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THE DEMOCRATIC EFFECTS OF THE INTERNET, 1994–2003

A Cross-National Inquiry of 152 Countries

Jacob Groshek

Abstract / Since its inception and subsequent diffusion, the Internet has been lauded as a potent democratizing agent. Using macro-level panel data from 1994 to 2003, this study examined 152 countries and found that increased Internet diffusion was a meaningful predictor of more democratic regimes. This was shown to be most true in developed countries, where non-linear fixed effects regression models showed the highest coefficient estimates and largest observed associations. Consistent with media system dependency theory, greater effects were also demonstrated for countries that already were at least partially democratic where the Internet was more prevalent and thus more likely to fulfill a greater number of information functions. In addition, Internet diffusion and democracy demonstrated a positive, statistically significant relationship (but with a marginal observed association size) in developing countries where the average level of sociopolitical instability was much higher. The Internet therefore should not be employed as a modern 'mobility multiplier' because of the strong associations and positive relationships it has shown with democracy but it should also not be ignored due to the democratic potential these results suggest.

Keywords / communication and national development / democratic divide / information communication technologies / media system dependency theory / new media and democracy

In his seminal text on national development and mass communication, Lerner (1958: 52) dubbed the mass media a 'mobility multiplier'. In this framework, Lerner suggested that mass media diffusion precipitates social modernization and democratic processes. Most scholars now agree, however, that the development process is not so simple or linear and mass media effects are more complex, subtle, and often not apparent on a national level for periods of years or even decades. Indeed, development research has undergone a substantial paradigm shift, and ongoing economic, political and health campaigns are now often employed through multiple media formats and in conjunction with multifaceted social and cultural methods (Muturi, 2005; Rogers, 2003; Sood et al., 2004).

While much progress has been made in understanding the relationship between information communication technologies (ICTs) and development, hypodermic-needle propositions remain. In one of the most memorable statements of this kind, former US vice president Al Gore (1995: 4) said that from ICTs 'we will derive robust

and sustainable economic progress, strong democracies, better solutions to global and local environmental challenges, improved health care, and – ultimately – a greater sense of shared stewardship of our small planet'. Gore continued, stating that the Internet will not only 'spread participatory democracy', but also forge 'a new Athenian Age of democracy'. Though these remarks were made at the time when the Internet was emerging rapidly to public markets, they demonstrate the same sense of utopian technological determinism that marked the introduction and subsequent diffusion of radio and television. Interestingly, this type of Lerner-esque forecasting continues prominently to the present day regarding communication technologies, specifically the Internet.

It is thus important to note that politicians are not alone in advancing such arguments. For example, Klaus Schwab, the executive chairman and founder of the World Economic Forum wrote, 'ICTs continue to offer the best hope for developing countries to accelerate their development processes' (Schwab, 2003: iii). More recently, Sumit Roy, an economist and former senior consultant for the United Nations Commission for Africa, similarly concluded that 'developing countries have to seize the challenge of ICT to foster development and usher in structural change and the shift to an information-based society and globalisation' (Roy, 2005: 219).

While few would disagree that bridging intra- and interstate digital divides is crucial (Mwesige, 2004), it remains open to debate what types of changes communication technologies might bring to bear in the developing world, and what effects they have heretofore shown in developed countries where they are more prevalent. The lessons of history, and indeed, media system dependency theory (Ball-Rokeach, 1998) suggest that communication technologies, including the Internet, are unlikely to drastically alter asymmetric power and economic relations within and between countries specifically in the short term. Yet, it is important to note that communication technologies are nonetheless vital to democracy and the process of democratization (O'Loughlin et al., 1998).

This type of theorizing that emphasizes the social requisites of democracy (Lipset, 1959, 1994) is best approximated by the macro-level linkages proposed in media system dependency theory (Rubin and Windahl, 1986). Specifically, there are two central features of media system dependency that identify conditions in which media diffusion may show micro- and macro-level effects. First, 'the greater the *number* and centrality of the specific information-delivery functions served by a medium, the greater the audience and *societal* dependency on that medium' (Ball-Rokeach and DeFleur, 1976: 7; emphasis added). Second, as media diffusion and dependency increase over time, the 'potential [for mass media messages to achieve a broad range of cognitive, affective, and behavioral effects] will be further increased when there is a high degree of structural instability in the society due to conflict and change' (Ball-Rokeach and DeFleur, 1976: 7).

Given this set of circumstances, it would be negligent to fail to investigate technologically deterministic claims – utopian or dystopian – at a time when communication technologies are still often positioned as drivers of democratic citizen empowerment (Arun et al., 2004). The goal of this study was therefore to examine what effect, if any, increased Internet diffusion has had on democratic growth

globally, and in developed and developing countries by analyzing macro-level panel data for 152 countries from 1994 to 2003. In so doing, this study re-examined still prevalent Lerner-type dominant paradigm arguments using a media system dependency theory framework that distinguished the conditions under which the tripartite relationship between media, audience and society may show greater or lesser effects (Ball-Rokeach and DeFleur, 1976).

Communication Technologies and Democracy

Since an informed public is essential to the proper functioning of government in democratic theory, communicative technologies have historically been considered powerful democratizing agents. For example, the Gutenberg press helped to initiate and sustain the Reformation, and both Jefferson and de Tocqueville observed that the free press was a catalyst for American democracy. It is therefore not surprising when politicians and scholars alike broadly proclaim the potential of new technologies to hasten the spread of effective democracies, even though democracy is a distinctly abstract concept that is difficult to quantify on a macro level.

Despite this obstacle, it has been nearly universally agreed that an operational definition of national democracy must include three interdependent elements: political rights, institutional checks and balances and civil liberties (Kedzie, 1997). Political rights are defined as the ability of citizens to choose their leaders and policies, while institutional checks and balances exist primarily to rein in the misuse of power by any branch of government. Civil liberties refer to the guarantees of freedom citizens have in their lives and acts of political participation (Polity IV, 2002).

Even with an understanding of the conceptual underpinnings of democracy, 'the history of technological prognostication is littered with faulty predictions of the impacts of new technologies' (Weare, 2002: 660). Over the last hundred years, new communication technologies including telegraphs, telephones, radios and televisions have, in most cases, failed to fulfill their social potential (Hornik, 1988). The Internet, however, is the most interactive and technologically sophisticated medium to date, which enhances user reflexivity in terms of user participation and generated content and thus has a greater likelihood of affecting change (Bucy and Gregson, 2001; Gaynor, 1996; Thornton, 2002).

Presumably, because the Internet is a nearly infinite repository of information, it is positioned, especially in participatory terms, to increase citizen awareness and involvement in self-governance. As noted in the 2000 United Nations (UN) Millennium Report, one of the major benefits of increased Internet diffusion is 'a means of monitoring the government to ensure the protection of human rights' (cited in Sonaike, 2004: 51). However, precisely *because* the Internet is a morass of information, studies have shown that many Internet users often use it primarily for email or entertainment (Lee, 1999; Mwesige, 2004; Robbins, 2002) and their empowerment may only be symbolic (Bucy and Gregson, 2001).

