

The Benefits of ITA Expansion for Developing Countries

BY STEPHEN J. EZELL | DECEMBER 2012

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The Information Technology Agreement (ITA) has triggered rapid growth in trade in information technologies and communications (ICT) products and services, with developing countries' share of global ICT exports more than doubling since 1996. Expanding the ITA will further benefit developing countries by lowering the cost of ICTs that are critical inputs to making their manufacturing and services sectors more competitive; boosting productivity across all sectors of their economies; fostering innovation; boosting exports of goods and services; and thus playing a major role in spurring economic—and employment—growth.

INTRODUCTION

In December 1996, 29 World Trade Organization (WTO) member nations launched the Information Technology Agreement (ITA), a novel trade agreement in which participating nations completely removed tariffs on eight categories of information and communications technology (ICT) products (such as semiconductors, computers, and telecommunications equipment). These countries understood that the 21st century would be the era of information and communications technology, and that the ITA could play a vital role in promoting affordable access to these technologies for businesses and consumers.¹

Today, 75 nations are ITA signatories, and in its first decade and a half, the ITA has had a significant impact on expanding global ICT trade. From 1996 to 2008, total global two-way trade in ICT products covered by the agreement increased more than 10 percent annually, from \$1.2 trillion to \$4.0 trillion, with this growth bolstered not just by the growth of the ICT industry but also by liberalization of trade in ICT products. The considerable growth of trade in ICT products has been fueled in large part by growth in developing countries' exports. In fact, exports of ICT products tripled between 1996 and

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2010, reaching an estimated \$1.4 trillion in 2010 and accounting for 9.5 percent of world merchandise trade—a share exceeding that of agriculture (9.2 percent) and automotive products (7.4 percent).² And during that period, developing economies' share of global exports of ICT products has more than doubled—from 31 to 64 percent.³

At the same time, the ITA has empowered the formation of efficient global ICT supply chains, which have enabled a shift from a closed, linear innovation model to an open innovation model that relies on close collaboration among suppliers, network partners, and customers to bring breakthrough new ICT products to market.⁴ In short, the ITA has played a critical role in promoting ICT trade and investment, which in turn has driven innovation, boosted productivity, increased employment, accelerated economic growth, and produced prosperity for all nations.

Much has changed since the ITA first took effect, yet the product scope of the ITA has not been expanded since the agreement was launched in 1996. Even then, the initial ITA did not cover a number of core ICT products such as DRAMs (dynamic random access memory chips) nor dozens of every-day consumer electronic products, including many types of audio-visual equipment such as audio speakers, DVD players, and video recording equipment. Moreover, technology has since spawned the creation of hundreds of innovative new ICT products, everything from GPS systems and video game consoles, such as Microsoft's xBox or Sony's Playstation, to ICT-enabled remote home and patient monitoring devices as well as an entirely new class of semiconductor chips called multi-component (MCO) semiconductors, many of which are not covered under the ITA's tariff-elimination regime. Expanding the ITA would promote affordability and accessibility to a new generation of ICT products and further propel growth in global trade of these innovation- and prosperity-enhancing ICT products.

For all these reasons, it's time to expand the scope of the products covered by the ITA, which would yield substantial benefits by removing tariffs on a significant array of ICT products not covered by the agreement. In fact, an expanded ITA could remove tariffs on at least an additional \$800 billion in ICT trade globally, a 20 percent increase over the \$4 trillion now covered annually. This paper makes the case for ITA expansion by first documenting the central role ICT plays in economic growth and then explaining why ITA expansion is good for developing countries in particular and the global economy in general.

THE ROLE OF ICT IN THE GLOBAL ECONOMY

ICTs constitute one of the global economy's most important industries. In fact, global value-added by ICT industries more than doubled from \$1.2 trillion in 1995 to \$2.8 trillion in 2010 (see Figure 1), and today the ICT industry accounts for 6 percent of global GDP.⁵ ICT industries also account for a notable share of employment; for example, in 2010, ICT industries employed 5.8 percent of workers in OECD economies, a 13 percent increase over the 5.1 percent they employed in 1995.⁶ While the largest ICT firms are of course the most globally well known, the ICT industry supports a range of small to medium-sized enterprises (SMEs) and larger firms in its ecosystem. In fact, 95 percent of

firms in the United States' computer and electronics product manufacturing industry are SMEs (firms with less than 500 employees).⁷ A strong SME base is thus vital to the health of any nation's ICT ecosystem.

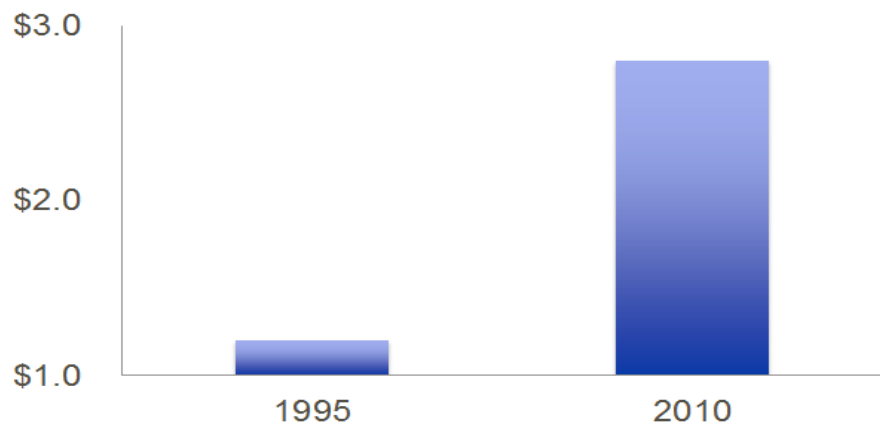


Figure 1: Global Value-Added by ICT Industries, 1995 and 2010 (\$ Trillions)

Yet ICTs' impact on the global economy goes far beyond the industry's direct contributions to GDP and employment, for ICT is the global economy's strongest driver of productivity and innovation in non-ICT industries.⁸ ICT achieves this status by virtue of being today's pre-eminent general purpose technology, or "GPT." GPTs, such as ICTs, are transformative "platform" technologies that share three key characteristics: 1) they are pervasive, touching all industries and sectors of the economy and society; 2) they simultaneously experience rapid performance improvements and price declines over time; and 3) they make it possible to invent and to produce new products (e.g., computer numerically controlled machine tools); processes (e.g., self check-in at airports); business models (e.g., e-businesses or business models based on fractional ownership or the simultaneous aggregation of supply and demand); and even fundamental new inventions (e.g., mapping the human genome).⁹

