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Trust, the Internet and the Digital Divide

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Abstract: The Internet is expected to have a positive impact on economic growth. In this paper, we examine how differences in willingness to trust influence Internet adoption rates across countries. We show that trust has a statistically significant influence on levels of Internet penetration across countries. We also show that increasing Internet adoption through policies to promote trust will have larger impacts on high than low trust countries -- differences in trust may produce a *digital divide* among nations. Since low trust countries tend to be low or middle income countries, this digital divide between countries may translate into a *developmental divide*.

I. Introduction

The Internet is expected to be an important source of economic growth in the 21st century. The Congressional Budget Office (2001) predicts the US economy will grow at 2.1 percent annually over the coming decade – a 0.9 percent increase over US growth for the period 1974 to 1995. Varian et al (2002), estimate that the Internet will account for 48% of this 0.9 percent increase in growth. In a similar vein, Litan and Rivlin (2000) discuss research estimating Internet driven productivity gains in US manufacturing of 0.2 and 0.4 percent per year.

Whether such predictions come to pass depends upon whether people and firms choose to adopt the Internet and how fully they embrace the idea of conducting business over it. The degree to which people and firms adopt web-based activities will depend on how willing they are to accept the greater anonymity and associated possibilities for opportunism inherent in Web-based transactions. This willingness may, in turn, depend on how much people trust each other. As such, to the extent that Internet adoption depends on how trusting people are, trust will indirectly impact economic growth rates among nations.

There is, in addition, evidence that trust has a direct impact on economic growth and growth rate differences across countries. Prior to the late 1990s, economic growth rates were explained almost exclusively in terms of labor and capital endowments and differences in how these endowments are augmented by capacities for technological change. In the context of the discussion in the prior paragraph, the indirect impact of trust on growth occurs through its impact on the adoption of the Internet, a technological change. During the 1990's, spurred largely by observations and arguments put forth by

social theorists like Fukuyama (1995) and Putnam et al (1993), economists investigated the possibility that differences in economic growth might stem directly from differences in the extent to which members of different cultures were willing to trust each other. The arguments in favor of this possibility are straightforward. Almost all transactions involve some opportunities for misrepresentation, non-compliance, or outright fraud. Detailed contracts, extensive monitoring of performance, and litigation are means of discouraging such behaviors, but they are all costly to implement. Mutual trust is an efficient substitute for these enforcement mechanisms, and empirically it appears to serve this purpose. Knack and Keefer (1997), for example, found that a very simple measure of how trusting inhabitants of different countries are is a significant explanatory variable in regressions of average annual growth rates in per capita income from 1980 to 1992. Moreover, the impact is large – a 10% increase in the measure of trust translates into a .8% increase in economic growth – a sizable increment given world average growth rates of 1% to 3% in the latter half of the 20th century.

Taken together these observations have a potentially troubling implication for low trust countries, the majority of which tend to be of low and middle income; namely, that in the coming years they will take a double-hit in terms of economic growth – penalized for low trust first in terms of higher transactions costs and then again through lower adoption of growth enhancing technology. Knack and Keefer's (1998) findings suggest the first hit will surely come to pass. Whether the second does as well depends upon whether trust impacts Internet adoption. Our first objective in this paper is to test whether the proposition that trust is an important determinant of Internet adoption is, in fact, true. To presage our findings, it is. This result would seem to suggest that efforts to

increase trust in low and moderate trust counties are in order. Unfortunately, we show that returns to any such policy will be greater for high trust countries than for low ones – differences in trust among countries will promote an increasing *digital divide* between them. To the extent that contributions the Internet makes to economic growth accrue disproportionately to high trust countries, this *digital divide* will translate into a *developmental divide*.

II. Data

The specifics of our analyses of the impact of trust on Internet adoption are dictated by the availability of trust measures for different countries. In their examination of whether trust directly influences economic growth rates, Knack and Keefer (1997) used responses to a question involving trust posed to thousands of respondents from 29 countries with market economies in the 1981 and 1990-1991 "World Values Survey."[1] The question was:

> "Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?"

Knack and Keefer took the percentage of respondents from each country who answered that people could be trusted as a measure of how "trusting" that country's populace was.[2] They then conducted regression analyses examining the impact of this measure of trust on average annual growth in per capita income for 1980 to 1992. They

[1] For a discussion of the World Values Survey see http://ssdc.ucsd.edu/ssdc/icp02790.html

[2] In their paper, Knack and Keefer examine the broader question of whether "social capital" influences economic growth. Social capital is a composite term reflecting attributes shared within groups that promote cooperative behavior. Trust, loosely defined as the expectation that others will abide by their commitments and act benevolently, is one component of social capital. Civic-mindedness, again loosely defined as willingness to ascribe to norms promoting socially, though not necessarily individually, preferred outcomes, is a second component.

found that trust contributes significantly to economic growth, particularly in poorer countries without developed legal enforcement systems.[3]

The growth rates in Knack and Keefer (1997) were averages over the period 1980 – 1992. To minimize endogeneity problems, they computed trust values based on 1980 WVS responses where possible and 1990 responses otherwise. Knack and Zak (1998) provide trust measures derived from responses to the 1995 WVS for 17 of the 29 countries used in Knack and Keefer (1997) and 1990 values for the remainder. Given that the Internet was not commercialized until 1995, endogeneity is not an issue in our analyses so we use the most recent 1995 data where possible and 1990 values otherwise. None of the results reported in the ensuing sections are particularly sensitive to whether we employ the combination of values, or exclusively 1990 values. Values for this "Trust" variable for each country as well as values for all other independent and dependent variables considered in our analyses are shown in Table 1.

