Why Tariffs on Chinese ICT Imports Would Harm the U.S. Economy

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Raising the cost of ICT products by levying tariffs on ICT imports from China would reduce growth in U.S. ICT investments, which would lower productivity growth, and thus economic growth.

As the Trump administration prepares to take action against unfair Chinese trade practices under its Section 301 review, all options, including tariffs, appear to be on the table. But applying tariffs on information and communications technologies (ICT) imported from China should not be one of them. ICT represents the largest source of U.S. economic growth—accounting for up to 50 percent of U.S. GDP growth over the past 10 years.[1] Artificially raising the cost of ICT products by levying tariffs on ICT imports from China would reduce growth of U.S. ICT investments, which would lower productivity growth, and thus economic growth. ITIF estimates that a 10 percent tariff levied on Chinese ICT imports would slow the growth of U.S. output by $163 billion over the next 10 years, and a 25 percent tariff would slow output by $332 billion. For the average American household, this slower economic growth would mean $150 to $306 less income in year 10. While the Trump administration's goals of confronting China's unfair trade practices and reinvigorating U.S. manufacturing are commendable, applying tariffs on ICT imports would needlessly harm the U.S. economy.

HOW ICT INVESTMENT DRIVES U.S. ECONOMIC GROWTH

ICT goods include goods such as computers, smartphones, servers, routers, and computer chips. These and related ICT goods (and services) represent the U.S. economy's most significant driver of economic growth. In fact, ICT investment accounted for 50 percent of U.S. economic growth from 2005 to 2012 and 35 percent from 2010 to 2016.[2]

Notwithstanding this outsized economic impact—and even though the United States is home to 8 of the world's 14 largest technology companies by revenue—America's ICT goods and services sectors contribute just 8 percent to U.S. GDP annually.[3] That's because the vast majority of economic benefits from ICT, over 80 percent, stem from their adoption as productivity- and innovation-enhancing capital goods and services.[4] ICT consumption is far more important than ICT production in driving economic growth, a key reason why ICT tariffs would do far more harm than good to the U.S. economy.

ICT products are such powerful tools because they represent "general-purpose technologies"—just as electricity and the steam engine were—meaning they represent a set of technologies that restructure the entire economy and enhance the productivity and innovative capacity of organizations across all industries. As such, ICT capital has a much larger impact on improving productivity than non-ICT capital—three to five times larger.[5] Consider that the introduction of personal computers, email, and business software has allowed modern office workers to become nearly five times more productive than their 1970s-era counterparts.[6]

Low-cost, best-of-breed ICT products are not just crucial to improved productivity, but also to enabling competitive ICT services trade, which represents a rapidly growing U.S. sector. For instance, U.S. firms in digitally intensive industries sold $222 billion in goods and services online in 2012.[7] Moreover, from 2011 to 2016, trade in ICT-enabled services increased by 20 percent annually.[8] Tariffs on ICT imports would raise costs for U.S. firms engaged in this sector, making their digital exports less competitive.

The central point is that ICT drives employment and productivity growth throughout the economy, not just in the ICT production and services sectors. For example, between 2006 and 2016, information technology-related jobs in non-ICT industries (occupations such as web developers and computer programmers) increased by 35 percent, as compared to economy-wide employment growth of 6 percent.[9] Moreover, the U.S. International Trade Commission credits digital trade with the creation of up to 2.4 million U.S. jobs.[10] Furthermore, the benefits of ICT services largely go to other "non-ICT" sectors, such as finance, agriculture, hospitality, and tourism that collectively generate up to 75 percent of the value added by data flows over the Internet.[11]

In summary, ICT, through both production and consumption, represents a key source of U.S. economic dynamism and economic growth as well as high-value-added production and well-paying employment.

HOW TARIFFS ON ICT GOODS WOULD HARM ICT PRODUCERS AND CONSUMERS

ICT products underpin the digital economy.[12] As such, increasing prices on ICT products by applying tariffs on those goods harms both ICT producers and consumers.

To the extent that U.S.-located ICT-goods producers rely on components imported from China, tariffs would increase the cost of finished goods they produce, placing them at a competitive disadvantage versus foreign producers of final ICT goods.[13] Moreover, it's unlikely that tariffs on Chinese ICT exports would induce ICT producers to move considerable ICT production back to the United States. With an extensive install and supplier base for ICT goods production in Asia, tariffs on Chinese ICT imports would likely mean a shift in production to other similarly low-cost Asian nations, such as India, Malaysia, or Vietnam, which U.S.-located ICT producers would then source from instead.