In addition to studies of how people interact with the online environment (Althaus and Tewksbury, 2000; Nie and Hillygus, 2002), several studies have identified relationships between Internet use and democracy, in which increased dependency on

the Internet for political information was among the strongest predictors of political participation (Tolbert and McNeal, 2003) and a meaningful predictor of voter learning (Drew and Weaver, 2006). In a macro-level study of Internet effects, Kedzie (2002: 122) found that 'every model, set of statistical tests, and functional form in this study is consistent with the hypothesis that interconnectivity is a powerful predictor of democracy, more than any of democracy's traditional correlates'. Although the Kedzie study was tested on data from 1993, before the Internet became widely diffused publicly, it nonetheless introduces an important empirical relationship between Internet diffusion and democracy on a multinational level.

Specific to this inquiry is the presumed ability of an increase in the prevalence of the Internet to demonstrate a meaningful change to political structures, such as that suggested by the ripple effects of media system dependency theory (DeFleur and Ball-Rokeach, 1989). Importantly, the diffusion of the Internet subsumes the actual growth of the Internet itself, which addresses both the number and centrality of information functions identified by media systems dependency theory. That is, increased Internet diffusion and access creates a situation whereby information available on the Internet grows exponentially through user creation and participation as the Internet reaches more and more individuals, which can be assumed to increase the number and centrality of information functions online for specific communities and nations. Thus, though diffusion measures may be somewhat imprecise, they generally reflect accessibility patterns and unique information functions of the Internet that are – at least theoretically – related to its likelihood of affecting democratic change in a given country.

In terms of this study, observed increases in Internet diffusion (and the accompanying assumed increases in the centrality of information functions online) are likely to show both indirect and direct impacts on democratic growth as expected by media system dependency theory. Only direct macro-level linkages between the Internet and national levels of democracy are investigated here since measuring audience dependency and effects are beyond the scope of this inquiry. Nonetheless, it is recognized that these cognitive, affective and behavioral audience effects often act as the mechanisms through which mass media, including the Internet, 'can force changes in the nature of the relationships between the sociocultural system and the media system' (Ball-Rokeach and DeFleur, 1976: 19). These linkages, plotted graphically in Figure 1, are the basis along with other aforementioned evidence for the following hypothesis:

H1: Increased Internet diffusion predicts increased democracy levels across all countries.

In a 16-year study of 137 countries, Weaver (1977: 169) concluded that 'growth of mass communications is important to the growth of participant forms of government and to greater freedom of expression'. However, in a 1985 update of the 1977 study, Weaver, Buddenbaum and Fair found that in 105 less developed countries, 'there is no link between urbanism and education or between media development and accountability of governors' (Weaver et al., 1985: 116). Because these studies were undertaken during the Cold War era, it is uncertain whether similar patterns will continue, specifically when measuring the development of the Internet as compared to radios and newspapers. Nonetheless, this framework is useful to

FIGURE 1

Hypothetical Model for the Influence of Communication Technologies and Endogenous Sociocultural Structures on Democratic Growth Based on Relationships Identified by Media System Dependency Theory
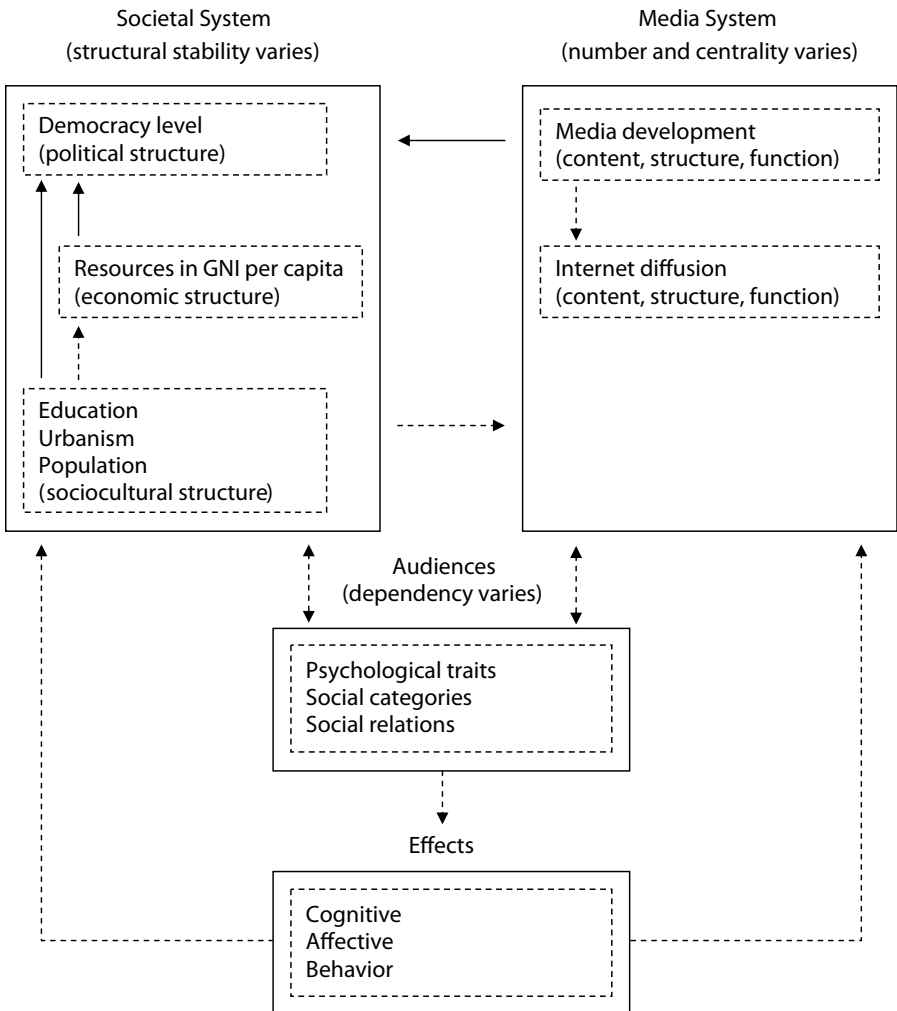
Note: Solid arrows indicate relationships examined in this study. Dashed arrows indicate mechanisms that underlie proposed linkages, but were not directly measured because nations, not audiences, were the units of analyses.

Source: Ball-Rokeach and DeFleur (1976); Rubin and Windahl (1986).

examine variations in the Internet and democracy relationship across developed and developing countries.

Though differentiating between developed and developing countries can be a complicated process not easily amenable to quantification, it is necessary in order

to make accurate and meaningful comparisons. For this purpose, the UN 2003 Human Development Index was used. This index comprises rankings of life expectancy at birth, adult literacy rates, combined gross enrollment ratios in primary, secondary and tertiary schools and gross domestic product per capita. Based on these figures, the index placed all countries into high, medium and low categories. In the study reported here, countries ranked high were considered developed whereas countries ranked medium and low were considered developing.

When using this scale, the mean level of Internet penetration in developing countries reached only 4.28 percent in 2003. Although these countries may be less stable and thus more media dependent, this level of Internet diffusion seems unlikely to reach a sufficient amount of people or fulfill enough unique, central information functions described by media system dependency theory to show a meaningful democratic effect. By comparison, the 34.68 percent Internet diffusion rate among developed countries in 2003 suggested a robust increase in the number and centrality of information functions available online, such that it is expected:

H2: Increased Internet diffusion predicts increased levels of democracy among developed countries whereas increased Internet diffusion does not predict increased levels of democracy in developing countries.