For the 29 countries for which we had a trust measure, we collected two measures of Internet Penetration. OECD provides data on the percentage of households with Internet access in 1999 and/or 2000 for 17 countries. To maximize available degrees of freedom, we combined this data, taking the average for countries with 1999 and 2000 values and the single year values for the remaining countries, to create the series -- "Percent Households with Internet Access, avg.1999-2000," abbreviated "IP1."[4] OECD

[3]Knack and Keefer used other questions from the WVS to construct an index of "civic-mindedness" created largely from responses to questions regarding dealings with federal or local government. They found that civic-mindedness also promotes economic growth. This construct seems less relevant to the adoption of the Internet. Consistent with this view, preliminary analyses suggested that "civic-mindedness" does not influence Internet adoption.

[4] OECD data is available at http://www1.oecd.org/publications/e-book/92-2001-04-1-2987/B.5.2.htm. For Denmark, Ireland, the Netherlands and the United Kingdom, access to the Internet is via a home computer; for the other countries access to the Internet is through any device (*e.g.* computer, phone, TV, etc.). US data

also provided data on the "Number of Internet Subscribers per 100 inhabitants in 2000" (denoted "IP2") for 22 of our countries.[5]

The literature on the determinants of technological adoption suggests a number of economic, demographic, and infrastructural factors that might influence Internet adoption. Economic theory suggests that the quantity of a product demanded depends on its own price, income, and the price of substitutable and complementary goods. For our measure of income, we computed average per capita national income for our sample of countries by averaging data provided by the World Bank for the period 1995-1999.[6] This variable is denoted "Income." Our measure of Internet access price, denoted "Int. Price," is the average price of 20 hours of Internet access for 1995-2000 in purchasing power parity adjusted dollars computed by OECD.[7]

In addition to variables suggested by economic theory, there are a host of demographic characteristics that have been found to influence the adoption of new technologies. Young people, those with more education, and those who are more cosmopolitan are all more disposed to new technologies. To examine the role of age, we collected data on the percentage of the population 60 or older, as reported by the United

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for 1999 is, instead, from 1998. UK data is for the last quarter of 2000. Data for Mexico is only for households in urban areas with more than 15000 inhabitants. Data for Turkey is for households in urban areas only.

[5] OECD Science, Technology and Development Scoreboard at http://www1.oecd.org/publications/e-book/92-2001-04-1-2987/B.5.1.htm

[6] Source: World Bank, http://devdata.worldbank.org/data-query

[7] These average prices include line rental, public switched telephony network (PSTN) usage charges and the ISP fee, VAT and cover both peak and off-peak. OECD Science, Technology and Development Scoreboard at http://www1.oecd.org/publications/e-book/92-2001-04-1-2987/B.6.htm

Nations, "World Population Prospects, the 2000 Revision."[8] We denote this variable "Age. " The impact of education on adoption is captured by the variable "Education," which reports the average number of years of schooling among the population over 25 and is taken from Barro and Lee (2000).[9] As a measure of cosmopolitanism , we average data from the World Bank on the urban population as a percent of the total population for years 1995 through 1999. This variable is denoted "Urban."

In addition to explanatory variables generally found to influence the adoption of new technologies, there are others implied by the specific characteristics of the Internet. To use the Internet, one must have a personal computer or other device and must have a means of connecting to the Web – a phone line or alternative. As such, PC usage/availability and the level of infrastructure development as measured by main phone lines are other reasonable candidates for explaining Internet penetration. Our measure of PC penetration was derived from the estimated number of self-contained computers designed to be used by a single individual per 1000 inhabitants obtained from the World Bank World Development indicators for years 1995 though 1999.[10] Data on each country was averaged over the five year period to construct the variable "Average PC's per 1000, 1995-1999," denoted "PC." To gage the ability of people in different countries to connect to the Internet, we collected data on the average number of telephone mainlines

[8] Data available at http://www.un.org/esa/population/publications/wpp2000/wpp2000at.xls .

[9] International Data on Educational Attainment: Updates and Implications, http://www.korea.ac.kr/~jwlee http://www2.cid.harvard.edu/ciddata/barrolee/Appendix.xls

[10] The World Bank data (http://devdata.worldbank.org/data-query) is provided by International Telecommunications Union.

per 1000 population for the period 1995-1999 reported by the World Bank[11] for each of our sample countries. This variable is denoted "Lines."

