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**The Internet and Export: A Glimpse
from Selected African Countries**

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ABSTRACT

Rationale: This paper reports on a study of the effect of Internet use on exports in Africa. We adopt a panel data regression approach with data drawn from secondary sources on selected African countries. **Findings:** A 1% increase in Internet use is associated with a 2.2% increase in exports and this is indicative of the importance of the Internet in reducing the cost of exports of African economies. **Practical Implications:** Access to the Internet would increase export through a reduction in the entry and search costs associated with exporting from Africa.

KEYWORDS

Africa, Internet, Export, Country.

Introduction to Africa, Exporting and the Internet

Information Age gurus claim the Internet will alleviate global poverty, empower individuals, revolutionize commerce, and spread the light of democracy to the far corners of the globe. The Internet is a global, computer-mediated information resource and communication infrastructure

(Cox and Koelzer, 2003) and it allows tens of millions of people all over the world to communicate, share information and trade. The importance of the Internet for export firms in developing economy contexts like Ghana has been emphasized by scholars like Hinson and Sorensen (2006) who claim that in order to improve the e-competencies of Ghanaian export firms, resource limitations require that intermediate, partial and focused Internet adoption strategies be implemented, rather than national or even regional strategies. This assertion by Hinson and Sorensen (2006) is significant to the extent that the literature on Internet use claims for instance that the primary reason why African trade through the Internet has been limited is that the performance of many transactions (especially in relation to services) necessitates physical contact between producers and consumers, a condition that renders trade to distant locations in Africa infeasible (Department of Communication, 2000). No matter the barriers to Internet usage, the literature on Internet use for export captures several empirical records of how the Internet had improved the export enterprise.

Commerce that once took place in local markets now seamlessly occurs across most borders. Exporters connect to the Internet because it provides a relatively cost-effective method for international communications relative to international telephone calls or faxes: the local or domestic long-distance charges necessary to connect to the Internet are far lower than international rates, especially in developing countries. The Internet thus allows firms to perform certain activities at lower cost (Bacchetta et al 1998). Information technology and the Internet in particular, are causing fundamental changes in the economics of service industries as new network-based global e-commerce business models emerge and begin to dominate. The quality of future exports from African economies could also be improved by use of the Internet. The use of Internet could enable African exporters to adopt the application of modern risk assessment techniques and simplify customs controls. Internet use therefore can lead to considerable savings in overhead and sunk costs

for African exporters. Internet use could also cut interaction costs (the searching, coordinating and monitoring that people and companies must do when they exchange goods and services), resulting in significant savings to be shared by firms and consumers. In spite of these possible positive effects of Internet on exporting especially for African economies, there hardly exists a macro-level study on Internet use and exporting in Africa. This paper makes an important contribution to the literature, by testing empirically, the Internet use-export growth nexus for African economies. This paper sets out to answer the important research question:

Is there a relationship between increased Internet use and export enhancement in African countries?

The paper is set out as follows: part 1 addresses the issue of Africa, Internet and exporting whilst the second portion of this paper focuses on Internet use and development in Africa. The third section of the paper dilates on ICT infrastructure development and bandwidth cost in Africa. Section four of the study touches on the issue of legislative support for Internet development across Africa whilst section five of the paper introduces us to an overview of Internet use for export development. Section six of the paper discusses the theoretical framework adopted for the study whilst section seven introduces us to the methodology and empirical estimation adopted for the study. The final section of the paper showcases the study conclusions.

Internet use and development in Africa

Internet penetration in Africa has been very low compared to the rest of the world. Data from Internet World Stats 2009 (Table 1) shows that Internet penetration of Africa was 5.3% whilst the rest of the world had a penetration of 24.7%. Such low penetration rates appear to show little use of the Internet in Africa. These rates however mask substantial developments in Internet usage in

Africa. For instance, from 1994 to 2001, the number of Internet hosts increased from 17 per 10,000 people to 231 (International Telecommunication Union, 2003). The statistics in table 2 show tremendous growth in Internet usage in Africa. Internet use grew at 2843.34% on the average between 2000 and 2008. Even though the number of Internet users is still low in various individual countries, the phenomenal growth within the period shows the increasingly important role the Internet is playing in Africa. The Internet is progressively playing a pivotal role in the activities of African economies.

