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Internet Adoption among the Former Socialist Countries

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Abstract / The goal of this study was to explore inter-country differences in Internet connectivity among the formerly socialist countries of Eastern Europe, the former Soviet Union and Mongolia. Of particular interest was investigating if, in a region where per capita income and infrastructure differences are not extreme, other factors would become the dominant determinants. The results of the multivariate analysis show that the openness of society and cultural factors, using religion as a proxy, play critical roles. Countries with higher levels of civil liberties and those with Christian majority populations tend to have higher Internet connectivity.

Keywords / digital divide / former socialist countries / global Internet diffusion / inter-country / Internet connectivity / Internet use

Introduction

It is a well-worn truism – a truism nevertheless – that the degree to which a population embraces the Internet has profound effects on that nation's society and economy (see, for example, NTIA, 1999; USIC, 2000; World Bank, 2001). As such, it is not surprising that there is a growing number of studies about the determinants of Internet adoption (e.g. Beilock and Dimitrova, 2003; Corrocher and Ordanini, 2002; Dasgupta et al., 2001; Hargittai, 1999; Hawkins and Hawkins, 2003; ITU, 1999; Norris, 2001; Rodriguez and Wilson, 2000). In the majority of studies the dominant determinants are per capita income and infrastructure measures, with the latter usually gauging the efficiency of the telephone system.

In a global study of country-level Internet adoption, for example, per capita income alone accounted for 85 percent of the variation (Beilock and Dimitrova, 2003). Such results should not be surprising, particularly when the sample encompasses areas with very wide variations in per capita income and infrastructure. For example, per capita income in Germany is 250 times (i.e. 25,000 percent) higher than Ethiopia's. Differences in Internet usage rates between Germany and Ethiopia may be, in part, explained by cultural factors, educational levels, government policies, etc. However, these very real effects are likely to be masked by those related to the vast differences in income and infrastructure. But within regions where income and infrastructure are not as

pronounced, the impacts of these other factors may be more evident, particularly if there is variation within these factors.

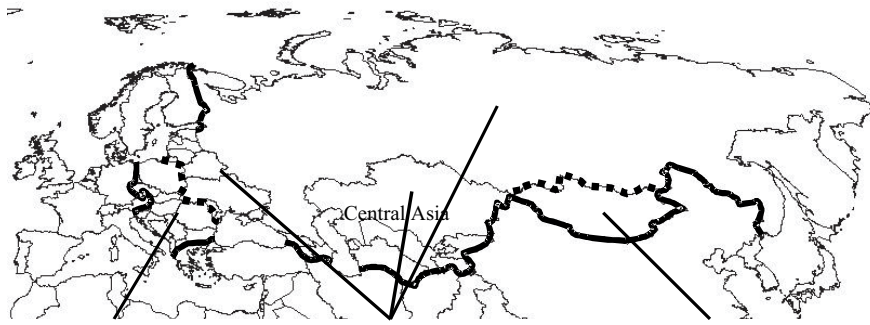
The Internet has moved humankind a giant step toward instantaneous access to information and communications with all individuals and organizations. Clearly, its most natural environment is in free societies. Recognizing this, measures of the openness of societies have been employed in several studies as determinants of Internet adoption (e.g. Dimitrova, 2002; Norris, 2001; Rodriguez and Wilson, 2000). While such measures are sometimes significant, rarely, if ever, have they been found to be the dominant ones. In this article, a study is presented of inter-country differences in Internet adoption rates in Eastern Europe, the former Soviet Union and Mongolia. Fewer than 15 years ago, this entire region was ruled by autocratic regimes that tightly controlled access to communications and information internally and built walls, minefields and jamming stations as prophylactics against foreign ideas. Then, the Berlin Wall fell and in virtually every nation of the region, many of them newly formed, societies have become more open. But there have been considerable differences in the extent and pace of these changes, from free-wheeling, relaxed Hungary and Slovenia to austere, regimented Belarus as well as some of the Central Asian republics. It would be expected that the differences in openness would be an important determinant of the Internet adoption in the region. Certainly, this is not to say that other factors, such as income and infrastructure, would not also play a role in Internet adoption. But in a region where, arguably, the most significant change of the past 15 years concerns societal attitudes toward access to information and intra-regional variation regarding this spans the gamut from repression to laissez faire, the role of openness in Internet adoption, relative to other factors, would be expected to be greater. Investigating this was the central purpose of the study.

