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# The Economic Effects of the Trans-Pacific Partnership: New Estimates

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## Abstract

This Working Paper estimates the effects of the Trans-Pacific Partnership (TPP) using a comprehensive, quantitative trade model, updating results reported in Petri, Plummer, and Zhai (2012) with recent data and information from the agreement. The new estimates suggest that the TPP will increase annual real incomes in the United States by $131 billion, or 0.5 percent of GDP, and annual exports by $357 billion, or 9.1 percent of exports, over baseline projections by 2030, when the agreement is nearly fully implemented. Annual income gains by 2030 will be $492 billion for the world. While the United States will be the largest beneficiary of the TPP in absolute terms, the agreement will generate substantial gains for Japan, Malaysia, and Vietnam as well, and solid benefits for other members. The agreement will raise US wages but is not projected to change US employment levels; it will slightly increase "job churn" (movements of jobs between firms) and impose adjustment costs on some workers.

**JEL Codes:** F12, F13, F14, F15, F17

**Keywords:** Trans-Pacific Partnership, Free Trade Agreements

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## 1. INTRODUCTION

The Trans-Pacific Partnership (TPP), concluded on October 5, 2015, reflects inevitable compromises but appears to have met its two key objectives: to establish new, market-oriented rules in a host of rapidly changing areas of international commerce and to reduce trade and investment barriers among TPP countries to yield considerable gains for the United States and its 11 partners.[1] This paper estimates the effects of the TPP using a comprehensive, quantitative trade model, updating results reported in Petri, Plummer, and Zhai (2012) with new data and information from the agreement.

The TPP is a landmark accord. In 2014 its member countries had combined GDP of $28 trillion, or 36 percent of world GDP, and accounted for $5.3 trillion in exports, or 23 percent of the world total.[2] They are unusually diverse, comprising low-, middle-, and high-income countries with varied economic systems. The agreement itself is deep and comprehensive, targeting economic integration with provisions that range from goods, services, and investment to critical new issues such as the digital economy, intellectual property rights, regulatory coherence, labor, and the environment. The role of the TPP in launching international cooperation on so-called next-generation trade rules cannot be assessed at this time, but it may prove to be its most valuable contribution in the long run.

Economic modeling can show, however, the effects of the scheduled liberalization elements of the TPP, provided it is ratified by its members. The estimates reported here suggest that the TPP will increase annual real incomes in the United States by $131 billion,[3] or 0.5 percent of GDP, and annual exports by $357 billion, or 9.1 percent of exports, over baseline projections by 2030, when the agreement is nearly fully implemented. Incomes after 2030 will remain above baseline results by a similar margin. Both labor and capital will benefit, but labor will get a somewhat more than proportionate share of the gains in total.

Given these benefits, delaying the launch of the TPP by even one year would represent a $94 billion[4] permanent loss, or opportunity cost, to the US economy as well as create other risks. Postponing implementation will give up gains that compound over time and defer or foreclose new opportunities for the United States in international negotiations. Unexpected political challenges or competing trade projects may also erode decisions in partner countries, further increasing the costs from delaying TPP ratification. While the United States will be the largest beneficiary of the TPP in absolute terms, the

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1. Australia, Brunei Darussalam, Canada, Chile, Japan, Malaysia, Mexico, Peru, New Zealand, Singapore, and Vietnam.

2. Data from the World Bank's *World Development Indicators* database, http://databank.worldbank.org/data/reports.aspx?source=2&Topic=21 (accessed on October 25, 2015).

3. These estimates are in constant 2015 dollars. The income concept is defined below. The apparent precision of the estimates should not be misinterpreted. Exact numerical results are provided to help readers compare relative magnitudes and check the internal consistency of results, but estimates could be one-third larger or smaller—as sensitivity analyses in section 5 indicate—due to uncertainties in data and assumptions.

4. The estimate of $94 billion replaces $77 billion in an earlier version of this Working Paper. The estimate is drawn from table 5, which has been corrected as explained in that table.

agreement will generate substantial gains for Japan, Malaysia, and Vietnam as well, and solid benefits for other members.

