

UNIVERSITY OF CALIFORNIA,
IRVINE

Macro - Macro Emergence: The Internet as a Cultural Institution

DISSERTATION

submitted in partial satisfaction of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

in Sociology

by

Matthew Pearce

Dissertation Committee:
Professor Evan Schofer, Chair
Professor David John Frank
Professor Ann Hironaka

2016

DEDICATION

Dedicated to Juanita Pearce and Virginia Livingston;
time is very important.

Table of Contents

	Page
List of Figures	v
List of Tables	vi
Acknowledgements	vii
Curriculum Vitae	ix
Abstract of the Dissertation	x
1 Introduction	1
2 Global Expansion of Participation and Policy	8
Abstract	8
Internet as ICT / Internet as New Media.....	14
Internet as an Institution.....	15
Argument & Expectations	16
Data.....	19
Analysis	21
Conclusions	27
Appendices.....	28
3 World Society as a Driver of Internet Expansion	29
Abstract	29
Global Evidence of Expansion	30
Explanations of National Variation	31
How do institutional mechanisms increase internet use?	36
Data and Methods	38
Results	43
Discussion	47
Appendices.....	49

Table of Contents Continued

4	Political Institutional Causes of Internet Expansion: The Role of Civil Liberties, Political Rights and Authoritarianism	51
	Abstract	51
	Data and Methods	58
	Results	63
	Conclusions	69
	Appendices	72
5	Conclusions	75
A	Universities as Receptor Sites for Globalized Institutional Practices	78
	Results	79
	References	82

List of Figures

	Page
2.1 Social institutions such as universities and civil society lead to internet expansion through globalized cultural norms	11
2.2 Google ngram of book corpus 1940 - 2000: internet law, law.....	13
2.3 Worldwide growth of education and internet	16
2.4 Word consistency over time.....	23
2.5 Increasing global internet users and declining percentage of US servers.....	24
3.1 Increasing internet users. Yearly distributions of countries by percent of internet users.....	31
3.2 Positive association between GDP and internet users by year	32
3.3 Positive association between INGOs and internet users by year	36
4.1 Internet users by democratic status, 1990 to 2015.....	53

List of Tables

	Page
2.1 Alternatives to the current global and public internet	9
2.2 Evidence of Institutionalization	17
2.3 Matching RFC Documents by Decade.....	22
2.4 Transition of internet organizations from domestic to international	25
2.5 OLS Regression.....	26
2.6 Descriptive Statistics	28
3.1 Descriptive Statistics	41
3.2 Panel Linear Model with Random Effects and PCSE of National Factors Predicting Internet Users	44
3.3 Comparison of Panel Linear Models of National Factors Predicting Internet Users	49
3.4 Correlations	50
4.1 Previous Studies with Democracy.....	55
4.2 Variations in Country Level Democracy.....	60
4.3 Panel Linear Models of Internet Users with Independent Democracy Measures	63
4.4 Panel Linear Models of Internet Users with Political Rights and Civil Liberties	65
4.5 Panel Linear Models of Internet Users with Democracy and Autocracy	66
4.6 Panel Linear Models of Internet Users with Polity Component Variables	67
4.7 Panel Linear Models of Internet Users with Combined Democracy Measures.....	68
4.8 Descriptive Statistics	72
4.9 Freedom House and Polity Democracy Measures	73
4.10 Correlations	74

ACKNOWLEDGMENTS

First, I would like to express my great appreciation to all the people who have been family. To my mother, Linda Pearce, who wrote her nursing thesis researching the effect of building a school next to a freeway on the hearing-ability of 5th graders. Then, as an eight-year-old, I almost understood what she was doing. Now, as an adult, I have no idea how she did it. I am fortunate to have excellent role models in my family from the work ethic and integrity of my father Harry Pearce, to the immense lifetime of support and guidance from both of my sisters: Naomi and Rebecca Pearce. Also, to my brother Sal Soghoian for his ability to confer the right amount of zen precisely when I need it.

My most profound and sincere appreciation goes to my advisors, Evan Schofer and David John Frank, for their honesty, skill, and encouragement. Both pushed me in complementary ways to expand my thinking and produce better work. Evan's sage creativity and detailed conceptualization, was well matched with David's intuitive vision and appetite for big projects. Additionally, to Ann Hironaka, who would at times remind me of how things are just complicated. This research effort was only possible because of their unwavering generosity and support. I have also grown from the mentorship of Nina Bandelj, Charles Ragin, and David Smith with their continuous encouragement and timely advice.

I am deeply indebted to my friends and colleagues for being there, doing it, and then showing me how it is done. To my good friends Hector Martinez and Nolan Philips for the inter-coder reliability validations and long impassioned conversations on research and teaching. To my cohort, writing groups and friends: Dylan Alberts, Edelina Burciaga, Jonathan Cavillo, Adam Dunbar, Erin Evans, Sean Fitzhugh, Wendy Fitzhugh, Beth Gardner, Henry Hail, Martín Jacinto, Sheefteh Khalili, Jessica Kizer, Alice Motes, Natasha Miric, Dana Nakano, Jenny Ng, Rottem Sagi, and Daniel Schneider — you were simply the best with-you-know-what, and I hope you know why. Thanks to Professors Gili Drori, Walter W. Powell, David Miyahara, Colin Beck, Francisco Ramirez, John Meyer, Christine Min Wotipka and both the Irvine and Stanford Comparative Sociology Workshops for inspiring conversations.

Thanks also to my truly great friends Mike Kittredge, Elida Erickson, Leticia Romo, Byron and Layla — who share the good-times and high-fives, dream the dreams, and help me keep all of my goals in sight. To Philip Lee for the dancing, smiles, and parades. To my writing buddy Diana Leong, and to my singing buddy Mark Pangilinan — you both make me feel at home. I get by with a little help from you friends.

I also appreciated the financial support I received from the Graduate Dean's Dissertation Fellowship Award and research funding from the UC Irvine Center for Organizational Research and the Center for the Study of Democracy.

Finally, to the many people who have had my interests in mind and helped me along the way: thanks for everything. Our communities share responsibility for all of our individual accomplishments. To the people in mine — I am extremely grateful for you. Thanks.

CURRICULUM VITAE

Matthew Pearce

EDUCATION

Doctor of Philosophy in Sociology 2016

University of California, Irvine

Master of Arts in Sociology 2012

University of California, Irvine

Master of Arts in Higher Education Policy, Organizations and Leadership 2008

Stanford University

California Professional Clear Teaching Credential 2003

Humboldt State University

Bachelor of Arts in Psychology 2002

Humboldt State University

Bachelor of Arts in English 2002

Humboldt State University

FIELDS OF STUDY

Global and Transnational Sociology, Quantitative Methods, Higher Education, Organizations and Social Informatics

ABSTRACT OF THE DISSERTATION

Macro - Macro Emergence: The Internet as a Cultural Institution

by

Matthew Pearce

Doctor of Philosophy in Sociology

University of California, Irvine, 2016

Professor Evan Schofer, Chair

The incredible rate of worldwide internet growth should lead us to question the macro level social mechanisms that cause it. These chapters propose that instead of conceptualizing the internet as just a technology or media, we should consider its similarities to education or other globalized social institutions. The internet is shaped by globalized ideas, developed in a globalized world, and is part of a world society of legitimated practices. From the global level of analysis, I argue that we can observe institutional emergence from the engineering documents that define internet protocols and the cultural rationalization employed in United Nations actions to define symbolic meaning. From the national level of analysis, I use panel linear modeling to demonstrate that links to globalized ideas through international non-governmental organizations cause the expansion

of internet users within a country. As a supportive globalized institution, I use similar panel linear models to analyze the aspects of democracy which cause internet expansion: the role of autocracy relative to democracy, and compare how expansion occurs in countries with differing levels of civil liberties and political rights. As additional analysis in appendices, I develop models which find support for the theory that universities play a role as receptor sites of world cultural norms to explain the growth of the internet. Evidence here supports the idea that the internet is a site where we can observe world societal diffusion and the macro level emergence of a social institution. In order to understand world society, we should look to the internet as a research site. In order to understand the growth of the internet, we should identify the ways in which the internet is institutionalized.

Chapter 1

Introduction

As social scientists, we tend to view the internet from two perspectives: as either a new media, or as the diffusion of a technology. Both perspectives come with excellently well-developed literatures that help us understand what is happening. But neither directly embed this research with an understanding of how the macro forces of globalization shape the internet and its expansion. This dissertation argues that the internet isn't quite like a media, and it isn't quite like a technology. Instead, we should consider that it may have characteristics of a social institution similar to cultural structures like education or democracy.

To test this perspective, we can see if the internet follows patterns matching the expansion of other globally institutionalized practices. We already have some insights by looking at the rate of expansion — nearly half the globe in the first 20 years of its wide availability. That level of diffusion is similar to what other sociologists have seen in the rise of educational structures and environmental organization (Hironaka 2014). Additionally, we know that it increases in countries that are democratic, and have higher levels of education and trade (Guillén and Suárez 2005). These are not incidental. These are also the characteristics of countries that are more embedded in globalized economic and cultural systems (Meyer et al. 1997).

So what then is driving expansion from this perspective? As the internet increases, both the infrastructure and cultural meaning applied to its practices also increase. There is a technical constitution, and also a social constitution of the internet in similar ways to the technical and social construction of education and democracy. Schools are built, and society interprets the meaning behind the credential or the processes that go into schooling. We see artifacts of these shared cultural meanings in the ways that the desks are arranged uniformly, and what is taken for granted as the practice of performing schooling (Meyer 1977).

Likewise, cables are run, servers are deployed, and laws are written describing what the internet is in relationship to governments and other institutions. There is both a technical and social process; both the technology and speech describing the cultural meaning of the technology are developed simultaneously. In this case it gets especially interesting because the internet has been globalized from the beginning of its development.

This research proposes to use a similar conceptual framework that previous researchers have used to compare institutional emergence of the internet with the emergence of education as a global institution (Baker and LeTendre 2005; Meyer 1977; Meyer et al. 2007). Both internet and education have come to be regarded as highly functional and highly symbolic. We can track similar increases, diffusion patterns and discourses regarding individuality, progress and human rights within each. The internet however presents us with a more recent beginning and richer documentation of participation practices and development.

What constitutes social institutionalization?

Sociological neoinstitutionalism points to shared similarities as evidence of the creation of shared cultural ideas (DiMaggio and Powell 1991). It is firmly rooted in the social construction of Berger and Luckmann (1967); that individuals interpret each other's actions, and that these interpretations crystalize into roles. These roles establish the bounds of action which are appropriate for the role to be interpreted correctly. The role describes a shared

meaning in which symbols are constructed from agreements between actors, and then acted on as if they are real and concrete.

In marriage, for example, we have an idea of what is appropriate action for people who are married. When people are acting within those bounds, and that role is interpreted, we treat marriage as a social fact and simultaneously elaborate marriage's integration into society. The role and the actions associated with it define categories and enable the collective action of people. Likewise, nations need to act-as-if they are nations so that they can be correctly categorized into that role and interpreted as a nation by others.

The world society (Meyer et al. 1997) perspective studies neoinstitutionalism at the global level of analysis. It predicts that as globalization unfolds, these systems of interpretation become more unified across the world. The models of what nationhood looks like become more uniform as the social systems reciprocating action and interpretation are performed among a global environment. I am hypothesizing in these chapters that internet adoption within a nation has become part of the globalized model of what contemporary nationhood looks like.

This performance in a global environment leads to curious and occasionally counter-intuitive actions. For example, that classrooms might look so similar to each other (Meyer 1977); whether they are for primary school children in Egypt, or the brigade of midshipmen at the US Naval Academy in Annapolis. Each might have rows of desks, presentation boards at the front and an instructor who delivers instruction to the students in the desks. This is the performance of schooling. The capacity of a nation to create systems that enact this performance becomes a metric which others use to interpret the degree to which they fit within a nationhood role. Schooling may bring individual rewards to individuals, but it also brings national recognition to nations (Baker and LeTendre 2005). Simultaneously, the social process of schooling credentials the individual's identity as an educated person and makes available new social action through that role.

The research examples I follow make this point by outlining the institutionalization of education (Meyer, Ramirez, and Soysal 1992), higher education (Meyer et al. 2007), and organization in general (Meyer and Bromley 2013). Additionally, scholars have shown the extent to which this global environment of participants is influenced by networks of expertise through international nongovernmental organizations (Boli and Thomas 1999; Hughes et al. 2009). It shapes conceptions of human rights (Hafner-Burton and Tsutsui 2005; Tsutsui and Wotipka 2004), anti-corruption practices (Cole 2015), science (Drori et al. 2003), gendered attitudes about math (Charles et al. 2014), civil war (Hironaka 2008) and public policy (Dobbin, Schrage, and Kalev 2015).

The institutionalization of the earth's environmental protection (Frank, Hironaka, and Schofer 2000) has been a generative research site for several reasons, including its interaction with other potentially complementary or antagonistic institutionalized systems. This interaction can be seen in textbooks. As international discourses that create meaning around environmental regulation become more established, the discourse of environmental protection simultaneously develops within social science text books of nations that are more connected to world polity through INGOs (Bromley et al. 2011a). Current lines of institutional theory point to the cumulative influence of a shared cognitive model along multiple institutionalized pathways. Hironaka (2014) argues that large-scale contemporary worldwide societal change occurs through a bee swarm of mildly influential legitimated systems which share a cognitive model, and collectively act through that model until it becomes widely shared and taken-for-granted as the primary cognitive frame.

Similar to these other sites of institutionalization, the internet should be institutionally conceptualized as a location where world society norms can be observed. Through the mild influence of multiple systems, we can see the emergence of the internet as a technology into its current form as a social structure which shapes the identity of individuals and nations through cognitive frames that are mutually reinforced by other globalized social institutions (Strang and Meyer 1993).

Overview of chapters

Chapter two makes this argument at the global level of analysis. The same words describing a globalized world which become increasingly present in children's textbooks are also present within the engineering documents that physically design the technology of the internet (Bromley et al. 2011b). The internet has always been embedded in a globalized world, and early on accounted for considerations related to nations, human rights and law, as well as engineering obstacles. As part of the internet's expansion, global institutions apply meaning to internet participation. This symbolic meaning then informs the identity and roles of individuals and nations. In 1990, only about 2.6 million people worldwide had access to the internet (The World Bank 2015). In 2015, the words created during the engineering of the internet, which later become part of United Nation information society goals, appear as guaranteed rights in the constitutional documents of three nations. The internet literally becomes part of the definition of some nations.

National diffusion is analyzed in chapter three. As evidence of institutionalization, world society linkages are shown to be a driver of internet adoption within nations. Using econometric panel linear models and accounting for economic and political theories of internet diffusion, global linkages through international non-governmental organizations are a strong and positive predictor of internet users within a country. Countries with higher levels of embeddedness in a globally rationalized system of civil society have higher percentages of their population using the internet. This is the same mechanism that world society scholars attribute to driving the expansion of education as an institution.

The similarities to the institutionalization of education underscore the theorization that complementary institutionalized practices reinforce the expansion of each other (March and Olsen 1998; Strang and Meyer 1993). The literacy that comes from education may be a functional requirement for internet participation. However, the functionality of democracy is not a requirement for internet adoption. Internet expansion occurs even in countries with high levels of violence, instability and autocratic oppression. However, democracy is a

globally legitimated model of governance and institutionally complimentary to the internet.

In chapter four the relationship between levels of internet use and the political institutionalization of democracy is examined at the national level of analysis. Democracy itself, and specifically democratic civil liberties cause higher levels of internet participation within countries, even after taking into account the potential restriction of autocratic characteristics. In fact, while autocracies may be brutally and oppressively restrictive toward individuals, this analysis does not show evidence of autocracy itself being systematically responsible for lower levels of internet use after accounting for characteristics of democracy within a country. This suggests that while autocracy may be a dead weight toward widespread internet access, it is the boost of democracy itself and not the restriction of autocracy that is responsible for the higher levels of internet users we observe within democracies. Cultural institutional features of democracy are likely responsible for increasing numbers of internet users within countries and the institutional expansion of the internet globally.

As additional analysis, I present appendix A with tables of panel linear models showing the association between systems of higher education and internet users within countries. Both the number of universities within a nation, and the enrollment levels of tertiary education students are used as measures. Universities organizationally rationalize and legitimate new knowledge — they are the birthplace of the internet. They are also connections to global communication networks of rationalized ideas. Frank, Jeong Robinson, and Olesen (2011) hypothesizes that universities act as receptor sites for globalized norms within a country. These tables support that hypothesis by showing positive associations with both enrollment and the number of universities within a country after taking other economic and political factors into account. Additionally, in models not presented, the interaction between INGOs and the number of universities within a country is significant and positively associated with higher levels of internet users. This indicates that along with the effect of universities themselves, the combined relationship between globalized links to world society through INGOs and universities appears to be associated with higher levels of internet use within a country.

Similar to education, the internet acts as a social institution in at least four important ways. First, it maintains worldwide symbolic representation. Educational credentialing signals modern participation. Similarly, internet participation brings with it globalized cultural signals and expectations, and process people into existing globalized social systems. Chapters two and three describe the worldwide and national levels of these representations. Secondly, the internet continues to develop from socially contested ideas. When we have debates about internet filtering, governance, intellectual property, or see the creation of novel software, we are coordinating how the internet as an institution should operate and simultaneously imbuing it with meaning, values and cognitive models about how the world should work. Thirdly, by acting as a site of social interaction, it shapes our thinking about how order is constructed. Performance and symbolic interpretation happens at every level of analysis. Individual roles are communicated. National roles are communicated. Lastly, and relatedly as a global macro cultural institution it reinforces and is shaped by other large macro social institutions such as democracy, science and education. Chapters four describes how democracy and perhaps the cognitive model of civil liberties creates internet expansion. Institutionalization reinforces shared symbolic systems of meaning.

If the raw volume of expansion were not enough to maintain the curiosity of social scientists, when viewed as a social institution the implications of the internet in setting up global level institutional change becomes more apparent. Most current studies conceptualize the internet as a media or communication technology. Locking our attention instead on how the globalized idea of the internet as a whole might challenge or support coexisting institutionalized structures, promises to teach us a great deal about global level change over the next decades and century — for those who communicate using the internet, as well as those who do not.

Chapter 2

Global Expansion of Participation and Policy

Abstract

From the global level of analysis, this chapter argues that the internet is like a social institution in ways that are similar to the expansion of education around the world. There are two important aspects of the internet's expansion and development as an institution: the physical expansion through participation of individuals and the rationalized expansion into organizational processes through policy. Analyzing the engineering documents used to physically construct the internet, I outline evidence that the social construction was heavily embedded in world societal views. The internet develops into a social institution which applies meaning to people as individuals and becomes a symbol whose metrics characterize the identity of populations.

The internet is constructed at least as much by words as it is by wires. Scholars of globalization have underestimated the extent to which global level social institutions facilitate the rapid expansion of the internet. While it is a mistake to view the internet solely as a media, it is also a mistake to view the internet solely as a technology. In the last 15 years the United Nations has encouraged internet expansion and problematized the social challenges of it. This develops global level systems of symbolic meaning. While the United Nations didn't directly create the internet — the idea of the United Nations specifically, and

a cohesive world-unit in general, as well as the normative practices of educated individuals, democracy, equality and other globally legitimated cultural frames are responsible for both its development and current directions (Hironaka 2014).

Imagine hypothetical alternatives to our current internet — for example if the internet were nationally situated (rather than global), or privately oriented (rather than public). The internet developed during a post-national period of time: in which the world is the unit of organization, and conceptualizations of individuals becomes increasingly more agentic and essentially equally authorized to claim freedom of expression as a fundamental right. This is the world in which we get our current internet.