Background on the Former Socialist Nations of Eastern Europe, the Former Soviet Union and Mongolia

In virtually all regards, the area for the study is vast. It comprises 28 nations stretching from Western Europe to the Pacific and accounting for nearly one-sixth of the earth's land mass (see Figure 1). The total population of the region is nearly 400 million, divided almost evenly between Eastern Europe, the Russian Federation and the remaining nations of the former Soviet Union plus Mongolia. Some nations, such as the Kyrgyz Republic, are among the most isolated in the world. Others, such as the Czech Republic and Slovenia, are in the heart of Europe. And, despite decades of domination under the Soviet bloc,[1] there is considerable cultural diversity. Religion is an imperfect, though often used, indicator of culture. By this measure, there are three main groupings: (1) Protestantism and Roman Catholicism, primarily in the northern half of Eastern Europe; (2) Islam, primarily in and around Central Asia as well as Albania and Bosnia and Herzegovina (see Figure 1); and (3) Orthodox Catholicism,[2] the dominant religion of the region and of its largest ethnic group, the Slavs. It should be noted that tiny Mongolia (1.9 million) is primarily Buddhist.

FIGURE 1

The Former Socialist Nations of Eastern Europe, the Former Soviet Union and Mongolia



Eastern Europe:
Albania
Bosnia and Herzegovina
Bulgaria
Croatia
Czech Republic
Hungary
Macedonia (FYR)
Poland
Romania
Slovak Republic
Slovenia
Serbia and Montenegro

Former Soviet Union:
Azerbaijan
Armenia
Belarus
Estonia
Georgia
Kazakhstan
Kyrgyz Republic
Latvia
Lithuania
Moldova
Russian Federation
Tajikistan
Turkmenistan
Ukraine
Uzbekistan

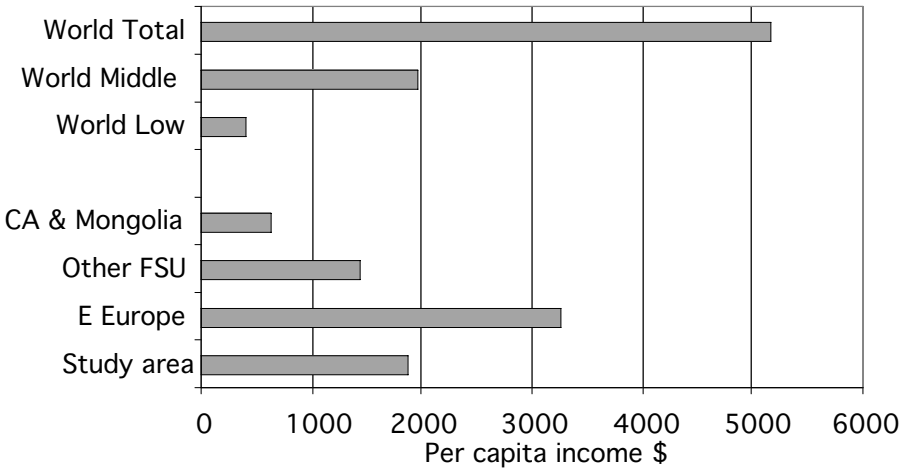
Mongolia

For the purpose of this study, and consistent with Fish (1998), Buddhism is categorized with Islam.