On the other side of the ledger, while the TPP is not likely to affect overall employment in the United States, it will involve adjustment costs as US workers and capital move from less to more productive firms and industries. Section 4 estimates that 53,700 US jobs will be affected—i.e., that number is *both* eliminated in less productive import-competing firms *and* added in exporting and other expanding firms—in each year during implementation of the TPP. This kind of movement between jobs and industries is what economists refer to as "churn," and most kinds of productivity growth cannot occur without it taking place. For perspective, 55.5 million American workers changed jobs in this way in 2014[5]—so the transition effects of the TPP would represent only less than 0.1 percent increase in labor market churn in a typical year.

Most workers who lose jobs do find alternative employment, but workers in specific locations, industries, or with skill shortages may experience serious transition costs including lasting wage cuts and unemployment.[6] In a similar study, Robert Lawrence (2014) estimated total such costs to displaced workers in detail and found them to be a fraction of overall US gains from an ambitious trade agreement.[7] Since the costs to the individuals displaced can be quite high, compensating them for these costs, using a fraction of the total US gains, is a compelling ethical and political objective, and policies to achieve equitable adjustment are likely to be affordable.

These estimates of the benefits of the TPP are similar to those published in 2012, but somewhat higher. Nearly all information in the model has been updated, including especially assumptions about the content of the agreement, which in 2012 were based on conjectures. However, changes in the provisions from early assumptions are not a significant factor in the higher results—at the aggregate level pluses and minuses mostly offset each other. Rather, the differences are due to new data, especially on nontariff barriers (NTBs), and the inclusion of effects not analyzed in previous work. These changes are explained in the text and in appendices A and B.

## 2. THE TPP AGREEMENT

Trade contributes to economic performance by improving productivity and by giving producers and consumers access to greater varieties of goods at lower prices.[8] It also stimulates competition and

5. Specifically, 55.5 million workers were separated from jobs, and 58.6 million workers were hired into jobs in 2014. Data are from the Bureau of Labor Statistics, www.bls.gov/jlt/data.htm (accessed on December 28, 2015).

6. Data from the Bureau of Labor Statistics, www.bls.gov/jlt/data.htm (accessed on January 6, 2016).

7. Lawrence will also analyze the labor market implications of the actual TPP deal in a forthcoming essay in volume 2 of PIIE Briefings on the TPP (Lawrence and Moran 2016).

8. The relationship between trade and economic performance has been widely studied; see, for example, WTO and World Bank (2015), OECD and WTO (2013), Stone and Shepherd (2011), Wacziarg and Welch (2008), and Sachs and Warner (1995).

encourages technology and investment flows. Countries have long pursued these benefits by gradually reducing tariffs through the General Agreement on Tariffs and Trade (GATT) and World Trade Organization (WTO) agreements, enabling world trade to grow twice as fast as output. In recent years, however, global negotiations have ebbed, NTBs have become more prevalent (Evenett and Fritz 2015), and world trade growth has slowed (World Bank 2015).

Today's lower tariffs, improved logistics, and better information systems enable firms to exploit gains from international specialization far more extensively than they did in the past. Firms in the United States and elsewhere have developed complex global value chains, often focused on the Asia Pacific, to raise productivity. These systems, along with new areas of economic integration made possible by technology, have stimulated demand for still lower trade barriers, better connectivity through ports and communications, and clearer, more coherent rules to facilitate international business operations (Petri et al. 2015).

Global trade negotiations have failed to keep pace with these trends. To fill the vacuum, nearly 100 new free trade agreements (FTAs) have been signed since 2000 in the Asian region alone.[9] Yet bilateral or small regional FTAs are "second-best" strategies for deeper integration. To take advantage of an FTA, exporters have to prove that they meet "rules of origin" (ROO)[10] and often cannot do so in an agreement that does not cover complete supply chains. Also, smaller FTAs tend to focus on narrow, regional goals and have little influence on global rules. They also tend to be inefficient, as they encourage the use of costly products from FTA partners instead of those efficiently produced by nonpartners.