Method

Following the work of similar macro-level studies of this kind (Kedzie, 2002; Oyelaran-Oyeyinka and Lal, 2005; Weaver, 1977; Weaver et al., 1985; Wilson, 2004), this study relied primarily on multiple regression models to 'investigate a range of potential causal arguments' (Kedzie, 2002: 110). Although there are, of course, limitations to using aggregate national panel data, it is nonetheless among the best methods to examine patterns of relationships between variables and to estimate linkages that might not be readily apparent or, in some cases, overestimated using other techniques (Beck and Katz, 1995; Weaver et al., 1985).

First, in order to identify potential relationships, global democracy and Internet diffusion levels were plotted for all countries across all years. Next, bivariate correlation coefficients were determined for all variables. Following this, a series of multivariate regressions using logarithmic transformations were modeled and then plotted to examine non-linear relationships. In order to maximize the explanatory capacity of this time-series cross-sectional data and reduce coefficient bias, these models also identified regional and time entities, and thereby more rigorously examined relationships over time and produced more consistent, unbiased estimations (Beck and Katz, 1995). Finally, another sequence of regressions and *t*-tests then examined democratic effects for countries of different development and democracy statuses.

Time Frame

The time frame of 1994–2003 was selected for clearly identifiable reasons. The public launch of the Internet is generally marked around 1994, following the introduction of the Mosaic web browser in 1993 and at the time of writing, 2003 was the latest

available year for much of the data. Since the time period of the study is unfortunately brief, the data are not amenable to a true time-series analysis that requires approximately 50 discrete time points. The panel, however, is continuous for 152 countries over 10 years and therefore less susceptible to stability problems (Chan et al., 2006). Also, by including data from the time that the Internet first became publicly available, emerging trends might be identified and predictions made about future patterns.

Variable Identifications

Data were inputted for each of the variables identified by Weaver et al. (1985), which included urbanism, education, resources, media development, sociopolitical instability and accountability of governors (democracy). The only exception in this study was government control of the press. The exclusion was based on a serious (nearly perfect) collinearity problem with democracy measures. This variable was also excluded from similar research by Kedzie (2002), Best and Wade (2005) and Persson and Tabellini (2006).

Three variables that were not represented by Weaver et al. (1985) were added to this study. The first additional variable was Internet diffusion per 100, as measured by the International Telecommunication Union (ITU). The second variable added was the 2003 UN Human Development Index, which was incorporated solely for the purpose of placing countries in developmental categories. The third variable was the population of each country, which was introduced primarily as a control variable. Binary regional and time operators were also added as part of specifying fixed effects regression models.

Countries

There were 152 countries selected for this study. Countries were chosen on the basis of their inclusion in many of the databases used from the UN, the ITU and the World Bank. Countries were omitted if large portions of data (15 percent or more for any category or year) were missing. In the case of missing figures among included countries, mean substitution at the country level was used for each missing case per variable.

Democracy

Data for this variable were drawn from the Polity IV database. The 'Polity 2' democracy score is a specific measure within the Polity IV database, often recognized for its validity, sophistication and comprehensiveness. These Polity 2 democracy scores, which range from –10 to +10, were therefore used to operationalize democracy in this study. Generally, Polity 2 democracy scores are calculated by indicators derived from weighted codings of the competitiveness of political participation, the regulation of participation, the openness and competitiveness of executive recruitment and constraints on the chief executive (Polity IV, 2002). In addition, factor analyses

also showed that the Polity 2 democracy scores load highly (over .90 for all years in this study) with Freedom House (2005) government accountability figures, which have been used previously (Best and Wade, 2005; Kedzie, 2002; Weaver, 1977; Weaver et al., 1985).

Resources

Weaver et al. (1985: 111) defined the availability of resources as 'the relative supply of material goods per person in a country, including such diverse "goods" as food, shelter, clothing, transportation, and energy'. They used gross national product (GNP) per capita in their study to measure availability of resources. This study employs gross national income (GNI) per capita, which is a similar but updated version of GNP that has become the standard for measuring countries' relative wealth (World Bank, 2005). These figures were supplied from the World Bank Database of World Development Indicators.

Internet Diffusion

Estimates from the ITU of Internet users per 100 were used as the measure for this variable. Through a series of frequency of use surveys, national and Internet Service Provider (ISP) data, these estimates are arrived at to generally indicate how accessible the Internet is to the public within a given country. Despite the fact that Internet user data may be less than concrete, they have been used in a similar fashion in other studies (Best and Wade, 2005; Milner, 2006) and should report general trends and patterns of the most crucial variable in this study.

Mass Media Development

Weaver et al. (1985: 120) defined this as 'the level of availability of mass communication products per person in any given country'. While media messages are not evaluated in this study, their prevalence is accounted for in mediated information networks. Though previous studies used television, radio and newspaper figures for this variable, this study only combined television and radio figures. Specifically, television per capita data from the World Bank World Development Indicators were added to with radio sets per thousand data from the ITU that was divided by the yearly country population figures.

The Pearson's correlation coefficient for these two figures was positive and statistically significant ($r = .79$, $p < .001$) and effectively represents broadcast media for the years 1994–2003. Although this measure of media development does not have a print component, recent trends in declining newspaper readership (Annual Report on American Journalism, 2005) suggest newspaper circulation figures may no longer accurately represent mass media development. Thus it is important to point out that the mass media development measure used here can be considered an estimate of the diffusion of broadcast media technologies since it comprised only television and radio diffusion figures.

Sociopolitical Instability

This variable was derived from the weighted conflict index found in the Banks' Cross-Polity Time-Series Database. These data represented an index of domestic stress and were used to approximate domestic stress as a function of sociopolitical instability. Weaver defined stress as 'a condition resulting from rapid change or from events which threaten the established pattern of life of a society or government' (Weaver, 1977: 160). In terms of this study, increased domestic stress was identified as one of the key sociopolitical conditions, namely instability, that might engender a greater democratic effect as a result of the increased diffusion of, and dependency on, media technologies.

Specifically, this variable included weighted codings of assassinations, general strikes, guerrilla warfare, government crises, purges, riots, revolutions and anti-government demonstrations. These data were collected from the same primary source as that of Weaver (1977) and were input unadjusted to the database.

Level of Education

Education figures indicate the societal-level effort a country is making to formally educate its populace. Gross enrollment ratio figures for both primary and second-ary schools, provided by UNESCO, were used as indicators in this study. Although tertiary enrollment data were excluded because it was incomplete, primary and secondary enrollment figures were added together and divided by 2 to obtain a measure based on 100 percent. These are also the same figures, albeit from a differ-ent source, used by Weaver (1977) to measure education.

Urbanism

Urbanism is an important variable because it implicitly rests on the assumption that more concentrated populations are more likely to be included in and exposed to multiple information networks (Weaver et al., 1985). Previous studies therefore focused on evidence of these networks, such as volume of mail and telephones per capita. This study included telephone per capita data, but since mail and car data were unavailable, the urban percentage of the population from the World Bank World Development Indicators database was substituted. These figures (telephone per capita and urban population percentage) were added together to create an index of urbanization. It has been shown that while there are large numbers of urban dwellers without cars or mail, they generally still have more access to information networks, including newspapers, televisions and Internet cafes (Mwesige, 2004; Sonaike, 2004) than those in rural areas.