The former socialist countries may be characterized as middle income (see Figure 2). Eastern Europeans tend to have the highest incomes, while the lowest are found in and around Central Asia. As with income, the region is in the middle of the pack worldwide with respect to Internet adoption, measured by hosts per 10,000 people (see Figure 3). Moreover, there appears to be the same intra-region pattern, with Eastern Europe highest and Central Asia/Mongolia the lowest. This suggests that, as elsewhere, income is the dominant determinant of Internet adoption. However, a closer comparison of Figures 2 and 3 reveals differences, indicating that more than income is influencing per capita Internet hosts. First, the study area's average per capita income is effectively identical to the average for all middle income countries, however the latter's Internet host penetration is 50 percent higher than the study area's. The worst, in this regard, appears to be Central Asia and Mongolia. This sub-area has an average per capita income 50 percent higher than the average for all low income countries, but its number of Internet hosts per capita is only 40 percent of the low income country average. On the other hand, Eastern Europe's average per capita income is 60 percent the world average, while the number of Internet hosts is 75 percent the world average. In other words, relative to their per capita

FIGURE 2

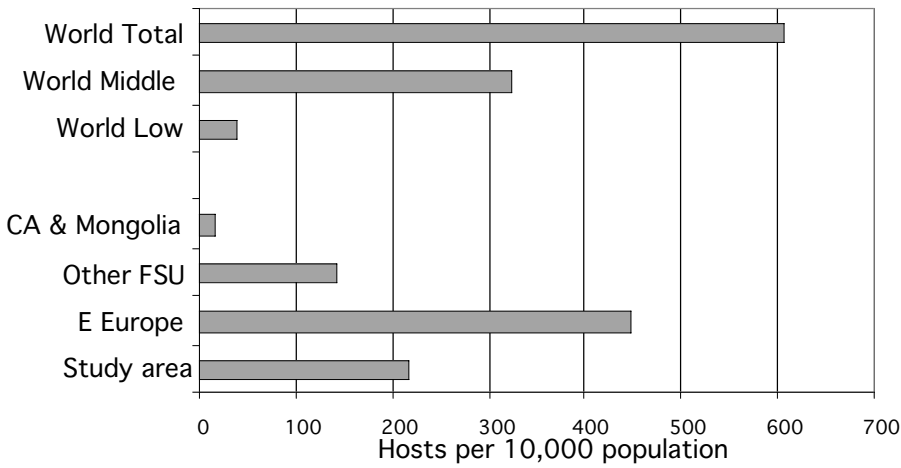
Per Capita Income, Study Area and World Averages, 2000



Source: World Bank, 2002

FIGURE 3

Internet Hosts Per 10,000 Population, Study Area and World Averages, 2000



Source: World Bank, 2002

income levels, Central Asia and Mongolia appear as negative outliers with regard to Internet hosts, while Eastern European countries have higher Internet connectivity than would be expected based on their income levels.

How can we determine the effects of these factors on Internet adoption in the region? Multivariate analysis is required to separate income and other effects on Internet use. In the next section, we present the theoretical framework for a model to facilitate this analysis.

General Model

Dependent Variable: IUR

The dependent variable in this study is the estimated number of Internet users per 10,000 people in a population (IUR). IUR is measured biannually by Network Wizards, with adjustments by the International Telecommunication Union (see ITU, 2000/1). IUR is derived from the number of Internet hosts (computers connected to the Internet with IP addresses) per 10,000 population.

Consistent with most previous studies, we posit that IUR is a function of income, infrastructure, cultural factors and openness, as shown in Equation 1:

$$\text{IUR} = f\,(\text{income, infrastructure, cultural factors and openness}) \qquad (1)$$

Several studies have observed a superior fit if the log of IUR is employed (Dasgupta et al., 2001; Dimitrova, 2002). We follow that precedent and use lnIUR.

Approaches taken by previous researchers and for the current study to operationalize each of the four determinants are briefly discussed below.