Table 2.1: Alternatives to the current global and public internet

	National	Global
Private	the Samsung Korea-net the Daimler Germany-net	the global IBM-net the global Sina Weibo-net
Public	the U.S.-net the Tunisia-net	the Internet

When we talk about the internet as a technology that spreads, we miss the macro level cultural influence that social institutions have contributed to the development of the internet, and its own institutional implications (DiMaggio et al. 2001). When we talk about it as a media, we have the problem of the concepts not transcribing as cleanly from previous media research to current media (Nie and Erbring 2000), or we have to bridge together disconnected literatures to talk about the characteristics of the internet’s structure (Wellman 2001). This is because the structure of the internet is both technical and cultural.

Before the internet, there had not been an internationally co-constructed system of meaning develop as rapidly. Even when we consider the unified messages within warfare, it is difficult to imagine other globally understood packages of shared cultural meaning spreading internationally as fast and involving the participation of as many individual actors. Nearly

half of the entire world's population are internet users (43%, or 3.2 billion in 2015). That is up from 15.7% (just over 1 billion people) ten years prior (The World Bank 2015). In addition to that metric, they also get the identity of "Internet Users." Pause for a moment and consider whether, when you see the label of internet user, does an image of what it means come to mind? Chances are that everyone reading this document is also an internet user. Think now about your colleagues; would they understand what you were doing if you emailed them? Would you have that expectation of someone who is not an internet user? Or, instead, would you be surprised to have a colleague who has never used the internet? There are many socially constructed practices with taken for granted patterns that define groups and shape our thinking. The internet is relentlessly socially constructed, and informs symbolic interpretation at multiple levels of analysis. While the university is not slowing down its own credentialing through degrees, internet use acts like a symbolic credential which nations use to assess their peers or measure the social and economic characteristics of a nation. As credentialed individuals, we make use of symbols which authorize our roles with each other - such as our assessment of an email address;¹ whether it is from an academic organization, or perhaps a personal email account instead, informs your role and the social conventions regarding a response. We learn these conventions through our participation within the social system in the ways that people always do: either through observations of symbolic interaction, or descriptions which inform our own interpretations (Berger and Luckmann 1967).

The features of its development at the macro institutional level are unique for a number of reasons. First, it developed already embedded in globalized ideas of science, research, universities; awareness of nations, cities and people were on the minds of the individuals who contributed to its initial and current engineering.² Secondly, the internet's actual development was almost immediately international. Satellite connections were established with Finland and then the United Kingdom within the very early stages while even initial

¹Email is specified in RFC 822. "Standard for the Format of ARPA Internet Text Messages" August 13, 1982

²This is not a technologically deterministic argument. When I say "it developed," I am not applying agency or inevitability. Instead, it is meant in the same way one would say "the Volkswagen bug developed into a hippie icon."

technical protocols were still being developed (Greenstein 2015). Thirdly, like other social institutions; it enables new modes of connection, ways of thinking and legitimation of appropriate action. It becomes the right location for some things, and the inappropriate location for other things. Social cues and negotiation validate social norms. Likewise, the boundaries of what is appropriate within an internet-scoped social environment change because of the ways this environment has developed and its global nature.

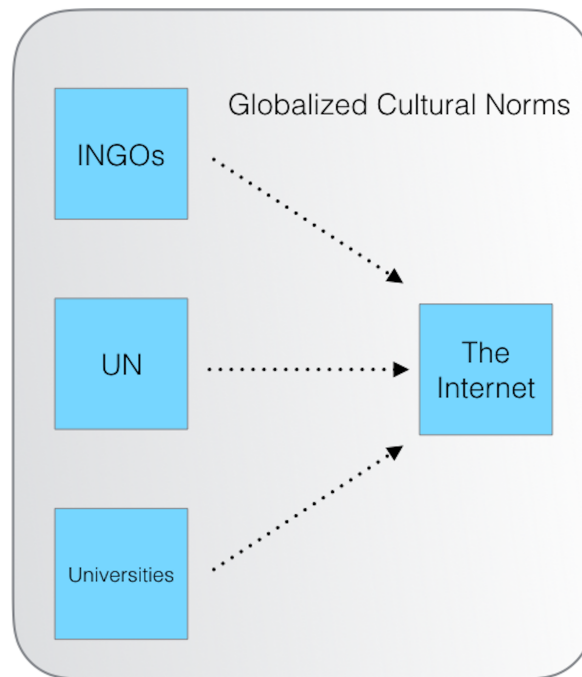


Figure 2.1: Social institutions such as universities and civil society lead to internet expansion through globalized cultural norms

This deeply integrated technical and social process embedded in a world society means that modeling our understanding based only on communication or the technology changes, misses the characteristics of how social forces change in an increasingly globalized world. Instead, this chapter argues that internet expansion takes on the characteristics of social institutions such as education and democracy (Baker 2014; Boli, Ramirez, and Meyer 1985; Meyer et al. 1992; Schofer and Meyer 2005; Torfason and Ingram 2010). Both education and democracy are examples of nearly universally recognized packages of cultural meaning and institutionalized through rational processes (Baker and LeTendre 2005). In designing

education systems and governmental political systems, country level factors negotiate shared meaning (including the boundaries of these concepts) and apply frames of interpretation, comparison, imitation, and legitimation based on a collective rationality (DiMaggio and Powell 1983).

Perhaps the most convincing evidence of the cultural importance of the internet is that the internet is filled with people. When people use the internet daily, they do so performing acts of symbolic communication as they interact with other people (Swidler 1986). This is a characteristic of other media — but the widespread adoption and even wider range of the performance available to individuals makes the internet unique in the way it connects people. When people use the internet it is inevitable that they will apply meaning to the ways they use it and the things that they are using it for (DiMaggio 1997).

Their actions using the internet have meaning, and that meaning is broadly interpreted to also provide information about the actors themselves: the individuals and their identity, nations and their shared identity characteristics with peers, as well as the overall cultural values embedded in our current unitary global concept (Bromley et al. 2011b; Eliasoph and Lichterman 2003). The access to this unitary global concept becomes more available to people as they become more connected to the internet, and the internet develops as an integrated part of this concept. Multiple internets do not make sense, just as multiple United Nations do not make sense. These factors shape many of its characteristics, including the pattern of diffusion and rapid globalization.

The internet serves a central role in many aspects of civil society (Banaji and Buckingham 2013). Social movements and political parties use the internet as a central place for civic debate (Castells 2013). Professional specialization has developed around internet law and rationalize authority on internet specific social problems such as intellectual property, licensing, and other claims which are unstructured by the technical specifications (Lessig 2000). For example, society is left to figure out in which cases should domain names (such as mcdonalds.com) be treated like a phone number, physical property, or licensed trademark.

Moreover, international social movements would take a different shape without the internet (Keck and Sikkink 2014). The internet needs to exist as a social problem for internet specializations of the professions to exist (Bowker et al. 1997; Davis 2001; Stefik and Lavendel 2005). Simultaneously, the increasingly rationalized integration of professions into the internet contribute to the characteristics that become integrated in the infrastructure. The legal interface which authorizes governments to tap or intercept content sometimes occurs before the technical interface, and sometimes after. This is part of the process which has both global actors, and globalized people in mind, and a globalized vocabulary to describe it. Rights are necessary social-constructs that need to be in place before other actors can violate them, or individuals can make claims about what constitute violations.

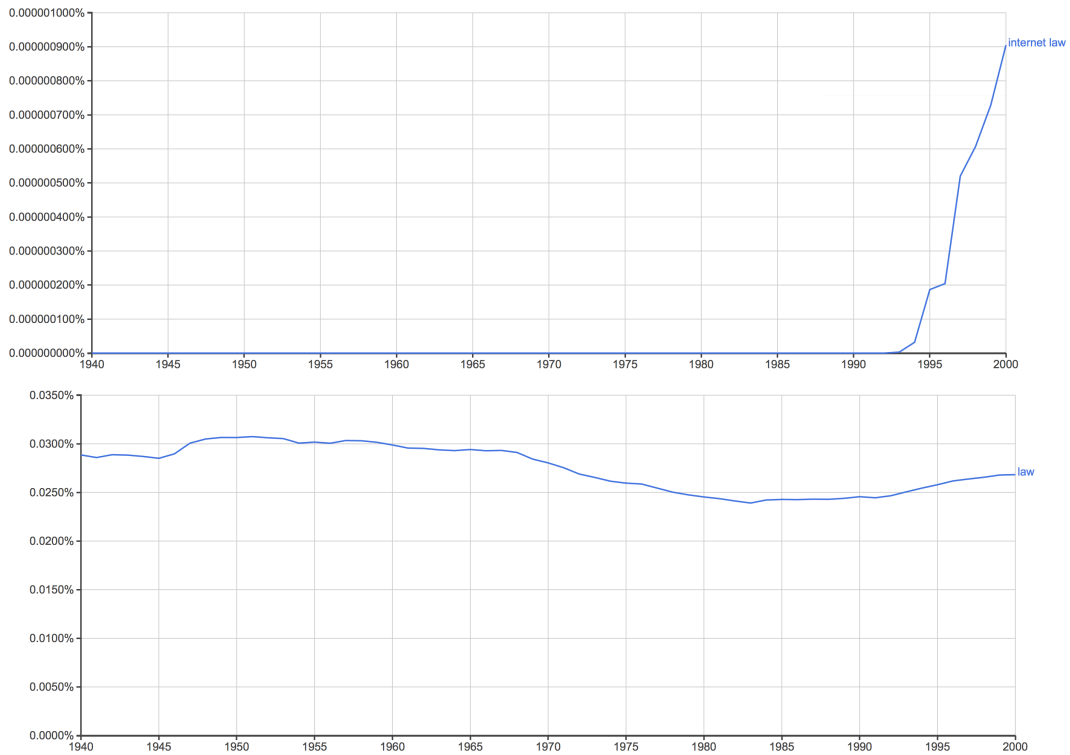


Figure 2.2: Google ngram of book corpus 1940 - 2000: internet law, law

Internet as ICT / Internet as New Media

There is a rich sociology of technology literature that views the internet as an Information and Communication Technology (ICT) (Andrés et al. 2010; Chinn and Fairlie 2010; Pick and Sarkar 2015) and views diffusion as an innovative technological and social process (Rogers 2010). The technology literature closely links the ideas of internet, innovation and business success (Guillén and Suárez 2001), or an integrated aspect of global capitalism (Gilpin 2002), or a disruptive technology in the way that Schumpeter describes (Lyytinen and Rose 2003). Different conceptions attribute the digital divide to political and economic institutions (Castells 2013; Milner 2006; Zhao et al. 2007) and do motivate global political analysis. Likewise, Starr (1997) among others note the ongoing reciprocal dynamics between new technologies and policy. While there are interactions with political institutions, there is not a focus on macro level action with phenomenological causes.

Consciousness is much more the domain of communication studies viewing the internet as a new media (Cohen et al. 1972a). Performance in the Goffman sense is brought into consideration early on (Boyd 2014; Markham 2013; McLuhan 1974). However, media studies traditions such as time displacement studies translate to the new media as cleanly. There is also work in this tradition on global level political structures (Mansell 2004), and control or restriction of media as part of the theorization (Milner 2006). Not widely addressed by media studies, but symptomatic of media itself is that the internet becomes a surface where experts negotiate social problems. It becomes the substance where expertise can creating psychological models related to overconsumption (Błachnio and Przepiorka 2016), or organizationally rationalizing practices when the technology rearranges boundaries of public and private life (McDonald and Thompson 2016).

Internet as an Institution

Others have also analyzed the institutionalization of the internet. DiMaggio et al. (2001) calls social scientists to the macroscopic analysis of the institutionalization of the internet. Drori and Jang (2003) state that nations try to live up to globalized social expectations of information technology sophistication based on their embeddedness in global linkages through INGOs and education. As many researchers have pointed out, we see this expansion in other arenas. Most notably, in addition to education this expansion of institutionalized norms occurs through diffusion of science policy, human rights adoption, environmental policy, civic organization, war, etc (Schofer, Hironaka, and Frank 2012). Global social institutions occur as the world becomes more rationalized through formal organization (Drori, Meyer, and Hwang 2006; Meyer and Bromley 2013). However, unlike any of these other arenas, the expansion of the internet has occurred entirely in an already globally organized world. From this perspective, I'm describing the institutionalization of the internet in the same way that Baker and LeTendre (2005) describe the institutionalization of education:

Education is an institution, like modern health care or the family, that may take on differing forms from nation to nation and even from region to region within a nation, but that at a deeper level is strongly affixed to global norms and rules about what education is and how schools should operate (Baker and LeTendre 2005:8).

How would we know that the internet is a global cultural institution? Institutional analysis highlights the ways in which environments provide the schemas and templates for local structure. In this tradition, world society theory argues for a collection of globalized schema (Meyer et al. 1997). Likewise, Schofer and Meyer (2005) shows how patterns of higher education expansion indicate cultural carriers as a causal mechanism, rather than more functional or conflict oriented explanations (Wallerstein 1974).

In analyzing the physical expansion of the internet, this research follows the models of Schofer and Meyer (2005) and Boli and Thomas (1997) by testing whether there are cul-

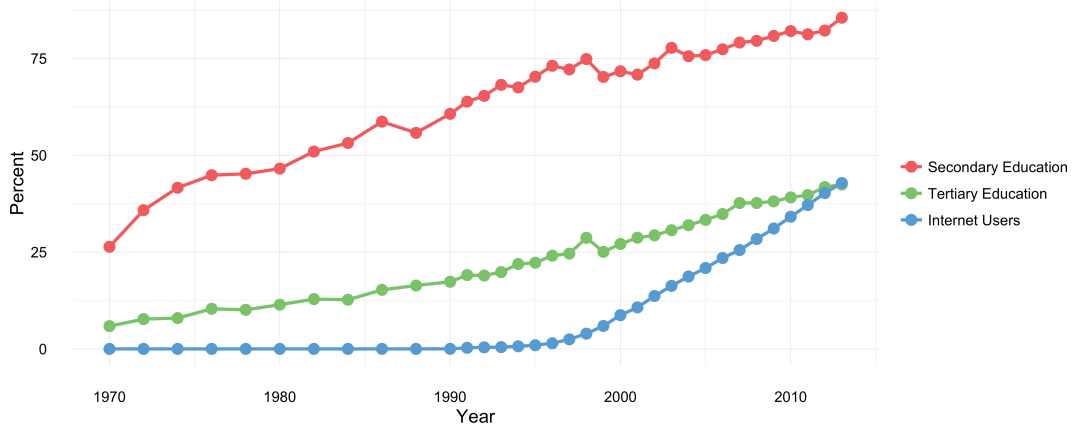


Figure 2.3: Worldwide growth of education and internet

tural components to the global adoption of the internet in the same way that there are global cultural norms which lead to the worldwide adoption of scientific rationalization, democratization or educational organization. In addition to the physical expansion of the internet, an indicator of the role that the internet plays as a social institution is the increasing organizational rationality wrapped around the negotiated meaning of the internet. In parallel with the physical expansion, the regulation and understanding of the internet has become increasingly present in policy. Through policy, governments formalize and express the symbolic meaning and contested ideas represented by the net. As such, it represents another area in which actors stake out substantive claims based on morality and cultural understandings. Any discussion of the internet at the policy level acknowledges its importance as both a technology and a cultural entity. Therefore, an increase in internet policy represents the increasing importance of this institution in the deliberations of governance.

Argument & Expectations

There are two important and simultaneous aspects of the internet's expansion and development as an institution: the physical expansion through participation of individuals, and the rationalized expansion into organizational processes through policy. The physical expansion

(much like the enrollments of university expansion) measures the increasing level of internet use by individual actors. Policy expansion indicates the inauguration and development of negotiated meaning-making by national actors. In order to understand the internet, we need to see if it acts like a social institution at the global level of analysis. It is both a site where global norms were considered throughout its development, and is now a social construct that applies meaning to people and nations. My arguments are as follows:

Table 2.2: Evidence of Institutionalization

Structure	Site/Target		Argument	Evidence
Physical	Internet	1)	Engineering developed within world cultural structure	United Nations topic consistency in engineering documents (RFCs)
		2)	Domestic vs international development becomes indistinguishable	Early and increasing international infrastructure, Supporting domestic organizations replaced by international
Cultural	Internet	3)	People perform culture using the internet	Users increase
		4)	People apply meaning to the net	United Nations conference agenda problematizes the net as a major issue
	World Society	5)	The internet applies meaning to people	RFC topics describe populations in United Nations documents

In “World Society and the Nation-State” Meyer et al. (1997) proposes a thought experiment in which they ask us to imagine the pressures a people might experience if they were newly integrated into a global system of nations. Suddenly higher levels of organization and more isomorphism would be expected through the integration of symbols that make interaction possible within the system. Similarly, imagine the social pressures that form new

technologies. If we had the luxury of a completely never-before-seen-clean-slate technology, our expectations and perceptions of the world would shape the way we use the technology and the kinds of problems we envision it as an appropriate solution. Use of the technology depends on the way we perceive, and expect others to perceive the world.

1. *Because the internet developed within an institutionalized world cultural structure, I expect topics of global organization (such as those present among United Nations priorities) to be consistently present within internet engineering documents.*

With the internet's immediate globalization, the distinction between domestic and international development quickly becomes decreasingly important. With the availability of expertise and internationally aligned cultural models (Strang and Meyer 1993), I expect to see

2. *increasing levels of international (non-US) physical infrastructure, and*
3. *the replacement of domestic internet-supporting organizations by international organizations.*

Wherever there are people, cultural interpretations are also present (Eliasoph and Lichterman 2003). In this regard, the interaction between the physical structure and social structure increases as more culture is performed, and more infrastructure put in place.

4. *An increasing number of internet users, also simultaneously means that there are increasing levels of social interaction on the internet.*

As people use the internet, they apply meaning to its use. Just as having a national education policy is a symbolic representation to other nations that express a consensus on the importance of schooling — national and global agendas that prioritize the internet concurrently apply meaning which contextualize internet use. In this case, the internet is problematized as both an obstacle related to social development, and as a solution to economic and political concerns (Cohen et al. 1972b; Drori et al. 2006).

5. *Within the United Nations conference agendas, I expect that the internet will be situated in parallel with other global level institutionalized topics such as education, or the environment, or the interests of individuals.*

As the internet becomes increasingly institutionalized, it will increasingly apply meaning to categories of people. Just as people have applied meaning to the internet, those same packages of meaning are applied to populations of the people who have varying levels of access to the internet. Education credentials individuals, and nations are evaluated based on the levels of education present as an indicator for the kind of places they are able to adopt in a globalized economy, or as a representation of the values of the country (Baker 2014).

6. *With the newly institutionalized vocabulary of the internet, I would expect topics which originated in engineering documents to be used to describe populations of people in global venues such as the United Nations.*

Previously un-nationalized concepts develop into metrics which change the physical realities of people within countries. Nations that are “highly connected” or “information literate” interact with peer nations which they perceive are at similar levels of connectedness, or literacy, or share similar values (such as civil liberties).

Data

This research uses two sites of observation: the engineering documents that designate the internet protocols, and United Nations summits, conferences, committees and resolutions. The engineering documents are based on a technical rationality and are designed to communicate to the people creating them how software and hardware should interact. Whereas, the United Nations documents are based on a legal, economic or cultural rationality and are designed to communicate agreement on the priorities of a worldwide body.

Request for Comments (RFCs) are engineering documents maintained by the Internet Engineering Task Force (IETF). For the most part RFCs are issued in text format, so that they can be easily searched and organized. They are indexed and referenced by sequential numbering from RFC0001 (“Host Software. S. Crocker. April 1969.”) and continuing to RFC7842 as of April 2016. For this analysis, I remove the RFCs that are only available in PDF or Postscript format,³ and then categorized the remaining text documents into six decades from 1960 ($n = 26$) through 2010 ($n = 2084$ at this time). Below are RFC titles randomly sampled from the dataset to illustrate the kinds of topics these documents would cover.

