THE ECONOMIC BENEFITS OF INTELLECTUAL PROPERTY RIGHTS IN THE TRANS-PACIFIC PARTNERSHIP

Contributors

Nam D. Pham, Ph.D.

Joseph Pelzman, Ph.D.
Justin Badlam
Anil Sarda

February 2014

ndp | analytics | 1730 Rhode Island Avenue, NW | Suite 205 | Washington, D.C. 20036 | 202.450.1368 | www.ndpanalytics.com

The Economic Benefits of Intellectual Property Rights in the Trans-Pacific Partnership[1]

ABSTRACT

Innovation fuels the U.S. economy. And the protection of intellectual property (IP) is what fuels innovation. The report quantifies the impact that IP-intensive manufacturing industries would have on the economic growth created by a prospective Trans-Pacific Partnership (TPP). Our analysis shows that two-thirds of these economic benefits for the U.S. economy and the 11 partner countries would come from IP-intensive industries. As such, the stronger the protection of IP rights under the TPP, the greater the value of trade leading to greater economic growth, additional jobs created, higher incomes, and development across countries.

[1] The opinions and views expressed in this report are solely those of the authors.

HIGHLIGHTS OF THE REPORT

Innovation fuels the U.S. economy. And the protection of intellectual property (IP) — the ownership of ideas instead of physical assets — is what fuels innovation. For two years now, the United States has been negotiating with 11 other trading partners who also border the Pacific Ocean to create a comprehensive trade agreement known as the Trans-Pacific Partnership (TPP). These negotiations are set to conclude in the coming year.

The TPP would go well beyond the usual dismantling of tariffs and import quotas, and include a range of new and emerging issues that are assuming more and more importance in the 21st century. Among these are the protection of IP afforded through copyrights, patents, regulatory data safeguards, trademarks, and trade secrets. Innovation thrives when inventors and investors are rewarded for their efforts to develop new products and services that people want to buy, not when their ideas are stolen as soon as they go to market.

Expanding the legal framework that supports robust IP protections in the United States is crucial to the success of the TPP, whose members include some of the world's fastest-growing economies, and together have a combined gross domestic product of $27.5 trillion — about 40 percent of the world economy. The twelve countries in a prospective TPP, which stretches from the Western Hemisphere to Asia, are Australia, Brunei, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore, the United States and Vietnam.

IP-intensive industries — those that rely far more heavily on IP than others — take up a vast swathe of the economy, and include pharmaceuticals, aerospace, computers and the software to run them, electronics, medical equipment, chemicals, and automobile manufacturing. These industries, in turn, have a far higher rate of innovative research and development. Not surprisingly, a host of studies have shown that these IP-intensive industries generate more skilled jobs, pay higher wages, and produce more than double the sales per employee of non-IP-intensive industries.

Trade policy is by its nature political, and over the years, virtually every country in the world has built up a labyrinth system of taxes and tariffs and import quotas and licenses to protect favored industries. Eliminating those taxes — removing a tariff on imported shoes, for example — and removing or at least lessening the burden of licensing and import quotas in competing markets, is the whole point of the dozens of free trade agreements now in place in the world among two or more countries.

This report quantifies the extent to which IP-intensive manufacturing industries have contributed to the additional economic growth that is a result of the ten free trade agreements (FTAs) already in effect between the United States and 16 other countries in five continents. Then, using the historical data, quantifies the impact that IP-intensive manufacturing industries would have on the economic growth created by a prospective TPP. Among our main findings:

- Innovation — the creation of something new or improved, or a new market practice — has made a significant contribution to the ten FTAs between the United States and other countries studied in this report. By eliminating tariffs and including IP provisions based on U.S. law and standards, these FTAs boosted manufacturing exports in IP-intensive industries by 10.9 percent and pharmaceuticals and medicines by 15 percent, compared to an average of 7.3 percent in all industries and just 3 percent in non-IP-intensive industries.

- Based on our findings about innovation and the existing FTAs, we estimate that the formation of the Trans-Pacific Partnership would increase U.S. manufacturing exports by $26 billion and U.S. gross domestic product (GDP) by $11 billion, and lead to the creation of as many as 48,000 additional jobs. Two-thirds of these economic benefits would come from IP-intensive industries.

- As market access increases and trade barriers fall around the world, foreign affiliates of U.S. firms play an ever-more important role, something that is especially true in IP-intensive industries. American manufacturing companies currently sell some $424 billion worth of goods to their foreign affiliates, a figure that will increase by an additional $8 billion if the TPP is concluded. Since more than two-thirds of affiliates sales are in IP-intensive industries — which rely on patents, trademarks, and trade secrets — IP protections based on current U.S. law need to be adopted to secure long-term economic growth.

- U.S. sales to foreign affiliates have a direct and positive spillover effect on local economies by adding jobs and physical assets. Assuming a finalized TPP maintains the same protections for intellectual property as currently exist under U.S. law, the creation of a trans-Pacific trade pact would produce combined benefits in the 11 other countries of $27 billion in additional sales, $6.4 billion in additional GDP, and 68,240 new jobs.

Our findings underscore the benefits of free trade areas where countries eliminate and reduce trade barriers. It is equally clear that strong IP protection is an essential requirement for innovation, which in turn is fundamental to economic growth. IP protections have not only enhanced economic growth, but also technology transfer, foreign direct investment, and localized innovation in countries across all levels of economic development.

The stronger the protection of IP rights under the TPP, the greater the value of trade and investment in IP-intensive industries. It is these industries that are in particular the engines of economic growth, higher wages and more jobs. We cannot invest in our future without them.

EXECUTIVE SUMMARY

Intellectual property (IP) rights are critically important to the economic success of a prospective Trans-Pacific Partnership (TPP) agreement. The United States is currently engaged in negotiations with 11 other countries (Australia, Brunei Darussalam, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore, and Vietnam); six of the TPP participants (Australia, Canada, Chile, Mexico, Peru, and Singapore) are already free trade partners with the United States. The negotiations seek to reduce both tariff and non-tariff barriers to trade in the Asia-Pacific region to promote greater economic integration. The conclusion of the TPP would create the most important free trade zone in the world. The combined GDP of the 12 TPP participants is nearly $27.5 trillion, accounting for 38.3 percent of global GDP.

Implementation of a TPP agreement that truly integrates the region with broad and deep reductions in tariff and non-tariff barriers, and includes commitments to strong IP protections, would benefit all 12 signatories to the TPP agreement. A trade agreement that eliminates external tariffs and converges, harmonizes, and ideally homogenizes internal regulatory and commercial rules would reduce the costs of production, compliance, and information. The more people and factors of production subjected to the same rules, the greater the scope for specialization and economies of scale, which, in turn, leads to productivity growth, higher incomes, and improved living standards.

In this report, we quantify the economic impacts of TPP on 12 participants via exports and foreign direct investment. We estimate the formation of TPP will boost U.S. annual exports by between $20.6 and $26.2 billion, will contribute between $9.0 and $11.3 billion to U.S. GDP, and will create between 38,811 and 47,586 jobs. The spillover effects of U.S. companies' exports to their foreign affiliates in the other 11 TPP countries are more than $26.9 billion in additional sales, $6.4 billion in additional GDP, and 68,240 jobs. More than two-thirds of these benefits come from IP-intensive industries that rely heavily on IP rights.

Impact of Innovation and IP Rights on U.S. Economy and Trading Partners

Innovation is fundamental to economic growth. It requires, among other things, a legal environment that strongly supports the protection of intellectual property rights. As shown in our previous studies, IP-intensive industries (those that invest more on R&D per employee than the national average) outperform non-IP-intensive industries across all economic measures.[2]

Our empirical studies estimate that IP creates 19 million direct jobs and supports 55 million direct and indirect jobs in the United States. In addition, we find that IP-intensive manufacturing industries, led by the pharmaceutical industry, create both high- and low-skilled jobs and provide nearly 60 percent greater compensation to their employees than non-IP-intensive industries. Both output and sales per employee in IP-intensive manufacturing industries more than double those of non-IP-intensive manufacturing industries.

---

[2] IP-intensive industries in the manufacturing sector are petroleum and coal product manufacturing (NAICS 324), chemicals (NAICS 325), computer and electronic products (NAICS 334), transportation equipment (NAICS 336), and medical equipment (NAICS 3391). The pharmaceutical industry (NAICS 3254) is a subset of the chemical sector.

With such a large productivity advantage over non-IP-intensive industries, IP-intensive manufacturing industries account for approximately 60 percent of U.S. manufacturing exports.[3]

The important contributions of IP protection to economic growth are evident not only in the U.S. economy but across countries at different stages of economic development. Indeed, empirical studies support the existence of a positive relationship between IP rights and innovation, and between innovation and economic growth. A World Bank study finds that a 20 percent increase in the number of patents granted annually was associated with a 3.8 percent increase in the output of 92 countries during 1960-2000.[4] Another study, relying on datasets of 80 countries, shows that strong IP protection induced greater gains in low-income countries than in high-income countries.[5]

Studies have generally found that developing countries that strengthen their patent protections spur technology transfer as well as localized innovation.[6] Moreover, strong IP protection attracts foreign direct investment (FDI). An OECD report finds that a 1 percent change in the strength of a country's IP protection framework is associated with a 2.8 percent increase in FDI inflows and a 0.7 percent increase in domestic R&D.[7]

Using the International Property Rights Index[8] and data on outward U.S. FDI to 53 developed and developing countries in 2010, we find that higher levels of IP protection attract greater amounts of FDI. Moreover, our results show that higher levels of IP protection attract a greater amount of FDI in IP-intensive industries than in non-IP-intensive industries. For example, U.S. FDI in foreign chemical industries (an IP-intensive industry) is 3.7 times greater than average FDI in foreign manufacturing overall.

In addition to attracting FDI, IP protection ties the fortunes of local firms to larger U.S. companies. Our results show that sales between foreign affiliates and U.S. parent companies are higher in IP-intensive industries than in non-IP-intensive industries. Indeed, during 1999-2010, the ratio of foreign affiliate sales to U.S. parent company sales in IP-intensive manufacturing industries was 0.50, versus 0.43 in non-IP-intensive industries. The ratio of foreign affiliate sales to U.S. parent companies in the pharmaceutical industry was 0.58 in 2010, or 58 cents for every dollar of corresponding U.S. parent company sales.

Effects of Innovation and IP Rights on U.S. FTAs

In addition to strengthening domestic markets, innovation improves U.S. competitiveness in global markets. Nearly two-thirds of U.S. exports during 2000-12 were IP-intensive products—including chemicals,

---

[3] Pham, Nam. 2010. "The Impact of Innovation and the Role of Intellectual Property on U.S. Productivity, Competitiveness, Jobs, Wages, and Exports." NDP Consulting; and Pham, Nam. 2012. "IP Creates Jobs for America." NDP Consulting.
[4] Chen, Derek H.C., and Carl Dahlman. 2004. "Knowledge and Development: A Cross-Section Approach." World Bank Policy Research Working Paper No. 3366.
[5] Falvey, Rod, Neil Foster, and David Greenway. 2004. "Intellectual Property Rights and Economic Growth." Research Paper 2004/12, University of Nottingham.
[6] Dutz, Mark, Antara Dutta, and Jonathan Orszag. 2009. "Intellectual Property and Innovation: New Evidence on the Relationship Between Patent Protection, Technology Transfer and Innovation in Developing Countries." CompassLexecon.
[7] Cavazos, R. et al. 2010. Policy Complements to the Strengthening of IPRs in Developing Countries, OECD Trade Policy Working Papers, No. 104, OECD Publishing.
[8] Tiwari, Gaurav. 2012. "International Property Rights Index." Report prepared for the Property Rights Alliance.

transportation equipment, and computer and electronics. As shown in our previous studies, innovation promotes U.S. exports, with the annual value of exports per employee in IP-intensive industries 3.4 times greater than in non-IP-intensive industries.

As of October 2013, the United States has concluded 14 preferential trade agreements with 20 other developed and developing countries in the Americas, North Africa, the Middle East, and Asia. As shown in previous U.S. FTAs, the reduction and elimination of tariffs leads to increased exports, which consequently increases output, employment, and wages in the exporting countries. In this report, we use available data for 16 countries under 10 previous trade agreements--from the North America Free Trade Agreement (NAFTA) in 1994 through the US-Peru trade promotion agreement in 2009--to estimate the impact of IP on U.S. exports.

Our results indicate that previous FTAs boosted U.S. manufacturing exports by an average of 7.3 percent after the trade agreements entered into force. Our results also show that IP-intensive manufacturing industries have stronger trade effects than non-IP-intensive industries. Previous FTAs raised annual exports of IP-intensive U.S. manufacturing industries by 10.9 percent and annual exports of the U.S. pharmaceuticals and medicines industry by 15.0 percent. In contrast, exports of non-IP-intensive industries to those 16 FTA countries rose by only 3.0 percent.[9]

Economic Impact of Innovation and IP Rights on TPP Countries

Our analytical framework applies the previous FTA effects to a set of assumptions to quantify the economic impacts of TPP on the United States and its 11 trading partners. Our analysis makes the following assumptions: that the TPP agreement will reflect IP rights and protections afforded under current U.S. law; that existing tariffs in the TPP's five non-FTA members will also be eliminated; and that the TPP agreement will achieve a 50 percent reduction in non-tariff barriers, such as IP infringement, discriminatory product standards, subsidies to local industry, buy-local or local-content provisions, and other behind-the-border impediments to international commerce.

As with previous preferential trade agreements, the elimination and reduction of tariff and non-tariff barriers is expected to increase the value of U.S. exports to other TPP countries. We estimate the implementation of TPP will raise annual U.S. manufacturing exports by between $20.6 billion (base case) and $26.2 billion (high case). The elimination of tariffs with the five non-FTA countries will raise U.S. exports by $5.6- $11.2 billion, with most of the gains occurring in IP-intensive industries. The 50 percent reduction in non-tariff barriers will generate another $15.0 billion in U.S. exports--$8.7 billion from IP-intensive industries and $6.2 billion from non-IP-intensive industries. The U.S. economy is expected to add between 38,811 and 47,586 new jobs, with additional annual wage increases of between $2.2 and $2.7 billion. U.S. GDP would rise by between $9.0 and $11.3 billion.

Based on the current relationship between U.S. parent companies and their foreign affiliates, we estimate that the implementation of the TPP will generate an additional $8.0 billion in sales of U.S. parent companies to their foreign affiliates. Consequently, foreign affiliates will generate additional sales of $26.9 billion, boost

[9] We use 2012 export data to normalize trade effects across 16 countries in 10 FTAs during 1994-2012.

local GDP by $6.4 billion, provide $2.6 billion in additional employee compensation, and create 68,240 new jobs.

Summary Table. Economic Benefits of TPP on 12 Participants

Panel 1. The United States

	Manufacturing Sectors	IP-intensive Industries	Non-IP-intensive Industries
Additional Exports ($ millions)	$20,607.4 ~ $26,218.0	$13,461.6 ~ $18,185.2	$7,145.8 ~ $8,032.8
Additional Value-Added ($ millions)	$8,963.2 ~ $11,343.2	$5,588.9 ~ $7,550.0	$3,374.3 ~ $3,793.2
Additional Wages ($ millions)	$2,161.5 ~ $2,693.5	$1,162.8 ~ $1,570.8	$998.7 ~ $1,122.7
Additional Employment	38,811 ~ 47,586	17,451 ~ 23,575	21,360 ~ 24,011

Panel 2. Other 11 Participants

	Additional Market Access to Mfg. U.S. Parent Companies ($ millions)	Additional Mfg. Sales of Foreign Affiliates ($ millions)	Additional Mfg. Value-Added of Foreign Affiliates ($ millions)	Additional Employees in Foreign Affiliates	Additional Wages Paid to Foreign Affiliate Workers ($ millions)
Australia	161.5	1,039.9	248.0	2,047	151.4
Brunei	4.8	25.0	6.0	30	3.2
Canada	857.5	2,402.2	572.9	4,525	241.2
Chile	69.1	82.7	19.7	318	7.6
Japan	2,935.9	13,107.8	3,125.9	16,744	1,504.5
Malaysia	543.3	3,630.5	865.8	10,505	182.7
Mexico	3,052.1	5,376.6	1,282.2	29,358	457.1
New Zealand	109.7	369.2	88.0	958	40.3
Peru	85.5	76.9	18.3	231	5.8
Singapore	14.1	145.3	34.7	73	4.0
Vietnam	129.1	674.3	160.8	3,451	39.6
11 TPP Countries	**7,962.5**	**26,930.4**	**6,422.3**	**68,240**	**2,637.4**

Our analysis demonstrates the importance of IP-intensive industries to the United States and its TPP partner countries. The economic gains, job growth, and value-added to these 12 economies are mainly the direct results of increased activity in IP-intensive industries, which are likely to thrive and spawn local benefits in an environment with strong IP protection. We estimate approximately two-thirds of the annual benefits come from IP-intensive industries. These economic gains will not be realized in the TPP, or in future free trade agreements, without strong IP rights.

INTRODUCTION

Empirical evidence overwhelmingly supports the claim that innovation is a strong determinant of prosperity. Wealth creation and rising living standards require increases in per capita economic growth, which depends on investments in new ideas, processes, technologies, and human capital. The returns on these investments are functions of the amount and quality of the investment, which is determined in large part by the rules and institutions supporting innovation.

Research and development (R&D) spending and educational attainment are two critical components of innovation, which – by some estimates – account for 80 percent of U.S. economic growth.[10] Technological innovation occurs in industries that invest heavily in R&D, and spawns ideas, products, and industries well beyond the original intent. It also supports economic activity in unanticipated ways. The cumulative benefits of R&D investment are widespread. By some estimates, annual R&D spending of 2.3-2.6 percent of GDP maximizes the long-run impact on productivity growth and is the key to long-run economic stability.[11]

Innovation that is commercially adapted can hardly be attributed to a single process or industry practice—it is part of a complex ecosystem. This ecosystem includes an institutional structure and system of property rights that provide the incentives to invest in innovative products, which in turn improve living standards and the quality of life. Central to the proper functioning of America's innovative ecosystem – indeed, key to U.S. economic success – has been a steadfast commitment to protecting intellectual property (IP) rights.

IP protection is also increasingly important to economic growth abroad. Countries with relatively strong IP protections tend to have larger economies and greater investment in IP-intensive industries, which are also the industries that contribute disproportionately larger shares of GDP, produce spillover benefits with their R&D spending, and support other local businesses with their intermediate goods purchases and the spending of their better-paid employees.