Income

Per capita income is the most frequently employed and frequently the strongest predictor of Internet penetration (see, for example, Arnum and Conti, 1998; Bazar and Boalch, 1997; Clarke, 2001; Elie, 1998; Hargittai, 1999; Kiiski and Pohjola, 2001). Elie (1998) found a strong correlation between Internet penetration in a country and per capita income. Hargittai (1999) found GDP per capita to be the strongest predictor of Internet connectivity, explaining 38 percent of the variation among OECD member countries.

However, such findings are not universal. For example, in a recent World Bank study, per capita income was statistically insignificant (Dasgupta et al., 2001). The researchers concluded that economic development did not have a strong influence on Internet intensity. Rather, the disparity in Internet use reflected the 'long-standing disparity in telecommunications access' between developed and developing countries (Dasgupta et al., 2001: 6). The insignificance of income may have been due to a high correlation between income and teledensity.

Economically developed countries of Southern Europe (such as Italy and Spain) have lower Internet usage levels than would be predicted on the basis of their GDP levels (Arnum and Conti, 1998; Corrocher and Ordanini, 2002; Elie, 1998). In contrast, Internet usage seems more advanced than would be suggested by the GDP levels in the Eastern European countries of Slovenia, the Czech Republic, Hungary, Slovakia and Poland. When comparing Western European and Eastern European countries, Elie (1998) found that Internet penetration differed from what would be expected simply based on a range of macroeconomic indicators. This suggests that although economic factors are

important, there are other determinants of Internet adoption at the societal level.

Per capita income measures may be based upon exchange rates or purchasing power parity. Exchange rate basis is usually more appropriate when focusing on trade, while purchasing power parity is more relevant when trying to gauge standards of living. The latter (PPP GNP) is clearly the case for the current study and is what was used. In an earlier study (Beilock and Dimitrova, 2003) we argued and empirically demonstrated that the effects of this variable would be expected to be non-linear, with successive per capita income increments having smaller and smaller positive impacts on IUR. It was found that a log transformation provided the best fit. Following that study, lnIncome is used in this present analysis.[3]

Infrastructure: Telecommunications

Telecommunications infrastructure seems like a logical infrastructure-related predictor of Internet connectivity. Several studies have shown that technology/infrastructure is an important determinant (Arnum and Conti, 1998; Corrocher and Ordanini, 2002; Dimitrova, 2002; Hargittai, 1999; Kiiski and Pohjola, 2001). The most commonly used measure of the telecommunications infrastructure in a country is the number of telephones per capita (Beilock and Dimitrova, 2003; Clarke, 2001; Hargittai, 1999; Hawkins and Hawkins, 2003; Kiiski and Pohjola, 2001). In the former socialist countries, residential telephones remain the main mode for connecting to the Internet, but mobile phone access is quickly gaining popularity.[4] Therefore, this study uses the combination of mobile and residential phones per 1000 inhabitants, phone density, as the infrastructure indicator.[5] It should be noted that a drawback of only using phone density is that it does not account for variations in technical qualities of the systems or in management and pricing/competition. Unfortunately, consistent data on quality are rarely available and, even when that is not the case, developing concise and consistent sets of variables to represent the dimensions of quality can be problematic.

Cultural Factors: Religion

Maitland (1999), among others, has argued that cultural factors should be included to explain the adoption of interactive technological innovations, such as the Internet. While there is widespread agreement with Maitland, representing culture is difficult due to the breadth and complexity of the concept (Jones, 1997; DiMaggio, 1997; Sondergaard, 1994; Tayeb, 1994). Broadly defined, culture refers to the values, religious beliefs, ethics, institutions, customs and traditions shared by a group of people.

Hofstede (1980) developed four dimensions to measure differences across cultures: power distance, uncertainty avoidance, individualism/collectivism and masculinity/femininity. The cultural dimension that relates to the adoption of the Internet is uncertainty avoidance (Hofstede, 2001). Broadly defined, uncertainty avoidance is 'the extent to which the members of a culture feel

threatened by uncertain or unknown situations' (Hofstede, 2001: 161). It follows that countries with higher uncertainty avoidance would be more resistant to the adoption of the Internet compared with low uncertainty avoidance countries.