RFC6357: Design Considerations for Session Initiation Protocol (SIP) Overload Control *RFC4198*: A Uniform Resource Name (URN) Namespace for Federated Content *RFC4224*: RObust Header Compression (ROHC): ROHC over Channels That Can Reorder Packets *RFC7084*: Basic Requirements for IPv6 Customer Edge Routers *RFC4363*: Definitions of Managed Objects for Bridges with Traffic Classes, Multicast Filtering, and Virtual LAN Extensions *RFC6405*: Voice over IP (VoIP) SIP Peering Use Cases *RFC1459*: Internet Relay Chat Protocol *RFC4875*: Extensions to Resource Reservation Protocol - Traffic Engineering (RSVP-TE) for Point-to-Multipoint TE Label Switched Paths (LSPs) *RFC5661*: Network File System (NFS) Version 4 Minor Version 1 Protocol *RFC7077*: Update Notifications for Proxy Mobile IPv6

From the hypothesized social agendas which are prioritized at the global level of analysis — through theory, or the priorities expressed in United Nations documents — I selected word stems that might represent evidence of these priorities within the RFC document. I then counted the documents which contained the word stem. As validation, I spot check lines which were selected for topic accuracy and remove terms where the relationship to the global context was spurious (i.e. “copyrights” selected with the term “rights” and subsequently present in most of the documents). If these globalized terms were not prioritized within engineering documents, I would not expect to see them represented, or only irregularly present throughout the RFC dataset spanning nearly six decades.

³I also removed the RFCs published on April 1st. The IETF has a long history of distributing joke standards on this date going back to 1978 - RFC748 “Telnet Randomly-lose option” written by the author of the email protocol IMAP that we currently use. Some of these joke protocols have been implemented (RFC1149 - “Standard for the transmission of IP datagrams on Avian Carriers”), but probably detract from the overall point of this chapter.

United Nations data was gathered from announcements and press releases related to major summits and conferences, as well as agenda items for UN associated organizations such as special committees. These represent the topics of importance at the global level of organization. Gross enrollment for secondary and tertiary education, the number of internet connected servers, and the percentage people within a country with access to the internet from home come from the World Development Indicators (The World Bank 2015). From the Union of International Association (Union of International Associations 2015), I use the count of INGOs within a country as an indicator of global linkages for OLS regression and descriptive analysis.

Analysis

The development of the internet was embedded in world society

Universities were the birthplace of the internet. The internet is firmly rooted in the rationalization of science, and evidence of a globalized social world is documented in the scientifically rationalized specifications of the internet. The table below shows the number of documents within a decade that contain the associated word stem. It is sorted by the mean percent of documents within a decade which contain a match. For reference, the total number of documents within a decade is listed at the bottom.

Words such as “internation” and “world” appear in the documents within the first two years (26 documents) of its existence, and before the network gets the name of “internet.” Topics related to the earth, nations, cultur(e/al), also make appearances early on.

In comparison to the increasing number of documents referencing internationally relevant terms, the stem for “legislation” matches 10 documents in 1970 and at most 27 documents in the millennial decade. As engineers join the reciprocation between the policy and technology development, the context where legislation may be domestically relevant, is likely generalizes

Table 2.3: Matching RFC Documents by Decade

	1960	1970	1980	1990	2000	2010	mean %	sd %
university	7	96	157	702	538	380	27.24	13.12
city	6	80	96	449	901	653	25.13	7.62
internation	1	19	139	671	797	482	22.80	16.63
nation	0	36	85	400	396	314	16.36	8.05
privacy	0	13	26	315	713	480	15.30	10.29
world	1	34	80	415	547	344	15.28	9.13
law	0	30	71	311	439	256	14.06	6.29
countr	0	9	29	238	256	138	7.91	4.97
educat	0	8	11	88	65	60	2.95	1.65
social	0	6	9	57	68	65	2.46	1.06
village	0	0	0	4	58	35	1.32	0.93
earth	0	1	6	25	39	21	1.14	0.61
cultur	0	2	1	34	35	25	1.02	0.79
legislat	0	10	2	17	27	17	0.95	0.31
united nations	0	0	3	23	10	4	0.70	0.57
democra	0	0	1	4	18	4	0.33	0.20
governance	0	0	0	1	12	8	0.29	0.20
sociolog	0	0	2	4	0	1	0.28	0.24
youth	0	0	0	6	1	4	0.20	0.17
disabilit	0	0	0	2	3	6	0.17	0.10
information society	0	0	0	0	2	2	0.08	0.02
human right	0	0	0	1	0	1	0.06	0.01
indigenous	0	0	0	0	0	1	0.05	0.00
person	0	91	107	446	—	—		
total documents	26	724	376	1575	2882	2084	1.00	0.00

later on into the broader concept of “law” which matches about 14% of the RFC documents within each decade.

Graphing the percentages of matching documents within each decade, we can see that the overall presence of these concepts increase in general from the 1970s, and then maintain consistently high levels of representation. “Privacy” becomes an interesting example where the institutionalization of the internet comes into focus. I suspect that as people are applying meaning to their activities online, the negotiated boundaries of social life become more explicitly incorporated into the engineering foundation of the internet. As people live more of their lives online, privacy becomes more important.

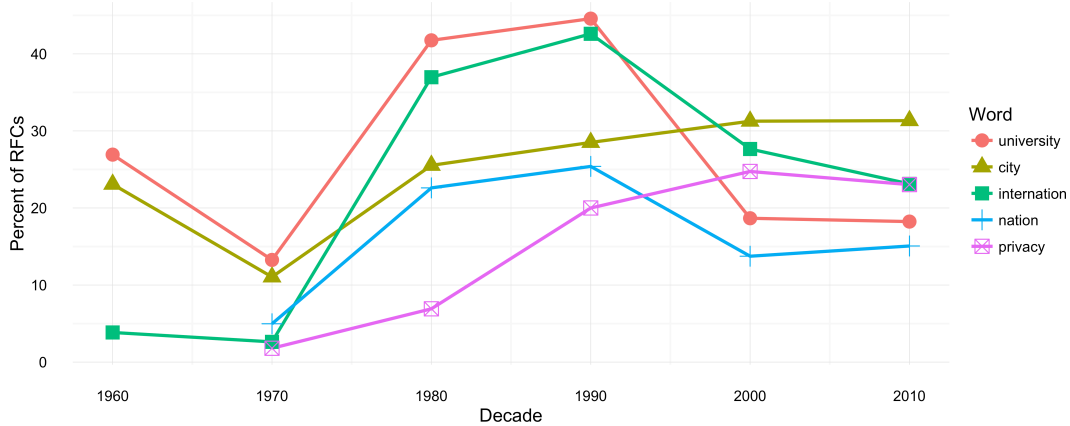


Figure 2.4: Word consistency over time.

Domestic vs international development becomes indistinguishable

Do you know if your web browser was made in the USA? The question barely makes sense and probably leaves you confused. The development of networking technology since the 1970s enabled software development to be even more distanced from location. Whereas, a global supply chain allows physical components be sourced from different locations, and shipped to the country where the final product is assembled. In the software analog, components can be sourced from different locations, and assembled in those same locations. Every piece of software depends on libraries of other software components to do the small things like ensure your file was saved to disk, or check that the information transmitted over the internet arrives complete. The development of these small component libraries have built upon each other over decades. The internet immensely increased the simultaneous development of this internationalization.

The first connection between networks of our modern internet began in 1969 between Stanford Research Institute and the University of California Los Angeles. In 1973 a satellite connection established a bridge between the network in the United States and Norway, quickly followed by a connection to London.⁴ In 1974, RFC0675 labels it the Internet. It

⁴This history is documented in RFC 2235. “Hobbes’ Internet Timeline.” November 1997.

was internationally distributed even before having its name. The internet has always been globalized. In the figure below you will see the concurrent increase in internet users and the declining proportion of US server infrastructure.

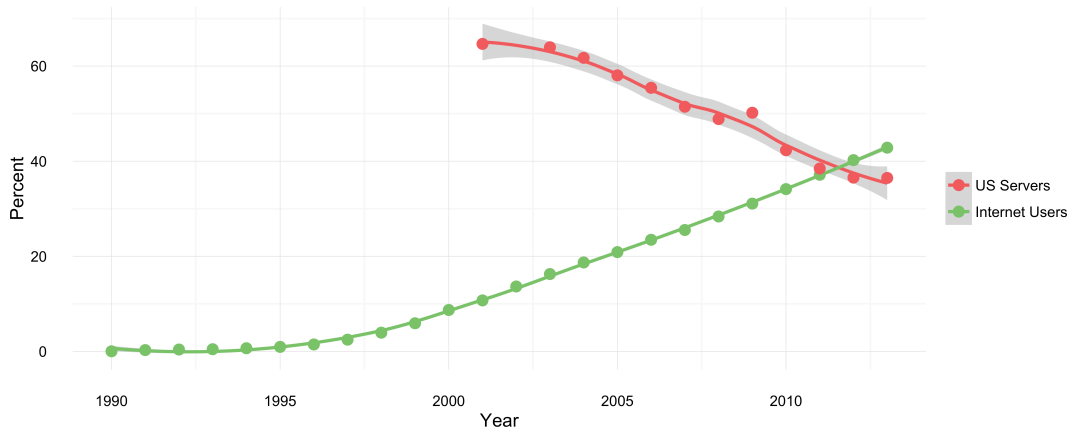


Figure 2.5: Increasing global internet users and declining percentage of US servers

In 1995 one of the last research networks (NSFNet) that restricted commercial use, closed down. It wasn't until 1999 that the number of internet users superseded the total population of the United States, and within that year only 35% of the US population had internet access at home. A majority of users were outside of the United States. In this same period of time other domestic organizations established to support the internet were transitioned to international counterparts.

Table 2.4: Transition of internet organizations from domestic to international

Domestic	International	Transition
National Science Foundation	Internet Society (ISOC)	1991
Internet Advisory Board (at Department of Defense)	Internet Architecture Board (at ISOC)	1992
Internet Engineering Task Force (at NSF)	Internet Engineering Task Force (at ISOC)	1993
	World Wide Web Consortium (W3C)	1994
InterNIC (at Stanford Research Institute)	Internet Corporation for Assigned Names and Numbers (IETF authority, Commerce Dept. contract)	1998
	Internet Governance Forum (UN)	2006

If the institutionalization of the internet is related to the global rise of education and global links through networks of expertise among INGOs, we should see an association with those measures. As an illustrative example, I show a table of OLS models using 25 yearly global level observations with the percentage of internet users as dependent on the percentage of secondary education enrollment, and the cumulative count of international nongovernmental organizations in each country. Using the year as the intercept, these models show positive coefficients between both secondary education and INGOS independently and in a combined model. Since these models violate the independence assumption of OLS, the significance of the p-value is unreliable. I check the direction of the coefficients by using similar models with generalized least squares and still show positive association between global levels of education and civil society through INGOs and worldwide level of internet use.

Table 2.5: OLS Regression

	<i>Dependent variable:</i>		
	Internet Users		
	(1)	(2)	(3)
Year	−0.066*** (0.008)	−0.031*** (0.004)	−0.047*** (0.010)
Secondary Education	2.032*** (0.215)		0.838 (0.498)
INGOs		0.097*** (0.009)	0.061** (0.023)
Observations	25	25	25
R ²	0.908	0.921	0.930
Adjusted R ²	0.900	0.914	0.920
Residual Std. Error	7.063 (df = 23)	6.564 (df = 23)	6.316 (df = 22)
F Statistic	113.858*** (df = 2; 23)	133.672*** (df = 2; 23)	97.173*** (df = 3; 22)

*Note:**p<0.1; **p<0.05; ***p<0.01
Standard errors in parenthesis.**Expansion of meaning**

In the early 2000s, the United Nations began integrating the internet into major platforms of social development. Of the 45 major summits between 1990 and 2015, three of them set agendas on information society development. By comparison, the topics of education, children, and food each had two dedicated conferences. Forests, indigenous people, and women, HIV/AIDs, and aging as topics were each the focus of one major summit (United Nations 2016).

As this process institutionalizes, ITU reports describe the lagging development of nations with lower levels of internet users. The implicit expectation in the discourse is that eventually everyone on earth will have internet access. Through this process the internet has been closely associated with fundamental human rights. In 2012 the United Nations Human Rights Council adopted a resolution declaring that people have the human right to freedom of expression on the internet (Sydell 2012). During the earlier World Summit on Information Society meetings, the internet was also linked to freedoms of assembly and the country level right to development. Access to the internet has been guaranteed as a constitutional right

of at least three nations (France, Greece and Mexico). Article 5A of the document that constitutes Greece as a nation guarantees that all people have a right to participate in the information society (Maddex 2007:179). Spain is currently considering legislation which declares access as a human right (Rothkopf 2015).

The internet is used in the very documents which constitute a nation to describe the characteristics of the nation, and the people within it. Nations describe their people in internet-terms, with internet freedoms. Twenty-five years ago the internet barely existed. The influence of the internet comes from its social institutionalization.

Conclusions

In this chapter I use historical accounts of the internet's development to research the ways in which its embeddedness in a scientific and democratic environment influenced its development. I use the documents written by engineers, which define the technical specification of internet protocols from the Request for Proposals (RFPs) documentation. I show words representing globalized priorities throughout the design of the internet. These word describing internet communications are invented during the RFC process, and end up enabling rights as part of country constitutions and declarations by global institutions. Institutions are both physically constructed and culturally constructed. This embeddedness in a global system, and reciprocation between other macro level institutions such as education and democracy create the internet that we see today as part of the ongoing organization and rationalization of a worldwide polity process.

Appendices

Table 2.6: Descriptive Statistics

Statistic	N	Mean	St. Dev.	Min	Max
Internet Users	25	16.543	15.366	0.025	45.250
Years	25	2,002.000	7.360	1,990	2,014
Secondary Education	25	73.517	6.977	58.424	85.519
INGOs	25	811.166	146.342	554.442	979.533

Chapter 3

World Society as a Driver of Internet Expansion

Abstract

What drives the growth of the internet? Current theories attribute the growth to economic factors, trade and democracy. In line with sociological neoinstitutional theories, I argue that global culture establishes taken-for-granted norms, including the norm of internet participation. This research uses time series regression to test whether organizational connections to global cultural models through the number of INGOs within a country and the diffusion of educational institutions establish the conditions prompting internet participation within countries.

Previous research starts with the understanding that the internet has expanded so rapidly due to economic or political reasons. In contrast to these explanations, this research tests whether isomorphism linked to global level institutionalization of world society is one of the primary causes of internet use.

Internet diffusion is different than prior technologies (Dewan, Ganley, and Kraemer 2005). It has revealed an extensive capacity to rearrange social order — including people's relationship to each other, their interactions with government, as well as access to models of legitimated knowledge. Prior technologies have not had the depth of cultural embeddedness, nor the

explosive rate of global adoption which we have experienced with the internet. This research argues that this extensive rate of growth is due in part to the internet's embeddedness in world cultural structures. Global structures facilitate the spread of the internet through links to collectively rationalized models provided by international organization, education and other aligned institutions.

Global Evidence of Expansion

Even before it became commercially available, the internet was immediately globalized simultaneous with its development (Greenstein 2015). In 1989 less than 1% of the world's population were connected. Within twenty five years almost 50% of the world used the internet from home (The World Bank 2015).

In addition to the global-level increase, levels of internet use are increasing within nations as well. In 2014, only 15 of 169 (or 8%) of countries listed in the world development indicators had less than 5% of their population connected. In a majority of countries, much larger proportions of the population have access to the internet at home. Even accounting for the inequality of the distribution, the number of countries with large populations of internet users cannot be satisfyingly explained by income inequalities alone. The aim of countries is to have higher rather than lower numbers of internet users. How does the majority of the world decide to do anything together this uniform and as rapid?

Figure 3.1 shows the steady increase in the percentage of internet users worldwide, and yearly frequencies of the number of countries within each percentage block. In 2005 there was a heavy right skew in the distribution of countries with internet access. By 2014 that skew decreases significantly to flatten out as more and more countries have higher percentages of internet users. While there is significant inequality, one of the stranger attributes of the digital divide discourse is the expectation that internet access become more like clean water

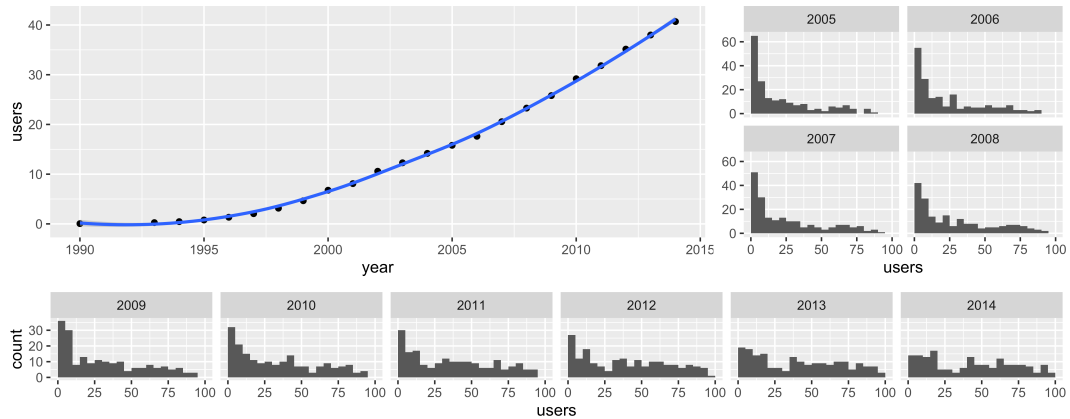


Figure 3.1: Increasing internet users. Yearly distributions of countries by percent of internet users.

in its ubiquity, even before clean water has become as ubiquitous¹ as clean water should be as a life necessity.

Explanations of National Variation

Causes of internet expansion is well traveled territory for social scientists. Billon, Lera-Lopez, and Marco (2010) has an excellent overview. Previous research has attributed the diffusion of the internet to either economic factors or political factors, or a combination of the two. Economic factors attribute gaps in diffusion to difference in per capita income (Beilock and Dimitrova 2003), levels of industrialization (Zhao et al. 2007), internet access costs (Kiiski and Pohjola, 2002), regulation, telecom policy and infrastructure (Hargittai 1999; Zhao et al. 2007) and world system status (Guillén and Suárez 2005). Whereas political factors involve lack of corruption (Bussell 2011), rule of law and educational systems (Zhao et al. 2007), and democratic regime type (Guillén and Suárez 2005; Milner 2006). Drori and Jang (2003) show that nations try to live up to globalized social expectations of IT sophistication based on their embeddedness in an ideology of national development. Almost all research

¹In 2015, 91.5% of the world population had access to improved water sources according to the World Health Organization (World Bank 2015).

starts with income as a determining factor in predicting the level of internet participation within a country. Wealth and income enable participation.

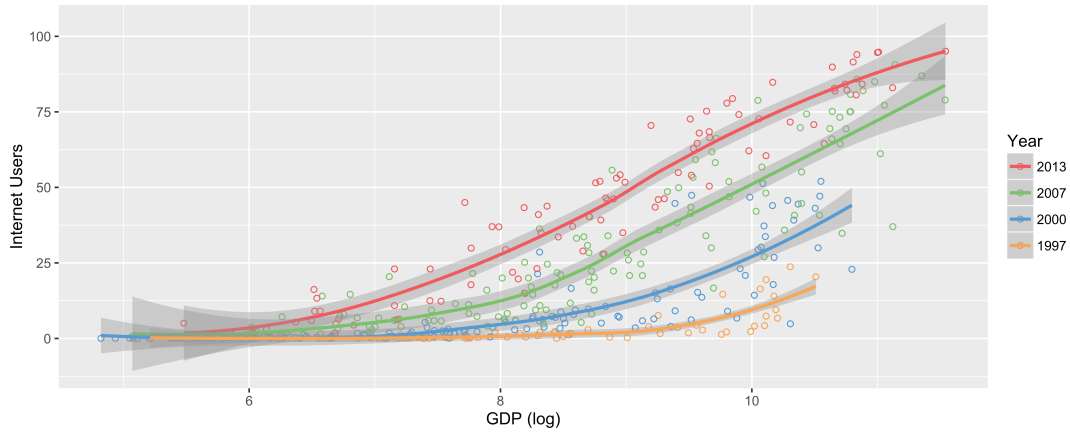


Figure 3.2: Positive association between GDP and internet users by year

A cross sectional view of GDP and the percentage of internet users within a country shows that there is likely a positive relationship which exhibits some curvilinearity. Even though income is a necessary condition to internet use, national levels of internet use extend beyond what GDP might predict alone. Dewan et al find “IT penetration levels are increasing in both rich and poor countries, but at a substantially higher rate in poor countries” (Dewan et al. 2005:411). As the above figure shows, by 2013 even some lower income countries have close to 50% of their population connected.