III. Analysis

As a first cut at testing the proposition that trust is an important factor in Internet adoption, we consider the simple linear regressions and scatterplots of IP1 and IP2 with respect to Trust shown in Figure 1. In the case of IP1, the correlation with Trust explains over 64% of the total variation in Internet adoption. For Internet Subscribers per 100 (IP2), the 40% correlation with Trust is noticeably lower. This difference is driven by a single outlier. South Korea has the largest number of Internet subscribers in the sample (23 /100) but a Trust value slightly below the mean (30 versus 36). South Korea's front-runner position in terms of Internet subscribers has been attributed to the coincidence of a number of factors,[12] most notably overcapacity in fiber optic cable and government policy promoting competition among Internet access providers. Fiber-optic overcapacity has been absorbed through provision of broadband Internet providing connection speeds roughly 20 times those achieved through traditional phone lines. Moreover, given competition among providers and peculiarities in the way charges for traditional phone usage are calculated, this broadband access is provided at low prices, roughly comparable to service over phone lines. When South Korea is dropped from the

[11] World Bank: World Development Indicators database at http://devdata.worldbank.org/data-query/ . Data supplied by International Telecommunication Union, World Telecommunication Development Report and database.

[12] For further discussion of these and other factors impacting Internet penetration in South Korea see Shameen (2000) and OECD (2001).

IP2 series, the fit of the regression improves substantially and becomes comparable to that obtained using IP1.

These simple univariate linear regression results support the contention that trust is an important determinant of Internet adoption although, as noted earlier there are a host of economic, demographic and infrastructural variables that might explain adoption as well. To flesh out what the determinants of Internet adoption are and rule out the possibility that the observed contribution of trust to adoption of this technology is spurious, we conducted multivariate regressions on IP1 and IP2. Given our dependent measures are proportions; we subjected both to a inverse-logit transformation $F^{-1}(y) = \ln\left(y/_{1-y}\right)$. Here F is the cumulative distribution function for the logistic distribution and F^{-1} is its inverse. The transformed dependent variables are regressed against the relevant independent variables using ordinary least squares.[13]

In light of the relatively small number of countries we have complete data on compared to the large number of potential explanatory variables, two sets of regression results are reported for each dependent measure. In the first set, all relevant regressors are run against the corresponding dependent variables and the results examined to see whether Trust enters significantly when all other potentially relevant variables are controlled for. In the second set of regressions, a stepwise procedure is employed to examine whether our Trust variable explains Internet adoption across countries in equations defined as, in a sense, "optimal" by the data.[14]

[13] Using the transformed dependent measures yields higher adjusted R^2's than those obtained using OSL. For further discussion of this logit form of regression analysis, see Intriligator, 1978, pp. 173-175.

[14] In stepwise regression, independent variables are entered into the regression equation sequentially – first the one most highly correlated with the dependent variable, next the one with the highest partial correlation

Regressions of IP1 and IP2 are of the following form:

$$1) \quad F^{-1}(IP1(2)) = a_0 + a_1 Trust + a_2 Income + a_3 Int.Price + a_4 Age + a_5 Education + a_6 Urban + a_7 Lines + a_8 PC$$

For regressions of IP1 (shown in the first two columns in Table 2), Lines, PC's and Trust enter at better than the .05 significance level in the all regressor equation. In the stepwise regression, Lines and PC's enter significantly at the .05 level while Trust and Income (with an unanticipated negative sign) enter at p=.055 and p=.071, respectively. The adjusted R^2 for these equations, both equal to .87, are quite high.

The "all regressor" equations for IP1 and IP2 both exhibit high multicollinearity. This is not surprising given the small number of observations compared to the number of independent variables and the relatively high correlation between many of the independent variables. Multicollinearity is not a problem in the stepwise regressions reported. Residuals in all the regressions reported tend to be randomly dispersed.

Regression results for IP2 (shown in the center two columns in Table 2) reflect some similarities to those obtained for IP1 but also important differences. Regarding the similarities, Lines and Income are selected as significant explanatory variables in both "all regressor" and stepwise regressions. PC is not, however, significant in explaining IP2 nor does Trust enter as significant in either of the IP2 equations. Instead, Education enters in the stepwise regressions of IP2. The adjusted R^2's for these equations, .70 and .69, are high although systematically lower than those for IP1.

Many of the discrepancies between results obtained for IP1 and IP2 are due to the presence of South Korea in the IP2 series. Withholding South Korea from the estimation

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and so forth until the variable to be included next would not enter significantly. For further discussion, see Nau - http://www.duke.edu/~rnau/regstep.htm.

of IP2 produces several consequences as shown in the right-hand columns in Table 2. First, it substantially improves the fit of the equations to the data – making them comparable to those obtained using the IP1. Second, it increases the importance of Average PC's per 1000 (p=.137 versus p=.823) although this variable is still shy of significance. Finally, it results in Trust entering all regressions significantly and replacing Education in the stepwise regressions.