ICT tariffs would also harm other kinds of businesses in which ICT inputs account for a key component of their final products. This would include industries such as aerospace, appliances, automotive, locomotives, and scientific instruments that produce goods that contain ICT components (e.g., semiconductors, sensors, and circuit boards). Applying tariffs on such ICT inputs would raise costs for these industries, harming their competitiveness. And the effect wouldn't be marginal. As the World Trade Organization (WTO) explains:

> The U.S. Bureau of Labor Statistics estimated the import price level in 2015 for the category "computers, peripherals and semiconductors" to be around 66 per cent below the respective level of 1996, while the average import prices for capital goods in total were only about 25 per cent below the level 1996. Therefore, and as a result of significant price reductions and increased performance, consumers and producers importing information technology products as inputs to their industry have benefited from an unprecedented reduction in the price paid for computational power.[14]

In other words, applying tariffs on ICT products would only harm the very U.S. manufacturers that the administration is working so hard to assist.

Yet the biggest negative effect, as documented below, would be on the wide array of businesses, non-profits, and government organizations that rely on ICT goods in their production processes. As prices increase, these organizations would invest less in these ICT-based capital goods, lowering their rate of productivity growth. The same dynamic would also apply to American consumers who increasingly use a wide variety of digital goods in their daily lives, from smartphones to smart appliances. In 2014, Americans spent $1,160 per capita on ICT goods and services, up 6 percent from the year prior.[15] And for many of these goods and services, consumers are using them as "prosumers," helping to drive efficiency and productivity. A case in point is when consumers use their smartphones for e-banking or e-retailing.

ITIF shares the Trump administration's goal of bolstering U.S. manufacturing, including of high-value-added ICT products such as tablets and semiconductors. But the way to achieve this is by focusing on ensuring that production and development, especially of next-generation ICT products, occurs in the United States and that the value chains supporting such are constituted domestically, which will require policies such as robust research and development funding and effective public-private partnerships like the growing Manufacturing USA network of Institutes of Manufacturing Innovation.[16] Put simply, tariffs aren't going to deliver the ICT goods.

MODELING THE ECONOMIC IMPACT OF TARIFFS ON CHINESE ICT IMPORTS

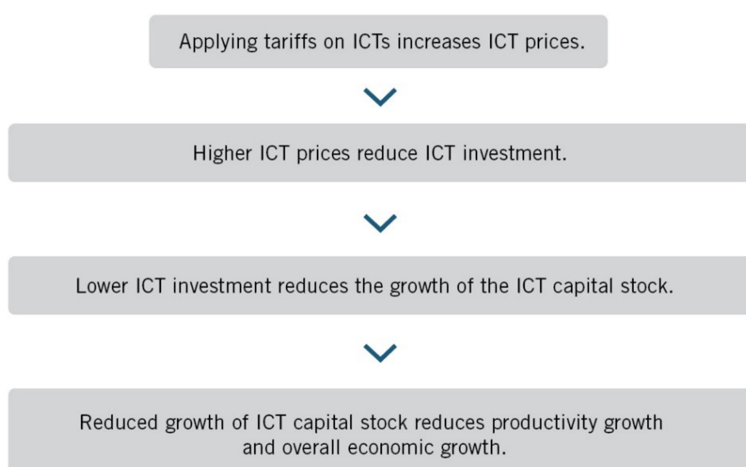
This report analyses the economic impact of tariff rates of 10 percent and 25 percent on ICT imports from China. These include products like computers, servers, smartphones, semiconductor manufacturing and testing equipment, software and scientific instruments, as well as most of the parts and accessories of these.

Under a 10 percent tariff rate, economic growth would slow by 0.041 percent in the first year after tariff implementation, and the economy would forego a cumulative $163 billion in economic growth over the ensuing 10 years. Under a 25 percent tariff rate, economic growth would decrease by 0.105 percent in the first year and the economy would forsake a cumulative $332 billion in economic growth over 10 years.

This slower economic growth would translate into the average American household's income being $150 to $306 less in year 10 than it would have been if such tariffs were not introduced. We do not model the direct effect of higher prices on consumers, because tariffs represent a transfer payment—consumers pay tariffs and the government receives the revenue. In contrast, the effect of higher prices on ICT products from tariffs is a direct cost to the economy, limiting growth.