H1. Economic development through GDP produces internet expansion.

Trade Globalization is the phenomenon of the increased interactions between nations through the decreased obstacle of geography. There are a few reasons why economic participation in a global system might increase internet participation. Functional arguments view the internet as enabling new ways to conduct business and therefore beneficial to trade (Clarke and Wallsten 2006). Dewan et al. (2005) argue that larger trade networks come with larger pressures to conform to technology norms. Crenshaw and Robison (2006) hypothesize that trade and investments may “channel” internet development. Acknowledging that most people expect a positive relationship with trade, Chinn and Fairlie (2010) do not

find significance after controlling for legal and regulatory institutional factors. Likewise, institutionalist argue that nations which participate more regularly in trade are more likely to adopt the standards of the rest of the world (Drori, Yong Jang, and Meyer 2006).

H2. Trade produces internet expansion.

Education Literacy is prerequisite for internet use, and the most common way that literacy develops is through a schooling system. Because of this, countries with lower levels of education are also likely limited to lower rates of internet use. But in addition to literacy, there are several other reasons that education may contribute to internet growth. Education is thought of as both functional and cultural (Durkheim 1956).

In the process of teaching children to read, schooling also teaches kids how society works through socialization. Research is consistently showing a connection to education. Users with higher levels of education spend more time on the internet and use it in a greater variety of ways (Blank and Groselj 2014). Teachers internationally are increasingly integrating internet use into their curriculum (Kozma 2003). As this process happens students are socialized to use the internet.

Education is highly connected to world society (Schofer and Meyer 2005). Frank et al (2000) hypothesize that nations will be more responsive to internationalized blueprints with the presence of “receptor sites” that can interpret and disseminate these models. Since the internet’s origin is highly rooted in academic expertise, the presence of universities may accelerate the adoption of this cultural model. A precursor to universities is a strong primary and secondary education system.

H3. Education produces internet expansion.

Democracy Democracies are highly legitimated forms of government that are reinforced by globalized cultural models (Lijphart 2012; Torfason and Ingram 2010). In previous internet diffusion research the effects of civil liberties are generally positive. Norris (2001) uses

civil liberties cross-sectionally in 2000 and doesn't find significance once economic development is accounted for. Beilock and Dimitrova (2003) find significant positive effects with a dichotomized category created from a measurement of civil liberties. Milner (2006) tests democracy more rigorously using three different measures and concludes that democracies are more likely to adopt the internet at faster rates. Guillén and Suárez (2005) also found that democratic political regimes enable faster growth. To most theorists, the connection is practical; the internet is viewed as a decentralized media which may threaten authoritarian regimes. As a result, governments tend to either restrict access, restrict content, or threaten unauthorized users. Democracies are more likely to provide a political climate that is conducive to both infrastructural development and cultural permissiveness fostering individual expression (Almond and Verba 1989).

H4. Internet expansion occurs in countries with more civil liberties.

World System The effect of a core/periphery world economic system of dependence should also be evident in the patterns of internet growth. Some theorists might view this as an enabler of exploitation. The internet is a means of facilitating capitalist transactions by reducing long distance coordination costs, facilitating placelessness, and creating new mechanism of economic participation (Arrighi 1994; Dicken 2011). Gunter Frank (1969) argues that technology will spread faster when it is in the core's interest to share the technology to benefit their position in the international division of labor. Clarke and Wallsten (2006) find that developing countries export to developed countries, more than other developing countries when internet penetration is higher. With outsourcing providing new avenues for employment, and the extraction of human capital, we may see more peripheral nations compelled to increase their internet usage.

Wallerstein (2004) argues that technology will diffuse slowly outside of the core because it is not in the interest of the core to share technology. Guillén and Suárez (2005) show this relationship where core and semi-peripheral nations have higher numbers of internet users than countries in the periphery. Devezas, Linstone, and Santos (2005) argues that the

growth of the internet is ushering in the conclusion of the 4th Kondratieff-wave and ushering in the consolidation structural phase of the 5th wave in which power is more ensconced.

H5. The internet expands more rapidly in the core and semi-periphery than in the periphery.

Infrastructure in Place Because a large percentage of internet access used telephone lines, previous research has used the number of phone lines as an indicator of the potential for internet access within a country (Dasgupta, Lall, and Wheeler 2005), or a proxy for the cabled infrastructure in place that enables advanced networking infrastructure (Andrés et al. 2010; Hargittai 1999; Norris 2001). In more recent periods wireless broadband has been the fastest growing type of connection (International Telecommunication Union 2015).

H6. There is a positive relationship between the number of phone lines and the number of internet users within a country.

World Society International Non-Governmental Organizations (INGOs) are thought of as the link between countries and commonly held conception of world society (Boli and Thomas 1997, 1999; Drori et al. 2003; Hironaka 2014). They act as both the enactors and carriers of world cultural norms. INGOs “provide models for global organizing, forms of discourse and communication, and avenues for influencing states and other actors” (Boli and Thomas 1997:180). These organizations act as advocates for specific ideas as well as conduits for the transmission of cultural scripts. Keck and Sikkink (2014) see INGOs as creating global norms by creating avenues for local social movements to access their government. I use INGOs in this research as an indication of world society connectedness similar to Tsutsui and Wotipka (2004), Frank and McEneaney (1999), and Schofer and Longhofer (2011).

H7. Connections to world society through international non-governmental organizations produces internet expansion.

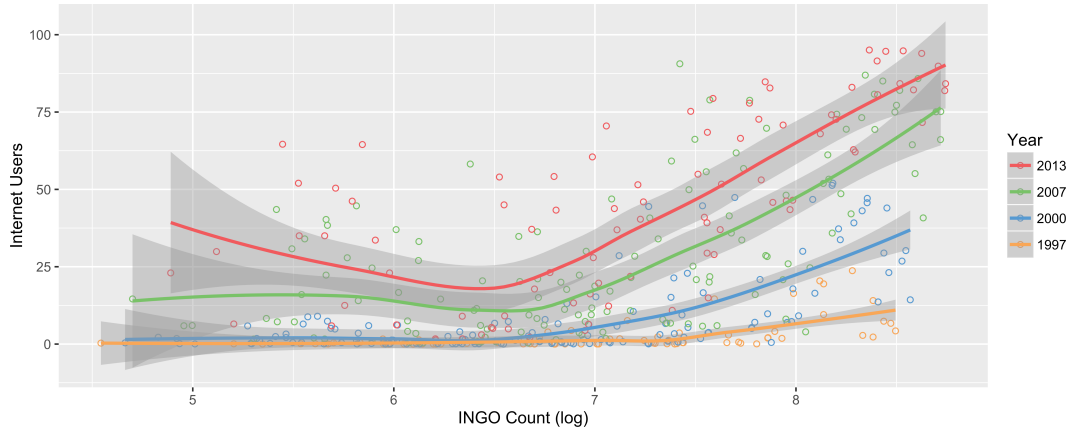


Figure 3.3: Positive association between INGOs and internet users by year

How do institutional mechanisms increase internet use?

Sociological Neo-Institutionalism reminds us that actors are performing within a social structure. That, in order for their identities to be successfully communicated, they need to act in ways that are meaningful to others. Much of the action of countries is symbolic. Roles inform action (Berger and Luckmann 1967). Actions inform roles. Symbolic actions which inform identities - at both the individual and national levels of analysis - are responsible for lots of social and cultural action (Meyer and Rowan 1977). When the social action is performed in a community with increasing contact, the actions of the actors become more similar to each other. Each social actor performs actions which other actors have acted. Isomorphism achieved (Aoki 2007). Since actions are so similarly repeated, analyzing international comparative measures of the dynamics of these symbolic actions; who invokes them, and how they are interpreted within a global society, helps us understand how macro systems of symbolic culture work, and model better global predictions.

Empirically this has been tested at multiple levels of analysis (Powell and Colyvas 2008). Individually; people imagine themselves acting in ways which they hope will be interpreted by others as politeness because they themselves interpret it as politeness when others act in those ways. Organizationally; when multinationals do not fit neatly into industrial cate-

gories, there is a cost to the valuation of the company's stock market trading price (Zuckerman 1999). Nationally; countries create educational systems to conform to global norms which help countries identify each other as peers (Boli et al. 1985).

In a similar fashion, I'm arguing that internet adoption acts as one of these symbolic practices which help nations identify each other as peers. In the world society literature, one mechanism of diffusion for globally institutionalized practices are through International Non-governmental Organizations (INGOs) (Boli and Thomas 1997). INGOs bring with them and spread universalized practices which are then applied to every country. World Society scholars predict these practices to spread faster in countries with more INGOs. I believe, and test here, that internet adoption is one of these globalized practices. INGOs come into a country and conduct their work using websites, email and other internet driven tools. They increasingly expect to interact with the nation, and other similarly professionalized organizations through these tools (Madon 1999). As these tools are being used, they communicate attributes about the nation to other nations. These attributes are designed to reinforce their identity as the nation they imagine themselves to be. Nations have an ideology of development that involves the internet (Drori and Jang 2003). Nations act like nations. Modern nations use the internet. People in modern nations use the internet.

Current globally institutionalized ideas provide a primary model of universalized personhood — an agentic individual. This model supersedes previous models which legitimated many different categories of person. We have seen changes to delegitimizing indentured servitude, and legitimating increasing incorporation of the rights of women in the political process, or conceptualizations of individuals with disabilities. Even using the stylized language of describing categories of 'individuals with disabilities' in the ways that are conceptualized as just, emphasizes the individualism of the person. This emphasis on the agency of everyone is becoming more widely adopted everywhere and reinforced by other cultural institutions such as science, through policy and discourse. We see this over and over as more and more political documents give increasingly universal rights to increasing categories of historically dis-empowered people — constitutional documents defining nations, also define personhood

and they are doing so more similarly to each other internationally.

People in nations use the internet when they imagine themselves to be agentic and are connected to a global identity model of personhood. As they develop connections to this globalized individual model (through education, and other institutions), they create the identity by practicing it and interpreting the practices of others (Berger and Luckmann 1967).

This national identity of connectedness is supported by qualitative observations as well. Near the beginning of 2016, Netflix (an internet video service provider) started offering its service to more countries around the world. When this happened, an NPR interview of Kenyan IT worker Mark Irungu’s reaction captures this sentiment when he says “it felt like, hey, you qualify. Finally, you know, you qualify” (Warner 2016). Even the act of receiving an internet service within a nation serves to legitimate that nation within a globally connected image.

Data and Methods

Using a panel linear model for time series data to address correlated error due to pooling yearly observations of the same country (Baltagi 2013; Wooldridge 2010), this research uses yearly internet participation measurement as an outcome predicted by the economic, political and cultural factors hypothesized. For the main analysis I present a country level random effects model with panel corrected standard errors (Beck and Katz 1995). Random effects models assume that there is already some level of unobserved homogeneity within the variance that we are attempting to explain; that some overall level of variance is shared between each country. It is the most appropriate to avoid omitted variable bias. It also becomes the most appropriate choice when modeling group level factors that do not change over time. In this case: world system status.

Both random and fixed effects models are theoretically and methodologically appropriate. As additional analysis, I also present fixed effects models. The fixed effects models solely account for variation within countries, but ignores difference between countries.

Despite the rigors already built into the panel linear modeling to account for the violated ordinary least squares assumptions that come with pooled cross sectional time series data, I also correct the standard errors to account for the probable serial correlation of yearly data. The Beck and Katz (1995) adjustment of standard errors for panel data leaves coefficients unchanged, but adjusts the variance co-variance matrix in estimating standard errors in order reduce the chance of an inaccurately significant p value and incurring type I error.

Dependent variable

The dependent variable is the percent of **internet users**, or the number of internet users per 100 people within each country. An internet user is defined as an “individual who can access the Internet, via computer or mobile device, within the home where the individual lives.” This measurement comes from the International Telecommunications Union (ITU) which is the United Nation’s agency in charge of coordinating information and communications technologies. The ITU works with governments and private sector members to define the appropriate methodology for assessing the number of internet users within a country. The latest edition to the methodology guide is a 207 page publication released in 2014 detailing the standardized indicators the agency uses (International Telecommunication Union 2014). These measurements are available after 1990. In 1990, the United States had the largest percentage of internet users with .78 % (The World Bank 2015). Within my analysis, countries are included when a percentage is first represented within the dataset.

Independent variables and controls

Economic, demographic, and control variables are drawn from the World Development Indicators (The World Bank 2015). Development and a nation's overall wealth is measured as the logged **GDP** per capita measured in current US dollars. This term was also squared to account for curvilinearity of the relationship. Embeddedness in a global economic system is measured by **trade** as a percentage of GDP. Trade is the sum of both imports and exports of goods and services. When GDP is also included in the model, the variance of a country's overall wealth is already taken into account; leaving this variable to explain the level of inter-country economic interaction. **Population density** (population divided by land area) is used as a control since it is physically easier to connect people when they live closer together. The raw **population** count is logged and models in order to account for nations with differing population sizes. To account for previous infrastructure in place, I include **phone lines** per person (Andonova 2006; Guillén and Suárez 2005; Hargittai 1999; Kiiski and Pohjola 2002). The correlation between phone lines and years shows a mild decline over time of this infrastructural component. The overall levels of education² are estimated with the percentage of gross **secondary education** school enrollments (Bagchi 2005).

Measurements of **democracy** come from the Freedom House Freedom in the World Report (Freedom House 2015). I reverse code the civil liberties score, so that higher levels of the measurement correspond with higher levels of civil liberties within countries (1 - 7).

Connections to world society are measured through the logged count of international non-governmental organizations within a country from the Union of International Association (Union of International Associations 2015). **INGOs** are theorized as conduits which transmit globalized scripts and models (Meyer et al. 1997; Schofer et al. 2012).

Guillén and Suárez (2005) use dummy variables based on Rossem (1996) to indicate **core** and **semi-peripheral** positions in the world system. I create dichotomous variables for

²High levels of missing observations in literacy measurements prevent comprehensive analysis with this more complete dataset, but also are not reported as significant in more recent research.

Table 3.1: Descriptive Statistics

Statistic	N	Mean	St. Dev.	Min	Max
Users	2,434	20.050	25.337	0.000	96.210
Year	2,434	2,003.311	6.122	1,990	2,014
GDP (log)	2,434	8.279	1.596	4.664	11.642
Population Density	2,434	135.568	195.027	1.406	1,718.439
Population (log)	2,434	15.836	1.956	10.726	21.029
Phone Lines	2,434	21.651	19.458	0.000	74.762
Secondary Education	2,434	76.823	30.358	5.165	165.581
Democracy	2,434	4.934	1.732	1	7
Trade	2,434	82.613	41.317	14.991	412.120
INGOs (log)	2,434	6.953	1.007	0.693	8.744
Floor	2,434	0.265	0.442	0	1
Ceiling	2,434	0.011	0.103	0	1
Core	2,434	0.103	0.304	0	1
Semi-Periphery	2,434	0.152	0.359	0	1

the same countries with two exceptions: Greece (core) and Indonesia (semi-periphery) are excluded from my dataset due to missing educational data.

Because a country's percentage never goes below 0 and tops out at 100 percent, I model floor and ceiling effects with dummy variables. Setting a `floor` of less than 1% and a `ceiling` of greater than 90%, only the floor was significant with a mild improvement of the model fit. The floor variable picks up the variation that is shared between countries which have zero, or very low levels of internet usage. Its significance indicates that there is shared variation between these nations.

Missing values of the dependent variable were filled in when the leading and lagging values were both equal. In most cases this recovered cases by filling in zeros in early time periods when countries had very little internet access. If this introduces bias, it is likely that the bias more conservatively estimates increases due to more observations within the set having zero growth. I also dropped the observations that were incomplete cases, or had 2 or fewer yearly observations. With these corrections, I ran analysis with 166 countries with a minimum of three, and a maximum of 24 yearly observations between 1990 and 2014. On average countries had 14.66 yearly observations with a standard deviation of 5.40.

Diagnostics

Hausman testing comparing fixed and random effects models could not rule out inconsistent estimation with a random effects model. In many cases, the more conservative fixed effects model might be preferred. However, since we have theoretical reasons to believe that there is unobserved shared variation, the avoiding the risk of omitted variable bias makes random effects model a better choice. As a further diagnostic, running a fixed effects model does not change the direction of any coefficient.

Collinearity is a concern when working with many related variables. The strongest correlations reach up to .85 between GDP, Phone Lines and Secondary Education. Using an ordinary least squares linear model with country dummies to simulate fixed effects, I check for collinearity using the variance inflation factor (VIF) (Fox 2016). Except for GDP and its square, the VIF of each coefficient remains below 1.6. Because of this, it is unlikely that collinearity produces sporadic estimations.

Additionally, as a way to detect whether interactions between well-established institutions already account for the effect of INGOs, I used fully saturated interactions between secondary education, GDP and democracy. Both higher levels of secondary education and GDP, and higher levels of secondary education and democracy together showed significant coefficients increasing the percentage of internet users within a country. The combined interaction between democracy, secondary education and GDP was also significant and positively associated with higher levels of internet users. Although it provided a slightly better model fit, it did not reduce the significance of the variables already included in the more parsimonious and interpretable models I present here.

Results

In the resulting model I analyze the economic, political and institutional causes of internet use. Among the economic factors; GDP and trade maintains significance in every model with an overall positive association as expected. Likewise, as expected trade contributes positively in every model including those using fixed effects. In the previous literature, trade was most often associated with cultural and network effects rather than being a functional driver itself of internet adoption. The relationships established through trade would ‘channel’ or create norms related to the embeddedness in a global economic system.

Guillén and Suárez (2005) find that position within a world economic system accounts for higher levels of internet use. Surprisingly, this analysis does not find the same effect when combined with the other variables. Instead, countries categorized in the core and semi-periphery (with the periphery as the omitted reference) show a negative association. There are at least two problems with drawing strong conclusions from these results. First, dummy variables were the only indication of world system position in a model where other variables contained more variation. Secondly, because of the weak signal presented to the model to uncover the categorical effects of position, the other economic and political factors which also indicate dependency relationships (such as high GDP, or the dominance of trade’s representation in GDP) may override the signal presented by these indicators. Or, it may indicate rapid expansion relative to the core as countries in the periphery are pressured to increase internet access. In a bare model, with few other regressors, world system position in the core and semi-periphery is significant and positively associated with internet users as expected. Comparison of internet usage levels with multiple indicators of world system position would likely return interesting results.

Among the political factors, there were fewer surprises. Democracy was significant and strongly associated with higher levels of internet use in the random effects models. Among the fixed effects models, the relationship was more tenuous. Although it maintained a

Table 3.2: Panel Linear Model with Random Effects and PCSE of National Factors Predicting Internet Users

	<i>Dependent variable:</i>
	Internet Users
GDP (log)	−76.576*** (6.655)
GDP * GDP	5.740*** (0.411)
Population Density	0.006 (0.005)
Population (log)	1.999*** (0.775)
Phones	−0.690*** (0.107)
Secondary Education	0.059 (0.050)
Democracy	1.401** (0.674)
Trade	0.099*** (0.024)
INGOs (log)	2.797*** (1.058)
Floor	−9.844*** (1.797)
Ceiling	7.793 (6.146)
Core	−19.608*** (5.162)
Semi-Periphery	−8.399** (3.556)
Constant	195.947*** (29.032)
Countries	166
Mean Observations / Country	14.66
Observations	2,434
R ²	0.640
Adjusted R ²	0.637
F Statistic	331.178*** (df = 13; 2420)

Note:

*p<0.1; **p<0.05; ***p<0.01

Panel corrected standard errors in parenthesis.

positive coefficient, it did not reach significance. There may be an aspect of democracy that is shared between countries. Countries with similar levels of civil liberties may share other cultural similarities that lead to internet use.

