heal	Safe	Pers	Soci	envi
Law gov data	1														
Right to info	0.80	1													
Civic part	0.54	.068	1												
Complaint	0.72	0.80	0.77	1											
Rule of law	0.82	0.81	0.69	0.80	1										
Control of corrupt	0.83	0.79	0.67	0.80	0.96	1									
Econ	0.79	0.72	0.44	0.67	0.83	0.80	1								
Busi	0.77	0.75	0.59	0.75	0.86	0.84	0.82	1							
Gove	0.79	0.82	0.78	0.84	0.94	0.94	0.76	0.84	1						
Educ	0.80	0.78	0.41	0.67	0.76	0.72	0.84	0.78	0.71	1					
Heal	0.76	0.68	0.37	0.63	0.72	0.72	0.82	0.70	0.67	0.87	1				
Safe	0.70	0.59	0.47	0.56	0.76	0.75	0.69	0.61	0.69	0.66	0.69	1			
Pers	0.57	0.69	0.76	0.76	0.69	0.70	0.55	0.63	0.80	0.56	0.55	0.57	1		
Soci	0.54	0.47	0.54	0.56	0.65	0.65	0.64	0.70	0.72	0.54	0.48	0.40	0.62	1	
Envi	0.58	0.59	0.51	0.63	0.67	0.67	0.61	0.65	0.69	0.64	0.64	0.59	0.70	0.63	1

Note: All values have a high significance level, meaning that they are within the 0–5% range.

Table 4-3. Correlation matrix for E-government and prosperity analysis.

	E-gov.	Rule of law	Control of corrupt	Econ	Busi	Gove	Educ	Heal	Safe	Pers	Soci	envi
E-gov.	1											
Rule of law	0.80	1										
Control of corrupt	0.78	0.96	1									
Econ	0.84	0.85	0.83	1								
Busi	0.80	0.86	0.85	0.82	1							
Gove	0.75	0.94	0.94	0.81	0.85	1						
Educ	0.92	0.77	0.74	0.85	0.77	0.73	1					
Heal	0.84	0.72	0.72	0.81	0.70	0.68	0.86	1				
Safe	0.71	0.78	0.76	0.74	0.63	0.70	0.70	0.71	1			
Pers	0.60	0.69	0.71	0.58	0.61	0.79	0.56	0.55	0.57	1		
Soci	0.52	0.66	0.68	0.63	0.69	0.73	0.54	0.49	0.41	0.64	1	
Envi	0.64	0.64	0.67	0.61	0.62	0.67	0.62	0.65	0.56	0.67	0.65	1

Note: All values have a high significance level, meaning that they are within the 0–5% range.

Table 4-2 and Table 4-3 show the correlation for open government and prosperity and e-government, respectively. For Table 5 throughout 6–2, one asterisk * was used to highlight the results with significance level of under 5%. Table 5 shows the direct and indirect correlations of each of the four Open Government Indexes to each of the nine prosperity

indexes. Table 6 shows the direct and indirect correlation of the E-government development index to each of the nine prosperity pillars.

From the numerous results obtained, the research finds that open government is not directly and nor positively related to prosperity. Therefore, hypothesis 1 is rejected. However, the results of the indirect effect

Table 5. The relationship between open government and prosperity for 96 countries in year 2015.