In summary, regression results obtained for the Average Percentage of Households with Internet Access suggest that Internet adoption depends not only upon technological preconditions – PC's and phone lines, but also on trust. If we are willing to exclude South Korea as an anomaly, albeit an important one from a developmental standpoint, from observations of Internet Subscribers, the results obtained using IP2 corroborate the importance of trust and phone lines.

Our findings regarding the importance of needed infrastructure are consistent with results reported in Hargatti (1999) and Robison et al (2001) in which main lines per 1000 were found to be important explanatory variables in regressions of Internet hosts per 1000 across nations.[15] Diez-Picazo (1999) reports regression results from an analysis of pooled cross-sectional and time series data on hosts per 1000 in which the number of personal computers per capita in the previous year enters significantly. Finally, there is some evidence consistent with the importance of trust. In their analysis of Hosts,

[15]Host counts by country provide an estimate of the number of computers in that country that are connected to the Internet. This dependent measure is not ideal for our purposes to the extent that there are vagaries in the way the origin of the host is determined. Where possible, hosts are attributed to countries according to their two level ISO country codes (i.e., according to their "country code Top Level Domain" or ccTDL). Unfortunately, the fact that a host's ccTDL is, say, Germany (i.e., .de) does not necessarily mean the computer resides in Germany. Moreover, many hosts are not classified by country code but by generic Top Level Domains (gTLD) like com, edu, org, net and int. Accurate counts of computers connected to the Internet by country require that these gTDLs be somehow allocated to specific countries.

Robison et al (2001) found that the level of "Political Openness," (an index measuring how democratic different countries are in terms of elective government and constitutional constraints on political power), positively influences Internet penetration. It seems reasonable to expect that people in societies characterized by "fair" institutions will be more willing to trust than people living in societies in which the government is less accountable. Knack and Keefer (1997) report regression results to this effect.

IV. The Comparative Statics of Trust and Internet Adoption

To the extent that Internet usage promotes economic growth, the findings reported above would seem to suggest that policy makers, particularly those in low-trust countries, should formulate programs to increase trust and, if not trust, then other determinants of adoption. To ascertain the effectiveness of promoting trust in low versus high trust countries, imagine that all countries invest $X in policies to promote greater trust and receive the same proportionate increment to their Trust score as a consequence. To calculate the impact of these proportionate changes in Trust on Internet adoption rates, we utilize the estimated models resulting from the stepwise regression exercises for IP1 and IP2 (excluding South Korea). For each dependent variable y_i, let $y_i^*=F(\alpha x_i)$ be our predicted value. In this case, the proportional impact on y resulting from a percentage change in Trust (i.e., the elasticity of y with respect to Trust) is:

3)

$$h_{y_i,Trust}(\alpha x_i) = \frac{\partial y_i^*}{\partial Trust_i} * \frac{Trust_i}{y_i^*} = \frac{\partial F(\alpha x_i)}{\partial Trust_i} * \frac{Trust_i}{F(\alpha x_i)} = \alpha_{Trust} Trust_i .$$

Notice that under the logistic distribution, the estimated *Trust* elasticity for any country is simply the estimated coefficient for Trust multiplied by that country's level of Trust. The estimated elasticities of Internet penetration with respect to Trust for all country except South Korea are shown in Table 3 where countries are sorted from low to high in terms of their Trust levels with the mean responses shown at the bottom. This sorting of the scores highlights the basic implication of this comparative static exercise regarding how increases in trust translate into increases in adoption: High trust countries will benefit proportionately much more from their investments in trust than do low trust countries.

To see how these results translate in terms of growth rates in Internet adoption, suppose each country adopts a policy that improves its' Trust scores by 5 percent per year.[16] For a country with the average number of Internet subscribers (IP2), this policy produces the series of growth rates depicted by the center line in Figure 2. As depicted, the growth rate in Internet subscribers increases from approximately 4% to 6¼ %. This translates into an increase from a current subscription level of 13% to a subscription level of 21% by 2010. Norway, the most trusting country in the sample, reaches Trust saturation by 2010 with an associated Internet Subscription level increasing from 16% to 35%. In contrast, for the lowest trust country, Brazil, this policy only stimulates the growth rate from 3½% to 5% over the 10 year period. The impact of this 10 year policy of 5% annual growth in Trust is to increase Internet Subscription from 1.6% to 1.67%!