Cultural traits have been given as an explanation for differences in Internet adoption among Western European countries (Forrester Research, 2000). Also, employing income and infrastructure measures, our earlier study (Beilock and Dimitrova, 2003) was able to explain 77 percent of inter-country variations in IUR in Western and Southern Europe. However, when we added the percentage of Roman Catholic or Orthodox Catholics (PCATH), explanatory power exceeded 90 percent, with PCATH being the most significant variable.

Drawing from our study of Western and Southern Europe, we use religion to represent culture. We acknowledge that religion, alone, does not capture the many dimensions normally included in culture. Some other aspects of culture, however, are reflected in the openness measure described in the next subsection. Nations are divided into those where the majorities of the populations are Orthodox, Roman Catholics or Protestant, or Muslim/Buddhist. Following Hofstede's observation that uncertainty avoidance is the most relevant aspect of culture with regard to technology, we hypothesized that the most significant division would be between countries with majority Christian populations and those with Muslim or Buddhist majorities. This hypothesis was supported in regressions showing insignificant differences between Orthodox and Roman/Protestant majority nations with respect to IUR, but significant differences between these and Muslim/Buddhist majority nations. Therefore, a binary variable was developed, Muslim religion, equaling 0 if a majority Christian country and 1 if majority Muslim or Buddhist.

Openness: Civil Liberties

There is ample anecdotal evidence that political freedoms also affect Internet use, with most accounts showing a positive relationship between openness and Internet connectivity (Dimitrova, 2002; Norris, 2001; Rodriguez and Wilson, 2000). Rodriguez and Wilson (2000) among others argue that democratic conditions are necessary for the adoption and development of new media technologies such as the Internet.

One way to measure the level of democratization and openness is to examine the level of civil liberties in the country. A good proxy variable for that is offered by the Freedom House. Their ranking of the level of civil liberties is based on 14 different criteria, which include freedom of expression and belief, free and independent media and freedom of cultural expression. The Freedom House has collected data on civil liberties within countries since 1972. It publishes an annual assessment of the state of freedom within a country by assigning a score to each state worldwide.

The civil liberties ratings are based on a seven-point scale, ranging from 'most free' to 'least free' countries. The scores are inverted in our analysis so that higher rankings indicate higher levels of civil liberties in society. The Freedom House scores are ordinal or qualitative, rather than quantitative.[6] As

such, it would be improper to use the scale as a single variable. Instead, the first level (i.e. the least open) became the omitted category, and a binary variable was created to represent each remaining openness level. If the effects of two or more adjacent levels were effectively identical to one another, the binary variables were combined. Through this process, three categories for openness were derived: low openness (score = 3 or 4), medium openness (score = 5) and high openness (score = 6). None of the 28 countries was ranked as 7. It is important to note that these openness levels are not absolute but relative to other countries.

Summing up, the conceptual model, presented in Equation 1, was operationalized through the use of the variables just described, in Equation 2 below.

$$\text{lnIUR} = f(\text{lnIncome, phone density, Muslim religion and openness}) \quad (2)$$

Multiple regression analysis was employed for estimation.[7] The results are discussed in the next section.

Results

Using the multivariate framework presented in the preceding section, six variants of the model were estimated to explain Internet connectivity in the former socialist countries. Our goal was to determine which model had the best explanatory power. The regression results for each of six models are presented in Table 1.

Employing the usual 'heavy lifters' of Internet adoption analysis, income and infrastructure, a very respectable 81 percent of the variation is explained (see Table 1, Model 1). As expected, both parameter estimates are positive, but that for income is insignificant, almost surely because of the high correlation between the two independent variables ($r = .84$, see Table 2). Adding in Muslim religion as a predictor improves the fit, but only slightly (see Table 1, Model 2). As might be expected, the negative parameter estimate indicates that majority Muslim or Buddhist nations tend to have lower Internet adoption rates than those with Christian majorities. This relationship has not been examined closely in prior research.