To summarize the relationship between tariffs on ICT imports and economic growth: Tariffs raise the price of ICT products (for the same dollar value, consumers can purchase less ICT), and since ICT products become more costly, businesses and consumers invest less in ICT products, which results in the economy having a smaller stock of computers and other such productivity-enhancing tools. As a consequence, productivity growth is slower than it would be otherwise. Figure 1 summarizes this conceptual model, which serves as the basis for the economic analysis that follows. (A detailed methodology can be found in the Appendix.)

Figure 1: Conceptual Framework for Analyzing the Economic Impact of Tariffs



This report first calculates the trade flows in ICT goods between the United States and the world, and then between the United States and China, identifying the flow of final goods (products for direct consumption and investment) and intermediate goods (inputs used for further production). The analysis relies on conservative and well-documented price elasticities for the consumption of ICT in response to price changes, whereby an increase in prices of 1 percent decreases consumption by 1 percent.[17] Next, we estimate the current stock of ICT capital in the U.S. economy. Then we estimate the level of ICT investment (controlling for how final and intermediate goods impact investment differently) under the status quo and under tariff rates of 10 percent and 25 percent on China-produced ICT imports. Given the expected change in ICT investment, we calculate the change in economic growth using an estimate that a 1 percent decrease in a country's ICT capital stock decreases productivity by 0.06 percent.[18]

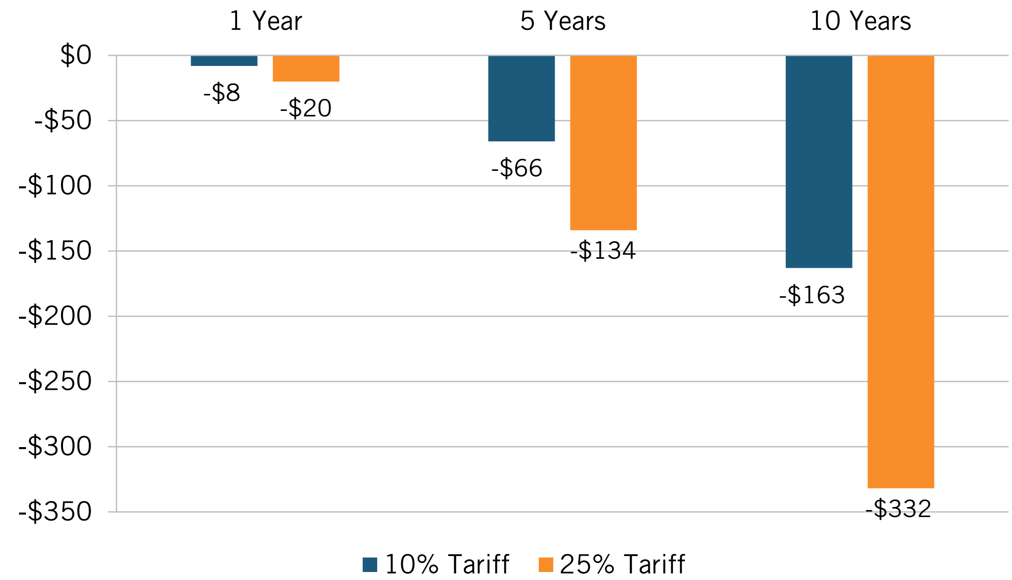
For an average American household, a 10 percent tariff on Chinese ICT imports would mean that after 10 years, its annual household income would be $150 less than it would have been without tariffs, and under a 25 percent tariff, $306 less.

In 2016, U.S. businesses, consumers, and other entities invested $1.2 trillion in ICT—56 percent in software, 22 percent in telecommunications equipment, and 22 percent in IT hardware. (U.S. ICT investment has been increasing by 4.2 percent per year since 2012.) Of this, just under 40 percent ($450 billion) comes from ICT imports, with China supplying $180 billion. To put that in context, China supplies just under 12 percent of U.S. ICT investment. In contrast to overall ICT investment increasing, ICT imports have been decreasing by 0.6 percent per year since 2012. This means that as U.S. investment in ICT has increased, a greater proportion of these investments have stemmed from U.S.-produced ICT goods and services.

ITIF estimates that in the first year after the United States ratifies a 10 percent tariff on Chinese ICT imports, Chinese ICT imports would decrease by $20.6 billion. This would mean a decrease in overall ICT investment by $21.9 billion, or 1.8 percent. This would in turn reduce the growth of ICT capital stock by 0.69 percent. This decline in capital stock growth would reduce productivity growth by 0.041 percent in the short run. A 25 percent tariff would lead to a 0.105 percent decrease in productivity growth.