Whether it makes sense for countries to promote Internet adoption through policies to enhance trust or through investment in things like main phone lines depends

[16] This five percent increase is the proportional increase from current trust levels (i.e., if a country's trust score in 20%, it increases to 21% next year, whereas if its score is 40% it increases to 42%)

upon how the costs of the different policies compare with their relative benefits. Our analyses enable us to characterize the benefits side of this equation. To demonstrate, note that the impact of a unit change in the level of Trust on our dependent measures is given by:

$$\frac{\partial y_i^*}{\partial Trust_i} = \frac{\partial F(ax_i)}{\partial Trust_i} = \frac{a_{Trust} e^{ax_i}}{1 + e^{ax_i}} = a_{Trust} F(ax_i).$$

Similarly, the impact of a unit change in Lines is given by $a_{Lines} F(ax_i)$. These expressions indicate a property of the logistic model; namely, that countries with larger predicted levels of Internet adoption reap larger absolute benefits from unit changes in any independent variable. The ratio of the benefits accruing from a unit change in Trust versus a unit change in Lines is simply the ratio their corresponding regression coefficients, a_{Trust} / a_{Lines}.[17] As such, to justify investments in Trust so as to increase Internet subscribers (our IP2 measure) by 1 unit (1%), the cost of doing so must be less than 77% (i.e., a_{Trust} / a_{Lines} equals .023 / .030) of the cost of increasing Lines by 10 units. Similar computations can be made for our other dependent measures with respect to their relevant policy variables.

V. Building Trust – An Open Question

Our econometric results allow us to characterize the benefits in terms of Internet penetration resulting from unit changes in Trust relative to unit changes in other explanatory variables like Lines – as the ratio of the relevant regression coefficients. Ascertaining how the costs of increasing trust compare with those of other policy options

[17] Adjusting for the fact that our trust measure is those trusting out of 100 people whereas our lines measure is lines per 1000 people.

is much more difficult for the simple reason that we don't know precisely what responses to the trust question posed in the WVS are revealing.[18] It may be that people responding to the question of whether others can be trusted answer affirmatively because they live in societies where formal mechanisms (e.g., property rights and legal statutes) and/or informal conventions (e.g., widely shared norms regarding the sanctioning of "unfair" or "unethical" behavior) assure that in apparently contentious situations it is, in fact, best for the parties involved to behave cooperatively.[19] In this case, policies promoting such institutions would seem in order although instituting fair, ethical and effective political and social institutions may not only be economically costly but politically unpalatable in those nations who would benefit the most from such changes.

An alternative, and not mutually exclusive, reason people in some nations may be more trusting than others is because they are simply psychologically or culturally predisposed to expect others to behave benevolently.[20] It is not obvious what sorts of policies might be pursued to implement changes in such cultural propensities. The fact that WVS responses regarding trust are highly correlated over time (e.g., from 1980 to

[18] We are not alone here. As Grootaert et al (2001) note with respect to research on social capital of which trust is a component, "On balance, it seems fair to say that the SCI (*Social Capital Initiative*) studies, as the social capital literature at large, have been more successful at documenting the beneficial impact of social capital than at deriving policy prescriptions and providing guidelines about how to invest in it." Italics added for clarity.

[19] In the context of game theory, we can think of these societies as having created institutions which solve social dilemmas and other problems of opportunistic behavior through mechanisms that afford opportunities for side payments and/or side penalties or, to use Yamagishi and Yamagishi's (1994) terminology, mechanisms that provide assurance

[20] Yamagishi and Yamagishi (1994) posit, for example, that Americans are more prone to trust than the Japanese in the sense of expecting people to behave benevolently even when it is not in their interest to do so (i.e., even when the structure of the situation does not assure benevolence will also be individually rational). Also see Buchan et al (2000). Hofstede (1991) also identifies what appear to be culturally shared traits (e.g., individualistic versus collectivist attitudes) which could promote or discourage willingness to trust.

1990 and 1995) may suggest that these cultural propensities are quite stable and not amenable to either unintended or intended manipulation.[21]

Yet a third, and again not mutually exclusively, interpretation of responses to the WVS question about trust is that it is signaling not only an attitude regarding willingness to trust people but also a willingness (or unwillingness) to trust technologies. Hofstede (2002) presents evidence showing that adoption of communications technologies is influenced by some of the same cultural characteristics thought to influence expectations regarding the benevolence of others that is consistent with this hypothesis.

Finally, recent research questions whether the answers to the WVS trust question reflect respondents' expectations regarding others at all. Glaser et al (1999) had Harvard undergraduates play a simple trust game. In this game, one player (the sender) receives $15. He or she then decides how much of this money to send to a second player (the recipient). Any amount sent is doubled by the experimenter. The sender knows that the receiver will have the option of sending some portion of the money he or she receives back to the sender but is under no obligation to do so. As such, to justify sending money the sender must trust that the receiver will behave benevolently and send money back. In addition to playing the game, participants filled out a questionnaire which included the WVS trust question. Glaser et al (1999) examined the extent to which an individual's response to this (and other questions) predicted the amount the subject sent – a revelation of how trusting the person is. It turns out the responses to the trust question don't predict amounts sent but do predict amounts sent back when the respondent is in the position of

[21] Inglehart, in Warren (1999), notes that cultural characteristics reflected in the WVS are stable over time although he also notes exceptions. For example, in the US in 1960, 58% of respondents to the WVS thought people could be trusted, whereas in 1995, the percentage had declined to 35%.

player 2. Stated somewhat differently, answers to the WVS question reveal the trustworthiness of respondents rather than how trusting they are.