Absent effective global negotiations, large and ambitious regional agreements—frequently called megaregional agreements—offer a way forward. They can include a sufficient number and range of partners to limit the costs of trade diversion and to have an impact on global rules. Yet their membership can be small enough to reach compromises on difficult issues. The TPP is the first megaregional agreement concluded in over two decades (the European Single Market and the North American Free Trade Agreement were similar in ambition) and could have large, systemic effects.

Given these wider objectives, TPP negotiators sought to eliminate traditional barriers as well as update rules to meet business and social goals. In the event, the tariff reductions in the TPP are deeper and wider than anticipated, including in our 2012 study. The TPP will eliminate three-quarters of nonzero tariffs immediately on entry into force (EIF), and 99 percent when fully implemented (see Freund, Moran, and Oliver 2016). However, it will include some divergences even among intraregional

9. "Free Trade Agreements," Asian Development Bank (ADB) Asia Regional Integration Center, https://aric.adb.org/fta (accessed on December 26, 2015).

10. Rules of origin ensure that only goods primarily produced in an FTA zone are eligible for tariff preferences. A producer might have to prove, for example, that inputs in the production process that originate outside the zone fall below a percentage limit or consist of different products in terms of the customs classification.

tariffs: Although most of its tariff schedules treat partners equally, some schedules, including those of the United States, retain differences among them.

Comprehensive rules are the most distinctive aspect of the TPP. In some areas the agreement builds on the WTO rulebook but tightens disciplines and creates new mechanisms to improve implementation. It includes more comprehensive rules for service trade and investment than were in WTO agreements and allows exceptions only on a negative-list basis. It improves mechanisms for setting food standards and technical barriers and for assessing the conformity of products with them, and begins to cut through the "spaghetti bowl" of overlapping trade agreements by establishing a single set of ROO that allows inputs produced in any TPP member to count toward meeting ROO standards. The TPP also strengthens intellectual property (IP) rights and prescribes greater commitments toward enforcing them,[11] and it has more comprehensive and enforceable rules on labor and the environment than previous agreements.

In other areas the TPP breaks new ground with provisions that were absent from or tangentially addressed by prior agreements. It sets new standards for access to telecommunication networks, prohibits tariffs on electronic commerce, limits restrictions on cross-border data transfers, and rules out data localization requirements. It also brings state-owned enterprises (SOEs) more clearly under international rules, ensuring that their purchases and sales are on a commercial basis, including their service exports and foreign investments. It has special chapters on trade facilitation and small and medium enterprises (SMEs) in order to improve access to online platforms and to make regulations simpler and easier to meet. Many of these provisions are enforceable under a new dispute settlement mechanism.

How do the TPP provisions affect the modeling results? In 2012, without a TPP agreement in hand, the template of the TPP was based on the conjecture that it would be similar to that of the Korea-US free trade agreement (KORUS). The KORUS template was then used to determine how extensively the TPP would reduce tariffs and NTBs in the several model sectors. In the event, the KORUS template is not far off the mark, but some TPP provisions have turned out to be more ambitious and others less so (see box 1). With respect to NTBs, the KORUS template still serves as the starting point in this study,[12] but it is adjusted extensively to reflect differences between the published TPP and KORUS (see appendix B). Analysis of the TPP tariff schedule, however, is based entirely on information in the TPP agreement.

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11. Additional areas covered in the IP chapter include explicit coverage of state-owned enterprises so that they cannot evade IP rules, enhanced penalties for counterfeits that threaten public health and safety, and digital copyright policies. Data exclusivity for biologic products was set at five years, with additional measures to reach eight-year effective protection (but not 12 years, as US negotiators had sought).

12. Detailed expert analysis of the TPP text, comparable to that used for the KORUS text in order to develop scores for sectoral NTB reductions, is not yet available.

**Box 1 Differences between the TPP and KORUS**

To calibrate NTB reductions, the 2012 study used scores estimated for the KORUS agreement to project how the TPP would affect barriers. The two agreements turned out to be similar, but, because the TPP includes diverse economies with higher barriers than those of Korea or the United States, its commitments often imply larger concessions for some members. Following are some specific differences.

