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Internet Access:
a new face of democracy ?

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Abstract

Is it possible that the positive effect of the internet usage by population on the democratization process of a society, seemingly intuitive, is actually spurious? As part of this discussion, we propose here using linear statistical frameworks to make inferences about the sign and significance of the internet access on democracy, along with the effect of other variables that seem to be useful to understand the dispersion of democratic levels among distinct nations. A first novelty in this paper is regarding the dependent variables: our exercises are based on four democratic concepts established by the United Nations, characterized through quantitative variables associated with political and civil liberties reported in the Human Development Report (HDR) of the United Nations Development Program (UNDP) for 2010. Since we intend to measure the effects adequately, we propose two promising frameworks based on fundamentals: i) a first in which besides the population's access to the internet, there are explanatory variables in the areas of social development and human and physical capital; and ii) a second, in which we consider the internet effects vis-à-vis other mass media, such as radio and television. In line with previous empirical studies, such as Best & Wade (2005), according to the first exercise, popular access to the internet was significant at 5% in the models regarding the level of democracy, violation of human rights and political involvement. We also find that the increase in the Human Development Index (HDI) of a society can lead people to participate less actively in the democratic process, while richer nations tend to violate human rights more frequently. Although it seems hard to compare the results based on the second exercise, due to the inexistence of articles modeling the effects of communication means for a cross-section of countries, as expected in the sense of Sieyès (1789), the power of the internet appears stronger in comparison with other means, i.e., it is the only communication tool seemingly capable of hastening the democratization processes, in the sense of Cheibub, Ghandhi & Vreeland (2009) and Gibney, Cornett & Woods (2010). These results can support decisions on public policies aiming at promoting democratization in some nations, paying attention to the new face of this democracy, which can be more dynamic and broader, but also ephemeral and relying on less ideology.

Keywords: Democracy; Violation of human rights; Political involvement; Democratic decentralization; Internet.

JEL Codes: D720, L860.

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1. INTRODUCTION

According to Bernstein (1998), the conquest of democracy, the progress of science and technology, the adoption of capitalism and advances in risk management are the pillars that distinguish current societies from those that existed for thousands of years. Machiavelli (1519), Althusius (1603), Suarez (1612), Spinoza (1677), Locke (1690), Montesquieu (1748), Rousseau (1762) and Leroux (1845), among others, adopt this viewpoint by advocating the relevance of the benefits of democratization.[1] Even the Bible contains examples showing that the power of rulers should not be absolute.

In this context, some natural questions have motivated researching. What is the origin of the concept of democracy and how has it evolved along the time? How can a society's level of democracy be measured, in absolute and relative terms? What characteristics can justify the different democratic levels observed in countries?

There is no consensus among researchers about the origin of democracy. Historians such as Finley (1985), claim that the first use of this institute was a fragment of the island of Chios, between 575 and 550 BC. However, others, such as Goyard-Fabre (1998), indicate the born of democracy in Ancient Greece, two thousand years ago. Authors, such as Keane (2009), disagree about this rationality, arguing that the literature usually repeats this cliché, ignoring the research on assemblies of ancient Mesopotamia Syria.[2]

Irrespective of the true origin, regarding its evolution, Huntington (1991) argues that humanity has experienced a succession of "waves of democratization", i. e., transitions of an undemocratic regime to a democratic one occurring within a specified period of time.

Although it seems arbitrary to specify exactly when there was a transition regime, the author suggests that the first wave born as a consequence of the American and French Revolutions, in the late eighteenth century. We can observe in the following decades, the expansion to other countries of suffrage to the secret ballot, setting the responsibility of prime ministers and parliaments.

The second wave took place after the end of World War II, was short and could be characterized by the adoption of democracy in Western Europe, Latin America and the former Western colonies newly independent.

The third wave began in 1974 with the Carnation Revolution in Portugal, followed by the democratic transitions in Latin America in the 80s, in Asia-Pacific and Eastern Europe after the fall of the former Soviet Union.

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[1] Historians and philosophers, such as Plato (c. 427-348/347 B.C), publicly criticized this governing regime.
[2] See Herodotus (484 c. 420 B.C.) for historical reports, according to which Cleisthenes can be considered the father of Athenian democracy.

To summarize, the democracy that exists in the contemporary world attests to the evolution of the mentality and the progress of political awareness, according to Goyard-Fabre (1998).

As we can see, over the years this regime of "government of the people, by the people" has been beset by ambiguities, difficulties and the complexity of structural and institutional changes, with its current global dimension being a consequence of its fundaments: respect for a constitution and citizens' basic rights. In this sense, Burdeau (1956) provides a rereading of the concept, suggesting that democracy is not just a single political regime, but rather exercises an influence on various systems of government, making its comprehension and the measurement of a nation's democratic level complex and controversial.

Probably for this reason, empirical articles employing quantitative and qualitative metrics capable of measuring the level of democracy are relatively recent in the political science literature. One of the most often mentioned and applied approaches is to measure the level of democracy according to the proposal of Freedom House (2004), for instance, which links a country's democratization to political rights and civil liberties, with values of these variables obtained directly by collecting data from survey questionnaires.[3]

Regardless of the metric for democracy, whether directly or indirectly measured, associated with a free press or the violation of human rights, if we observe large cross-sections of countries, it is possible to evidence an accentuated heterogeneity, even when analyzing current data.

According to United Nations (UN), based on values for 2008, while we can identify on the one hand that Colombia and Afghanistan had the worst level of human rights violation (level 5), due to their widespread civil disorder, on the other hand, five of the ten richest countries in the world in terms of overall Gross Domestic Product (GDP) – Brazil, China, United States, India and Russia – although presenting reasonable levels of social welfare and being free of civil conflicts for many years, were at level 4 in violation of human rights on a scale of 1 to 5. The contradictions and idiosyncrasies justifies a review of the literature to identify through statistical frameworks, what variables are useful to shed light on the dispersion of democratic levels among nations in a period of time or that indicate the evolution of democracy over time in a given society.

Since there are trusty databases about the democracy level in different nations, following an embryonic but promising research line, one of the most acknowledged puzzles is related to the role played by mass media in the process of democratization of societies, the motivation of this paper.

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[3] Freedom House is widely known as a relevant and reliable source of information about the state of freedom.

More specifically, our purpose here is to answer if the internet, as a revolutionary communication tool, is capable or not to understand the divergence of democracy levels observed in large cross-sections of economies in a given period of time, i.e., we do not work with panel data or time series, but only cross-section data.

Related to the role played by the internet, by promoting fast, objective and cheap access to population in terms of creation and dissemination of information, this communication tool can be seen intuitively as a source fostering democracy. Although allowing over two billion users to consult searching sites, to buy products and services and to participate in social networks, its real contribution to democratization is not consensual, since the apparent positive correlation between internet access and democratic levels can be an evidence of its capacity to influence, as argued by Sclove (2004), or a consequence of an economic and political scenario that enables the strengthening of democracy and the internet at the same time, without one necessarily influencing the other.

In order to measure the influence of internet, one of the most explored approaches uses some metric associated with a population's access to the internet, together with cultural, demographic and (especially) economic variables associated with development, education and health, which are intuitively associated with the process of democratization. Therefore, the statistical framework allows ascertaining the linear effect of each of these explanatory variables on the dependent variable, the level of democracy.

As a first novelty, we employ the concepts of democracy established by the United Nations (UN), characterized through variables associated with political and civil liberties and accountability of leaders. These variables can be quantified and their values are reported in the Human Development Report (HDR) of the United Nations Development Program (UNDP) for 2010. Basically speaking, the HDR for 2010 reports countries' levels of democracy according to four variables: *i)* the level of democracy, as proposed by Cheibub, Ghandhi & Vreeland (2009); *ii)* the level of violation of human rights, according to Gibney, Cornett & Woods (2010); *iii)* the level of democratic decentralization, in the sense of Beck et al. (2001); and *iv)* the level of public political involvement, which measures the percentage of people in a given society who express their opinions to their government representatives, according to the Gallup World Poll (2010).

Aligned to this route, in the first empirical exercise proposed in this article, we consider in our framework, besides internet access, economic variables such as the Human Development Index (HDI), the adult literacy rate and absolute GDP. We do not claim originality in this modeling, specifically the choice of the exogenous variables, which is based on the relevance of the areas of human and social development and human and physical capital, as emphasized by Kedzie (1997), Richards (2002) and Best & Wade (2005). Possibly, this latter article is the closest methodologically to our first exercise. They used a panel of 188 countries during 11 years and considered the following variables in modeling democracy: level of internet

use, per capita GPD and literacy rate, besides dummy variables for the continents. Here we include the HDI because of its broad composition that summarizes aspects associated with human and social development.

In the second exercise analyzed here, we follow the path used in Putnam (2000) and Scheufele & Nisbet (2002), where the purpose was to measure the effects of access of mass media based on an exercise limited to the population of United States of America. In this paper, we go one step further and ask about the effects of internet, radio and television access, but considering large cross-sections of countries.