Dep. Var. =	Indirect Effect						R ²
	Direct Effect		I.V. → M.V.		M.V. → D.V.		
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	
<i>Independent Variable = Publicized law and government data; Mediating Variable = Rule of Law</i>							
Economic Quality	25.82*	(0.000)	6.96*		4.70*	(0.000)	0.73
Business Environment	13.9*	(0.048)	(0.000)		6.55*	(0.000)	0.70
Governance	2.17	(0.772)			13.66*	(0.000)	0.69
Education	65.19*	(0.000)			4.03*	(0.006)	0.76
Health	35.67*	(0.000)			2.50*	(0.000)	0.74
Safety & security	18.97	(0.072)			6.32*	(0.000)	0.70
Personal Freedom	-1.75	(0.927)			11.93*	(0.000)	0.69
Social Capital	-0.77	(0.926)			4.75*	(0.000)	0.69
Environment	4.83	(0.626)			5.32*	(0.000)	0.69
<i>Independent Variable = Right to information; Mediating Variable = Rule of Law</i>							
Economic Quality	11.17	(0.120)	6.83*		6.18*	(0.000)	0.66
Business Environment	12.53	(0.062)	(0.000)		6.72*	(0.000)	0.67
Governance	18.56*	(0.007)			12.09*	(0.000)	0.68
Education	57.24*	(0.000)			4.99*	(0.000)	0.72
Health	20.20*	(0.014)			4.10*	(0.000)	0.68
Safety & security	-6.88	(0.501)			8.86*	(0.000)	0.66
Personal Freedom	56.18*	(0.001)			6.36*	(0.002)	0.69
Social Capital	-9.74	(0.215)			5.60*	(0.000)	0.66
Environment	10.89	(0.247)			4.75*	(0.000)	0.66
<i>Independent Variable = Civic participation; Mediating Variable = Rule of Law</i>							
Economic Quality	-13.08*	(0.002)	4.40*		8.65*	(0.000)	0.52
Business Environment	0.35	(0.933)	(0.000)		7.88*	(0.000)	0.47
Governance	23.64*	(0.000)			11.34*	(0.000)	0.63
Education	-17.46*	(0.028)			12.35*	(0.000)	0.50
Health	-12.85*	(0.011)			7.41*	(0.000)	0.50
Safety & security	-6.56	(0.294)			8.9*	(0.000)	0.48
Personal Freedom	59.94*	(0.000)			5.34*	(0.000)	0.63
Social Capital	7.61	(0.113)			3.85*	(0.000)	0.48
Environment	5.33	(0.356)			5.23*	(0.000)	0.48
<i>Independent Variable = Complaint mechanisms; Mediating Variable = Rule of Law</i>							
Economic Quality	0.32	(0.956)	5.52*		7.21*	(0.000)	0.65
Business Environment	9.97	(0.064)	(0.000)		6.75*	(0.000)	0.66
Governance	22.76*	(0.000)			11.20*	(0.000)	0.70
Education	17.28	(0.102)			8.46*	(0.000)	0.66
Health	8.23	(0.224)			5.07*	(0.000)	0.65
Safety & security	-11.73	(0.150)			9.58*	(0.000)	0.65
Personal Freedom	70.34*	(0.000)			3.51	(0.059)	0.73
Social Capital	5.40	(0.394)			4.04*	(0.000)	0.65
Environment	16.46*	(0.027)			3.87*	(0.000)	0.66
<i>Independent Variable = Publicized law & government data; Mediating Variable = Control of Corruption</i>							
Economic Quality	30.96*	(0.000)	7.09*		3.89*	(0.000)	0.74
Business Environment	18.73*	(0.014)	(0.000)		5.75*	(0.000)	0.71
Governance	1.74	(0.824)			13.47*	(0.000)	0.70
Education	75.8*	(0.000)			2.46	(0.100)	0.78
Health	36.49*	(0.000)			2.34*	(0.016)	0.75
Safety & security	21.73*	(0.046)			5.82*	(0.000)	0.71
Personal Freedom	-6.74	(0.724)			12.42*	(0.000)	0.70
Social Capital	-1.15	(0.892)			4.71*	(0.000)	0.70
Environment	3.90	(0.697)			5.36*	(0.000)	0.70
<i>Independent Variable = Right to information; Mediating Variable = Control of Corruption</i>							
Economic Quality	17.20*	(0.018)	6.78*		5.33*	(0.000)	0.65
Business Environment	18.75*	(0.006)	(0.000)		5.84*	(0.000)	0.66
Governance	23.12*	(0.001)			11.49*	(0.000)	0.67
Education	65.2*	(0.000)			3.84*	(0.006)	0.72
Health	21.51*	(0.007)			3.93*	(0.000)	0.66
Safety & security	-0.97	(0.923)			8.05*	(0.000)	0.63
Personal Freedom	53.80*	(0.001)			6.75*	(0.000)	0.67
Social Capital	-7.30	(0.339)			5.28*	(0.000)	0.63
Environment	11.92	(0.188)			4.63*	(0.000)	0.64
<i>Independent Variable = Civic participation; Mediating Variable = Control of Corruption</i>							
Economic Quality	-9.84	(0.032)	4.38*		7.95*	(0.000)	0.50
Business Environment	3.32	(0.456)	(0.000)		7.24*	(0.000)	0.46
Governance	25.29*	(0.000)			11.01*	(0.000)	0.64
Education	-11.97	(0.154)			11.15*	(0.000)	0.47
Health	-11.41*	(0.023)			7.11*	(0.000)	0.48
Safety & security	-4.1	(0.517)			8.38*	(0.000)	0.46
Personal Freedom	58.61*	(0.000)			5.67*	(0.000)	0.62
Social Capital	8.11	(0.086)			3.76*	(0.000)	0.47
Environment	5.87	(0.302)			5.13*	(0.000)	0.46

(Continued)

Table 5. (Continued).