ICTs are so powerful precisely because they enhance the productivity and innovative capacity of every individual, firm, and industry they touch throughout economies—and this holds true for developed and developing countries alike.¹⁰ In fact, ICT workers contribute three to five times more productivity than non-ICT workers.¹¹ And this is critically important, for productivity increases are the way economies get rich. In Canada, ICT use has been associated with higher labor productivity in the industries that adopt it.¹² In the United Kingdom, innovation—so much of it enabled by ICT—has accounted for 63 percent of annual labor productivity growth since 2000.¹³ In Australia, ICT capital has been found to be more productive than other types of capital at the aggregate level in all industries.¹⁴ A 2007 World Bank survey of over 20,000 businesses in low- and-middle income countries found that firms that use more ICT have faster sales, employment growth, and higher productivity.¹⁵ In Chile, firms with greater ICT use achieved total factor productivity (TFP) 40 percent higher than those with lower ICT use.¹⁶ Research

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performed in 2011 by Oxford Economics confirmed that ICT continues to generate a bigger return to productivity growth than most other forms of capital investment.¹⁷ In other words, ICT is “super capital” that has a much larger impact on productivity than other forms of capital.¹⁸

ICT is just as vital to enabling innovation as to boosting productivity. For example, the OECD found that the probability of innovation in a firm increases with the intensity of ICT use, and that this held true for both manufacturing and services firms and for different types of innovation.¹⁹ Likewise, in the European Union, 32 percent of companies report being “active innovators,” with ICT enabling half of those firms’ product innovations and 75 percent of their process innovations.²⁰ As general purpose technologies, ICT products can increase not only productivity and innovation in traditional sectors of an economy, but they can also spur the creation of completely new business sectors, thereby generating economic growth and creating jobs.²¹ Firms which are the most ICT-intensive are 25 percent to 30 percent more likely to grow in terms of employment than low ICT-intensive companies.²² In the United States, companies that were “intensive users of ICT” grew jobs at a rate of 5.1 percent from 2001 to 2009 (even while overall employment shrank 5.1 percent over that timeframe).²³ Another study found that U.S. corporations investing more in ICT increased their workforces by 14 percent between 2006 and 2010, while the average increase for Fortune 500 firms was just 6 percent.²⁴ More generally, the McKinsey Global Institute finds that the Internet has created 2.6 jobs for every job it has destroyed.²⁵

The impact of ICT products and services on promoting commercial and quality-of-life-enhancing innovations in developing countries has been remarkable. In particular, the proliferation of mobile communications/computing devices has bolstered the productivity, efficiency, and innovative capability of citizens and businesses, inspiring a wave of mobile-phone enabled innovations in developing countries, as ITIF has described in reports, including *The Digital Quality of Life* and *The Internet Economy 25 Years After.com*.²⁶ To take just two examples out of thousands, mobile phones allow fishermen in India to monitor prices in real time and take their catch to local markets where it will fetch the best price, an innovation that positively impacted the fish industry in southern India by increasing profits for sellers by 8 percent while also bringing down consumer costs by 4 percent.²⁷ In Kenya, the Apps for Africa award-winning M-Farm, a transparency tool for Kenyan farmers, enables them to use their mobile phones’ SMS feature to get information pertaining to the real-time retail price of their products and find buyers for their produce.²⁸ Mobile phones have also improved health and quality of life by serving as a platform for delivery of ophthalmological diagnosis and disease detection (such as diabetes) services in developing countries. And a December 2010 *Economist* article “Tablet Teachers” explained how “tablets and other digital devices may soon be the rule in African schools,” noting that they have already demonstrated measurable improvement in students’ skills from Ethiopia to Ghana.²⁹ In short, mobile technologies have become platforms for innovation—and the ITA has played an important role in furthering their diffusion throughout the developing world.

Ultimately, ICTs' productivity-enhancing and innovation-enabling benefits at the individual, firm, and industry level then aggregate up to enable productivity and economic growth at an economy level. For example, ICT was responsible for 75 percent of U.S. productivity growth from 1995 to 2002, and 44 percent from 2000 to 2006.³⁰ According to Japan's Ministry of Internal Affairs and Communications, Japan's ICT industry has contributed 34 percent of the country's economic growth from 2005 to 2010.³¹ Likewise, ICT usage in China has played a critical role in growth, accounting for 38 percent of total factor productivity growth and as much as 21 percent of GDP growth.³² In fact, the Internet alone accounted for 21 percent of the aggregate GDP growth from 2006 to 2011 across thirteen leading economies—Brazil, Canada, China, France, Germany, India, Italy, Japan, Korea, Russia, Sweden, the United Kingdom, and the United States.³³ Just as ICT has been a central driver of economic growth in developed countries, so has it been for developing countries. For example, a December 2010 World Bank report, *Kenya Economic Update*, found that "ICT has been the main driver of Kenya's economic growth over the last decade."³⁴ Specifically, the report found that ICTs were responsible for roughly one-quarter of Kenya's GDP growth during the 2000s. (Moreover, ICTs' contribution to Kenyan economic growth has only grown over time, with the ICT sector providing a more than six-times greater contribution to Kenyan GDP in 2009 compared to 1999.)³⁵ As Richard Heeks of Manchester University writes, "ICTs will have contributed something like one-quarter of GDP growth in many developing countries during the first decade of the 21st century."³⁶

These statistics highlight a vital point: while ICT production is important for economies, the vast majority of economic benefits from technology—as much as 80 percent—come from the widespread usage of technology, while approximately 20 percent of the benefits from technology comes from its production.³⁷ This means that government policies should focus not so much on encouraging ICT production but on promoting ICT usage among consumers and businesses.

Indeed, consumers in all countries—developed and developing alike—benefit from cheaper prices of ICT products and a key way to do this is to eliminate import tariffs. In fact, four distinct categories of users benefit from cheaper ICTs. First, ICT has helped spawn the emergence of "prosumers," individuals who act at the same time as both consumer and producer.³⁸ The digital economy has blurred the dichotomy between producers and consumers, as the spread of digital tools has empowered consumers to fill production functions—like booking their own hotel rooms or choosing their seat on a flight—once managed by producers. Second, ICT has further spawned what MIT Professor Eric von Hippel calls "the age of the consumer-innovator," where consumers collectively generate massive amounts of product innovation, often empowered by ICT.³⁹ Third, firms in non-ICT producing industries, especially those industries that intensely consume ICT products—such as airlines, financial services, logistics, and manufacturing, as well as e-businesses, software developers, and business process firms—benefit from access to cheaper ICT products. Fourth, ICT-producing industries themselves benefit from the cheaper imports of the component parts and products in their supply chains. That is, eliminating

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tariffs on intermediate ICT inputs, such as semiconductors, lowers the final cost of ICT end-products, such as computers.

Because ICT usage contributes greater benefits to economic growth, tariffs are particularly pernicious when applied to ICTs, hurting the nations that impose them by raising the cost of ICT goods and services, thus causing businesses (and individuals) to invest less in ICT, which lowers their productivity—and in the case of traded sectors—their competitiveness. In other words, tariffs on ICT products raise the cost of ICT goods for ICT-using industries in an economy and inhibit the ability of those sectors to procure best-of-breed technologies at the best price. Hence, placing high tariffs on one sector of an economy (ICT) damages all the other sectors of an economy. And, by distorting global markets for innovative products and services, high tariffs disadvantage the economic interests of the most efficient and innovative enterprises, leaving the world with less innovation and higher-cost ICT products than would otherwise be the case.