The basic foundation for choosing this second set of variables is the position of Sieyès (1789), who argues that the more united people are the greater chances of success in their struggles. Consequently, the formation of politically participative societies can occur more effectively with the presence of new technologies, and in this process, each communication means may be indispensable to its era. Radio, in the beginning, by permitting local, and in some cases national, access to information, although restricted and basically unilateral, promoted a change in the electorate in response to political propaganda, breaking with the electoral tradition, as the well-known *voto do bico de pena* in Brazil.[4] With the emergence of television, there was greater access, with the main new characteristic being the ability to see rather than just hear candidates, for instance. With the internet revolution, the speed of transmission and quantity of information both increased. More important: the dynamic and multilateral interactive nature of this medium, allowing all users to participate through blogs and virtual communities, besides providing access to radio and television with computers and mobile devices.

The remainder of the paper is organized as follows. Section 2 gives an account of the evolution of the internet access, while Section 3 discusses the techniques used to estimate the frameworks proposed here. Section 4 presents the empirical results obtained in this paper. Concluding remarks are offered in Section 5.

2. THE EVOLUTION OF THE INTERNET IN THE WORLD

Even in light of earlier advances in communication, such as the first development of written forms of communication between the Phoenicians through a pioneering alphabet 3,500 years before Christ, or the establishment by the Egyptians six centuries later of a rudimentary but standardized form of writing, culminating in the first written encyclopedia by the Syrians around 1,200 to 1,330 BC, it is possible to argue that in the last four decades the internet has been the greatest advance in democratization of information in history, now in real time and combining the written word with sound and images, going beyond multimedia to the realm of

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[4] Unfortunately, there were national radio networks widely exploited by politicians against the democracy. For example, Hitler's use of radio as a national mass propaganda instrument.

hypermedia and hypertext. Nowadays, access to the internet has become fundamental or even vital in specific cases to societies, enabling people to perform daily activities – from the simplest to those of the greatest responsibility – easily, quickly, efficiently, reliably and cheaply, through electronic devices that range from desktop computers to tiny handheld apparatuses.

Unlike other advances in communication (printing, telegraph, radio, television), the internet traces its origins to a specific government effort, with the establishment of a network of computers in 1969 by the Advanced Research Projects Agency (ARPA). According to Castells (2003), this agency was created in 1958 by the American Department of Defense with the purpose of attaining superiority over the Soviet Union in military technology. In 1990, this original Arpanet was technologically obsolete, and management of the internet was entrusted to the National Science Foundation. But soon thereafter, internet management was privatized, as part of the movement to establish public domain over computer network technology and deregulation of telecommunications. At that point, the majority of computers in the United States were able to log online, and this capability was the main impetus for the diffusion of network interconnections. In the 90s, many internet service providers set up their own networks and established their own communications portals on a commercial basis.

According to the International Telecommunications Union (ITU), an organization linked to the UN, in 2011 more than two billion people in the world were internet users, while there were 250 million in 2000, meaning an annual growth rate of 20.8%. Despite this revolution in access to information and the fast growth, only 30% of the world's nearly seven billion people have access to this means of communication, a lower level if compared to roughly five billion people with mobile telephone subscriptions and the global coverage of this form of communication of greater than 90%. Hence, there is still room for significant growth of the internet, to even out the great existing disparities among the world's nations.

In order to analyze this access in a disaggregated way, Figure 1 reports the percentage of population in each of the HDI ranges of 188 countries. If we observe the average percentage of users and the respective dispersion, adequate for samples with values having distinct orders of size, i.e., the ratio between the standard deviation and the mean, we can evidence a distinct and apparently robust pattern, according to which the higher the HDI, the greater the average internet access level and the lower the dispersion reflected by the coefficient of variation. This is an expected result based on the better quality of life, education, and access to and comprehension of information in countries with higher HDI. Figures 1.a to 1.d, broken down according to HDI category, show average access values of 65.66%, 31.09%, 12.33% and 3.53%, while the dispersion fluctuates between 0.22 and 1.03. In the case of other countries and territories (Figure 1.e), the average access is 22.70%, with a high dispersion of 1.02.

In light of the discussion about the influence of internet access on a nation's democratization process and the correlations in large samples of countries between internet access and the other explanatory variables used in the two empirical exercises presented in this article (e.g., according to the UN's Human Development Report, there is correlation of 0.79 with the HDI and of 0.58 with television access), the following question arises: Is it possible that the positive effect of the internet on democracy, seemingly intuitive, is actually spurious?

Figure 1 - Percentage of the population with internet access in countries according to HDI category
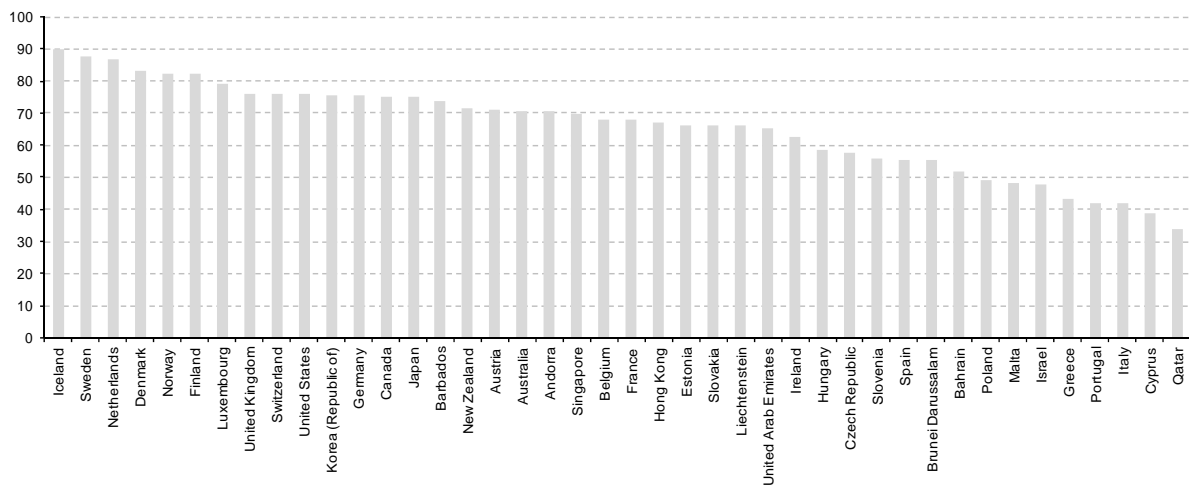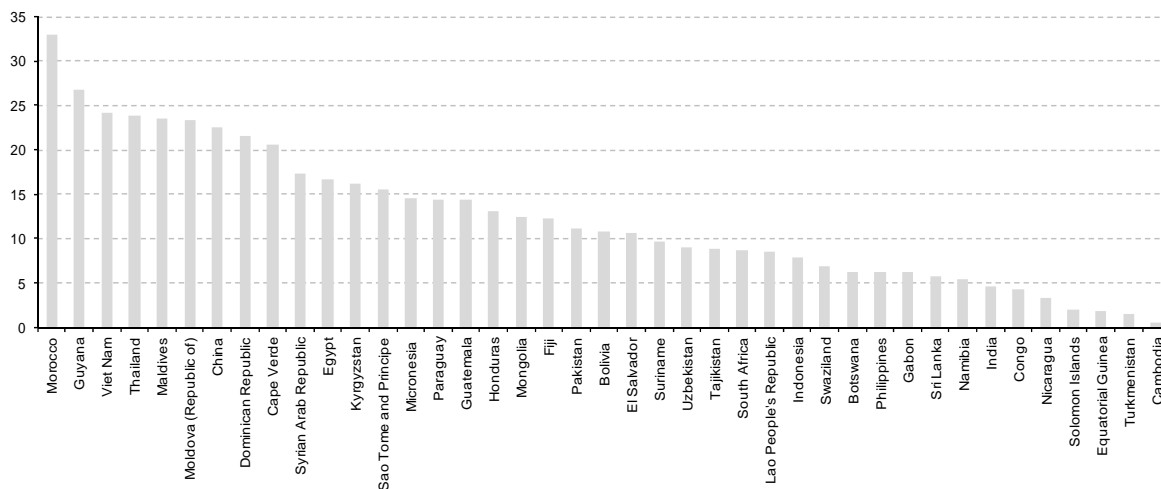

