ONLINE GOVERNMENT SERVICES AND SETTING UP BUSINESS: EVIDENCE FROM PANEL DATA

Amit Das, College of Business and Economics, Qatar University, Doha, Qatar, amit.das@qu.edu.qa

Shobha S. Das, College of Business and Economics, Qatar University, Doha, Qatar, shobha.das@qu.edu.qa

Abstract

Amidst continuing difficulties in justifying the expenditure on e-Government with financial and other returns, we examine whether the delivery of government services online facilitates the setting up of new businesses in a country. Using a panel assembled from three public sources of data, we examine whether delivering more and more government services online reduces the number of procedures that must be completed to start a new business, as well as the time and cost of these procedures. A fixed-effects analysis of the data shows that providing more government services online does make it easier to set up business, as does improvement in the ICT infrastructure and human capital of the country.

Keywords: *e-Government, fixed-effects models, ease of doing business, entrepreneurship*

1.   INTRODUCTION

1.1 Accounting for the benefits of e-Government

Attempts to quantify the benefits of e-Government initiatives have proven to be more difficult than rolling out the information systems that comprise e-Government (Jenner 2011). Conventional measures such as return on investment (ROI) fail to validate large investments in e-Government (estimated at some $70 billion in the United States alone). Beyond financial measures, e-Government has been claimed to improve the relationship between citizens and their government (Wong 2013). But others have noted that improvements on relationship-oriented indicators such as the American Customer Satisfaction Index (ACSI) are too slow to justify the capital invested (Anthopoulos 2015).

To some extent, the difficulty in measuring the value of e-Government reflects a more general problem with the assessment of all IT/IS systems where benefits, especially the non-financial, are measured imprecisely, and the local contingencies within which systems are implemented resist the application of generalizable metrics (Hellang & Flak 2012). In this regard, several frameworks have been advanced, targeting the value of e-Government systems. An example is the consulting firm Booz Allen Hamilton's Value Measuring Methodology (VMM) deployed at a number of US government agencies. The VMM assesses e-Government systems based jointly on value, cost and risk, where value is broadly construed to include "direct user (customer) value, social (non-direct user / public) value, government operational / foundational value, government financial value, and strategic / political value" (Booz Allen Hamilton 2004). While this certainly expands the definition of value beyond the financial cost savings, the consultants themselves acknowledge that such analysis might be "viewed as a means to get funding, not as a tool for on-going management and evaluation."

Amidst all the focus on measurement, we must also remain open to the possibility that e-Government becomes yet another casualty in a long stream where new technologies are appropriated to reinforce existing administrative and political arrangements, rather than become instruments of administrative reform: "the primary beneficiaries have been functions favored by the dominant political-administrative coalitions in public administrations" (Kraemer & King 2006). One way to assess whether e-Government benefits others besides its proponents (i.e. the government) is to adapt stakeholder theory to e-Government (Scholl 2001) and examine particular constituencies in terms of the benefits they receive from e-Government. In this spirit, we dedicate this paper to the examination of a particular segment of the economy: new businesses. There have been other studies of how small businesses have benefited from e-Government policies in terms of market intelligence generation, new business development, and time savings (Thompson et al. 2005), but our study focuses on an even earlier stage of a firm's life-cycle – the incorporation of a new business. In particular, we examine the effect of delivering government services online on the process of setting up a new business.

1.2 Online delivery of government services

The online delivery of government services enables citizens to initiate and complete transactions with the government remotely via the Internet. This must go beyond merely providing digitized versions of paper forms for download, which must then be filled out and submitted in person. Transaction-capable e-Government systems must accept inputs from citizens, process them appropriately in the context of prevailing laws and regulations, and issue responses that confirm the execution of the requested transactions. Fortunately, apart from somewhat steeper demands with respect to authentication (establishing that a party participating in a transaction is who he claims to be) and the security of online payments (including alternatives to credit cards), the online delivery of government services can often leverage technologies developed and refined in Business-to-Consumer (B2C) e-commerce. For example, markup languages such as XML allow the embedding of semantic meaning in documents, allowing machine processing of document contents without human intervention. Thus, the contents of a field tagged as "Mailing Address" can be accepted into any program that recognizes such a field, and processed appropriately.