Along with GDP and trade, the connection to world society through the logged INGO count maintained a positive and significant relationship as one of the most robust predictors of internet use. As seen in the appended tables, this measure remained fairly consistent through both fixed and random effects models.

This finding is consistent with the hypothesized expectations. INGOs bring with them professionalized practices, as well as globally legitimated and universally applicable conceptual models of the nation. I argue that these models and professional practices include expectations of internet access and use. Ideologies of success adopted by nations, and other mechanisms of collective rationality through institutions are likely to drive internet use within nations.

Hypothesis about the previous infrastructure contributing to the current infrastructural expansion did not hold up in these models. The association was already showing some indication of weakening in more recent research studies that used time series data. This could support the observation that the internet is acting differently than the diffusion of other technologies. Or, it could just be a reflection that mobile broadband is the fastest growing segment of internet users. When compared to social, political and economic factors; having a telephone infrastructure in place does not make as much difference as the other factors in the model.

Both a floor (1%) and ceiling (10%) were included. Only the floor was significant and negatively associated with internet use in random effects models. Using the more conservative fixed effects neither reached significance. We can interpret this as saying that within a country, lower initial levels of internet use do not show evidence of a relationship with later levels of internet use. Instead, only when taking into account the shared variation of

other countries in the world with the random effects model, did evidence of shared variation between countries with the lowest levels of internet use reach statistical significance. Along with the theoretical expectations that countries share an unobserved characteristic before their internet levels reach 1% of their population, the presence of this floor in random effects lends credibility to concerns regarding unobserved variable bias within a fixed effects model that are corrected in random effects modeling.

Surprisingly, population became significant only after accounting for world system position. This measurement was designed to control for a large number of very small nations within the dataset. Likewise, population density did not matter as much as expected. Only when accounting for just the within-country differences do we see the density of the population contributing as expected in a positive direction. When comparing nations to each other, there is no evidence of differences between nations with higher urban concentrations and their rural counterparts. Social and economic characteristics, including links to globalization through trade or other institutions are more important than the physical obstacles of distance.

One factor which loses significance once world society connections through INGOs are accounted for is the effect of secondary education. Education is considered a precursor to internet use since literacy is required. Additionally, nations with higher levels of secondary education also already have higher levels of INGOs present and are already embedded in a globally institutionalized social structure. Once INGOs are included in the models, the effect of secondary education loses statistical significance. This suggests that the aspects of secondary education which make a difference may not be the functional aspects related to literacy or other skills, but instead perhaps the institutional aspects of education.

Discussion

The internet is a technical expansion of a cultural practice. Its adoption is influenced by other large macro cultural structures of organization. Institutions supporting the internet include economic embeddedness through trade, democracy, links to world society, and education. We can anticipate that these factors contribute at multiple levels of analysis — and certainly through individually normative, and nationally normative actions.

National action. Social scientists have argued that national practices are largely symbolic (Meyer et al. 1997), or a result of dependency relationships (Wallerstein 1974). Peer nations recognize each other through a collectively rational presentation of legitimated practices (DiMaggio and Powell 1983; Meyer and Rowan 1977). Educational systems are thought to be one of these symbols of modernity (Meyer 1977). Internet participation is another way in which nations present their modern identity to the world. As a symbolic prerequisite to being considered a modern nation, the nation must participate in the internet and conform to legitimated practices regarding its participation. These expectations of participation are carried through normative practices of INGOs when they work within a nation, as well as through connections to international bodies such as the United Nations.

Individual Action. Previous research findings have also connected world society to governmental actions. World society explains the global expansion of higher education (Schofer and Meyer 2005), mass education (Meyer et al. 1992), human rights treaties (Hafner-Burton, Tsutsui, and Meyer 2008), environmental treaty ratification (Hironaka 2014), and sex law reform (Frank and McEneaney 1999). However, there are only a few previous studies which have connected world society explanations to the aggregate individual decisions that make up country level data (Suarez 2008).

The diffusion of the internet highlights how institutionalized world-level processes contribute to individual decisions. The internet is made up of individuals. And unlike other institutions, individuals are rarely subject to compulsory requirements to join the internet and

participate — as may be required within education or democracy. It seems likely that decisions to use the internet are cultural and related to identity and globalized ideas of modern personhood. While research demonstrating cultural structures at the global level of analysis gains momentum, the internet offers a rare domain where insight into simultaneous individual and national practices can develop through multilevel analysis. Internet use is caused at higher levels of analysis by international connections to social institutions. Research on the dynamics of institutional social change at multiple levels could be further developed by studying the internet as a site of institutionalization.

DiMaggio et al. observed that “sociology has been slow to take advantage of the unique opportunity to study the emergence of a potentially transformative technology in situ” (2001:329). Previous research focuses on features of the individual nation, rather than features of the world as a whole. The rapid rise and immediate globalization of the internet necessitates analysis as a global level phenomenon. It is rare to have well documented data on such as rapid and narrow period of diffusion. From the onset this technology was conceptualized with a global audience in mind. As we watch its rapid spread, we should strongly consider how internationalized models and schema contributing to a globalized culture which produces the internet.

Appendices

Table 3.3: Comparison of Panel Linear Models of National Factors Predicting Internet Users

	<i>Dependent variable:</i>				
	Internet Users				
	Fixed Effects		Random Effects		
	(1)	(2)	(3)	(4)	(5)
GDP (log)	−97.954*** (7.731)	−96.811*** (7.609)	−96.895*** (7.686)	−76.115*** (6.640)	−76.576*** (6.655)
GDP * GDP	7.692*** (0.481)	7.574*** (0.471)	7.543*** (0.470)	5.667*** (0.408)	5.740*** (0.411)
Population Density	0.039** (0.018)	0.038** (0.018)	0.039** (0.018)	0.005 (0.005)	0.006 (0.005)
Population (log)	7.088 (7.075)	6.507 (7.026)	4.328 (7.110)	0.426 (0.687)	1.999*** (0.775)
Phones	−0.097 (0.145)	−0.142 (0.145)	−0.136 (0.148)	−0.771*** (0.107)	−0.690*** (0.107)
Secondary Education	0.058 (0.064)	0.052 (0.064)	0.039 (0.063)	0.052 (0.051)	0.059 (0.050)
Democracy	0.573 (0.914)	0.486 (0.909)	0.511 (0.897)	1.211* (0.680)	1.401** (0.674)
Trade	0.175*** (0.030)	0.165*** (0.029)	0.159*** (0.028)	0.108*** (0.024)	0.099*** (0.024)
INGOs (log)		3.088*** (1.020)	2.827*** (0.952)	3.237*** (1.069)	2.797*** (1.058)
Floor			−1.823 (1.505)	−10.713*** (1.849)	−9.844*** (1.797)
Ceiling			7.571 (4.731)	7.699 (6.190)	7.793 (6.146)
Core					−19.608*** (5.162)
Semi-Periphery					−8.399** (3.556)
Constant				218.643*** (28.927)	195.947*** (29.032)
Countries	166	166	166	166	166
Mean Observations / Country	14.66	14.66	14.66	14.66	14.66
Observations	2,434	2,434	2,434	2,434	2,434
R ²	0.740	0.742	0.744	0.633	0.640
Adjusted R ²	0.687	0.689	0.690	0.630	0.637

Note:

*p<0.1; **p<0.05; ***p<0.01
Panel corrected standard errors in parenthesis.

Table 3.4: Correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Users													
2. Year	0.55												
3. GDP (log)	0.70	0.14											
4. Population Density	0.08	0.03	0.11										
5. Population (log)	-0.04	-0.02	-0.09	-0.07									
6. Phone Lines	0.59	-0.03	0.85	0.14	-0.04								
7. Secondary Education	0.57	0.12	0.82	0.09	-0.10	0.77							
8. Democracy	0.50	0.07	0.62	0.07	-0.19	0.66	0.57						
9. Trade	0.22	0.16	0.17	0.13	-0.48	0.09	0.13	0.12					
10. INGOs (log)	0.49	0.08	0.58	-0.01	0.57	0.59	0.49	0.47	-0.17				
11. Floor	-0.47	-0.59	-0.49	-0.08	0.09	-0.39	-0.51	-0.36	-0.16	-0.30			
12. Ceiling	0.30	0.13	0.18	-0.01	-0.05	0.12	0.13	0.12	0.10	0.12	-0.06		
13. Core	0.26	-0.05	0.39	0.09	0.37	0.45	0.32	0.25	-0.18	0.44	-0.10	0.02	
14. Semi-Periphery	0.00	-0.07	0.10	-0.06	0.34	0.08	0.07	0.05	-0.18	0.32	-0.02	0.00	-0.14

Countries (n = 166): Afghanistan, Albania, Algeria, Angola, Antigua and Barbuda, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bhutan, Bolivia, Botswana, Brunei, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Cape Verde, Central African Republic, Chad, Chile, China, Colombia, Comoros, Congo, Costa Rica, Croatia, Cuba, Cyprus, Czech Republic, Democratic Republic of the Congo, Denmark, Djibouti, Dominica, Dominican Republic, East Timor, Ecuador, Egypt, El Salvador, Equatorial Guinea, Estonia, Ethiopia, Fiji, Finland, France, Gabon, Gambia, Georgia, Germany, Ghana, Greece, Grenada, Guatemala, Guinea, Guinea-Bissau, Honduras, Hungary, Iceland, India, Indonesia, Iran, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Kuwait, Kyrgyzstan, Laos, Latvia, Lebanon, Lesotho, Liberia, Libya, Lithuania, Luxembourg, Macedonia, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Montenegro, Morocco, Mozambique, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russia, Rwanda, Samoa, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Seychelles, Sierra Leone, Slovakia, Slovenia, Solomon Islands, South Africa, South Korea, Spain, Sri Lanka, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Sudan, Suriname, Swaziland, Sweden, Switzerland, Syria, Tajikistan, Tanzania, Thailand, Togo, Tonga, Tunisia, Turkey, Uganda, Ukraine, United Kingdom, United States of America, Uruguay, Uzbekistan, Vanuatu, Venezuela, Yemen, Zimbabwe.

Chapter 4

Political Institutional Causes of Internet Expansion: The Role of Civil Liberties, Political Rights and Authoritarianism

Abstract

Most studies of internet diffusion show positive correlations with democracy. While some research argues that democracies facilitate diffusion; democracy is a broadly defined concept. Which aspects of democracy cause growth? Disaggregating the component variables of Freedom House and Polity IV indexes of democracy, I test whether characteristics of civil liberties, political rights, and autocracy correlate with national level growth of internet users. When looking at the differences within countries over time, countries with higher levels of democracy are associated with higher levels of internet users overall, and relative to autocracy. Autocracy is associated with reduced numbers of internet users overall, but I do not find evidence that autocracy itself restrains internet expansion when also accounting for democracy. This research confirms that democracy itself matters; especially civil liberties. The observed growth pattern has implications for understanding the role of political structures on the growth of new forms of global communication and participation.

Almost every study analyzing the political causes of internet diffusion cites democracy as a driver of internet adoption. Although it is a driver, we have not identified why. Within

nations that are democratic, democracy is practiced in many different ways. The characteristics of democracies which increase internet users within a country are not well understood. This chapter uses the variation of democracy within countries to understand which aspects of democracy are responsible for increasing internet participation.

Globally, the internet is expanding very rapidly. Within the 24 years between 1990 and 2014, worldwide participation grew from essentially zero to 40.7% of the world's population (The World Bank 2015). With its current ubiquity, it is easy to forget how recently it was developed and how rapidly it has grown. Although global participation is increasing rapidly in almost every country, there is wide variation. Throughout that time, only North Korea has kept itself mostly free of internet participation. Other nations such as East Timor and Somalia have less than 2% of their population connected. Only a small number of countries have less than 10% of their population using the internet. These countries tend to be lower income and less democratic than the countries at higher levels of participation. Among the nations with higher levels of participation, the United Arab Emirates, Bahrain, most of the nordic nations, Qatar, Japan and the United Kingdom all outpace the United States with 87% of its population using the internet in 2014 (The World Bank 2015). The variety of ways in which democratic practices are institutionalized in the political structures varies greatly even among these countries with high levels of internet use.

What explains the rapid global expansion of internet participation? Broadly, researchers have studied this as the global digital divide (Castells 2009; Corrocher and Ordanini 2002; Drori and Jang 2003; Norris 2001; Pick and Sarkar 2015). Economic and political theories of diffusion privilege the role of development, democratization and network effects (Andrés et al. 2010; Milner 2006). Unsurprisingly, income within a country as measured by the GDP per capita is one of the strongest predictors of internet participation within a country (Hargittai 1999). Large literatures look at the digital divide in access among communities (DiMaggio et al. 2001), as well as nations (Norris 2001).

Also consistent across the literature is the correlation between democracy and internet

growth. Democracy has been theorized as a cause of its diffusion. What is unclear is the extent to which democracy itself actually increases internet use, or whether authoritarianism restricts growth. Authoritarian regimes have a history of repressing media which they do not control (Holkeboer and Vreeland 2013). Milner (2006) and others argue that national leaders who see the internet as a threat, use policies to restrict the spread of the internet. Milner’s analysis leads to the conclusion that “democratic governments facilitate the spread of the internet relative to autocratic ones” (p 176). Autocracy may act as a dead weight which pulls internet adoption down despite other pressures which encourage its adoption. Or, instead characteristics of democracy itself may independently cause internet growth.

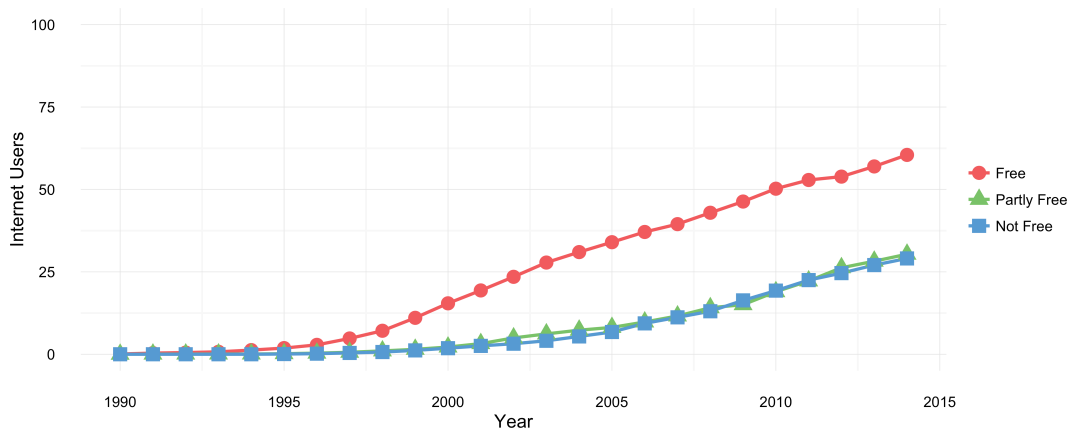


Figure 4.1: Internet users by democratic status, 1990 to 2015

Those conclusions are supported by looking at where internet expansion occurs. The internet is expanding in richer countries and in democracies. The divide between country income levels is highly stratified with countries categorized by the UN as “least developed” having 8.6% of their population using the internet, compared to 80.6% of the population in high income countries (The World Bank 2015).

Plotting the growth of internet users over time using Freedom House (2015) democracy categories (free, partly free, not free) it is easy to see that democracies have a much larger percent of their population using the internet. However, over time, there are only small,

almost indistinguishable variations between the countries classified as “partially free” and “not free”. Over sixty percent of the population in democratic nations are using the internet, whereas it is half of that in other nations. Within this representation it is easy to see why democracy might be seen as cause of internet growth. Another way to view this is that the internet is growing rapidly, even in countries that are not democratic. Consistent with these expectations from prior research, I hypothesize that within nations

1. *There will be a positive association between each independent measure of democracy and increasing percentages of internet users*
2. *The independent effect of autocracy will be negatively associated with internet users*

Democracy itself is a broad concept. It is not clear which aspects of democracy may actually produce internet growth. Democracy in practice contains at least two primary components: personal freedoms and regulated authority of governance (Lijphart 2012). Previous studies have treated democracy as a unitary variable associated with internet adoption. In most studies of internet adoption, the notion of democracy has been quantitatively characterized as a combination of different factors, but then indexed and modeled as a singular variable. The broad nature of democracy, and its diverse implementation, creates the question of which characteristics are responsible for the growth that we see. It is likely that there is a complex relationship between democracy, political institutions, cultural practices and economic causes of internet diffusion.

Previous studies have used variations of two measures, and characterize democracy along two aspects: civil liberties, and political rights.

Table 4.1: Previous Studies with Democracy

Paper	Democracy Measure	Outcome	Method
Norris (2001)	FH - Civil Liberties (1:7)	+	OLS, not sig with development
Beilock and Dimitrova (2003)	FH - Civil Liberties: High	+	Tobit / OLS
	FH - Civil Liberties: Low	-	
Dori and Jang (2003)	Polity IV - DEMOC (1:10)	.	Panel OLS, not sig
Guillén and Suárez (2005)	Polity IV - DEMOC (1:10)	+	OLS / GLS, significant at .05 in 1 of 3 models
Milner (2006)	Polity IV - POLITY (-10:10)	+	CSTS NB Reg
	FH - Political Rights (1:7 reverse)	+	
	Przeworski et al (2000) (dummy)	+	

Studies of political culture note that the structures that maintain personal freedoms require the widespread adoption of liberalized cultural values (Almond and Verba 1989). Among these values are interpersonal trust, belief in the essential equality of people, and the belief that minorities deserve protection (Coleman 1990; Putnam 1993). There is an increasing body of literature looking at political socialization (Dalton 2008; Jennings, Stoker, and Bowers 2009). Civil liberties may represent the social norms and cultural components of democracy. Norris (2011) represents the distinction between countries with high political rights as constitutional democracies, and countries with high civil liberties as liberal democracies. Zakaria (1997) describes them as ‘illiberal democracies’ when nations have free and fair elections, but are missing the liberties commonly packaged with conception of liberal democracy. Knutsen (2015) expects civil liberties among other factors to cause democracies to have faster rates of technological change.

In previous internet diffusion research, the effects of civil liberties are mixed. Norris (2001) uses civil liberties cross sectionally in 2000 and doesn’t find significance once economic

development is accounted for. Beilock and Dimitrova (2003) find significant positive effects with a category created from a measure of civil liberties.

3. *Conceptualizing civil liberties as an expression of social norms which are favorable to internet use, internet use will increase in nations with higher levels of civil liberties relative to political rights.*

If civil liberties are part of a democratic culture, then political rights provide highly stabilized procedural structure and organization. Social movement and communication scholars point to the capacity of the internet to facilitate the expression of civil liberties as leading to the development of increasing political rights within a nation (Farrell 2012; Nisbet, Stoycheff, and Pearce 2012). Others conceptualize civil liberties as a result of stabilized political rights (Marshall, Gurr, and Jagers 2015). In either case, functional aspects of democracy through increased spending on education or strengthened property rights may also provide social capital and economic explanations for the higher percentage of internet users we see within democratic countries (Knutsen 2011; Lindert 2004). Within the diffusion literature, Guillén and Suárez (2005) and Milner (2006) both find positive associations with internet use by testing measures which account for political rights of citizens.

4. *Conceptualizing political rights as providing the stability and civil society platforms which enables internet diffusion, internet use will increase in nations with higher political rights, after accounting for levels of civil liberties.*

This research can improve current literature in three ways. First, there is simply more data available now. We have the opportunity to run analysis on 25 years of available data that measures internet growth. Secondly, this research isolates specific aspects of democracy rather than treating it as a unified concept. Thirdly, with improved data we can use model validation techniques to isolate the components that may be varying and causing an effect.