Development

In order to classify countries in terms of development status, the UN (2003) Human Development Index was used. This index comprises rankings of life expectancy at

birth, adult literacy rates, combined gross enrollment ratios in primary, secondary and tertiary schools and gross domestic product (GDP) per capita. This report placed all countries into high, medium and low categories whereby highly developed countries were coded as 3, medium developed countries as 2 and less developed countries as 1. For comparison purposes in the study reported here, categories 1 and 2 were considered developing countries while category 3 countries were considered developed.

Region

Regional dummy variables were introduced to model state-specific effects. Based on distinctions in the Polity IV database country coding procedure, which generally identified countries geographically, this was a relatively straightforward task. In several instances, a procedure described by Kedzie (1997) was used, where countries that seemed geographically misplaced were regionally categorized on the basis of three incorporated elements: geography, history and religion. One such case includes North African countries, which were included with other Middle Eastern countries based on their historical and religious background rather than simple geography (Kedzie, 1997).

Population

Population figures for each country were inputted unadjusted from the World Development Indicators database. Although population is not specified in Figure 1, it acts as important control variable in order to optimize the regression functions.

Model Identifications

To investigate H1, a regional fixed effects regression model was identified that could be estimated separately for each year. This type of analysis is able to identify specific trends in the relationship between Internet diffusion and democracy over time. In determining coefficient estimates, statistical significance, observed association sizes and other predictors can be identified for each year. Thus, Model 1 is as follows:

$$Y_{i,t-1} = \beta_0 + \beta_1 \ln X_{1i} + \beta_2 \ln X_{2i} + \beta_3 \ln X_{3i} + \beta_4 \ln X_{4i} + \beta_5 \ln X_{5i} + \beta_6 \ln X_{6i} + \beta_7 \ln X_{7i} + \phi_i S_i + \mu_i$$

In this and all models, Y denotes the Polity 2 democracy score for each region (i) associated with a one-year time lag ($t - 1$). β_0 is the unknown intercept and β_1 through β_7 are unknown coefficient estimates of their respective variables. X_1 represents Internet diffusion, X_2 represents gross national income (GNI) per capita, X_3 represents mass media development, while X_4 represents education enrollment, X_5 represents urbanization, X_6 represents sociopolitical instability and X_7 represents population, all of which were transformed using a natural logarithm (ln). ϕ_i is treated as a summary of unknown estimators of region-specific effects, with all regions being summarized by S_i. Finally, μ_i represents the error term.

Since H2 only differentiates statistically on the basis of sample size by including countries with certain development statuses, a slightly different model than previously identified was constructed to test both propositions. Model 2 included λ_t as the summary of unknown time-specific coefficients, where T_t denotes each year and could be estimated separately with the appropriate countries to test H2 (developed countries and developing countries). Model 2 is the following linear-log fixed effect regression with i state (regional) binary variables and t time binary variables and a lagged dependent variable, which was identified to examine H2:

$$Y_{i,t-1} = \beta_0 + \beta_1 \ln X_{1it} + \beta_2 \ln X_{2it} + \beta_3 \ln X_{3it} + \beta_4 \ln X_{4it} + \beta_5 \ln X_{5it} + \beta_6 \ln X_{6it} + \beta_7 \ln X_{7it} + \phi_i S_i + \lambda_t T_t + \mu_{it}$$

By using fixed effects panel regression models that controlled for time and region-specific effects, omitted variables were controlled for, and heteroskedascity problems were mitigated in these tests. Specifically, the fixed effects models controlled for unobserved variables that differed across region but did not vary across time while also controlling for unobserved variables that differed across time but did not vary across state. Also, the estimators reported in these analyses can be considered robust since autocorrelation was controlled by lagging the dependent variable one year, which also reduced the sample size by 152.

Findings

Before reporting on the hypotheses, it is first important to examine basic trends between Internet diffusion and democracy. Because of the relatively small number of time intervals in this study ($N = 10$), several analyses emphasize structural and graphically visible patterns in the data. Little variance, in fact only an increase of 0.56 units, was demonstrated in average Polity 2 democracy scores from 1994 to 2003, which is fairly predictable given the global nature of this study and its relatively short time frame. Internet diffusion, on the other hand, showed a sharp increase to an average of nearly 14 percent per country. This relationship, which creates a unique statistical condition whereby democracy obviously existed before any appreciable Internet diffusion and remained relatively stable during a period of rapid Internet diffusion, is plotted graphically for all countries in Figure 2.

In order to examine the extent to which Internet diffusion represents a unique, testable concept, basic bivariate correlations were calculated. These results indicate that the Internet is indeed distinct from other concepts in this study. Internet diffusion was most highly correlated with urbanization at .77 ($p < .001$) even though a component of urbanization is fixed telephones per capita, which are of course important to the infrastructure demands of the Internet. Interestingly, all of the variables except sociopolitical instability and population are positively and significantly correlated as shown in Table 1, but none of the regression models suffered from multicollinearity problems as outlined by Stock and Watson (2003) and many studies conceive of the Internet both as a unique predictor and a dependent variable (Milner, 2006).

FIGURE 2

Relationship between the Mean Levels of Internet Diffusion and Democracy for all Countries over all Years
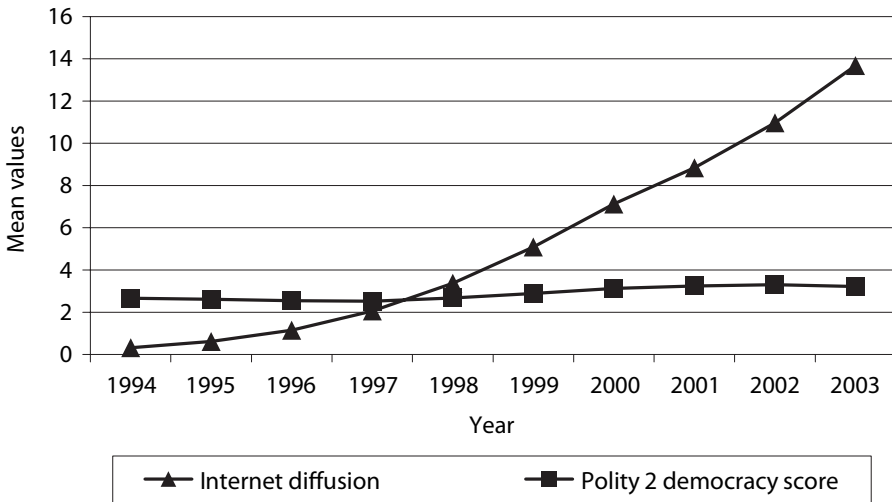
The first hypothesis expected that increased Internet diffusion predicts increased levels of democracy across all countries. Since the dependent variable in this model, the Polity 2 democracy scores, is bounded and many countries achieved the maximum level for many years in a row, it is prudent to predict that Internet diffusion and all other independent variables will have increasingly marginal returns. That is, although Internet diffusion may continue to reach greater and greater levels, any effect it (or any other predictor variables) may have on democracy will plateau.