Apart from the low technological hurdle, delivering services online is an attractive proposition for governments seeking efficiency. Avoiding repetitive data entry saves time, cost and errors, and allows the databases of different agencies to draw data from a single submission by the citizen. Web technologies enable anytime and anywhere access to form-filling applications from laptops and mobile phones, without requiring applicants to visit one or a few physical locations during designated hours (hence the aphorism: from in-line to on-line). The scalability of such technologies also provides simultaneous service to many customers (without being limited by the availability of front-line personnel). In fact, wider use of technology yields economies of scale, making it possible to deliver services (such as business registration) more cheaply, thus reducing the charges that must be levied to recover the cost of governmental services. Lower charges, in turn, promote wider use.

While the above illustrates how existing procedures can be automated to run faster and cheaper, there exists another less obvious source of savings in the adoption of e-Government. As the private sector had experienced in the form of the business process redesign movement (Hammer & Champy 1993), the thoughtful application of IT to government processes provides an opportunity to reflect on the logic of the processes themselves (whether and when certain steps are still required) and their inter-relationships. Some processes (such as the exchange of paper documents) might have been rendered superfluous by changes in the environment (and can therefore be eliminated), while others can be simplified, updated or consolidated. Best practices can be shared across processes; for example, a particularly robust authentication scheme residing within one process can be re-used (as a web service, perhaps) to secure multiple applications. The recent trend towards service-oriented architectures (SOA) makes such mix-and-match systems viable.

Additionally, the capture of data into computer databases feeds data mining (Big Data) applications that detect patterns, paving the way for further refinement of the online services. In addition to automating government processes, we also informate them (Zuboff 1988), rendering them visible and open to intervention (Bannister 2010). Progressive improvement of online e-Government services encourages their wider use, pointing back to the virtuous cycle driven by economies of scale.

1.3 Ease of setting up business

Governments all over the world are keenly aware of the role of entrepreneurs in their economies, especially in job creation. In the last five years alone, many countries have made it easier for local entrepreneurs to set up small and medium enterprises (commonly defined as having 10 to 50 employees) by simplifying the pre-registration, registration and post-registration procedures applicable to such businesses. Examples of countries that have simplified pre-registration and registration formalities (publication, notarization, inspection and other requirements) include Greece, Hong Kong SAR China, Israel, Italy, Lithuania, Malaysia, the Russian Federation, and Zambia (World Bank 2013). Others, such as Costa Rica, Poland, and Portugal, have cut or simplified post-registration procedures (tax registration, social security registration, licensing). Yet others – Croatia, Greece, the Netherlands, and Poland – have abolished or reduced the minimum capital requirement for incorporating small and medium businesses. A significant number – including Burundi, Costa Rica, Côte d'Ivoire, and Guatemala – have created or improved one-stop shop facilities allowing entrepreneurs to register with different agencies simultaneously rather than sequentially. Finally, countries such as Azerbaijan, Chile, Nepal, and Panama have introduced or improved online procedures for business registration and the electronic filing of documents (World Bank 2013).

All of the above suggests that the online delivery of government services (including full transaction capability) can play a role in improving the ease of setting up a new business in a country. In this paper, we examine whether improvements in the online delivery of government services over time are associated with greater ease of setting up new businesses in different countries around the world.