About 80 to 90 percent of Africa's email traffic is to and from outside of the continent. A business owner in Mozambique would spend US\$38,250 per hour all year round on telephone to talk to a UK partner. This same business owner would only need US\$1,328 for a computer, modem and Internet access, if the communication is via Internet. Similarly, in Tanzania, a small firm Tanzania Regent Clearing and Forwarding, has through the use of Internet systems reduced the cost of placing orders for products from USD500 to USD45 per month (Jensen 1998). Again, in Ghana there seems to be a conscientious attempt to use ICT as an engine of growth and as a means of diversifying from its traditional major exports, cocoa, gold and timber. The Ghana Export Promotion Council for instance has been charged to be at the fore-front of e-business development in Ghana's non-traditional export sector. Indeed businesses in Africa are increasingly using the Internet to exhibit and market their products internationally via various platforms such as the UN International Trade Centre's Virtual Handcraft Exhibition Centre. Moodley (2002) reports issues regarding Internet access to global markets from the standpoint of South African wood furniture producers. The Moodley article starts out with the assertion that Internet-based business-to-business (B2B) e-commerce promises to have profound impact on the economic relationship between the industrially advanced countries of the north and the less developed economies of the south. These cases of

Internet use in Africa show the important role the Internet is playing in African business- particularly the international trade sector

Table 1. Internet Usage

Region	Penetration (Population)
Total for Africa	5.30%
Rest of the World	24.70%
World Total	21.90%

Source: Internet World Stats (2009)

Table 2. Internet Use in Africa

Country	Use Growth (2000-2008)	Users in Africa
Algeria	6900.00%	6.90%
Angola	233.30%	0.20%
Benin	900.00%	0.30%
Botswana	433.30%	0.20%
Burkina Faso	700.00%	0.20%
Burundi	1900.00%	0.10%
Cameroon	1750.00%	0.70%
Cape Verde	362.50%	0.10%
Chad	5900.00%	0.10%
Comoros	1300.00%	0.00%
Congo	13900.00%	0.10%
Congo, Dem. Rep.	45980.00%	0.50%
Cote d'Ivoire	650.00%	0.60%

Djibouti	685.70%	0.00%
Egypt	1815.60%	16.90%
Ethiopia	2810.00%	0.60%
Gabon	440.00%	0.20%
Gambia	2405.00%	0.20%
Ghana	2066.70%	1.30%
Guinea	525.00%	0.10%
Guinea-Bissau	2366.70%	0.10%
Kenya	1400.00%	5.90%
Lesotho	1650.00%	0.10%
Libya	2500.00%	0.50%
Madagascar	266.70%	0.20%
Malawi	830.00%	0.30%
Mali	431.90%	0.20%
Mauritania	500.00%	0.10%
Mauritius	290.80%	0.70%
Morocco	7200.00%	14.30%
Mozambique	566.70%	0.40%
Namibia	233.70%	0.20%
Niger	700.00%	0.10%
Nigeria	4900.00%	19.60%
Rwanda	2900.00%	0.30%
Sao Tome Principe	253.80%	0.00%
Senegal	1950.00%	1.60%
Seychelles	433.30%	0.10%
Sierra Leone	160.00%	0.00%

South Africa	91.30%	10.50%
Swaziland	320.00%	0.10%
Tanzania	247.80%	0.80%
Togo	220.00%	0.60%
Tunisia	1665.00%	3.50%
Uganda	4900.00%	3.90%
Zambia	2400.00%	1.00%
Zimbabwe	2602.00%	2.60%

Source: Internet World Stats (2009)

The Internet appears to be playing a vital role in African businesses. Almost all Sub-Saharan African economies have had substantial trade reforms and liberalization policies and these have yielded some appreciable increase in exports and made these economies open. However, there is still a shortfall in terms of Africa's export contribution to total world exports. For example, Africa's share in world merchandise trade, measured in value terms, has declined steadily since 1980, from around 6 percent to around 2% in 2002 (WTO, 2004). This low export performance is attributed to factors such as very high communication costs of trading. This study aims at ascertaining whether or not increased Internet use could bolster the export fortunes of African countries.

ICT infrastructure development and bandwidth cost

The race to build a West Africa fibre optic line promises to push international bandwidth prices to new lows (Southwood, 2008). The year 2009 could mark a major milestone in Africa's digital development. With the expected arrival of several key undersea fibre connections, the year 2009 could herald dramatic increases in available bandwidth and connection speeds (Cust, 2009). Four international fibre projects (Globacom's Glo 1, Mainstreet's Main 1, IWTGC's Infinity cable,

Infraco/DTI's Africa West Coast Cable) are racing to complete ahead of each other on the West coast of Africa to give some much needed additional capacity and price competition to SAT3. The expected drop in bandwidth prices could be spectacular. While these major developments take place on the West Coast, prices are expected to also fall to somewhere between US\$500-1,000 on the East Coast. Ethan Zuckerman reports there is a Sea COM cable that will be the first fibre line to reach east Africa, bringing online Kenya, Uganda, Tanzania, Mozambique, Rwanda, and their neighbours (Cust, 2009).