To the extent that we wish to construct policies to promote trust, understanding what our measures of trust are, in fact, reflecting is going to be crucial. Glaser et als' (1999) work highlights the fact that careful experimentation and analysis can accomplish this goal.

VI. Conclusions

Trust has been found to have a direct influence on economic growth across countries through its impact on transactions costs. In this paper, we conjectured that trust may also have an indirect impact on economic growth across nations with the Internet impacting growth rates and trust impacting adoption of the Internet. Our results suggest that trust does, in fact, influence Internet adoption. Since low trust countries tend to be low or middle income countries, this will result in a digital divide between these countries and higher-trust, higher-income ones. To the extent that the level of Internet adoption influences economic growth, this digital divide will translate into a developmental divide. How large this divide will be is, at present, unknowable. It seems safe to assume that any growth dividend accruing from the Internet increases at least linearly as Internet adoption rises. If network effects are relevant, then the relationship between Internet penetration and a growth dividend will be increasing in the level of adoption. While policies designed to encourage trust among low trust nations would seem to be a means of mitigating these digital and developmental divides, the implications of our comparative static analyses are not encouraging -- high trust countries

benefit more from such policies. Of course, it is possible that there are policies that might effectively and significantly increase trust at low cost. Further research to understand what trust measures are revealing will be needed to determine what such policies might entail.

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Figure 1: Internet Adoption versus Trust

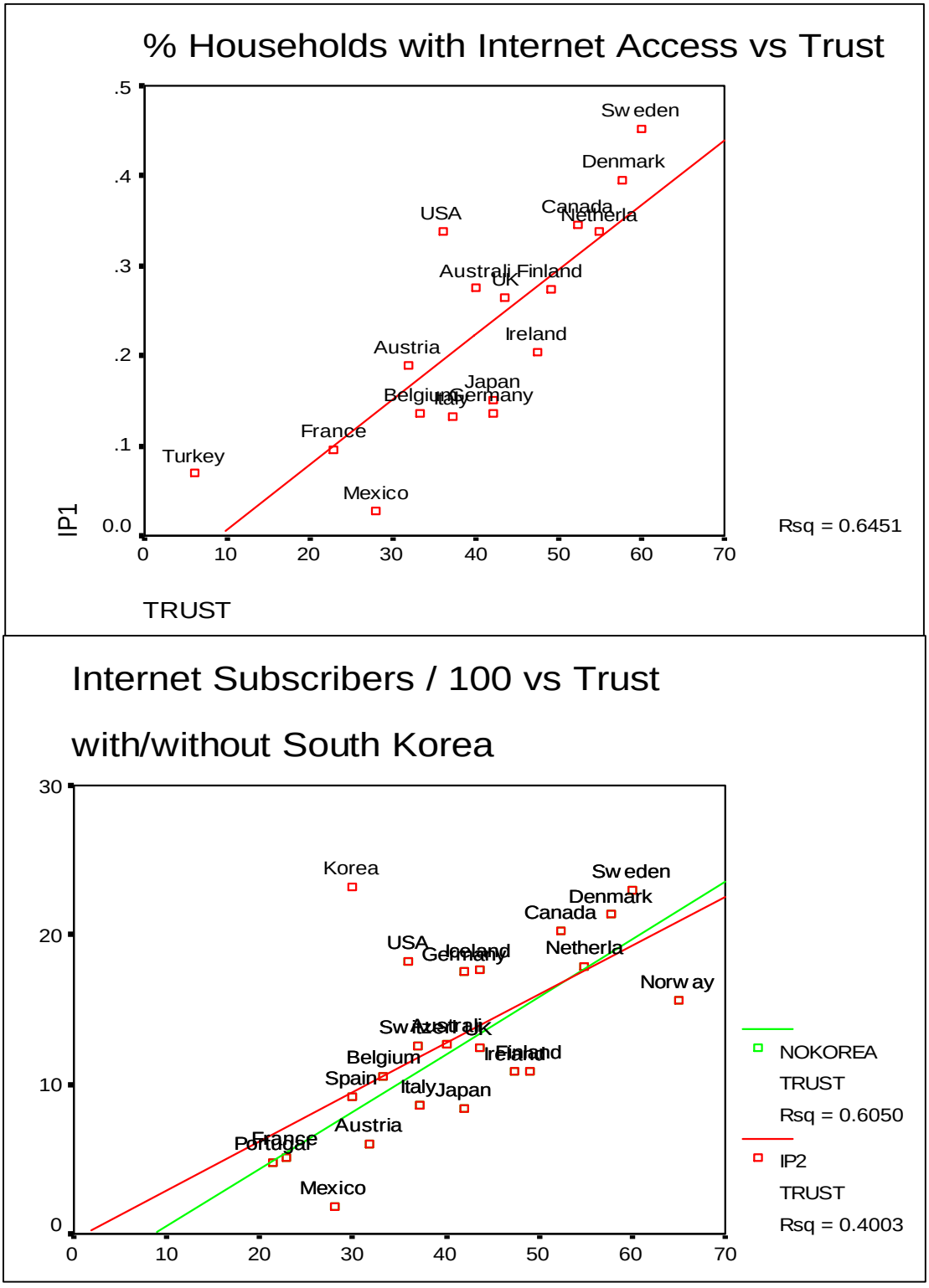

Figure 2: Internet Subscriber (IP2) Growth Rate Resulting From A Trust Growth Rate of 5% Per Year

