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THE IMPACT OF IT DEVELOPMENT ON INTERNATIONAL RELATIONS: AN EMPIRICAL EXAMINATION FOR POLICY CHOICE*

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This research explores the impact of IT development, as measured by the Information Society Index (ISI), on the competitiveness of nations in international relations. It is hypothesized that variation in the power of the major sectors such as IT and economic development, inequality, and social status affects variation in nation's competitiveness. Multivariate analysis confirms this hypothesis. The result shows that IT development as a weight of the ISI index and economic development interact to produce a positive impact on the changes in international relations when the effects of other conditions are held constant. This finding, moreover, holds up after additional investigation for possible OLS assumption violations, sample dependence of results, and model misspecification. The implication is that IT development suggests a complex dynamic of international relations between convergence and diversity via future track of cyber democracy with the norm that authority for operation be decentralized.

Key Words: *IT Development, International Relations, Cyber Democracy*

STATEMENT OF THE PROBLEM

As increasing attention is focused on IT development, the issue of whether the internet revolution is desirable for the change in international relations becomes controversial. The present research explores the debates concerning the role of IT development on international relations by challenging the traditional assumptions and ad hoc concepts. The baseline of this work is that the internet has been received rather differently and has had differing impacts in the various regions around the world. Therefore, an understanding of the relationship between the internet and international relations needs to consider these differences. In addressing this issue, conservatives maintain that IT development has a significant impact on a nation's competitiveness but the mechanism of new technology has been conjugated with the existing framework such as national laws and norms.

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Conversely, liberals argue that informatization with globalization makes a great contribution to the change in international relations.

Despite their contrasting views, both conservative and liberal approaches hold that IT development may influence a nation's competitiveness in international relations. In this vein, this paper attempts to gain some clear picture of the impact of IT development on the changing nature of international relations among the conventional wisdom. An empirical examination of the internet, based on this framework, will not only enable us to eventually offer more reliable prediction about the future of IT development but also shed light on some of more important aspects of the discipline of international relations where the impact of the new information technology has been significant.

Significant internationalization of the information revolution has given rise to a great deal of literature on globalization that has become resilient. The major impact the internet and networks have brought to the globe is a dramatic new wave of challenges for government and society both nationally and internationally. Although many aspects of IT development have been responsible for lowering the cost of information process, the invention of the internet seems destined to spread the information revolution throughout the world. Whereas all forms of interactive transnational communication prior to the internet were too expensive to be used except by the wealthy, the purchase of a computer and access to the internet make frequent global communication affordable to more people than would previously have thought of using an international code. This reduction in the cost of international communications has amounted to a paradigm shift.

It is often suggested that IT development will eventually bring the internet to almost everywhere, but there is no guarantee that this will happen automatically. The costs involved in building infrastructures to spread the new technologies are often more than those of installing older communications facilities. Furthermore, getting a country into the position to be able to build new infrastructures involves much more than money (Bell, 1973). It requires not only economic resources but also social and security matters conducive the spread of modern technology and communications, a willingness and ability to tap into the resources of global power bloc, and much more. Since internet diffusion has been highly variable in different countries and regions of the globe, it has had dissimilar impacts on international relations in diverse economic, social, and security settings.

For short periods of time in specific areas, individuals may experience a sense of enthusiasm about the unprecedented freedom that accompanied the global spread of the internet, particularly in its early stages. A number

of NGOs and NPOs have adopted internet freedom as a human rights norm and use international networks in a variety of ways to express that position. The previous mechanism has at least been counterbalanced by a vast array of judicial and intellectual challenges that have provided considerable evidence that the internet may promote the values of open societies with cyber democracy. However, almost all governments have stepped in to regulate and develop laws and rules for governing the internet system, both within and between nations. In doing so, government leaders have often tried to control the growing power of the internet in the Third sector. Accordingly, it requires a comprehensive framework for the role of the internet in international relations which lead to consensus building toward a new international architecture.

INFORMATION AND GLOBALIZATION

Social scientists have had a long-standing concern with the forces underlying national competitiveness in international relations, and their studies have been guided by theories of economic development (Burchill and Linklater, 1996; Harris, 1995; Held, 2005; Huntington, 1996). Sociologists and political scientists, on the other hand, typically stress the importance of power equations among social actors (Castells, 1996; Evans et al., 1993; Krasner, 1983). A literature review indicates that the previous studies on international relations have not paid serious attention to the role of the internet in the process of globalization. Documentation of this area, however, suggests that IT development has been closely related with the state's economic capacity, and developmental strategy (Skolnikoff, 1993; Ward, 1996). Currently, the internet use in the world has been the way the new technology helped accelerate the strengthening of civil society. This is a worldwide phenomenon that can be described as the central factor in an unprecedented redistribution of resources among social actors.