This report's main objectives are to estimate the economic benefits of a comprehensive Trans-Pacific Partnership agreement for the United States and its 11 negotiating partners, and to demonstrate how protecting IP rights is essential for all TPP countries who wish to realize a large part of the projected benefits. The stronger the commitment to protecting intellectual property within TPP, the greater will be the value of trade and investment in IP-intensive products and industries. This, in turn, will generate stronger economic growth, higher wages, and more jobs in the region.

IMPORTANCE OF IP RIGHTS TO THE U.S. ECONOMY

The U.S. economy resides at the world's technological frontier, dependent on highly-skilled human capital and a perpetual stream of innovation for its continued growth. Essential to this formula is an infrastructure that encourages investment in research that produces innovations yielding immediate economic benefits,

---

[10] Jones, Charles. 2002. "Sources of U.S. Economic Growth in a World of Ideas." *American Economic Review*, 92:1, pp. 220-239.

[11] Aw, Bee Yan, Mark J. Roberts, and Daniel Yi Xu. 2009. "R&D Investment, Exporting and Productivity Dynamics." NBER Working Paper No. 14670.

while sowing the seeds of parallel and future innovation. Rules and institutions that support the recognition and protection of IP rights deserve much of the credit for U.S. economic growth in recent decades.

IP-intensive industries – those industries that invest more than the industry-wide average in R&D expenditures per employee – play critically important roles in advancing innovation, adding value to the economy, and contributing disproportionately to job and wage growth. IP-intensive industries have become the backbone of the U.S. economy and the basis of U.S. industrial competitiveness.[12]

Public and private research confirms that IP-intensive industries contribute both directly and indirectly, through spillover benefits, to employment, innovation, investment, and output in a broad range of economic sectors. In a previous study of the economic contributions of IP-intensive industries to the U.S. economy, we find that IP is responsible for 19.1 million jobs directly and another 36.6 million indirectly in related supply chain activities – for a total of 55.7 million American jobs.[13]

During 2000-07, employees of IP-intensive industries were paid an average salary of $59,041, a nearly 60 percent premium over the $37,202 salary of the average worker in non-IP-intensive industries (Table 1).

Table 1. Economic Performance per Employee in the United States, IP-intensive versus Non-IP-intensive Industries, 2000-2007[14]

	Wages	Sales	Value-Added	Exports	R&D Spending	Capital Spending
IP-Intensive	$59,041	$485,678	$218,373	$91,607	$27,839	$15,078
Non-IP-Intensive	$37,202	$235,438	$115,239	$27,369	$2,164	$6,831
Difference	$21,839	$250,240	$103,134	$64,238	$25,676	$8,246

The economic activities of IP-intensive industries total $5.8 trillion in output—nearly half the total private sector output. Workers in IP-intensive industries are also more productive, reflecting the labor skill required and relative capital intensity of IP-intensive work. Moreover, output per employee in IP-intensive industries is almost double the average for non-IP-intensive workers.[15]

America's IP-intensive industries owe much of their success to large-scale investments in R&D and a skilled labor force, which together produce knowledge-intensive products. The U.S. manufacturing sector's average R&D intensity (R&D expenditures over sales) has increased from 2.6 percent in 1983 to 4.1 percent in 2010.[16] The United States now accounts for more than one-third of global R&D, about 70 percent

[12] Pham, Nam. 2010. "The Impact of Innovation and the Role of Intellectual Property on U.S. Productivity, Competitiveness, Jobs, Wages, and Exports." NDP Consulting. Web; Ginarte, J.C., Park, W.G., 1997. "Determinants of Patent Rights: A Cross-National Study." *Research Policy*, 26, pp. 283–301.
[13] Pham, Nam. 2012. "IP Creates Jobs for America." NDP Consulting. Web.
[14] Pham. 2010.
[15] Pham. 2012.
[16] Tassey, Gregory. 2010. "Rationales and Mechanisms for Revitalizing U.S. Manufacturing R&D Strategies." Journal of Technology Transfer 35 (2010): 283-333; Updated 2010 figures from: National Science Foundation. 2013. "Business R&D Performance Remained Virtually Unchanged in 2010."National Center for Science and Engineering Statistics. NSF 13-324.

of which is contributed by private firms.[17] In 2010, private R&D totaled $221.7 billion in all industries and $159.6 billion in the manufacturing sectors. R&D spending in 2010 was 3.2 percent of domestic sales for all industries and 4.1 percent for manufacturing sectors.

The pharmaceutical industry accounts for the largest share of U.S. private sector R&D spending, and with a ratio of R&D-to-sales of 12.7 percent – more than triple the U.S manufacturing sector average – is the most R&D-intensive in the United States. In 2010, pharmaceutical and medicine manufacturers (NAICS 3254) in the United States invested $45.4 billion in R&D – over 28.4 percent of manufacturing R&D funded by U.S. firms.[18] These investments yield new treatments and potential cures that reduce U.S. morbidity and mortality rates, which also contributes positively to U.S economic growth.

Table 2. R&D Performed in the United States, by Source of Funds and Selected Industry, 2010[19]

	All R&D Expenditures ($ millions)	R&D Paid by the Company ($ millions)	R&D Intensity (R&D / Sales; %)
All Industries	$278,977	$221,706	3.2
Manufacturing (31-33)	196,712	159,579	4.1
Chemicals (325)	58,038	53,555	5.7
Pharmaceuticals and medicines (3254)	49,415	45,398	12.7
Computer and electronic (334)	59,875	51,223	9.6
Transportation (336)	42,913	21,076	4.7
Nonmanufacturing (21-23, 42-81)	82,265	62,127	2.1

Developing new medical treatments and therapeutics involves an extensive web of supply chains to facilitate R&D, production, and distribution, which support 3.4 million jobs across the United States in 2011, including 813,523 direct jobs.[20] The pharmaceutical industry pays an average salary and benefits of $110,490 per worker, which is more than double the national average of $54,455.[21] The industry accounted for $789 billion in output in 2011—2.9 percent of total U.S. output that year.[22]

Beyond its directly measurable economic contributions, evidence suggests that IP protection stimulates innovation and that its social return is considerably higher than the economic rate of return to the

---

[17] National Science Foundation. 2012. "Chapter 4. R&D National Trends and International Comparisons." NSF Science and Engineering Indicators 2012. Accessed August 14, 2013. Web.

[18] National Science Board. 2012. "Science and Engineering Indicators 2012," Arlington VA: National Science Foundation (NSB 12-01). In addition to manufacturers, pharmaceutical industry also covers portions of other sub-industries include drug and druggist sundries wholesale (NAICS 4242), scientific research and development services (NAICS 5417), and management of companies and enterprises (NAICS 5511).

[19] National Science Foundation. 2013. "Business R&D Performance Remained Virtually Unchanged in 2010." June 2013.

[20] Battelle. 2013. "The Economic Impact of the U.S. Biopharmaceutical Industry." Battelle Technology Partnership Practice. Prepared for the Pharmaceutical Research and Manufacturers of America.

[21] Ibid.

[22] Ibid.

innovator.[23] R&D in the pharmaceutical industry is strongly correlated with both medical innovation and increases in life expectancy. The pharmaceutical industry leads all others in scientific breakthroughs that improve physical and mental wellness, reduce mortality and morbidity, and, ultimately, make the global economy more productive. The new drugs benefit the economy through multiple channels, including increased worker productivity, longevity, and savings on other types of medical expenditures.[24] From 1970 to 2000, gains in life expectancy added about $3.2 trillion a year to national wealth.[25] The success of the industry and its ability to introduce new methods to meet the health challenges of current and future generations relies on a system that gives incentives for investment in R&D and allows innovators to recoup their investments by protecting their intellectual property.

U.S. Law, Innovation, and IP Rights

Intellectual property rights — crucial to America's innovation-fueled prosperity — serve two primary functions:

- To protect original creations and technical designs from commercial infringement; and,
- To provide economic incentive – the capacity to recoup investment and earn profits – to create novel products and ideas.

Without IP protection, innovators are at significant market disadvantages relative to competitors, who could profit from the innovators' investments in R&D and thereby discourage innovation in the first place.[26] Thus, the comparative advantages of companies often hinge on their ability to protect their IP — embodied in patents, regulatory data protections, copyrights, trademarks, and trade secrets — all critical for the economic success of innovative pharmaceutical companies as well as for other IP-intensive industries.

Incentives are the essence of economics and are particularly necessary in a competitive, high cost, risky marketplace.[27] Investments in R&D involve both technological uncertainty (how to create new technologies that are operational) and commercial uncertainty (how to ensure consumers will adopt new technologies). The decisions to produce or to invest in IP are therefore linked with decisions to bear risk.[28] U.S. law reflects the nature of this risk by guaranteeing IP rights that serve as the foundation for innovation policy. The promotion and protection of IP rights induce investment in R&D, which spawns innovation. Indeed, IP protection — at home and abroad — is a crucial element in President Obama's *Strategy for American Innovation*, the *National Export Initiative*, and the U.S. Intellectual Property Enforcement Coordinator's *Joint Strategic Plan*.

---

23 Mansfield, et al.1977. "Social and Private Rates of Return from Industrial Innovations." *Quarterly Journal of Economics*, 41, pp. 221-240.

24 PhRMA. 2013. "Chart Pack: Biopharmceuticals in Perspective," pp. 4-7, 53-56.

25 Murphy, Kevin and Robert Topel. 2006. "The Value of Health and Longevity," *Journal of Political Economy*.

26 Gallini, Nancy and Suzanne Scotchmer. 2002. "Intellectual Property: When Is It the Best Incentive System?" *Innovation Policy and the Economy,* Volume 2. Editors: Adam B. Jaffe, Josh Lerner and Scott Stern. NBER. MIT Press: Boston.

27 Arrow, Kenneth. 1962. "Economic Welfare and the Allocation of Resources for Invention. In The Rate and Direction of Inventive Activity: Economic and Social Factors." National Bureau of Economic Research, pp. 609-626.

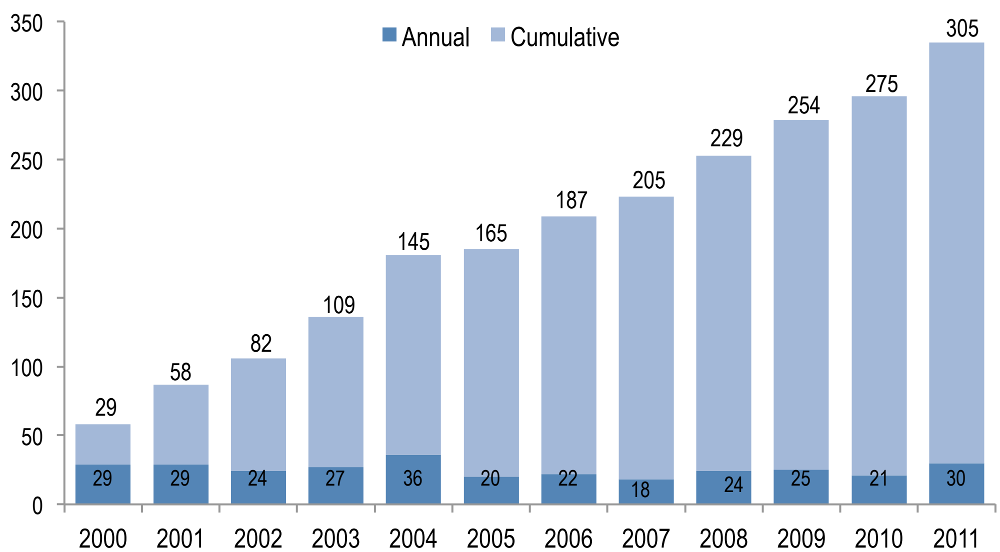
28 Belleflamme, Paul. 2006. "Patents and Incentives to Innovate: Some Theoretical and Empirical Economic Evidence." *Ethical Perspectives, Journal of the European Ethics Network*,13(2), pp. 267-288.

Importance of IP Rights to Pharmaceutical Innovation

Innovation in the pharmaceutical sector has yielded new discoveries and 21st century medicines that have fundamentally altered the future of human health. These breakthroughs in human health have occurred because of a system of IP laws that safeguard proprietary research activities and encourage investment in new treatments and cures. The introduction of biological medicines — those derived from living organisms — have added numerous therapeutic options for many diseases and has had important effects on such fields as oncology and rheumatology.[29] But the process from discovery to commercialization of new medicines is long, expensive, and uncertain.

Fulfilling the safety and effectiveness data requirements to gain FDA approval of new medicines often takes more than a decade to complete, with costs to meet pre-approval standards averaging, conservatively, more than $1.2 billion for each new therapeutic.[30] Studies show that firms need more than 12 years to recoup R&D expenditures and capital investment for biologic medicines, yet such medicines only have a clinical success rate of 20 percent.[31] The industry relies heavily on the protection of IP rights – patents and regulatory data protection, in particular – to recoup the costs of developing new drugs and to have enough incentive to continue investing in R&D.[32] As a result of this system of property rights protections, the U.S. pharmaceutical industry leads the world in developing new therapeutics, with more than 300 new medicines approved in the last decade (Figure 1).

Figure 1. Annual and Cumulative New Drug Approvals Since 2000[33]



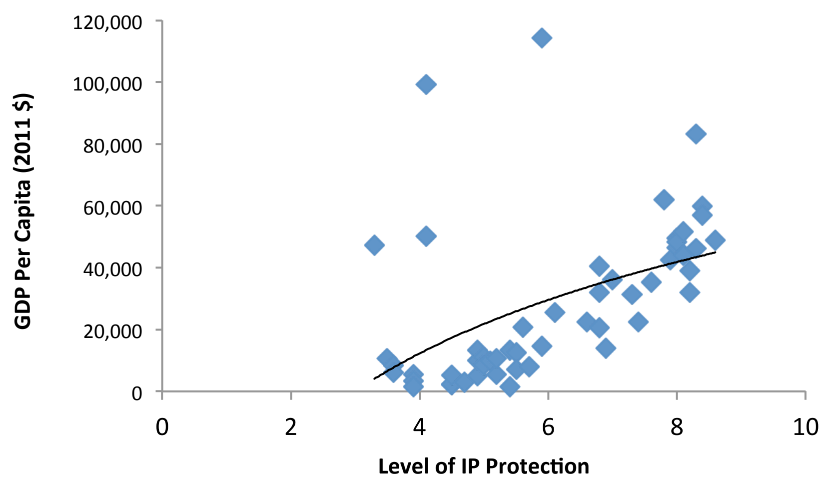
[29] Schacht, Wendy and John Thomas. 2012. "Follow-On Biologics: The Law and Intellectual Property Issues." *Congressional Research Service.*
[30] DiMasi, Joseph and Henry Grabowski. 2007. "The Cost of Biopharmaceutical R&D: Is Biotech Different?" *Managerial and Decision Economics,* 28, pp. 469-479.
[31] Grabowski, Henry, Genia Long, and Richard Mortimer. 2011. "Data Exclusivity for Biologics." Nature Reviews | Drug Discovery. Volume 10.; DiMasi & Grabowski, 2007.
[32] U.S. Food and Drug Administration. 2013. "Frequently Asked Questions on Patents and Exclusivity." Web.
[33] Long, Genia and Justin Works. 2013. "Innovation in the Biopharmaceutical Pipeline: A Multidimensional View." Analysis Group.

Patents and regulatory data protection help ensure that new medicines are brought to market on a scale that serves U.S healthcare demands. Regulatory data protection is intended to encourage innovators to invest large amounts of capital and assume the risks of failure to conduct the complex clinical work required to demonstrate that an innovative drug or biological product is safe and effective. Currently, there are more than 17,000 projects in the preclinical and clinical pipeline with more than 5,400 products in development or under review by the FDA.[34] Acknowledging the complexity and uncertainty of the biologics innovation process, policymakers added a provision to the *Patient Protection and Affordable Care Act of 2010* granting 12-years of regulatory data protection, as well as a pathway for approving biosimilars.[35]

Level of IP Protection and Economic Development

The economic benefits of IP protection do not accrue only to the United States. Increased levels of innovation are the product of stronger IP protections throughout the world, where per capita GDP and income levels have been on the rise. Evidence supporting a strong, positive relationship between IP rights, innovation, and economic growth is well supported in the literature[36] (Figure 2).

Figure 2. Level of IP Protection and GDP Per Capita in 53 Developed and Developing Countries, 2011[37]



Across the globe, IP rights have boosted investments in R&D, patent filings, foreign direct investment (FDI), and technology transfer. Studies show that as emerging economies modernize, their R&D expenditures as a share of GDP rise at an increasing rate.[38] Bosch finds a strong relationship between R&D and the

---

[34] Ibid.
[35] U.S. Public Law 111-148. Patient Protection and Affordable Care Act. 124 Stat. 807.
[36] Kanwar, Sunil and Robert Evenson, 2003. "Does Intellectual Property Protection Spur Technological Change?," Oxford Economic Papers, *Oxford University Press*, vol. 55(2), pp. 235-264; Falvey, R., Foster, N. and Greenaway, D. 2006. "Intellectual Property Rights and Economic Growth." *Review of Development Economics*, 10, pp. 700–719.
[37] Tiwari, Gaurav. 2012. "International Property Rights Index." Report prepared for the Property Rights Alliance. Web.
[38] Lederman, Daniel and William F. Maloney. 2003. "Research and Development (R&D) and Development," The World Bank, Policy Research Working Paper Series No. 3024.

number of patents granted in 49 developed and developing countries during 1960-2005.[39] Countries with poor IP protection, on the other hand, are at greater risk of accumulating human capital without a corresponding increase in R&D investment as a share of national income. As a result, emerging economies that lack IP protections will have less innovative capacity, and incremental increases in education attainment will fail to contribute meaningfully to productivity gains in innovative industries.[40]

Evidence shows that the strength of a country's IP protection regime positively affects economic development and growth.[41] Chen and Dahlman find that a 20 percent rise in the annual number of patents granted was associated with an increase of 3.8 percent in output in 92 countries during 1960-2000.[42] Falvey finds that strong IP protections stimulated even greater gains in lower-income countries than in the high-income countries.[43]

Strong IP protections also serve as magnets for FDI and international technology transfer. Cavazos shows that a 1 percent change in the strength of a country's IP protection — derived from a statistical index — is associated with a 2.8 percent increase in FDI inflows, a 2 percent increase in service imports, and a 0.7 percent increase in domestic R&D.[44] IP rights facilitate more foreign trade and international technology transfer, improving local skills accumulation and indirectly supporting innovation. IP protections are linked to increased FDI and technology diffusion, with a large volume of literature supporting the role of international trade in transferring technology both among developed countries and from developed to developing countries.[45] Data from 1990 to 2005 show a positive relationship between the level of patent protection and technology transfer and innovation.[46]

We use outward U.S. FDI as share of GDP of the recipient country (based on U.S. Bureau of Economic Analysis data) and the International Property Rights Index[47] to evaluate the relationship between the level of IP protection and outward U.S. manufacturing-sector FDI in 53 developed and developing countries. Our results show that higher levels of IP protection attract greater amounts of FDI from U.S. companies. Moreover, our results show that higher levels of IP protection attract greater amounts of FDI in IP-intensive industries, which are larger contributors to economic growth that non-IP industries. For example, U.S.