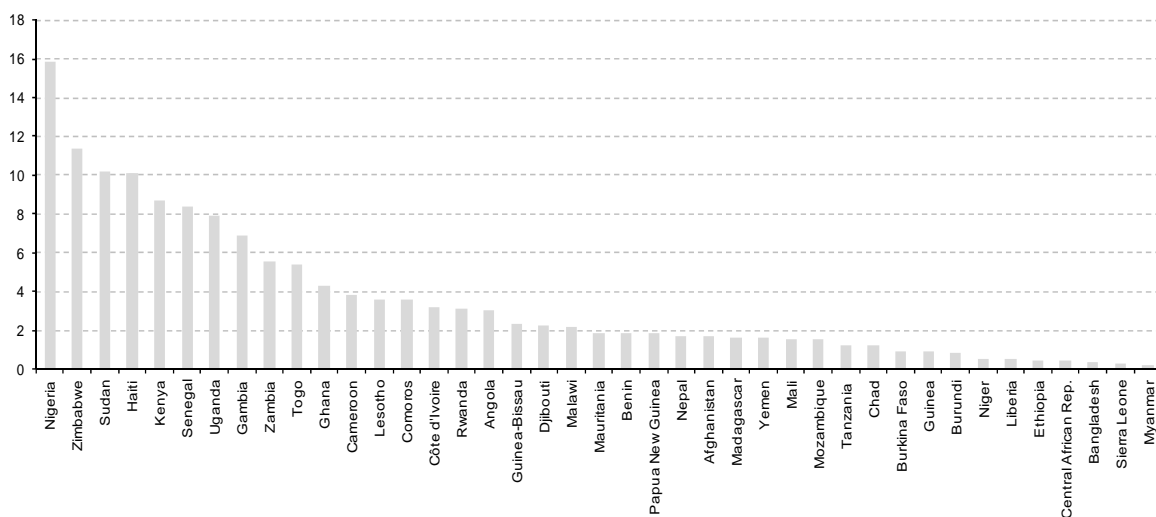1.a - Database contains 42 countries with very high HDI (period: 2008).
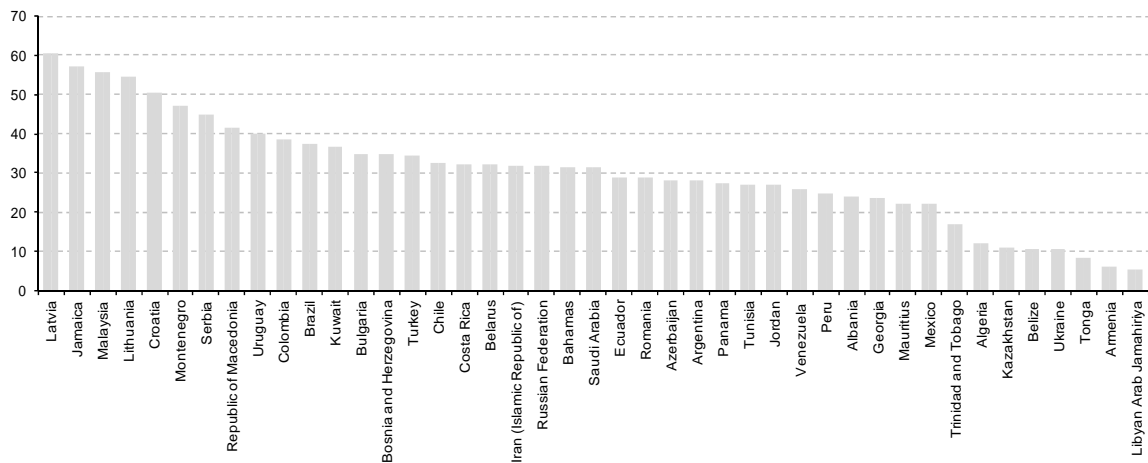
1.b - Database contains 43 countries with high HDI (period: 2008).
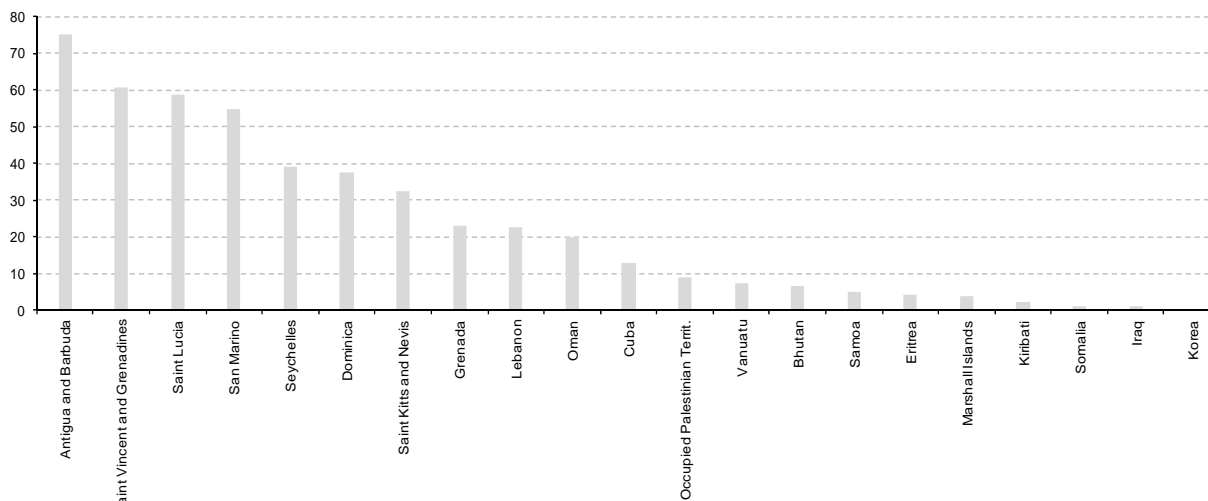
Figure 1 - Percentage of the population with internet access in countries according to HDI category (cont.)

1.c - Database contains 41 countries with medium HDI (period: 2008).

1.d - Database contains 41 countries with low HDI (period: 2008).

1.e - Database contains 21 other countries and territories (period: 2008).

Main source: Human Development Report of the United Nations Development Program (UNDP) for 2010.

To address this question in statistically suitable formulation it is necessary to use linear models, which can allow valid inferences on the aggregate explanatory power of the macroeconomic variables or variables associated with means of communication. It is also possible to measure the individual influence of each variable, particularly of internet access, both by observing the values of the estimations of the respective parameters and the elasticity. We also can measure the effort necessary for nations to change category in terms of violation of human rights or to achieve greater democratic decentralization, for example.

3. EMPIRICAL EXERCISES

3.1. Database on Democracy

The analysis of the possible and intuitive effects of internet access on the levels of democracy depends on the existence of measurable and non-latent variables able to quantify one society's level of democracy *vis-à-vis* others'. In this sense, we innovate here when we identify our variables dependent variables based on the democratic concepts established by the United Nations (UN), which are characterized by quantitative variables associated with political and civil liberties and government accountability, whose values are reported in the Human Development Report (HDR) of the United Nations Development Program (UNDP) for 2010. This report is published yearly, and each edition has a specific theme that is explored in more detail. For example, in 2001 the report analyzed how the discovery and use of new technologies could have altered and influenced the paths of development experienced to that point.

In the 2010 edition, our source of the data on countries' levels of democracy, the objective was to discuss human development as a source of the wealth of nations. Among other variables, such as press freedom, the propensity to jail journalists or the portion of the population feeling subject to extraction of bribes, the 2010 HDR provides (Chapter 6) the levels of democracy of nations according to four interesting variables, from a perspective more associated with political science.

The first variable corresponds to a ranking proposed by Cheibub, Ghandhi & Vreeland (2009), according to which a nation is assigned the level of 0 if it is considered undemocratic, 1 when it is seen as democratic but without changes of government, and 2 when fully democratic, without reservations. Observing the 194 countries listed in the HDR for 2010, among the distinct HDI levels, it is possible to identify a cross-section containing data on this democracy metric in 179 countries.

The second variable is the level of violation of human rights, according to Gibney, Cornett & Woods (2010). Their scale goes from 1 to 5, with 1 corresponding to a society with

low violation of these rights and 5 to a country where these rights are routinely violated. The sample with data on this variable contains 147 countries.

The third variable measures the level of democratic decentralization, in the sense of Beck et al. (2001), according to whom level 0 means the absence of local elections in the country, 1 means the legislature is elected but the executive is appointed and 2 means the legislative body and executive are elected locally by society. The HDR reports the values of this variable for a panel composed of 115 countries.

The fourth variable is associated with the population's political involvement, measured by the percentage of people that have expressed their opinion to political leaders, as shown by the Gallup World Poll (2010). According to the HDR, 143 countries can be assigned values regarding popular political involvement.
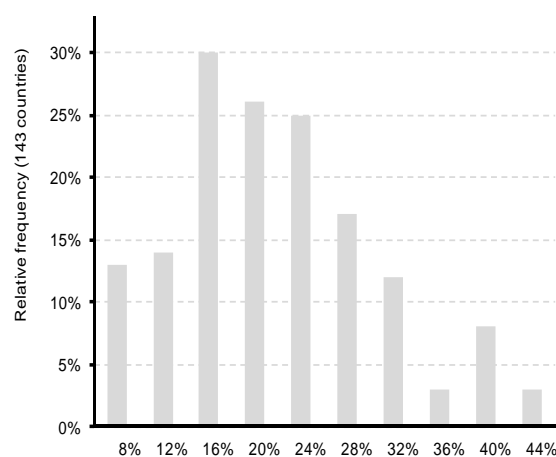
Figure 2 presents the histograms of these four variables, to give a general notion of the dispersion of countries regarding democratic levels. We can see in histogram 2.a that approximately 60% of the countries have the highest level of democracy in the sense of Cheibub, Ghandhi & Vreeland (2009), while about 20% have an intermediate level and just under 20% are characterized as undemocratic. This pattern is similar to that when the variable of interest is the level of democratic decentralization, as shown in histogram 2.c. A detailed analysis of the countries with zero democracy shows they are essentially African and Asian nations with recognized undemocratic profiles, such as China, besides icons like Cuba and also countries with histories of civil or military wars, such as Iran, Angola or Vietnam. In terms of democratic decentralization, once again the African and Asian continents include the majority of least democratic countries, in the sense of not having local elections.