Thus, all independent variables were transformed using a natural logarithm and the model became a linear-log specification. Doing so converted changes in variables into percentage changes, which is an appropriate measure that produces easily interpretable coefficients on the original democracy scale (where a 1 percent change in Internet diffusion is associated with a change in Polity 2 democracy score of $0.01\beta_1$). Additionally, linear-log fixed effects models showed higher adjusted R^2 scores than linear OLS models, which indicates that the linear-log models fit the data better.

To examine H1, Model 1 was tested across all countries for each year of the study and 1996 was the first year that Internet diffusion showed a statistically significant relationship with democracy. As shown in Table 2, this statistical significance continued through the end of the time period, suggesting that the increase in Internet diffusion became consistently associated with more democratic political structures and processes. For example, in 1996, a 1 percent increase in Internet diffusion was associated with an increase in Polity 2 democracy scores of 0.026 units (on a scale of −10 to +10). Although the magnitude of this finding may appear miniscule, it actually suggests a meaningful democratizing effect given the inertial characteristics of political structures, the bounded democracy measure and the relatively brief time period in this study.

TABLE 1

Bivariate Pearson Correlation Matrix for Observed Development and Media Variables

Variables	2	3	4	5	6	7	8
1. Internet diffusion	.35***	.67***	.62***	.45***	.77***	−.15***	−.01
2. Democracy		.35***	.43***	.38***	.43***	−.01	−.01
3. GNI per capita			.75***	.54***	.81***	−.17***	−.02
4. Broadcast media diffusion				.66***	.78***	−.18***	.03
5. Education enrollment					.67***	−.12***	.05*
6. Urbanization						−.17***	−.03
7. Sociopolitical instability							.10***
8. Population							–

Note: There were 152 countries over a 10-year time frame, which produced a sample of $N = 1520$ for all correlation coefficients (Pearson's r) reported.

***$p \leq .001$.

Yet since the actual average Internet diffusion was only 1.15 percent in 1996, it was rather surprising to find statistically significant results when considering this diffusion rate was associated with a nearly negligible increase of 0.03 units on the Polity 2 democracy scale. Moreover, the regression coefficient in 2003 was nearly equivalent to that of 1996 (though intervening years did show minor fluctuations) but the actual size of association increased to 0.36 units on the Polity 2 democracy scale because average Internet diffusion reached 13.68 percent in 2003. Even though the Internet continued to diffuse, the average level of democracy remained

TABLE 2

Regression Analyses of Internet Diffusion Predicting Democracy by Year

Years	All countries			
	B	SE	Adj. R^2	Other significant predictors
1994	3.81	2.68	0.40	Latin America; Europe; Middle East (negative)
1995	2.48	1.93	0.40	Latin America; Europe; Middle East (–)
1996	2.62#	1.57	0.40	Latin America; Europe; Middle East (–)
1997	2.97*	1.40	0.42	Latin America; Europe; Middle East (–)
1998	3.40**	1.25	0.44	Latin America; Europe; Middle East (–)
1999	3.85**	1.11	0.48	Instability; Latin America; Europe; Mid. East (–)
2000	3.26**	0.99	0.50	GNI; Latin America; Europe; Middle East (–)
2001	2.90**	0.93	0.50	Instability; Latin America; Europe; Middle East (–)
2002	2.69**	0.96	0.49	Latin America; Europe; Middle East (–)
2003	2.65**	0.89	0.49	Urbanism; L. America; Europe; Africa; Middle East (–)

Note: Coefficients reported are unstandardized and were derived using a dependent variable lagged one year (except for 1994) with fixed effects operators for region. The continuous independent variables were transformed using a natural logarithm (ln) to model non-linear relationships. $N = 152$ for all years and significance is at the $p < .10$ level.

#$p < .10$; *$p < .05$; **$p \leq .01$.

relatively stable – increasing only from an average of 2.66 to 3.22 – over the course of this study.

These findings first suggest that countries that were already more democratic diffused the Internet more so than their less democratic counterparts, which is consistent with the conclusions of Dimitrova (2002) and Milner (2006). Second, and more important to this study, these findings also indicate that increased Internet diffusion was associated with certain countries becoming more democratic and that those countries were often countries that were at least partially democratic *already*.

As illustrated in Figure 3, which fits a fractional polynomial (linear-log) regression line to a scatterplot of all countries for all years, very few non-democratic countries with a Polity 2 score of zero or less in 2003 had average Internet diffusion rates over 13.68 percent (the global average) at that time. Of these countries (Belarus, Bahrain, Kuwait, Qatar, Singapore and the United Arab Emirates), only Bahrain demonstrated an increase in its Polity 2 score and that increase was from –9 to –7. The democracy level in Belarus actually declined dramatically from +7 to –7 over the 10-year time frame of this study despite the fact that the Internet reached a relatively robust 14.09 percent of Belarussian citizens by 2003.

When these results are taken together, they suggest that the democratizing effect of the Internet is severely limited among non-democratic countries. Nonetheless, increased Internet diffusion predicted increased levels of democracy across all

FIGURE 3

Fitted Fractional Polynomial (Linear-Log) Regression Line Laid over Scatterplot of all Countries' Democracy Level for all Years
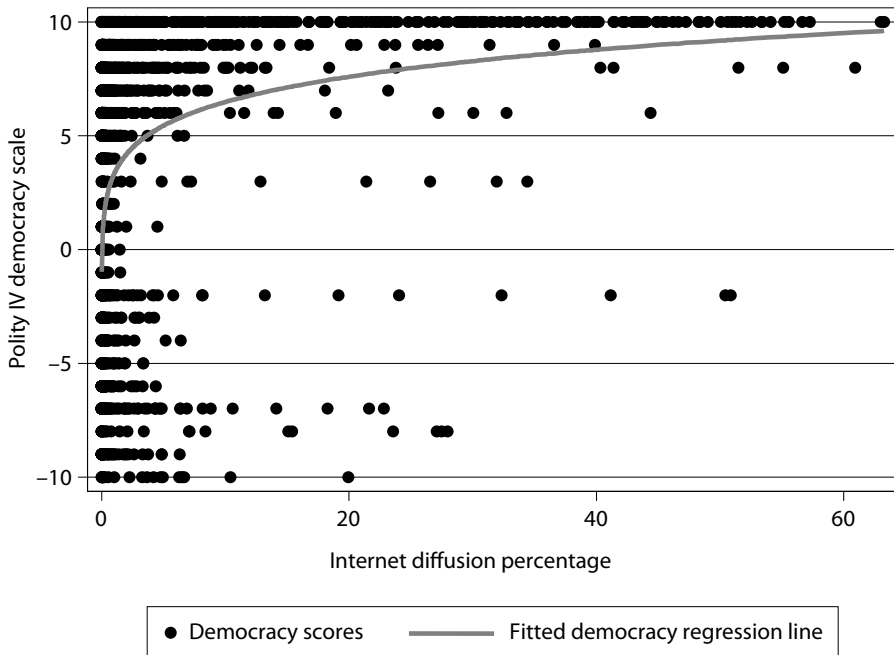
countries to a statistically significant degree (B = 1.80, SE = 0.30, p < .001) and H1 was supported precisely because countries with Polity 2 scores greater than zero did, indeed, have higher levels of Internet diffusion, which was associated with many of these already democratic countries becoming *even more* democratic.

t-Tests of the average levels of change in Internet diffusion and democracy from 1994 to 2003 between democratic and non-democratic countries found more specific evidence that democratic countries not only had higher levels of Internet diffusion (17.32 percent) but also greater democratic growth (1.39) than non-democratic countries. In fact, as shown in Table 3, non-democratic countries actually showed just a 5.26 percent mean increase in Internet diffusion and an average *decrease* in democracy of –1.14 units. Both of these differences in means were statistically significant, (t(150) = 4.41, p < .001) for Internet diffusion and (t(150) = 4.06, p < .001) for democracy scores, respectively.