Currently, dedicated bandwidth price in Nigeria hovers around \$4800/Kbps (about N6.1m) for a month while in Ghana a month for a 1MB shared connection goes for no less than \$8,000. An E1 costs \$50,000 a month in Nigeria, Ghana and Benin but \$225,000 in neighbouring Cameroon and far away Angola. It is \$300,000 in South Africa with a more matured International bandwidth market (www.itedgenews.com). It must be noted that there is a relationship between infrastructural development in ICT and bandwidth costs. For instance, in Botswana the leading Internet service provider - BTC has slashed costs by 64 percent due to expansion in the capacity of its bandwidth (www.allafrica.com). In development terms, faster, cheaper Internet connectivity, combined with technologies such as WiMAX and mobile connectivity mean the democratization of the Internet is a step closer to reality for many Africans (Oruame 2008). There are broader implications for economic growth across the continent and the realization of ICT-based business opportunities are hampered by bandwidth bottlenecks. Better digital connectivity, as well as saving the respective economies millions in excessive bandwidth costs, opens up new opportunities in communications and information technologies that shift the continent a few digital metres closer to the rest of the digitally connected globe. Hence the current expansion in ICT infrastructure development could lead to significant effects on the costs of Internet services.

Legislative support across countries

The development of e-Policies and e-Strategies within the global network economy has today become strategic indicators upon which governments, the private sector and development partners make their investment decisions. Within this broad background, steps are being taken by various African countries to remove obstacles to ICT development. In this respect, many African countries are developing their country specific ICT policies and strategies to create the enabling environment to promote the use of ICT in governance, education, health, trade, commerce and agriculture to mention but few in a competitive terrain (Oquaye, 2006).

Evidence of government's support for the ICT sector from Benin suggests that in 2003 the government implemented a national e-Policy, which sets out the country's vision and objectives to promote the use of information and communication technologies (ICT) across all sectors. This is rated as slightly effective and will be continued over the next two years (www.who.int). Botswana has also had an ICT policy since their 8th development plan (NDP8). The policy has been better articulated and its implementation begun in NDP9. The mere existence of an ICT policy indicates recognition of the importance of the ICT to the country's economic and social future as well as the need to address it at the appropriate level in the government (www1.american.edu).

In Ghana, the government has identified ICT as the driver and enabler of a sustained and coordinated socio-economic development. The Ministry of Communications is committed to facilitating the management of the convergence of ICT as tools to promote viable, integrated and accelerated national development within a global setting through the Ghana ICT4AD Policy

document. The government of Algeria has also placed weight on the development of ICT-related human resources by forming a committee in charge of defining the elements of an Algerian national information society strategy. The committee works on creating synergies among the different sectors in the area of infrastructure, training, and research as well as information systems and ICTs (Hamdy 2007).

An overview of Internet use for export Development

Eid et al (2002) conceptualized business-to-business international Internet marketing as comprising five categories; marketing strategy, website, global, internal and external related factors. They affirm the fact that firms can sustain their competitive advantage by leveraging the Internet to improve their international marketing posture. Doing business across multiple geographical borders is better facilitated by the application of Internet technologies. Moodley (2002) argues for example that Africa could exploit the opportunities offered by the website in order to be at par with the rest of the world in their international business activities and this is in spite of the fact that Sorenson and Buatsi (2002) have argued that African governments need to increase investments in Internet infrastructure if they want to see African firms move beyond the email stage of Internet utilization.

In relation to small exporting internationalizing firm Internet usage several scholarly contributions have been made. Conceptual contributions have been made by Anderson (2005) who constructed a framework for export intermediation and the Internet. His paper held implications for how export managers seeking to integrate the possibilities of the digital revolution in the organization of their export marketing activities could seek to go about it. Earlier Samiee (1998) had also made a conceptual contribution to the understanding of the relationship between exporting and the Internet. He explored the potential roles of the Internet in Marketing and examined the use of the Internet in

exporting in the light of exporter type and its development. These conceptual contributions to the exporting-Internet literature have been made in addition to other key empirical contributions to the global discourse on the subject.