In contrast, cutting tariffs lowers prices on ICTs and raises demand for them. In fact, Gurbaxani et al. find that for every 1 percent drop in price in ICT products, there is a 1.5 percent increase in demand.⁴⁰ This is an excellent example of what's called import demand elasticity—lower import prices lead to increased demand for a product or service. Low tariffs have also contributed to the development of global supply chains and the globalization of ICT hardware development that has also contributed to reducing ICT prices. For example, Mann finds that the globalization of ICT hardware resulted in ICT prices some 10 percent to 30 percent lower than they would have been based on domestic production and domestic technological advances alone in the United States in the 1990s. Mann estimates this made U.S. GDP some \$250 billion higher over the 1995 to 2000 period than it would have been had there been no globalization of IT hardware.⁴¹ Put simply, ICT tariff elimination bolsters ICT usage, which in turn boosts productivity and generates innovation, and this is why the ITA and the effort to expand its product coverage are so important.

ITA EXPANSION BENEFITS DEVELOPING COUNTRIES

Developing countries account for 42 percent of ITA membership⁴² and 64 percent of global ICT exports. The ITA has benefitted these countries considerably. From 1996 to 2008, developing country ITA exports expanded at an annual rate of 33.6 percent, compared to 7.2 percent for developed countries.⁴³ And given the rapid growth of ICT production and consumption in their economies, the ITA is even more relevant today for many developing countries such as India, Indonesia, Malaysia, the Philippines, Thailand, and Vietnam than it was even when they first joined.

The ITA and ITA expansion benefit developing countries in five principal ways: 1) lower ICT costs facilitates diffusion and adoption of affordable ICT products and services which boosts productivity and thus enhances economic growth; 2) by lowering the price of key inputs, the ITA has undergirded development of burgeoning ICT software and services industries in many developing countries, including India, Indonesia, Malaysia, and the

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Philippines; 3) boosting exports of ICT products and services; 4) contributing to the competitiveness of developing countries manufacturers'; and 5) promoting innovation in developing countries' ICT sectors.

ITA Expansion Promotes Diffusion of Affordable ICTs Vital to Boosting Productivity and Growth

By helping decrease the prices for ICTs through tariff reduction, the ITA has helped facilitate the diffusion of ICTs such as mobile phones throughout developing countries. This is because, as noted previously, there is a 1.5 percent increase in demand for every 1 percent drop in price in ICT products. For example, Indonesia went from having just .28 mobile phone subscribers per 100 citizens in 1996 to 98 in 2011. Likewise, in India, the number of cellular phone subscribers per 100 inhabitants increased from just .03 per 100 inhabitants in 1996 to 72 in 2011.⁴⁴

And greater penetration of ICTs among consumers and businesses directly boosts economic growth in developing countries. Specifically, the World Bank has found that a 10 percent increase in high-speed broadband Internet penetration adds 1.38 percent to annual per-capita GDP growth in developing countries. Likewise, a 10 percent increase in mobile phone penetration adds 0.81 percent to annual per-capita GDP growth in developing countries.⁴⁵ (See Figure 2.) And according to a study of 131 developing countries, increasing mobile and Internet penetration impacted economic growth more than any other variable tested, short of primary school education.⁴⁶

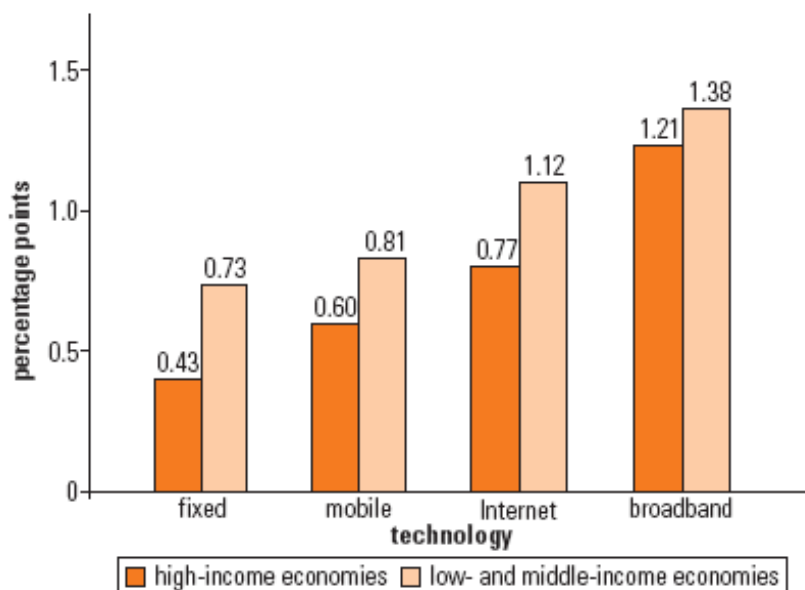


Figure 2: Impact of a 10 Percent Increase in Penetration of Key ICTs on Annual Percent GDP Growth⁴⁷

But it's not just that the demand for ICT products is price elastic, it's also income elastic, meaning that a 1 percent increase in income leads to an increase greater than 1 percent in the demand for ICT products.⁴⁸ In other words, demand for ICT products grows

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disproportionately when an economy grows and when prices for such products fall. Thus, as an economy grows, it engenders a virtuous cycle whereby the prices of ICT products fall and ICT becomes more easily available, including for additional sectors of the economy eager to realize the productivity gains associated with its use.⁴⁹

The World Trade Organization notes that this demand behavior is independent of the level of a country's gross domestic product or level of development of the economy.

Disproportionate growth rates of ICT spending compared with GDP growth have been observed in countries as diverse as China, India, Ireland, Korea, Malaysia, Poland, and Singapore.⁵⁰ Similarly, there is evidence of widespread adoption of ICT in low-income sectors of developing countries once it becomes affordable.⁵¹

How are ICTs able to generate such outsized impacts on economic growth? The answer lies in their ability to impact economy-wide productivity growth. Productivity growth—the increase in the amount of output produced by workers per a given unit of effort—is the most important measure and determinant of economic performance for any nation.⁵² Low productivity is the reason why developing nations are less wealthy than developed ones. ICTs are vital for developing countries because they enable the productivity growth that lies at the core of economic growth and which are the source of reduced poverty and higher living standards. As noted, a seminal World Bank survey of over 20,000 businesses in low- and middle-income countries found that firms that use more ICT have faster sales, employment growth, and higher productivity. A study of six West African countries found that approximately 40 percent of their increase in total factor productivity growth was attributable to ICT-related growth.⁵³ Developing-country small- and medium-sized enterprises (SMEs) experience a 10 percent productivity boost from Internet usage.⁵⁴

Economies can increase their productivity in two ways. First, firms can become more productive, usually by investing in new technologies or improving the skills of their workers. This is called the “growth effect,” whereby a nation's productivity goes up not by some sectors getting bigger or smaller, but by all sectors getting more productive. For example, a country's retail, hospitality, banking, transportation, and automobile manufacturing sectors can all increase their productivity at the same time. The second way to increase productivity—called the “shift (or mix) effect”—is more dynamic and disruptive: low-productivity firms and/or industries lose out in the marketplace to high productivity firms and/or industries that are more efficient and can cut prices or boost quality to gain market share.⁵⁵ Across-the-board productivity growth and shifts in the mix of establishments toward more productive ones can both contribute to an increase in a nation's productivity and average incomes.