Figure 2 - Histograms of the endogenous variables able to measure democracy

2.a - Histogram of the levels of democracy [a]

2.b - Histogram of the levels of human rights violation [b]
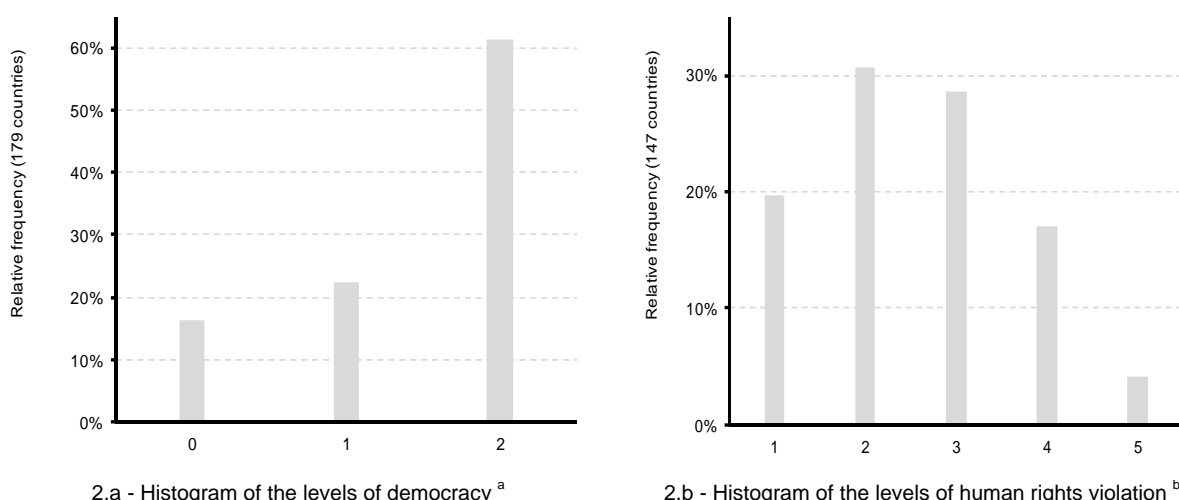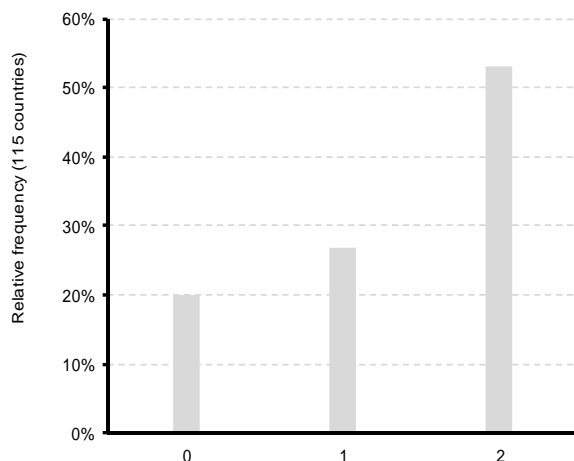
2.c - Histogram of the levels of democratic decentralization [c]   2.d - Histogram of the levels of political involvement [d]

Main source: Human Development Report of the United Nations Development Program (UNDP) for 2010. [a] The level of democracy, according to Cheibub, Ghandhi & Vreeland (2009), is ranked so that 0 corresponds to an undemocratic country, 1 to a democratic country, but without regime changes, and 2 corresponds to a fully democratic country. Database contains 179 countries (period: 2008). [b] The level of human rights violation, according to Gibney, Cornett & Woods (2010), is such that 1 corresponds to the lowest level of violations and 5 to the highest level. Database contains 147 countries (period: 2008). [c] The level of democratic decentralization, according to Beck et al. (2001) is such that 0 means there are no local elections, 1 means the legislature is elected by the executive is appointed and 2 means the legislative bodies and executive are elected locally. Database contains 115 countries (period: 2008). [d] The political involvement variable measures the percentage of people who state they have expressed their opinion to their elected leaders, according to the Gallup World Poll (2010). Database contains 143 countries (period: 2008).

Regarding the levels of human rights violation, according to histogram 2.b, nearly 30 countries, located on five continents, have the best level of democracy, while less than 5% have the maximum level of violation, with the some standouts: Colombia, Palestine and Afghanistan. Finally, on the matter of political involvement, reported in histogram 2.d, China and Poland show the lowest levels of popular participation, followed by 13% of the countries that have levels lower than or equal to 8%. On the other hand, there are only three countries where over 40% of the society participates actively in political life: Sierra Leone, Laos and Cuba. One should ask, just for curiosity: What kind of participation could this be in dictatorships like Cuba and Laos, or a country recently rent by civil war like Sierra Leone?

3.2.   Database on Economics and Mass Media

Since we have identified and described the ways of quantifying countries' levels of democracy, our next step in building the database is to define what variables can, together with internet access, be useful in explaining the existing patterns of democracy. The literature in this respect is still incipient and far from consensual, although there are some promising approaches based on theoretical arguments or results associated with statistical inference. Here we take the latter, a more quantitative approach, adding to the discussion by proposing two models of democratic levels, relying on extensive samples of countries.

The first model contains, besides internet access, economic variables like the Human Development Index (HDI), the Gross Domestic Product (GDP), expressed in US dollars adjusted for purchasing power parity, and the adult literacy rate, i.e., the percentage of the

population aged 15 and over that can read and write, with full understanding, a simple statement of daily activities.[5] Our choice of these explanatory variables aims to concentrate in just a few metrics in the areas of human and social development and human and physical capital, as proposed by Best & Wade (2005), who use per capita GDP and the literacy rate, besides dummy variables for the continents.

Based on the assumption that the means of communication are essential in the process of uniting people, in the second model we analyze the relevance of these means, more specifically access to radio, television and the internet. Figure 3 contains the histogram of the two sets of explanatory variables.

The cross-section of countries whose economic variables are measured in the Human Development Report (HDR) of the UNDP for 2009 and 2010 encompasses nearly all of the 194 UN member countries.

Analysis of histogram 3.a shows that over 67% of the countries have HDI values between 0.7 and 1.0, while only 1%, specifically the African countries Zimbabwe and Niger, have HDI below 0.35. Just over 30% of countries have HDI between 0.35 and 0.7, basically consisting of African and Asian countries. There is strong geographic dispersion of these 179 countries, which can be a contributing factor to the heterogeneity of the democratic levels of the member states of the United Nations.[6]

Besides human development, there is segregation in terms of human capital, as we can observe in histogram 3.b, according to which 12% of the countries, mainly African ones, have education levels whereby under 60% of the people over the age of 15 years have basic literacy in the local language, while this literacy metric is 90% or higher in more than 56% of the countries. This is also cause for concern and may have power in explaining the disparities in political terms in the sample of countries.

Since the HDI already incorporates per capita GPD, we included absolute GPD as well, as a traditional metric able to capture the effect of aggregate size of the economy. Histogram 3.c shows that about 70% of the nations have annual GDP of under US$ 100 billion. The 14 countries with GPD greater than US$ 1 trillion omitted from histogram 3.c are located in Europe and North America, except for China, Japan and South Korea. The geographic disparity of the economic variables and a parsimonious bias suggest we could do not consider dummy variables to represent continents, in this respect diverging from Best & Wade (2005).

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[5] The HDI is obtained from the geometric mean of indices calculated according to levels of schooling, life expectancy at birth and per capita GDP. There are those who criticize it by questioning its originality or even because it does not consider aspects associated with sustainability, but rather simply consolidates in a single yardstick elements necessary to understand political and democratic levels in different economies.
[6] The calculation of the HDI, originally proposed in works such as Haq (1990) and Sudhir & Sem (1994), was modified in 2010 regarding the measurement of the education index.

Although according to the World Bank, many countries supply data on internet access, according to the Institute for Statistics of the United Nations Educational, Scientific and Cultural Organization (UNESCO), only one-fourth of nations have data on access to television and radio.

Analysis of the percentage of nations whose populations have or do not have access to means of communication based on histograms 3.d and 3.e allows inferring a very close pattern regarding access to radio or television, where more than 90% of the population have access to these two communication media in 81% and 76% of the countries, respectively. In the case of radio, only in Ukraine fewer than 50% of the people have access to radio, while this is true for television in Mauretania, Bhutan, Tanzania and Uganda.

