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Conference Paper

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20th ITS Biennial Conference, Rio de Janeiro, Brazil, 30 Nov. - 03 Dec. 2014: The Net and the Internet - Emerging Markets and Policies

Provided in Cooperation with:

International Telecommunications Society (ITS)

Suggested Citation: Garcia-Murillo, Martha; Velez-Ospina, Jorge Andres (2014) : The impact of ICTs on the informal economy, 20th ITS Biennial Conference, Rio de Janeiro, Brazil, 30 Nov. - 03 Dec. 2014: The Net and the Internet - Emerging Markets and Policies, International Telecommunications Society (ITS), Rio de Janeiro

This Version is available at:

<http://hdl.handle.net/10419/106841>

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The impact of ICTs on the informal economy

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Juan is the head of a small household consisting of two children and his wife. He sells pirated CDs on the streets of Bogotá. He was forced into this situation after losing a previous job as a truck driver and was unable to find a job because of his lack of education. His current income is USD\$ (PPP) 7,748 a year. Up to this point, he has been unable to afford a mobile phone, but he recently decided that it might be a worthwhile investment, as some of his friends in the informal sector have mobile phones, and they seemed to make running a business easier.

The purpose of this paper is to determine the impact that information and communication technologies (ICTs) have on the informal sector, also known as the *shadow economy*.

In a previous paper, we looked at the impact of ICTs on the creation of new businesses (Garcia-Murillo, Velez-Ospina, & Vargas-Leon, 2013). At the time, however, we decided to ignore the informal sector because we believed that its economic activities are unproductive and do not significantly contribute to the economic growth of a nation. We continue to believe that this is a type of activity that should be discouraged.

Nevertheless, understanding the informal sector is critical because it reflects, to a certain extent, the economic and political conditions of a country. It is a reflection of a government's inability to target poverty effectively.

What is informality?

Juan has a network of friends who also work in the informal sector. Some of them have small enterprises that operate informally; others do not own their own enterprises, but are employed by an informal entity. Curiously, he also has friends who work informally for small companies that are not part of the informal sector (ILO, 2012).

An enterprise is considered to belong to the informal sector when it is not registered under the specific legal frameworks associated with the operations of such an entity. These can involve registration of the entity, tax or social security filings, labor requirements, permits to operate, and so forth.

Individuals and informality

At any given point, a person like Juan will need to weigh the costs and benefits of entering the formal economy, taking into consideration the time, effort and costs that this would entail.

Individuals find the informal sector an attractive source of income because entry is easy, it requires little capital and equipment; it can easily accommodate a small, one-person operation; and the skills required are low (Charmes, 2000a).

The factors that make entry into the informal sector easy are also the reasons why it is not generally desirable for an economy to rely on this type of labor for its economic growth. These informal enterprises do not pay taxes, have little potential for growth and development, and contribute little to capital or knowledge creation. These are mainly subsistence operations that keep those in the lowest strata of income levels alive. The problem of informality is exacerbated by population growth, migration from rural areas, poverty and indebtedness (Charmes, 2000a).

Because Juan operates illegally, he has had to pay significant penalties for selling on the streets, and he often has to bribe the police to avoid having his stock confiscated. This can amount to 10 percent to 15 percent of his gross income, compared to the 1 percent on average that official companies in Peru pay for bribes.

Because he is not legally established, Juan is poorly protected by the police and the courts from crimes committed against his property or from contract violations, and he is unable to obtain any type of business insurance.

Operating in the informal sector provides some basic business skills. A few years ago, Juan wanted to expand his operations, but because of the nature of the business, he was unable to obtain capital from either the private sector or government sponsorship. Given their higher risk operations, informal companies like Juan's find it difficult to access capital, and when they do, the interest they pay is significantly higher than that in the formal sector, 22 percent and 4.9 percent, respectively, in Peru in 1985. A study in Bangladesh found similar disparities in the interest rate paid for capital, between 48 percent and 100 percent for informal versus 12 percent on average for formal entities (Huq & Sultan, 1991). Individuals who work in the informal sector remain poor because the income that they generate from their efforts is low (Charmes, 2000b). This is in part because entities in the informal sector remain intentionally small, due to the fact that more capital-intensive firms can be more easily detected (Loayza, 1997).