The second hypothesis expected that increased Internet diffusion predicts increased levels of democracy among developed countries whereas increased Internet diffusion does not predict increased levels of democracy in developing countries. When tested using Model 2, developed countries showed a 0.023 point increase in democracy score for every 1 percent increase in Internet diffusion (p < .001). Placing this finding into relation with observed conditions, developed countries showed an average of 34.68 percent Internet penetration in 2003, which corresponds to an observed increase of 0.798 units on the democracy scale in those countries. A democratic shift of this proportion in relation to Internet diffusion is evidence of a meaningful macro-level relationship and thus supports the first proposition of H2.

Among developed countries, the same general pattern of democratic countries demonstrating greater average changes than non-democratic countries continued, but not to the same degree as reported when all countries were analyzed. For example, developed democratic countries did show a 35.11 percent average level of increased Internet diffusion, which was statistically significant compared to the 23.71 percent average increase in non-democratic developed countries (t(45) = 1.74, p < .10). Also, developed democratic countries showed an average increase of 0.61 units in Polity 2 scores compared to a 0.33 unit increase among developed

TABLE 3

Relationships between Democratic and Non-Democratic Countries and Average Levels of Democracy and Internet Diffusion, Differentiated by National Development Status

	Hypothesis 1: all countries		Hypothesis 2: developed countries		Hypothesis 2: developing countries	
Mean change in:	Polity ≥ 0 (N = 102)	Polity < 0 (N = 50)	Polity ≥ 0 (N = 41)	Polity < 0 (N = 6)	Polity ≥ 0 (N = 61)	Polity < 0 (N = 44)
Democracy level	1.39	–1.14***	0.61	0.33	1.92	–1.34***
Internet diffusion	17.32	5.26***	35.11	23.71#	5.37	2.74*

#p < .10; *p < .05; ***p < .001.

non-democratic countries, but this mean difference was not statistically significant ($t(45) = 0.39$, $p > .10$) as shown in Table 3.

This counterintuitive finding, however, is somewhat misleading because developed democratic countries actually averaged a Polity 2 democracy score of 9.19 and many of these countries maintained the maximum democracy score of 10 for all years under investigation. On the other hand, developed non-democratic countries averaged a democracy score of –7.08, thereby suggesting the observed changes between these two groups of countries was a statistical artifact due at least in part to the bounded nature of the democracy measure used here.

Surprisingly, when the second proposition of H2 was examined, developing countries also showed a statistically significant increase in democracy scores, with a 0.022 unit increase in the Polity 2 score being associated with each 1 percent increase in Internet diffusion ($p < .001$). This coefficient estimate was only slightly less than that of developed countries, which is summarized in Table 4. However, the actual observed average increase in Internet diffusion in these developing countries was only 4.28 percent and associated with an increase of only 0.094 units on the democracy scale. Thus, it can be noted that in conditions actually reported in developing

TABLE 4

Fixed Effects Regression Analyses of Variables Predicting Democracy

Variables	Developed countries		Developing countries	
	B	SE	B	SE
Internet diffusion	2.327***	0.505	2.164***	0.530
Broadcast media diffusion	1.437*	0.380	–0.889**	0.0319
Sociopolitical instability	0.345***	0.078	0.113*	0.056
GNI per capita	–0.742#	0.423	–0.042	0.290
Education enrollment	5.874**	2.047	0.998#	0.546
Urbanism	1.026	1.562	1.593***	0.467
Population	0.107	0.178	0.379**	0.131
North America	–1.96	1.384	Dropped	
Latin America	0.162	0.986	6.885***	0.718
Europe	0.069	0.897	7.223***	1.009
Sub-Saharan Africa	Dropped		2.351***	0.642
Middle East	–11.421***	1.139	–3.262***	0.746
Asia	–3.347**	1.053	2.170**	0.787
Adjusted R^2	0.622		0.308	
N	423		945	

Note: Coefficients reported are unstandardized and were derived using a lagged dependent variable with fixed effects operators for region and time. Continuous independent variables were transformed using a natural logarithm (ln) to model non-linear relationships. Time specific effects are not reported though certain years did show a significant effect.

*$p < .05$; **$p < .01$; ***$p \leq .001$.

countries, the Internet is unlikely to have thus far demonstrated a consistently mean-ingful macro-level effect on democratic structures, which is consistent with the expec-tations of the second proposition of H2.

Though the observed relationship between Internet diffusion and democracy in developing countries is exceptionally weak, it is statistically significant. Further-more, it seems reasonable to expect that as Internet diffusion increases over time in these countries, it will be positively associated with greater levels of democracy, as was demonstrated in tests including all countries and developed countries in this study. In fact, the same pattern was present in developing countries where demo-cratic countries with a Polity 2 democracy score greater than zero were the same countries that showed greater increases in Internet diffusion rates *and* levels of democracy.

As indicated in Table 3, the average increase in Internet diffusion in developing democratic countries was 5.37 percent, which was statistically significant ($t(103) =$ 2.25, $p < .05$) when compared to the average 2.74 percent increase of developing non-democratic countries. Similarly, the average increase in Polity 2 scores among developing democratic countries was a robust 1.92 units, whereas developing non-democratic countries averaged −1.34 units, which was a *decrease* manifest in a statistically significant relationship ($t(103) = 3.97$, $p < .001$). Taken together, these results suggest that a certain level of democratic governance was crucial to increasing the accessibility of the Internet, which in turn was related to increased democratization. Democratic effects of the Internet, however, were limited in non-democratic countries where national policy decisions limited the free flow of infor-mation even when diffusion rates were relatively high.

Conclusion and Discussion

Overall, it seems that the Internet may be a potent democratizing agent. Indeed, increased Internet diffusion demonstrated some of the highest coefficient correlates with democracy in this study, which is particularly interesting in light of media devel-opment, as measured by television and radio diffusion, predicting lower democracy levels in developing countries. However, as history has shown, technological poten-tial should not suggest technological determinism. This is most true of the Internet among all existing information technologies. As Rosenau and Johnson (2002: 75) wrote, existing patterns of governmental conflict and cooperation 'will be both amplified and modified by the information technologies'.

Best and Wade (2005) positioned the Internet as a potential democratic regu-lator that can increase civil rights and political liberties. Much like their study, which used linear OLS regression models and a series of regional dummy variables, the study reported here also found that the Internet has a positive effect on democracy, but that such increases would most likely be achieved in countries where demo-cratic changes are already underway. It would therefore be rather imprudent to suggest a totalizing concept of the Internet as a democratic silver bullet, since positive democratic effects of the Internet were primarily observed in countries that were already developed and at least partially democratic. Internet diffusion in this

study did not conclusively show an appreciable democratic effect in developing and non-democratic countries – but results of hypothesis testing indicate it may have the potential to do so.