Dep. Var. =	Direct Effect		Indirect Effect				R ²
			I.V. → M.V.		M.V. → D.V.		
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	
<i>Independent Variable = Complaint mechanisms; Mediating Variable = Control of Corruption</i>							
Economic Quality	4.36	(0.480)	5.56*		6.43*	(0.000)	0.65
Business Environment	13.95*	(0.015)	(0.000)		5.98*	(0.000)	0.66
Governance	24.11*	(0.000)			10.86*	(0.000)	0.70
Education	24.51*	(0.025)			7.08*	(0.000)	0.66
Health	8.95	(0.185)			4.90*	(0.000)	0.65
Safety & security	−8.85	(0.287)			8.98*	(0.000)	0.65
Personal Freedom	67.72*	(0.000)			3.95*	(0.029)	0.72
Social Capital	5.76	(0.360)			3.94*	(0.000)	0.64
Environment	16.36*	(0.026)			3.85*	(0.000)	0.66

of open government to prosperity show significance. In both Tables 5 and 6, the four independent variables show significant and positive effect to the two mediating variables, which also show significant and positive effect to all nine dependent variables. Open Government does have significant and positive indirect effect via Rule of Law and Control of Corruption. Therefore hypothesis 2 is supported. Statistical results show that social capital and environment are not significantly related to open government, however, they show a significant relationship toward e-government (Table 6 and Table 6). Results show that social capital and environment and positively and significantly related to Open Government via Rule of Law and Control of Corruption. Therefore, hypothesis 3 is partially accepted.

A core finding of the study is the significant role of Rule of Law and Control of Corruption. Table 5 throughout Table 6 show that there is a significant and positive relation of open government to prosperity via Rule of Law and Control of Corruption. Two pathways were analyzed: first the open government to the two mediating variables and second the mediating variables to prosperity. The first path shows a significant and positive relation, meaning that publicity of government data, the right to information, civic participation and feedback to the government is, in a positive way, affecting the confidence level of the public to abide by laws and regulation and confront against corruption. The second pathway shows that the confidence level of the public, which is influenced by open government has significant and positive impact on prosperity.

To briefly touch upon the third research question, the correlation of each of the indexes of dependent and independent variables show some significance. Leaving out the economic quality and business environment variable, Table 4-2 shows that governance and education are highly related to publicized law and government data (0.79, 0.80) and right to

information (0.82, 0.78). Governance and personal freedom are highly related to civic participation (0.78, 0.76) and complaint mechanism (0.84, 0.76). Governance shows a very high significant relation to the two mediating variables: Rule of Law and Control of Corruption (0.94). Social capital and environment show lower correlations with the independent and mediating variables relative to other prosperity indexes.

When using the e-government index as the independent variable, education (0.92) and health (0.84) are the highly related dependent variables. Governance is the highest related dependent variable to the two mediating variables: Rule of Law and Control of Corruption.

In statistical point of view, the Rule of Law and Control of Corruption have a very high correlation, but this study considered both of them due to their distinguished concepts.

Discussion and conclusion

Discussion

The correlation matrices in Table 4 show us that all the variables have high significance. After having shown that open government and transparency is a topic of interest, the empirical findings show attention-seeking findings. Open government is related to social capital and environment through the mediating effects of Rule of Law and Control of Corruption. Through a regression analysis the study shows that published law and data, citizen's right to information, their participation in governmental affairs and the complaint mechanism have a significant impact not only on a community's economic welfare, but also on social welfare and environment. This is a fundamental finding beyond previous literature, which asserts the positive influence of information dissemination on economic prosperity. Clearly, social capital and environment are factors that should be taken into consideration when discussing about a nation's wellbeing. For instance, the level of

Table 6. The relationship between E-government and prosperity for 96 countries in year 2008–2015.