Some of Juan's friends who work informally for formal companies have often been abused with poor working conditions and low wages, and they fear being laid off at any moment. Laborers in the informal sector are poorly protected; they have no formal labor contracts and rarely have the opportunity to improve their skills through formal training (De Soto, 1989; Loayza, 1997; Orlando, 2001)

Factors that lead to informality

Given the challenges and difficulties that people face when working in the informal sector, one must ask why it is that individuals like Juan opt to work under these uncertain conditions. As Amuedo-Dorantes (2004) indicates employment in the informal sector can be supply-led – that is, individuals opt to work in the informal economy because the value of their marginal income in either the formal or the informal sector, which means they have determined that they can make slightly higher earnings working in the informal sector.

An alternative reason why some individuals decide to work in the informal sector is because their specific personal characteristics, or institutional barriers, make it difficult for them to find a job in the formal sector (Dobson & Ramlogan-Dobson, 2012). This other explanation points to a demand-led rationale, by which individuals find it difficult to secure employment or to start a company.

Sadly, while informal employment may provide some means of survival, it is by no means a panacea, as these households are more likely to slip down into poverty even more. According to Amuedo-Dorantes (2004), employment in the informal sector increases the likelihood of poverty by 8 percent for male-headed households and by 4 percent for female-headed households.

Consequently, poor individuals like Juan, finding themselves in difficult, if not desperate, economic circumstances, are forced to engage in economically unproductive activities that generate a minimum survival income. The prospects for them to grow personally and professionally are minimal and, while this “job” may give them the means to live and barely support a family, it is rarely an option for escaping poverty. The hope is thus to make these informal activities disappear and provide more opportunities for people to find employment in the formal economy.

Burdensome bureaucracies

Regulation, ideally conceived, is intended to protect employers, employees and consumers. It protects employers by limiting their liability when problems with a product arise, protects their assets from being stolen, and protects them from fraudulent activities on the part of employees and from exploitative labor practices and salaries, while providing benefits for employees, such as social security, paid vacations, sick leave and protection against unjustifiable firing. It protects consumers from dangerous products or services.

Regulation, nonetheless, can be intrusive, and overwhelming to the point of discouraging entry or forcing employers to hire people informally, for example, in order to avoid paying the costs for labor compliance (Mazumdar, 1976).

When Juan was ready to enter the formal sector with a video rental store, he found it impossible to accomplish. He faced bureaucratic barriers involving government officials requiring him to comply with complex and often corrupt processes that entailed significant license or registration

fees, and he would have to visit multiple government offices (Loayza, 1997). He probably realized that these difficulties were not going to end after he started the business, because there were so many legal and procedural requirements that had to be complied with, it would be difficult to remain legal once he started operations.

In a now-famous study by De Soto (1989), the registration of a firm in Peru took 10 months and cost an estimated \$1,037 in lost utilities equivalent to 32 times the minimum monthly salary and included \$195 dollars for licenses and other regulatory requirements. This was later compared with two cities in Florida in the U.S., where it took three and a half hours, and in New York City, where it took four hours to register a new firm

In many developing countries, excessive regulation is common, and many researchers have attested to that. In the Philippines, even micro enterprises require a lawyer and an accountant to comply with all regulatory requirements (Alonzo, 1991), while in Egypt, as observed by Chickering and Salahdine (1991, p. 191) "much of the country's entrepreneurial talent is consumed in circumventing the country's nightmare bureaucratic regulatory system."

Regulation in any country will fall, for the most part, on areas such as the exploitation of resources, labor laws, environmental protection, quality control and consumer protection, distribution of profits, process of production and import controls (Loayza, 1997).

Labor laws are complex pieces of legislation that regulate the number of days of annual leave with pay, the number of days of maternity leave, social security contributions as a percentage of wages, minimum wage as a percentage of average wage, and severance pay, all of which can be difficult to comply with unless expert labor attorneys are hired to navigate the process of approvals, even under efficient government processes.

A study of the informal sector in Mexico found that street vendors participated in their own organizations to take care of problems with the government (51% of respondents) and to assign and negotiate spaces for the merchants (29% of respondents.) These organizations emerged as a means to overcome government regulations and red tape. It is much easier for these street

vendors to become members of these organizations than to try to work within the bounds of government oversight (Rama, 1995).

Street vendor organizations, at least in Mexico, are used to manage stall locations, adjudicate conflicts among vendors selling similar products, maintain waiting lists, assign the use of space when a vendor is absent and even oversee the sale of informal “rights” for “rented” spaces to individuals who are leaving the market. These organizations are, in fact, alternate government structures.

For this study, we use the variable *cost of starting a business* as a proxy for bureaucracy. Figure 1 shows the relationships of bureaucracy with the informal market.