In some areas the TPP has stronger rules than KORUS:

- In the TPP, 75 percent of nonzero tariff lines fall to zero immediately and 99 percent eventually vs. two-thirds and 96 percent under KORUS.
- Yarn-forward rules of origin for textiles and apparel are more flexible in the TPP.
- The TPP provides further commitments on technical barriers to trade and sanitary and phytosanitary regulations and new mechanisms to rapidly resolve emerging regulatory issues.
- The TPP Electronic Commerce chapter limits restrictions on data transfers.
- The TPP Intellectual Property Rights chapter requires criminal penalties for trade secret theft and unlawful exploitation of copyrighted work, and adds rules on data exclusivity for biologics.
- The TPP Environment chapter has more comprehensive coverage, including of fisheries and wildlife trafficking.

In other areas the TPP breaks new ground:

- New chapters on Trade Facilitation and Small and Medium-Sized Enterprises address issues that make it easier to exploit opportunities for trade.
- The Government Procurement chapter establishes obligations for seven members (Australia, Brunei, Chile, Malaysia, Mexico, Peru, and Vietnam) that are not parties to the WTO Government Procurement Agreement.
- A new State-Owned Enterprises chapter addresses distortions that SOEs can cause in markets.
- A new Regulatory Coherence chapter provides guidelines for streamlining and coordinating the regulatory processes of members.

These commitments are qualified, however, by lists of nonconforming measures with respect to the chapters on services, investment, financial services, and SOEs.

## 3. ASSESSMENT METHODOLOGY

A global computable general equilibrium (CGE) model is used to analyze the effects of the TPP (see appendix A). The model is similar to the one used in our 2012 study but, as appendix table A.1 shows, virtually all of its components have been updated with more recent data, new research results, and information on the agreement itself. Some changes increased estimated benefits, others decreased them. On the whole, the estimates presented here are larger than those previously published, and appendix B traces how specific changes in data and methodology explain these differences.

## Estimating Framework

The TPP is modeled in three steps. First, the CGE model is solved to project global growth and trade over 2015–30. This "baseline" solution includes the effects of 63 regional trade agreements that have been concluded among TPP partners but are in some cases not yet fully implemented. Second, the provisions of the TPP are mapped into projected changes in tariffs, NTBs on goods and services, and barriers on foreign direct investment (FDI). This step assumes that 20 percent of the NTB liberalization under the TPP also applies to partners who are not TPP members, an effect not included in our previous work.[13] Third, the model is run with the barriers projected under the TPP, and the results are compared to the baseline solution.

The model assumes that the TPP will affect neither total employment nor the national savings (or equivalently trade balances) of countries. This "macroeconomic closure" assumption allows modern trade models to focus on the goals of trade policy—namely sustained productivity and wage increases through changes in trade patterns and industry output levels. With minor variations, the assumption is used in most applied models of trade agreements.[14] The assumption does not predict normal levels of unemployment and savings for 2030 or any other year; it simply says that inevitable deviations from normal values in the future will be caused by factors *other* than trade policy changes.

CGE models not only help to assess long-term structural changes in the economy but also offer insight into the adjustments that have to occur along the way. Labor market adjustments are of particular concern, since they may involve costly transitions and unemployment for some workers. These costs represent the downside of trade liberalization and are estimated in section 5. Since the estimates suggest that adjustments will be uneven across firms and individuals, efforts to facilitate them will require targeted policies to improve labor mobility, equip workers with new skills, and provide adjustment assistance where needed. To design these policies, even more detailed studies will be needed. But the present analysis does indicate that the benefits of the TPP to the US economy will greatly outweigh adjustment costs, and that economywide price and employment consequences will be limited.[15] Despite some difficult

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13. The nonpreferential liberalization effect was not included in our 2012 study but has been widely used in European studies (e.g., European Commission 2012), often with a higher spillover factor. The rationale is that some provisions of regional agreements—including disciplines on IP protection, transparency, good regulatory practices, regulatory convergence, SME development, and others—cannot be operationally restricted to apply to members alone and will improve market access for all partners.

