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Impact of the Prevailing Internet on International Trade in Asia

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Abstract

This article provides empirical evidence for the relationship (1) between the prevailing Internet and international trade and (2) between the prevailing Internet and economic growth in Asian countries. The empirical results show that Internet promotes international trade both in developed countries and developing Asian countries; however, the effect is larger in Asian countries. The Internet can increase economic international trade; on the other hand, it has not necessarily been linked to economic growth. If countries seek to enhance international trade and economic growth, they need to implement specific policies that facilitate investment in information and communications technologies (ICT) to encourage efficient and effective economic growth. A digital revolution can form the foundation of a sustainable global economy. It is important to respond to this opportunity.

Keywords: Asia, economic growth, host, international trade, ICT, Internet

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Introduction

The Internet has been established all over the world and has overcome many trade-related barriers. Moreover, the Internet has reduced time and the disadvantage of location and has promoted efficiency in many fields. Many studies have been presented about the validity and possibilities of the Internet beyond academic analysis. The use of the Internet allows many possibilities.

The percentage of individuals who use the Internet continues to grow worldwide and by end 2011, 2.3 billion people were online users. In developing countries, the number of Internet users doubled between 2007 and 2011, but only a quarter of inhabitants in the developing world were online users by the end of 2011. The percentage of individuals who use the Internet in the developed world was about 70% by the end of 2011. In Iceland, the Netherlands, Norway and Sweden, more than 90% of the inhabitants are online. However, by the end of 2011, 70% of the total households in developed countries and only 20% of those in developing countries had Internet access. Some outstanding exceptions include Lebanon and Malaysia, with 62% and 61% of households with Internet respectively (International Telecommunication Union [ITU], 2012). It also should be noted that most countries have seen significant improvement in GDP via ICT (Amiri and Oliphant, 2012).

Many studies have indicated that the Internet promotes international trade by using trade opportunities. Also, economic growth theories show that economic growth occurs as a result of investments in ICT. Studies such as Rauch (2001), Rauch and Trindade (2002), Frend and Weinhold (2002, 2004), Swenson (2004), Albuquerque et al. (2005), Greaney (2005, 2009), Choi (2010) are examples. However, Hakanson and Dow (2012) confirmed that the impact of geographic distance has increased largely for homogenous goods, whereas for more

differentiated goods, it has decreased slightly. However, few studies have examined the relationship between the Internet and trade as not many years have elapsed since the Internet was introduced.

In general, studies conducted in the 1980s and 1990s showed that the relationship between ICT productivity and economic growth was small (Roach, 1991; Jourgenson et al., 1999; Oliner et al., 2000). Oliner and Sichel (2000) and Jorgenson (2001) employed a growth-accounting framework in which they separated ICT capital from non-ICT capital and focused on business cycles. Moshiri and Jahangard (2004) studied the case of Iran and found that there was no significant relationship between ICT and economic growth.

Some studies have shown an unclear relationship between ICT and economic growth. Mankiw et al. (1992), Pjola (2001, 2002) confirmed that the effect of ICT on growth was significant and positive in high income countries and positive but not significant in developing countries. Dewan and Kraemer (2000) found that the gap is the result of low levels of IT investment in developing countries and also a lack of complementary assets such as knowledge-based structures for the development of the use of IT goods. Freund and Weinhold (2004), Clarke and Wallsten (2006) and Vemuri and Siddiqi (2009) examined the impact of Internet use on international trade and found a positive relationship between Internet use and trade; however, the effect was not uniformly strong for all regions. Jorgenson and Vu (2005) showed that the effect of the amount of investment in IT on economic growth is striking in all countries but especially in industrialized economics and developing areas in Asia. Clarke and Wallsten (2006) and Clarke (2008) showed that the effect is much stronger in developing countries than in developed countries. Noh and Yoo (2008) and Choi and Hoon (2009) found similar results.

Brynjolfsson (1993), Bharadwaj (2000), Melville et al. (2004), Banker et al. (2006), and Karimi et al. (2007) showed a positive and significant correlation with economic growth at various levels for regions and countries. Nours and Satti (2002) found that ICT expenditures had a positive impact on economic growth in many cases. Clarke and Wallsten (2006), Freud and Weinhold (2004), and Vemuri and Siddiqi (2009) examined the impact of Internet use by using international trade theoretical models and found a positive and significant relationship between Internet use and trade. Choi and Hoon (2009) supported the view that economic growth is positively correlated with Internet use. Nasab and Aghaei (2009) showed that the effect of ICT on economic growth is positive and significant. Meijers (2012) found that Internet use impacts economic growth. Jorgenson et al. (2008), Ark et al. (2008) and Oliner et al. (2008) confirmed that ICT have a positive impact on economic and labor productivity growth and on total factor productivity growth. Roller and Waverman (2011) and Czernich et al. (2011) indicated that the use of the Internet not only induces temporary growth toward a higher growth level but also introduces the possibility of permanent higher growth rates as the R&D process is affected.

This article is based on Lee (2012), which used data from OECD countries. The gravity model is used to study the relationship between the Internet effect and international trade.

Few studies have examined the relationship between Internet growth and economic growth. Also, empirical studies have had mixed results, depending on the research method employed and geographical configuration considered.

This article is structured as follows. After this introduction, section 2 provides a theoretical model for empirical estimation. Section 3 shows the empirical results and analyzes them. Finally, this article ends with a brief summary.

Theoretical model for empirical estimation

This article employs a gravity model. The gravity model of international trade states that bilateral trade flows are based on the economic sizes (often using GDP) and distance between two units (countries. This model for bilateral trade states that the international trade between two countries is proportional to the product of the two countries' GDPs and inversely proportional to their geographical distance.