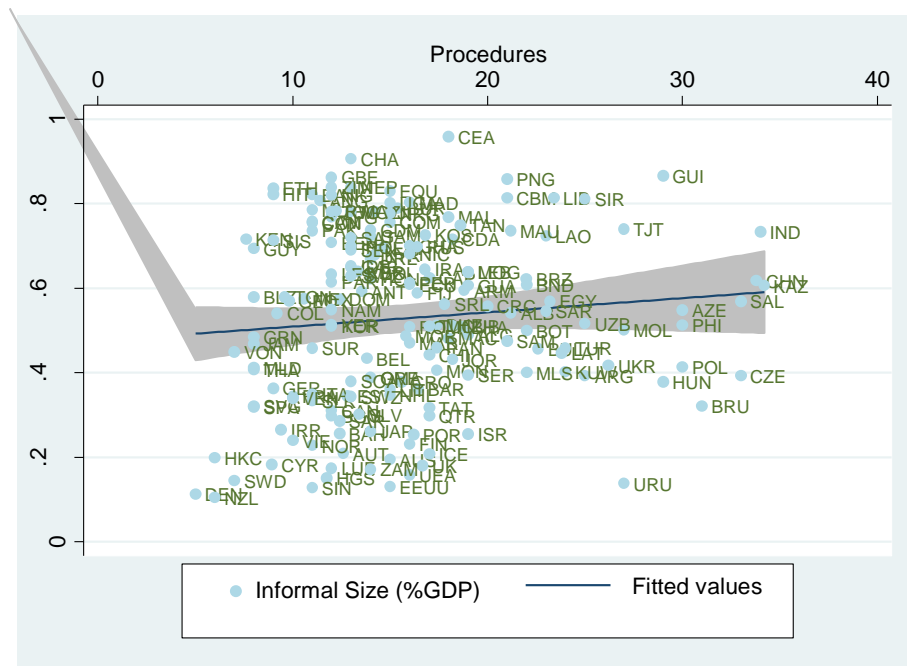


Figure 1. Relationship between the cost of starting a business and the size of the informal sector.

Corruption

In addition to the bureaucratic processes that Juan needed to comply with to move into the formal economy, he discovered that many of those requirements would be impossible to meet without paying significant bribes. This was not a one-instance situation but would involve a number of occasions in different government offices. Corruption is thus an additional barrier for individuals trying to move their operations from the informal to the formal sector (Lambsdorff, 1999).

North (1990) states that institutions influence economic activity. Citizens will engage in the enterprises that generate the greatest economic returns. In many countries, the most lucrative activities are bribes, kickbacks, and illegal favors; these generate serious negative distortions in the economy and undermine citizens' trust in the (democratic) institutions of the country, moving many of them into the informal sector. When a country experiences high levels of corruption, these illegal activities become institutionalized as part of the fabric of society.

For corruption to occur, one of the parties in the relationship must be able to give the other a privilege that would otherwise be difficult to get. Governments are thus one of the main sources of corruption, particularly those with big bureaucracies, because there are many activities within the purview of the state—in the form of licenses, permissions, contracts, and so forth—directly controlled by a few powerful individuals in government.

Figure 2 shows the relationship between the World Bank's *control of corruption* and the size of the informal sector.

Taxes

At the time when Juan was trying to expand his informal business, he also became aware of the taxes that he would have to pay to formally register his business, and he balked. This is not surprising; there is evidence that the informal sector emerges when there are excessive taxes

(Loayza, 1997). Taxes are an important source of income for governments, and given a lack of resources to enforce tax returns for individuals, companies become easy targets for extracting tax income. In developed countries, the tax income from corporations amounted to only 7.6 %, which is almost triple the tax rate that prevailed in developing economies, which was approximately 17.8 percent (Burgess & Stern, 1993). This problem is exacerbated when a comparatively smaller corporate sector has to make up for unpaid taxes on the part of the informal economy, leading to higher taxes than in developed nations.

Figure 3 depicts the relationship between taxes and the informal sector, which shows as an inverse relationship.