However, the lion's share of productivity growth in most nations—and especially large- and medium-sized ones—comes not from changing the sectoral mix to higher-productivity industries, but from all firms and organizations, even low-productivity ones, boosting their productivity. Overall, the evidence shows that it is changes in organizations (e.g., businesses, government, non-profits, etc.) that drive productivity, with around 80 percent

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of productivity growth coming from organizations improving their own productivity and only about 20 percent coming from more productive organizations replacing less productive ones.⁵⁶

This is confirmed by research in the McKinsey Global Institute's report *How to Compete and Grow: A Sector Guide to Policy*, which explains that countries that outperform their peers do not have a more favorable sector mix, but instead have individual sectors that are more competitive and productive.⁵⁷ In other words, it's not share that matters, it's productivity growth across all sectors. Put succinctly, the productivity of a nation's sectors matters more than its mix of sectors. As the McKinsey report elaborates:

The mix of sectors is surprisingly similar across countries at broadly equivalent stages of economic development. It is not the mix of sectors that decides the growth in developed economies, but rather the actual performance within the sectors compared with their counterparts in peer economies. [There is] a similar pattern in developing countries; even if they started with a less favorable sector mix; the fastest-growing countries outperformed their peers in terms of their sector competitiveness.⁵⁸

Nevertheless, many developing countries continue to focus on shifting the compositional mix of their economy rather than growing by raising across-the-board productivity growth. For instance, many developing countries have placed high tariffs on ICTs in an effort to spur creation of domestic information technology production industries. For example, Argentina has imposed tariffs on assembled computers with the goal of creating a domestic computer assembly industry. But the result of this policy has actually been to create a *less efficient* and *higher-cost* computer industry where up to one-third of computers sold in Argentina are hand-assembled in small shops. Brazil has likewise long-placed high tariffs on imports of foreign computers and component parts. Similarly, Argentina's recent introduction of protectionist policies demanding equality of imports and exports as a condition for granting import licenses⁵⁹ has resulted in no Apple or RIM smartphones being imported for nearly a year.⁶⁰

Yet, despite their good intentions, governments that impose high tariffs and other protectionist policies on ICT products only have the effect of raising the prices of ICTs for domestic users, inhibiting ICT diffusion throughout domestic sectors such as financial services, retail, and transportation, and manufacturing thus lowering the rate of productivity growth. As an OECD report, *The Information and Communications Technology Sector in India: Performance, Growth, and Key Challenges*, noted, India's ICT sector "has acted as a catalyst for growth across the Indian economy, including in areas such as real estate, automobiles, travel and tourism, railway, and mortgage banking industries."⁶¹ When these sectors have to pay higher prices for critical ICT inputs due to tariffs, it only damages their competitiveness and potential for growth. This is why research by P.D. Kaushik and Nirvikar Singh found that for every \$1 of tariffs India imposed on imported ICT products (in the years before it joined the ITA), the Indian economy suffered a loss of \$1.30 due to

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lower productivity. As Kaushik and Singh concluded from their study of ICT adoption in India, “High tariffs did not create a competitive domestic [hardware] industry, but [they] limited adoption [of ICT by users in India] by keeping prices high.”⁶² In other words, India’s tariffs on ICT products reduced domestic ICT investment which in turn limited productivity growth.

Ultimately, tariffs on ICT products do not create a competitive domestic hardware industry as is often intended, but high tariff policies do have profoundly negative consequences across all sectors of an economy by keeping prices high and thereby limiting adoption of ICT. As Kraemer and Dedrick found in a cross-national study of Asia-Pacific region countries, any government policy that makes computers less expensive will encourage the use and increase the benefits of ICT.⁶³ As Kraemer notes, “One of the best ways to promote ICT use is to not create barriers to use. Any government policy that makes computers more expensive will discourage use and reduce the possible benefits of IT. Simply lowering tariffs and taxes, eliminating other trade barriers, and encouraging competition in distribution channels will help promote use as much as any specific efforts to encourage use.”⁶⁴

If the policy goal of imposing high tariffs on ICT products is to incentivize domestic ICT production (i.e., promote import substitution industrialization), why does it tend to produce the opposite result? In large part, the answer is that the globalization of ICT supply chains means that ICT products often move across several countries in their production, with key components added at various steps in the process before final assembly occurs. In this case, high tariffs on ICT parts and products simply compel ICT firms to bypass these countries entirely in their global supply chains and manufacture and assemble elsewhere.

A final point is that some countries are reticent to eliminate tariffs on ICT products because they are concerned about the negative fiscal impact on government revenue from loss of tariff collections. But the reality is that the benefits of economic growth far outweigh the benefits of collecting tariff revenue on imported ICT products. Moreover, this loss tends to be offset—if not exceeded—by sales or VAT taxes generated from both the increased domestic demand for ICT products and services and the across-the-board growth in the broader economy.

Affordable ICT Products are Critical for a Competitive ICT Services Sector

Having access to affordable, best-of-breed ICT products is essential for firms in ICT software and services sectors, including business process outsourcing (BPO), system integration, IT consulting, application management, custom applications, infrastructure management, software testing and web development. By eliminating tariff on a wide range of foundational ICT products, the ITA has played a key role in promoting the development of a thriving ICT services sector in many developing countries, including India, Indonesia, and the Philippines.

ICT products have undergirded the development of the vibrant IT software and services industries in many developing countries.

For example, India's IT-BPO industry accounted for 7.5 percent of Indian GDP in 2012, a significant increase from 1.2 percent in 1998, shortly after India joined the ITA.⁶⁵ Indian IT-BPO revenues reached \$88.1 billion in 2011, with direct employment totaling 2.8 million, and indirect job creation equaled an additional 8.9 million jobs.⁶⁶ In general, NASSCOM estimates that for every job created in the IT-BPO sector, four jobs are created in the rest of the economy.⁶⁷ Moreover, the IT-BPO industry (including hardware and services exports) accounts for a significant share of the country's exports, and have increased from less than 4 percent of India's exports in 1998 to account for 25 percent in 2012.⁶⁸ At current rates, India's ICT sector is poised to become a \$225 billion industry by 2020.⁶⁹

ICT services industries have also grown rapidly throughout Southeast Asian countries, including in Indonesia, Malaysia, and the Philippines (each an ITA signatory), where in 2006, for example, 160,000 Philippine citizens were employed in the country's \$2 billion business process outsourcing industry.⁷⁰ In fact, total ICT and ICT-enabled services revenues in the Philippines reached \$6 billion in 2008, up from \$100 million in 2001.⁷¹ The Philippines' government estimates that, by 2016, its ICT sector "will contribute around \$50 billion in annual direct revenues to the Philippine economy [and another] \$150 billion in indirect investments in the economy, through real estate, transport and telecommunications, banking, and taxes."⁷²

The ITA and ITA Expansion Boost Developing Country Exports

The ITA and its potential expansion impact exports from developing countries through two channels: first, by enhancing the competitiveness and export potential of all firms in a developing economy by making ICT inputs more accessible and affordable, and secondly by specifically fostering the ICT goods and ICT services export potential of developing countries.