Independent Variable = E-government index; Mediating Variable = Rule of Law							
Dep. Var. =	Direct Effect		Indirect Effect				R ²
			I.V. → M.V.		M.V. → D.V.		
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	
Economic Quality	20.44*	(0.000)	4.09*		4.42*	(0.000)	0.73
Business Environment	16.32*	(0.000)	(0.000)		6.02*	(0.000)	0.69
Governance	−1.94	(0.197)			14.36*	(0.000)	0.64
Education	61.06*	(0.000)			1.06*	(0.001)	0.88
Health	31.87*	(0.000)			1.03*	(0.000)	0.79
Safety & security	12.6*	(0.000)			6.44*	(0.000)	0.66
Personal Freedom	10.28*	(0.004)			9.62*	(0.029)	0.65
Social Capital	−0.49	(0.777)			4.97*	(0.000)	0.64
Environment	15.51*	(0.000)			3.04*	(0.000)	0.67
Independent Variable = E-government index; Mediating Variable = Control of Corruption							
Economic Quality	22.79*	(0.000)	4.1*		3.83*	(0.000)	0.73
Business Environment	17.7*	(0.000)	(0.000)		5.66*	(0.000)	0.68
Governance	1.67	(0.253)			13.44*	(0.000)	0.62
Education	63.28*	(0.000)			0.52	(0.084)	0.88
Health	31.25*	(0.000)			1.18*	(0.000)	0.78
Safety & security	15.71*	(0.000)			5.65*	(0.000)	0.64
Personal Freedom	9.41*	(0.005)			9.8*	(0.000)	0.62
Social Capital	−0.49	(0.763)			4.95*	(0.000)	0.61
Environment	13.70*	(0.000)			3.74*	(0.000)	0.64

social capital will have much effect on the community's development project, if social capital of the community is managed by a capable agency (Krishna, 2001). As for the environment, in many developed countries government has set up legislations and regulations to protect their national parks, which clearly states that government information dissemination and intervention is essential for controlling pollution and human impact on environment. The literature mentioned in section 2 are evidence of the importance of social capital and environment and how they are interlinked to the social wellbeing of a community. Another finding of the study the cross-sectional study and longitudinal study (Table 5 throughout 6–2). The comparison between the two models (Table 5 and Table 6) show that the role of Rule of Law and Control of Corruption are consistent and important in mediating an open government and prosperity. The study has overcome the limitations and inaccuracies of previous studies using single year datasets. Furthermore, the four variables for Open Government Index show a more precise and accurate description of open government than just the e-government index. Future studies using the prosperity index will be necessary to follow and record the patterns of the effects of open government on prosperity.

Conclusion

The study concludes that Rule of Law and Control of Corruption are two necessary mechanisms to link open government and their information dissemination with prosperity, especially social capital and environment. If there is no effort in building or sustaining the mechanisms of Rule of Law and Control of Corruption, open

government itself will not have a full impact on prosperity. In other words law enforcement and regulations to protect citizens and maintain social order, citizens' right-to-know and the control towers of society are means of letting information flow into society. It functions as a circle within a prosperous society. Surely, the level of the two mechanisms in each country will differ much due to economic, cultural and technological differences (for example infrastructure development and law enforcement) and will their impact on each society will also differ. Future studies should take into consideration these variables to discuss the overall effect of a society's development.

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Appendix

Variable description

Independent Variable

Publicized laws and government data

The World Just Project regards this the first dimension to what they define as open government: transparent, accessible, participatory, collaborative and responsive. According to Lathrop and Ruma (2010) the accessibility of government data is a precondition to open government, which is improving transparency and accountability of public affairs through which citizens have the opportunity to influence political decisions (Heckmann, 2011).

Right to information

Right to information has become synonymous with democracy. With the diffusion of right to information law throughout Central and Eastern Europe, South Africa and

South America after the Cold War (Florini, 2007) and the spread of the Access to Information law (Relly & Sabharwal, 2009) the movement toward citizens' rights to information and information accessibility has become important. The law gives citizens the right to gain access to data and documents to trace actions and decisions made by the government. This allows them to detect corruption and hold the government accountable for the information it provides (McGee & Gaventa, 2011; Michener & Bersch, 2013).