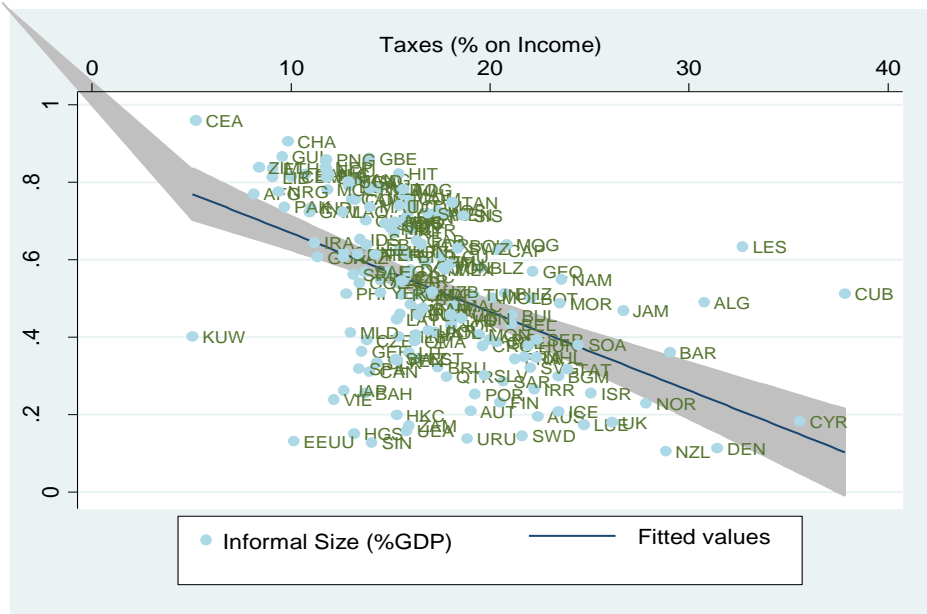


Figure 3. The relationship between government taxes received and the informal sector

ICTs

In a previous study, we found that information and communication technologies positively affected the creation of new businesses. The rationale for this relationship was that information technologies remove the barriers to entry, while also providing sector information, business skills information and access to the collective wisdom of many users willing to share their experience and expertise in any given area.

In that study, we did not include the informal sector, mainly because we believed that individuals employed in the informal economy did not contribute to the capital accumulation and economic growth of a nation. Feedback on our work from other scholars, however, argued that the informal sector is a critical component of a developing nation because it provides jobs and income to a portion of the population that would otherwise have no other options. This idea is also found in the literature. Some of these informal enterprises exhibit great sophistication, enabling owners and the small group of informal employees that they work with to operate under better conditions for themselves (Amuedo-Dorantes, 2004).

Juan owns a cell phone and goes to a café to connect to the Internet. Through friends and the Internet, he is finding job opportunities and government programs that can help him abandon his informal business. ICTs, we believe, have the potential to reduce barriers to information, which may be necessary if Juan is to formalize his operations.

There have been multiple efforts by governments to try to reduce the size of the informal sector. This is because these informal entities use government services, but do not fully contribute to their provision. This, in turn, negatively affects the provision of more and better services, such as basic infrastructure. This leads to a vicious circle of informality and poor government services.

In the last five years, information and communications technologies have developed rapidly. Some of these technologies have been implemented by governments in efforts to make their operations more efficient. This, we believe, will contribute positively to the reduction of the informal sector.

The question now is whether ICTs implemented by government and used by individuals like Juan can move individuals from the informal to the formal economy by reducing some of the barriers associated with the government.

Figures 4 and 5 show the relationship between two technologies and the size of the informal sector.



Figure 4-5. The relationship between cell phone and broadband subscriptions and the size of the informal sector.

Education

Juan has heard from his friends that they have used the Internet to get merchandise because they can find the cheapest outlets, and they can communicate with friends in other markets where the merchandise also is sold. Juan has not taken advantage of these technologies but is curious about them.

A report conducted by the economics Ministry in Colombia indicated that small businesses did not use ICTs, for two main reasons. One was the price associated with the use of these technologies; the other was that the businesses could not envision how to use them. This alerted us the effect of education as a prerequisite for individuals in the informal sector to be able to take advantage of ICTs.

Gërxfhani and Van de Werfhorst (2013) make a connection between education and the informal sector by assuming that human capital decreases the need for individuals to enter the informal

economy. In addition, they believe that education heightens the population's civic commitment, which may lead them to morally refuse to participate in the informal sector.

Although not directly addressing the connection between education and the informal sector, Štulhofer and Rimac (2002), surprisingly, found a positive correlation between education and the underground economy in Croatia.

Rogers (1983) diffusion of innovations theory includes education as one of the factors that leads to technology adoption. Better-educated populations are quicker to adopt new technology than those with less education. Similarly, Kelly and Petrazzini (1997) found that academic institutions play an important role in the diffusion of the Internet because they are among the first ones to be connected.

The impact of education is, nonetheless, not entirely clear. A study by Hargittai (1999) found that education is only relevant to Internet adoption when government policies are not in the model.