When it comes to information revolution and globalization, two extreme positions stand as outposts that circumscribe the literature.[1] One argues that it was created by the sector acting outside the realm of governments and international order (Goldsmith and Eggers, 2004). This perspective reflects a position that a lack of enforcement of law internationally will so weaken the control of governments and global hegemony (Brownlie, 2002). In this view, it would not be subject to the old laws of nation-states and previous rules of

[1] Globalization can be taken to denote the stretching and deepening of interaction across space and time, and spurts of military, economic, technological, and cultural dimensions produced increasing global reverberations that are intensive as well as extensive (Held, 1995).

trade and development. The main attention comes from technology, business, and NGO leaders at the intersection of activities where the internet becomes enmeshed with international affairs. The opposite position holds that the revolutionary potential of the internet for liberating people from previous forms of government control may result in its architecture enabling sovereigns to reclaim some of their authority (Wu, 1997). In this view, internet use is under the authority of large companies and governments, and influence over the lives of individuals. But the relationship between IT development and international relations has not fully developed in either of the above perspectives (Drezner, 2004; Lessign, 1999).

If technology determinism that defines the relationship between IT and society, in general, is extended to the field of international relations, there should be a causal relationship between the development and diffusion of new technology and changes in international relations (Davis, 2003; Matthews, 1997). By drastically reducing the importance of proximity, the new technologies change people's perceptions of community. The internet connects people across borders with exponentially growing ease while separating them from natural and historical associations within nations. The main thesis that IT revolution will bring dramatic changes to global society has been contended by the previous studies on information society (Castells, 1996; McGowan, 1995).

Amid shifting alliances and joint ventures, made possible by computers and communications, nationalities blur (Rodrik, 2000). Whereas multinational corporations (MNCs) become an arm of government, the concern in the internet age is that they are disconnecting thenselves from their home countries' national interests and regulations, moving jobs and factories, and evading taxes (Schiller, 1998). In short, internet technology has been a driving force, shifting financial clout from states to the market with its offer of unprecedented speed in business transactions. This argument rests on assertions that the world is becoming increasingly economically integrated and that this process is likely to continue in a linear fashion in the future (Jacobson, 2000).

Their argument, nevertheless, simplifies the process of IT revolution and does not offer enough explanations for any specific mechanism that leads to such changes. For example, the internet sector has always a variety of interest groups who have clashed over its rules. There are heated debates as to how to address numerous policy and regulatory issues that emerge with new communications technologies. Also, whether the proliferation and influence of NGOs and other non-state international organizations have substantially diminished the power of the state is open to question. There

are two central points: 1) that private power is still no substitute for state power and 2) that a gain in power by non-state actors does not necessarily translate into a loss of power for the state.

Although the internet and other aspects of IT have enabled a small elite class to organize more effectively ever before, they have not been able to overwhelm or supplant state power, and their ability to pressure governments and international organizations on specific issues has been dependent on considerable support from organizations in international relations (Shapiro, 2000). The usual assumption of these joint activities is that NGOs are not competitors to the state power but instead are working cooperatively with national governments and international organizations to implement common programs. In this context, the argument that NGOs are able to push around even the largest governments is somewhat misleading (Rittberger, 1993). By contrast, they can also have the opposite effect, increasing political and social fragmentation by enabling more identities and interests scattered around the globe to coalesce.

THE ROLE OF THE INTERNET IN INTERNATIONAL RELATIONS

The present research builds on the foregoing theoretical framework, placing special emphasis on testing an empirical specification of IT development in international relations. Although the internet has played a key role in bringing changes to international relations, it is not simple to theoretically approach to the relationship between the internet and international relations (Gibson, 1997). Nevertheless, this study analyzes, as a dependent variable, the most widely used measure of competitiveness of nations for international relations (CS). This complex measure is used to take into account government and business efficiency as well as capacity in a given society, which constitutes the matrix of international relations.

One of the major hypotheses of the present study is that variation in the power of the major sectors affects variation in national competitiveness, which leads to international relations in the international society. Information Society Index (ISI) is used as a measure of IT development, meaning partially the strength of the internet. While ISI is employed for the overall effect of IT in international relations, the number of uses for the internet is used for the interaction effect of IT with economic growth.