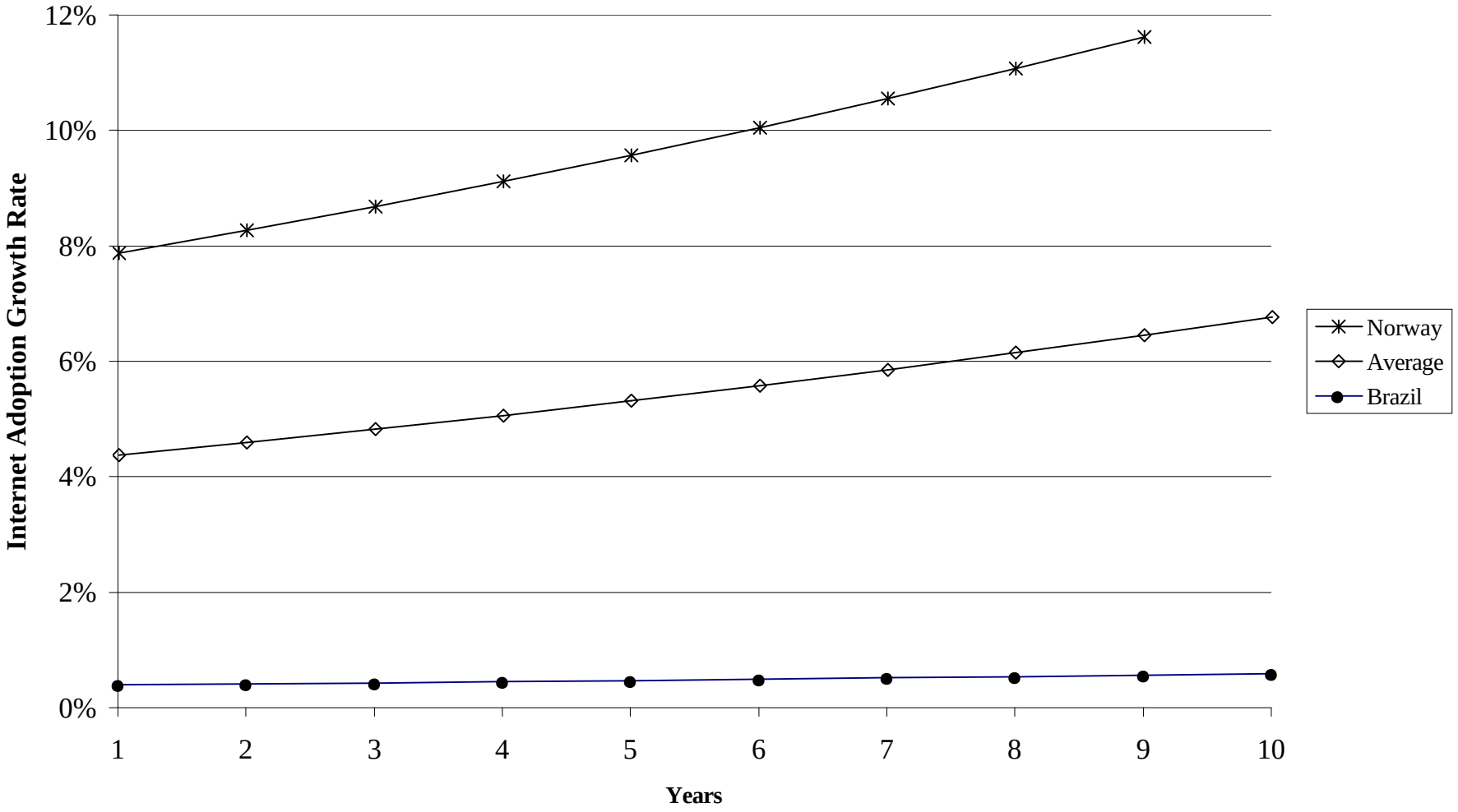

Table 1: Variables and Values

Country	Households with Internet Access	Internet Subscribers per 100	Trust	Per capita Income (1,000s)	Average Internet Access Price	Percent Population 65 and older	Average Years of Education	Percent Urban	Phone lines per 1000	PCs per 1000 Population
	IP1	IP2	Trust	Income	Int. price	Age	Education	Urban	Lines	PC
Argentina	.	.	18%	$7.77	.	13	8	89%	184	36
Austral.	28%	13	40%	$21.17	$ 38.65	16	10	85%	510	367
Austria	19%	6	32%	$27.19	$ 73.51	21	8	64%	482	207
Belgium	14%	11	33%	$25.87	$ 72.84	22	9	97%	485	248
Brazil	.	.	3%	$4.35	.	8	4	80%	112	26
Canada	35%	20	52%	$19.97	$ 29.93	17	11	77%	625	286
Chile	.	.	21%	$4.62	.	10	8	85%	174	46
Denmark	40%	21	58%	$32.94	$ 54.15	20	10	85%	642	345
Finland	27%	11	49%	$24.03	$ 30.88	20	10	66%	550	305
France	10%	5	23%	$25.10	$ 54.06	21	8	75%	569	171
Germany	14%	18	42%	$27.61	$ 64.59	23	10	87%	552	240
Iceland	.	18	44%	$27.34	$ 32.71	15	8	92%	614	289
India	.	.	38%	$0.41	.	8	4	27%	19	2
Ireland	20%	11	47%	$19.19	$ 78.75	15	9	58%	414	262
Italy	13%	9	37%	$20.08	$ 48.78	24	7	67%	447	131
Japan	15%	8	42%	$36.78	$ 59.12	23	9	78%	524	202
S. Korea	.	23	30%	$10.00	$ 37.04	11	10	80%	431	148
Mexico	3%	2	28%	$3.92	$ 65.09	7	6	74%	100	34
Neth.	34%	18	55%	$26.07	$ 48.84	18	9	89%	566	280
Norway	.	16	65%	$34.08	$ 47.53	20	12	74%	630	360
Portugal	.	5	21%	$10.86	$ 66.75	21	5	60%	398	74
S. Africa	.	.	16%	$3.54	.	6	8	50%	112	42
Spain	.	9	30%	$14.91	$ 78.32	22	7	77%	401	94
Sweden	45%	23	60%	$26.81	$ 36.89	22	11	83%	676	346
Switzerl	.	13	37%	$41.48	$ 66.40	21	10	68%	665	380
Turkey	7%	.	6%	$2.99	$ 54.14	8	5	72%	243	22
UK	27%	12	44%	$21.36	$ 49.65	21	9	89%	538	246
USA	34%	18	36%	$29.97	$ 31.71	16	12	77%	640	413
Mean	23%	13	36%	$19.66	$ 53.06	17	8	75%	439	200