---

[39] Bosch, Mariano, Daniel Lederman, and William Maloney. 2005. "Patenting and Research and Development: A Global View." World Bank Policy Research Working Paper No. 3739.

[40] Bravo-Ortega, Claudio and Daniel Lederman. 2010. "Intellectual Property Rights, Human Capital And The Incidence Of R&D Expenditures." World Bank Policy Research Working Paper No. 5217.

[41] Eicher, Theo, and Cecilia García-Peñalosa. 2008. "Endogenous Strength of Intellectual Property Rights: Implications for Economic Development and Growth." *European Economic Review*, 52(2), pp. 237-258.

[42] Chen, Derek H.C., and Carl Dahlman. 2004. "Knowledge and Development: A Cross-Section Approach." World Bank Policy Research Working Paper No. 3366.

[43] Falvey, R., Foster, N. and Greenaway, D. 2006. "Intellectual Property Rights and Economic Growth." Review of Development Economics, 10, pp. 700–719.

[44] Cavazos, R. et al. 2010. "Policy Complements to the Strengthening of IPRs in Developing Countries." OECD Trade Policy Working Papers, No. 104, OECD Publishing.

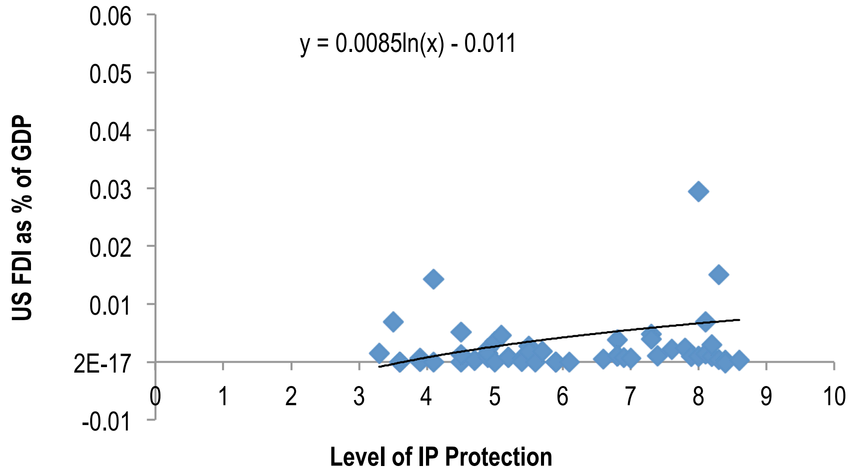
[45] Anja, Breitwieser and Neil Foster. 2012. "Intellectual Property Rights, Innovation and Technology Transfer: A Survey." MPRA Paper 36094, University Library of Munich, Germany; Coe, David, Elhanan Helpman, and Alexander Hoffmeister. 1995. "North-South R&D Spillovers". National Bureau of Economic Research.

[46] Dutz, Mark, Antara Dutta, and Jonathan Orszag. 2009. "Intellectual Property and Innovation: New Evidence on the Relationship Between Patent Protection, Technology Transfer and Innovation in Developing Countries." CompassLexecon.

[47] Tiwari, Gaurav. 2012. "International Property Rights Index." Report prepared for the Property Rights Alliance. Web.

outward FDI in foreign chemical industries (an IP-intensive industry) is 3.7 times greater than average FDI in foreign manufacturing overall (Figure 3).

Figure 3. FDI and Level of IP Protection, Chemical Sector[48]



In sum, IP rights are essential inducers of innovation. Moreover, IP-intensive industries drive U.S. economic growth and are crucial to developing country growth models. In the United States and around the world, IP-intensive industries have played vital roles in developing technological innovation, spurring investment in R&D, and disseminating technology and best practices. Importantly, IP-intensive industries contribute disproportionately to overall employment, compensation, investment, and output. The evidence strongly suggests that countries with a high level of IP protection attract greater investment in IP-intensive industries and enjoy greater returns to their economic activities.

THE ECONOMIC IMPACT OF PREVIOUS U.S. FTAs

Global economic integration has increased rapidly since 1980. World trade as a percentage of GDP has increased from about 40 percent in 1980 to about 50 percent in 2009, while global outward FDI stocks rose from 5.4 percent of world GDP in 1980 to about 33 percent in 2009.[49] Economic theory, empirical studies, and trade data support the conclusion that trade agreements, which reduce or eliminate tariffs, lead to increased exports, which consequently have a positive effect on output, employment, and wages in the exporting countries.

As of October 2013, the United States has concluded and implemented 14 preferential trade agreements with 20 countries located in the Americas, North Africa, the Middle East, and Asia (Table 3).

[48] Ibid.
[49] World Intellectual Property Organization. 2011. "World Intellectual Property Report: The Changing Face of Innovation." WIPO Economics and Statistics Series. Web.

Table 3. Chronology of 14 U.S. Trade Agreements[50]

Free Trade Agreements	Entered into Force	Participating Countries
U.S.-Israel FTA	August 19, 1985	Israel
U.S.-NAFTA	January 1, 1994	Canada, Mexico
U.S.-Jordan FTA	December 17, 2001	Jordan
U.S.-Singapore FTA	January 1, 2004	Singapore
U.S.-Chile FTA	January 1, 2004	Chile
U.S.-Australia FTA	January 1, 2005	Australia
U.S.-Morocco FTA	January 1, 2006	Morocco
U.S.-Bahrain FTA	January 11, 2006	Bahrain
Dominican Republic-Central America-United States Free Trade Agreement (CAFTA-DR)	The agreement entered into force for the United States and El Salvador, Guatemala, Honduras, and Nicaragua during 2006, for the Dominican Republic on March 1, 2007, and for Costa Rica on January 1, 2009.	El Salvador, Guatemala, Honduras, and Nicaragua; Dominican Republic and Costa Rica.
U.S.-Oman FTA	January 1, 2009	Oman
U.S.-Peru TPA	February 1, 2009	Peru
U.S.-Korea FTA	March 15, 2012	Korea
U.S.-Colombia TPA	May 15, 2012	Columbia
U.S.-Panama TPA	October 31, 2012	Panama

We now estimate the trade effects of U.S. FTAs by comparing the differences in bilateral U.S. export growth pre- and post-FTA by measuring and comparing the performance of IP-intensive manufacturing sectors with those in non-IP-intensive manufacturing sectors. The six IP-intensive industries in the manufacturing sector covered in the analysis include petroleum and coal product manufacturing (NAICS 324), chemical manufacturing (NAICS 325), computer and electronic products manufacturing (NAICS 334), transportation equipment manufacturing (NAICS 336), and medical equipment manufacturing (NAICS 3391). The pharmaceutical industry (NAICS 3254) is a subset of the chemical sector.[51] We distinguish IP-intensive industries and non-IP-intensive industries to evaluate the importance of IP protection and to assess their effects on U.S. exports under previous FTAs.

In order to estimate the trade effects of previous U.S. FTAs, we employ a statistical analysis known as a "constant market share" (CMS) and a "shift-share" methodology. The methodology is widely used in empirical studies to detect structural change in U.S. exports and to measure its magnitude.[52] (Appendix 1 describes various analytical frameworks currently used to assess international trade patterns.)

---

[50] Office of the United States Trade Representative, Executive Office of the President.
[51] Pham. 2011; Pham. 2010.
[52] Bowen, Harry P. and Joseph Pelzman. 1980. "A Constant Market Share Analysis of U.S. Export Growth: 1962-1977." U.S. Department of Labor, Report on U.S. Competitiveness; Pelzman, Joseph and Randolph C. Martin. 1981. "Direct Employment Effects of Increased Imports: A Case Study of the Textile Industry." *Southern Economic Journal*; Pelzman, Joseph and Gregory K. Schoepfle. 1988. "The Impact of the Caribbean Basin Economic Recovery Act on Caribbean Nations' Exports and

We begin our calculations by performing a regression analysis to estimate normal U.S. export growth during the pre-FTA period. We then add the observation for the first post-FTA and perform another regression. We repeat this process for the second and then third post-FTA year. We then compare each estimated U.S. export growth rate post-FTA to the estimated U.S. export growth pre-FTA. Finally, we determine the tariff effect of the FTA on U.S. exports in each industry as the difference between pre- and post-FTA export growth rates.

We use export data collected from the U.S. International Trade Commission's (USITC) DataWeb for all manufacturing sectors (NAICS 31-33), which include IP-intensive and non-IP-intensive industries. Our sample includes U.S. exports to 16 FTA countries: Australia, Bahrain, Canada, Chile, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Jordan, Mexico, Morocco, Nicaragua, Oman, Peru, and Singapore. We did not attempt to measure the effects of four U.S. FTAs – the U.S.-Israel, U.S.-Korea, U.S.-Colombia, and U.S.-Panama – because of data limitations. The U.S.-Israel FTA was implemented in 1985 before the NAICS classification system was devised, and the other three were implemented in 2012 so the relevant data are not yet available.

Since each FTA, and each sector within each FTA, is different, we perform individual regressions to capture the individual bilateral trade effects of 10 FTAs with 16 countries – from NAFTA (1994) through Peru (2009) – on the exports of the U.S. manufacturing sector (the six IP-intensive industries identified above plus the aggregate manufacturing sector). Our 448 regressions produce 112 estimates of U.S. export multipliers for seven manufacturing industries and 16 countries.[53] The magnitude of the impact of FTAs on U.S. exports varies substantially across 16 countries and seven manufacturing industries.

Our analysis indicates that FTAs spurred more than $41.9 billion in U.S. manufacturing exports, or 7.3 percent of all exports to those 16 FTA countries. U.S. FTAs spurred over $34.2 billion in exports from U.S. IP-intensive industries, or 10.9 percent of IP-intensive exports. Pharmaceutical exports alone increased $1.25 billion, or 15 percent of U.S. exports, to those FTA partner countries. Exports of non-IP-intensive industries grew by about $7.7 billion, or 3.0 percent of U.S. exports, to those 16 FTA countries (Table 4).[54]

Development." *Economic Development and Cultural Change*; and, Danninger, Stephan and Fred Joutz. 2008. "What Explains Germany's Rebounding Export Market Share?" *CESifo Economic Studies*.

[53] Seven industries x 16 countries = 112 estimates derived from four regressions each = 448 regressions.

[54] We use 2012 export data to normalize trade effects across 16 countries in 10 FTAs during 1994-2012.

Table 4. Trade Creation of U.S. Manufacturing IP-intensive and Non-IP-intensive Industries, 1994-2012 (2012 Constant Dollars)

	U.S. Trade Creation ($ millions)	U.S. Exports to FTAs ($ millions)	U.S. Trade Creation as % of U.S. Exports to FTAs
Manufacturing Sectors	**41,957.4**	**571,514.2**	**7.3%**
IP-intensive industries	34,221.4	314,872.5	10.9%
Petroleum & coal products (324)	9,436.6	52,868.2	17.8%
Chemical (325)	7,090.8	65,997.8	10.7%
Pharmaceuticals & medicines (3254)	1,251.0	8,316.8	15.0%
Computer & electronic products (334)	6,950.1	81,459.4	8.5%
Transportation equipment (336)	10,029.3	106,625.3	9.4%
Medical equipment (3391)	714.7	7,921.7	9.0%
Non-IP-intensive industries	7,736.1	256,641.7	3.0%

Our findings show that nearly 81.6 percent of the trade gains attributable to FTAs accrued to the IP-intensive industries, which accounted for 55.1 percent of U.S. exports to FTA countries (Table 5).

Table 5. Composition of Trade Creation and Exports to FTA Countries, 1994-2012 (%)

	Trade Creation	Exports to FTAs
Manufacturing Sectors	**100.0%**	**100.0%**
IP-intensive industries	81.6%	55.1%
Petroleum & coal products (324)	22.5%	9.3%
Chemical (325)	16.9%	11.5%
Pharmaceuticals & medicines (3254)	3.0%	1.5%
Computer & electronic products (334)	16.6%	14.3%
Transportation equipment (336)	23.9%	18.7%
Medical equipment (3391)	1.7%	1.4%
Non-IP-intensive industries	18.4%	44.9%

Our results show that IP-intensive industries have stronger trade effects than non-IP-intensive industries. The simple average and weighted average multipliers for manufacturing overall (NAICS 31-33) are 0.085 and 0.073, respectively, suggesting that previous FTAs raised U.S. manufacturing exports by between 7.3 percent and 8.5 percent a year. Since total manufacturing includes both IP-intensive and non-IP-intensive industries, the export multipliers of IP-intensive industries are conclusively higher than non-IP-intensive industries.

Additionally, we compare our methodology for estimating these export multipliers to that undertaken by the U.S. International Trade Commission (USITC) for nine previous FTAs and find two major differences. First, we look at actual U.S. export data *after* the FTAs took effect, while the USITC assessments were conducted before the FTA implementations. Second, we use time-series regression analysis to capture the structural change of U.S. exports in each individual sector, while the USITC employs a full complex macroeconomic model. In some cases – such as Bahrain and Jordan, where data were not fully available – the USITC used back-of-the-envelope calculations to estimate the impact of FTAs on U.S. exports. Overall, our estimates using the averages appear to be on the lower end of the range of the USITC estimates, which average between 2.51 and 2.86 times higher than ours.

Our regression results show a maximum increase of 23.3 percent in U.S. exports in previous FTAs, which is roughly consistent with the USITC's estimates of an increase in exports from 18.9 percent to 23.7 percent. For the simulation purposes in this report, we double our base case to 14.6 percent to create an upper bound (high case).

THE IMPORTANCE OF IP RIGHTS ON U.S. TRADE WITH TPP COUNTRIES

The United States is currently engaged in Trans-Pacific Partnership (TPP) negotiations with 11 other countries (Australia, Brunei Darussalam, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore, and Vietnam); six of the TPP participants (Australia, Canada, Chile, Mexico, Peru, and Singapore) are already free trade partners of the United States. The negotiations aim to reduce both tariff and non-tariff barriers to trade in the Asia-Pacific region to boost economic integration.

The TPP has been described by the Obama Administration as a 21st century agreement, expecting that it will go beyond just reducing border barriers to include convergence, if not harmonization, of rules and provisions that apply to commerce across national borders. The TPP would create the most ambitious free trade zone in the world. The combined size of the economies of the 12 TPP participants is nearly $27.5 trillion, accounting for 38.3 percent of global GDP and encompassing nearly 800 million people (Table 6).

Table 6. Trans-Pacific Partnership Participants, as of October 2013[55]

Country	GDP (2012; in $ millions)	Population (2012)	Existing Free Trade Agreements with U.S.
Australia	1,520,608.1	22,683,600	U.S.-Australia, January 2005
Brunei	16,953.9	412,238	--
Canada	1,821,424.1	34,880,491	NAFTA – January 1, 1994
Chile	268,313.7	17,464,814	U.S.-Chile, January 1, 2004
Japan	5,959,718.3	127,561,489	--
Malaysia	303,526.2	29,239,927	--
Mexico	1,177,271.3	120,847,477	NAFTA – January 1, 1994
New Zealand	139,767.6	4,405,200	--
Peru	197,111.0	29,614,887	US-Peru, February 1, 2009
Singapore	274,701.3	5,183,700	US-Singapore, January 1, 2004
United States	15,684,800.0	313,914,040	--
Vietnam	141,699.1	88,840,000	--
TOTAL	**$27,488,940.7**	**794,635,625**	

In 2012, the United States exported more than $616.6 billion of manufactured products to all TPP countries. Of this total, $540.2 billion was to the six countries that already have trade agreements with the United States (FTA countries) and $76.4 billion was to the five countries that do not have trade agreements with the United States (non-FTA countries). To all of these TPP countries, the United States exported $345.7 billion in IP-intensive products and $270.9 billion of non-IP-intensive products. In 2012, the U.S. exported nearly $51 billion in pharmaceuticals and medicines to the world, about 25 percent of which went to TPP countries. Of the $12.7 billion in pharmaceutical exports to TPP countries, about 64 percent went to the six FTA countries and 36 percent went to the five non-FTA countries (Table 7).

[55] GDP and population statistics are from the World Bank database; trade agreement information is from the Office of the United States Trade Representative, Executive Office of the President.

Table 7. U.S. Exports to TPP Participating Countries, 2012 ($ millions)

	Total U.S. Exports	TPP Participating Countries		
		Total	Existing FTAs with U.S.	No FTAs with U.S.
Manufacturing Sectors	**1,346,047.3**	**616,609.7**	**540,186.1**	**76,423.6**
IP-intensive industries	790,777.9	345,691.5	296,914.2	48,777.3
Petroleum & coal products (324)	111,554.0	46,756.3	45,293.4	1,462.9
Chemical (325)	196,943.9	76,170.4	63,089.2	13,081.2
Pharmaceuticals & medicines (3254)	50,921.4	12,743.5	8,142.9	4,600.6
Computer & electronic products (334)	204,498.4	94,572.6	77,841.8	16,730.8
Transportation equipment (336)	247,867.1	116,439.3	103,283.5	13,155.8
Medical equipment (3391)	29,914.3	11,753.0	7,406.4	4,346.6
Non-IP-intensive industries	555,269.5	270,918.2	243,271.9	27,646.3

U.S. manufacturing exports to TPP countries accounted for 45.8 percent of total U.S. manufacturing exports in 2012, with 40.1 percent going to the six FTA countries and 5.7 percent going to the five non-FTA countries. About 43.7 percent of U.S. IP-intensive exports and 48.8 percent of non-IP-intensive products went to TPP countries. Pharmaceutical exports to TPP countries accounted for 25 percent of U.S. pharmaceutical exports, of which 16 percent went to FTA countries and 9 percent went to non-FTA countries (Table 8).