Addressing the causal claims and strong consistent findings of previous research (Milner 2006), this study starts with that understanding — that democracy leads to internet ex-

pansion. Norris (2001) argues that democracy is causal due to its sequential precedence and positive association. Both popular and academic accounts of the internet attribute the participatory nature as an inherent defining characteristic of this technological innovation (Lessig 2004; Rheingold 1993; Shirky 2008). Likewise, democracy's innovation and defining characteristic is also participation and collective action (Anderson 1991). Understanding how democracy impacts the internet we can test the theoretical assertions of globalization scholars, including DiMaggio et al. who call for more research on how the internet and large institutional structures interact (2001).

5. *If there are characteristics of democracy responsible for internet growth, I hypothesize that higher levels of democracy will lead to higher levels of internet users, even after accounting for the level of autocratic control within nations.*

With these studies in mind, I am expecting to be able to replicate their findings using time series methods with the larger sample of countries and years available. Secondly, if there is a distinction between civil liberties and political rights associated with internet users in a country, I will be modeling so that we can see those distinctions. Third, I want to compare the effect of democracy versus autocracy. Do democracies boost, while autocracies restrain simultaneously? Or instead, is the positive effect we observe, the result of either restraint or boost from one political structure?

6. *If democracy only increases internet use due to authoritarian restrictions of internet growth, there will be a negative association between autocracy and internet participation within a nation even after controlling for levels of democracy which may be available within a nation.*

Data and Methods

To investigate the effects of substantively different aspects of democracy, I model internet growth within countries using the index and component variables from the primary measures of democracy used in previous research. Independent variables come from two datasets: the Freedom House Freedom in the World report (Freedom House 2015), the Polity IV Project (Marshall et al. 2015). The dependent variable in each model is the percentage of internet users within a country (*Internet Users* per 100 people) collected by the International Telecommunications Union (ITU). The ITU is the division of the United Nations responsible for coordinating telecom policy. This variable measures individuals who have access to the internet at home on any device (The World Bank 2015). Although it doesn't measure the quality of access, or consistency of access, it is the measurement that is used most often in the previous research.

These models use yearly observations of country level data between 1990 and 2014. Complete data is available for 189 countries using Freedom House data and 159 countries in the Polity data with each country having an average of 20.46 yearly observations. Tables in the appendices show descriptive statistics and correlations for the variables used.

Analysis is conducted using panel regression with country fixed effects in order to address correlated error due to pooling yearly observations of the same country (Baltagi 2013). Fixed effects focus on the variation within a country, rather than expect shared variation between countries. Panel models with random effects showed similar results. Diagnostic Hausman testing showed estimation inconsistencies between some of the models with fixed and random effects. In these cases, the more conservative fixed effects are preferred. Because democracy is fairly stable within countries across yearly observations, the variation present needs to be especially large in order for it to be reflected in models with fixed effects.

Freedom House

The first measure of democracy is also one of the most widely used within the current diffusion literature. Freedom House uses a panel of analysts to score each country based on the events and conditions within its border each year using a checklist of indicators. From this questionnaire and the consensus of the analysts, Freedom House creates a *political rights* and *civil liberties* rating for each country. The political rights rating is based on questions related to the electoral process, political pluralism and participation, and functioning of government. The civil liberties rating is based on indicators of freedom of expression and belief, associational and organizational rights, rule of law, and personal autonomy and individual rights.

The distinctions between the political rights and civil liberties scores and how they have been used has been analyzed and reviewed by Armstrong (2011). There is a high correlation between political rights and civil liberties. The measure is widely used as a combined sum, mean of the two scores, or each used independently. Milner (2006) uses the political rights score. Norris (2001) uses the civil liberties score. Beilock and Dimitrova (2003) use the civil liberties score to create categories. Freedom House itself uses the combined mean score to also create categories of Free (1 - 2.5), Partially Free (3 - 5), and Not Free (5.5 - 7).

For this analysis I have reverse coded political rights and civil liberties so that increasing measures of each correspond to increased rights and liberties (1 - 7). Because of the high correlation between the two (.93), collinearity might impede our ability to see independent effects of each. To account for this, I use the mean of the two scores as the overall level of democracy (*score*), and created a variable that takes the *difference* between political rights and civil liberties. Countries with higher political rights than civil liberties will have positive values. If a nation has more civil liberties than political rights, the value of this difference will be negative.

Table 4.2: Variations in Country Level Democracy

	political rights	civil liberties	difference	polity2
Swaziland	1.43	3.05	-1.62	-9.05
Tonga	3.67	5.14	-1.48	—
Brunei	1.67	3	-1.33	—
Israel	6.88	5.56	1.32	9.62
Fiji	3.26	4.57	-1.3	1.91
Burkina Faso	3.15	4.45	-1.3	-1.42
Greece	6.84	5.64	1.2	10
Gabon	2.55	3.7	-1.15	-2.26
Lebanon	2.48	3.57	-1.1	6
Congo	2.2	3.25	-1.05	-4.21
Eritrea	1.33	2.33	-1	-6.53
Chad	1.53	2.53	-1	-2.28
Kazakhstan	2	3	-1	-5.15
Monaco	6	7	-1	—
Grenada	6.96	6	0.96	—
India	5.71	4.75	0.96	8.83
Ivory Coast	2.05	3	-0.95	-0.86
Tunisia	2.29	3.24	-0.95	-3.61
El Salvador	5.9	4.95	0.95	7.21
Azerbaijan	2	2.95	-0.95	-6.61

To see examples of the variation within democracies, Table 2 lists the 20 countries with the largest absolute value of the mean difference, and their corresponding mean political rights, civil liberties and polity2 score. Both high and low democratic countries have large differences between political rights and civil liberties. Countries with more political rights than civil liberties, such as Israel and Greece, are emphasized in bold. Within the top differences, countries with more political rights tend to have higher overall levels of democracy. Other countries such as Tonga and Swaziland with higher levels of civil liberties tend to have lower levels of democracy overall.

Polity IV

Polity IV is the measure of democracy used by Guillén and Suárez (2005). Milner (2006) also uses it in addition to the political rights rating from Freedom House. Polity IV focuses

on political rights, rather than civil liberties. As such it measures governance structures and conceptualizes democracy and autocracy separately, providing a distinct score for each. Democracies are conceptualized with three component elements: 1) procedures for citizens to express preferences for policies and leaders, 2) institutionalized constraints on executive power, and 3) a guarantee of civil liberties in acts of political participation. This last point on civil liberties, unlike Freedom House, is not directly coded as part of the component variables. Specifically, the codebook highlights its exclusion of “coded data on civil liberties,” considering civil liberties as resulting from the other aspects of democratic governance (Marshall et al. 2015 Dataset Users’ Manual p14).

Although autocracy is perhaps conceptualized by most social scientists as the inverse of a democracy, it is measured separately in Polity IV so that each country has both a *democracy* and *autocracy* score. Autocracies have the characteristic of restricting competitive political participation. The two are highly negatively correlated (-.85) but not perfectly inverse; indicating that there still are democratic aspects of autocracies and autocratic aspects of some democracies. Similar to the difference measure that I created for the Freedom House dataset, the *polity2* measure also reflects the difference of the two: the autocracy score subtracted from the democracy score. It ranges from 10 for highly democratic, to -10 for highly autocratic governments.

In addition, I use the concept variables relating mostly to political rights in the openness of *executive recruitment*, checks and balances of *executive constraint* on power, and *political competition*. Political competition captures both the level of organization and lack of interference in elections.

Controls

Multiple previous studies show income as the largest predictor of internet users within a country (Beilock and Dimitrova 2003). I control for this consistent with those studies by

using the natural log of *GDP per capita* in current US dollars (The World Bank 2015). Because the effect is nonlinear, I also use the squared term of this measure. This measurement alone captures a large amount of the variation within nations.

To control for the effect of very small countries in the dataset, I use a dummy variable if the country's population is less than 1 million. I also present additional analysis using a lagged dependent variable for some models. By doing this the model is showing us the effect of yearly variation (in all cases, growth). Andrés et al. (2010) use this technique in their modeling to show that a strong predictor of internet growth is the number of users in the previous year. They attribute this to network effects.

Although logically it makes sense that education and literacy is a prerequisite for internet use within a country, I do not use these controls. Previous research has either excluded them (Milner 2006), or found them similarly unhelpful for a number of reasons. First, due to high numbers of missing observations, introducing literacy would reduce the sample of usable cases considerably. Second, Guillén and Suárez (2005) test these variables and note that “the reason for the lack of significance is that literacy – or any education measure, for that matter — is highly correlated with” GDP per capita. And thirdly, the fixed effects models that I present show within country variation. In countries where education measures are high, they tend to stay high.

Cases were dropped when they had fewer than two years of complete data. For cases where there was missing data on the dependent variable, the value was carried forward from the previous observation only when the previous observation and the following complete observation were identical. In most cases this meant that cases where internet usage was zero (or very low) in the initial years were still represented within the analysis, instead of dropping and potentially biasing toward nations where growth was strong and consistently reported.

Results

Testing each measure of democracy with the base model supports the findings of previous research: every measure of democracy has a significant and positive association with the number of internet users within a country. Higher levels of autocracy are associated with lower levels of internet use. Milner and others proposed that autocracies likely restrict internet expansion, and that is supported here.

Table 4.3: Panel Linear Models of Internet Users with Independent Democracy Measures

	<i>Dependent variable:</i>						
	Internet Users						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
GDP	−94.206*** (2.270)	−94.428*** (2.266)	−94.376*** (2.269)	−94.299*** (2.262)	−96.180*** (2.464)	−96.848*** (2.497)	−96.469*** (2.497)
GDP * GDP	7.613*** (0.142)	7.607*** (0.142)	7.618*** (0.142)	7.582*** (0.141)	7.650*** (0.154)	7.688*** (0.155)	7.671*** (0.156)
Over 1M	1.274 (2.337)	1.645 (2.333)	1.432 (2.336)	1.806 (2.330)	0.536 (2.331)	0.509 (2.398)	0.380 (2.400)
FH Score		1.380*** (0.338)					
FH Political Rights			0.624** (0.258)				
FH Civil Liberties				1.869*** (0.356)			
Polity Polity2					0.291*** (0.088)		
Polity Democ						0.535*** (0.154)	
Polity Autoc							−0.467*** (0.181)
Countries	189	189	189	189	159	159	159
Observations	3,866	3,866	3,866	3,866	3,134	3,099	3,099
R ²	0.690	0.691	0.690	0.692	0.690	0.690	0.690
Adjusted R ²	0.655	0.657	0.656	0.657	0.654	0.654	0.653

Note:

*p<0.1; **p<0.05; ***p<0.01
Panel Linear Models with Country Fixed Effects. Standard errors in parenthesis.

The first model of Table 3 is the base model showing significant effects of both logged GDP and the squared term, and the high level of variation that is explained by accounting for wealth. The statistical significance of GDP-squared indicates that the effect is curvilinear.

Since all of the Freedom House measures are using the same scale (1-7) we can compare the coefficients and observe that while each measure of democracy is associated with a higher number of internet users within a country, the strongest effect is with civil liberties and the

combined score. Political rights has a smaller coefficient, which also makes it significant at the .05 level instead of at the .01 level.

Likewise, all of the Polity variables have significant associations with internet use. The combined polity2 measure as well as the democracy measure both have positive associations. The descriptive statistics show a positive mean for polity2; which indicates that overall countries lean more democratic than autocratic. This model shows that in addition to that overall tendency, the countries which have more democratic features (and a higher, positive polity2 score) are associated with higher levels of internet use.

Autocracy is also significant and negatively associated. One question posed in the literature is whether there is a boosting effect of democracy, or restraining effect of autocracy. These base models show evidence of both happening simultaneously. If autocracy were neutral, we would likely see non-significant results or maybe even a mild but positive association that corresponds to the overwhelmingly positive trend of internet use increasing in all nations. Instead, both the significant positive relationship between higher levels of democracy alone, and higher levels of democracy gradationally moderated by the autocratic features of a country represented in polity2, indicate that democracy itself increases internet use. This isolation of democracy also supports the independence of the negative autocracy results — that autocracy restricts.

Table 4 analyses the Freedom House measures of democracy. It starts with the same positive association of the overall score from the previous table. When the difference between political rights and civil liberties is introduced, the coefficient from the overall score increases slightly. The coefficient for the difference variable shows a significant and negative association with the number of internet users within a country. As the difference between political rights and civil liberties increases, there is a negative association with higher levels of internet users. What this means is that after accounting for an overall level of democracy, there is a negative association with internet users when a country has more political rights than civil liberties. Likewise, when nations have more civil liberties than political rights, there is a

Table 4.4: Panel Linear Models of Internet Users with Political Rights and Civil Liberties

	<i>Dependent variable:</i>					
	Internet Users					
	(1)	(2)	(3)	(4)	(5)	(6)
GDP	−94.428*** (2.266)	−94.097*** (2.270)	−94.258*** (2.263)	−94.258*** (2.263)	1.819** (0.734)	1.822** (0.733)
GDP * GDP	7.607*** (0.142)	7.600*** (0.142)	7.578*** (0.142)	7.578*** (0.142)	0.012 (0.050)	0.009 (0.050)
Over 1M	1.645 (2.333)	1.289 (2.336)	1.800 (2.331)	1.800 (2.331)	2.219*** (0.621)	2.254*** (0.621)
FH Score	1.380*** (0.338)		1.827*** (0.363)		0.255*** (0.090)	0.354*** (0.097)
FH PR - CL		−0.490 (0.303)	−1.091*** (0.325)			−0.239*** (0.086)
FH Political Rights				−0.177 (0.309)		
FH Civil Liberties				2.004*** (0.427)		
Lagged Internet Users					0.985*** (0.004)	0.984*** (0.004)
Countries	189	189	189	189	189	189
Observations	3,866	3,866	3,866	3,866	3,692	3,692
R ²	0.691	0.690	0.692	0.692	0.980	0.980
Adjusted R ²	0.657	0.655	0.657	0.657	0.928	0.928

*Note:**p<0.1; **p<0.05; ***p<0.01
Country fixed effects. Standard errors in parenthesis.

positive association with internet users.

Despite the issues of collinearity that we control for by using the difference, we can see the association with civil liberties reinforced again in the next model where the variation in civil liberties shows a significant and positive association with internet users, whereas political rights is not statistically significant.

Table 4.5: Panel Linear Models of Internet Users with Democracy and Autocracy

	<i>Dependent variable:</i>			
	Internet Users			
	(1)	(2)	(3)	(4)
GDP	−96.180*** (2.464)	−96.850*** (2.500)	−96.850*** (2.500)	−96.850*** (2.500)
GDP * GDP	7.650*** (0.154)	7.688*** (0.156)	7.688*** (0.156)	7.688*** (0.156)
Over 1M	0.536 (2.331)	0.508 (2.398)	0.508 (2.398)	0.508 (2.398)
Polity Polity2	0.291*** (0.088)	0.005 (0.268)	0.531** (0.228)	
Polity Democ		0.526 (0.463)		0.531** (0.228)
Polity Autoc			0.526 (0.463)	−0.005 (0.268)
Countries	159	159	159	159
Observations	3,134	3,099	3,099	3,099
R ²	0.690	0.690	0.690	0.690
Adjusted R ²	0.654	0.654	0.654	0.654

Note: *p<0.1; **p<0.05; ***p<0.01
Country fixed effects. Standard errors in parenthesis.

Table 5 shows similar results with the Polity dataset. Using a similar method to the last table; comparing the difference between two component measurements in order to see which is influencing the relationship while controlling for collinearity, we can compare autocracy and democracy scores with the polity2 measure. Although polity2 is significant in the base models, when we include this variable with democracy, neither results in a predictor with significant p-values. However, you can see a dramatic change in the coefficients as the effect of polity2 decreases, and the democracy increases. Combined with autocracy, polity2

maintains a significant and positive relationship. In this model the positive and significant coefficient of polity2, after accounting for autocracy, reflects strong support that democracy itself is responsible for growth. This is confirmed in model 4 of this table when democracy is positive and significant, whereas autocracy doesn't show evidence of a relationship. Using the Polity IV measurement of autocracy, we are not seeing an indication that autocracy is reducing internet use after accounting for democracy.

Table 4.6: Panel Linear Models of Internet Users with Polity Component Variables

	<i>Dependent variable:</i>			
	Internet Users			
	(1)	(2)	(3)	(4)
GDP	−96.375*** (2.489)	−96.403*** (2.500)	−97.012*** (2.506)	−97.056*** (2.511)
GDP * GDP	7.664*** (0.155)	7.666*** (0.156)	7.700*** (0.156)	7.701*** (0.156)
Over 1M	0.491 (2.400)	0.384 (2.400)	0.385 (2.397)	0.447 (2.399)
Polity Exec Recruitment	0.635*** (0.229)			0.315 (0.320)
Polity Exec Constraint		0.592** (0.259)		−0.082 (0.371)
Polity Competition			0.609*** (0.178)	0.504** (0.232)
Countries	159	159	159	159
Observations	3,099	3,099	3,099	3,099
R ²	0.690	0.689	0.690	0.690
Adjusted R ²	0.653	0.653	0.654	0.653

Note:

*p<0.1; **p<0.05; ***p<0.01
Country fixed effects. Standard errors in parenthesis.

Comparing the component indexes of the Polity measure in Table 6, countries with more democratic practices of executive recruitment, constraint on the executive, and higher levels of political competition all independently show positive and significant associations with internet use. Compared together, only political competition shows a significant and positive association. Although not presented here, additional models comparing these measures to each other in combination all still indicate significance only with political competition.

Finally, Table 7 combines the Freedom House and Polity measures. Despite high correlation between the variables, we don't see the evidence of model inconsistencies that are usual associated with multiple collinearity. The strength of association seen in the coefficients remain fairly consistent with the previous models which isolated individual effects, nor do the coefficients change direction in unexpected ways. Checking the generalized variance inflation factors with a pooled model does not indicate violations of collinearity assumptions (Fox and Monette 1992).

Table 4.7: Panel Linear Models of Internet Users with Combined Democracy Measures

	<i>Dependent variable:</i>	
	Internet Users	
	(1)	(2)
GDP	−96.665*** (2.503)	−96.733*** (2.503)
GDP * GDP	7.642*** (0.156)	7.643*** (0.156)
Over 1M	0.919 (2.393)	0.989 (2.393)
FH Score	1.025** (0.472)	0.939** (0.476)
FH PR - CL	−1.541*** (0.363)	−1.614*** (0.366)
Polity Polity2	0.307*** (0.116)	
Polity Democ		0.650** (0.255)
Polity Autoc		0.060 (0.269)
Countries	159	159
Observations	3,099	3,099
R ²	0.692	0.692
Adjusted R ²	0.655	0.655

Note: *p<0.1; **p<0.05; ***p<0.01
Country fixed effects. Standard errors in parenthesis.

With these diagnostic checks in mind, combining these measures show distinct characteristics of democracy which consistently associate with higher levels of internet users within a country. The overall level of democracy represented by the Freedom House score and

democratic aspects balanced by and autocratic characteristics represented by polity2 show positive associations with internet use. The association with civil liberties represented by the Freedom House difference between political rights and civil liberties also remains strong. This is emphasized in the second model which still shows a strong significant association with multiple dimensions of democracy, rather than autocracy.

Conclusions

Several of hypothesis were supported by these results. Democracy increases internet users in general (H1, H2); civil liberties specifically (H3), and independent of potentially negative effects of autocracy (H5). However, political rights do not increase internet users (H4) in similar ways to civil liberties. Additionally and surprisingly, there is no evidence here that autocracy restricts internet growth after accounting for the positive effect of democracy (H6).