However, the profile is very different for the internet, the most recent communication medium. Since the correlation between the percentage of people with their own computer and those with internet access is 85%, this suggests that the higher cost of regular access to this communication medium, associated with the level of education needed to use it, can explain the evidence shown in histogram 3.f that in 2008 there were 40 countries (mainly in Africa) where under 5% of the population had internet access, and that in almost 50% of the sample of 188 countries, under 20% of the population had internet access that year, while in the Nordic countries the rates range from 80% to 90%.

Figure 3 - Histogram of the explanatory variables in economic terms and regarding access to means of communication
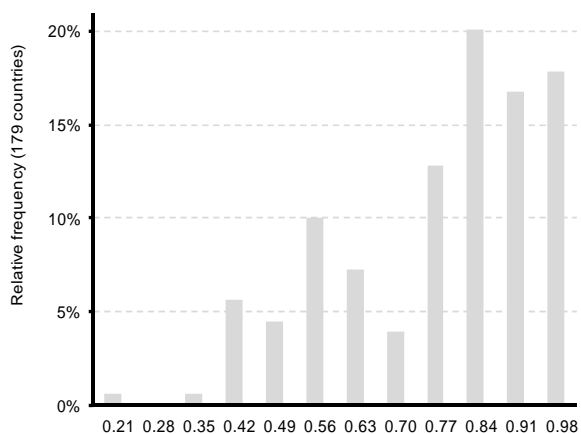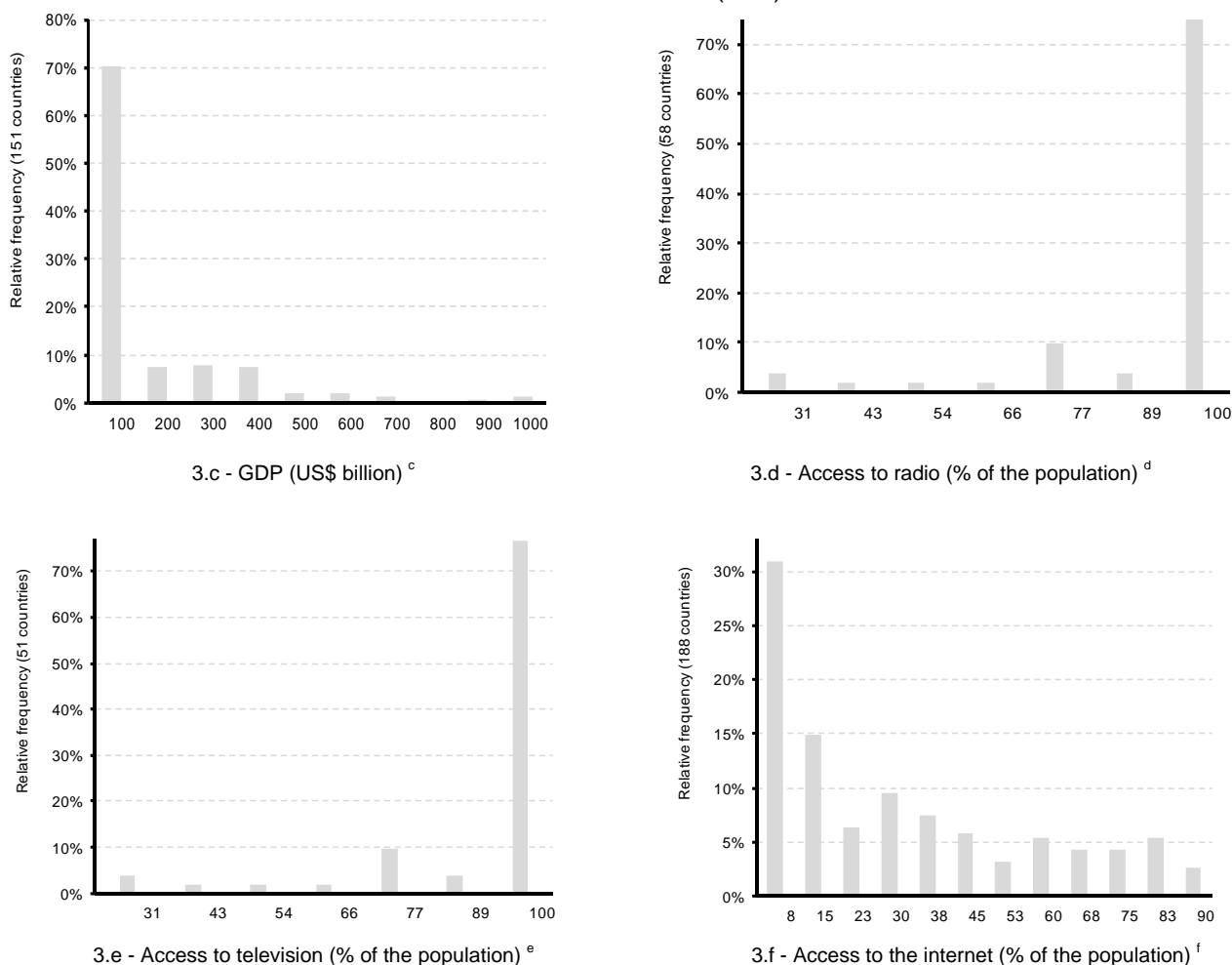

3.a - Human Development Index (HDI) [a]
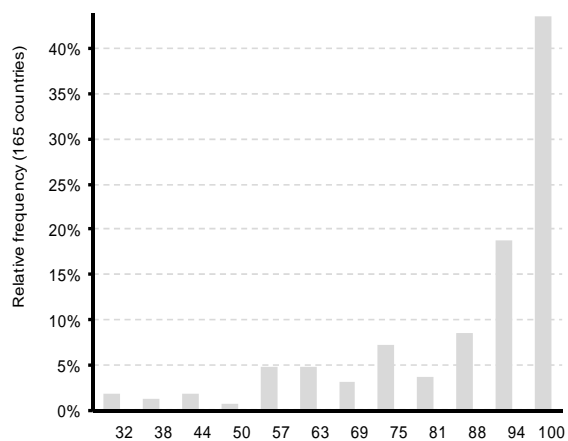
3.b - Literacy level [b]

Figure 3 - Histogram of the explanatory variables in economic terms and regarding access to means of communication (cont).

3.c - GDP (US\$ billion) [c]

3.d - Access to radio (% of the population) [d]

3.e - Access to television (% of the population) [e]

3.f - Access to the internet (% of the population) [f]

Main Source: Human Development Report of the United Nations Development Program (UNDP) for 2009 and 2010. [a] Human Development Index (HDI) proposed by Sudhir & Sem (1994). Source: Institute for Statistics of UNESCO (2009a, b), World Bank (2009) and United Nations (2009). Period: 2007. [b] Adult literacy rate: Percentage of the population aged 15 years and older that can read and write a simple statement on daily life. Source: Institute for Statistics of UNESCO (2010a). Period: 2008. [c] Gross domestic product (GDP) expressed in US\$ under purchasing power parity. In histogram 3.c, for better visualization, we excluded 14 countries with GDP over US\$ 1 trillion. Source: World Bank (2010a). Period: 2008. [d] Percentage of the population that can access radio. Source: Institute for Statistics of UNESCO (2010b). Period: 2005. [e] Percentage of the population that can access television. Source: Institute for Statistics of UNESCO (2010b). Period: 2005. [f] Percentage of the population that can access internet. Source: World Bank (2010b). Period: 2008.

3.3. Linear Models

Once we have described the explanatory variables, in this subsection we detail each linear model proposed in this article. With respect to the first set of variables, relations (1) to (4) model the democratic levels in function of internet access and economic variables.

(1) $\qquad Democr_j = \theta_1.Int_j + \vartheta_1.Lit_j + \mu_1.HDI_j + \pi_1.GDP_j + \epsilon_j, \; j = \{1,\dots,149\}$

(2) $\qquad Humrig_j = \theta_2.Int_j + \vartheta_2.Lit_j + \mu_2.HDI_j + \pi_2.GDP_j + \epsilon_j, \; j = \{1,\dots,129\}$

(3) $\qquad Demdec_j = \theta_3.Int_j + \vartheta_3.Lit_j + \mu_3.HDI_j + \pi_3.GDP_j + \epsilon_j, \; j = \{1,\dots,102\}$

(4) $\qquad Polinv_j = \omega_4 + \theta_4.Int_j + \vartheta_4.Lit_j + \mu_4.HDI_j + \pi_4.GDP_j + \epsilon_j, \; j = \{1,\dots,124\}$

In these relations, the exogenous or explanatory variables are such that Int_j corresponds to the percentage of the population of country j having internet access in 2008, Lit_j corresponds to the literacy level of country j in 2008, HDI_j corresponds to the Human Development Index of country j in 2007 and GDP_j corresponds to the Gross Domestic Product of country j, expressed in US$ under purchasing power parity in 2008.[7] In turn, the endogenous or dependent variables, all measured in 2008, are: $Democr_j$, corresponding to the level of democracy of country j; $Humrig_j$, corresponding to the level of human rights violation of country j; $Demdec_j$, corresponding to the level of democratic decentralization of country j; and $Polinv_j$ corresponding to the level of political involvement of country j.