At this point, it is unclear which ICTs will have the greatest impact on the reduction of the informal economy. Assuming that the Internet is key to moving individuals away from the informal sector, its adoption might depend on the population's having a fairly high level of education, unlike the adoption of cell phones, which require no education and which street vendors may prefer (Dasgupta, 2001).

Similarly, De Paula and Scheinkman (2011) found that entrepreneurs require managerial knowledge as well as experience, which also determines the probability of their entering the formal or informal sector. Individuals with high ability are more likely to enter the formal sector.

Figure 6 shows the relationship we found between ICTs and education.

Model

Several approaches have been used to capture the size of informal sector. In this paper, we wanted to approach the problem using the latent variables technique. For this, we used the Multiple Indicators and Multiple Causes Model (MIMIC) to identify the causes of informality and to test the significance of factors that could explain the size of the informal economy. On the other hand, given that the estimation of informality was jointly captured for all countries in the sample, we were able to use the estimations of the size of the informal sector to verify that it corresponded to estimates done by other scholar who have studied these countries. The model was constructed based on the theories we identified in the literature review.

The MIMIC model is specified as follows:

$$I = \tau'X + \varepsilon \quad (1)$$

$$Z = \Phi I + \mu \quad (2)$$

and $E(\varepsilon\mu') = 0$, $E(\varepsilon^2) = \sigma_\varepsilon^2$, $E(\varepsilon^2) = \Omega$, a diagonal matrix.

In the equation (1), the latent variable I , represent the Informality Variable, this is linearly determined by a set of exogenous factors X that identified the bureaucratic process, corruption, unemployment and ICTs. In the equation (2) the latent variable I linearly determines the set of observable endogenous indicators like GDP per capita, infrastructure, and human development index.

The reduce form for the model is obtain putting (1) in (2) as follows:

$$Z = \Phi(\tau'X + \varepsilon) + \mu \quad (3)$$

$$Z = \rho'X + v \quad (4)$$

The structural equations from the parameters (causes) use the maximum likelihood estimation method.

The model pretend that the latent variable I has high correlation with the indicators Z and also solves the problem of endogeneity between indicators and causal variables.

Note that in equation (4) we have a nonlinear parameter. Therefore, is necessary to adopt a normalizations, setting, for instance, one of the coefficients in \emptyset equal to one (constrained). Normalization of the latent variable can be obtained from the estimated values of the causal coefficients. Then, we can compare the differences in the latent-variable values for the countries and thus, rank all of them.

Results

Figure 7 reports the estimation results. The regression coefficients and their respective standard errors (in parentheses) are represented by the arrows pointing in the direction of influence in the model. In this case, the MIMIC model involved five causal variables (X), and 3 indicators(Z).