2. THEORETICAL FRAMEWORK

For the reasons described above, the ease of requesting services anytime, anywhere, as well as the ability to fulfill such requests mainly through automated processing, we expect to see a link between

the online delivery of e-Government services and the ease of setting up business. Increased availability of online channels (potentially 24x7, rather than conventional "office hours") and the ability to process common transactions automatically without human intervention may be expected to reduce the time needed to complete registration and subsequent formalities in setting up a new business. The cost savings to the government agency / agencies from increasing automation, if passed on to citizens (consumers of services), would reduce the cost of procedures that need to be completed to set up business. Finally, the rationalization of regulatory processes (echoing the spirit of business process redesign in the private sector) might lead to the elimination, simplification and consolidation of requirements, prompting a decrease in the number of procedures to be completed to set up a business.

While the online delivery of government services directly affects the ease of setting up business, other factors might play a role as well. Partialing out the variance attributable to such factors helps us get a better fix on how strong the relation between online services and ease of setting up business really is, hence we should include such factors as covariates in our statistical models. To start with, the overall state of telecommunication infrastructure, beyond government services alone, is likely to have an effect on the ease of starting business. After all, a fledgling business needs to communicate with its suppliers, customers, regulators and creditors as well as the government. High penetration of phone and internet connectivity makes this task easier and is therefore expected to improve the ease of setting up business. The availability of human capital in a country (in the form of educated, employable workers) affects almost all aspects of setting up business – the quality of government services, the ability of new businesses to harness technologies, and the preparedness of other constituencies (suppliers, customers, etc.) to participate in e-business. We thus hypothesize that higher levels of human capital (mostly education) should make it easier to set up business in a country.

While the technical logic connecting the ease of setting up business to online government services may be convincing in its own right, it cannot be denied that e-Government is essentially a tool for governance, absent which, the potential benefits of online services might never be realized. Before attributing improvements in the ease of setting up business to the online availability of government services, therefore, we must examine the role of changes in governance. The quality of regulation, enforcement of the rule of law, and the control of corruption are features of the politics of a country that exist independently of e-Government. Backed by political will, these values can ease the setting up of business by making the laws governing the establishment of business less onerous, ensuring adequate protection of life and property (physical and intellectual) by law enforcement, and stamping out bribery and corruption among government officials. Progress on these fronts creates a milieu conducive to startups (and businesses in general) without any appeal to IT. In fact, many potential benefits of e-Government probably presuppose a benign political environment.

It is also often suggested that the implementation of e-Government itself is a function of governance evolution (Ciborra & Navarra 2003). Countries with progressive governance are also viewed as more likely to embrace e-Government, partly because of the shared value of transparency and partly because the rollout of e-Government might bring greater accountability to governance, in a sort of reverse causality (Tolbert & Mossberger 2006). It turns out that the theorized causal role of progressive governance in the adoption of e-Government is not always supported by empirical evidence, whether cross-sectional or longitudinal (Singh et al. 2007; Das et al. 2011), but it is a widely-held perception nevertheless, hence improvements in governance must be controlled for before any improvements in the ease of setting up business are attributed to e-Government.

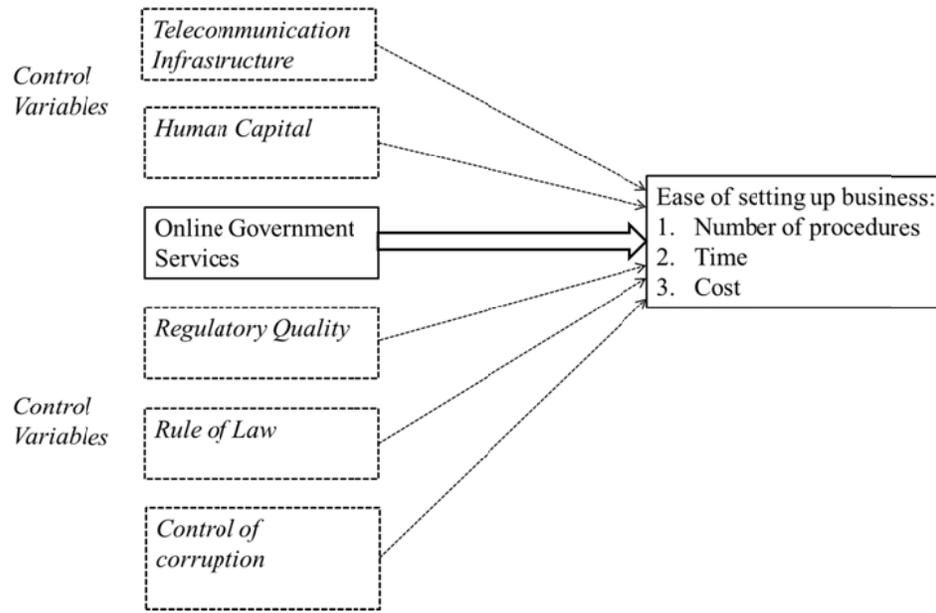Our theoretical framework is summarized in Figure 1 below.