The model also has been used repeatedly in international relations to examine the effectiveness of currency unions and regional agreements (see, for example, Feenstra (2004), Rose (2007), Liu (2009), Debasri and Pozo (2011), and Kurihara (2011)). The model is often extended by including variables to explain language relationships, contiguity, colonial history, exchange rate regimes, and other variables.

The gravity model has been introduced and cited many times. Not only academic fields but also real-world researchers have stated that patterns of trade are determined by aggregate preferences for goods within countries. Krugman (2001) stated that if trade encourages greater specialization in production, industry-specific shocks may cause members' business cycles to diverge and that comparative advantages do not anticipate the relationships in the gravity model. Alternatively, Baldwin (2006) showed that greater trade integration may correlate with national incomes.

The dependent variable is bilateral trade volume (export plus import) between two countries. The independent variables are GDP, distance (between the capitals), and the number of Internet hosts. GDP and distance are often used in gravity estimations.

This article uses the following gravity model equation:

$$\log (TRADEij) = \alpha 1+\alpha 2 \log (INTERNETi\times INTERNETj) +\alpha 3 \log (GDPi\times GDPj) +\alpha 4 \log (DISTANCEij)+uij$$

where TRADEij are the sum of bilateral trade from country i to j and that from country j to country i. INTERNET presents the number of Internet hosts in each country, i and j. GDP means GDP of each country of i and j. DISTANCE means the physical distance between the capitals of country i and country j.

The main focus is the coefficient $\alpha 2$. $\alpha 2 > 0$ is expected, moreover, not only the sign but also the absolute value are examined.

The existence of unobservable country-specific effects and also lagged dependent variables among the explanatory variables reduce explanatory power or problems for empirical analysis. The gravity model could be one solution, and the number of independent variables that explain international trade is limited.

In the next section, empirical analysis is performed and examined.

Empirical results

The 2005 and 2010 data for developed and developing economies are examined. The classification is from IMF's (International Monetary Fund's) for countries. One is *advanced economies* and the other is *developing Asia*. However, the Czech Republic (advanced economies) and Bhutan, Kiribati, Democratic Republic of Timor-Leste, and Tuvalu (developing Asia) are excluded because of data availability. The countries used for the empirical analysis are noted in the Appendix. The data for trade volumes are from Direction of Trade Statistics (IMF), the numbers of hosts are from *World Factbook* (CIA), GDPs are from International Financial Statistics (IMF), and the distance between capitals are from Auroral Rays (http://chihuahua.s171.xrea.com/).

The results are reported in Table 1.

Table 1 Cross-country gravity regressions for trade

	2005		2010	
	Asia	OECD	Asia	OECD
Intercept	4.641***	-1.180***	-1.199***	-1.391***
	(0.000)	(0.000)	(0.000)	(0.000)
GDPij	0.648***	0.630***	0.651***	0.652***
	(0.000)	(0.000)	(0.000)	(0.000)
Distanceij	-0.840***	-0.835***	-0.841***	-0.765**
	(0.000)	(0.000)	(0.000)	(0.012)
Internetij	0.044***	0.053**	0.062***	0.062***
	(0.001)	(0.022)	(0.000)	(0.009)
Adj.R2	0.841	0.843	0.840	0.836
F	154.29	156.02	153.27	152.95
	(1)	(2)	(3)	(4)

Note. Parentheses contain *p* values. ***, **, and * are significant at 1%, 5%, and 10% respectively.

For the Internet, the coefficients of (1), (2), (3), and (4) are positive and significant, which is consistent with previous studies (see Freud and Weinhold, 2002, 2004; Greaney, 2005, 2009). The Internet produces a strong network effect on international trade. The coefficients were larger for Asia than for the OECD in (1) and (2); however, they were almost equal in Asia and OECD in (3) and (4). The change rates of the coefficients are larger for Asia.

The effect of distance has been decreasing in the OECD [see (2) and (4)]. For 2010, the variable was not significant at the 1% level as in Kurihara (2003). As noted in Brooks and Benno (2011), one reason is that trade costs have declined. Alternatively, improvements in ICT may have contributed greatly. ICT promotes international trade while decreasing costs and time.

Finally, the growth rate of per capita GDP was regressed. The coefficient of (1)~(4) are -0.005, 0.018, 0.016, and 0.015; however, all of them are insignificant.

Conclusion

This article examined whether or not the Internet has increased international trade. The study shows a strong relationship between networks and international trade. ICT can play an important role in international trade.

Ziesemer (2002), Stevenson (2008), and Levin (2011) showed that Internet use affects markets such as labor markets by reducing costs and facilitating access to information. Moore et al. (2009) showed that the Internet also has impacted society in a less positive way, as, for instance, online crime is spreading rapidly. Investment in ICT infrastructure and promotion of educational programs geared toward the increase of knowledge and skills in the use of ICT are necessary. If countries seek to enhance economic growth, they need to implement specific policies that facilitate investment in ICT to promote efficient, effective economic growth. For these points, further research is needed.

This research did not find any evidence, however, that ICT can play a vital role in the pathway to economic recovery. A digital revolution can form the foundation of a sustainable global economy. Causing economic growth from the development of ICT is necessary.

Appendix

Advanced economies (34)

Australia, Austria, Canada, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong SAR, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, San Marino, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Taiwan Province of China, United Kingdom, United States

Developing Asia (24)

Afghanistan, Bangladesh, Brunei Darussalam, Cambodia, China, Fiji, India, Indonesia, Lao P.D.R., Malaysia, Maldives, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Samoa, Solomon Islands, Sri Lanka, Thailand, Tonga, Vanuatu, Vietnam

Trade partners excluded because of data availability

Czechoslovakia, Guadeloupe, Guiana, Luxembourg, Martinique, Réunion, Serbia Montenegro, Yemen, Yugoslavia

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