Democracy as a political institution causes internet adoption — specifically perhaps liberal democracy. Democracy is as much a cultural institution as it is a political institution. There are both cultural mechanisms through symbols and shared meaning, as well as organizational structures and processes which maintain democracies. People within democracies need to think of themselves as empowered to provide input, and representatives need to adopt a role and identity of representing people other than themselves. Writing those symbolic roles and values into law does not put them automatically into practice. Likewise, the internet also maintains cultural institutional characteristics. In addition to the technology and wires, the values that are applied to the internet, and the cultural practices people participate in using the internet are constantly socially negotiated. As an internet user, there are symbolic characteristics (such as an email address) that individuals increasingly incorporate into their identity.

This research started with replication of previous democracy findings in order to understand

why a cultural and political institution such as democracy would have a causal effect on the growth of internet users. After successfully finding each measure of democracy still holding up in expected ways using rigorous models, the next goal was to pull these measures apart and see if we could identify common traits of what might be occurring. In doing so, I look at the aspects of the measure that correspond with civil liberties and the aspects that correspond with political rights. Within the Freedom House dataset we see strong support that civil liberties more than political rights correspond with increases in the number of internet users within a country. In some exploratory models which were less definitively validated, political rights showed a negative association after taking into account civil liberties. Instead of answering questions, this raises the question of why political rights (constitutional democracy) might have such an unexpected outcome.

Additionally, the dynamic between authoritarian regimes and the internet is a hotly debated issue. Individual cases of suppression and systematic restrictions are well documented (Diebert et al. 2010). However, the internet is growing everywhere — even in places that are not democratic. And so, there are hypothesis in the literature that the positive association of democracy is really due to the lack of growth expected from restrictive autocracies. This research doesn't find any evidence of authoritarian restrictions reducing the percentage of internet users within a nation after accounting for levels of either political rights or civil liberties individually or together. The measure of autocracy on its own show expected results of negative association. However, combined with a measure that looks at the difference between democracy and autocracy within the same nation, democracy still shows a positive association, while autocracy doesn't indicate an association in multiple models. We don't have evidence that shows restraint of internet expansion overall, or any association after accounting for levels of democracy. Global internet expansion is occurring exceptionally fast: even in war zones, and even in areas where governments are not supportive of its expansion. Communication scholars have long shown that governments which have more centralized authority try to restrict media and journalism. Peradventure something different is happening with the internet than we would expect in comparison to media.

These results are extremely consistent; democracies themselves increase internet use. That finding has been suspected and tested in prior research — but even in relationship to autocracies, and even using much larger datasets, and extremely rigorous modeling with lagged dependent variables showing change from year to year, this finding is still present. So what is it that creates internet expansion within democracies? My suspicion is that coinciding cultural similarities are mutually supportive. Freedom of expression and involvement is fostered on the net, just as participation is fostered in healthy democracies (Almond and Verba 1989).

My hope in decomposing Polity into concept variables was to get a better understanding of this question of why civil liberties matter. The analysis may provide some insight. More important than who is allowed to run, or whether there are checks and balances on leaders, is the quality of elections. If there is widespread participation in free, fair and well organized elections — it may be an indication of how widespread the cultural adoption of democracy is among citizens who are not directly part of the government. This cultural adoption might also be an indicator of the kind of civil liberties that would reinforce increasing levels of internet use.

Within countries there is debate on whether the internet facilitates the distribution of crafted messages from political elites or whether it has allowed new audiences to engage in political speech (Hindman 2009). With revolutions using the internet as a media platform and for organization, there is room for debate about the internet's impact on politics. What's clearly reinforced by this research is that the political structure, and perhaps the cultural structure of nations impact internet growth. The way democracy is implemented makes a difference.

Appendices

Table 4.8: Descriptive Statistics

	n	sd	mean	min	max
Countries	189	—	—	—	—
Years/Country	—	4.03	20.46	2	25
Year	3866	6.63	2004	1990	2014
Internet Users	3866	24.79	18.34	0	98.16
GDP (log)	3866	1.62	8.12	4.61	12.17
Over 1 Million	3866	0.39	0.81	0	1
FH Political Rights	3866	2.12	4.7	1	7
FH Civil Liberties	3866	1.78	4.71	1	7
FH Score	3866	1.92	4.71	1	7
FH PR - CL	3866	0.81	-0.01	-3	2
Polity Polity2	3134	6.41	3.83	-10	10
Polity Democ	3099	3.86	5.7	0	10
Polity Autoc	3099	2.82	1.84	0	10
Polity Exec Recruitment	3099	2.17	6.38	1	8
Polity Exec Constraint	3099	2.05	5.01	1	7
Polity Competition	3099	3.04	7.02	1	10

```
update(models.list[['blended']][[1]], model = "pooling") %>% vif()
```

```
##                                GVIF Df GVIF^(1/(2*Df))
## poly(log(gdp), 2, raw = T) 1.652780 2      1.133845
## over1M                    1.012956 1      1.006457
## fh_total                   6.772068 1      2.602320
## fh_diff                    1.397428 1      1.182129
## polity_polity2             5.837580 1      2.416108
```

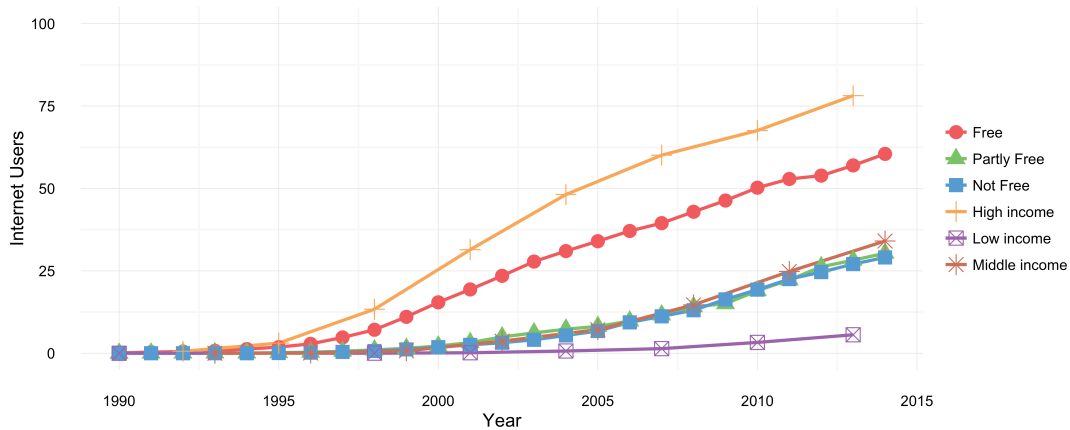


Table 4.9: Freedom House and Polity Democracy Measures

	Democracy		Autocracy
	Civil Liberties	Political Rights	
Freedom House	X	X	
Polity		X	X

Table 4.10: Correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Year	-	-	-	-	-	-	-	-	-	-	-	-	-
2. Internet Users	0.55	-	-	-	-	-	-	-	-	-	-	-	-
3. GDP (log)	0.17	0.69	-	-	-	-	-	-	-	-	-	-	-
4. Over 1 Million	-0.01	-0.04	-0.16	-	-	-	-	-	-	-	-	-	-
5. FH Political Rights	-0.02	0.37	0.5	-0.18	-	-	-	-	-	-	-	-	-
6. FH Civil Liberties	0.04	0.44	0.56	-0.24	0.93	-	-	-	-	-	-	-	-
7. FH Score	0.01	0.41	0.54	-0.21	0.99	0.98	-	-	-	-	-	-	-
8. FH PR - CL	-0.12	-0.01	0.08	0.05	0.57	0.23	0.42	-	-	-	-	-	-
9. Polity Polity2	0.04	0.3	0.38	0.05	0.9	0.84	0.89	0.52	-	-	-	-	-
10. Polity Democ	0.02	0.36	0.48	0.04	0.92	0.86	0.91	0.53	0.97	-	-	-	-
11. Polity Autoc	-0.06	-0.19	-0.19	-0.06	-0.79	-0.74	-0.78	-0.47	-0.95	-0.85	-	-	-
12. Polity Exec Recruitment	0.03	0.23	0.28	0.05	0.82	0.75	0.8	0.52	0.94	0.89	-0.92	-	-
13. Polity Exec Constraint	0.03	0.33	0.43	0.06	0.88	0.83	0.88	0.5	0.95	0.96	-0.86	0.85	-
14. Polity Competition	0.05	0.28	0.36	0.06	0.85	0.81	0.84	0.45	0.93	0.9	-0.89	0.81	0.85

Chapter 5

Conclusions

In the previous chapters, I analyze the internet as a site of institutionalization. Globalized ideas have shaped the social systems which created and spread the internet. In turn, people interpret the roles and identity of others through their use of the internet. Internet participation changes the way individuals view the world. Instead of just a technical progression, institutionalization attaches values and symbolic meaning to the internet. As one of the available packages of symbolic meaning, the internet is rationalized to be an extension of basic human rights applicable to all people. This happens at all levels of analysis.

Within this dissertation I analyze the institutionalization at the global level of analysis using the technical documents of the internet protocols and the social documents of international bodies. Within the technical documents there are consistent references to a globalized social order. Within the social documents, technical concepts are increasingly used to identify categories of people, or voice symbolic goals and values from shared cognitive conceptions the world.

At the national level, the same mechanisms that cause the institutionalization of education are responsible for the increasing levels of internet use within countries. Links to world society are positively associated with the expansion of internet users. As INGOs link coun-

tries to unified messages defining personhood, they spread the conception of modern people being internet users, and modern nations having large percentages of internet users.

As we see from chapter 2, internet use packaged with these conceptions of social development within nations, by the United Nations and international civil society, redefines what it means to be a contemporary nation, and also categorizes internet use with other social priorities. Internet use becomes a topic of similar stature to food, immigration, the environment, and the concerns of special marginalized populations in the world.

In addition to definition at the global level, and transmission at the national level through INGOs, I examine the ways in which the complementary institution of democracy causes internet expansion. The shared values of civil liberties found within liberal democracies likely cause some of the internet expansion that we see. Additional analysis demonstrates support for the idea that universities act as receptor sites within nations for the transmission of globalized ideas.

The internet acts as a globalized institution in ways that are similar to the institutionalization of education. We can see this institutional emergence through documentation of the institution itself as well as through its various impacts on other globally institutionalized structures.

What is answered by looking at this perspective?

As the overall levels of globalized institutionalization inevitably increases, it also becomes increasingly important to study these shared global systems of meaning that shape so much action within individual social systems, and which simultaneously have consequential implications for national social systems.

Many scholars have looked at the effect of the internet as a socially impactful tool for organizations, social movements, and individual expression (Langman 2005; Myers 1994;

Tufekci and Wilson 2012). However, the macro-social causes for its formation or its role as a social institution have been neglected (DiMaggio et al. 2001; Farrell and Petersen 2010). These institutional features of the internet relate to other important components of global society through social movements, participatory democracy, education and economic growth.

In addition to the content on the internet, the internet itself should be thought of as a site of contested norms, ideals and social negotiation. Internet users directly connect with the globe when they connect to the internet in a way that discourse emphasizing the global citizenship of individuals could only reinforce previously by prompting us to imagine these connections. Accordingly, governments and the world increasingly accommodate internet policy within the scope of their organizational responsibilities. In doing so, they are symbolically communicating to the world about who they are as nations. Independent of the content, the connections alone reshape our understanding of ordered reality and have the potential to influence change at the macro level (Jepperson and Meyer 2011).

Within a historically short period of time, the internet went from a local research network to the global carrier of nearly all information and foundational instrument to many national economic aspirations. It enables new industries (such as search engines and bandwidth providers), organizational models (such as remote and distributed workforces), and sets expectations of government and personhood. While it was always conceptualized as a global network, the assumptions that underly how that network should work and how people should communicate with each other have tacit and taken for granted foundations deeply embedded in other globalized cultural institutions.

Appendix A

Universities as Receptor Sites for Globalized Institutional Practices

“Suppose I were to tell you, that I’m not the doctor you think I am.” /
“Well, you’re the only one that can help me.”
— Groucho Marx, *A Day At The Races* (1937)

Education has been shown as a site where institutional mechanisms in policy and practices can be visible and measured. One way in which this is visible is through the massive expansion of the university and tertiary education (Schofer and Meyer 2005). In addition to being an indicator of world polity mechanisms, theorists argue that universities act as a receptor site within a country for other globalized practices (Frank et al. 2011). This research tests whether universities accelerate the expansion of the internet as a globalized practice within countries after accounting for other connections to globalization.

Results

The tables below present panel linear models with random and fixed effects (Baltagi 2013; Wooldridge 2010). INGO count is from the Union of International Association (Union of International Associations 2015). University count was created from the World Higher Education Database (International Association of Universities 2016). All other variables are from the World Development Indicators and described in the previous chapters (The World Bank 2015).

Table A.1: Descriptive Statistics

	n	sd	mean	min	max
Countries	160	–	–	–	–
Year/Country	–	2.98	21.07	11	25
Ceiling	2175	6.37	2003	1990	2014
Trade	2175	1.52	3.46	0.69	7.58
Exports	2175	25.67	19.52	0	96.21
INGOs	2175	1.65	8.27	4.62	11.63
Population Density	2175	0.94	7.06	0.69	8.74
Phones	2175	186.5	125	1.41	1755
Tertiary Education % Gross	2175	1.64	16.17	10.84	21.03
Population	2175	19.78	21.97	0	74.76
Years	2175	1.05	3.12	0.26	4.78
Internet Users	2175	1.79	4.84	1	7
Freedom House Civil Liberties	2175	0.48	4.28	2.73	5.87
Universities	2175	0.55	3.52	1.71	5.27
GDP Per Capita	2175	0.46	0.3	0	1
Country	2175	0.1	0.01	0	1
Floor	2086	24.68	17.98	0	94.82

Table A.2: Panel Linear Models with Random Effects

	<i>Dependent variable:</i>			
	Internet Users			
	(1)	(2)	(3)	(4)
GDP	−84.051*** (6.379)	−90.337*** (6.713)	−90.712*** (6.726)	−88.230*** (6.569)
GDP * GDP	6.216*** (0.398)	6.479*** (0.409)	6.506*** (0.410)	6.309*** (0.400)
Population Density	0.006 (0.005)	0.006 (0.005)	0.006 (0.005)	0.010** (0.005)
Population (log)	−1.361 (1.352)	1.369* (0.751)	0.020 (1.348)	−0.419 (1.338)
Trade (log)	28.066*** (4.423)	25.623*** (4.359)	25.983*** (4.369)	23.809*** (4.291)
Exports (log)	−12.634*** (3.427)	−11.830*** (3.393)	−12.039*** (3.394)	−10.494*** (3.364)
FH Civil Liberties	−0.188 (0.670)	−0.072 (0.644)	−0.206 (0.651)	−0.212 (0.648)
Phones	−0.793*** (0.098)	−0.827*** (0.097)	−0.831*** (0.098)	−0.858*** (0.096)
INGO (log)	2.733*** (0.803)	2.736*** (0.797)	2.649*** (0.793)	2.561*** (0.774)
Floor	−10.083*** (1.362)	−8.715*** (1.361)	−8.876*** (1.352)	−8.316*** (1.326)
Ceiling	6.715 (5.829)	5.150 (5.816)	5.164 (5.820)	6.022 (5.654)
Univ Count (log)	4.508*** (1.361)		1.779 (1.460)	−3.659 (2.256)
Ter. Enroll (log)		6.669*** (1.355)	5.853*** (1.501)	1.431 (2.009)
Univ Count (log) * Ter. Enroll (log)				1.957*** (0.597)
Constant	205.810*** (36.606)	197.261*** (32.181)	217.374*** (36.317)	232.514*** (36.071)
Countries	160	160	160	160
Observations	2,175	2,175	2,175	2,175
R ²	0.687	0.694	0.695	0.703
Adjusted R ²	0.683	0.690	0.691	0.698

Note:

*p<0.1; **p<0.05; ***p<0.01

Table A.3: Panel Linear Models with Fixed Effects

	<i>Dependent variable:</i>				
	Internet Users				
	(1)	(2)	(3)	(4)	(5)
Users (lagged)	0.975*** (0.007)	0.974*** (0.007)	0.975*** (0.007)	0.974*** (0.007)	0.970*** (0.007)
GDP (log)	1.840*** (0.266)	1.619*** (0.283)	1.487*** (0.322)	1.478*** (0.322)	1.206*** (0.331)
Trade (log)	1.187** (0.543)	0.836 (0.555)	0.853 (0.559)	0.730 (0.562)	0.350 (0.561)
INGO (log)	0.928*** (0.154)	0.826*** (0.149)	0.857*** (0.151)	0.809*** (0.148)	0.717*** (0.144)
Univ Count (log)		1.164*** (0.420)		0.944** (0.479)	0.004 (0.516)
Ter. Enroll (log)			0.704** (0.334)	0.364 (0.379)	−0.805* (0.462)
Univ Count (log) * Ter. Enroll (log)					0.512*** (0.126)
Countries	160	160	160	160	
Observations	2,086	2,086	2,086	2,086	2,086
R ²	0.979	0.979	0.979	0.979	0.979
Adjusted R ²	0.902	0.902	0.902	0.902	0.901

*Note:**p<0.1; **p<0.05; ***p<0.01
Standard errors in parenthesis.

References

- Almond, Gabriel Abraham and Sidney Verba. 1989. *The civic culture*. Sage Publications, Inc.
- Anderson, Benedict. 1991. *Imagined Communities*. New York: Routledge, Chapman Hall.
- Andonova, Veneta. 2006. "Mobile phones, the Internet and the institutional environment." *Telecommunications Policy* 30(1):29–45.
- Andrés, Luis, David Cuberes, Mame Astou Diouf, and Tomás Serebrisky. 2010. "The diffusion of the Internet: A cross-country analysis." *Telecommunications Policy* 34(5-6):323–40.
- Aoki, Masahiko. 2007. "Endogenizing institutions and institutional changes." *Journal of Institutional Economics* 3(01):1–31.
- Armstrong II, David A. 2011. "Stability and change in the Freedom House political rights and civil liberties measures." *Journal of Peace Research* 48(5):653–62.
- Arrighi, Giovanni. 1994. *The Long Twentieth Century: Money, Power, and the Origins of Our Times*. London: Verso.
- Bagchi, Kallol. 2005. "Factors Contributing to Global Digital Divide: Some Empirical Results." *Journal of Global Information Technology Management* 8(3):47–65.
- Baker, David. 2014. *The Schooled Society*. Stanford University Press.
- Baker, David and Gerald K. LeTendre. 2005. *National Differences, Global Similarities*. Stanford University Press.
- Baltagi, Badi Hani. 2013. *Econometric Analysis of Panel Data*. 5th ed. West Sussex: John Wiley & Sons.
- Banaji, Shakuntala and David Buckingham. 2013. *The Civic Web*. Cambridge: MIT Press.
- Beck, Nathaniel and Jonathan N. Katz. 1995. "What to do (and Not to Do) with Time-Series Cross-Section Data." *American Political Science Review* 89(03):634–47.
- Beilock, Richard and Daniela V. Dimitrova. 2003. "An exploratory model of inter-country Internet diffusion." *Telecommunications Policy* 27(34):237–52.
- Berger, Peter and Thomas Luckmann. 1967. *The Social Construction of Reality: A treatise in the sociology of knowledge*. New York: Anchor Books.
- Billon, Margarita, Fernando Lera-Lopez, and Rocio Marco. 2010. "Differences in digitalization levels: a multivariate analysis studying the global digital divide." *Review of World Economics* 146(1):39–73.
- Blank, Grant and Darja Groselj. 2014. "Dimensions of Internet use: amount, variety, and