Scholars like Nguyen (2007) have made new contributions to the Internet use in developing/transition economies with a study of the key factors that influence the utilization of the Internet by internationalizing firms in Vietnam. Bennett (1997) also investigated the experiences of Website use amongst UK businesses while Morgan-Thomas and Bridgewater (2004) researched the phenomenon of virtual export channels (VEC). In the review of all three conceptual and empirical papers, there is a dearth of studies that focus on a more macro understanding of how the Internet could improve the export propensities of a continent like Africa. A study of this nature is needed to better understand from a multi-country perspective, evidence on how the Internet can improve exports because:

(1) Exports are the mainstay of several developing economies including African countries and any technology or business process that improves exports from Africa is a welcome development.

(2) The literature offers contradictory views on whether African exporters can benefit from the Internet (see Moodley 2002, Hinson and Abor 2005; Hinson and Sorensen 2006) and therefore a study that moves beyond these firm level studies to understand the continental African picture should be welcome.

The Theoretical framework

The relevant innovation of the Internet is that, it lowers entry costs in a new market through organized exchanges with numerous buyers and sellers and through powerful search engines, which enable sellers and buyers to find each other at a low cost. Internet can reduce entry cost by reducing search cost. The Internet is likely to reduce this entry costs associated with imperfect information since networks can expand and information can be more easily exchanged. Freund and Weinhold (2004) develop a model with segmented markets and imperfect competition to demonstrate the effects of a reduction in fixed costs of entry. The Internet reduces the fixed-cost that firms face in markets with sufficient Internet penetration. *Ceteris paribus*, exports are greater when the fixed cost is lower (and Internet connectedness is greater) because more firms enter the foreign market.

The Freund and Weinhold (2004) model yields predictions about how the Internet will affect trade flows: Bilateral trade growth increases between two countries, with a growth in Internet connectivity. The Internet strengthens trade competition, and leads to greater import growth from more proximate countries, thus, increasing the effect of distance on trade. Finally, Internet development is likely to increase aggregate trade. Firms can use the Internet to unearth potential customers, sell products directly, bid for contracts, and communicate with customers and distributors Clarke (2008). The cost of engaging in the above without Internet access could be huge. The use of Internet for example, helped women in Guyana sell handcrafted hammocks at competitive prices Friedman (1999).

Freund and Weinhold (2002, 2004) find that there is a significant and positive relationship between Internet penetration and trade. Thus, exports grow faster with greater Internet use. Wallsten (2003) and Balamoune (2002) also find that Internet users made up a greater share of the population in developing countries that are more open to trade. Clarke and Wallsten (2004) find that higher

Internet penetration in developing countries is correlated with greater exports to developed countries. Therefore Internet access appears to stimulate exports from poor countries to rich countries. Using data on firms from Eastern Europe and Central Asia, Clarke (2008) also finds a strong correlation between exporting and Internet connectivity.

Empirical Estimation

Following Clarke and Wallsten (2004), we test for the effect of Internet use on exports using the following model

$$Exports_{it} = \alpha + \beta InternetUse_{it} + \delta Control_{it} + \varepsilon_{it} \quad (1)$$

Our model is estimated via panel data methods, where $\varepsilon_{it} = \nu_i + \eta_{it}$ ν_i are individual country effects. The sample consists of forty three African countries¹, selected on the basis of data availability for the period 1996-2006. The dependent variable is the value of exports of goods and services in constant 2000 US\$, Internet use is the proportion of Internet users per 1000 people. A priori, it is expected that an increase in Internet use reduces the cost of exporting and hence increases exports of African countries. Control, is a vector of control variables, which include GDP per capita in constant 2000 US\$, population in millions, land area in 1000s of square kilometres and the exchange rate. These variables control for stages of development and trade liberalization. The more developed an economy is, the more likely it is to utilize the Internet. Similarly, the more open an economy, the more likely it is to adopt Internet use. All variables are obtained from the World Development Indicators. A summary statistical description of variables used is given in table 3.

Table 3. Descriptive statistics of variables (panel statistics 1996-2006)

Variable	Mean	Std. Dev.	Obs
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¹ A list of the countries is provided in the appendix

Exports (Constant 2000 US\$)	3940000000	7680000000	458
GDP Per Capita (Constant 2000 US\$)	1016.721	1441.213	480
Internet (users per 1000 people)	13.24	27.99	463
Population (in millions)	15.739	1.54	480
Area (1000s of sq km)	12.092	2.018	528
Exchange rate	1331.398	7647.828	528

The model is run on both fixed and random effect, however post estimation tests, such as the Hausman test χ^2 (6.99) prob (0.136), suggest the random effects as a more suitable option. The model is therefore estimated via random effect. Two types of random effects are estimated, the traditional Swamy-Arora generalized least square random effect and the maximum likelihood estimates random effects. The idea is to examine the consistency and robustness of the specification and results. Finally, a Breusch and Pagan Lagrangian multiplier test for random effects, χ^2 (1157.6) prob (0.000) confirm robustness of the model and shows that the random effects specification is correct.