Table 8. Shares of U.S. Total Exports to TPP Countries, 2012 (%)

	Total U.S. Exports	TPP Participating Countries		
		Total	Existing FTAs with U.S.	No FTAs with U.S.
Manufacturing Sectors	**100.0%**	45.8%	40.1%	5.7%
IP-intensive industries	100.0%	43.7%	37.5%	6.2%
Petroleum & coal products (324)	100.0%	41.9%	40.6%	1.3%
Chemical (325)	100.0%	38.7%	32.0%	6.6%
Pharmaceuticals & medicines (3254)	100.0%	25.0%	16.0%	9.0%
Computer & electronic products (334)	100.0%	46.2%	38.1%	8.2%
Transportation equipment (336)	100.0%	47.0%	41.7%	5.3%
Medical equipment (3391)	100.0%	39.3%	24.8%	14.5%
Non-IP-intensive industries	100.0%	48.8%	43.8%	5.0%

The U.S. exports more IP-intensive products than non-IP-intensive products to the world, and to TPP countries. In 2012, 58.7 percent of U.S. exports to the world were IP-intensive. Similarly, 56.1 percent of U.S. exports to TPP countries were IP-intensive (Table 9).

Table 9. Export Shares of IP-intensive and Non-IP-intensive Industries, 2012 (%)

	Total U.S. Exports	TPP Participating Countries		
		Total	Existing FTAs with U.S.	No FTAs with U.S.
Manufacturing Sectors	**100.0%**	**100.0%**	**100.0%**	**100.0%**
IP-intensive industries	58.7%	56.1%	55.0%	63.8%
Petroleum & coal products (324)	8.3%	7.6%	8.4%	1.9%
Chemical (325)	14.6%	12.4%	11.7%	17.1%
Pharmaceuticals & medicines (3254)	3.8%	2.1%	1.5%	6.0%
Computer & electronic products (334)	15.2%	15.3%	14.4%	21.9%
Transportation equipment (336)	18.4%	18.9%	19.1%	17.2%
Medical equipment (3391)	2.2%	1.9%	1.4%	5.7%
Non-IP-intensive industries	41.3%	43.9%	45.0%	36.2%

In 2012, the United States imported nearly $1.85 trillion of manufactured goods from the world and $659.7 billion from its 11 TPP partner countries – $474.4 billion from the six FTA countries and $185.3 billion from the five non-FTA countries (Table 10).

Table 10. U.S. Imports from TPP Participating Countries, 2012 ($ millions)

	Total U.S. Imports	TPP Participating Countries		
		Total	Existing FTAs with U.S.	No FTAs with U.S.
Manufacturing Sectors	**1,849,155.5**	**659,659.1**	**474,365.7**	**185,293.3**
IP-intensive industries	1,041,839.7	394,399.5	280,598.5	113,801.1
Petroleum & coal products (324)	135,871.5	24,272.7	23,393.1	879.6
Chemical (325)	199,883.0	47,729.4	38,555.7	9,173.7
Pharmaceuticals & medicines (3254)	88,900.8	11,046.5	9,308.7	1,737.8
Computer & electronic products (334)	364,483.4	111,012.4	69,841.3	41,171.1
Transportation equipment (336)	313,875.9	202,932.8	142,903.1	60,029.7
Medical equipment (3391)	27,725.9	8,452.2	5,905.3	2,546.9
Non-IP-intensive industries	807,315.8	265,259.5	193,767.3	71,492.3

Manufacturing imports from TPP countries accounted for 35.7 percent of total U.S. imports in 2012, with 25.7 percent coming from the six FTA countries and 10 percent from the five non-FTA countries. About 37.9 percent of imported IP-intensive products came from TPP countries, with 26.9 percent coming from the six FTA countries and 10.9 percent from the five non-FTA countries. About 12.4 percent of U.S. imported medicines came from TPP countries, with 10.5 percent coming from the six FTA countries and 2 percent from the five non-FTA countries (Table 11).

Table 11. Import Shares of U.S. Total Imports from TPP Countries, 2012 (%)

	Total U.S. Imports	TPP Participating Countries		
		Total	Existing FTAs with U.S.	No FTAs with U.S.
Manufacturing Sectors	100.0%	35.7%	25.7%	10.0%
IP-intensive industries	100.0%	37.9%	26.9%	10.9%
Petroleum & coal products (324)	100.0%	17.9%	17.2%	0.6%
Chemical (325)	100.0%	23.9%	19.3%	4.6%
Pharmaceuticals & medicines (3254)	100.0%	12.4%	10.5%	2.0%
Computer & electronic products (334)	100.0%	30.5%	19.2%	11.3%
Transportation equipment (336)	100.0%	64.7%	45.5%	19.1%
Medical equipment (3391)	100.0%	30.5%	21.3%	9.2%
Non-IP-intensive industries	100.0%	32.9%	24.0%	8.9%

IP-intensive products accounted for 59.8 percent of U.S. manufacturing imports from TPP countries, with pharmaceuticals and drugs accounting for just 1.7 percent of U.S. imports from TPP countries (Table 12).

Table 12. Import Shares of IP-intensive and Non-IP-intensive Industries, 2012 (%)

	Total U.S. Imports	TPP Participating Countries		
		Total	Existing FTAs with U.S.	No FTAs with U.S.
Manufacturing Sectors	100.0%	100.0%	100.0%	100.0%
IP-intensive industries	56.3%	59.8%	59.2%	61.4%
Petroleum & coal products (324)	7.3%	3.7%	4.9%	0.5%
Chemical (325)	10.8%	7.2%	8.1%	5.0%
Pharmaceuticals & medicines (3254)	4.8%	1.7%	2.0%	0.9%
Computer & electronic products (334)	19.7%	16.8%	14.7%	22.2%
Transportation equipment (336)	17.0%	30.8%	30.1%	32.4%
Medical equipment (3391)	1.5%	1.3%	1.2%	1.4%
Non-IP-intensive industries	43.7%	40.2%	40.8%	38.6%

THE POSITIVE ECONOMIC IMPACT OF TRANS-PACIFIC PARTNERSHIP ON MEMBER COUNTRIES

Like other preferential trade agreements, the TPP is expected to produce economic benefits for all member countries by increasing trade flows, spurring cross-border investment, and widening the scope for specialization and economies of scale. The most immediately observable trade effects can be measured by changes in exports resulting from the elimination or reduction of tariff and non-tariff barriers. But other important benefits will include harmonization of certain rules and standards, upgrades in IPR protection, stronger investor protections, and other changes that stimulate FDI and commercial activities between U.S. parent companies and their foreign affiliates.

Our analysis is built on three major assumptions: (1) The TPP agreement will reflect IP rights and protections afforded under current U.S. law (i.e., as finalized in the Korea-U.S. FTA plus the 12-years of regulatory data protection for biologics); (2) The elimination of existing tariffs applies to the five non-FTA members in the TPP agreement; and, (3) The TPP agreement achieves a 50 percent reduction in NTBs, such as IP infringement, discriminatory product standards, subsidies to local industry, buy local or local-content provisions, and other behind-the-border impediments to international commerce.

Our assumption of rigorous IP protections is informed by previous U.S. FTAs, which have required trade partners to establish comparable standards by adopting provisions of U.S. law in effect at the time. For example, the recent 2012 U.S.-Korea FTA includes the U.S. standards, including the enforcement of patent mechanisms (often referred to as linkage), patent term adjustments due to administrative and marketing delays, and prohibitions on the adoption of superfluous patentability criteria not specified in the World Trade Organization's (WTO's) Trade Related Aspects of Intellectual Property Agreement (TRIPS Agreement). The U.S.-Korea FTA did not include 12-years of regulatory data protection for biologics since that provision was not part of U.S. law at the time. Our assessment assumes that the TPP IP agreement will include this provision since it is now part of U.S. law.

We assume the TPP will eliminate virtually all tariffs among trading partners, as other free trade agreements have done. To reflect the goal of the United States Special Trade Representative (USTR) of eliminating tariffs and non-tariff barriers across all areas, we assume the agreement will include significant NTB reductions. Indeed, the USTR has identified regulatory protectionism and other NTBs as among the most serious impediments to international trade today.[56] In a recent assessment, the WTO also estimated that NTBs are now almost twice as restrictive as tariffs.[57]

Economic Impact of TPP on U.S. Exports

Overall, we estimate that U.S. manufacturing sector exports will increase by between $20.6 billion (base case) and $26.2 billion (high case), as a result of tariff elimination and NTB reduction in the TPP. The impact of tariff elimination on U.S. manufacturing exports to the five non-FTA countries are between $5.6 billion and $11.2 billion, with most of the gains occurring in the IP-intensive industries. In addition, a 50 percent reduction in non-tariff barriers produces another $15.0 billion in U.S. exports to all 11 countries, $8.7 billion of IP-intensive products and $6.2 billion of non-IP-intensive products (Table 13).

---

[56] Executive Office of the President. Office of the United States Trade Representative. "Trans-Pacific Partnership (TPP) Trade Ministers' Report to Leaders," November 12, 2011, available at http://www.ustr.gov/about-us/press-office/press-releases/2011/november/trans-pacific-partnership-tpp-trade-ministers%E2%80%99-re

[57] World Trade Organization. 2012. World Trade Report 2012 -- Trade and public policies: A closer look at non-tariff measures in the 21st century; Hoekman, Bernard, and Nicita. 2011.

Table 13. Economic Impact of TPP on U.S. Exports ($ millions)

	Manufacturing Sectors	IP-intensive Industries	Non-IP-intensive Industries
TOTAL	**20,607.4 ~26,218.0**	**$13,461.6 ~ $18,185.2**	**$7,145.8 ~ $8,032.8**
Tariff Elimination	5,610.6 ~ 11,221.2	4,723.6 ~ 9,447.2	887.0 ~ 1,774.0
NTB Reduction	14,996.8	8,738.0	6,258.8

Tariff Elimination Effects. As shown earlier, previous FTAs raised U.S. manufacturing exports by between 7.3 percent (base case) and 14.6 percent (high case). Using these export multipliers, we estimate that the TPP will spur an additional $5.6 billion (base case) to $11.2 billion (high case) of U.S. manufacturing exports to the five non-FTA countries. IP-intensive products dominate the mix of U.S. exports to these five non-FTA countries, accounting for between $4.7 billion (base case) and $9.4 billion (high case). The pharmaceutical industry will export between $692 million and $1.4 billion to the five non-FTA countries (Table 14).

Table 14. Trade Creation from Tariff Elimination in Five TPP Countries without Existing U.S. FTAs ($ millions)

	Trade Creation from Tariff Elimination		U.S. Exports to TPP Participating Countries	
	Base	High	No FTAs with U.S.	Total
Manufacturing Sectors	**5,610.6**	**11,221.2**	**76,423.6**	**616,609.7**
IP-intensive industries	4,723.6	9,447.2	48,777.3	345,691.5
Petroleum & coal products (324)	261.1	522.2	1,462.9	46,756.3
Chemical (325)	1,405.4	2,810.9	13,081.2	76,170.4
Pharmaceuticals & medicines (3254)	692.0	1,384.0	4,600.6	12,743.5
Computer & electronic products (334)	1,427.5	2,854.9	16,730.8	94,572.6
Transportation equipment (336)	1,237.4	2,474.9	13,155.8	116,439.3
Medical equipment (3391)	392.1	784.3	4,346.6	11,753.0
Non-IP-intensive industries	887.0	1,774.0	27,646.3	270,918.2

Tariff elimination from the TPP agreement will boost U.S. manufacturing exports 7.3-14.7 percent-- 9.7-19.4 percent in IP-intensive industries and 3.2-6.4 percent in non-IP-intensive industries. Pharmaceutical exports will grow 15-30 percent (Table 15).

Table 15. Comparison of Trade Creation from Tariff Elimination to Non-FTA Countries & All TPP Countries (%)

	Percentage of U.S. Exports to Non-FTA Countries		Percentage of U.S. Exports to All TPP Countries	
	Base	High	Base	High
Manufacturing Sectors	**7.3%**	**14.7%**	**0.9%**	**1.8%**
IP-intensive industries	9.7%	19.4%	1.4%	2.7%
Petroleum & coal products (324)	17.8%	35.7%	0.6%	1.1%
Chemical (325)	10.7%	21.5%	1.8%	3.7%
Pharmaceuticals & medicines (3254)	15.0%	30.1%	5.4%	10.9%
Computer & electronic products (334)	8.5%	17.1%	1.5%	3.0%
Transportation equipment (336)	9.4%	18.8%	1.1%	2.1%
Medical equipment (3391)	9.0%	18.0%	3.3%	6.7%
Non-IP-intensive industries	3.2%	6.4%	0.3%	0.7%

We estimate that 84.2 percent of trade creation occurs in the IP-intensive industries and 15.8 percent in the non-IP-intensive industries. Currently, IP-intensive industries account for 58.7 percent and non-IP-intensive industries for 41.3 percent of U.S. manufacturing exports. The IP-intensive industries' share is even higher in exports to TPP countries and higher still in exports to the five non-FTA countries (Table 16).

Table 16. Shares of IP-intensive and Non-IP-intensive Industries of Trade Creations and Export Patterns (%)

	Trade Creation (Base and High)	U.S. Exports to TPP Participating Countries		U.S. Mfg. Exports
		No FTAs with U.S.	All	
Manufacturing Sectors	**100.0%**	**100.0%**	**100.0%**	**100.0%**
IP-intensive industries	84.2%	63.8%	56.1%	58.7%
Petroleum & coal products (324)	4.7%	1.9%	7.6%	8.3%
Chemical (325)	25.0%	17.1%	12.4%	14.6%
Pharmaceuticals & medicines (3254)	12.3%	6.0%	2.1%	3.8%
Computer & electronic products (334)	25.4%	21.9%	15.3%	15.2%
Transportation equipment (336)	22.1%	17.2%	18.9%	18.4%
Medical equipment (3391)	7.0%	5.7%	1.9%	2.2%
Non-IP-intensive industries	15.8%	36.2%	43.9%	41.3%

Non-Tariff Barrier Reduction Effects. While global trade liberalization has greatly reduced tariffs, non-tariff barriers such as violations of IP rights, technical product regulations, and buy-local provisions, are growing impediments to trade.[58] IP-intensive industries, including the pharmaceutical and biotechnology industries, face significant challenges with NTBs in exporting to emerging economies. Beyond NTBs related to the protection of IP rights, net importers of pharmaceutical products impose tariffs and NTBs on market-ready therapeutics, active pharmaceutical ingredients, and other substances critical to the production of

[58] World Trade Organization. 2012. World Trade Report 2012 -- Trade and public policies: A closer look at non-tariff measures in the 21st century.

medicines.[59] NTBs raise costs, which are reflected in the final price of essential medicines and medical supplies, thereby limiting access to health care.[60]

We use the Overall Trade Restrictiveness Index (OTRI) developed by Kee, Nicita, and Olarreaga in 2009 for 78 countries to measure the non-tariff barriers of TPP countries.[61] The Index estimates an average of NTBs of 78 countries was about 10 percent and has been widely used in empirical studies published in international trade journals and in publications of the WTO, the World Bank, and UNCTAD. In conjunction with the OTRI, we use the mid-point value of trade elasticities reported in the *WTO Report 2012*, which suggests that trade flows increase 2-3 percent when the ad-valorem tariff equivalent of non-tariff barrier rate declines from 10 percent to 5 percent.[62]

From least- to most-restrictive, the trade restrictiveness index ranges from 0.034 (Canada) to 0.228 (Japan), for an average of 0.108 for the 10 TPP countries in the database (Singapore and Vietnam are not included in the Index). We also obtained the most-favored nation (MFN) applied tariff rates for the 12 TPP countries from the WTO. The average applied MFN rate for the TPP countries is 0.035; Singapore is 0 and Vietnam 0.033.[63] For Vietnam, we assign an average NTB value of 0.100, as their applied MFN tariff rate of 0.033 is close to the TPP average of 0.035. Since Singapore's applied MFN rate is 0, we assume a negligible NTB value of 0.005 to Singapore's index score; therefore, the effects are minimal.

We estimate that total U.S. manufacturing exports would rise by nearly $15 billion if other TPP countries reduced their NTBs by 50 percent across the board (Table 17). Our estimates are again conservative relative to a USITC estimate that the costs of NTBs are $90 billion in global welfare.[64]

---

59 UNCTAD, Classification of NTMs 2012 http://ntb.unctad.org/docs/Classification%20of%20NTMs.pdf

60 United Nations Commission on Trade and Development Secretariat. 2007. Market access, market entry and competitiveness, background note, February 14, 2007.

61 Kee, HiauLooi, Alessandro Nicita, and Marcelo Olarreaga. 2009. "Estimating Trade Restrictiveness Indices." The Economic Journal.

62 World Trade Organization. 2012. World Trade Report 2012 -- Trade and public policies: A closer look at non-tariff measures in the 21st century; Hoekman, Bernard, and Nicita, 2011.

63 Kee, et al., 2009.

64 Andriamananjara, Soamiely, et al. 2004. "The Effects of Non-Tariff Measures on Prices, Trade, and Welfare: CGE Implementation of Policy-Based Price Comparisons," Working Papers 15863, United States International Trade Commission, Office of Economics.

Table 17. U.S. Export Growth by Reductions in Non-Tariff Barriers in TPP Countries

		U.S. Exports ($ millions; 2012)			U.S. Exports from 50% NTB Reduction ($ millions; 2012)		
	NTB (%)	Manu-facturing	IP-intensive	Non-IP-intensive	Manu-facturing	IP-intensive	Non-IP-intensive
Australia	0.058	28,827.5	13,663.2	15,164.2	418.0	198.1	219.9
Brunei	0.055	141.9	66.6	75.3	2.0	0.9	1.0
Canada	0.034	261,093.1	134,306.4	126,786.7	2,219.3	1,141.6	1,077.7
Chile	0.041	17,440.6	12,024.1	5,416.5	178.8	123.2	55.5
Japan	0.228	58,262.4	37,024.8	21,237.6	3,321.0	2,110.4	1,210.5
Malaysia	0.184	11,775.0	8,557.7	3,217.3	541.6	393.7	148.0
Mexico	0.162	195,036.0	111,809.9	83,226.1	7,899.0	4,528.3	3,370.7
New Zealand	0.105	2,848.6	1,535.2	1,313.4	74.8	40.3	34.5
Peru	0.102	8,673.1	5,372.2	3,300.9	221.2	137.0	84.2
Singapore	0.005	29,115.8	19,738.4	9,377.4	36.4	24.7	11.7
Vietnam	0.100	3,395.7	1,593.0	1,802.7	84.9	39.8	45.1
Total TPP Countries		**616,609.7**	**345,691.5**	**270,918.2**	**14,996.8**	**8,738.0**	**6,258.8**
6 FTA Countries		540,186.1	296,914.2	243,271.9	10,972.6	6,152.9	4,819.6
5 Non-FTA Countries		76,423.6	48,777.3	27,646.3	4,024.2	2,585.1	1,439.1

We use the ratio of U.S. manufacturing sales to value added published by the U.S. Bureau of Economic Analysis to estimate the value added of manufacturing sectors under both our base-case and high-case scenarios for additional exports to the 11 TPP countries. We estimate that value added to the U.S. manufacturing sectors ranges between $8.9 billion and $11.3 billion if the TPP were implemented--$5.5-$7.5 billion in the IP-intensive industries and $3.3-$3.8 billion in non-IP-intensive industries. Similarly, we estimate additional wages range between $2.1 billion and $2.7 billion in the manufacturing sectors, between $1.1 billion and $1.5 billion in IP-intensive industries, and between $998.7 million and $1.1 billion in the non-IP-intensive industries. The TPP potentially creates between 38,811 and 47,586 jobs in U.S. manufacturing sectors--between 17,451 and 23,575 jobs in IP-intensive industries and between 21,360 and 24,011 jobs in the non-IP-intensive industries (Table 18).