Figure 1: Variables and relationships

3. DATA SOURCES

3.1 Ease of setting up business

We examine three measures of the ease of setting up business provided jointly by the World Bank and the International Finance Corporation (IFC):

1. the *number* of post-registration procedures that a newly-established firm must perform,
2. the *time* (in days) that such procedures take on average in a particular country, and
3. the *cost* of such procedures (expressed as a percentage of the per capita income of that country).

The source of these measures is the data that the World Bank collects annually about the ease of doing business in nearly 200 countries. The database focuses on regulations and institutions affecting small and medium-sized domestic formal firms. All the sub-components of the Doing Business indicators are based on primary data. Data are collected using a questionnaire that is completed by experts who deal with regulatory requirements. The Ease of Doing Business survey complements the Enterprise Survey of the World Bank where data are collected from firms. Almost three quarters of the data are fact-based and verified by the Doing Business team. The remaining data are collected through extensive consultation with multiple contributors; most of these data relate to the time to complete standard transactions. Teams from the World Bank also visit about 30 countries each year for more in-depth assessment of the data; so far over a hundred countries have been visited. All information is shared with and reviewed by governments. Close to 10,000 private professionals (experts) who deal with regulatory requirements were the respondents of the latest Doing Business Survey in 2013.

For this paper, we referred to the Ease of Doing Business reports published every year from 2003 to 2013.

3.2 e-Government

The evolution of e-Government around the globe is tracked by various agencies including the United Nations Public Administration Network (UNPAN). UNPAN reports, which cover almost 200 countries, have documented the state of e-Government in the years 2002, 2002, 2003, 2004, 2007, 2009, 2011 and 2013. Following UNPAN practice, we extracted data on three aspects of e-Government:

1. the *online service index*: more than 90 researchers – qualified graduate students and volunteers from universities in the field of public administration – assess each country's national website in the native language, including the national portal, e-services portal, and e-participation portal, as well as the websites of the related ministries of education, labor, social services, health, finance and environment as applicable (UNDESA 2014).
2. the *telecommunication infrastructure index* – an arithmetic average of five indicators: estimated internet users per 100 inhabitants, number of main fixed telephone lines per 100 inhabitants, number of mobile subscribers per 100 inhabitants, number of wireless broadband subscriptions per 100 inhabitants and number of fixed broadband subscriptions per 100 inhabitants. Due to changes in the definition of the index reported by UNPAN over the window of our study, we re-assembled the index from primary data drawn from the International Telecommunication Union (www.itu.int).
3. the *human capital index* made up of the adult literacy ratio, the gross enrolment ratio, the mean number of years of schooling, and the expected number of years of schooling. Well-developed human capital, in the form of a well-educated citizenry, is a key factor in the deployment of e-Government as well as its utilization (UNDESA 2014).

The first of the three measures above is our main independent variable of interest; the other two are included in our model as control variables.