Regarding the first, by decreasing the costs of ICT inputs through tariff elimination, the ITA bolsters developing country firms' adoption of the ICTs key to support exports (and business growth). For example, one study that analyzed the impact of Internet penetration rates in 66 developing countries found that a one percent increase in the number of Internet users is associated with a 4.3 percentage point increase in exports.⁷³ Another study of 4,800 SMEs in twelve countries (including China, India, and Russia) found that companies using Web technologies grew twice as fast as those with a minimal Internet presence.⁷⁴ The ITA means that exporters can access these critical technologies more cheaply and hence will use more of them.

But the greatest impact of the ITA has been on bolstering exports of ICT goods and services from developing countries. As even ITA skeptic Murali Kallummall acknowledges, "when we compare share of ITA-I products exports at the category level to understand which category benefited the most from the information technology agreement, it is evident that the developing countries gained the most."⁷⁵ Indeed, the ITA has helped boost exports of ICT goods and services by many ITA member countries, in part by making

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those countries' ICT goods and services firms more competitive and in part by expanding the global market for ICT products (by reducing tariffs).

According to the World Trade Organization, India's average annual growth rate of ICT exports from 2005 to 2010 was 35 percent (versus only 10 percent for ICT imports).⁷⁶ It's worth noting that this growth rate was more than double the average annual growth in ICT exports of 17 percent from 1996 to 2010. While the ITA initially entered force in 1997, for India it didn't come until full force until 2005, as the early 2000s were a phase-in period for the tariff eliminations. Thus, India experienced a much higher rate of increase in ICT exports once it became a full-fledged member of the ITA. Other developing nations have also seen significant increases in their ICT product exports since the launch of the ITA. For example, Vietnam's average annual growth in ICT product exports from 1996 to 2010 has been 45 percent, China's 29 percent, and Costa Rica's 26 percent.⁷⁷

Exports of ICT goods account for a significant percentage of many ITA member countries' total goods exports. For example, ICT goods exports account for 36 percent of the Philippines' total goods exports, 34 percent of Malaysia's, 29 percent of China's, 20 percent of Costa Rica's, and 19 percent of Thailand's, all of which are ITA signatories.⁷⁸ (See Figure 3.) In fact, ICT goods exports account for far higher shares of total goods exports in ITA member countries than most non-ITA member countries, with Brazil, Argentina, and Chile (none of which are members of the ITA) clearly lagging, as Figure 3 illustrates. In fact, ICT exports only account for 1 percent of Brazil's total goods exports and for less than a half of 1 percent of Chile and Argentina's total goods exports.

This trend is also clear when examining the percentage change in countries' ICT goods exports as a share of their total goods exports over time. From 1997 to 2010, the share of ICT goods exports as a percentage of the country's total exports increased by 39 percent in China and 16 percent in India, but decreased by 227 percent and 300 percent, respectively, in non-ITA member countries Argentina and Brazil. This suggests that if countries like Argentina and Brazil wish to boost their ICT goods exports, remaining outside the ITA is not the way to do it. Again, this is because many ICT goods exports are inputs into global production networks of ICT products, and countries that impose high tariffs on ICT products are simply being excluded from these global supply chains. While ITA membership does not guarantee that a country will be a strong ICT goods exporter, it does appear to be associated with stronger ICT goods exports.

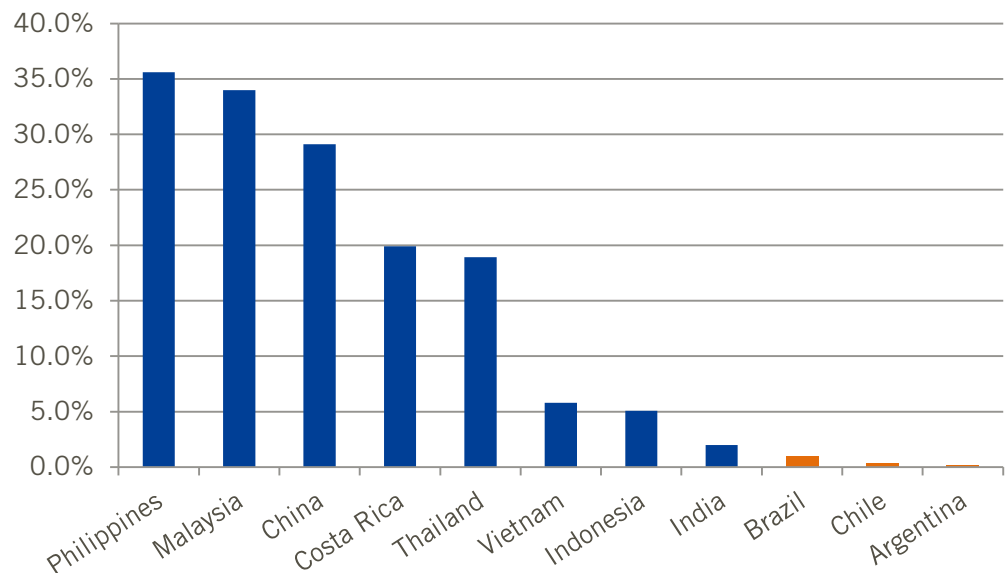


Figure 3: ICT Goods Exports as Percentage of Total Goods Exports, 2010⁷⁹
 (Note: All charts depict ITA members in blue; Non-ITA members depicted in orange)

Many ITA members are also strong exporters of ICT services. This is not surprising, because countries whose businesses and consumers have access to best-of-breed, cost-competitive ICT products are likely to be better positioned to provide more competitive ICT services. ICT services exports account for 47 percent of India's total services exports, 32 percent of Costa Rica's, 20 percent of Honduras's, and 16 percent of the Philippines', as Figure 4 shows. Again, Latin American ITA members outperform non-ITA members.