Table 18. Economic Benefits of TPP to the United States

	Manufacturing Sectors	IP-intensive Industries	Non-IP-intensive Industries
Additional Exports ($ millions)	$20,607.4 ~ $26,218.0	$13,461.6 ~ $18,185.2	$7,145.8 ~ $8,032.8
Additional Value-Added ($ millions)	$8,963.2 ~ $11,343.2	$5,588.9 ~ $7,550.0	$3,374.3 ~ $3,793.2
Additional Wages ($ millions)	$2,161.5 ~ $2,693.5	$1,162.8 ~ $1,570.8	$998.7 ~ $1,122.7
Additional Employment	38,811 ~ 47,586	17,451 ~ 23,575	21,360 ~ 24,011

Economic Impacts of TPP on 11 Partner Countries

In previous sections, we have demonstrated how reductions in tariff and non-tariff barriers result in much higher exports from the United States to its TTP partner countries. Of course, exporters in those 11 countries will also benefit from the improved market access to their partners' markets. But freer trade delivers other benefits; for example, consumers tend to be among the biggest beneficiaries of the lower prices delivered through trade agreements.

Often overlooked in assessing the benefits of trade liberalization are the lower costs afforded domestic producers who rely on imported intermediate goods (e.g., raw materials, parts, and components) or semi-finished products that are further processed and sold locally or, ultimately, exported. The emergence of globalization--and with it the proliferation of transnational supply chains and cross-border investment—has increased the magnitude of the economic benefits of trade agreements not captured by export growth.

Trade agreements lead not only to increased exports but also to increased foreign direct investment. Sometimes those increases are driven by the desire of producers in non-signatory countries to have a production presence within the trade agreement region, so as to benefit from the preferential access to the region's market. TPP countries should expect – and generally welcome -- such investment from countries like Brazil, China, India, and Russia.

But considerably more inward FDI should be expected from TPP partner countries, as they step up efforts to facilitate and optimize their new preferential access. When U.S companies compete for business abroad, they tend not to rely exclusively on their exports. They rely increasingly on their local presence and as a result, foreign affiliates' activities of U.S. companies now account for 10 percent of the global economy.[65]

Success requires a better understanding of the market, collecting intelligence on the ground, interacting with local suppliers and customers, and taking advantage of the division of labor in a way that allows supply chain functions to be divided up between the United States and other locations. In support of their increased exports to Malaysia, for example, U.S. parent companies will establish or supplement the operations of their foreign affiliates in Malaysia. How much of a local presence will depend upon multiple factors, including the product or service in question, the size of the market, the quality of the workforce, the stability of the political and economic climate, the quality of infrastructure, and the strength of the rule of law. Ultimately, the amount and quality of inward FDI from the United States will depend on how comfortable U.S. parent companies are with investing locally in the activity in question.

If trading partners have strong IP protections in place, U.S parents will have more confidence investing locally in IP-intensive activities, which produce greater local benefits than non-IP-intensive investment. Locations that do not have strong IP protections, or that do not rigorously enforce them, will suffer a dearth of IP-intensive investment.

In addition to the direct benefits of creating new jobs at higher rates of compensation, the establishment and expansion of foreign affiliates of U.S. parent companies have been found to generate spillover benefits in the form of technology transfer, the adoption of best practices, greater domestic intermediate goods

[65] UNCTAD, 2011

purchases, and workforce skills accumulation.[66] Strong IP rights are instrumental to establishing knowledge-based economic activities in emerging economies.

Just as U.S. export growth captures some of the key benefits of trade liberalization, a variety of activities of foreign affiliates of U.S. parent companies--and the interactions between them--also reflect the benefits of trade liberalization. The U.S. Bureau of Economic Analysis maintains extensive data on the performance of U.S. parent companies and their foreign affiliates. We use the data from the U.S. Direct Investment Abroad (USDIA) database to analyze the impacts of trade agreements on U.S. parent firms and their affiliates. Our database covers the period between 1999 and 2010.

More than 55 percent of U.S. manufacturing exports in 2010 were shipped from U.S. parent companies to their foreign affiliates. Just 45 percent of U.S. exports went directly to end-users. In 2010, U.S. parent companies in the manufacturing sector exported nearly $767.5 billion, accounting for nearly 70 percent of total U.S. manufacturing exports. Of that total, $566 billion were IP-intensive products and $201.5 billion were non-IP-intensive products. The share of firm exports to their affiliates in IP-intensive industries was 58 percent compared with 47.8 percent in non-IP-intensive industries. This suggests that IP-intensive firms are more likely to spur economic spillovers by more intensively engaging local firms and setting in motion a process of greater local spending and investment and a proliferation of best practices. The pharmaceutical industry is even more of a catalyst for such spillovers. More than 77.3 percent of U.S. parent exports of pharmaceuticals went to their affiliates.

In 2010, U.S. companies sold $424.3 billion of their manufactured products to their foreign affiliates and $343.1 billion to other foreign persons. The share of U.S. companies' sales overseas to both foreign affiliates and foreign persons was 19 percent of all manufacturing products in 2010--20.4 percent of IP-intensive industries and 16 percent of non-IP-intensive industries (Table 19).

Table 19. U.S. Companies Sales by Market Segment, 2010 ($ billions)

	Total Sales	Sales to U.S. Market	Sales to Outside U.S. Market	Sales To Foreign Affiliates	Sales to Other Foreign Persons
Manufacturing Sectors	**4,022.5**	**3,255.0**	**767.5**	**424.3**	**343.1**
IP-intensive industries	2,767.9	2,202.0	566.0	328.2	237.8
Petroleum & coal products (324)	925.8	749.1	176.7	100.9	75.7
Chemical (325)	569.9	477.6	92.3	64.0	28.3
Pharmaceuticals & medicines (3254)	284.9	242.2	42.6	33.0	9.6
Computer & electronic products (334)	399.2	276.4	122.8	86.0	36.8
Transportation equipment (336)	773.7	614.6	159.1	65.7	93.4
Medical equipment (3391)	99.3	84.3	15.0	11.5	3.5
Non-IP-intensive industries	1,254.5	1,053.1	201.5	96.2	105.3

[66] Javorcik, Beata. 2004. "The Composition of Foreign Direct Investment and The Protection of Intellectual Property Rights In Transition Economies." *European Economic Review* 48 (1), 39–62.; Poole, J., 2009. "Knowledge Transfers From Multinational To Domestic Firms: Evidence From Worker Mobility." Working Paper. University of California at Santa Cruz.

We measure the relationship between U.S. firm sales and foreign affiliate sales in IP-intensive and non-IP-intensive industries by calculating the ratio of foreign affiliate sales to U.S. company sales. Our results show that sales between foreign affiliates and U.S. companies are higher in IP-intensive industries and non-IP-intensive industries. Indeed, during 1999-2010, foreign affiliate sales were 48 cents for every dollar of U.S. firms' sales versus 0.50 in IP-intensive industries (and 0.58 in the pharmaceutical industry) and 0.43 in non-IP-intensive industries (Table 20). The results suggest that IP-intensive industries are more likely to spur local economic activity because of a greater propensity to engage local firms (usually foreign affiliates of the U.S. parent companies) as part of a strategy of competing in the local market. IP-intensive firms are more likely to engage local entities, which facilitate and transmit positive spillovers. But to attract the business of IP-intensive firms in the first place, commitments to strong IP protections must be established.

Table 20. Foreign Affiliates Sales of IP-intensive and Non-IP-intensive Industries, 1999-2010

	Foreign Affiliate Sales / U.S. Companies Sales
Manufacturing Sectors	**0.48**
IP-intensive industries	0.50
Pharmaceuticals & medicines	0.58
Non-IP-intensive industries	0.43

The implementation of TPP will affect U.S. companies doing business with their foreign affiliates in all TPP countries. As shown earlier, the implementation of TPP raises U.S. exports by $20.6 billion owing to tariff elimination in five TPP countries and a 50 percent reduction in non-tariff barriers in 11 TPP countries, $14.0 billion IP-intensive products and $6.6 billion non-IP-intensive products.

Total U.S. manufacturing exports in 2010 were nearly $1.1 trillion. In that year, U.S. parent companies exported $424.3 billion of manufacturing products to their foreign affiliates worldwide, accounting for 38.6 percent of total U.S. manufacturing exports.[67] Using the BEA average, we estimate that the additional $20.6 billion in U.S. exports would stimulate U.S. firms' manufacturing exports by more than $7.9 billion to the 11 TPP countries, with $5.2 billion is IP-intensive products and $2.7 billion is non-IP-intensive products (Table 21).

[67] These figures represent the value of exports of physical goods and do not include licensing fees.

Table 21. Effects of TPP on U.S. Company Manufacturing Exports to 11 TPP Countries, ($ millions)

	Effects of TPP on U.S. Exports to TPP Countries			Effects of TPP on U.S. Parent Company Exports to TPP Countries		
	Manu-facturing	**IP-intensive**	**Non-IP-intensive**	**Manu-facturing**	**IP-intensive**	**Non-IP-intensive**
Australia	418.0	198.1	219.9	161.5	76.6	85.0
Brunei	12.4	7.1	5.3	4.8	2.8	2.0
Canada	2,219.3	1,141.6	1,077.7	857.5	441.1	416.4
Chile	178.8	123.2	55.5	69.1	47.6	21.5
Japan	7,598.3	5,757.6	1,840.7	2,935.9	2,224.7	711.2
Malaysia	1,406.1	1,161.7	244.4	543.3	448.9	94.4
Mexico	7,899.0	4,528.3	3,370.7	3,052.1	1,749.7	1,302.4
New Zealand	283.9	194.0	88.9	109.7	75.0	34.7
Peru	221.2	137.0	84.2	85.5	52.9	32.5
Singapore	36.4	24.7	11.7	14.1	9.5	4.5
Vietnam	334.2	188.3	145.9	129.1	72.8	56.3
Total TPP Countries	**20,607.4**	**13,461.6**	**7,145.8**	**7,962.5**	**5,201.5**	**2,761.0**
6 FTA Countries	10,972.6	6,152.9	4,819.7	4,239.7	2,377.4	1,862.3
5 Non-FTA Countries	9,634.8	7,308.7	2,326.1	3,722.8	2,824.0	898.8

Foreign affiliates import U.S. manufactured goods, add value, and then sell the finished product locally or abroad. According to the BEA data, the ratio of foreign affiliates' imports from the U.S. to foreign affiliates' sales averaged 5.22 in 2010, suggesting that foreign affiliates sell $5.22 for every dollar's worth of imports from their parent companies. Using this ratio, we estimate that the additional $7.96 billion of U.S. manufacturing exports to foreign affiliates would stimulate foreign affiliates' sales by nearly $26.9 billion, with an $18.6 billion increase in IP-intensive product sales and an $8.3 billion increase in non-IP-intensive sales.

The BEA reports an average ratio of foreign affiliates' sales to foreign affiliates' value added of 0.238 in 2010, which suggests that foreign affiliates created 23.8 cents of value added for every dollar of their sales. Using this value added multiplier, we estimate foreign affiliates' value added to exceed $6.4 billion if the TPP were implemented; $3.8 billion in value added would occur in the IP-intensive products and $2.6 billion in non-IP-intensive products (Table 22).

Table 22. Effects of TPP on Foreign Affiliate Sales and Value-Added in 11 TPP Countries, ($ millions)

	Effects of TPP on Foreign Affiliate Sales in Eleven TPP Countries			Effects of TPP on Foreign Affiliate Value-Added in Eleven TPP Countries		
	Manu-facturing	**IP-intensive**	**Non-IP-intensive**	**Manu-facturing**	**IP-intensive**	**Non-IP-intensive**
Australia	1,039.9	718.0	322.0	248.0	149.0	99.0
Brunei	25.0	17.2	7.7	6.0	3.6	2.4
Canada	2,402.2	1,658.5	743.7	572.9	344.3	228.6
Chile	82.7	57.1	25.6	19.7	11.9	7.9
Japan	13,107.8	9,049.7	4,058.1	3,125.9	1,878.7	1,247.2
Malaysia	3,630.5	2,506.5	1,124.0	865.8	520.3	345.4
Mexico	5,376.6	3,712.1	1,664.6	1,282.2	770.6	511.6
New Zealand	369.2	254.9	114.3	88.0	52.9	35.1
Peru	76.9	53.1	23.8	18.3	11.0	7.3
Singapore	145.3	100.3	45.0	34.7	20.8	13.8
Vietnam	674.3	465.5	208.7	160.8	96.6	64.2
11 TPP Countries	**26,930.4**	**18,593.0**	**8,337.4**	**6,422.3**	**3,859.8**	**2,562.5**
6 FTA Countries	9,123.7	6,299.1	2,824.6	2,175.8	1,307.7	868.1
5 non-FTA Countries	17,806.7	12,293.9	5,512.8	4,246.5	2,552.2	1,694.3

All told, the impact of TPP on exports of U.S. parent companies to their affiliates alone would be to add $26.9 billion in sales and $6.4 billion in value added for foreign affiliates in 11 countries. We apply the BEA employment and wage multipliers for each of the 11 countries to estimate the additional employment and wages resulting from the agreement. Overall, TPP will create 68,167 additional jobs and more than $2.6 billion wages at foreign affiliates of U.S. manufacturing companies (Table 23).

Table 23. The TPP Effects on Employment and Wages in Foreign Affiliates in Manufacturing Sectors

	Additional Foreign Affiliates Sales of Manufacturing ($ millions)	Additional Employees	Additional Wages ($ million)
Australia	1,039.9	2,047	151.4
Brunei	25.0	30	3.2
Canada	2,402.2	4,525	241.2
Chile	82.7	318	7.6
Japan	13,107.8	16,744	1,504.5
Malaysia	3,630.5	10,505	182.7
Mexico	5,376.6	29,358	457.1
New Zealand	369.2	958	40.3
Peru	76.9	231	5.8
Singapore	145.3	73	4.0
Vietnam	674.3	3,451	39.6
11 TPP Countries	**26,930.4**	**68,240**	**2,637.4**

CONCLUSION AND POLICY IMPLICATIONS

Implementation of a TPP agreement that truly integrates the region with broad and deep reductions in tariff and non-tariff barriers and includes commitments to strong intellectual property protections would be broadly beneficial to all 12 countries. A trade agreement that eliminates external tariffs and converges, harmonizes and ideally homogenizes internal regulatory and commercial rules would lend itself to reduced costs of production, compliance, and information. The more people and factors of production subject to the same rules, the greater the scope for specialization and economies of scale, which in turn lead to productivity growth, higher incomes, and improved living standards.

Our analysis demonstrates the importance of IP-intensive industries to the United States and its TPP partner countries. The economic gains, job growth, and value-added to the U.S. economy are mainly the direct results of the increased activities of IP-intensive industries, which are likely to thrive and spawn local benefits. Strong IP protection is the linchpin for these economic gains. The potential annual benefits of the TPP to the U.S. economy include between $20.6 billion and $26.2 billion in additional exports, $8.9 billion to $11.2 billion in additional GDP, and $2.1 billion to $2.6 billion in additional compensation. Approximately two-thirds of the gains come from IP-intensive industries.

In addition to the United States, all TPP partner countries are expected to benefit from the Trans-Pacific Partnership formation through increased trade among TPP members. Without modeling the full economic benefits of inter-trade among all members, we estimate only a portion of the impact of TPP on the exports of U.S. parent companies to their affiliates to underscore the importance of IP protection. The benefits to the 11 TPP countries are about $26.9 billion in additional output and $6.4 billion in additional GDP. Consistent rules of trade bring greater efficiency and predictability for industries doing business in the global marketplace. Consequently, strong IP protections across borders guarantee that the movement of innovative goods and products are protected by the same rules in each country. As the literature makes clear, this creates market efficiency that allows economic gains and increased exports, FDI, and technology transfers. An agreement that upholds the highest standards of IP protection, removes tariffs, and better harmonizes the legal and regulatory environments of these economies would reduce the costs of production, regulatory compliance, and information, thus generating greater efficiencies, higher incomes, and higher per capita economic growth.

References

Anderson, James and Eric van Wincoop. 2004. “Trade Costs.” *Journal of Economic Literature*, 42(3), pp. 691-751.

Anderson, James E. and Douglas Marcouiller. 2002. “Insecurity And The Pattern Of Trade: An Empirical Investigation.” *The Review of Economics and Statistics*, MIT Press, vol. 84(2), pages 342-352, May.

Andriamananjara, Soamiel, et al. 2004. "The Effects of Non-Tariff Measures on Prices, Trade, and Welfare: CGE Implementation of Policy-Based Price Comparisons," Working Papers 15863, United States International Trade Commission, Office of Economics.

Anja, Breitwieser and Neil Foster. 2012. "Intellectual Property Rights, Innovation And Technology Transfer: A Survey," MPRA Paper 36094, University Library of Munich, Germany.

Arrow, Kenneth. 1962. "Economic Welfare and the Allocation of Resources for Invention. In The Rate and Direction of Inventive Activity: Economic and Social Factors. National Bureau of Economic Research, pp. 609-626.

Aw, Bee Yan, Mark J. Roberts, and Daniel Yi Xu. 2009. “R&D Investment, Exporting and Productivity Dynamics.” NBER Working Paper No. 14670.

Battelle. 2013. "The Economic Impact of the U.S. Biopharmaceutical Industry." Battelle Technology Partnership Practice. Prepared for the Pharmaceutical Research and Manufacturers of America.