- types." *Information, Communication and Society* 17(4):417–35.
- Boli, John and George M. Thomas. 1997. "World culture in the world polity: A century of international non-governmental organization." *American Sociological Review* 62(2):171.
- Boli, John and George M. Thomas. 1999. *Constructing World Culture*. Stanford University Press.
- Boli, John, Francisco O. Ramirez, and John W. Meyer. 1985. "Explaining the Origins and Expansion of Mass Education." *Comparative Education Review* 29(2):145–70.
- Bowker, Geoffrey, Susan Leigh Star, Les Gasser, and William Turner. 1997. *Social Science, Technical Systems, and Cooperative Work*. New York: Psychology Press.
- Boyd, Danah. 2014. *It's Complicated*. Yale University Press.
- Bromley, Patricia, John W. Meyer, and Francisco O. Ramirez. 2011a. "The Worldwide Spread of Environmental Discourse in Social Studies, History, and Civics Textbooks, 1970 - 2008." *Comparative Education Review* 55(4):517–45.
- Bromley, Patricia, John W. Meyer, and Francisco O. Ramirez. 2011b. "The Worldwide Spread of Environmental Discourse in Social Studies, History, and Civics Textbooks, 1970-2008." *Comparative Education Review* 55(4):517–45.
- Bussell, Jennifer. 2011. "Explaining Cross-National Variation in Government Adoption of New Technologies." *International Studies Quarterly* 55(1):267–80.
- Blachnio, Agata and Aneta Przepiorka. 2016. "Personality and positive orientation in Internet and Facebook addiction. An empirical report from Poland." *Computers in Human Behavior* 59:230–36.
- Castells, Manuel. 2009. *The Rise of the Network Society*. Oxford: Wiley-Blackwell.
- Castells, Manuel. 2013. *Networks of Outrage and Hope*. Oxford: John Wiley & Sons.
- Charles, Maria, Bridget Harr, Erin Cech, and Alexandra Hendley. 2014. "Who likes math where? Gender differences in eighth-graders attitudes around the world." *International Studies in Sociology of Education* 24(1):85–112.
- Chinn, Menzie D. and Robert W. Fairlie. 2010. "ICT Use in the Developing World: An Analysis of Differences in Computer and Internet Penetration." *Review of International Economics* 18(1):153–67.
- Clarke, George R. G. and Scott J. Wallsten. 2006. "Has the Internet Increased Trade? Developed and Developing Country Evidence." *Economic Inquiry* 44(3):465–84.
- Cohen, Michael D., James G. March, and Johan P. Olsen. 1972a. "A Garbage Can Model of Organizational Choice." *Administrative Science Quarterly* 17(1):1–25.
- Cohen, Michael D., James G. March, and Johan P. Olsen. 1972b. "A Garbage Can Model of Organizational Choice." *Administrative Science Quarterly* 17(1):1–25.
- Cole, Wade M. 2015. "Institutionalizing a global anti-corruption regime: Perverse effects on country outcomes, 1984-2012." *International Journal of Comparative Sociology* 56(1):53–80.
- Coleman, James S. 1990. *Foundations of Social Theory*. Cambridge: Belknap Press.
- Corrocher, Nicoletta and Andrea Ordanini. 2002. "Measuring the digital divide: a framework for the analysis of cross-country differences." *Journal of Information Technology* 17(1):9–19.
- Crenshaw, Edward M. and Kristopher K. Robison. 2006. "Globalization and the Digi-

- tal Divide: The Roles of Structural Conduciveness and Global Connection in Internet Diffusion." *Social Science Quarterly* 87(1):190–207.
- Dalton, Russell J. 2008. "Citizenship Norms and the Expansion of Political Participation." *Political studies* 56(1):76–98.
- Dasgupta, Susmita, Somik Lall, and David Wheeler. 2005. "Policy Reform, Economic Growth and the Digital Divide." *Oxford Development Studies* 33(2):229–43.
- Davis, R. A. 2001. "A cognitive-behavioral model of pathological Internet use." *Computers in Human Behavior* 17(2):187–95.
- Devezas, Tessaleno C., Harold A. Linstone, and Humberto J. S. Santos. 2005. "The growth dynamics of the Internet and the long wave theory." *Technological Forecasting and Social Change* 72(8):913–35.
- Dewan, S., D. Ganley, and K. L. Kraemer. 2005. "Across the digital divide: A cross-country multi-technology analysis of the determinants of IT penetration." *Journal of the Association for Information Systems* 6(12):409–32.
- Dicken, Peter. 2011. *Global Shift*. 6th ed. New York: Guilford Press.
- Diebert, Ronald, John Palfrey, Rafal Rohozinski, and Jonathan Zittrain. 2010. *Access Controlled*. 1st ed. Cambridge: The MIT Press.
- DiMaggio, Paul J. 1997. "Culture and Cognition." *Annual Review of Sociology* 23:263–87 IS.
- DiMaggio, Paul J. and Walter W. Powell. 1983. "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields." *American Sociological Review* 48(2):147–60.
- DiMaggio, Paul J. and Walter W. Powell. 1991. "Introduction." in *The new institutionalism and organizational analysis*, edited by W. W. Powell and P. J. DiMaggio. Chicago: University of Chicago Press.
- DiMaggio, Paul J., Eszter Hargittai, W. Russell Neuman, and John P. Robinson. 2001. "Social Implications of the Internet." *Annual Review of Sociology* 27(1):307–36.
- Dobbin, Frank, Daniel Schrage, and Alexandra Kalev. 2015. "Rage against the Iron Cage The Varied Effects of Bureaucratic Personnel Reforms on Diversity." *American Sociological Review* 80(5):1014–44.
- Drori, Gili S. and Yong Suk Jang. 2003. "The Global Digital Divide A Sociological Assessment of Trends and Causes." *Social Science Computer Review* 21(2):144–61.
- Drori, Gili S., John W. Meyer, and Hokyung Hwang. 2006. *Globalization And Organization*. Oxford: Oxford University Press.
- Drori, Gili S., John W. Meyer, Francisco O. Ramirez, and Evan Schofer. 2003. *Science in the Modern World Polity: Institutionalization and Globalization*. Stanford University Press.
- Drori, Gili S., Suk Yong Jang, and John W. Meyer. 2006. "Sources of Rationalized Governance: Cross-National Longitudinal Analyses, 1985 - 2002." *Administrative Science Quarterly* 51(2):205–29.
- Durkheim, Émile. 1956. *Education and Sociology*. New York: The Free Press.
- Eliasoph, Nina and Paul Lichterman. 2003. "Culture in Interaction." *American Journal of*

- Sociology* 108(4):735–94.
- Farrell, Dan and James C. Petersen. 2010. “The Growth of Internet Research Methods and the Reluctant Sociologist.” *Sociological Inquiry* 80(1):114–25.
- Farrell, Henry. 2012. “The Consequences of the Internet for Politics.” *Annual Review of Political Science* 15(1):35–52.
- Fox, John. 2016. *Applied Regression Analysis and Generalized Linear Models*. 3rd ed. Los Angeles: SAGE Publications.
- Fox, John and Georges Monette. 1992. “Generalized Collinearity Diagnostics.” *Journal of the American Statistical Association* 87(417):178–83.
- Frank, David John and Elizabeth H. McEneaney. 1999. “The Individualization of Society and the Liberalization of State Policies on Same-Sex Sexual Relations, 1984 - 1995.” *Social Forces* 77(3):911–43.
- Frank, David John, Ann Hironaka, and Evan Schofer. 2000. “The nation-state and the natural environment over the twentieth century.” *American Sociological Review* 65(1):96.
- Frank, David John, Karen Jeong Robinson, and Jared Olesen. 2011. “The Global Expansion of Environmental Education in Universities.” *Comparative Education Review* 55(4):546–73.
- Freedom House. 2015. *Freedom in the World*. Washington D.C.: Freedom House.
- Gilpin, Robert. 2002. *The Challenge of Global Capitalism*. Princeton: Princeton University Press.
- Greenstein, Shane. 2015. *How the Internet Became Commercial*. Princeton: Princeton University Press.
- Guillén, Mauro F. and Sandra L. Suárez. 2001. “Developing the Internet: entrepreneurship and public policy in Ireland, Singapore, Argentina, and Spain.” *Telecommunications Policy* 25(5):349–71.
- Guillén, Mauro F. and Sandra L. Suárez. 2005. “Explaining the Global Digital Divide: Economic, Political and Sociological Drivers of Cross-National Internet Use.” *Social Forces* 84(2):681–708.
- Gunder Frank, Andre. 1969. “The Sociology of Development and the Underdevelopment of Sociology.” *Catalyst* 3:20–73.
- Hafner-Burton, Emilie M. and Kiyoteru Tsutsui. 2005. “Human Rights in a Globalizing World: The Paradox of Empty Promises.” *American Journal of Sociology* 110(5):1373–1411.
- Hafner-Burton, Emilie M., Kiyoteru Tsutsui, and John W. Meyer. 2008. “International Human Rights Law and the Politics of Legitimation.” *International Sociology* 23(1):115–41.
- Hargittai, Eszter. 1999. “Weaving the Western Web: explaining differences in Internet connectivity among OECD countries.” *Telecommunications Policy* 23(10-11):701–18.
- Hindman, Matthew. 2009. *The Myth of Digital Democracy*. Princeton: Princeton University Press.
- Hironaka, Ann. 2008. *Neverending Wars: The International Community, Weak States, and the Perpetuation of Civil War*. Cambridge: Harvard University Press.
- Hironaka, Ann. 2014. *Greening the Globe: World Society and Environmental Change*. New

- York: Cambridge University Press.
- Holkeboer, Christian Bachelder and James Raymond Vreeland. 2013. "Calling Democracies and Dictatorships: The Effect of Political Regime on International Long-Distance Rates." *Kyklos* 66(3):417–37.
- Hughes, Melanie M., Lindsey Peterson, Jill Ann Harrison, and Pamela Paxton. 2009. "Power and Relation in the World Polity: The INGO Network Country Score, 1978 - 1998." *Social Forces* 87(4):1711–42.
- International Association of Universities. 2016. *World Higher Education Database*.
- International Telecommunication Union. 2014. *Manual for Measuring ICT Access and Use by Households and Individuals*. Geneva Switzerland: International Telecommunication Union.
- International Telecommunication Union. 2015. *Measuring the Information Society Report 2015*. Geneva Switzerland: International Telecommunication Union.
- Jennings, M. Kent, Laura Stoker, and Jake Bowers. 2009. "Politics across Generations: Family Transmission Reexamined." *The Journal of Politics* 71(03):782–99.
- Jepperson, Ronald and John W. Meyer. 2011. "Multiple Levels of Analysis and the Limitations of Methodological Individualisms." *Sociological Theory* 29(1):54–73.
- Keck, Margaret E. and Kathryn Sikkink. 2014. *Activists beyond Borders*. Ithaca: Cornell University Press.
- Kiiski, Sampsa and Matti Pohjola. 2002. "Cross-country diffusion of the Internet." *Information Economics and Policy* 14(2):297–310.
- Knutsen, Carl Henrik. 2011. "Democracy, Dictatorship and Protection of Property Rights." *Journal of Development Studies* 47(1):164–82.
- Knutsen, Carl Henrik. 2015. "Why Democracies Outgrow Autocracies in the Long Run: Civil Liberties, Information Flows and Technological Change." *Kyklos* 68(3):357–84.
- Kozma, Robert B. 2003. "Technology and Classroom Practices." *Journal of Research on Technology in Education* 36(1):1–14.
- Langman, Lauren. 2005. "From Virtual Public Spheres to Global Justice: A Critical Theory of Internetworked Social Movements." *Sociological Theory* 23(1):42–74.
- Lessig, Lawrence. 2000. *Code and Other Laws of Cyberspace*. New York: Basic Books.
- Lessig, Lawrence. 2004. *Free Culture*. New York: Penguin.
- Lijphart, Arend. 2012. *Patterns of Democracy*. 2nd ed. New Haven: Yale University Press.
- Lindert, P. H. 2004. *Growing Public: Volume 1, The Story: Social Spending and Economic Growth Since the Eighteenth Century*. Cambridge University Press.
- Lyytinen, Kalle and Gregory M. Rose. 2003. "The Disruptive Nature of Information Technology Innovations: The Case of Internet Computing in Systems Development Organizations." *Management Information Systems Quarterly* 27(4):557–96.
- Maddex, Robert L. 2007. *Constitutions of the World*. 3rd ed. Washington DC: CQ Press.
- Madon, S. 1999. "International NGOs: networking, information flows and learning." *The Journal of Strategic Information Systems* 8(3):251–61.
- Mansell, Robin. 2004. "Political Economy, Power and New Media." *New Media & Society*

6(1):96–105.

- March, James G. and Johan P. Olsen. 1998. “The Institutional Dynamics of International Political Orders.” *International Organization* 52(4):943–69.
- Markham, Annette N. 2013. “The dramaturgy of digital experience.” in *The drama of social life*, edited by C. Edgley. New York: Routledge.
- Marshall, Monty G., Ted Robert Gurr, and Keith Jagers. 2015. “Polity IV Project, Political Regime Characteristics and Transitions, 1800-2014.” Retrieved (<http://www.systemicpeace.org/inscrdata.html>).
- Marx, Groucho, Chico Marx, and Harpo Marx. 1937. *A day at the races*. Metro-Goldwyn-Mayer.
- McDonald, Paula and Paul Thompson. 2016. “Social Media(tion) and the Reshaping of Public/Private Boundaries in Employment Relations.” *International Journal of Management Reviews* 18(1):69–84.
- McLuhan, Marshall. 1974. “At the moment of Sputnik the planet became a global theater in which there are no spectators but only actors.” *Journal of Communication* 24(1):48–58.
- Meyer, John W. 1977. “The Effects of Education as an Institution.” *American Journal of Sociology* 83(1):55–77.
- Meyer, John W. and Patricia Bromley. 2013. “The Worldwide Expansion of Organization.” *Sociological Theory* 31(4):366–89.
- Meyer, John W. and Brian Rowan. 1977. “Institutionalized Organizations: Formal Structure as Myth and Ceremony.” *American Journal of Sociology* 83(2):340–63.
- Meyer, John W., John Boli, George M. Thomas, and Francisco O. Ramirez. 1997. “World Society and the Nation-State.” *American Journal of Sociology* 103(1):144–81.
- Meyer, John W., Francisco O. Ramirez, and Yasemin Soysal. 1992. “World Expansion of Mass Education, 1870-1980.” *Sociology of Education* 65(2):128–49.
- Meyer, John W., Francisco O. Ramirez, David John Frank, and Evan Schofer. 2007. “Higher Education as an Institution.” in *Sociology of higher education*, edited by P. J. Gumpert. Baltimore: JHU Press.
- Milner, Helen V. 2006. “The Digital Divide The Role of Political Institutions in Technology Diffusion.” *Comparative Political Studies* 39(2):176–99.
- Myers, Daniel J. 1994. “Communication Technology and Social Movements: Contributions of Computer Networks to Activism.” *Social Science Computer Review* 12(2):250–60.
- Nie, Norman H. and Lutz Erbring. 2000. *Internet and Society*. Stanford Institute for the Quantitative Study of Society.
- Nisbet, Erik C., Elizabeth Stoycheff, and Katy E. Pearce. 2012. “Internet Use and Democratic Demands: A Multinational, Multilevel Model of Internet Use and Citizen Attitudes About Democracy.” *Journal of Communication* 62(2):249–65.
- Norris, Pippa. 2001. *Digital Divide*. Cambridge: Cambridge University Press.
- Norris, Pippa. 2011. “Measuring Governance.” Pp. 179–200 in *The sage handbook of governance*, edited by M. Bevir. London: SAGE Publications Ltd.
- Pick, James B. and Avijit Sarkar. 2015. *The Global Digital Divides*. Berlin, Heidelberg: Springer.
- Powell, Walter W. and J. A. Colyvas. 2008. “Microfoundations of Institutional Theory.” in

- The sage handbook of organizational institutionalism*, edited by R. Greenwood, C. Oliver, R. Suddaby, and K. Sahlin-Andersson. London: SAGE.
- Putnam, Robert D. 1993. "The Prosperous Community: Social Capital and Public Life." *The American Prospect* 13:35–42.
- Rheingold, Howard. 1993. *The Virtual Community*. Reading, Mass.: Addison-Wesley Pub. Co.
- Rogers, Everett M. 2010. *Diffusion of Innovations*. 4th ed. New York: The Free Press.
- Rossem, Ronan Van. 1996. "The World System Paradigm as General Theory of Development: A Cross-National Test." *American Sociological Review* 61(3):508–27.
- Rothkopf, David. 2015. "Is Unrestricted Internet Access a Modern Human Right?" Retrieved (<https://foreignpolicy.com/2015/02/02/unrestricted-internet-access-human-rights-technology-constitution/>).
- Schofer, Evan and Wesley Longhofer. 2011. "The Structural Sources of Association." *American Journal of Sociology* 117(2):539–85.
- Schofer, Evan and John W. Meyer. 2005. "The Worldwide Expansion of Higher Education in the Twentieth Century." *American Sociological Review* 70(6):898–920.
- Schofer, Evan, Ann Hironaka, and David John Frank. 2012. "Sociological Institutionalism and World Society." in *The wiley-blackwell companion to political sociology*, edited by E. Amenta, K. Nash, and A. Scott. Oxford: Blackwell Publishing Ltd.
- Shirky, Clay. 2008. *Here Comes Everybody*. New York: Penguin.
- Starr, Paul. 1997. "Smart technology, stunted policy: developing health information networks." *Health Affairs* 16(3):91–105.
- Stefik, Mark and Giuliana Lavendel. 2005. "Libraries and Digital Property Rights." *Research and Advanced Technology for Digital Libraries* 1–10.
- Strang, David and John W. Meyer. 1993. "Institutional Conditions for Diffusion." *Theory and Society* 22(4):487–511.
- Suarez, David. 2008. "Rewriting citizenship? Civic education in Costa Rica and Argentina." *Comparative Education* 44(4):485–503.
- Swidler, Ann. 1986. "Culture in Action: Symbols and Strategies." *American Sociological Review* 51(2):273–86.
- Sydell, Laura. 2012. "U.N. Human Rights Council Backs Internet Freedom." *National Public Radio, Morning Edition*.
- The World Bank. 2015. "World Development Indicators 2015."
- Torfason, Magnus Thor and Paul Ingram. 2010. "The Global Rise of Democracy: A Network Account." *American Sociological Review* 75(3):355–77.
- Tsutsui, Kiyoteru and Christine Min Wotipka. 2004. "Global Civil Society and the International Human Rights Movement: Citizen Participation in Human Rights International Nongovernmental Organizations." *Social Forces* 83(2):587–620.
- Tufekci, Zeynep and Christopher Wilson. 2012. "Social Media and the Decision to Participate in Political Protest: Observations From Tahrir Square." *Journal of Communication* 62(2):363–79.
- Union of International Associations. 2015. Yearbook of International Organizations. Bel-

- gium: Union of International Associations.
- United Nations. 2016. "Major Conferences and Summits." Retrieved (<http://www.un.org/en/development/desa/what-we-do/conferences.html>).
- Wallerstein, Immanuel. 1974. *The Modern World-system: Capitalist agriculture and the origins of the European world-economy in the sixteenth century*. Emerald Group Pub Limited.
- Wallerstein, Immanuel. 2004. *World-Systems Analysis*. Durham: Duke University Press.
- Warner, Gregory. 2016. "Is Netflix Chill? Kenyan Authorities Threaten To Ban The Streaming Site." Retrieved (<http://www.npr.org/sections/goatsandsoda/2016/01/21/463807063/is-netflix-chill-kenyan-authorities-threaten-to-ban-the-streaming-site>).
- Wellman, Barry. 2001. "Physical Place and Cyberplace: The Rise of Personalized Networking." *International Journal of Urban and Regional Research* 25(2):227–52.
- Wooldridge, Jeffrey M. 2010. *Econometric Analysis of Cross Section and Panel Data*. 2nd ed. Cambridge, Massachusetts: The MIT Press.
- Zakaria, Fareed. 1997. "The rise of illiberal democracy." *Foreign Affairs* (November 1997).
- Zhao, Hongxin, Seung Kim, Taewon Suh, and Jianjun Du. 2007. "Social institutional explanations of global internet diffusion: a cross-country analysis." *Journal of Global Information Management* 15(2):28–55.
- Zuckerman, Ezra W. 1999. "The Categorical Imperative: Securities Analysts and the Illegitimacy Discount." *American Journal of Sociology* 104(5):1398–1438.