3.3 Governance

Our measures of governance are drawn from the World Governance Indicators project (Kaufmann et al. 2010). The World Governance Indicators comprise six composite indicators based on 32 data sources for about 215 countries. Data from surveys of households and firms (9 data sources including the Afrobarometer surveys, Gallup World Poll, and Global Competitiveness Report survey) , commercial business information providers (4 data sources including the Economist Intelligence Unit, Global Insight, and Political Risk Services), NGOs (11 data sources including Global Integrity, Freedom House, and Reporters Without Borders), and public sector organizations (8 data sources including the CPIA assessments of World Bank and regional development banks, the EBRD Transition Report, and the French Ministry of Finance Institutional Profiles Database) are re-scaled and combined to create six broad dimensions of governance. The score of each country on each of the six indicators is reported as a *z*-score for that indicator, for the year.

Of the six dimensions that are measured in each report (issued in 1996, 1998, 2000, and then every year from 2002 to 2012), we considered the following three to be directly relevant to setting up new businesses:
1. *Regulatory Quality* – the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development, as perceived by businesses, NGOs and other organizations.
2. *Rule of Law* – perceived 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.
3. *Control of Corruption* – perceived 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 (Kaufmann et al. 2010).

We synthesized our dataset from the three public sources described above. About 8% of the data (covering almost 200 countries over eight years) is composed of missing values, making our panel data unbalanced. Our statistical analysis is conducted in a manner appropriate for unbalanced panel data.

4. HYPOTHESES

Our primary research hypothesis is that improvements in the online delivery of government services, as captured by the UNPAN's Online Service Index, are associated with greater ease of setting up business: fewer procedures, shorter time, and lower cost. We thus state three individual hypotheses:

H1a: *Changes* in the *Online Services Index* over time are *negatively* associated with changes in the *Number of Procedures* that must be completed to set up a new business.

H2a: *Changes in the Online Services Index* over time are *negatively* associated with changes in the *Time* needed to set up a new business (measured in days).

H3a: *Changes in the Online Services Index* over time are *negatively* associated with changes in the *Cost* of setting up a new business (expressed as a percentage of the income per capita for a country).

Each of these hypotheses is tested separately in the presence of the control variables: ICT infrastructure, Human Capital, Regulatory Quality, Rule of Law and Control of Corruption, so as to accurately assess the strength of the relationship between the independent variable (online government services) and the dependent variables (number of procedures, time, and cost).

5. ANALYSIS

5.1 Panel data models

e-Government research is evolving from purely cross-sectional analysis (e.g. Das et al. 2009) to longitudinal analysis, often using panel data (e.g. Ngafeeson & Merhi 2013). A panel data set follows a sample of individuals over time, thus providing multiple observations on each individual in the sample (Hsiao 2003). Panel data allows control over variables that cannot be directly observed or measured (like geographical or cultural factors) or variables that change over time but not across entities (i.e. global financial crises, or technology evolution), thus accounting for individual heterogeneity.

5.2 Fixed-effects model

The independent variables in analyzing panel data might be time-invariant (stay the same for each entity over the window of analysis), or changing over time. In our case, both independent and dependent variables change over time (time-varying covariates). Fixed-effects models are appropriate when we are only interested in analyzing the impact of independent variables that vary over time.

Each entity in a panel data set has its own individual characteristics (e.g. geography or culture) that may or may not influence the predictor variables. When using fixed-effects models, we explicitly assume that something within the individual may impact or bias the predictor or outcome variables, and that we need to control for this. Fixed-effects models remove the effect of such time-invariant characteristics so we can assess the net effect of the predictors on the outcome variable. The estimated coefficients of the fixed-effects models cannot be biased because of omitted time-invariant characteristics. An important assumption of fixed-effects models is that all time-invariant characteristics are unique to the individual and are not correlated with other individuals' characteristics. Fixed-effects models are thus appropriate for studying the causes of changes within an entity (a country, in our case). A time-invariant characteristic (e.g. geography or culture) cannot cause such a change, because it is constant for each entity.