Belleflamme, Paul. 2006. "Patents and Incentives to Innovate: Some Theoretical and Empirical Economic Evidence." Ethical Perspectives, Journal of the European Ethics Network, 13(2), pp. 267-288.

Bosch, Mariano, Daniel Lederman, and William Maloney. 2005. "Patenting and Research and Development: A Global View." World Bank Policy Research Working Paper No. 3739.

Bowen, Harry P. and Joseph Pelzman. 1980. “A Constant Market Share Analysis of U.S. Export Growth: 19621977.” U.S. Department of Labor, Report on U.S. Competitiveness.

Bravo-Ortega, Claudio and Daniel Lederman. 2010. "Intellectual property rights, human capital and the incidence of R&D expenditures." World Bank Policy Research Working Paper No. 5217.

Brookings Institution. 1999. “Measuring the Price of Medical Treatments.” Edited by Jack Triplett. Washington: Brookings Institution.

Brown, Drusilla K., Alan V. Deardorff, and Robert M. Stern. 2000. "Computational Analysis of the Accession of Chile to the NAFTA and Western Hemisphere Integration." *The World Economy*, Wiley Blackwell, 23(2), pp. 145-174.

Chen, Derek H.C., and Carl Dahlman. 2004. "Knowledge and Development: A Cross-Section Approach." World Bank Policy Research Working Paper No. 3366.

Cockburn, Iain and Josh Lerner. 2009. "The Importance of Evaluating the Cost of Capital for Early-Stage Biotechnology Ventures to Preserve Innovation." Report prepared for the National Venture Capital Association. Web.

Coe, David, Elhanan Helpman, and Alexander Hoffmeister. 1995. "North-South R&D Spillovers". National Bureau of Economic Research.

Cook T. 2007. Regulatory Data Protection in Pharmaceuticals and Other Sectors. In Intellectual Property Management in Health and Agricultural Innovation: A Handbook of Best Practices (eds). A Krattiger, RT Mahoney, L Nelsen, et al.). MIHR: Oxford, U.K., and PIPRA: Davis USA.

Cutler, David M. and Mark McClellan. 2001. "Is Technological Change in Medicine Worth It?" 20, *Health Affairs*, pp. 11-29.

Danninger, Stephan and Fred Joutz. 2008. "What Explains Germany's Rebounding Export Market Share?" CESifo Economic Studies.

DiMasi, Joseph A. and Henry G. Grabowski. 2007. "The Cost of Biopharmaceutical R&D: Is Biotech Different?" Managerial and Decision Economics, 28(4-5), pp. 469-79.

Dutz, Mark, Antara Dutta, and Jonathan Orszag. 2009. "Intellectual Property and Innovation: New Evidence on the Relationship Between Patent Protection, Technology Transfer and Innovation in Developing Countries." CompassLexecon.

Economist Intelligence Unit. 2004. "Executive Survey on R&D Globalization." Web.

Eicher, Theo, and Cecilia García-Peñalosa. 2008. "Endogenous Strength of Intellectual Property Rights: Implications for Economic Development and Growth." *European Economic Review*, 52(2), pp. 237-258.

Ezell, Stephen. 2012. "Ensuring the Trans-Pacific Partnership Becomes a Gold-Standard Trade Agreement." The Information Technology and Innovation Foundation. Washington, DC.

Falvey, R., Foster, N. and Greenaway, D. 2006. "Intellectual Property Rights and Economic Growth." *Review of Development Economics*, 10, pp. 700–719.

Francois, Joseph and Miriam Manchin, Miriam. 2007. “Institutions, Infrastructure and Trade.” CEPR Discussion Papers 6068, C.E.P.R. Discussion Papers.

Javorcik, Beata. 2004. “The Composition of Foreign Direct Investment and The Protection of Intellectual Property Rights In Transition Economies.” *European Economic Review* 48 (1), 39–62

Gallini, Nancy and Suzanne Scotchmer. 2002. "Intellectual Property: When Is It the Best Incentive System?" Innovation Policy and the Economy, Volume 2. Editors: Adam B. Jaffe, Josh Lerner and Scott Stern. NBER. MIT Press: Boston.

Ginarte, J.C., Park, W.G., 1997. Determinants of Patent Rights: A Cross-National Study. *Research Policy* 26, pp. 283–301.

Gould, David M. and William C. Gruben. 1996. “The Role of Intellectual Property Rights in Economic Growth.” Journal of Development Economics, Vol. 48, No. 2, pp. 323-350.

Grabowski, Henry, Genia Long, and Richard Mortimer. 2011. *Data Exclusivity for Biologics* (January). Nature Reviews|Drug Discovery. Volume 10.

Grabowski, Henry. 2002. “Patents and New Product Development in the Pharmaceutical and Biotechnology Industries.” Duke University Department of Economics.

Grilliches, Zvi. 1992. “The Search for R&D Spillovers.” Scandinavian Journal of Economics, 94, pp. 29-47.

Hoekman, Bernard and Alessandro Nicita. 2011. “Trade Policy, Trade Costs, and Developing Country Trade.” *World Development*, 39(12), pp. 2069-2079.

Ivarsson, Inge and ClaesGoranAlvstam. 2010. "Upstream Control and Downstream Liberty of Action?: Interdependence Patterns in Global Value Chains, with Examples from Producer-Driven and Buyer-Driven Industries." *Review of Market Integration*, 2(43).

Javorcik, B., 2004b. The composition of foreign direct investment and the protection of intellectual property rights in transition economies. *European Economic Review* 48 (1), 39–62.

Jones, Charles. 2002. “Sources of U.S. Economic Growth in a World of Ideas.” *American Economic Review*. 92:1.

Kamiyama, Shigeki, et al. 2006. “Valuation and Exploitation of Intellectual Property.” Organisation for Economic Co-operation and Development. STI Working Paper 2006/5.

Kanwar, Sunil and Robert Evenson. 2003. "Does intellectual property protection spur technological change?," Oxford Economic Papers, Oxford University Press, vol. 55(2), pp. 235-264.

Kee, HiauLooi, Alessandro Nicita, and Marcelo Olarreaga. 2009. "Estimating Trade Restrictiveness Indices." The Economic Journal.

Lederman, Daniel and William F. Maloney. 2003. "Research and Development (R&D) and Development," The World Bank, Policy Research Working Paper Series No. 3024.

Lev, B. 2001.*Intangibles: Management, Measurement, and Reporting*. Washington D.C.: Brookings Institution Press.

Long, Genia and Justin Works. 2013. "Innovation in the Biopharmaceutical Pipeline: A Multidimensional View." Analysis Group.

Mansfield et al.1977. "Social and Private Rates of Return from Industrial Innovations." Quarterly Journal of Economics, 41, pp. 221-240.

Murphy, Kevin and Robert Topel. 2006. "The Value of Health and Longevity," *Journal of Political Economy.*

National Science Board. 2012. "Science and Engineering Indicators 2012," Arlington VA: National Science Foundation (NSB 12–01).

National Science Foundation. 2012. "Chapter 4. R&D National Trends and International Comparisons." *NSF Science and Engineering Indicators 2012*. Accessed August 14, 2013. Web.

National Science Foundation. 2013. "Business R&D Performance Remained Virtually Unchanged in 2010." June 2013.

Nicholson, M. W. 2007. "The Impact of Industry Characteristics and IPR Policy on Foreign Direct Investment." *Review of World Economics*, 43(1), pp. 27-54.

Office of the United States Trade Representative. "Trans-Pacific Partnership (TPP) Trade Ministers' Report to Leaders," November 12, 2011.

Pelzman, Joseph and Gregory K. Schoepfle. 1988. "The Impact of the Caribbean Basin Economic Recovery Act on Caribbean Nations' Exports and Development." *Economic Development and Cultural Change*.

Pelzman, Joseph and Randolph C. Martin. 1981. "Direct Employment Effects of Increased Imports: A Case Study of the Textile Industry." *Southern Economic Journal.*

Pelzman, Joseph. 1977. "Trade Creation and Trade Diversion in the Council of Mutual Economic Assistance: 1954–1970." *American Economic Review,* 67(4), pp. 713–722.

Pham, Nam. 2010. “The Impact of Innovation and the Role of Intellectual Property on U.S. Productivity, Competitiveness, Jobs, Wages, and Exports.” NDP Consulting. Web.

Pham, Nam. 2012. “IP Creates Jobs for America.” NDP Consulting.

Poole, JP. 2009. “Knowledge Transfers From Multinational To Domestic Firms: Evidence From Worker Mobility.” Working Paper. University of California at Santa Cruz.

Schacht, Wendy and John R. Thomas. 2000. "Patent Law and Its Application to the Pharmaceutical Industry." Congressional Research Service. Web.

Staffan, Burenstam Linder. 1961. An Essay on Trade and Transformation. John Wiley & Sons Ltd.; Almqvist & Wiksell, Stockholm.

Tassey, Gregory. 2010. “Rationales and Mechanisms for Revitalizing U.S. Manufacturing R&D Strategies.” *Journal of Technology Transfer* 35 (2010): 283-333.

Tiwari, Gaurav. 2012. “International Property Rights Index.” Report prepared for the Property Rights Alliance. Web.

U.S. Department of Commerce. 2012. “Intellectual Property and the U.S. Economy: Industries in Focus.”

U.S. Direct Investment Abroad Department of Commerce, Bureau of Economic Analysis, Financial and Operating Data for U.S. Multinational Companies, U.S. Direct Investment Abroad.

U.S. Food and Drug Administration. 2013. “Frequently Asked Questions on Patents and Exclusivity.” Web.

U.S. Public Law 111-148. Patient Protection and Affordable Care Act. 124 Stat. 807.

United Nations Conference on Trade and Development Secretariat. 2007. Market Access, Market Entry and Competitiveness, Background Note, February 14, 2007.

United Nations Conference on Trade and Development. 2011. “World Investment Report 2011. Geneva: United Nations Conference on Trade and Development.

United Nations Conference on Trade and Development. 2012. “Classification of Non-Tariff Measures.”

Venables, Anthony J. 1999. “Regional Integration Agreements - A Force For Convergence Or Divergence?” Policy Research Working Paper Series 2260, The World Bank.

Wilson, John S., Catherine Mann, and Tsunehiro Otsuki. 2003. "Trade Facilitation And Economic Development : Measuring The Impact." Policy Research Working Paper Series 2988, The World Bank.

World Intellectual Property Organization. 2011. "World Intellectual Property Report: The Changing Face of Innovation." WIPO Economics and Statistics Series. Web.

World Trade Organization. 2012. *World Trade Report 2012 -- Trade and Public Policies: A Closer Look At Non-Tariff Measures In The 21st Century*.

Country Profiles

Australia

Bilateral trade between the U.S. and Australia in 2012 was high in the IP-intensive industries. Australia imported $28.8 billion in total manufacturing goods from the U.S. of which $13.7 billion came from IP-intensive industries and $977.8 million from pharmaceutical products. In 2012, Australia exported $7.7 billion in total manufacturing goods to the U.S., of which $2.3 billion came from IP-intensive industries and $449.3 million from pharmaceutical products (Table 1a).

Table 1a. US-Australia – Exports and Imports, 2012 ($ millions)

	Imports from the U.S.	Exports to the U.S.
Manufacturing (31-33)	**28,827,467,089**	**7,692,243,826**
IP-intensive industries	13,663,219,887	2,291,488,208
Petroleum & coal products (324)	359,102,882	25,036,047
Chemical (325)	3,107,514,585	740,380,999
Pharmaceuticals & medicines (3254)	977,786,526	449,262,046
Computer & electronic products (334)	3,105,043,783	513,771,494
Transportation equipment (336)	5,898,769,478	646,975,736
Medical equipment (3391)	1,192,789,159	365,323,932
Non-IP-intensive industries	15,164,247,202	5,400,755,618

As a percent of total manufacturing sectors, 47.4 percent of Australian imports from the U.S. were in the IP-intensive industries and 3.4 percent in the pharmaceutical industry. Nearly 30 percent of Australian manufacturing exports to the U.S. are in the IP-intensive industries and 5.8 percent from the pharmaceutical industry (Table 1b).

Table 1b. U.S.-Australia – Composition of Trade, 2012 (%)

In 2012, Australia's manufacturing imports made up 2.1 percent of total U.S. manufacturing

	Imports from the U.S.	Exports to the U.S.
Manufacturing (31-33)	**100.0%**	**100.0%**
IP-intensive industries	47.4%	29.8%
Petroleum & coal products (324)	1.2%	0.3%
Chemical (325)	10.8%	9.6%
Pharmaceuticals & medicines (3254)	3.4%	5.8%
Computer & electronic products (334)	10.8%	6.7%
Transportation equipment (336)	20.5%	8.4%
Medical equipment (3391)	4.1%	4.7%
Non-IP-intensive industries	52.6%	70.2%

exports. Australian manufacturing exports to the U.S. accounted for 0.4 percent of U.S. total manufacturing imports. In terms of the pharmaceutical industry, Australia imported 1.9 percent of all U.S. pharmaceutical exports, while the U.S. received 0.5 percent of all U.S. pharmaceutical imports from Australia (Table 1c).

Table 1c. U.S.-Australia – Shares of US Trade, 2012 (%)

	Imports from the U.S. (as a percentage of U.S. exports)	Exports to the U.S. (as a percentage of U.S. imports)
Manufacturing (31-33)	**2.1%**	**0.4%**
IP-intensive industries	1.7%	0.2%
Petroleum & coal products (324)	0.3%	0.0%
Chemical (325)	1.6%	0.4%
Pharmaceuticals & medicines (3254)	1.9%	0.5%
Computer & electronic products (334)	1.5%	0.1%
Transportation equipment (336)	2.4%	0.2%
Medical equipment (3391)	4.0%	1.3%
Non-IP-intensive industries	2.7%	0.7%

Brunei Darussalam

Bilateral trade between the U.S. and Brunei Darussalam in 2012 was significant in the IP-intensive industries. Brunei imported $141.9 million in total manufacturing goods from the U.S. of which $66.5 million came from IP-intensive industries and $900,916 from pharmaceutical products. In 2012, Brunei exported $13.5 million in total manufacturing goods to the U.S., of which $8.5 million came from IP-intensive industries. Data for pharmaceutical product exports to the U.S. are not available (Table 2a).

Table 2a. U.S.-Brunei – Exports and Imports, 2012 ($ millions)

	Imports from the U.S.	Exports to the U.S.
Manufacturing (31-33)	**141,930,129**	**13,535,151**
IP-intensive industries	66,591,314	8,542,686
Petroleum & coal products (324)	176,890	5,119,446
Chemical (325)	6,581,092	2,706,668
Pharmaceuticals & medicines (3254)	900,916	--
Computer & electronic products (334)	18,144,355	23,031
Transportation equipment (336)	41,180,945	693,541
Medical equipment (3391)	508,032	--
Non-IP-intensive industries	75,338,815	4,992,465

As a percent of total manufacturing sectors, 46.9 percent of Brunei's imports from the U.S. were in the IP-intensive industries and 0.6 percent from the pharmaceutical industry. Nearly 63 percent of Brunei's manufacturing exports to the U.S. are in IP-intensive industries (Table 2b).

Table 2b. U.S.-Brunei – Composition of Trade, 2012 (%)

	Imports from the U.S.	Exports to the U.S.
Manufacturing (31-33)	**100.0%**	**100.0%**
IP-intensive industries	46.9%	63.1%
Petroleum & coal products (324)	0.1%	37.8%
Chemical (325)	4.6%	20.0%
Pharmaceuticals & medicines (3254)	0.6%	--
Computer & electronic products (334)	12.8%	0.2%
Transportation equipment (336)	29.0%	5.1%
Medical equipment (3391)	0.4%	--
Non-IP-intensive industries	53.1%	36.9%

In 2012, Brunei's manufacturing imports made up 0.01 percent of total U.S. manufacturing exports. Brunei's manufacturing exports to the U.S. accounted for less than 0.01 percent of U.S. total manufacturing imports Table 3c).

Table 2c. US-Brunei – Shares of US Trade, 2012 (%)

	Imports from the U.S. (as a percentage of U.S. exports)	Exports to the U.S. (as a percentage of U.S. imports)
Manufacturing (31-33)	**0.01%**	**0.00%**
IP-intensive industries	0.01%	0.00%
Petroleum & coal products (324)	0.00%	0.00%
Chemical (325)	0.00%	0.00%
Pharmaceuticals & medicines (3254)	0.00%	--
Computer & electronic products (334)	0.01%	0.00%
Transportation equipment (336)	0.02%	0.00%
Medical equipment (3391)	0.00%	--
Non-IP-intensive industries	0.01%	0.00%

Canada

Bilateral trade between the U.S. and Canada in 2012 was high in IP-intensive industries. Canada imported about $261 billion in total manufacturing goods from the U.S. of which $134.3 billion came from IP-intensive industries and $4.7 billion from pharmaceutical products. In 2012, Canada exported $216.7 billion in total manufacturing goods to the U.S., of which $123.9 billion came from IP-intensive industries and $4.29 billion from pharmaceuticals (Table 3a).

Table 3a. US-Canada – Exports and Imports, 2012 ($ millions)

	Imports from the U.S.	Exports to the U.S.
Manufacturing (31-33)	**261,093,144,963**	**216,673,414,988**
IP-intensive industries	134,306,402,570	123,926,885,372
Petroleum & coal products (324)	11,862,438,526	19,928,751,184
Chemical (325)	29,547,354,068	25,922,281,250
Pharmaceuticals & medicines (3254)	4,718,217,749	4,294,891,438
Computer & electronic products (334)	27,885,102,060	7,536,494,744
Transportation equipment (336)	61,589,721,423	70,188,740,898
Medical equipment (3391)	3,421,786,493	350,617,296
Non-IP-intensive industries	126,786,742,393	92,746,529,616

As a percent of total manufacturing sectors, 51.4 percent of Canadian imports from the U.S. were in the IP-intensive industries and 1.8 percent pharmaceuticals. Nearly 58 percent of Canadian manufacturing exports to the U.S. are in the IP-intensive industries and 2 percent from pharmaceuticals (Table 3b).