In Model 3, the openness measures are added. It should be noted that in preliminary runs it was found that openness levels 1 and 2 and levels 3 and 4 had essentially identical effects and there was no loss of explanatory power or impact on other parameter estimates from combining each of these into two pairs. The explanatory power of Model 3 is very high, accounting for 94 percent of the variation. As the lowest openness scores, 1 and 2, formed the omitted category, the positive signs for the highly significant parameter estimates associated with low, medium and high openness support the proposition that greater openness is conducive to higher Internet adoption rates. Sensitivity to the extent of openness is further suggested by the relative magnitudes of these estimates, with that for low openness being the smallest and that for high openness the largest. This interesting finding suggests higher openness has significant positive impact on Internet connectivity in the former socialist countries.

TABLE 1

Regression Analysis of Internet Adoption in the Former Socialist Countries

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	–.73	–.46	–.41	.66***	–1.81	1.25***
	(1.60)	(1.51)	(1.066)	(.20)	(1.10)	(.20)
Income	.19	.21	.14		.37***	
	(.21)	(.20)	(.14)		(.13)	
Phone Density	.0044***	.0033***	.0022***	.0027***		
	(.0009)	(.0010)	(.00077)	(.00063)		
Low Openness			.67***	.68***	.66***	.67***
			(.14)	(.14)	(.17)	(.19)
Medium Openness			.83***	.81***	.91***	.88***
			(.19)	(.19)	(.22)	(.25)
High Openness			1.08***	1.12***	1.27***	1.55***
			(.20)	(.20)	(.22)	(.22)
Muslim Religion		–.45**	–.37**	–.37**	–.60***	–.77***
		(.21)	(.15)	(.15)	(.15)	(.15)
Equation statistics:						
R^2	.81	.84	.94	.93	.91	.88
F Statistic	52.46***	50.01***	52.06***	62.12***	45.50***	42.14***
Number of obs.	28	28	28	28	28	28

Notes: a. Table reports beta coefficients from multiple regression analysis with standard errors in parentheses.

b. Dependent variable is ln of Internet users per 10,000 inhabitants (ITU, 2000).

c. ** and *** denote significantly different from zero at the .05 and .01 levels, respectively.

TABLE 2

Simple Correlations Among Independent Variables

	Income	Phone Density	Muslim Religion
Phone Density	.84		
Muslim Religion	–.61	–.74	
Openness[a]	.50	.63	–.65

Notes: a. Openness is the 1-to-7 scoring of openness by the Freedom House. It is inverted to have higher scorings denote greater openness.

b. Table reports Pearson correlations (r) among all independent variables.

c. All correlations were significantly different from zero at the .01 level.

To explore further the importance of openness and religion, in Models 4 and 5 income and phone density were excluded, one at a time, and they were both dropped in Model 6. Removing income (Model 4) has almost no impact on the overall explanatory power of the equation or the remaining parameter estimates. If, instead, phone density is removed (Model 5), the equation still explains over 90 percent of the variation. Reflecting the multicollinearity problem between income and phone density, with the removal of the latter, the parameter estimate associated with the former becomes significant. Other than an increase in the magnitude and significance of the parameter estimate for Muslim religion, there are few other changes.

In the final model – Model 6 – only two predictors are left. Relying solely on the openness indicators and Muslim religion, 88 percent of the variation in Internet use is explained. This is impressive considering that in Model 1, only 81 percent of the variation was explained by income and phone density. This finding suggests that the theoretical justification for inclusion of openness and culture as determinants was sound.

Finally, the comparison of the six models presented above indicates that Model 3 and Model 4 seem to be superior in explaining Internet penetration in the former socialist countries. The comparison also shows that it is desirable to incorporate several factors as predictors of Internet adoption, going beyond the traditional income and infrastructure variables measured in earlier studies.