Maximum	45%	23	65%	$41.48	$ 78.75	24	12	97%	676	413
Minumum	3%	2	3%	$0.41	$ 29.93	6	4	27%	19	2
n	17	22								

Table 2: Internet Penetration Regression Results

	Average Percentage of Households with Internet Access (IP1)		**Internet Subscribers per 1000 (IP2)**		**Internet Subscribers per 1000 (IP2, excluding Korea)**	
	All Regressors	Stepwise	All Regressors	Stepwise	All Regressors	Stepwise
(Constant)	*-2.308*	**-4.015**	-6.5410	**-4.8590**	**-6.0500**	**-5.4380**
Trust	**0.0223**	*0.0176*	0.0128		**0.0199**	**0.0215**
Income	-0.0124	*-0.0302*	**-0.0456**	**-0.0375**	**-0.0345**	
Int. Price	-0.0024		0.0084		0.0066	
Age	-0.0315		-0.0086		0.0206	
Education	-0.2170		0.1310	**0.1480**	-0.0233	
Urban	-0.0062		0.0133		*0.0125*	*0.0119*
Lines	**0.0043**	**0.0036**	**0.0052**	**0.0046**	**0.0034**	**0.0030**
PC	**0.0052**	**0.0033**	-0.0005		0.0027	
N	17	17	22	22	21	21
Adj. R^2	0.87	0.87	0.70	0.69	0.85	0.82

Coefficients in bold significant at .05 level

Coefficients in italics significant at .10 level

Table 3: Elasticities of Adoption with Respect to Trust

Country	Trust	IP1	IP2
Brazil	3%	0.053	0.064
Turkey	6%	0.105	0.129
S. Africa	16%	0.281	0.343
Argentina	18%	0.316	0.386
Chile	21%	0.369	0.450
Portugal	21%	0.376	0.459
France	23%	0.400	0.489
Mexico	28%	0.492	0.601
S. Korea	30%	0.527	0.644
Spain	30%	0.527	0.644
Austria	32%	0.558	0.682
Belgium	33%	0.583	0.712
USA	36%	0.632	0.772
Switzerl	37%	0.650	0.794
Italy	37%	0.651	0.796
India	38%	0.667	0.815
Austral.	40%	0.702	0.858
Germany	42%	0.738	0.901
Japan	42%	0.738	0.901
Iceland	44%	0.766	0.935
UK	44%	0.766	0.935
Ireland	47%	0.832	1.017
Finland	49%	0.860	1.051
Canada	52%	0.920	1.124
Neth.	55%	0.964	1.178
Denmark	58%	1.013	1.238
Sweden	60%	1.054	1.287
Norway	65%	1.141	1.394
Mean	36%	0.631	0.771
Maximum	65%	1.141	1.394
Minumum	3%	0.053	0.064