Table 3b. U.S.-Canada – Composition of Trade, 2012 (%)

	Imports from the U.S.	Exports to the U.S.
Manufacturing (31-33)	**100.0%**	**100.0%**
IP-intensive industries	51.4%	57.2%
Petroleum & coal products (324)	4.5%	9.2%
Chemical (325)	11.3%	12.0%
Pharmaceuticals & medicines (3254)	1.8%	2.0%
Computer & electronic products (334)	10.7%	3.5%
Transportation equipment (336)	23.6%	32.4%
Medical equipment (3391)	1.3%	0.2%
Non-IP-intensive industries	48.6%	42.8%

In 2012, Canada's manufacturing imports made up 19.4 percent of total U.S. manufacturing exports. Canadian manufacturing exports to the U.S. accounted for 11.7 percent of U.S. total manufacturing imports. In terms of the pharmaceutical industry, Canada imported 9.3 percent of all U.S. pharmaceutical exports, while the U.S. received 4.8 percent of all U.S. pharmaceutical imports from Canada (Table 3c).

Table 3c. U.S.-Canada – Shares of US Trade, 2012 (%)

	Imports from the U.S. (as a percentage of U.S. exports)	Exports to the U.S. (as a percentage of U.S. imports)
Manufacturing (31-33)	**19.4%**	**11.7%**
IP-intensive industries	17.0%	11.9%
Petroleum & coal products (324)	10.6%	14.7%
Chemical (325)	15.0%	13.0%
Pharmaceuticals & medicines (3254)	9.3%	4.8%
Computer & electronic products (334)	13.6%	2.1%
Transportation equipment (336)	24.8%	22.4%
Medical equipment (3391)	11.4%	1.3%
Non-IP-intensive industries	22.8%	11.5%

Chile

Bilateral trade between the U.S. and Chile in 2012 was high in IP-intensive industries. Chile imported about $17.4 billion in total manufacturing goods from the U.S., with about $12 billion from IP-intensive industries and $192 million in pharmaceutical products. In 2012, Chile exported $6.3 billion in total manufacturing goods to the U.S., of which $675.9 million came from IP-intensive industries and $8.7 million were pharmaceuticals (Table 4a).

Table 4a. US-Chile – Exports and Imports, 2012 ($ millions)

	Imports from the U.S.	Exports to the U.S.
Manufacturing (31-33)	**17,440,636,472**	**6,366,717,109**
IP-intensive industries	12,024,142,911	675,910,063
Petroleum & coal products (324)	5,634,297,158	68,133,755
Chemical (325)	1,767,576,337	579,434,708
Pharmaceuticals & medicines (3254)	192,567,218	8,713,701
Computer & electronic products (334)	1,960,666,437	8,968,607
Transportation equipment (336)	2,488,144,866	19,330,151
Medical equipment (3391)	173,458,113	42,842
Non-IP-intensive industries	5,416,493,561	5,690,807,046

As a percent of total manufacturing sectors, 68.9 percent of Chilean imports from the U.S. were in the IP-intensive industries and 1.1 percent from the pharmaceutical industry. Nearly 10.6 percent of Chilean manufacturing exports to the U.S. are in the IP-intensive industries and 0.1 percent from the pharmaceutical industry (Table 4b).

Table 4b. US-Chile – Composition of Trade, 2012 (%)

	Imports from the U.S.	Exports to the U.S.
Manufacturing (31-33)	**100.0%**	**100.0%**
IP-intensive industries	68.9%	10.6%
Petroleum & coal products (324)	32.3%	1.1%
Chemical (325)	10.1%	9.1%
Pharmaceuticals & medicines (3254)	1.1%	0.1%
Computer & electronic products (334)	11.2%	0.1%
Transportation equipment (336)	14.3%	0.3%
Medical equipment (3391)	1.0%	0.0%
Non-IP-intensive industries	31.1%	89.4%

In 2012, Chilean manufacturing imports made up 1.3 percent of total U.S. manufacturing exports. Chilean manufacturing exports to the U.S. accounted for 0.3 percent of U.S. total manufacturing imports. In terms of the pharmaceutical industry, Chile imported 0.4 percent of all U.S. pharmaceutical exports, while the U.S. received less than one tenth of a percent of all U.S. pharmaceutical imports from Chile (Table 4c).

Table 4c. U.S.-Chile – Shares of U.S. Trade, 2012 (%)

	Imports from the U.S. (as a percentage of U.S. exports)	Exports to the U.S. (as a percentage of U.S. imports)
Manufacturing (31-33)	**1.3%**	**0.3%**
IP-intensive industries	1.5%	0.1%
Petroleum & coal products (324)	5.1%	0.1%
Chemical (325)	0.9%	0.3%
Pharmaceuticals & medicines (3254)	0.4%	0.0%
Computer & electronic products (334)	1.0%	0.0%
Transportation equipment (336)	1.0%	0.0%
Medical equipment (3391)	0.6%	0.0%
Non-IP-intensive industries	1.0%	0.7%

Japan

Bilateral trade between the U.S. and Japan in 2012 was high in IP-intensive industries. Japan imported $58.2 billion in total manufacturing goods from the U.S., of which $37 billion came from IP-intensive industries and $4.3 billion from pharmaceutical products. In 2012, Japan exported $139.9 billion in total manufacturing goods to the U.S., of which $92.3 billion came from IP-intensive industries and $1.6 billion were pharmaceuticals (Table 5a).

Table 5a. U.S.-Japan – Exports and Imports, 2012 ($ million)

	Imports from the U.S.	Exports to the U.S.
Manufacturing (31-33)	**58,262,378,722**	**139,927,650,997**
IP-intensive industries	37,024,812,940	92,326,703,685
Petroleum & coal products (324)	1,279,840,338	635,346,706
Chemical (325)	11,480,887,069	8,410,196,351
Pharmaceuticals & medicines (3254)	4,360,294,396	1,668,264,975
Computer & electronic products (334)	9,295,516,135	22,939,078,308
Transportation equipment (336)	10,845,399,630	59,288,349,586
Medical equipment (3391)	4,123,169,768	1,053,732,734
Non-IP-intensive industries	21,237,565,782	47,600,947,312

As a percent of total manufacturing sectors, 63.5 percent of Japanese imports from the U.S. were in the IP-intensive industries and 7.5 percent from the pharmaceutical industry. Nearly 66 percent of Japanese manufacturing exports to the U.S. were in the IP-intensive industries and 1.2 percent were pharmaceuticals (Table 5b).

Table 5b. U.S.-Japan – Composition of Trade, 2012 (%)

	Imports from the U.S.	Exports to the U.S.
Manufacturing (31-33)	**100.0%**	**100.0%**
IP-intensive industries	63.5%	66.0%
Petroleum & coal products (324)	2.2%	0.5%
Chemical (325)	19.7%	6.0%
Pharmaceuticals & medicines (3254)	7.5%	1.2%
Computer & electronic products (334)	16.0%	16.4%
Transportation equipment (336)	18.6%	42.4%
Medical equipment (3391)	7.1%	0.8%
Non-IP-intensive industries	36.5%	34.0%

In 2012, Japan's manufacturing imports made up 4.3 percent of total U.S. manufacturing exports. Japanese manufacturing exports to the U.S. accounted for 7.6 percent of total U.S. manufacturing imports. In terms of the pharmaceutical industry, Japan imported 8.6 percent of all U.S. pharmaceutical exports, while the U.S. received nearly two percent of all U.S. pharmaceutical imports from Japan (Table 5c).

Table 5c. U.S.-Japan – Shares of US Trade, 2012 (%)

	Imports from the U.S. (as a percentage of U.S. exports)	Exports to the U.S. (as a percentage of U.S. imports)
Manufacturing (31-33)	**4.3%**	**7.6%**
IP-intensive industries	4.7%	8.9%
Petroleum & coal products (324)	1.1%	0.5%
Chemical (325)	5.8%	4.2%
Pharmaceuticals & medicines (3254)	8.6%	1.9%
Computer & electronic products (334)	4.5%	6.3%
Transportation equipment (336)	4.4%	18.9%
Medical equipment (3391)	13.8%	3.8%
Non-IP-intensive industries	3.8%	5.9%

Malaysia

Bilateral trade between the U.S. and Malaysia in 2012 was high in IP-intensive industries. Malaysia imported about $11.7 billion in manufacturing goods from the U.S., with $8.5 billion from IP-intensive industries and $92.8 million in pharmaceuticals. In 2012, Malaysia exported $24.5 billion in manufacturing goods to the U.S., of which $18.7 billion came from IP-intensive industries and about $34 million from pharmaceutical industries (Table 6a).

Table 6a. U.S.-Malaysia – Exports and Imports, 2012 ($ million)

	Imports from the U.S.	Exports to the U.S.
Manufacturing (31-33)	**11,774,994,571**	**24,519,998,103**
IP-intensive industries	8,557,701,894	18,744,814,594
Petroleum & coal products (324)	90,131,181	125,748,575
Chemical (325)	792,222,559	534,364,876
Pharmaceuticals & medicines (3254)	92,844,937	34,058,634
Computer & electronic products (334)	6,253,844,044	16,545,289,681
Transportation equipment (336)	1,309,135,864	217,976,676
Medical equipment (3391)	112,368,246	1,321,434,786
Non-IP-intensive industries	3,217,292,677	5,775,183,509

As a percent of total manufacturing sectors, 72.7 percent of Malaysian imports from the U.S. were IP-intensive and 0.8 percent were pharmaceuticals. Nearly 76.4 percent of Malaysian manufacturing exports to the U.S. were in the IP-intensive industries and 0.1 percent from the pharmaceutical industry (Table 6b).

Table 6b. U.S.-Malaysia – Composition of Trade, 2012 (%)

	Imports from the U.S.	Exports to the U.S.
Manufacturing (31-33)	**100.0%**	**100.0%**
IP-intensive industries	72.7%	76.4%
Petroleum & coal products (324)	0.8%	0.5%
Chemical (325)	6.7%	2.2%
Pharmaceuticals & medicines (3254)	0.8%	0.1%
Computer & electronic products (334)	53.1%	67.5%
Transportation equipment (336)	11.1%	0.9%
Medical equipment (3391)	1.0%	5.4%
Non-IP-intensive industries	27.3%	23.6%

In 2012, Malaysia's manufacturing imports made up 0.9 percent of all U.S. manufacturing exports. Malaysian manufacturing exports to the U.S. accounted for 1.3 percent of U.S. total manufacturing imports. In terms of the pharmaceutical industry, Malaysia imported 0.2 percent of all U.S. pharmaceutical exports, while the U.S. received less than one tenth of a percent of all U.S. pharmaceutical imports from Malaysia (Table 6c).

Table 6c. U.S.-Malaysia – Shares of US Trade, 2012 (%)

	Imports from the U.S. (as a percentage of U.S. exports)	Exports to the U.S. (as a percentage of U.S. imports)
Manufacturing (31-33)	**0.9%**	**1.3%**
IP-intensive industries	1.1%	1.8%
Petroleum & coal products (324)	0.1%	0.1%
Chemical (325)	0.4%	0.3%
Pharmaceuticals & medicines (3254)	0.2%	0.0%
Computer & electronic products (334)	3.1%	4.5%
Transportation equipment (336)	0.5%	0.1%
Medical equipment (3391)	0.4%	4.8%
Non-IP-intensive industries	0.6%	0.7%

Mexico

Bilateral trade between the U.S. and Mexico in 2012 was high in IP-intensive industries. Mexico imported about $195 billion in manufacturing goods from the U.S., with $111.8 billion from IP-intensive industries and $1.7 billion in pharmaceuticals. In 2012, Mexico exported $221.9 billion in manufacturing goods to the U.S., of which $137.9 billion came from IP-intensive industries and $353.7 million from pharmaceutical firms (Table 7a).

Table 7a. U.S.-Mexico – Exports and Imports, 2012 ($ million)

	Imports from the U.S.	Exports to the U.S.
Manufacturing (31-33)	**195,035,969,882**	**221,912,363,223**
IP-intensive industries	111,809,869,626	137,939,173,650
Petroleum & coal products (324)	20,755,137,208	2,538,892,036
Chemical (325)	23,543,896,121	4,783,084,853
Pharmaceuticals & medicines (3254)	1,736,386,029	353,759,535
Computer & electronic products (334)	37,710,592,643	54,763,216,862
Transportation equipment (336)	27,867,551,315	71,234,267,089
Medical equipment (3391)	1,932,692,339	4,619,712,810
Non-IP-intensive industries	83,226,100,256	83,973,189,573

As a percent of total manufacturing sectors, 57.3 percent of Mexican imports from the U.S. were from IP-intensive industries and 0.9 percent were pharmaceuticals. Nearly 62.2 percent of Mexican manufacturing exports to the U.S. were in IP-intensive industries and 0.2 percent in pharmaceuticals (Table 7b).

Table 7b. U.S.-Mexico – Composition of Trade, 2012 (%)

	Imports from the U.S.	Exports to the U.S.
Manufacturing (31-33)	**100.0%**	**100.0%**
IP-intensive industries	57.3%	62.2%
Petroleum & coal products (324)	10.6%	1.1%
Chemical (325)	12.1%	2.2%
Pharmaceuticals & medicines (3254)	0.9%	0.2%
Computer & electronic products (334)	19.3%	24.7%
Transportation equipment (336)	14.3%	32.1%
Medical equipment (3391)	1.0%	2.1%
Non-IP-intensive industries	42.7%	37.8%

In 2012, Mexico's manufacturing imports made up 14.5 percent of all U.S. manufacturing exports. Mexican manufacturing exports to the U.S. accounted for 12 percent of all U.S. manufactured imports. In terms of the pharmaceutical industry, Mexico imported 3.4 percent of all U.S. pharmaceutical exports, while the U.S. received 0.4 percent of all U.S. pharmaceutical imports from Mexico (Table 7c).

Table 7c. U.S.-Mexico – Shares of US Trade, 2012 (%)

	Imports from the U.S. (as a percentage of U.S. exports)	Exports to the U.S. (as a percentage of U.S. imports)
Manufacturing (31-33)	**14.5%**	**12.0%**
IP-intensive industries	14.1%	13.2%
Petroleum & coal products (324)	18.6%	1.9%
Chemical (325)	12.0%	2.4%
Pharmaceuticals & medicines (3254)	3.4%	0.4%
Computer & electronic products (334)	18.4%	15.0%
Transportation equipment (336)	11.2%	22.7%
Medical equipment (3391)	6.5%	16.7%
Non-IP-intensive industries	15.0%	10.4%

New Zealand

Bilateral trade between the U.S. and New Zealand in 2012 was high in IP-intensive industries. New Zealand imported about $2.8 billion in manufacturing goods from the U.S., with $1.5 billion from IP-intensive industries and $77.7 million in pharmaceuticals. In 2012, New Zealand exported about $3 billion in manufacturing goods to the U.S., of which $363.9 million came from IP-intensive industries and $33.8 million from pharmaceutical industry (Table 8a).

Table 8a. U.S.-New Zealand – Exports and Imports, 2012 ($ millions)

	Imports from the U.S.	Exports to the U.S.
Manufacturing (31-33)	**2,848,621,122**	**3,025,342,442**
IP-intensive industries	1,535,193,274	363,913,332
Petroleum & coal products (324)	84,078,372	53,936
Chemical (325)	355,173,717	149,873,118
Pharmaceuticals & medicines (3254)	77,757,593	33,818,240
Computer & electronic products (334)	254,437,970	85,130,358
Transportation equipment (336)	765,366,618	21,356,322
Medical equipment (3391)	76,136,597	107,499,598
Non-IP-intensive industries	1,313,427,848	2,661,429,110

As a percentage of total manufacturing sectors, 53.9 percent of New Zealand's imports from the U.S. were in the IP-intensive industries and 2.7 percent from the pharmaceutical industry. Roughly 12 percent of New Zealand's manufacturing exports to the U.S. are in the IP-intensive industries and 1.1 percent from the pharmaceutical industry (Table 8b.)

.

Table 8b. U.S.-New Zealand – Composition of Trade, 2012 (%)

	Imports from the U.S.	Exports to the U.S.
Manufacturing (31-33)	**100.0%**	**100.0%**
IP-intensive industries	53.9%	12.0%
Petroleum & coal products (324)	3.0%	0.0%
Chemical (325)	12.5%	5.0%
Pharmaceuticals & medicines (3254)	2.7%	1.1%
Computer & electronic products (334)	8.9%	2.8%
Transportation equipment (336)	26.9%	0.7%
Medical equipment (3391)	2.7%	3.6%
Non-IP-intensive industries	46.1%	88.0%

In 2012, New Zealand's manufacturing imports made up 0.2 percent of total U.S. manufacturing exports. New Zealand's manufacturing exports to the U.S. accounted for 0.2 percent of U.S. total manufacturing imports. In terms of the pharmaceutical industry, New Zealand imported 0.2 percent of all U.S. pharmaceutical exports, while the U.S. received less than a tenth of a percent of all U.S. pharmaceutical imports from New Zealand (Table 8c).

Table 8c. U.S.-New Zealand – Shares of US Trade, 2012 (%)

	Imports from the U.S. (as a percentage of U.S. exports)	Exports to the U.S. (as a percentage of U.S. imports)
Manufacturing (31-33)	**0.2%**	**0.2%**
IP-intensive industries	0.2%	0.0%
Petroleum & coal products (324)	0.1%	0.0%
Chemical (325)	0.2%	0.1%
Pharmaceuticals & medicines (3254)	0.2%	0.0%
Computer & electronic products (334)	0.1%	0.0%
Transportation equipment (336)	0.3%	0.0%
Medical equipment (3391)	0.3%	0.4%
Non-IP-intensive industries	0.2%	0.3%

Peru

Bilateral trade between the U.S. and Peru in 2012 was high in IP-intensive industries. Peru imported about $8.6 billion in manufacturing goods from the U.S., of which $5.3 billion came from IP-intensive industries and $73.2 million from pharmaceutical industries. In 2012, Peru exported $4.6 billion in total manufacturing goods to the U.S., of which about $1 billion came from IP-intensive industries and $71,954 from pharmaceutical industries (Table 9a).

Table 9a. U.S.-Peru – Exports and Imports, 2012 ($ million)

	Imports from the U.S.	Exports to the U.S.
Manufacturing (31-33)	**8,673,109,790**	**4,633,855,126**
IP-intensive industries	5,372,182,490	1,030,759,957
Petroleum & coal products (324)	2,277,788,798	760,221,737
Chemical (325)	1,303,418,006	261,112,002
Pharmaceuticals & medicines (3254)	73,238,337	71,954
Computer & electronic products (334)	1,245,636,131	3,966,233
Transportation equipment (336)	485,066,607	5,076,305
Medical equipment (3391)	60,272,948	383,680
Non-IP-intensive industries	3,300,927,300	3,603,095,169

As a percent of total manufacturing sectors, 61.9 percent of Peruvian imports from the U.S. were in the IP-intensive industries and 0.8 percent from the pharmaceutical industry. Nearly 22.2 percent of Peruvian manufacturing exports to the U.S. were in the IP-intensive industries and less than one tenth of a percent from the pharmaceutical industry (Table 9b).