Following the conventional wisdom, economic growth, income inequality, and social development are included in the analysis of international relations (Harris, 2005; Midgley, 1995; Nachum, 2005). Economic growth, one of the most important aspects of international relations, is measured in terms

of GDP per capita. A logarithmic transformation of this variable is used to correct problems with skewness in the relationship. The GINI Index, which is a popular measure of income inequality laying the foundation for current forms of class struggle in the transnational system, is also included in the analysis. To capture the effect of social development on international relations, the literacy rate by UNDP is used.

The recurrent issue is over the changes brought on by the internet in the security sector. In the information age, military power is not simply the strength of the physical force but the length of information flow which leads to an invisible warfare (Keohane and Nye, 2000). The internet itself has been emerging as a strategic resource in the IT warfare, as seen in the case of hacking. This type of warfare is an example that internet has enabled many countries, groups, and individuals to easily attack or counterattack each other. Even global hegemony of the United States is left vulnerable to such attacks. The percentage of military expenditure out of total budget in a country is utilized as a measure of the security sector.

Finally, theoretical considerations call for inclusion of an interaction variable of IT development and economic growth to capture the possible joint or non-additive effect of IT and economic growth. Nations at very high levels of economic development are able to take advantage of developing IT, and they are likely to move toward utilizing IT power in strengthening their global status, while nations with lower level of economic development do not have much room for introducing IT programs. Therefore, there is a reason to suspect that the impact of IT on national competitiveness may vary according to the level of economic development. Specifically, the hypothesized assertion that `the greater the level of IT development, the higher national competitiveness' holds valid only at high levels of economic development. In a given condition, this study employs the number of broadband internet subscribers per 100 inhabitants to explore an interaction effect of the internet variable, avoiding multicollinearity.[2]

The suggested model can be expressed in the following equation:

$$\begin{aligned}\text{Competitiveness of Nations} = {} & b0 + b1\,(\text{Informatization}) \\ & + b2\,\ln(\text{Economic Growth}) \\ & + b3\,(\text{Income Inequality}) \\ & + b4\,(\text{Literacy}) \\ & + b5\,(\text{Security})\end{aligned}$$

[2] For the detection and treatment of possible multicollinearity, this study uses the method of the variance inflation factor (VIF). The VIF values for independent variables identified in each model are quite small (e.g., less than 2.0), indicating little multicollinearity.

+ b6 (Internet Use) *(Economic Growth) + e

Data for the analysis were taken from highly reliable international publications such as *World Competitiveness Yearbook, World Development Report, Human Development Report*, and *ITU Internet Report*, which provide varrous information on all the nations. The basic analytical strategy is to utilize multivariate regression techniques for estimating the model of international relations. The study employs a sample of 28 countries, selected by stratified random sampling of the 177 population across each sector. A different sample drawn from the same population might have yielded a different set of findings. The systematic clustering analysis, however, of 132 countries, after excluding 45 African countries where the internet has not been widlely adopted, divides the country population into 6 regions from the West to Asia, bused on social sustainability such as economic growth, inequality, and social development. And then the procedure proceeds to systematically select independent samples, with the sampling interval, from each cluster in proportion to the size of the stratum in the population. If the original population list is in random order, systematic sampling would yield a sample that could be statistically considered a reasonable substitute for a random sample. This sampling procedure suggests that 28 countries across each region are meaningful in the developmental process. Rather than including

TABLE 1. OLS ESTIMATES FOR INTERNATIONAL RELATIONS MODEL

	Dependent Variable = CS[1]		
Variable	Regression Coefficient	Standard Error	t-value
Intercept	16.101	14.765	1.091
Informatization	0.929	0.564	1.647*
ln(Economic Growth)	3.961	1.562	2.535***
Income Inequality	-0.896	0.628	-1.426*
Literacy	1.015	0.737	1.377*
Security	0.023	0.039	0.589
Internet Use * Economic Growth	0.068	0.037	1.837**
R^2_{adj}	.732		
F	3.294		
P	.001		
N	28		

Notes: * P < .10; ** P < .05; *** P < .01 (one-tailed test)

(1) CS: competitiveness score of nations (dependent variable)

an entire population, it is based on the laws of probability drawing findings about attributes of a population from evidence contained in a significant sample. Ordinary least squares estimate (OLS) is the method of quantitative analysis.

