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GOODS FOLLOW BYTES

Investment in e-business could strengthen the EU's efforts to improve the integration of European product markets

Most of the public and academic debate on the economic effects of Information- and Communication Technologies (ICT) focuses on the implications of these technologies for productivity and employment growth. Recent research by DIW Econ indicates that this, however, is only part of the story. ICT may additionally facilitate physical trade in goods and products across national borders. In doing so, investment in ICT could provide a suitable policy tool to deepen integration within the EU Single Market and advance some of the major economic benefits it provides. This bulletin will describe how the relationship between e-business and trade has been determined empirically and what its implications are in practice.

ICT and International Trade

The use of ICT has picked up rapidly in the EU over the last ten years despite starting much later than its main trading partners in North America and Asia. ICT facilitated the exchange of information and therefore global e-business growth. This is particularly true for the last 10 years, when broadband technologies were implemented around the world. Its impact has been felt especially in the sector of e-commerce, which is that part of e-business that involves the usage of ICT to initiate or support the trade of goods and services. Concurrently, both the volume of intra-EU trade and the EU's international trade with its major commercial partners has more than tripled between 1995 and 2007. Yet although the growth in international trade and the development of ICT has occurred simultaneously, a formal link between them has not yet been established. This may be surprising, given the fact that there are good theoretical reasons to expect a positive relationship between ICT and international trade to emerge.

First of all, e-business in general should enhance trade as it reduces information costs, as well as search and transaction costs across international borders. This not only allows Business-to-Business (B2B) transactions to take place more easily, it also facilitates communication within multinational firms themselves.

Specifically e-commerce enables sellers to easily reach buyers in distant regions, including other countries, thereby increasing the size of the market and the possibility for international trade. This is particularly relevant for Business to Customer (B2C) relations. The success of online

retailing platforms, such as Amazon, is a case in point.
However, e-business can only work properly if all partners that are part to a transaction have a sufficient level of ICT development at their disposal. Economic theory therefore commonly suggests that ICT markets are strongly influenced by network effects, meaning that the value of a technology to its users is positively influenced by the total number of users of that technology. For example, the value of an electronic sales platform increases, the higher the total number of businesses that use this system. Due to these network characteristics, theory would predict that ICT enhances international trade if both trading nations possess a good level of ICT development.

Computing trade

Although the relationship between the development of ICT and the growth of trade is expected to be positive, this is not easy to measure and prove scientifically. First of all, establishing a simple trend for the entire EU between both variables over time is not enough. Trade takes place not on an aggregate scale, but between individual countries, so that a sensible approach should take effects that are specific to particular countries or time periods into account. Secondly, trade between any two countries may not only be affected by the degree to which they themselves employ ICT, but also by the degree to which other countries have made use of that technology. Therefore, the relative level of ICT uptake in any pair of countries in comparison to third countries may be more important than the absolute level. Additionally, care must be taken to distinguish between the specific trade-enhancing effects of ICT and the general trade-inducing effects of infrastructure improvements such as investment in roads or railway lines.
These pitfalls are circumvented by modifying an existing approach known as the 'gravity model'. This model relies on the premise that the trade volumes between two countries is positively related to the size of their respective GDP and negatively related to the distance between them. Adding variables for the level of ICT development and general infrastructure improvements then provides a method to precisely estimate the effect of e-business.

The degree of ICT development is measured by an index comprising three dimensions of ICT uptake: the level of ICT infrastructure, the availability of ICT-specific skills and the actual usage of ICT. The index is constructed individually for all EU-27 countries, except for Malta, Cyprus and Luxemburg, for the entire period of the analysis (1995-2007). Countries are then divided into two groups according to their degree of ICT development.

Delivering strong results

The results confirm the economic prediction that ICT has indeed enhanced trade within the EU over the period studied. Quantitatively, the analysis shows that trade flows between any two countries with good ICT development were 33% higher than between a country pair where one or both countries displayed poor levels of ICT development.
To increase the policy relevance of this result, we split up the broad 'ICT development' category into its three constituent components, namely ICT infrastructure, actual usage of ICT and the level of ICT specific skills in each EU-country. The outcome indicates that, once we control for the general level of infrastructure in a country, the degree of actual ICT usage is the most important determinant of trade flows. Specifically, a country pair where both trading partners display an above average level of ICT usage trades about 47% more compared to the case where both or one of the trading partners use ICT only to a limited degree.
Furthermore, the analysis strongly supports the network characteristic of ICT. Only the adoption or increased usage of e- technologies by both trading partners will exert a positive effect on their trade volumes.

Putting ICT to work

The strong positive effects of ICT on trade flows, as well as its apparent network characteristics, have sizable policy implications on both a national as well as on a European level. First of all, it should now be clear that the impact of ICT transcends its immediate effect on productivity and growth as it also encourages commerce on an international level. This offers an opportunity to realise gains from specialisation, such as

greater product variety, more competition and therefore increased firm efficiency. It will also facilitate the international convergence of prices, and ultimately facilitate deeper European market integration and hence the utilisation of economies of scale and scope.

These results might offer some cautionary support for policy makers to pay increased attention to ICT investment. Yet the rationale for a coordinated European response is even more compelling when considering the network effects of e-technology discussed above. The fact that ICT investments can only unfold their positive effects once implemented by all EU countries precludes a purely national solution and favours a European approach.

Indeed, a close look at the current levels of ICT uptake among European countries shows that there is still a lot of room for improvement. Whereas some countries, such as the Netherlands or the Scandinavian states display levels of ICT usage exceeding that of the most technically sophisticated nations in Northern America and East Asia, other European states continue to lag behind. This is especially true for many of the new accession countries in Central and Eastern Europe. For example, only 30% of the population in Romania accesses the internet once a month, compared to a figure of more than 90% in the Netherlands. Our analysis suggests that these disparities may be particularly worrying as they may be a factor retarding trade and market integration inside the EU. This ultimately hinders the new accession countries to catch up economically to the old EU-15 states.

However, our analysis also indicates that any policy, whether European or otherwise, should not merely focus on measures promoting investment in ICT infrastructure. As the actual usage of ICT turns out to be one of the most important causes of trade flows, efforts should also be directed towards encouraging the profitable use of existing infrastructure for e-business rather than simply expanding the number of broadband connections.

Conclusion

Our analysis indicates that efforts to transform the EU into an ICT-based 'information society' may encourage trade among its members and may therefore enhance market integration within the European Union.

We extend a standard 'gravity model' to take absolute and relative trade barriers, as well as investment into general infrastructure, into account. In doing so, we are the first to be able to quantify the positive effect of ICT on the physical trade in goods. Our results prove that the effect is considerable and significant, and is strongly dependent upon network effects. Moreover, the actual usage of ICT is a more important factor than investment in ICT infrastructure.

Ultimately, these outcomes offer some support for policy on a European level seeking to even out existing discrepancies in ICT usage between European countries.

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Our services

We provide economic expertise in areas such as…

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- Assessing perspectives of key economic sectors
- Forecasting future energy demand
- Assessing market regulations (third party access, licensing, competition, tariff setting)
- Strategic advice on market positioning
- Impact analysis of tax reforms
- Evaluation of labour market policies

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We are a 100% subsidiary company of the German Institute for Economic Research – DIW Berlin. To turn academic excellence into added value for our clients, project teams at DIW Econ include experienced consultants as well as scientific staff of DIW Berlin on a case-by-case basis. In this way we combine the relevant sector-specific know-how of our consultants with the theoretical foundation and the sound knowledge on economic modelling and empirical methodologies of world-class economists.

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