Moreover, in many developing and non-democratic countries access to the Internet is limited by filtration software, state laws, self-censorship, cost, speed and other factors (Best and Wade, 2005). Until many of these obstacles are minimized, the full potential of the Internet as a democratic tool cannot expect to be realized, as was consistently shown in this study. Currently, many non-democratic regimes have attempted to expand their economic base through increased ICT development and Internet access while simultaneously trying to control access.

As this trend progresses, one latent result of national-level Internet diffusion – even under strict governmental controls – may therefore be a gradual liberalization of the public sphere precisely due to an increased influx of information flows that are enhanced by the Internet (Sunstein, 2007). Evidence of this phenomenon already exists, where technological advances that circumvent autocratic controls, if only briefly, such as those demonstrated by Internet radio broadcasts in the Balkans in the mid-1990s (Bieber, 2000), can have dramatic national and international effects.

However, increased Internet diffusion cannot be considered a democratic panacea since the results of this study suggest democratic effects of the Internet are unlikely to be achieved in an environment that has not already reached a certain level of democratic processes and policies. Thus, with regard to the still prevalent Lerner-type dominant paradigm prognostication, it is quite clear that Internet diffusion is *not* a modern mobility multiplier. The Internet does demonstrate significant, albeit modest effects, even when incorporating time and regional specific variables, but it by no means circumvents or overrides more traditional correlates of democratization processes. Thus, both policy and academic forecasting of Internet effects ought to proceed with more cautious and reasonable expectations, or consider more viable alternatives such as blending new communication technologies like the Internet with existing media such as radio and television to reach wider audiences (Sood et al., 2004; Wilson, 2004).

The results of this study generally reinforce the relationships outlined by media system dependency theory, specifically concerning the level of social stability engendering conditions under which mass media, in this case the Internet, may show an effect. Considering the relatively low, almost negligible average amount of Internet diffusion in developing countries, a remarkable positive coefficient was shown in terms of democratic growth even though the observed association size was marginal. Thus, it seems that the higher levels of sociopolitical instability often present in developing democratic countries proved to be just as important in cultivating a democratic effect as the increased diffusion of Internet. Even though Internet diffusion in developing countries was invariably limited over the course of this study, its presence constituted a statistically significant effect. This suggests that developing countries, which in this study were shown to be far less politically stable than developed countries ($t(1518) = -6.91$, $p < .001$), are also quite responsive to the introduction of the Internet though the actual observed associations have yet to demonstrate noticeable and meaningful democratic changes at the national level.

Importantly, however, the effect of the Internet increasing in number of users (and presumably the centrality of information functions) that this access provides to an increasingly dependent audience should also not be overlooked. Many developed countries in this study already have healthy and sustained democracies, and these countries seemed to drive the meaningful and statistically significant associations with increased Internet diffusion. The confounding nature of Internet diffusion and Internet growth was thereby mitigated by the fact that as the Internet became increasingly accessible, nationally central information available online also became increasingly vast, more so in and from developed democratic countries where user penetration rates were higher.

Thus, the results of this study operationally demonstrate support for both of the major propositions of media system dependency theory: an increase in Internet diffusion was associated with and likely contributed to democratic growth in more stable developed democratic countries, and sociopolitical instability contributed to conditions whereby the increased Internet diffusion showed a significant effect in developing democratic countries. It is therefore important to note that when considering macro-level relations in media system dependency theory, both conditions need not be met. That is, though no specific critical level of diffusion was identified in this study, democratic effects of the Internet are more likely to be demonstrated in sociopolitically stable societies when the Internet reaches an increasingly wider percentage of the population. Alternatively, sociopolitical instability may contribute to more apparent levels of Internet effects, even when presented with seemingly inconsequential levels of diffusion, as shown by developing countries in this study.

Despite the best efforts of researchers, the extent of the personal, social and, indeed, global impact of the Internet remains to be determined. Using a series of sophisticated multiple regression models, this study found significant macro-level relationships related to Internet diffusion that were manifest in the developed and developing world, with both being tempered by the prevailing national democracy level and the degree of sociopolitical instability.

These findings suggest that the democratic potential of the Internet is great, but that actual effects might be limited because Internet diffusion appears conditional upon national-level democracy itself. This potential coincides with many studies that have shown localized benefits of increased Internet access (Fillip, 2005; Haseloff, 2005) and several other multinational studies that have reported similar, positive results of Internet diffusion on democratic growth using different model specifications (Best and Wade, 2005; Kedzie, 2002; Pilat and Wyckoff, 2005). With this growing body of evidence, it is thus rational to expect that efforts to bridge the digital and democratic divide will not only continue, but will also bear further democratic fruit on the national, and perhaps, global scale in the foreseeable future.

References

Althaus, S.L. and D. Tewksbury (2000) 'Patterns of Internet and Traditional News Media Use in a Networked Community', *Political Communication* 17: 21–45.

Annual Report on American Journalism (2005) 'The State of the News Media 2005'; at: www.stateofthemedia.org (accessed 10 October 2005).

Arun, S., R. Heeks and S. Morgan (2004) 'ICT Initiatives, Women, and Work in Developing Countries: Reinforcing or Changing Gender Inequalities in South India?', Development Informatics Working Paper 20; at: www.sed.manchester.ac.uk/idpm/publications/wp/di/di_wp20.pdf (accessed 8 November 2005).

Ball-Rokeach, S.J. (1998) 'A Theory of Media Power and a Theory of Media Use: Different Stories, Questions, and Ways of Thinking', *Mass Communication and Society* 1(1/2): 5–40.

Ball-Rokeach, S.J. and M.L. DeFleur (1976) 'A Dependency Model of Mass-Media Effects', *Communication Research* 3(1): 3–21.

Beck, N. and J.N. Katz (1995) 'What to Do (and Not to Do) with Time-Series Cross-Section Data', *The American Political Science Review* 89(3): 634–47.

Best, M.L. and K.W. Wade (2005) 'The Internet and Democracy: Global Catalyst or Democratic Dud?', The Berkman Center for Internet and Society Research; at: cyber.law.harvard.edu/publications (accessed 15 March 2006).

Bieber, F. (2000) 'Cyberwar or Sideshow? The Internet and the Balkan Wars', *Current History* 99(635): 124–8.

Bucy, E.P. and K.S. Gregson (2001) 'Media Participation: A Legitimizing Mechanism of Mass Democracy', *New Media and Society* 3(3): 357–80.

Chan, F., T. Mancini-Griffoli and L.L. Pauwels (2006) 'Stability Tests for Heterogeneous Panel Data', Graduate Institute of International Studies Geneva: Economics HEI Working Paper No: 24/2006.

DeFleur, M.L. and S.J. Ball-Rokeach (1989) *Theories of Mass Communication*, 5th edn. White Plains, NY: Longman.

Dimitrova, D.V. (2002) 'Internet Diffusion in the Post-Communist Countries', *Medienjournal: Innovative Approaches to ICT Research* (Vienna) 64–71.

Drew, D. and D.H. Weaver (2006) 'Voter Learning and Interest in the 2004 Presidential Election: Did the Media Matter?', *Journalism and Mass Communication Quarterly* 83(1): 25–53.