Unstandardized regression coefficients for the equations described above are shown in Table 1. The findings are, by and large, consistent across the model. Overall, a statistically significant amount (73%) of the variance in the dependent variable, the score of national competitiveness, can be explained by the model. IT development was found to be significanty and positivery velated to international velations. Specifically, the coefficient effect of Information Society Index has a strong positive sign, and is statistically significant at the .10 level in a one-tailed test, when the effects of other variables are held constant. A one-tailed test is employed in the present research since the conventional wisdom suggests a clearly stated hypothesis of the issues.

The coefficient for economic growth is statistically significant at the $p<.01$ level in a one-tailed test and its sign is in the direction of positive, net of the effects of other variables. The coefficient for income inequality is negative and statistically significant at the 0.10 in a one-tailed test. The result for social development, measured by the literacy rate, shows a positive sign and is statistically significant when the effects of other variables are controlled. The coefficient for the security sector is not statistically significant, and its sign is in agreement with the hypothesized positive one that the strong security sector will have greater international relations than will weak military power. Controlling for other variables, the interaction term of internet use and economic growth is statistically significant at the .05 level in a one-tailed test, and its sign is in the expected direction. This result is in line with the hypothesis of a positive interaction effect of the number of uses for internet and economic development on the score of national competitiveness.

To ascertain whether these results are robust with respect to sample compositions, an outlier influential case analysis was conducted and the result showed the same patterns, except the inequality variable, which is statistically not significant in the outlier test.[3] Based on the $DFBETAS_{ij}$ statistics, there are major differences between the countries identified as outliers

[3] The diagnostic procedure is considered the systematic and informative measure of the potential influence of a particular observation on the robustness of regression estimates (Bollen and Jackman, 1985). The suggested cutoff criterion for identifying unusual cases in this analysis is .3779, based on the DFBETASij statistics. However, the omission of outlier cases makes the model censored or truncated.

which have greater variation in income inequality. The results of the post hocanalysis with all outliers omitted indicate that while the removal of 3 influential cases changes the inequality variable, overall results are strongly consistent with the original results. Thus, the findings for these variables appear to be robust with respect to the composition of the sample.

INTERNET REGIME

Although IT and economic development, by themselves, are sufficient for increasing national capacity for international relations, it is necessary to qualify that the internet has a significant effect on the dynamic international relations. It can be argued, from the present research, that there is causality between the advent and diffusion of new technology, the internet revolution, and changes in the international political economy. However, more explanation is needed to see how and why the new technology brings the changes in international relations.

As the internet contributes to promotion of globalization, many countries attempt to link internet-related development to the evolution of an international regime for the internet, which has begun to take in a more than embryonic form in the advanced region. The concept of international regimes can be used as principles, norms, rules, and decision-making procedures around which actor expectations converge in a given area (Drezner, 2004). One could define the international regime for the internet so broadly as to consist of any and all interactions that involve the internet at the international level (Rittberger, 1993). At the other extreme, regimes are sometimes identified with international institution or organizations, such as the International Telecommunication Union or the World Trade Organization. If one conceives of regime theory in this way, the study of regimes becomes indistinguishable from traditional studies of international organizations, none of which alone circumscribes or defines patterns of international behavior to the extent that takes place within international regimes. Since most of the initial inventions that made international networking possible were products of developed countries, it is not surprising that these parts of the world have been in the forefront of the international regime's formation.

On the other hand, the rest of the globe has been catching up at various speeds, and some have started to play key roles in challenging the development of regime rules. Aspirations by developing countries to be relatively independent of the global internet regime are not very different from their aspirations in support of sovereignty and autonomy in other issue areas.

But their aspirations seem especially significant in internet-related areas for two reasons: 1) because of the nature of internet technology, which poses special challenges to the independence of communications across national borders; and 2) because IT is such a crucial factor in world economic development and global power equations. With regard to the internet regime, the points that have been stressed are 1) that authority for operation of the internet be decentralized internationally, and 2) that the process for developing international technical standards be inclusive rather than government directed. Identification of emergent international regime principles or norms for operation of the internet does not mean a robust regime. In a number of areas, it has been difficult to develop an agenda for negotiating internet regime principle and norms among nation states due to international law and security matters (Brownlie, 2002).

