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The impact of the Internet on global industry: New evidence of Internet measurement☆

Ting Ting Huang[a,*], Bruce Qiang Sun[b]

[a] University of Pittsburgh, 4901 Wesley W. Posvar Hall, Pittsburgh, PA 15260, United States
[b] SUNY Buffalo State, Bishop Hall 301, Buffalo, NY 14222, United States

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ABSTRACT

This paper presents a new way to measure the diffusion of the Internet, using a panel of 10 countries. Different from the previous literature, we use city-level daily databases, downloaded from Cooperative Association for Internet Data Analysis (CAIDA), to construct weekly data across countries. The determinants of Internet cross-traffic traveling are studied using several attributes which offer new opportunities to define network construction and information technology. With the Swiss KOF Globalization Index, this data can be used to reevaluate financial services and business marketing, political interaction and social emergence, and globalization. The major findings are that a significant and positive relationship exists between Internet distance and the different globalization indexes: economic and financial globalization, political globalization, and social globalization. The Internet flows ahead of globalization. The dynamic panel causality analysis demonstrates further empirically the causality of the Internet diffusion on the different indexes of globalization.

1. Introduction

Since the end of the last century, the world has seen many technological innovations, resulting in economic growth and more and more global interactions across countries. There has been a deep and dominant change in financial and social development. The Information Technology (IT) industry, which stimulated great amounts of research concerned with the *new definition of globalization*. Clarke and Wallsten (2006) defined globalization to be the process of creating bridges of connections among agents at multi-continental distances, mediated through a variety of flows including people, information and ideas, capital and goods. When looking at the pattern of the GDP, the growth rate of GDP, or the business cycle, all evidences have shown to this point a comprehensive and continuable influence of the Internet. Most economists agree on the idea that the spike-format increase in the IT industry has triggered this long-term growth since 1990s.

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* Corresponding author.
E-mail address: tingehuang@hotmail.com (T.T. Huang).

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The core question posited by this paper is: Does the Internet contribute to globalization, as measured by the Swiss KOF index? The hypotheses can be simply stated as the following: The Internet is expected to flow ahead of globalization, and its flow is not a concurrent movement with globalization. We expect the relationship between the diffusion of the Internet and globalization to be positive. The influences of the diffusion of the Internet on economic and financial globalization, social globalization, and political globalization are everywhere. The basic evidences are the following: First, the Internet impacts trade of both goods and services. Trade of goods will be affected because Internet technology makes the development of global markets for goods possible, but trade of services will be impacted because new services, which are transmittable via the Internet, can now be traded almost at no cost, irrespective of location. The Internet is therefore likely to have a relatively greater effect on the volume of trade in services. The global market, which concentrates on numerical transactions, gets the greatest jump across different markets, such as VoIP phone service, online TV, Telecom, computer goods and services, and financial on-line services in all industries. And due to the tremendous Internet data-dealing systems, the Internet also greatly improves the methods and environment in education institutions and research centers, allowing for availability of continuous 24-h numerical information. Second, the Internet is likely to decrease the costs of gathering and communicating information. The benefits from increased communication are likely to be larger for more fragmented and less organized groups. Furthermore, researchers (Ward, 1996; Clarke and Wallsten, 2006; Wagner and Leydesdorff, 2006) have pointed out that an increase in the availability of information through the Internet's lowering of communication costs implies changes in political outcomes. Finally, the evaluation of institutions and government policies gains new meanings. Besides previous testing possibilities, there are other characteristics, such as accessibility, completeness, efficiency, quality, transparency, and timing. Information comes in may different forms: facts, opinions, stories, interpretations, statistics, etc., and it is created for many purposes. Information exists on many levels of quality or reliability. The time when information is released can be a sign of its credibility. Influenced by the current environment of Internet and informed by the tools of information technology in the last decade, the government strives to prove responsibility and accountability, to maintain transparency and fiscal integrity, to sustain the public trust and to react quickly to the response from industries, while still confronting the rapidly changing and oftentimes threatening financial and economic, political and social environment in which countries work together to serve the world and population. It could be estimated that the faster the Internet develops, the more quickly the information can be transferred, and the more information packets can be sent through different monitors. The Internet allows information to be more quickly transferred, helping the government achieve their goals.

In this paper, we present a new way of measurement for diffusion of the Internet, and are the first to set up a unique and valuable dataset, using a panel of 10 countries examined from 1998 to 2008. Different from the previous literature, this project uses city-level daily databases from CAIDA(The Cooperative Association for Internet Data Analysis). CAIDA has developed a special tool, Skitter, which actively probes forward IP paths and round trip times (RTTs) from a Skitter host to a specified list of destinations. Thus we can construct the yearly, monthly, and weekly datasets of Internet across countries from Skitter. In investigating the Internet's influence on the cross-country data of globalization, the determinants of Internet cross-traffic traveling consist of several attributes which capture the stability and efficiency of the information traveling and characterize the macroscopic connectivity and performance of the Internet. Unlike World bank datasets, which are the only valuable resources so far for economists to investigate the behavior of the Internet in recent research, the data we gathered from CAIDA characterizes the macroscopic connectivity and performance of the Internet, allowing various topological and geographical representations at multiple levels of aggregation granularity, which provides valuable input for empirically-based modeling of Internet behavior and properties. In other words, CAIDA research provides a new and efficient way to gain insight into the complexity of a large, heterogeneous and dynamic worldwide topology. It's obvious that there are broad ranges of applications to this unique database. In this paper we developed a parallel processing computational statistics method interpreting the Internet trafficing data from 20 cities around the world in a period of 10 years. This allows us to compare the degrees of changes in globalization over a large number of countries before and after the beginning of the century. This paper also contributes to two strands of the international integration literature. First, when combined with the Swiss KOF Globalization Indexes, this new datasets can be used to reevaluate business service, political interaction and social emergence, and globalization. This data is a new form of evidence to support the Swiss KOF Globalization Indexes. Second, under this new measurement of the Internet, a significant and positive relationship can be found between Internet distance and the different globalization indexes: financial and economic globalization, political globalization, and social globalization. The Internet flows ahead of globalization. The dynamic panel causality analysis demonstrates further empirically the causality of Internet diffusion on the different indexes of globalization, especially the social globalization. The shock from the annual cycles can be forecasted, and we show that prompt reflection can be traced using the traffic fluctuations.

2. Literature review

With the development of the Internet, network construction, and information technology, we are in a position to talk about "globalization" in a new light. Many previous studies focused on the development of technology, financial activities, and trade volume, based on national-level numerical figures and graphs. When Abramson (2000) suggested Internet globalization indicators, Freund and Weinhold (2000, 2004a,b, 2011) stated that the Internet stimulates international trade. Concerned about the direction of causality between web hosts and trade flows, they found that countries with relatively more hosts would trade more, simply because they produce and consume a lot of high-tech products. The data in this paper was taken from the Internet Software Consortium (ISC). It was used to count how many web hosts were attributed to each