Against the baseline 3 percent annual GDP growth projected by the Office of Management and Budget, in the forthcoming years a 10 percent tariff on Chinese ICT imports would mean $8 billion lower U.S. GDP growth after the first year, $66 billion after the fifth, and $163 billion after the tenth, on a cumulative basis. Under a 25 percent tariff regime, the estimated economic losses would be $20 billion after the first year, $134 billion after the fifth year, and $332 billion after the tenth (see figure 2). For an average American household, a 10 percent tariff on Chinese ICT imports would mean that, after 10 years, its annual household income would be $150 less than it would have been without the tariffs, and under a 25 percent tariff, $306 less.

Figure 2: Cumulative GDP Forgone if Tariffs Are Levied on Chinese ICT Imports (US $Billions)



THE RIGHT WAY TO CONFRONT CHINESE INNOVATION MERCANTILISM

As ITIF has documented in numerous reports, including "Enough Is Enough: Confronting Chinese Innovation Mercantilism" (2012) and "Stopping China's Mercantilism: A Doctrine of Constructive, Alliance-Backed Confrontation" (2017), China represents the world's leading practitioner of "innovation mercantilist" practices, which constitute the single greatest trade threat to both America's economy and the global trading system.[19] China's mercantilist practices are rampant and include policies such as: forced intellectual property (IP) or technology transfer as a condition of market access; data or production localization requirements; production or export subsidies; unbalanced licensing and investment regimes; manipulation of standards; and many others.

As such, the Trump administration is right to have undertaken a comprehensive review of America's trade relationship with China under Section 301 of the Trade Act of 1974. The goal must be to ensure that America's enterprises are able to trade, invest, and sell on free and fair terms. But any steps to pressure China into better behavior should also be in America's economic interests. Blanket tariffs applied across entire categories of productivity-boosting capital goods, especially on ICT, would reduce investment in these technologies in the United States, thus decreasing U.S. productivity, competitiveness, and economic growth.

To be sure, as ITIF noted in its response to the administration's Request for Public Comments as part of its "Section 301 Investigation into China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation," strong action to confront Chinese mercantilism is necessary.[20] Such actions must be initiated from a perspective not of U.S. protectionism but of protecting a free and fair global trading system that has produced tremendous value for the United States and for the global economy when participants have played by the rules. The administration's policies must also be specifically designed to enroll like-minded allies in the cause of confronting Chinese mercantilism; we cannot fight this battle alone—nor should we want to. Conducting such a battle one-on-one would likely produce a tit-for-tat retaliation from China.

Rather, we need a targeted approach that also works to enlist our allies. As ITIF suggested in its response to the administration's call for public comment, more-targeted policy steps are available to contest Chinese mercantilism. These include:

- Working with our allies to create and maintain a comprehensive "bill of particulars" on Chinese innovation-mercantilist policies and practices, deciding which elements can be brought to the WTO for action and which need new rules.
- Collaborating with like-minded countries to bring a WTO case against China for its IP and technology transfer mandates and/or its extensive system of market-distorting production subsidies.
- Ensuring reciprocity in IP and technology licensing agreements.
- Updating the Committee on Foreign Investment in the United States (CFIUS) to reflect the realities of modern state-led capitalism and if necessary requiring separate reviews for investment from state-directed economies.
- Placing a temporary ban on all technology transfers to any Chinese state-owned, state-controlled, or substantially state-funded company if the technology is part of a stated Chinese industrial policy goal or sector for which China's government has set explicit import-substitution targets.
- Requiring notification to the U.S. government on a confidential basis of technology licenses to China and of transactions in China in which the Chinese government or Chinese government-affiliated entities are involved.
- Denying use of the U.S. banking system to companies benefitting from stolen IP and requiring Chinese-headquartered enterprises that wish to list on U.S. stock exchanges to provide audited books according to Generally Accepted Accounting Principles.
- Continuing not to recognize China as a market economy and amending U.S. trade law to reflect that non-market economy status includes state planning and control over IP and technology.
- Permitting the U.S. Trade Representative to hire outside counsel for WTO disputes, as many countries (such as China) do, particularly for more technically complex matters.