In origin, the internet regime can be viewed as a spontaneous order due largely to the nature of the technology. The international regime around the internet, however, is being established to deal with dilemmas resulting from attempts to maximize common interests, based on this new technology among nation-states that guard their national sovereignty in an international order. Because of its rapid worldwide diffusion and potential for creating dramatic changes in global communication networks, the internet has caught the attention of states and other organizations interested in transforming it into a negotiated order (Krasner, 1983: 93-113). International regime norms negotiated for governance of the internet is the principle of openness that major international stakeholders and users are rebuilt into the structure of the internet mechanisms, designed to promote global cooperation and cyber activities. One indication that the international regime for the internet is moving from a spontaneous order to a negotiated order is, among many others, the inclusion of internet-related issues in the negotiations of major international actors, particularly in the economic sphere. Although it is not easy to develop an agenda for rudimentary internet-related norms among sovereign states and international organizations, the existence of internet regime norms can serve as the basis for negotiations between nations and other actors involved with the internet and will be essential in the future.

CONCLUSION AND POLICY IMPLICATIONS

The major hypothesis of this study was that the impact of IT development as measured by ISI Index on national competitiveness in international relations would vary according to the level of economic development.

Specifically, it was hypothesized that the positive effect of IT development would occur mainly at higher levels of development. This prediction was confirmed by the positive sign and statistical significance of the coefficient of the interaction term. Controlling for the other variables in the model, it was observed that IT and economic development interacted in their effect on national competitiveness. This finding is in line with the perspective that IT is, by and large, applicable to mainly industrialized, market economies. Evidence from the present study indicates that the possibility of using the internet to promote international relations is great as much as the gravity of other significant factors such as developmental sustainability, including economic growth, income inequality, and social development.

Economic development has been, and will continue to be, a major factor for the vast majority of international states when considering programs to provide the telecommunications infrastructures that would make internet access possible for larger portions of the national population. In short, as liberals claim, it seems that IT development is needed to support the strong national power while the conservative argument that economic growth, by itself, is sufficient for increasing national competitiveness also appears to be correct. Furthermore, it is worth noting that IT development and economic development are not mutually exclusive but two variables go hand-in-hand in promoting a more strong national capacity in international relations.

The internet has offered major challenges to existing laws at the international level, and is creating new dilemmas for governance, particularly in relationships between nations. In theory, one can imagine the internet eventually bringing together like-minded people from many countries to help build more open communications networks, thicker patterns of globalization, and eventually more open civil societies or even democracy. Similar ideas have been proposed in other contexts, with the hope that such efforts might be led by international organizations or intergovernmental organizations. Potential resources could be either developed domestically or imported from abroad to facilitate more rapid internet-related activities.

But the real world in most countries is rather different than an idealized information commons or a global cyber democracy (Leydesdorff, 2003). The leaders convinced of the value of IT and the internet have been hampered in their ability to exploit such resources in the face of what they see as more pressing and immediate needs that are closer to their perceived national interests. Furthermore, there is often a deep-seated reluctance to allow unrestricted dissemination of information over the internet which can be served as an engine of social movements. This refers to the political nature of the internet regime. In some cases internet security concerns have resulted in

polices directly counter to what might be best for the growth of e-business transactions. What is viewed as excessive concern with security precautions by the governments has often led to charges from international human rights organizations that such precautions constitute invasions of privacy and other violations of human rights (Lessign, 1999).

The rapid spread of internet and the growth of cyberspace have provided a public arena of global scope. The notion of a publicum as a communication channel can be applied to the internet, which reflects a power shift from the previous mechanism. This conception is similar to that of the leadership of the internet society and various internet-based organizations that are trying to develop various forms of online democracy, with decisions being made on the basis of input or even votes from internet users around the globe. Many countries, nonetheless, are experiencing the use of the internet by elite minorities representing a fairly narrow spectrum of political discourse relative to local contest, rather than witnessing the emergence of cyberspace democracy or the incipient triumph of the internet in promoting civil society and democracy. In this vein, the idea that the internet could somehow be the venue for a democratic town meeting in cyberspace seems still in the realm of fiction.

In addition to the impact the internet has had on the nature of economic development and political dialogue in international relations, social sustainability is perhaps another major factor in the development of internet-related activity. This, in turn, reflects the middle point for internet use of the concerned population, thereby increasing the possibility of cyber democracy. In point of fact, attracting the new network citizens within the internet regime requires a stable political situation, legal and administrative frameworks conducive to the functioning of a healthy cyber sector. The policy for internet regime is directly aimed at the mechanism that provides for the publicum of cyber democracy against the domination of government and business by extending the space for free communications among social actors. Although the internet allows diversity of perspectives and does not require conformity by all nations, it is necessary for the regime to build on norms of interoperability and flexibility by finding ways to attract to more promising positions in developmental sustainability.

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