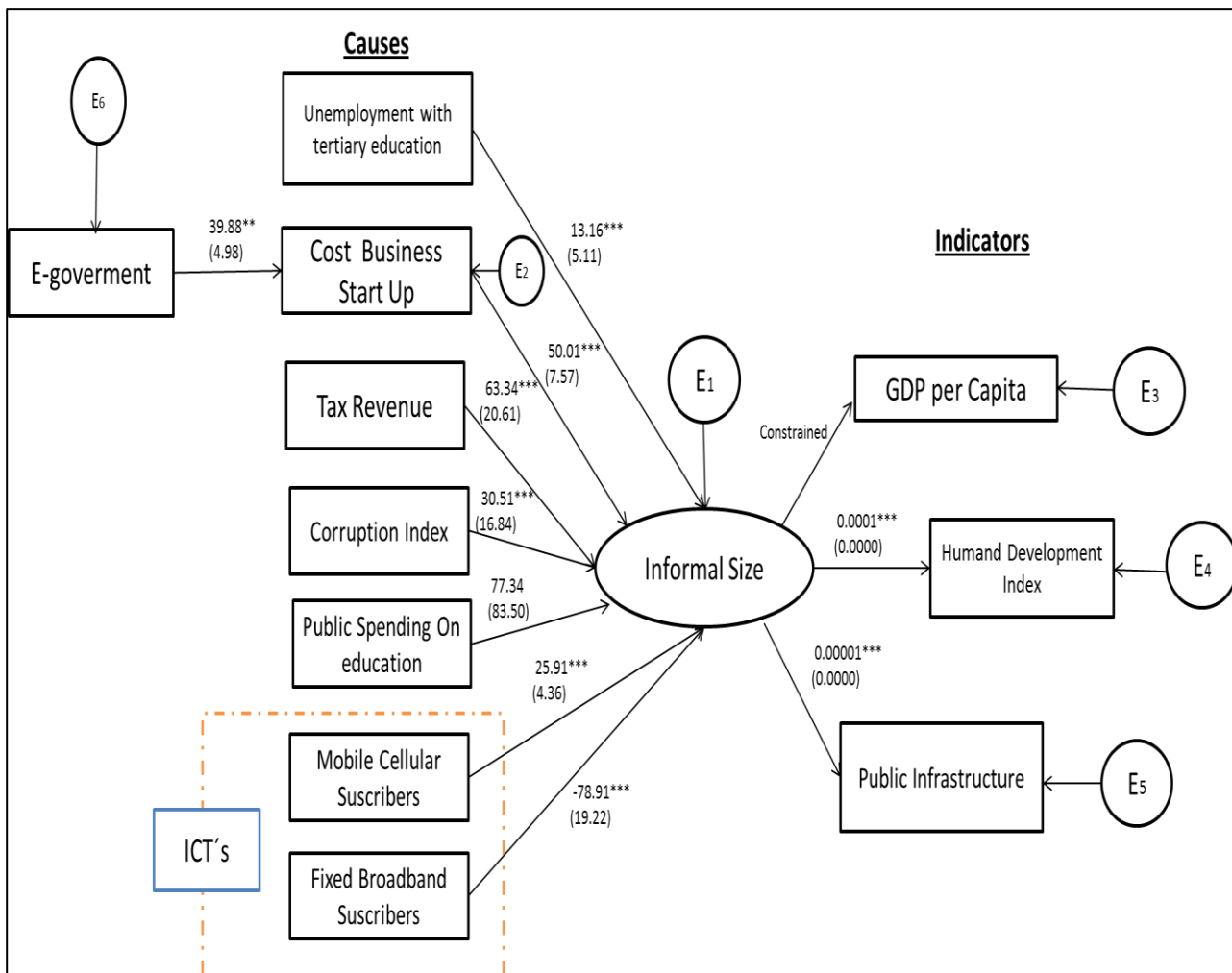
The results of this study led us to a different set of conclusions from those we started out to explore.

Our initial hypothesis was related to the notion of individual empowerment, with the expectation that information and communication technologies and the information that is available through web sites would allow entrepreneurs to explore economic options outside of the informal sector.

First, it is clear that the rate of unemployment pushes people into the informal sector. An increase in the unemployment rate leads to a high increase in the size of the informal economy.

However, our analysis of the information and communication technologies point to a slightly different picture; specifically, cell phones and broadband access have an impact on the size of the informal sector, although they fulfill different functions. First, cell phones are indeed an enabling

technology, but the amount of information that a person can obtain through them is restricted to person-to-person interactions. The sign of this coefficient on the informal sector is positive and significant, meaning that an increase in the use of cell phones also increases the informal sector. This, to us, represents efficiencies, primarily in the form of a reduction of the transaction costs associated with coordination and, potentially, enforcement. A street vendor needs to be able to coordinate his or her operations with the people who provide their goods and then maintain communication with their representatives, to ensure that their property is not confiscated when law enforcement tries to shut down their operations. The prevalence of cell phones in less developed countries, in the absence of broadband, actually aggravates the problem by making it easier to operate.



The second technology that we analyzed is broadband, which in this case has a negative and significant coefficient, showing that a greater diffusion of broadband does actually help to reduce the size of the informal sector. The effect is not only significant, but also quite large. This provides some initial evidence of the positive effects that access to broadband can have on disadvantaged populations. Unlike cell phone technology, which appears to impact only business operations by reducing transaction costs, broadband gives people access to many more resources that can provide the means to finding alternative employment options.

Sadly, other significant and large factors in the model are all the other variables related to government functions. The largest is the taxes collected by the government, which lead significant increase in the informal economy every time the government increases its tax revenues. This problem is exacerbated by the impact that other government variables have on the informal economy. For example, the cost of doing business, which was our proxy for bureaucracy, shows that, indeed, the higher the cost of doing business, the larger the informal sector. If we think about the manner in which governments evolve, we are likely to find that procedures evolve, and their history or rationale fades, leading to the creation of bureaucracies, which can lead to the prevalence of inefficiencies that open opportunities for corruption, all of which contributes to and further exacerbates the problem of informality. In this case, corruption is also a significant factor leading to an increase in the informal sector. If the corruption index goes up, the size of the informal sector increases significantly as well.