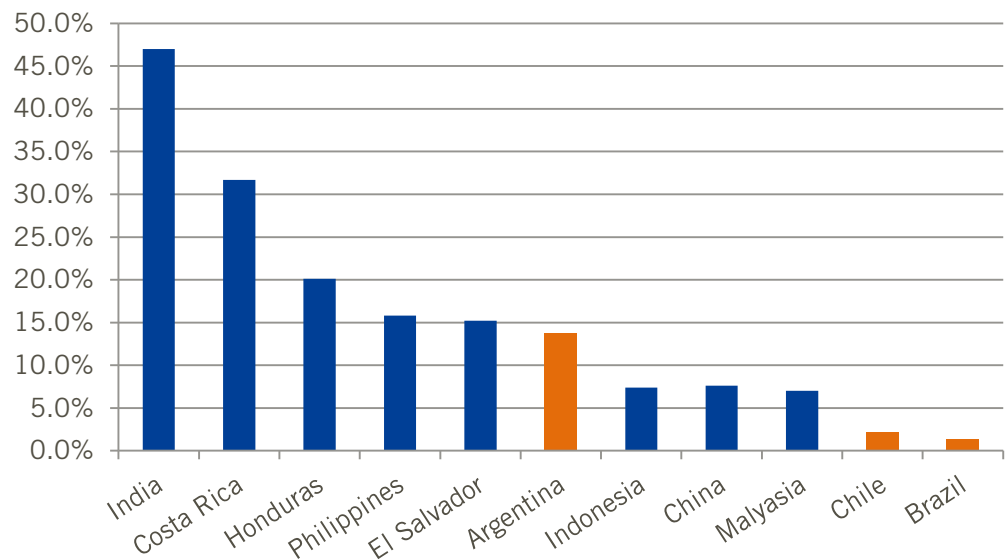


Figure 4: ICT Services Exports as Percentage of Total Services Exports, 2010⁸⁰

Many of these ITA members also saw faster growth in ICT services exports as a percentage of their overall services exports than non-ITA members, as Figure 5 illustrates. Indeed, the percent that ICT services exports accounts for out of the country's total service exports increased by more than 50 percent (from the first year in which data is available to 2011) in China, Malaysia, and the Philippines, while ICT services exports as a percentage of the country's total services exports fell by 178 percent in Chile and 247 percent in Brazil. While clearly many factors influence these trends, once again this data suggests that countries that impose policies which make it more difficult or costly to procure best-of-breed ICT products (as Brazil and Chile have done by not joining the ITA) are more likely to experience lagging ICT services export sectors.

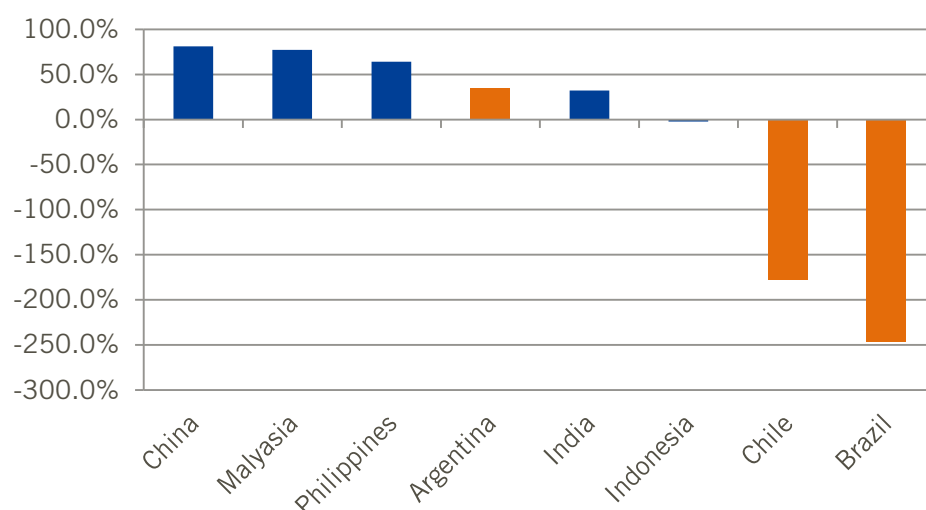


Figure 5: Percent Change in ICT Services Exports as Percentage of Total Services Exports, 1996 (or most recent year available) to 2011⁸¹

As these figures suggest, ICT products and services offer attractive export potential for many countries. For example, India has set a goal to increase its ICT exports thirteen-fold from \$5.5 billion today to \$80 billion by 2020.⁸² Certainly India is well-positioned to tap into the global growth in consumption of ICT products (and services). Participating in ITA expansion will only facilitate India's realization of this goal, for ITA expansion will increase the size of the global marketplace for ICT products and services, giving India a larger market in which to export its ICT products and services.

ICT Products are Vital Inputs to Manufacturers' Competitiveness

Modern manufacturing processes increasingly rely on sophisticated ICTs, making ICTs a foundational building block for a country's manufacturing base. For example, a recent study by the IDA Science and Technology Policy Institute finds that modern manufacturers "rely less on labor-intensive mechanical processes and more on sophisticated information-technology-intensive processes."⁸³ Numerous examples of information technology usage exist in the manufacturing domain, including its support of digital-

Nations that make access to these critical ICT inputs more expensive by imposing tariff duties on them will only damage their domestic manufacturers.

control systems, asset-management software, computer-aided design (CAD), integrated sensing, robotics, and modeling and simulation.

The use of information technology speeds up overall productivity in the factory by increasing communication speed and efficiency and by helping maintain quality by better controlling processes. It's why a study by Joseph and Abraham found that ICT investment in the Indian manufacturing sector has been a key factor to rapid increases in labor productivity.⁸⁴ The tasks that can be monitored and controlled with information technology are increasing in number as well as complexity, and these increases are enabling high-speed production with increasing accuracy.⁸⁵ Going forward, there will be greater use of information technology in linking the design stage of an individual component to the larger assembly manufacturing system and to the use of manufactured products. The use of computer-enabled technologies improves communications that enable both "smart manufacturing" in the factory and "smart supply-chain design"—sending the right products to the right suppliers.

The implication is clear. If a nation's manufacturers wish to successfully compete in global markets, they will have to create and use data and information throughout the product life cycle, while adopting new computer-controlled machine tools, modeling and simulation, and real-time optimized production approaches. Governments that provide open access to the necessary manufacturing components and inputs will benefit their domestic producers; those that make access to these critical ICT inputs more expensive by imposing tariff duties on them will only damage their domestic manufacturers (including both their ICT manufacturers and non-ICT manufacturers).

Some policymakers are concerned that the performance of their country's manufacturing sector has declined since their country entered the ITA, in large part because of the impact of imports on their electronics manufacturing sector. For instance, Kallummall attributes "the decreasing value addition in the electronic hardware sector" in India and "the increasing tendency of manufacturers turning into assemblers" to India's participation in the ITA.⁸⁶

But since the early 2000s, when India was phasing-in its ITA tariff commitments, its manufacturing sector has grown by at least 5 percent annually. In fact, since dipping to a low of about 2.5 percent in 2001 (on the heels of the global slowdown caused by the dot-com bust), the growth rate of India's manufacturing sector increased virtually every year, achieving annual growth rates well in excess of 10 percent by 2007.⁸⁷ In fact, India's average annual percent growth in manufacturing value-added was 5.36 percent from 1996 to 2004 and this accelerated to 8.39 percent from 2005 to 2011, the period after India's tariff reduction commitments in the ITA became fully binding.⁸⁸ (See Figure 6.)