The number of countries in the sample used for each model changes because of the need to have a homogeneous sample with the same countries, in the sense that a country belongs to the sample of an exercise only if it has a complete data series of the explanatory and dependent variables of the model in question. In the case of democratic decentralization, modeled by relation (3), for example, only 115 countries have data reported in the HDR for 2010. This number falls to 102 when requiring the country in question also to have data on internet access, literacy, HDI and GDP. The results of the estimation of these relations are reported in Table 1.

In our second proposed empirical exercise, we consider the set of variables associated with access to means of communication. Relations (5) to (8) detail the linear frameworks. The new variables in relation to relations (1) to (4) are only the explanatory ones: $Radio_j$ and TV_j correspond respectively to the percentage of the population of country j that has access to radio and television, based on data from 2005. This is the most recent year for which data are available for large panels of countries in the reports from the UN, and the data are reported in the edition for 2010, the only one containing this type of information. Finally, the samples are composed of fewer countries than those in the first exercise employing economic variables. The results of the estimation of these relations are given in Table 2.

(5) $\quad Democr_j = \beta_1. Int_j + \gamma_1. Radio_j + \delta_1. TV_j + \varepsilon_j, \ j = \{1, \dots, 48\}$

(6) $\quad Humrig_j = \beta_2. Int_j + \gamma_2. Radio_j + \delta_2. TV_j + \varepsilon_j, \ j = \{1, \dots, 41\}$

(7) $\quad Demdec_j = \beta_3. Int_j + \gamma_3. Radio_j + \delta_3. TV_j + \varepsilon_j, \ j = \{1, \dots, 33\}$

(8) $\quad Polinv_j = \alpha_4 + \beta_4. Int_j + \gamma_4. Radio_j + \delta_4. TV_j + \varepsilon_j, \ j = \{1, \dots, 42\}$

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[7] In the HDR for 2007-2008, the most recent HDI data from 2005, while in the HDR for 2009 the data are from 2007 and in the HDR for 2010 these data are from the same year of 2010.

3.4.   Estimation Method

        With respect to statistical/econometric techniques of estimation and inference from the values of the parameters in the models described in relations (1) to (8), since the levels of democracy and democratic decentralization can only assume the values 0, 1 or 2 and the human rights violation values are integers from 1 to 5 (i.e., discrete quantities), an ordered response model as described in Hausman, Lo & MacKinlay (1992) is most suitable for the analysis. More specifically, here we use the ordered probit model, which is applicable to the empirical study of dependent variables that only assume a finite number of values that can be easily ordered.

        In contrast, for relations (4) and (8), since the dependent variable on political involvement of the population assumes non-discrete values in the range from 0.00% to 100.00%, we decided to use a more traditional technique of estimation of linear models: the ordinary least squares (OLS).

        In both cases (estimation by OLS and ordered probit), the inferences for the cross-section are based on p-values obtained by using the heteroskedasticity consistent covariance matrix proposed by White (1980).

4. RESULTS

4.1.   Model with democracy indicators in function of internet access and economic variables

        The most relevant aspects regarding estimation of linear models such as those described in relations (1) to (4) are associated with the explanatory power of the proposed model, the individual significance of the parameters and the sign of these estimated parameters.[8] From Table 1, we can see that the explanatory power of the democratic levels in the cross sections of countries in the time frame proposed here varies from 7.60% to 12.82%.[9] This reasonable but limited explanatory power does not invalidate the results or conclusions. It is necessary to adopt parsimonious models, mainly in the second empirical exercise, in view of the reduced number of countries in the sample.

        In terms of significance, except for the model described in relation (3) in terms of democratic decentralization (a variable associated with the holding of local elections in the different spheres and that hence has high inertia against change because of the need for constitutional reform), in all the others internet access was significant at 5%. More specifically, in the models described by relations (2) and (4), the influence of this variable was significant even at 1%. In the case of the level of democracy according to Cheibub,

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[8] In some cases, joint significance analysis, such as by applying the the Wald test, can also be important.
[9] In the specific case of the models described in relations (1) to (3) estimated by the ordered probit technique, the explanatory power reported is given by the pseudo R^2, as usual.

Ghandhi & Vreeland (2009), the parameter θ_1, with estimated significance of 0.0185, permits inferring that the internet exerts a positive influence on democracy, such that an increase of approximately 54% in the portion of society with internet access can be responsible for changing the level from 0 to 1 or from 1 to 2, all other variables held constant. For example, if internet access in Russia increased from the observed 31.9% of society to 85.9%, that country's democracy level could go from level 1 to level 2.

Table 1 - Estimation of the model of democracy indicators in function of internet access and economic variables [a, b]

Model: $Democr_j = \theta_1.Int_j + \vartheta_1.Lit_j + \mu_1.HDI_j + \pi_1.GDP_j + \epsilon_j, \quad j = \{1, \dots, 149\}$

Estimation method: Ordered Probit   **Explanatory power:** $R^2 = 7.60\%$

Internet		Literacy		HDI		GDP	
θ_1	0.0185* [0.0129]	ϑ_1	-0.0068 [0.5378]	μ_1	0.8171 [0.6211]	π_1	0.0000 [0.7029]

Limit 1		Limit 2	
-0.7917	[0.1168]	0.0756	[0.8840]

Model: $Humrig_j = \theta_2.Int_j + \vartheta_2.Lit_j + \mu_2.HDI_j + \pi_2.GDP_j + \epsilon_j, \quad j = \{1, \dots, 129\}$

Estimation method: Ordered Probit   **Explanatory power:** $R^2 = 10.39\%$

Internet		Literacy		HDI		GDP	
θ_2	-0.0277* [0.0001]	ϑ_2	-0.0093 [0.3838]	μ_2	1.1864 [0.4767]	π_2	0.0002* [0.0001]

Limit 1		Limit 2		Limit 3		Limit 4	
-1.5969*	[0.0027]	-0.5224	[0.3271]	0.4452	[0.4200]	1.6532*	[0.0072]

Model: $Demdec_j = \theta_3.Int_j + \vartheta_3.Lit_j + \mu_3.HDI_j + \pi_3.GDP_j + \epsilon_j, \quad j = \{1, \dots, 102\}$

Estimation method: Ordered Probit   **Explanatory power:** $R^2 = 11.20\%$

Internet		Literacy		HDI		GDP	
θ_3	-0.0050 [0.5671]	ϑ_3	0.0005 [0.9706]	μ_3	3.2622 [0.1448]	π_3	0.0002 [0.0726]

Limit 1		Limit 2	
1.3989	[0.0527]	2.2421*	[0.0028]

Model: $Polinv_j = \omega_4 + \theta_4.Int_j + \vartheta_4.Lit_j + \mu_4.HDI_j + \pi_4.GDP_j + \epsilon_j, \quad j = \{1, \dots, 124\}$

Estimation method: Ordinary last squares   **Explanatory power:** $R^2 = 12.82\%$

Intercept		Internet		Literacy		HDI		GDP	
ω_4	31.8302* [0.0000]	θ_4	0.2117* [0.0000]	ϑ_4	0.1311 [0.0805]	μ_4	-39.8111* [0.0012]	π_4	0.0005 [0.0553]

Internet access also appears to have significant influence on violation of human rights, with the negative sign indicating that higher levels of internet access are associated with lower levels of violation. Except for Colombia, with an internet access rate of 38.5%, in all other countries with the maximum level of human rights violation this percentage is below 10%. The strength of the influence indicates that, for instance, if internet use in the Palestinian territories rose from 9% to 81.2%, the level of violation could decline from 5 to 3.

In terms of political involvement, an increase of 47.2% in the portion of the population with internet access is associated with a 10% increase in the portion of people who express their opinion to public officials, in the sense measured by the Gallup World Poll (2010). To summarize, except for the case of holding local elections, where none of the variables was significant, according to all the other variables, internet access appears to have an important positive impact on the level of democracy. These findings corroborate the previous evidences reported in Kedzie (1997) and Best & Wade (2005).

The economic variables were insignificant in all the models, with two exceptions. An increase in the HDI can lead people to participate less actively in the democratic process by expressing their opinion to public officials. This is a counterintuitive result that can possibly be interpreted as indicating that in more developed societies people are less credulous of the effectiveness of personally expressing their views or that they feel less need to do this because of satisfaction with government. Kedzie (1997) offers an evidence to the contrary, i.e., quality of life influences positively the democracy, in the sense of political rights and civil liberties.

In turn, GDP was significant in influencing the level of violation of human rights, with a positive sign. In other words, richer nations tend to violate human rights more. This result can be seen as counterintuitive, but the truth is that there is no consensus: Kedzie (1997) corroborates our evidence, which diverges form the result reported in Best & Wade (2005).