In random-effects models, the variation across entities is assumed to be random and uncorrelated with the predictor or independent variables included in the model. This assumption is violated in our data, ruling out the use of random-effects models, which are more efficient if they are admissible. On our data, the Hausman test comparing random-effects and fixed-effects models finds the former to be inconsistent, ruling out their use. Our choice of fixed-effects models is also consistent with the advice of Clark & Linzer (2014) on this matter.

6. RESULTS

6.1 Means and bivariate correlations

The means of the independent and dependent variables, year by year, are shown in Table 1 below.

Year	2002	2003	2004	2005	2007	2008	2009	2010
Number of Procedures		9.815	9.658	9.517	8.978	8.459	7.967	7.760
Time to start		51.424	48.942	49.902	42.939	38.978	36.262	34.317
Cost to start		69.523	69.002	70.963	56.326	52.164	42.592	41.143
Online services	0.255	0.296	0.336		0.349		0.282	
ICT infra	0.177	0.176	0.178		0.210		0.233	
Human capital	0.712	0.711	0.714		0.783		0.760	
Regulatory quality	-0.029	-0.029	0.000	0.000	0.000	0.000	0.000	0.000
Rule of law	-0.048	-0.037	0.000	0.000	0.000	0.000	0.000	0.183
Control of corruption	-0.023	-0.027	0.000	0.000	0.000	0.000	0.000	0.000

Table 1: Mean values of the independent and dependent variables, by year

Empty cells in Table 1 indicate data not available. In our models, we assume a 1-year lag between the independent and dependent variables (independent variables take a year to affect the dependent variable) The distribution of empty cells shows why our panel contains five waves of data: the dependent variable in 2003, 2004, 2005, 2008 and 2010 is fitted against independent variables measured a year earlier.

Bivariate correlations among all variables (with the 1-year lag built in) are shown below in Table 2.

	Number of Procedures	Time to start	Cost to start	Online services	IT infra	Human capital	Regulatory quality	Rule of law	Control of corruption
Number of Procedures	1.000								
Time to start	0.421	1.000							
Cost to start	0.293	0.285	1.000						
Online services	-0.290	-0.264	-0.424	1.000					
ICT infra	-0.438	-0.264	-0.390	0.755	1.000				
Human capital	-0.204	-0.108	-0.492	0.593	0.615	1.000			
Regulatory quality	-0.410	-0.292	-0.429	0.743	0.845	0.578	1.000		
Rule of law	-0.471	-0.283	-0.443	0.657	0.842	0.500	0.897	1.000	
Control of corruption	-0.442	-0.250	-0.402	0.664	0.860	0.481	0.876	0.944	1.000

Table 2: Bivariate correlations among independent and dependent variables

6.2   Fixed-effects model for dependent variable: Number of Procedures

The Number of Procedures that must be completed to start a new business falls as the online availability of government service rises. A one-point increase in a country's score for UNPAN's Online Service Index is associated with almost three fewer procedures to complete in starting a business. Besides online government services, three other factors are negatively associated with the dependent variable; they are the ICT Infrastructure of the country, the level of Human Capital, and the Regulatory Quality aspect of governance. The mechanism through which Regulatory Quality might reduce the Number of Procedures is fairly obvious (reducing the number of procedures is often part of a sound policy to encourage entrepreneurship) , but how ICT infrastructure and Human Capital might work is not easy to decode. It is possible that a more developed ICT infrastructure enables more complete data to be collected and stored from each interaction between the business and the government, reducing the need to go back for more data. Human capital on both sides, in the form of educated employees, improves the effectiveness of business-government interaction, and might partly explain why increases in human capital are associated with decreases in the Number of Procedures.