Again, Figure 6 makes clear the outperformance of ITA members over non-ITA members in manufacturing value-added growth rates from 1996 to 2011. To be sure, many factors beyond a country's membership in the ITA have influenced countries' manufacturing

value-added growth rates over this period. That said, this is another piece of evidence that countries that fully engage in the global trading system and open their markets through tariff elimination are outperforming their peers.

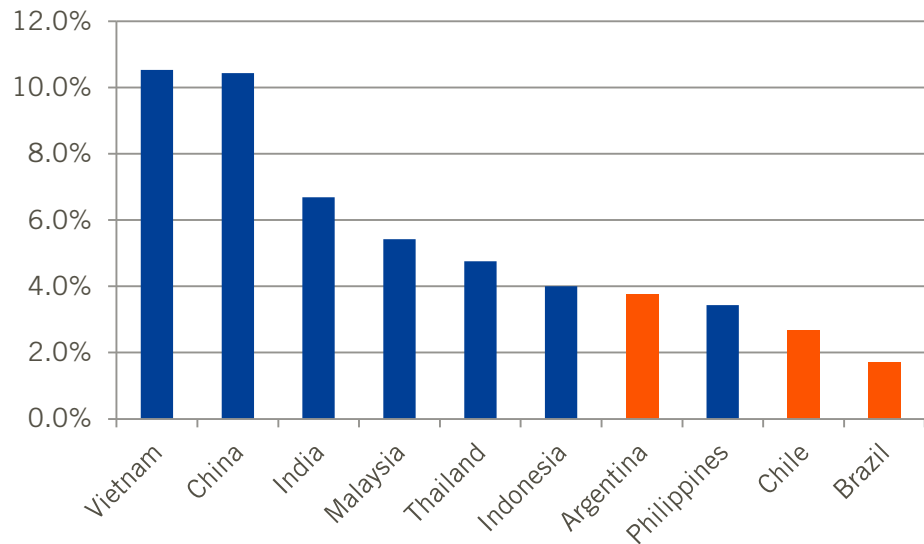


Figure 6: Average Annual Percent Growth in Manufacturing Value-Added, 1996-2011⁸⁹

Some nations, such as China and Vietnam, have seen particularly rapid manufacturing growth. And while India's manufacturing sector has shown notable growth in value-added from 1996 to 2011, it's clear that India has been outperformed by China and Vietnam. There's an understandable desire for India to become a more competitive player in the global manufacturing economy, especially in knowledge-intensive and advanced technology products. But Rajiv Kumar and Abhijit Gupta of the Indian Council for Research on International Economic Relations find that "the main constraints in [India] doing so have been the low level of R&D, relative lack of skilled personnel, and relatively low FDI levels."⁹⁰ The authors note that India is one of the smallest investors in R&D among developed countries and that India has one of the lowest number of researchers per capita among major developed countries, with only 120 researchers for every million people, a rate 1/5th China's and 1/25th Korea's.⁹¹ Kumar and Gupta identify six other factors holding back the competitiveness of India's manufacturing sector, including: 1) the presence of entry barriers; 2) labor market rigidities; 3) procedural constraints; 4) exit barriers; 5) emerging skill constraints; and 6) infrastructure.⁹² For instance, it takes 35 days to start a business in India, 62 days to register property, 25 days to complete one procedure to enforce a contract, and 10 years to close a business—all durations well in excess of those seen in developed and developing countries alike, including India's principal competitors such as China and Korea.⁹³ Meanwhile, India's Industrial Disputes Act makes it very difficult to fire workers (contributing to labor market rigidities and reducing the willingness of manufactures to hire workers) and the country faces an infrastructure investment deficit of more than \$350 billion.

Government policies should focus not so much on encouraging ICT production but on promoting ICT usage among consumers and businesses.

As the Information Technology and Innovation Foundation (ITIF) writes in the book *Innovation Economics: The Race for Global Advantage*, there is a fierce competition underway among nations for innovation-based economic growth.⁹⁴ These nations have put in place aggressive policies to grow and attract the highest-value-added economic activity they can: the high-wage, knowledge-intensive manufacturing, research, ICT, and services jobs that power today's global, innovation-based economy. The most successful countries in this competition seek to get the framework (or "factor") conditions right by implementing strong policies on three sides of an innovation triangle: their business environment, regulatory environment, and innovation policy environment. In particular, these countries: make it easy to start a business; embrace transparency and the rule of law (including strong intellectual property protections); enact a pro-innovation tax system; enable competitive product and labor markets; *embrace a competitive and open trade regime*; place limited regulations on the digital economy; deploy world-class digital and physical infrastructures; and invest robustly in R&D, education, and skills development.⁹⁵ To be sure, that's a considerable list. But whether it's to attract global investment or to ensure an economy has put in place the best conditions to foster innovation among its enterprises and citizens, these are the policies a country has to get right.

ITA Participation Boosts ICT Innovation

This report previously mentioned how ICT products enable commercial and quality-of-life innovations in developed and developing countries alike. But the ITA has also proven instrumental in boosting countries' innovation potential in the ICT sector itself, especially for developing countries. As the World Trade Organization's *15 Years of the Information Technology Agreement* report notes, "Among developing ITA participants, the rise of China, Korea and Chinese Taipei as the top traders in the GPNs [global production networks] of IT products is mirrored by a profound shift of relative innovation efforts into ITA-related industry fields in these economies."⁹⁶ For example, the report notes that Korea's patenting activity after the 1996 launch of the ITA "concentrated disproportionately" in the three ITA-related fields of computer technology, telecommunications, and semiconductors, surpassing Europe in nominal terms and almost reaching Japanese dimensions in absolute numbers by 2006.⁹⁷ Likewise, "patenting activity among applicants from China shifted disproportionately into computer technology and telecommunications after 2000." Nor were "disproportional innovation efforts" in ITA-related technologies confined to the largest developing economies like China or Korea; they "could also be observed in the smaller developing countries that are strong traders in ICT products."⁹⁸ For example, Malaysia has seen a six-fold increase in its published patent applications for computer technology and a four-fold increase in semiconductor patent applications since 2000. Penang, Malaysia, which has long hosted the semiconductor manufacturing plants of many multinational companies, has even become known as the "Silicon Valley of the East" and developed into a global outsourcing hub.⁹⁹

But while the evidence suggests that "economies that participate intensely in global production networks of IT products have experienced a significant increase in innovation efforts in the IT-related sectors of their domestic economy," once again countries that have

Developing countries that have joined the ITA have far outperformed peer countries that have not in terms of boosting exports of ICT products and services and achieving higher rates of innovation in ICT sectors.