14. Other work on the effects of TPP is reviewed in box 2 on page 16. Because trade policy models, including this one, generate wage increases, some researchers add endogenous labor supply growth that amplifies estimated income gains. This assumption may be justified in some circumstances. However, since labor supply elasticities are highly uncertain, this study conservatively assumes no such amplification of benefits.

15. Paul Krugman (1993, 25) put it this way: "The level of employment is a macroeconomic issue, depending in the short run on aggregate demand and depending in the long run on the natural rate of unemployment, with microeconomic policies like tariffs having little net effect. Trade policy should be debated in terms of its impact on efficiency, not in terms of phony numbers about

transitions, the large majority of economic agents and markets are likely to see small, mostly expansionary wage and exchange rate changes during implementation.[16]

The results show that reductions in trade barriers under the TPP generate reallocations of labor and capital toward efficient firms and industries, enabling them to produce more of what they produce best. The model suggests that by 2030 some 796,000 jobs will have been added in US exporting activities—a number often described as jobs directly supported by exports—drawing workers from other firms. More detailed estimates of sectoral employment changes, showing jobs added and eliminated in various industries, will be used below to examine possible unemployment effects. Overall, as structural changes increase the productivity of the US economy, labor and capital will have more income to share. A widely-noted indicator of the potential benefits is that export jobs already pay as much as 18 percent more than average jobs, and even more when compared to import-competing jobs (Bernard et al. 2007, Riker 2010).

### How Far Will Barriers Fall?

The most important data points of the model include trade and investment barriers for each product on each exporter-importer link. These are difficult to estimate because some impediments are hard to pinpoint and because complex patterns of existing bilateral trade agreements affect much intra-TPP trade. Information on tariffs is reasonably complete and reliable, but data on NTBs, which are more significant, are measured less accurately and leave gaps to be filled. The estimates in this study are based on several major research efforts referenced in appendix A.

Using the best available data, table 1 reports trade barriers imposed by the United States on its imports and barriers imposed by TPP partners on US exports. The top half of the table shows tariffs; those for 2015 were estimated on the basis of the Global Trade Analysis Project (GTAP) database. Tariffs in both directions are already modest, in part because much US trade with TPP partners is covered under FTAs with Australia, Canada, Chile, Mexico, Peru, and Singapore. On average, the United States imposes lower tariffs than its partners, but tariffs are high in some sectors, such as US imports of textiles and apparel (up to 25 percent for some products in the broader categories) and US exports of food and beverage products.

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jobs created or lost." Predictions of large job losses in Europe and in the United States as a result of the TTIP and TPP agreements, respectively, have been recently circulated by Jeronim Capaldo (Capaldo 2014, Capaldo et al. 2016). These papers dismiss microeconomic analysis and use a macroeconomic model that has no equations or variables to handle trade policy, trade barriers or structural change. In their simulations, the TPP is represented with exogenous macroeconomic assumptions that are unrelated to the agreement's provisions, and simply *predetermine* job losses and a worsening of the income distribution. Serious concerns about the credibility of the European paper have been raised by Martin Wolf in the *Financial Times* (Wolf 2015), Bauer and Erixon (2015), and Erixon and Bauer (2015).

16. The wage changes projected by the model show US real wages rising 0.5 percent under the TPP, suggesting slight expansionary pressures during implementation. The change in the US real, trade-weighted exchange rate show slightly contractionary effects, requiring a total depreciation of 0.1 percent over the 15-year period.

The bottom half of the table shows NTBs, represented as tariffs that would have had the same protective effect (tariff equivalents). NTBs include quotas in agriculture and energy, standards and regulations that may be arbitrary, measures that explicitly or implicitly favor domestic producers, certification requirements that are unreasonably difficult to meet, lengthy or unpredictable customs procedures, and a host of other limitations on how companies are allowed to operate in foreign markets. NTBs have been widely recognized as the leading challenge to trade policy (UNCTAD 2010) and data suggest that their use has been rising (Evenett and Fritz 2015), perhaps to compensate for declining tariffs.