All of these government-related variables combined paint a grim picture of systemic problems that lead to the emergence of informal economic operations. We appear to have a government that gets its revenue from an inadequate tax structure, which, combined with bureaucratic inefficiencies and corruption, further exacerbates the problem of the informal sector.

Education, on the other hand, does not result in a significant coefficient. Our unemployment variable, which is calculated as the percentage of unemployed people with tertiary education, gives an indication of the problems that persist in the economy, which lead to an inability on the part of educated people to find employment.

Given that we are interested in the impact of technologies, we also explored the impact that electronic commerce has on bureaucratic processes, – specifically, the cost of doing business. In other words, we wanted to find out if ICTs have reduced the burden of bureaucracy on individuals wishing to start a business. The variable is significant and positive, meaning that the introduction of technologies in the country has led to increases in the cost of starting a business. Although this is not what we would have expected, it is possible that today, when we are just at the beginning of the introduction of technology into government processes, businesses need to invest in technology as well and learn the new system, which might display and why the variable has a positive sign.

Finally, in regard to the outcome variables, we find that the informal economy affects the GDP per capita positively, which is not surprising because the income that these individuals generate from their informal operations gets spent in the formal economy. The model also shows that both infrastructure and human development are positively affected, but the degree is too small to be of great importance or concern.

Given the results of this study, we are optimistic about the positive impact broadband can have on an economy, which should lead to a reduction of the informal sector.

CONCLUSIONS

This paper proposes an analytical model whereby taxes, bureaucratic processes, and corruption negatively affect informality, to the extent that educated people are unable to find employment and expenditures for education do not appear to have any impact on the size of the informal sector

Regarding ICTs, many governments in less developed countries, where the problem of informality is more pervasive, have been highly satisfied with the expansion of mobile networks and have touted the effectiveness of their telecommunications policies. This paper shows the

limitations of the mobile infrastructure, which is important. However vital information regarding educational and employment opportunities, as well as government operations and services, may only be accessible through more sophisticated web pages that are difficult to navigate using a cell phone. The implication and policy recommendation is for governments to put a greater emphasis on expanding their broadband infrastructure.

Nonetheless, given these results, it is clear that an integrated approach to reducing informality rests on a strengthening of government institutions and on measures to reduce burdensome bureaucratic processes.

Appendix 1: Variable's Definitions

NAME	CODE	DESCRIPTION	SOURCE
Human Development Index (HDI) value:	hdi	A composite index measuring average achievement in three basic dimensions of human development—a long and healthy life, knowledge and a decent standard of living. See Technical note 1 for details on how the HDI is calculated. Source: HDRO calculations based on data from UNDESA (2011), Barro and Lee (2011), UNESCO Institute for Statistics (2012), World Bank (2012) and IMF (2012). Data in the tables are those available to the Human Development Report Office as of 15 October 2012, unless otherwise specified.	United Nations Development Programme
Fixed broadband Internet subscribers (per 100 people)	fbiphp	<i>Fixed broadband Internet subscribers</i> consists of the number of broadband subscribers with a digital subscriber line, cable modem, or other high-speed technology.	World Bank
Mobile cellular subscriptions (per 100 people)	mcsphp	Mobile cellular telephone subscriptions are subscriptions to a public mobile telephone service using cellular technology that provides access to a public, switched telephone network. Post-paid and prepaid subscriptions are included.	World Bank
GDPPC,PPP(constant 2005 international \$)	gdppc	<i>GDP per capita based on purchasing power parity (PPP)</i> . PPP GDP is gross domestic product converted to international dollars, using purchasing power parity rates. An international dollar has the same purchasing power over GDP as the U.S. dollar has in the United States. GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy, plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for the depreciation of fabricated assets or for the depletion and degradation of natural resources. Data are in constant 2005 international dollars.	World Bank
Tax revenue (% of GDP)	taxr	<i>Tax revenue</i> refers to compulsory transfers to the central government for public purposes. Certain compulsory transfers, such as fines, penalties, and most social security contributions, are excluded. Refunds and corrections of erroneously collected tax revenue are treated as negative revenue.	World Bank
infrastructure reindex	infrastructureindex	The Macquarie Global Infrastructure Index Series (MGII), calculated and managed by FTSE, is designed to reflect the stock performance of companies within the infrastructure industry, principally those engaged in the management, ownership and/or operation of infrastructure and utility assets.	
E-government Index	egi	The E-Government Development Index is a composite index comprising the Web Measure Index, the Telecommunication Infrastructure Index and the Human Capital Index.	UN Public Administration Programme
Procedures to build a arehouse (number)	pbw	The <i>number of procedures to build a warehouse</i> is the number of interactions of a company's employees or managers with external parties, including government agency staff, public inspectors, notaries, land registry and cadaster staff, and technical experts apart from architects and engineers.	World Bank