China's innovation mercantilism represents a serious and systemic threat to America's economy and especially to the health, competitiveness, and viability of America's advanced-technology enterprises and industries. The threat demands a forceful, concerted, and thoughtful response. But blanket tariffs on broad categories of ICT goods would do more harm than good to the U.S. economy.

APPENDIX: DETAILED METHODOLOGY

Data for this analysis comes from U.S. Bureau of Economic Analysis, the U.S. Census Bureau, the UN Comtrade and Main Aggregate database, the World Bank, the World Input-Output tables, the Organization for Economic Cooperation and Development, the World Trade Organization, the Conference Board, and the White House Office of Management and Budget. The analysis builds on a framework ITIF developed in its 2017 analysis "How Joining the Information Technology Agreement Spurs Growth in Developing Nations."[21]

Data for calculating trade in ICT goods comes from the United Nations Comtrade Database.[22] The database provides the value and weight of imports and exports between each country and its trading partners, broken down by year and commodity type. The database releases trade data according to three classification systems for traded goods. Of these three systems, this analysis uses two. The first is the Harmonized Commodity Description and Coding System (HS). This system is used most often to identify which products countries enact tariffs on (or other forms of trade barriers). In this system, there are over 5,000 distinct goods categories, with these categories revised every four to six years. Currently, the HS2012 is the most up-to-date classification system. The second is the Broad Economic Categories (BEC) system. This system classifies goods into capital, intermediate, and consumption goods. For purpose of this analysis, we collapsed the categories of capital and consumption goods into a final goods category. Currently, this system is in its fourth revision, with the fifth revision slated to come into effect by the end of 2018. To merge these two classification systems, the United Nations provides mapping correlation tables to allow users of the trade data to convert a product identified in one classification system into the other.

ITIF identified 269 ICT products by their HS codes. One minor limitation is that a handful of ICT products do not have HS codes attached to them and thus cannot be properly identified within the trade data. This arises because such products may be new or very specialized, and as such do not have classification codes attached to them. These "unidentified" products (which consist of more than just ICT goods) comprise approximately 2 percent of trade in ICT products.

ITIF used 2016 as the base year for our analysis, as 2017 trade data has yet to be fully released. U.S. trade flows, both imports and exports, were calculated for total trade in these 269 ICT products (according to their HS codes). In addition, ITIF calculated the real change in ICT trade flows from 2011 to 2016 using relevant GDP deflators available from the World Bank. Next, import values for these 269 products were summed to get the total value of ICT imports. Then ICT trade attributable to China and the rest of the world were separated and mapped onto their BEC equivalents to identify the value of final and intermediate goods imported from China.

To determine the change in ICT imports, we employ a price elasticity of import demand of -1. This means that a 1 percent increase in price decreases the quantity demanded for ICT products by 1 percent. This value is chosen as a proxy for developed countries and is based on literature tracking the change in the price elasticity of demand for ICT.[23]

Using this proxy value does not take into consideration the fact that the price elasticities of import demand are sensitive toward change in exchange rates and other trade frictions. Realistically, each ICT product has its own demand elasticity, but such estimates have yet to be developed. Furthermore, ITIF uses the total value of imports as a proxy for physical quantity demanded. This assumes that the value of imports captures the physical quantity demanded, although the change in prices would in turn have increased physical quantity of ICT goods imported (i.e., 10 CPUs cost $1,000, thus quantity demanded is 10, introducing a 10 percent tariff would mean that a CPU costs only $110, but with that $1,000, one can now only get 9 CPUs; but since the value of that is still $1,000, it does not accurately represent the change in physical quantity). Note that this change is not the price elasticity of import demand, it is the effect of using monetary value as a proxy for quantity demanded. Another limitation is that the price elasticity of import demand only estimates changes at the margins, rather than a change from no tariffs to a tariff levy. A study that analyzed global effects from the ITA found that countries that completely eliminated their tariffs had a much larger trade-creation impact than those countries that gradually reduced their tariffs to zero.[24] (In other words, going from, say, a 6 percent tariff to no tariff had a greater trade effect than going from an 8 percent tariff to a 2 percent tariff.) This is because reducing tariffs to zero reduces border formalities considerably and demonstrates lock-in and a firm commitment, easing the trade in goods and facilitating efficient global supply chains. Conversely, by enacting tariffs, the United States would raise the transaction costs for trade and may see a larger decrease in imports (i.e., a 10 percent tariff may induce a decrease in quantity demanded for ICT by much more than 10 percent).