Civic participation

Civic participation improves the realization of important democratic values (Macintosh, 2008). Although there is a lack of scientific evidence to prove whether civic participation is directly related to a prosperous society, the objective of many organizations and studies indicate that open government leads to public participation and democratic societies (Di Gennaro & Dutton, 2006; Hilgers, 2012; Lathrop & Ruma, 2010).

Complaint mechanism

The last condition for an open government is the complaint mechanism implementation between the public and government. The public must raise their complaints and their voices and government must respond to the citizens' requests. The purpose of the mechanism is that the public is not only provided with data, but can give feedback to the government so that their opinion is reflected in the process.

Dependent variable

Economic dimension

Economic quality

Stable and high-quality economic fundamentals, such as accounting reports, increase economic wealth which promotes social wellbeing. The economic quality pillar measures the countries' performance in four key areas: structural policies (e.g., trade barriers), economic satisfaction and expectations (e.g. satisfaction with living standards), distribution of prosperity (e.g., relative poverty), engagement (e.g. labor force participation and financial access), and production quality and diversity (e.g., export diversity and quality).

Business environment

In a good and strong business environment citizens have the opportunity to pursue innovative ideas to improve their

lives, leading to more wealth and higher social wellbeing. The business environment measures how well people have access to infrastructure, such as the internet, transport and credit, and how comfortable people are with the idea of starting their own business. Bittencourt (2011) proved that financial development indeed played an important role in generating economic growth, economic activity and innovation in the region.

Institutional dimension

Governance

A well-governed and democratic society has a high level of citizen wellbeing because of assured political and economic freedom. Governance measures the effective and accountable government, fair elections political participation, the rule of law, and the level of a country's democracy. It also assesses levels of government corruption and competition, and citizens' confidence in the honesty of elections and the broader policymaking process.

Personal freedom

According to the Legatum institute, a society experiences high levels of income and wellbeing when its citizens enjoy freedom of expression, belief, and organization, as well as personal autonomy in a diverse society. This pillar measures the freedom of a country's social tolerance. It captures the importance of various freedoms—of choice, expression, movement, and belief—and tolerance of minorities and immigrants, which enhance a country's wealth and the wellbeing of its citizens. Societies that foster strong civil rights and freedoms show increases in levels of citizen satisfaction.

Social dimension

Health

A strong health infrastructure enables citizens to enjoy good physical and mental health. Strong mental health leads to higher levels of economic prosperity and wellbeing, whereas poor health keeps people from fulfilling their potentials. The health pillar evaluates countries based on indicators of strong health infrastructure (rates of immunization and sanitation facilities), life expectancy and mortality rate, and individual satisfaction with health. It is reported that self-reported wellbeing and health are strongly and significantly correlated to a society's overall health, further fostering human capital creation, which leads to higher economic development.

Safety & security

Safety & Security measures the national security, personal precariousness, and personal safety of a country. A stable social and political environment at a national level is measured by the political terror scale and its investment for sustaining economic growth. Academic research shows that organized political violence, such as crime, hinders economic growth (Cho, Choi, Lee, & Yang, 2016; Guiso, Sapienza, & Zingales, 2004). When individual citizens worry about their personal safety³ their overall wellbeing suffers. In addition, an environment of fear and uncertainty negatively affects life satisfaction.

Social capital

When people trust and respect one another the social network and the cohesion of a society has a direct and positive effect on the prosperity of a country. Social Capital measures a country's performance in three areas: Social cohesion and engagement (bridging social capital); community and family networks (bonding social capital); and political participation and institutional trust (linking social capital). Empirical studies on social capital have shown that citizen wellbeing improves through social trust (Helliwell, 2006). Similarly, societies with lower levels of trust experience lower levels of economic growth (Guiso et al., 2004). Thus the word "capital" in "social capital" highlights the contribution of social networks as an asset that produces economic returns and improves wellbeing.

Environment

Environment has been recently added to the Prosperity Index. The Legatum Institute has found that several indicators of the environment, including the use of pesticides, and land and marine areas devoted to nature, and air quality, show a significant relationship with average national wellbeing and material wealth. A high-quality environment may bring a sense of wellbeing and satisfaction to a country's population, whether it is physical, such as air quality; social, such as green areas and recreation; or symbolic such as national parks. Agriculture, ecotourism and nature conservation also provide economic benefits making a high-quality environment an important measure linked to economic and social prosperity.

³Personal safety measured through questions such as "Do you feel safe walking alone at night?".