failed to participate in the ITA are getting left out, as “there is a notable absence of such trends in economies that remain outside the ITA or do not figure prominently in the GPNs of IT products.”¹⁰⁰ Indeed, the relative innovation efforts in ICT-related fields in the largest non-ITA member countries—Brazil, Mexico, and Russia—remain significantly below their cross-industry average. Mexico’s case in particular demonstrates that increased trade in ICT products alone doesn’t translate into increased rates of manufacturing-related technological innovation that appears in patent applications by a nation’s resident inventors or firms. As the WTO concludes:

To the extent that patent applications by residents can serve as an indicator for innovative activity in that economy, they indicate that innovation in ITA-related fields has increased disproportionately among most of the top-trading ITA participants since 1997. This coincides with the implementation of the ITA. Among the top-trading ITA participants that are developing countries, the steady rise in their share of trade in IT products is accompanied with a disproportional increase in innovative activity in the ITA-related technologies among residents of these countries—particularly since the application of the TRIPS [Trade-Related Aspects of Intellectual Property Rights] Agreement in developing countries.¹⁰¹

One other salient point in this discussion is that, as a result of the increased reliance on global production networks, the largest exporters of ICT products also tend to be the largest importers of these products.¹⁰² Indeed, the top ten ITA-exporting countries are the exact same as the top ten ITA-importing countries. The reason for this, again, is that the production of advanced ICT products has become globalized, with products moving seamlessly (ideally) across borders as different components or value-added elements are added by companies in nations specializing at specific points in the production process until assembly and manufacture of the final product is completed. Thus, high levels of ICT imports are actually a sign of strength—not of weakness—when assessing a country’s position in the global economy. This demonstrates again that countries imposing high tariffs on ICT products or their components are simply going to be left out of global ICT production networks, as the experience of South American countries such as Argentina and Brazil so clearly illustrate.

ITA EXPANSION BENEFITS THE GLOBAL ECONOMY

It’s separately worth noting that ITA expansion is poised to grow the global economy. Specifically, ITA expansion will benefit the overall global economy by increasing the global stock of ICT capital, which in turn boosts productivity and hence per-capita incomes. Research from Harvard’s Kennedy School of Government finds that a 10 percent increase in ICT capital stock adds approximately 0.45 percent to output growth.¹⁰³ As noted previously, ITA expansion would bring an additional \$400 billion in imports of ICT products under ITA coverage (one-half of the \$800 billion increase in two-way trade in global ICT products). The global weighted-average, most-favored nation (MFN) tariff on ICT goods not currently covered by the ITA is 5.3 percent.¹⁰⁴ The World Bank provides import demand elasticities—a measure of how much demand for a product will increase in

ITA expansion will help developing countries realize their goals of boosting ICT products and services exports by increasing the size of the global ICT marketplace by \$190 billion annually.

a country given a certain reduction in tariff levels—for 70 of the 75 ITA member countries.¹⁰⁵ ITIF analysis of these World Bank figures finds an average import demand elasticity of 1.3 for ITA member countries. Applying the 5.3 percent average tariff reduction on the additional \$400 billion in ICT product imports with the 1.3 import demand elasticity suggests that ITA expansion should lead to a \$28 billion increase in the global capital stock. The current global ICT capital stock is \$4.1 trillion.¹⁰⁶ \$28 billion represents 0.07 percent of this amount. If a 10 percent increase in ICT capital spurs a 0.45 percent increase in output growth, then a 0.07 percent increase in ICT capital stock will spur a 0.003 percent increase in output growth. As global GDP is \$63.1 trillion, ITA expansion will lead to annual global GDP being \$190 billion larger than it otherwise would be.

BEYOND ITA PRODUCT EXPANSION

As documented, expansion of the products covered by the ITA will produce immediate and substantial benefits for the global economy. ITA product coverage expansion is attainable; it's supported by over 60 ICT industry associations from around the world and backed by the leaders of the 21 Asia Pacific Economic Cooperation (APEC) economies, who at the 2012 APEC Leaders' Meeting in Vladivostok issued a declaration calling for a swift and good outcome of expansion negotiations. ITA product expansion should be the immediate focus of the global trade policy community.

Longer term, however, expanding the geographic reach of countries participating in the ITA agreement also merits attention. While 75 of the 157 WTO member countries participate in the ITA, there are several notable exceptions, particularly in Africa and Latin America. For example, Argentina, Brazil, Chile, and South Africa have failed to sign onto the ITA, meaning that they receive the benefits of duty-free access to the 75 other countries for the high-technology products covered by the agreement without having to provide similar access to their own markets in return.

Ironically however, as described above, such countries' decision not to participate in trade arrangements such as the ITA, which promote more uninhibited flows of global trade, only end up hurting themselves. For example, in a study comparing East Asian and Latin American countries, the World Bank found that the East Asian countries demonstrated larger flows of trade, foreign direct investment, and licensing behavior and suggested that this provides an explanation for the East Asian countries' relatively stronger technological growth than that of the Latin American countries.¹⁰⁷ Thus, it's ultimately in these countries' own interest to join trade-expanding vehicles such as the ITA.

CONCLUSION

In developed and developing countries alike, ICT is today's most powerful driver of economic growth and a key contributor to employment growth. But it's also enriching communities, society, and contributing to improved quality of life. As Nobel Laureate Professor Amartya Sen remarked in addressing the contribution of the ICT sector to the Indian economy at the NASSCOM India Leadership Summit 2007:

... [it] is not that the IT industry should do something for the country at large, for that it does anyway. It makes enormous contributions: it generates significant income for many Indians; it has encouraged attention to technical excellence as a general requirement across the board; it has established exacting standards of economic success in the country; it has encouraged many bright students to go technical rather than merely contemplative; and it has inspired Indian industrialists to face the world economy as a potentially big participant, not a tiny little bit-player...rather, is that it can do even more, indeed in some ways much more. This is because the reach of information is so wide and all-inclusive, but also because the prosperity and commanding stature of the IT leaders and activists give them voice, power and ability to help the direction of Indian economic and social development.¹⁰⁸

For its part, the ITA has been one of the most successful trade agreements ever undertaken. It has played an indispensable role in expanding global trade, production, and consumption of ICT products, which has spurred innovation, enhanced productivity, increased employment, and accelerated economic growth. Expansion of the ITA would bring immediate and significant benefits to both ICT producers and consumers in both developed and developing nations. As this paper has made clear, developing countries that have joined the ITA have seen their ICT sectors flourish, while nations that have not, particularly those in South America, have seen their ICT sectors flounder. The central question for those nations considering ITA membership or expansion is whether they want to go down the South American path, or whether they want to follow the East Asian path and how to general policy approaches that allow economies to fully engage global production networks and supply chains.

Now is the time for policymakers in ITA member countries—developed and developing alike—to seize on the opportunity to further tariff rate elimination on ICT products, which promises to extend the already significant benefits the ITA has produced for individuals, businesses, and economies throughout the world.

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