Table 4. Regression results

	Swamy-Arora Random Effects	MLE Random-Effects
GDP Per Capita	1.376*** (21.6)	1.372*** (21.61)
Land Area	0.003 (0.05)	0.005 (0.09)
Population	0.944*** (13.12)	0.94*** (13.34)
Exchange rate	0.056***	0.055***

	(3.56)	(3.5)
Internet use	0.022***	0.023***
	(2.1)	(2.15)
Intercept	-3.089**	-3.024**
	(-3.15)	(-3.11)
<i>Diagnostics</i>		
R^2	0.919	
Wald χ^2 (5)	902.44	
	[0.000]	
LR χ^2 (5)		383.37
		[0.000]
Observations	407	407

Notes: ***, ** indicate 1% and 5% level of significance respectively. Figures in parenthesis are z statistic scores, figures in square brackets are probability values of significance of chi squared tests. The regressions were run using natural logs of land area and population. The appropriateness of the Random-Effects was tested using Hausman and Breusch and Pagan tests. Results are as follows: Hausman test χ^2 (6.99) prob [0.136], Breusch and Pagan Lagrangian multiplier test for random effects χ^2 (1157.6) prob [0.000]

Our results which are consistent with that of others (Freund and Weinhold 2002, 2004 Clarke and Wallsten, 2004) show the presence of a significant and positive effect of Internet use on exports. A 1% increase in Internet use is associated with a 2.2% increase in exports from African countries- table 4. The increase in exports from Internet use comes from a reduction in entry and search costs associated with exporting from Africa. A reduction in these entry costs can help expand networks and also result in easy exchange of relevant trade information between an African exporter and an

international partner. Indeed, for first time small and medium scale exporters' Internet use leads to considerable savings in overhead and sunk costs. The use of Internet thus reduces the cost of exporting for African economies and is instrumental in increasing African exports. Internet use therefore strengthens trade competition and helps African economies have greater participation in international trade.

Turning to the control variables, apart from land area, all other control variables have a significant relationship with exports. An increase in per capita GDP increases exports; there is also a positive relationship between population and exports. These results confirm the use of GDP and population to proxy stages of development, thus more developed economies within the sample are likely to have greater Internet use. Finally, exports increase with exchange rate depreciation.

Conclusion

This paper investigated the effect of Internet use on exports in Africa. Results from a panel data regression estimate of selected African countries, show that a 1% increase in Internet use is associated with a 2.2% increase in exports. This result is indicative of the importance of the Internet in reducing the cost of exports and thereby increasing exports of African economies. Access to Internet would increase exports through a reduction in entry and search costs associated with exporting from Africa. Such costs in addition to others-communications costs are obstacles for exporting from Africa. A reduction in these entry costs can help expand networks and also result in easy exchange of relevant trade information between an African exporter and an international partner. For small and medium scale exporters in Africa, Internet use leads to considerable savings in overhead and sunk costs. The use of emails and web portals help reduce the cost of communicating via telephone as well as the cost of travelling for exhibition and marketing

purposes. Increased usage of Internet facilities therefore has potentials for increasing Africa's exports substantially.

It is however important to add that increased Internet usage requires some infrastructural development in the telecommunications sector. Even though the telecommunications sector in Africa is undergoing deep-going reforms, there is still low geographical penetration of telecommunications infrastructure, with more concentration in few big cities. Furthermore there is the problem of low or thin bandwidth links which hamper the speed of Internet connectivity in most African countries. For now the most serious constraints to Internet adoption is thin bandwidth, non-existing intra-regional connectivity and the low level and inefficient fixed lines network that is equally constrained by inter-exchange congestion. In addition, African countries suffer erratic power supplies while per capita electricity consumption is low (Oyeyinka and Adeya, 2002).

However, the importance of the Internet to African businesses and exporters in particular cannot be ignored; search and marketing costs are reduced, communication costs are reduced, and the route for payment shortened. Electronic invoices are raised and sent to buyers via emails. The Internet is therefore an important catalyst in boosting growth in the export sector. It is therefore important that infrastructural problems associated with Internet use are expeditiously dealt with by devoting substantial financing to their development. This will help increase further, the gains to be obtained from Internet use.

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