Fillip, B. (2005) 'Local Entrepreneurial Skills and Sustainability in Rwanda's Community Internet Centers', *Dot-Comments E Newsletter* 12 July; at: www.dotcomalliance.org/newsletter/article.php?article_id=107 (accessed 22 October 2005).

Freedom House (2005) 'Freedom of the Press 2005'; at: www.freedomhouse.org/research/pressurvey.htm (accessed 10 November 2005).

Gaynor, D. (1996) 'Democracy in the Age of Information: A Reconception of the Public Sphere'; at: www.georgetown.edu/faculty/bassr/gaynor/intro.htm (accessed 24 November 2005).

Gore, A. (1995) 'Forging a New Athenian Age of Democracy', *Intermedia* 22(2): 4–6.

Haseloff, A. (2005) 'Cybercafes and Their Potential as Community Development Tools in India', *The Journal of Community Informatics* 1(3): 1–22.

Hornik, R.C. (1988) *Development Communication: Information, Agriculture, and Nutrition in the Third World*. New York: Longman.

International Telecommunications Union (2005) 'United Nations Common Database'; at: unstats.un.org/unsd/cdb/cdb_help/cdb_quick_start.asp (accessed 30 October 2005).

Kedzie, C. (1997) 'Communication and Democracy: Coincident Revolutions and the Emergent Dictator's Dilemma', unpublished doctoral dissertation, RAND Graduate School, Santa Monica, CA.

Kedzie, C. (2002) 'Coincident Revolutions and the Dictator's Dilemma', pp 105–30 in J.E. Allison (ed.) *Technology, Development, and Democracy*. Albany, NY: State University of New York Press.

Lee, S. (1999) 'Private Uses in Public Space: A Study of an Internet Café', *New Media and Society* 1(3): 331–50.

Lerner, D. (1958) *The Passing of Traditional Society*. New York: The Free Press.

Lipset, S.M. (1959) 'Some Social Requisites of Democracy: Economic Development and Political Legitimacy', *American Political Science Review* 53: 69–105.

Lipset, S.M. (1994) 'The Social Requisites of Democracy Revisited', *American Sociological Review* 59: 1–22.

Milner, H.V. (2006) 'The Digital Divide: The Role of Political Institutions in Technology Diffusion', *Comparative Political Studies* 39(2): 176–99.

Muturi, N. (2005) 'Communication for HIV/AIDS Prevention in Kenya: Social-Cultural Considerations', *Journal of Health Communication* 10: 77–98.

Mwesige, P.G. (2004) 'Cyber Elites: A Survey of Internet Café Users in Uganda', *Telematics and Informatics* 21(1): 83–101.

Nie, N.H. and D.S. Hillygus (2002) 'The Impact of Internet Use on Sociability: Time-Diary Findings', *IT and Society* 1(1): 1–20.

O'Loughlin, J., M.D. Ward, C.L. Lofdahl, J.S. Cohen, D.S. Brown, D. Reilly, K.S. Gleditsch and M. Shin (1998) 'The Diffusion of Democracy', *Annals of the Association of American Geographers* 88(4): 545–74.

Oyelaran-Oyeyinka, B. and K. Lal (2005) 'Internet Diffusion in Sub-Sahara Africa: A Cross Country Analysis', *Telecommunications Policy* 29: 507–27.

Persson, T. and G. Tabellini (2006) 'Democracy and Development: The Devil in the Details', National Bureau of Economic Research Working Paper 11993; at: www.iies.su.se/~perssont/papers/aea_06_jan10_final.pdf (accessed 30 March 2006).

Pilat, D. and A.W. Wyckoff (2005) 'The Impacts of ICT on Economic Performance: An International Comparison at Three Levels of Analysis', pp. 77–110 in W.H. Dutton, B. Kahin, R. O'Callaghan and A.W. Wyckoff (eds) *Transforming Enterprise: The Economic and Social Implications of Information Technology*. Cambridge, MA: The MIT Press.

Polity IV (2002) 'Polity IV Annual Time-Series Users' Manual'; at: www.cidcm.umd.edu/inscr/polity/index.htm#data (accessed 25 October 2005).

Polity IV (2003) 'Polity IV Annual Time-Series Database'; at: www.cidcm.umd.edu/inscr/polity/index.htm#data (accessed 25 October 2005); currently at: www.systemicpeace.org/polity/polity4.htm

Robbins, M.B. (2002) 'Are African Women Online Just ICT Customers?', *The International Communication Gazette* 64(3): 235–49.

Rogers, E. (2003) *Diffusion of Innovations*, 5th edn. New York: The Free Press.

Rosenau, J.N. and D. Johnson (2002) 'Information Technologies and Turbulence in World Politics', pp. 55–78 in J.E. Allison (ed.) *Technology, Development, and Democracy*. Albany, NY: State University of New York Press.

Roy, S. (2005) *Globalisation, ICT, and Developing Nations*. Thousand Oaks, CA: Sage.

Rubin, A.M. and S. Windahl (1986) 'The Uses and Dependency Model of MassCommunication', *Critical Studies in Mass Communication* 3(2): 184–99.

Schwab, K. (2003) 'Preface', pp. iii–iv in S. Dutta, B. Lanvin, and F. Paua (eds) *The Global Information Technology Report 2002–2003*. New York, NY: Oxford University Press.

Sonaike, S.A. (2004) 'The Internet and the Dilemma of Africa's Development', *The International Communication Gazette* 66(1): 41–61.

Sood, S., M. Sengupta, P.R. Mishra and C. Jacoby (2004) 'Come Gather Around Together: An Examination of Radio Listening Groups in Fulbari, Nepal', *The International Communication Gazette* 66(1): 63–86.

Stock, J.H. and M.W. Watson (2003) *Introduction to Econometrics*. Boston, MA: Addison Wesley.

Sunstein, C.R. (2007) *Republic.com 2.0*. Princeton, NJ: Princeton University Press.

Thornton, A. (2002) 'Does Internet Create Democracy?', unpublished master's thesis, University of Technology, Sydney; at: www.zip.com.au/~athornto (accessed 23 October 2005).

Tolbert, C.J. and R.S. McNeal (2003) 'Unraveling the Effects of the Internet on Political Participation?', *Political Research Quarterly* 56(2): 175–85.

United Nations (2003) *Human Development Report*. New York: United Nations.

United Nations (2005) 'United Nations Common Database'; at: unstats.un.org/unsd/cdb/cdb_help/cdb_quick_start.asp (accessed 30 October 2005).

Weare, C. (2002) 'The Internet and Democracy: The Causal Links between Technology and Policy', *International Journal of Public Administration* 25(5): 659–91.

Weaver, D.H. (1977) 'The Press and Government Restriction: A Cross-National Study over Time', *Gazette* 24(3): 152–70.

Weaver, D.H., J.M. Buddenbaum and J.E. Fair (1985) 'Press Freedom, Media, and Development, 1950–1979: A Study of 134 Nations', *Journal of Communication* 35(2): 104–17.

Wilson, E. (2004) *The Information Revolution and Developing Countries*. Cambridge, MA: The MIT Press.

World Bank (2005) 'World Development Indicators Database'; at: econ.worldbank.org (accessed 12 November 2005).

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