Unemployment with tertiary education (% of total unemployment)	uewte	<i>Unemployment by level of educational attainment</i> shows the unemployed by level of educational attainment, as a percentage of the unemployed in general. The levels of educational attainment accord with the International Standard Classification of Education 1997 of the United Nations Educational, Cultural, and Scientific Organization (UNESCO).	World Bank
Cost of business start-up procedures (% of GNI per capita)	cbsup	The cost to register a business is normalized by presenting it as a percentage of gross national income (GNI) per capita.	World Bank
Control of corruption	corruption	<i>Control of corruption</i> 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 the "capture" of a state by elites and private interests.	World-wide governance indicators
Effectiveness of government	Governance	This indicator measures the quality of public services, the quality of the civil service and its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to its stated policies.	World-wide governance indicators

Appendix 2. Basic statistics Table

CODE	Median	standard deviation	min	max
hdi	0.65440784	0.174658295	0.27	0.943
fbiphp	8.24402255	8.409675177	1	37
mcsphp	70.9895955	38.68694173	1	205
pcphp	58.1808994	9.198302017	0	94
gdppc	10850.8127	8577.484046	298	57073
taxr	16.8680983	6.21518422	0.195383	58.8583
infrastructureindex	0.09048565	0.098422127	0.0017487	0.6390205
egi	0.45457433	0.180222717	0.1142	0.9157
corrup	37.1968296	23.37110527	1	97
pbw	16.020936	6.475662879	5	45
uewse	45.2156738	15.94595624	4.5	82.8000031
Informalsize	0.46530956	0.22437512	0	1
Senrollment	80.6848218	27.5581318	11.14075	155.0718

Appendix 3. Correlation coefficients matrix.

The correlation coefficient	Informalsize	Human Development Index (HDI) value	Fixed broadband Internet subscribers (per 100 people)	Mobile cellular subscriptions (per 100 people)	Personal Computers (per 100 people)	Population in the largest city (% of urban population)	Tax revenue (% of GDP)	infrastructure index	E-Government	freedom from corruption	Procedures to build a warehouse	Unemployment with secondary education (% of total unemployment)	secondary people /total
Informalsize	1.0000												
Human Development Index (HDI) value	-0.7320	1.0000											
Fixed broadband Internet subscribers (per 100 people)	-0.4934	0.5841	1.0000										
Mobile cellular subscriptions (per 100 people)	-0.4728	0.6579	0.5135	1.0000									
Personal computers (per 100 people)	-0.2335	0.2606	0.5396	0.1845	1.0000								
Population in the largest city (% of urban population)	-0.2565	0.2533	0.2825	0.2097	0.1705	1.0000							
Tax revenue (% of GDP)	-0.4503	0.3873	0.2309	0.2161	0.1345	0.1278	1.0000						
Infrastructure index	-0.4062	0.5071	0.3779	0.1629	0.1606	0.1552	0.1392	1.0000					
E-Government	-0.2384	0.3158	0.2858	0.2371	0.1428	0.0590	0.1173	0.1021	1.0000				
Freedom from corruption	-0.6759	0.5326	0.5543	0.3541	0.3164	0.2772	0.2809	0.4246	0.2103	1.0000			
Procedures to build	-0.0456	-0.0093	-0.1679	0.0325	-0.1041	0.0138	-0.1299	-0.1260	-0.0040	-0.1398	1.0000		
Unemployment with secondary education (% of total unemployment)	-0.3374	0.2762	0.1803	0.2436	0.0103	0.1418	0.1668	0.0813	0.1540	0.1497	0.1138	1.0000	
Secondary people/total	-0.8831	0.6651	0.3772	0.4122	0.1898	0.1794	0.3123	0.3205	0.1981	0.3679	-0.0169	0.2114	1.0000

The correlation coefficient	<i>Informal Size</i>	<i>GDPPC,PPP(constant 2005 international \$)</i>	<i>Human Development Index (HDI) value</i>	<i>Infrastructure index</i>
<i>Informal Size</i>	1			
GDPPC,PPP (constant 2005 international \$)	-0,2565***	1		
Human Development Index (HDI) value	-0,5722***	0,1361***	1	
Infrastructure index	-0,4062***	0,1552***	0,2808***	1

***Significant at 5 percent level of significance.

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