Table 9b. U.S.-Peru – Composition of Trade, 2012 (%)

	Imports from the U.S.	Exports to the U.S.
Manufacturing (31-33)	**100.0%**	**100.0%**
IP-intensive industries	61.9%	22.2%
Petroleum & coal products (324)	26.3%	16.4%
Chemical (325)	15.0%	5.6%
Pharmaceuticals & medicines (3254)	0.8%	0.0%
Computer & electronic products (334)	14.4%	0.1%
Transportation equipment (336)	5.6%	0.1%
Medical equipment (3391)	0.7%	0.0%
Non-IP-intensive industries	38.1%	77.8%

In 2012, Peru's manufacturing imports made up 0.6 percent of total U.S. manufacturing exports. Peruvian manufacturing exports to the U.S. accounted for 0.3 percent of U.S. total manufacturing imports. In terms of the pharmaceutical industry, Peru imported 0.1 percent of all U.S. pharmaceutical exports, while the U.S. received less than one tenth of a percent of all U.S. pharmaceutical imports from Peru (Table 9c).

Table 9c. U.S.-Peru – Shares of US Trade, 2012 (%)

	Imports from the U.S. (as a percentage of U.S. exports)	Exports to the U.S. (as a percentage of U.S. imports)
Manufacturing (31-33)	0.6%	0.3%
IP-intensive industries	0.7%	0.1%
Petroleum & coal products (324)	2.0%	0.6%
Chemical (325)	0.7%	0.1%
Pharmaceuticals & medicines (3254)	0.1%	0.0%
Computer & electronic products (334)	0.6%	0.0%
Transportation equipment (336)	0.2%	0.0%
Medical equipment (3391)	0.2%	0.0%
Non-IP-intensive industries	0.6%	0.4%

Singapore

Bilateral trade between the U.S. and Singapore in 2012 was very high in IP-intensive industries. Singapore imported about $29.1 billion in total manufacturing goods from the U.S., with $19.7 billion from IP-intensive industries and $444.6 million in pharmaceuticals. In 2012, Singapore exported about $17 billion in manufactured goods to the U.S., of which $14.7 billion came from IP-intensive industries and $4.2 billion from pharmaceutical industries (Table 10a).

Table 10a. U.S.-Singapore – Exports and Imports, 2012 ($ million)

	Imports from the U.S.	Exports to the U.S.
Manufacturing (31-33)	**29,115,806,940**	**17,087,147,854**
IP-intensive industries	19,738,427,181	14,734,254,399
Petroleum & coal products (324)	4,404,625,274	72,058,131
Chemical (325)	3,819,470,027	6,269,409,335
Pharmaceuticals & medicines (3254)	444,678,141	4,201,991,517
Computer & electronic products (334)	5,934,717,054	7,014,881,955
Transportation equipment (336)	4,954,256,179	808,711,279
Medical equipment (3391)	625,358,647	569,193,699
Non-IP-intensive industries	9,377,379,759	2,352,893,455

As a percent of total manufacturing sectors, 67.8 percent of Singapore's imports from the U.S. were in IP-intensive industries and 1.5 percent in pharmaceuticals. Astoundingly, 86.2 percent of Singapore's manufacturing exports to the U.S. were in IP-intensive industries and 24.6 percent in pharmaceuticals (Table 10b).

Table 10b. U.S.-Singapore – Composition of Trade, 2012 (%)

	Imports from the U.S.	Exports to the U.S.
Manufacturing (31-33)	**100.0%**	**100.0%**
IP-intensive industries	67.8%	86.2%
Petroleum & coal products (324)	15.1%	0.4%
Chemical (325)	13.1%	36.7%
Pharmaceuticals & medicines (3254)	1.5%	24.6%
Computer & electronic products (334)	20.4%	41.1%
Transportation equipment (336)	17.0%	4.7%
Medical equipment (3391)	2.1%	3.3%
Non-IP-intensive industries	32.2%	13.8%

In 2012, Singapore's manufactured imports made up 2.2 percent of total U.S. manufacturing exports. Singapore's manufactured exports to the U.S. accounted for 0.9 percent of U.S. total manufacturing imports. In terms of the pharmaceutical industry, Singapore imported 0.9 percent of all U.S. pharmaceutical exports, while the U.S. received 4.7 percent of all U.S. pharmaceutical imports from Singapore (Table 10c).

Table 10c. U.S.-Singapore – Shares of US Trade, 2012 (%)

	Imports from the U.S. (as a percentage of U.S. exports)	Exports to the U.S. (as a percentage of U.S. imports)
Manufacturing (31-33)	**2.2%**	**0.9%**
IP-intensive industries	2.5%	1.4%
Petroleum & coal products (324)	3.9%	0.1%
Chemical (325)	1.9%	3.1%
Pharmaceuticals & medicines (3254)	0.9%	4.7%
Computer & electronic products (334)	2.9%	1.9%
Transportation equipment (336)	2.0%	0.3%
Medical equipment (3391)	2.1%	2.1%
Non-IP-intensive industries	1.7%	0.3%

Vietnam

Bilateral trade between the U.S. and Vietnam in 2012 was high in IP-intensive industries. Vietnam imported nearly $3.4 billion in total manufacturing goods from the U.S., with $1.5 billion from IP-intensive industries and $68.8 million in pharmaceuticals. In 2012, Vietnam exported $17.8 billion in total manufacturing goods to the U.S., of which about $1.6 million came from IP-intensive industries and $1.6 million from pharmaceutical industries (Table 11a).

Table 11a. U.S.-Vietnam – Exports and Imports, 2012 ($ million)

	Imports from the U.S.	Exports to the U.S.
Manufacturing (31-33)	**3,395,669,011**	**17,806,804,217**
IP-intensive industries	1,592,961,984	2,357,081,673
Petroleum & coal products (324)	8,690,809	113,378,220
Chemical (325)	446,315,364	76,605,479
Pharmaceuticals & medicines (3254)	68,817,235	1,678,699
Computer & electronic products (334)	908,863,110	1,601,532,320
Transportation equipment (336)	194,680,336	501,297,416
Medical equipment (3391)	34,412,365	64,268,238
Non-IP-intensive industries	1,802,707,027	15,449,722,544

As a percent of total manufacturing sectors, 46.9 percent of Vietnamese imports from the U.S. were in the IP-intensive industries and 2 percent in pharmaceuticals. Nearly 13.2 percent of Vietnamese manufacturing exports to the U.S. were in IP-intensive industries and less than one tenth of a percent in pharmaceuticals (Table 11b).

Table 11b. U.S.-Vietnam – Composition of Trade, 2012 (%)

	Imports from the U.S.	Exports to the U.S.
Manufacturing (31-33)	**100.0%**	**100.0%**
IP-intensive industries	46.9%	13.2%
Petroleum & coal products (324)	0.3%	0.6%
Chemical (325)	13.1%	0.4%
Pharmaceuticals & medicines (3254)	2.0%	0.0%
Computer & electronic products (334)	26.8%	9.0%
Transportation equipment (336)	5.7%	2.8%
Medical equipment (3391)	1.0%	0.4%
Non-IP-intensive industries	53.1%	86.8%

In 2012, Vietnamese manufacturing imports made up 0.3 percent of total U.S. manufacturing exports. Vietnam manufacturing exports to the U.S. accounted for 1 percent of U.S. total manufacturing imports. In terms of the pharmaceutical industry, Vietnam imported 0.1 percent of all U.S. pharmaceutical exports, while the U.S. received less than one tenth of a percent of all U.S. pharmaceutical imports from Vietnam (Table 11c).

Table 11c. U.S.-Vietnam – Shares of US Trade, 2012 (%)

	Imports from the U.S. (as a percentage of U.S. exports)	Exports to the U.S. (as a percentage of U.S. imports)
Manufacturing (31-33)	**0.3%**	**1.0%**
IP-intensive industries	0.2%	0.2%
Petroleum & coal products (324)	0.0%	0.1%
Chemical (325)	0.2%	0.0%
Pharmaceuticals & medicines (3254)	0.1%	0.0%
Computer & electronic products (334)	0.4%	0.4%
Transportation equipment (336)	0.1%	0.2%
Medical equipment (3391)	0.1%	0.2%
Non-IP-intensive industries	0.3%	1.9%

Appendix 1

In order to estimate the contribution of these FTA's on U.S. exports we have used a constant market share (CMS) and a shift-share methodology whereby we estimate the pattern of exports in the pre-FTA period and compare it to the post FTA period after adjusting for normal growth, change in market destinations, change in variety of products within an aggregate commodity definition. There are a number of estimating methodologies applied in the literature to determine the economic impact of these FTAs and to forecast the impact of the TPP and other future regional agreements. Among the most inclusive are general equilibrium methodologies that are estimated at a very high level of product aggregation across a wide variety of member countries. These models referred to as Computable General Equilibrium (CGE) models provide estimates of the trade and economic welfare impacts of prospective U.S. free trade agreements using a prominent CGE model of the world economy, known as the Global Trade Analysis Project (GTAP) model. The advantage of this methodology is its ability to capture cross-sector resource flows. As barriers drop or are eliminated in a single tradable sector, resources flow to the most efficient uses, both in terms of the sector directly affected by the FTA and all other sectors. This approach is not useful for this exercise because our focus is on 3 and 4 digit NAICS IP-intensive and non-IP-intensive industry groups. The most fruitful approach is a partial equilibrium approach which is designed to estimate the direct impact of trade enhancement within an FTA on U.S. exports of the affected categories. A discussion of the Gravity model which has also been applied to the current list of FTAs is provided in Pelzman (1977).[68]

Constant Market Share Approach

Rather than using elasticities from the FTA member countries, which are not very reliable, the preferred partial equilibrium approach is based tracking the performance of exports before and after a structural change such as an FTA.A country's exports are a reliable indicator of its position on the world market for two reasons. The indicator takes into account the international division of production processes since a large part of imported intermediate products found within exports usually belong to the same sector (e.g. electronic parts and assembled computers). Focusing on exports provide a very simple but reliable correction for dealing with the globalization of production processes and the induced vertical specialization of countries at various stages of production.

Formally, the Constant Marker Share (CMS) identity can be written as:

$$X^{00} - X^{0} \equiv rX^{0} + \sum_{i}(r_i - r)X_i^0 + \sum_{i}\sum_{j}(r_{ij} - r_i)X_{ij}^0 + \sum_{i}\sum_{j}(X_{ij}^{00} - X_i^0 - r_{ij}X_{ij}^0)$$

where:

r = the growth rate of total world trade in value terms;

r_i = the growth rate of international trade in commodity I;

r_{ij} = the growth rate of total imports of commodity i by country j;

[68] Pelzman, Joseph. 1977. "Trade Creation and Trade Diversion in the Council of Mutual Economic Assistance: 1954-1970." American Economic Review, 67(4), pp. 713 - 722.

X =total exports of the focus country;
0 = initial period;
00 = second period;
i = commodity group;
j =country of destination.

The first term on the right hand side of the CMS identity indicates what the US's exports would have been had they expanded at the same rate as world trade. The second term, the commodity effect, indicates the influence of changes in the composition of the focus country's exports on growth. For example, if the focus country specializes in commodities for which international trade is growing rapidly, one would expect to see its exports of those commodities also growing rapidly.

Diversification, measured through exports, is a good indicator of production structures and industry's development level. Diversification limits the dependence on a small number of products and hence reduces a country's vulnerability to industry-specific external shocks. In order to capture the degree of product diversification, two separate indicators are calculated: the equivalent number of products and the spread. The spread is the inverse of the corresponding concentration. The equivalent number (EN=1/Herfindal), is a theoretical value which represents the number of markets of identical size that would lead to the degree of export concentration exactly equal to the observed one. Because this indicator is not highly sensitive to activities of relatively weak importance, it is a measurement that is suited to sectoral studies.

The third term indicates the effect of market distribution. If the focus country's exports are primarily directed toward rapidly growing (declining) markets then its exports should rise (decline). Diversifying partner countries reduces a country's dependence on a small number of export markets and hence the vulnerability to shocks within destination countries. In order to capture the degree of market diversification, the same two complementary indicators referred to above are used: the equivalent number of markets and the spread. The equivalent number used for calculating market diversification distinguishes for each country, the number of partner countries weighed according to their importance. The increase in rank is a function of the increase in the level of diversification of markets.

The last term on the right hand side is referred to as the competitiveness effect. This residual effect indicates the extent to which the growth of the focus country's exports was above the CMS norm and is therefore unexplained by either the world, market, or commodity effects. It is to be noted that an increase (i.e., a positive value) in this competitiveness factor may be due to both demand factors and supply factors, such as increased productivity, or to marketing and government policies such as reduced trade interference or inducements to export.

<u>Shift Share Approach:</u>
Using the CMS estimates we can apply a shift-share and constant -share projection models. As a first step, projections of future U.S. exports to the FTA countries can be made on the assumption that these exports will grow at some constant rate. This simple constant-share model can be written as:

$$\tilde{X}_{jk,t+n} = a_{jk,(t-m,t)} X_{jk,t}$$

Where *a* is the constant-share term based on a historical period *(t - m,t)*

Despite the fact that such constant-share models track well, these models are very simplistic. The existence of an FTA is anticipated to create a structural change in U.S. exports. In order to provide for this structural shift U.S. exports to the FTA countries are projected using a regional model that allows for changes in the constant-share term. This model, known in the literature as the shift-share model, can be specified as:

$$\tilde{X}_{jk,t+n} = [r_{hk,(t,t+n)} + b(R_{jk,(t-m,t)} - r_{hk,(t-m,t)})]X_{jk,t}$$

Where *r* is the average export growth rate for the defined world "norm" (either OECD or Latin America or Asia designated as *h)* and *R* is the growth rate of U.S. FTA country exports. The scalar *b* adjusts for differences in the length of the historical period *(t - m, t)* and the projection period *(t, t + n).* Let the U.S. be denoted as country j and the FTA importing countries as i, where i = 1, ... ,I. Trade occurs in a series of goods designated as *k (k* = 1, ... , *K).*

About the Contributors

Nam D. Pham, PhD
Managing Partner, ndp|analytics
Nam D. Pham is Managing Partner of ndp|analytics, a strategic research firm that specializes in economic analysis of public policy and legal issues. Prior to founding ndp|analytics in 2000, Dr. Pham was Vice President at Scudder Kemper Investments in Boston, where he was responsible for research, asset allocations, and currency hedging for global and international bond funds. Before that he was Chief Economist of the Asia Region for Standard & Poor's DRI; an economist at the World Bank; and a consultant to both the Department of Commerce and the Federal Trade Commission.

Dr. Pham is an adjunct professor at the George Washington University. Dr. Pham holds a Ph.D. in economics from the George Washington University, an M.A. from Georgetown University; and a B.A. from the University of Maryland. He is a member of the board of advisors to the Dingman Center for Entrepreneurship at the University of Maryland Smith School of Business and a board member of the Food Recovery Network.

Joseph Pelzman, PhD
Senior Advisor, ndp|analytics
Professor of Economics, International Affairs and Law, George Washington University

Joseph Pelzman has over 30 years of experience specializing on issues relating to trade capacity building, the development of and testing of workable free-trade area agreements and on delinking trade liberalization from fiscal tax issues. He has been involved in numerous international projects including a program and legislation for a Fair Trade Commission for the Government of Barbados, a modeling framework for assessing tax deferral systems as Section 936 was being discontinued for Puerto Rico, and a framework of reviewing fiscal reform packages in support of trade liberalization for Morocco and Jamaica. Some of his current published work includes a study of the Enforcement Issues of the Dispute Settlement Understanding under current WTO procedures, a study of the US negotiation of CAFTA and FTAA in a sequential bargaining context, a study of Regional Incentive Systems both in the Middle East and in Puerto Rico, as they apply to the sunrise industries, a study of post-MFA competition of the PRC with Vietnam and India and an assessment of an effective model of providing tariff liberalization without incurring a reduction in fiscal funding in the MENA region.

Professor Pelzman teaches International Trade Theory, International Trade Law, Law and Economics and Middle-East Economics. He holds a J.D. from George Washington University Law School, a Ph.D., Economics from Boston College and a B.S., Economics from Boston College. He also studied Russian & East European area studies at Harvard University.

Justin Badlam
Principal, ndp|analytics

Justin Badlam is Principal at ndp|analytics responsible for research, project management, and public affairs of the firm. Badlam brings more than six years of research, communications, and advocacy experience on public policy issues for the private sector. Prior to joining ndp|analytics Badlam was Manager of Research and Communications at the U.S. Chamber of Commerce's Global Intellectual Property Center. In that capacity, Badlam led the completion of more than a dozen major research, multimedia, and advocacy projects, which garnered considerable media coverage. Before that he was a Senior Research Associate in the U.S. Chamber of Commerce's development division. He started his career at the Hertz Corporation in their Association and Federation Relations office.

In addition to his professional experience, Badlam was a recipient of Presidential Management Fellowship and New York State Academic Excellence Scholarship. He holds a master's degree in International Commerce and Policy and a graduate certificate in Regional Economic Development from George Mason University's School of Public Policy. He received his B.A. in Latin American Studies from Plattsburgh College (SUNY).

Anil Sarda
Associate, ndp|analytics

Anil Sarda is an Associate at ndp|analytics. He provides for research and analysis on client projects as well as lead support for marketing efforts of the firm. He first joined the firm in 2012. Prior to working for the firm, Sarda held marketing and corporate strategy positions at BranchOut, a rapidly growing professional social media network based in San Francisco, and at PRGX Global, an international business analytics and profit discovery firm in Atlanta. He graduated from The George Washington University, School of Business with a B.B.A. degree in International Business and Marketing.

About ndp|analytics. ndp|analytics is a strategic research firm that specializes in economic analysis of public policy and legal issues. Our services include economic impact studies, business impact analyses, cost-benefit analyses, statistics, and data construction. Our analytical frameworks are data-driven and are supported by economic fundamentals, robust, transparent, and defensible. We present facts and findings to tell a complete story in a simple yet effective language for the broad public audiences. We excel in supporting organizations for advocacy, government and industry relations, public affairs campaigns, and strategic initiatives. Clients of ndp|analytics include trade associations, coalitions, financial institutions, law firms, U.S. and foreign corporations, and multinational organizations. Our work has been prominently cited in the 2011 Economic of Report of the President to the Congress, the media, reports from government agencies, Congressional testimonies, and by Congressional leaders.

ndpanalytics.com