EDBStartProc	Coef.	Std. Err.	t	P>t
Online services	-2.719	0.690	-3.940	0.000
ICT infra	-16.216	1.631	-9.950	0.000
Human capital	-2.714	0.998	-2.720	0.007
Regulatory quality	-1.075	0.453	-2.370	0.018
Rule of law	-0.268	0.546	-0.490	0.623
Control of corruption	0.283	0.410	0.690	0.490
_constant	15.124	0.800	18.900	0.000

Table 3: Regression coefficients for the Number of Procedures

6.3   Fixed-effect model for dependent variable: Time

The online delivery of government services and the state of ICT infrastructure are the two main factors that drive down the Time needed to set up a business. The anytime-anyplace availability of government (and private) services and the automatic processing of common requests can both shorten the Time need to set up business.

EDBStartTime	Coef.	Std. Err.	t	P>t
Online services	-22.571	6.907	-3.270	0.001
ICT infra	-145.580	16.313	-8.920	0.000
Human capital	-18.387	9.982	-1.840	0.066
Regulatory quality	-7.684	4.533	-1.700	0.091
Rule of law	-1.345	5.461	-0.250	0.806
Control of corruption	-1.348	4.097	-0.330	0.742
_constant	94.093	8.004	11.760	0.000

Table 4: Regression coefficients for Time

6. 4 Fixed-effects model for dependent variable: Cost

The Cost of starting a new business falls with the online availability of government services, as well as improvements in ICT Infrastructure and Human Capital. Online e-Government services, coupled with ICT infrastructure, reduce the cost of connectivity and transactions, and also bring benefits from labor savings via automation. We can only speculate that the quality of Human Capital improves the efficiency of business-government interactions, thus saving costs.

EDBStartCost	Coef.	Std. Err.	t	P>t
Online services	-45.031	21.598	-2.080	0.037
ICT infra	-118.849	50.963	-2.330	0.020
Human capital	-119.210	31.288	-3.810	0.000
Regulatory quality	-4.132	14.216	-0.290	0.771
Rule of law	-6.091	17.133	-0.360	0.722
Control of corruption	0.914	12.882	0.070	0.943
_constant	189.446	25.176	7.520	0.000

Table 5: Regression coefficients for Cost

7.   CONCLUSIONS

The online delivery of government services, as measured by UNPAN's Online Service Index, significantly affects the Number of Procedures, the Time and the Cost of setting up a new business in a country. Of the control variables, the state of ICT infrastructure and, to some extent, human capital contribute significantly to improving the ease of starting business. At least for this segment of stakeholders (new businesses), the efforts of governments in bringing their services online appear to have been vindicated. Higher ICT penetration is also doing its bit to facilitating startups, as might have been accepted.

These results are significant, especially when viewed in the context of related research. In terms of consequences, Klapper et al. (2010) have showed that the ease of setting up business "matters"; easier conditions are associated with higher levels of new firm entry and density in an economy. In terms of antecedents, Williams et al. (2013) have shown online government services are better developed under regimes of sound governance (not necessarily democratic). Given our failure to find support for the effect of governance on the ease of setting up business, we can tentatively conclude that such an effect is mostly mediated by the delivery of government services online. If this is indeed true, one of the main pathways through which government policies might boost entrepreneurship (setting up of new businesses) might be the online delivery of government services, as shown in Figure 2 below.
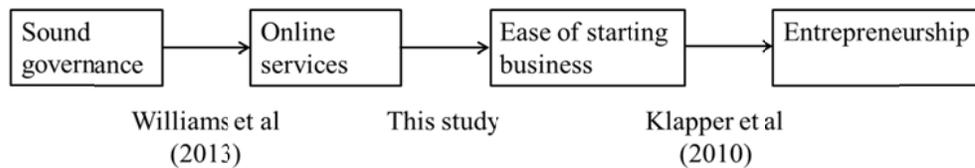

Figure 2: Online services as a pathway from governance to entrepreneurship

Future research will reveal whether this line of reasoning holds merit.

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