In summary, for this analysis, we assume that a 10 percent tariff placed on ICT imports from China decreases the total import value of these goods by 10 percent (and a 25 percent tariff an equivalent 25 percent decrease in value).

To estimate how the decrease in ICT imports from China impacts the U.S. economy, we first estimate how the decrease in Chinese ICT imports leads to a decrease in U.S. ICT investment. Then we estimate the economic impact using the elasticity of ICT capital (a 1 percent increase in ICT stock increases GDP by 0.06 percent) and compare that to the baseline scenario of GDP growth under no change to ICT investment. There are a number of studies that estimate the elasticity of ICT capital. For example, Cardona, Kretschmer, and Strobel conducted a meta-analysis of 29 economic studies that examine the relationship between ICT investments and economic growth, and suggest that the results from those studies cluster at a value of 0.06.[25] A more recent study released in early 2018 by Thomas Niebel analyzes the impact of ICT capital on economic growth using data from 2000 to 2010 and clusters countries according to their economic development status. Depending on his model specifications, he too finds an ICT capital elasticity of approximately 0.06.[26]

Data to estimate current ICT investment, composition of ICT investment, and capital stocks come from The Conference Board. Basic economic data such as GDP and gross capital formation (i.e., capital investments) comes from the United Nations Main Aggregates Database (with the latest data for 2016). Data for the growth rate in ICT capital investment comes from the OECD productivity statistics series. Real growth rates for these indicators were calculated from 2011 to the latest year data was available and averaged.

Using these indicators, ITIF estimates that approximately 32 percent of annual U.S. investment goes into ICT. And the composition of these ICT investments are 22 percent into IT hardware, 22 percent into telecommunications, and 56 percent into software. Each year, these types of ICT investments depreciate by 30 percent for IT hardware, 12 percent for telecommunications, and 46 percent for software. Using the net perpetual inventory method, ITIF estimates the current stock of ICT capital and projects economic growth under the baseline scenario of no trade shocks to the current growth rate of ICT investment. ICT investment is split into two categories, domestically produced (73 percent) and imported (27 percent); domestically produced investments increase 4.2 percent per annum, and imported investments decrease at 0.6 percent per annum. This baseline estimate allows us to formulate a counterfactual estimate as to how much GDP will be lost under a reduction in ICT investment from levying tariffs on Chinese ICT imports.

To estimate the decrease in ICT investment accrued due to reduced Chinese ICT imports, ITIF estimated the value of final ICT goods imported from China and intermediate ICT goods imported from China, and this is modelled in as a trade shock (i.e., a one-time static decrease in trade flows). Final ICT import goods comprise 81 percent of ICT imports from China and represents a direct decrease in ICT investment for the following year. Intermediate ICT import goods make up 19 percent of ICT imports and has a partial impact on ICT investment. This arises because only a portion of intermediate goods imported is invested in the economy—U.S. producers use imported intermediate goods to produce final goods consumed both in the United States or exported to other countries.

The World Input Output tables provide data on how the share of intermediate goods produced by other countries that is contained in a unit of final output (for example, a computer produced by the United States may contain $100 worth of components from China, $250 worth of components from Japan, $175 worth of components from Mexico), and the share of final output that is consumed by a country or exported. To that effect, we assume that U.S. ICT production contains 5 percent of Chinese imports and that 33 percent of U.S. ICT production is purchased and remains in the United States.

Given a reduction in intermediate and final goods imports from China under either tariff scenario, a new value for annual ICT investment can be calculated. ITIF then calculates the estimated change in ICT capital stocks, and its induced impact on economic growth in the case of a 10 percent tariff and 25 percent tariff on ICT imports from China. We then compare these two cases against the baseline projections to calculate GDP forgone.

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0.9 since the early 2000s. (Note that the elasticity used here differs from the ones used in two previous ITIF reports, where our models correlated a 1 percent drop in ICT prices to a 1.3 percent increase in ICT consumption, as the elasticity is higher in developing countries. This study uses 1 as indicated by more recent research on the effect for developed countries such as the United States.)

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ERRATA

This report was updated on March 19, 2018. Estimates of the percentage change in economic growth due to ICT tariffs were misstated in the second full paragraph on page 4 and have been corrected. Estimates of GDP growth projections over 10 years have been clarified in the last paragraph on page 5. These changes have no bearing on the report's main findings regarding total economic growth projections over 10 years or on projected changes to household income.

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ABOUT ITIF

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