Discussion

The primary motivation for the study presented in this article was to model the determinants of Internet adoption among the former socialist nations with particular emphasis on the effects of openness and of culture, represented by religion. Our working hypothesis was that the effects on Internet adoption of openness and culture should be more evident among the former socialist countries than for a world model where vast inter-country differences in per capita incomes and infrastructure tend to mask the effects of other factors (see, for example, Beilock and Dimitrova, 2003). The results are consistent with this expectation. While the measures of income and infrastructure by themselves

can explain the large majority of inter-country variations in Internet adoption rates, the results are greatly improved through the addition of the openness and religion measures. Moreover, the openness and religion measures, by themselves, are superior to only using income and infrastructure.

The influence of political and cultural factors on Internet connectivity has only rarely been emphasized in previous research. What we show is that for a region that is relatively homogeneous, these two determinants – openness and culture – play an important role. In other words, when differences in income and infrastructure are not extreme, openness and culture come to the fore. In this study, the relative influence of political and cultural factors was stronger than that of the traditional income and infrastructure indicators.

Based upon both our personal experiences in the region and the analysis presented here, we believe that these results can be taken at face value, i.e. that openness and religion actually are key determinants of Internet adoption rates among the former socialist nations. Despite the apparent statistical strength of our analyses, in forming their own opinions readers and future researchers should be aware that these results may be, in part, artifacts of collinearity among the independent variables and/or other factors coincident with the patterns of openness and religion.

The correlations are strong among all the independent variables, as shown in Table 2. One variable may act, in part, like an instrument for another variable. For example, a comparison of Models 3, 4, and 5 in Table 1 suggests that the income and infrastructure measures had similar impacts – they 'tell the same story' – whether used together or one at a time. This may be coincidence or, more likely, because higher income levels lead to acquisition of more infrastructure and/or vice versa. But the same may be true with regard to openness. More open societies may be better able to advance economically.[8] Or the reverse may hold, that higher economic standards promote more open societies.[9] If so, the true model of Internet adoption may have multiple equations. We propose that the key factor for this region is openness, openness leading to economic gains and economic gains resulting in infrastructure improvements, which, in turn, facilitate more openness and development. But that is only our supposition, with the proof left to future research.

In addition to correlations among the independent variables, the geographic patterns of openness and religion raise the possibility of alternative explanations. With the exception of Mongolia, all of the nations with openness scores of 5 or 6 are in the northern part of Eastern Europe, the areas of the Balkans which escaped prolonged conflict since the collapse of the totalitarian regimes, and the Baltic republics (see Figure 4). It is possible, for example, that the openness measures are actually capturing the effects of differences in infrastructure qualities.[10] The same may be true with regard to the religion variable. All of the predominantly Muslim countries of the region have experienced significant conflicts, which have negatively affected infrastructures over the past decade and/or are in Central Asia, an area of the former Soviet Union known to have very low quality infrastructures (see Figure 5). So it is possible that the cultural characteristics associated with Islam do not impact negatively on Internet adoption, relative to Christianity, but rather, that Muslim-majority

FIGURE 4

The Most Open Societies Among The Former Socialist Nations of Eastern Europe, The Former Soviet Union, and Mongolia