4.2. Model of the democracy indicators in function of access to the internet and other means of communication

According to the results reported in Table 2, the models with the variables that measure democracy in countries in terms of access to means of communication, described in relations (5) to (8), appear to have explanatory power with a greater order of magnitude in comparison with the models of the previous exercise, varying from 16.13% to 21.07%.[10]

In the case of relations (7) and (8), which model the relevance of the means of communication on political involvement and democratic decentralization, respectively. none of the communication parameters were significant at 5%.

The results of estimations (5) and (6) allow inferring that only access to the internet is able to significantly influence, at 5% and 1% respectively, the process of democratization of nations.

Specifically, the value of 0.0402 for the parameter β_1 suggests that an increase of 24.9% in internet access is able to promote an increase of one level in democracy, so that in South Africa, for instance, democracy could rise from level 1 to 2 if the observed level of internet access of 8.6% increased to 33.5%. In turn, according to the estimate of the parameter β_2 of -0.0338, Brazil could go from level 4 to 3 in human rights violation if the internet access climbed from the current 37.5% to 67.1%, or to level 2 if this grew to 96.7%.

In summary, it appears that internet access is the most relevant variable to be observed by policymakers responsible for or concerned with a country's democratization, since it is the most efficient, although the cost of providing access seems to be higher than for radio and television.

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[10] It is necessary to stress the limitation of this second exercise regarding the smaller number of countries, lower than 50 in all the models, and the exclusion of the variable on access to newspapers, which was reported in the HDR for 2010 by 67 countries. The need for matching by inclusion of this variable would have reduced the sample even more, besides the inadequacy of including a fourth explanatory variable with so few observations.

Table 2 - Estimation of the model with democracy indicators in function of access to the internet and other means of communication [a, b]

Model: $Democr_j = \beta_1.Int_j + \gamma_1.Radio_j + \delta_1.TV_j + \varepsilon_j,\qquad j = \{1,...,48\}$

Estimation method: Ordered Probit   **Explanatory power:** $R^2 = 21.07\%$

Internet		Radio		TV	
β_1	0.0402* [0.0233]	γ_1	-0.0020 [0.8902]	δ_1	-0.0096 [0.3550]

Limit 1	Limit 2
-0.9263 [0.4647]	-0.2400 [0.8497]

Modelo: $Humrig_j = \beta_2.Int_j + \gamma_2.Radio_j + \delta_2.TV_j + \varepsilon_j,\qquad j = \{1,...,41\}$

Estimation method: Ordered Probit   **Explanatory power:** $R^2 = 16,26\%$

Internet		Rádio		TV	
β_2	-0.0338* [0.0005]	γ_2	-0.0026 [0.8646]	δ_2	0.0091 [0.3272]

Limit 1	Limit 2	Limit 3
-1.5995 [0.1569]	-0.2898 [0.7953]	0.4306 [0.7006]

Modelo: $Demdec_j = \beta_3.Int_j + \gamma_3.Radio_j + \delta_3.TV_j + \varepsilon_j,\qquad j = \{1,...,33\}$

Estimation method: Ordered Probit   **Explanatory power:** $R^2 = 16,13\%$

Internet		Rádio		TV	
β_3	0.0138 [0.1621]	γ_3	-0.2088 [0.0633]	δ_3	0.0441 [0.0699]

Limit 1	Limit 2
-16.8840 [0.1017]	-15.8808 [0.1194]

Modelo: $Polinv_j = \alpha_4 + \beta_4.Int_j + \gamma_4.Radio_j + \delta_4.TV_j + \varepsilon_j,\qquad j = \{1,...,42\}$

Estimation method: Ordinary Least Squares   **Explanatory power:** $R^2 = 17,91\%$

| Intercepto		Internet		Rádio		TV	
α_4	8.5065 [0.5023]	β_4	0.0926 [0.1913]	γ_4	0.2486 [0.1489]	δ_4	-0.1671 [0.1019]

Main source: Human Development Report for 2010. [a] Explanatory variables: i) *Int* corresponds to the percentage of the population with internet access (2008), ii) *Radio* corresponds to the percentage of the population with access to radio (2005) and iii) *TV* corresponds to the percentage of the population with access to television (2005). [b] Endogenous variables: i) *Democr* corresponds to the level of democracy according to Cheibub, Ghandhi & Vreeland (2009), ii) *Humrig* corresponds to the level of violation of human rights according to Gibney, Cornett & Woods (2010), iii) *Demdec* corresponds to the level of democratic decentralization according to Beck et al. (2001) and iv) *Polinv* corresponds to the level of political involvement measured by the percentage of people who express their opinion to public officials, according to the Gallup World Poll (2010). * significance of the coefficient in question at 5%, according to the p-value reported in brackets, obtained by using by the heteroscedasticity consistent covariance matrix proposed by White (1980).

One should be careful with the purpose to compare our findings to the evidences reported in Putnam (2000) or Scheufele & Nisbet (2002), since these studies use data collected from the population living in the United States of America. According to the former, internet access does not influence democracy, while the latter argues that internet access, but not for political reasons, can promote democracy.

A likely key element in this conclusion based on the quantitative results is the fact that the internet is a multilateral communications medium rather than a unilateral one like radio and television, allowing full and egalitarian interaction of all users. Furthermore, the internet overlaps radio and television, since both can be received online. Despite the results of the economic variables, it would probably be rash to suggest substituting public policies aimed at human development and increasing the human and physical capital of nations with policies to foster mass internet access, but it is possible to think about possible ways of combining policies that stimulate internet access with those seeking to provide more decent living conditions. A particular aspect regarding internet is the greater expense in relation to other means of communication, since there is a need for investment in personal computers and training (human capital) in their use, something that does not apply to radio and television. Nevertheless, the declining cost of hardware and the increasing number of devices that can access the internet (smart phones, netbooks, tablets, etc.) are ameliorating this drawback to promoting internet access.

Figure 4 contains the dispersion graphs of internet access and the democratic variables in question, based on our exercises. It can be seen that even in the case of democratic decentralization, where internet access was not significant in any of the exercises, and in the case of political involvement, which was not significant in the second exercise, there appears to be an influence of this access on the process of democratization of countries, in both cases with the expected intuitive slope. Observation of these graphs for the other explanatory variables shows that it is common for the tendencies have much more modest slopes, but still in the intuitive direction.

Figure 4 - Dispersion between internet access and each of the variables that measure democracy
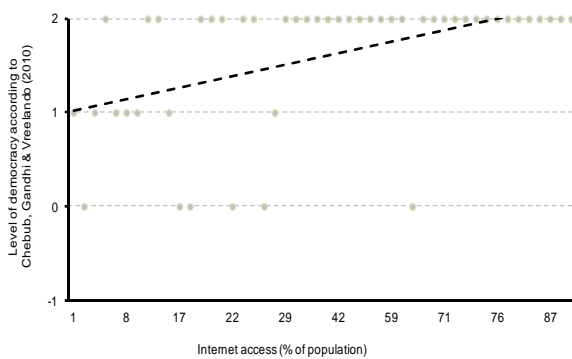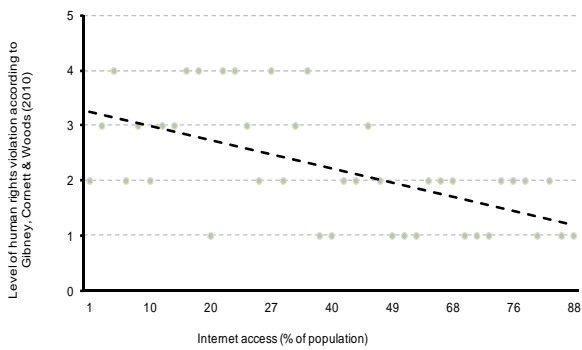

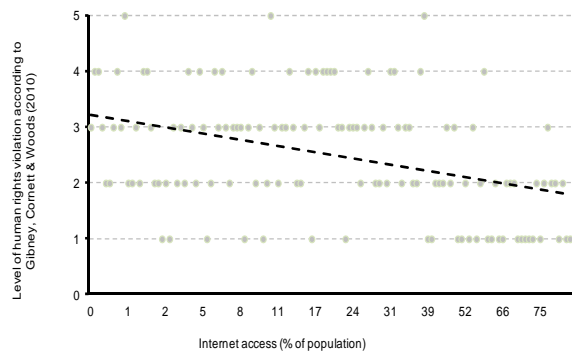4.a.1 - Democracy: 48 countries used in the exercise of the influence of means of communication
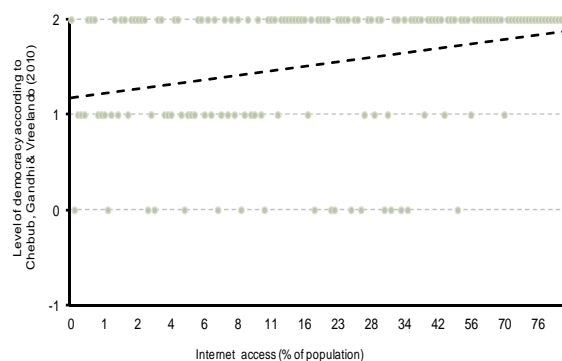
4.a.2 - Democracy: 149 countries used in the exercise of the influence of internet access and economic variables
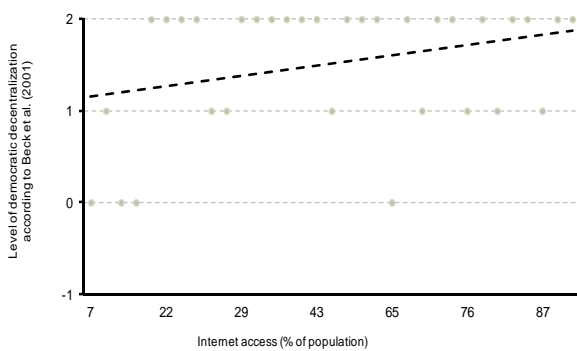
Figure 4 - Dispersion between internet access and each of the variables that measure democracy (cont.).