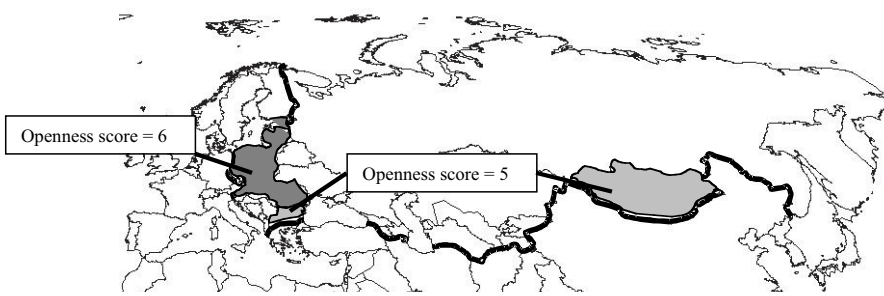
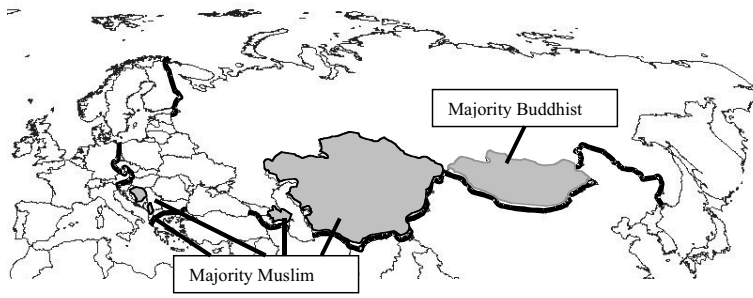


FIGURE 5

Majority Muslim or Buddhist Populations Among The Former Socialist Nations of Eastern Europe, The Former Soviet Union, and Mongolia



populations happen to live in areas with low quality and/or partially destroyed infrastructures.

Certainly, our study is limited in scope as it examined only the former socialist countries. Future studies should explore the influence of culture and openness in other regions of the world. Additionally, the theoretical framework presented here included macro-level indicators such as income and teledensity, but did not take into account the impact of government policy or computer skills. Some research suggests that these two variables may serve as additional determinants of Internet adoption (European Union, 2004; Hawkins and Hawkins, 2003). Another potential infrastructure predictor may be the number of computers (PCs) per capita, data for which were not readily available at the time this study was conducted.

Indeed, the influence of additional factors needs to be examined in the context of the former socialist countries. Eastern Europe in general lags behind the rest of Europe in terms of Internet adoption rates. It is possible, therefore, that additional barriers to Internet penetration exist in this region. A necessary step to reducing the digital divide is identification of factors that impact Internet

adoption. Only after this is done can nations design effective policies to assure their citizens the fullest possible access to information and ICTs.

Conclusion

Cross-country Internet diffusion is a complex phenomenon. Globally, differences in Internet connectivity may be explained, primarily, by the vast inter-country differences in incomes and infrastructures. However, among the former socialist countries, where income and infrastructure differences were not extreme, other factors, i.e. openness and culture, were found to be the strongest explanatory variables for Internet connectivity. These findings are important for understanding differences in this region. Moreover, they suggest that important insights could be gained from similar research in other regions.

Notes

1. Technically, the nations of the Former Yugoslavia, Albania and Mongolia were not part of the Soviet bloc. However, they were strongly influenced by the Soviet Union and had regimes largely similar to other nations within the Soviet sphere.
2. Including the Armenian Apostolic Church. It is also often referred to as Eastern Orthodox Christianity.
3. Experimentation with the unlogged variable as well as the variable plus the squared term confirmed the superior fit of lnIncome.
4. Curiously, though understandably, some of the most rapid gains in mobile phone usage are in areas with the most primitive residential phone systems, a classic case of leapfrogging from a backward technology to the latest.
5. Another potential infrastructure measure was the number of PCs per capita. Unfortunately, data on PCs in the former socialist countries are not available.
6. That is, countries assigned higher numbers are more open than those with lower numbers, but the relative sizes of those numbers do not connote the intensities or degrees of those differences.
7. Technically, IUR is a truncated variable, as it cannot take on negative values. As such, an argument could be made for employing Tobit, rather than regression, analysis. The authors did perform parallel estimates using both approaches and the results were effectively identical.
8. Indeed, this is a frequently used argument to explain the poor economic performance of socialist economies relative to the capitalist economies and the final collapse of the former.
9. Essentially arguing, bread first, by any means, and then freedom as a luxury good.
10. It seems that in the region the qualities of everything from building stocks to roads to telephone lines tend to erode the further east one travels (see, for example, Gransden et al., 1995).

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