4.b.1 - Human rights: 41 countries used in the exercise of the influence of means of communication
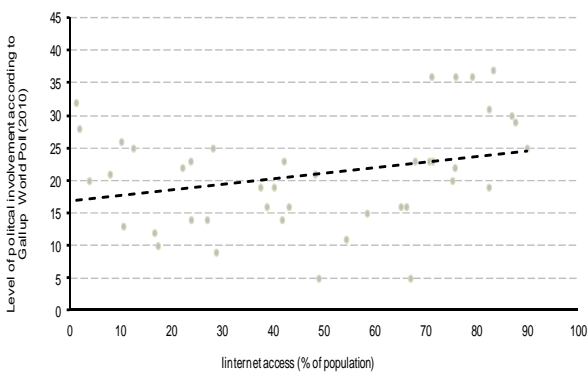

4.b.2 - Human rights: 129 countries used in the exercise of the influence of internet access and economic variables
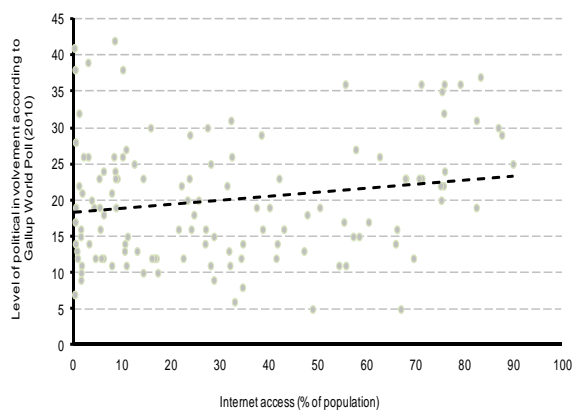

4.c.1 - Democratic decentralization: 33 countries used in the exercise of the influence of means of communication
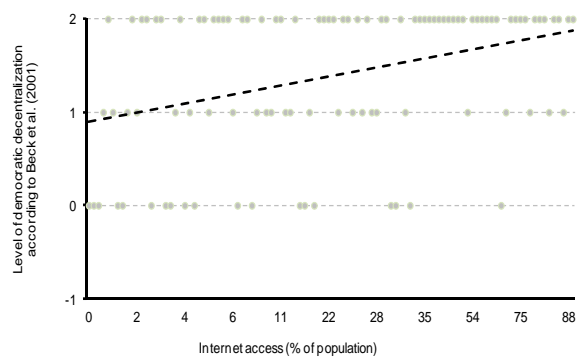
4.c.2 - Democratic decentralization: 102 countries used in the exercise of the influence of internet access/economic variables

4.d.1 - Political involvement: 42 countries used in the exercise of the influence of means of communication

4.d.2 - Political involvement: 124 countries used in the exercise of the influence of internet access/economic variables

Main source: Human Development Report of the United Nations Development Program (UNDP) for 2010.

5. CONCLUSION

A greater intensity of discussion among people enables action through the common will, which is a relevant step of the formation of political societies advocated by

Sieyès (1789), uniting a greater number of people no matter how dispersed they are physically, giving greater legitimacy to their interests.

This French philosopher seemed to predict that a revolutionary communication tool would emerge and that more than two centuries later, this media would be strictly necessary for the following processes.

First, it was used to promote communication during the Arab Spring and other popular manifestations characterizing this fourth wave, which were organized by social networks throughout the world, against not only tyrannical government, but also against corruption, impunity of criminal organization, prejudice, racism and violence. Wolfsfeld, Segev & Sheafer (2013) is a recent source to better understand the role played by social media considering the political environment.

Second, the internet can be useful for a broader monitoring democracy, a new political form post-parliamentary defined by the rapid growth of many different types of extra-parliamentary mechanisms and the voting power.11 According to Keane (2010), by putting political parties and elected governments under constant monitoring, leaves them on constant alert, questioning their authority and forcing them to change their schedule. An example is the Transparency Portal in Brazil, which enables people to observe and to keep up with the main government expenses and revenues.

To summarize, the advent of the internet and the expansion of popular access through its social networks counteract the weapon of state control, strengthening recognition that sovereignty rests with the people, an essential element of democracy. Despite the wide acceptance of the idea that internet use promotes democracy, making inferences on the relationship between the two requires formulating a well-specified statistical framework to enable comparison of the various aspects of democracy in societies with similar variables in terms of welfare and development, but that differ in the percentage of people who regularly access the internet, to see whether this alone causes distinct levels of democracy. In line with previous studies, such as Kedzie (1997), Richards (2002) and Best & Wade (2005), internet access is significant at 5% regarding the level of democracy, violation of human rights and political involvement according to the results for the first framework proposed here, based on economic variables. According to the second approach, the internet appears to be a more powerful tool promoting democracy than other means of communication: it seems to be the only one able to accelerate the process of democratization in the sense of Cheibub, Ghandhi & Vreeland (2009) and Gibney, Cornett & Woods (2010).

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[11] Many political scientists believe that the third wave began its decline after September 11, 2001, when some setbacks became evident, so that recent events such as the Arab Spring, as well as democratic movements in several African and Asian countries are appointed by some analysts as the beginning of the fourth wave, according to Wolin (2001).

For one side, these results can be used to support decisions on public policies aiming to enhance democratization in a determined nation by promoting connection of the population with the rest of the world. Indeed, the cost-benefit ratio of such efforts is likely better when compared to expanding access to radio or television, besides the advantages of the internet as an efficient tool to increase human capital. By what other means can needy students in Africa take classes from American and European Nobel Laureates in Economics?

It is likely that this strategic relevance was observed by United Nations, when it considered internet access and online freedom of expression as basic human rights.

For the other side, although we can observe a legion of the use of social networks to spur popular action, such as the demonstrations against the FARC in Colombia in February 2008, when some 10 million people took to the streets, this new face of democracy suffers from some sins: it is ephemeral, relies on less ideology and not necessarily it is organized by institutions or unions. We remember, as a symbolic example of political immaturity, that an intense movement on social networks in February 2013 reached 1.5 million signatures, in less than two weeks, on an online petition asking for Renan Calheiros exit from the presidency of the Brazilian Senate, based on a criminal complaint to the Superior Court of this country. Regardless of the legitimacy of motivation, many subscribers even know the history or charges against this senator, having voted in herd effect. The result is that days later, the young organizer of the petition was said frustrated since the action has been useless in trying to promote the removal from office, even this amount of signatures is equivalent to more than 1% of the national electorate, approximately 140 million.

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Is it possible that the positive effect of the internet usage by population on the democratization process of a society, seemingly intuitive, is actually spurious? As part of this discussion, we propose here using linear statistical frameworks to make inferences about the sign and significance of the internet access on democracy, along with the effect of other variables that seem to be useful to understand the dispersion of democratic levels among distinct nations. A first novelty in this paper is regarding the dependent variables: our exercises are based on four democratic concepts established by the United Nations, characterized through quantitative variables associated with political and civil liberties reported in the Human Development Report (HDR) of the United Nations Development Program (UNDP) for 2010. Since we intend to measure the effects adequately, we propose two promising frameworks based on fundamentals: i) a first in which besides the population's access to the internet, there are explanatory variables in the areas of social development and human and physical capital; and ii) a second, in which we consider the internet effects vis-à-vis other mass media, such as radio and television. In line with previous empirical studies, such as Best & Wade (2005), according to the first exercise, popular access to the internet was significant at 5% in the models regarding the level of democracy, violation of human rights and political involvement. We also find that the increase in the Human Development Index (HDI) of a society can lead people to participate less actively in the democratic process, while richer nations tend to violate human rights more frequently. Although it seems hard to compare the results based on the second exercise, due to the inexistence of articles modeling the effects of communication means for a cross-section of countries, as expected in the sense of Sieyès (1789), the power of the internet appears stronger in comparison with other means, i.e., it is the only communication tool seemingly capable of hastening the democratization processes, in the sense of Cheibub, Ghandhi & Vreeland (2009) and Gibney, Cornett & Woods (2010). These results can support decisions on public policies aiming at promoting democratization in some nations, paying attention to the new face of this democracy, which can be more dynamic and broader, but also ephemeral and relying on less ideology.