Some regulations that have legitimate, welfare-increasing objectives (for example, product safety standards) may be included in estimates of NTBs developed by other researchers, but they should not be counted as barriers. To account for the exclusion of these components, only three-quarters of NTBs are considered barriers subject to reduction in the TPP. Like tariffs, the remaining NTBs are relatively low for goods, except for food products, textiles, and apparel. They are higher in service industries, which involve more regulated and less easily defined products. In addition to excluding legitimate regulations, the current analysis assumes that only 50 percent of the remaining NTBs in services and 75 percent of those in goods are "actionable," that is, subject to politically feasible reductions through trade policy.

Combining those assumptions, the actionable portion of initially estimated NTBs is calculated as 56.3 percent for goods and 37.5 percent for services. To simulate the effects of trade policy, these barriers are then reduced in proportion to scores (from 0 to 100) that represent the quality of the provisions of an agreement that address barriers in various goods and service sectors. The scoring methodology is explained in appendix A; it relies on textual analysis of trade agreements by the WTO and other experts. The scores for the TPP are based, in the first instance, on such a quantitative analysis of KORUS. Because similar analysis is not yet available for the TPP, KORUS scores were subjectively adjusted (typically slightly downward) to account for differences between the two agreements. These adjustments are reported in appendix B.

The resulting changes in barriers under the TPP are presented in the post-2015 columns of table 1, assuming that the agreement enters into force in 2017. Tariffs fall dramatically. As already noted, 75 percent of nonzero tariff lines are eliminated immediately as the TPP enters into force, and 99 percent are eliminated eventually. In the table, tariffs fall somewhat more slowly than in the published tariff schedules, because we assume that some trade is ineligible for preferences under the ROO (say, apparel made in Vietnam from Chinese fabrics; see Elliott 2016). However, by 2030 nearly all tariffs among TPP members will be eliminated, and most products are assumed by then to have regional supply chains that make them eligible for preferences. (A few tariffs, like the 25 percent US tariff on trucks and SUVs, remain for as long as 30 years.) NTBs decline, but reductions often fail to reach the actionable upper bound. Barriers on FDI are projected using a similar methodology.

## 4. EFFECTS OF THE TPP

This section examines the effects of the TPP on the United States, first for the economy as a whole, second for its several industrial sectors, and third for employment, which is of obvious importance to the public and policymakers. Readers should bear in mind that sectoral details are central to the last two issues but more uncertain than aggregate results, in part because errors in detail often offset each other.

### Incomes, Exports, and Foreign Investment

Table 2 shows, based on the current analysis, the principal measure of benefits, "real income gains." This term refers to the awkward technical definition of equivalent variations, the indicator economists prefer for assessing policy changes. It measures how much extra income a country would require, without the TPP, to undertake real expenditures as desirable as those feasible with the TPP. Expenditures normally depend on income earned from production, so real income gains are similar (but not identical) to gains in real GDP. Because both real GDP[17] and real incomes are expressed in constant prices, the relationship between them depends on relative prices. For example, if the TPP lowers output prices relative to consumer goods prices, then a given GDP increase will correspond to a smaller real income increase.

Annual income gains generated by the TPP by 2030 will be $131 billion for the United States and $492 billion for the world. US gains represent about 0.5 percent of baseline GDP. To put these benefits in context, all investments in a given year in the United States have been estimated to add one percentage point to US economic growth (Fernald 2014). US investment in 2014 was $2.9 trillion (Council of Economic Advisors 2015). Thus, the gains to income from the TPP can be thought of as the equivalent of $1.45 trillion in investment in 2014.

Large gains are also projected for Japan, Malaysia, and Vietnam. Japan benefits from improved market access throughout the TPP region, including early liberalization of auto imports in markets other than the United States, and from domestic reforms that reduce distortions in its protected service and investment sectors. Percentage gains are especially large for Vietnam and Malaysia, where the agreement should also stimulate domestic reforms and provide access to protected foreign markets. Other significant percentage gains are projected for the smaller economies of Brunei, Peru, Singapore, and New Zealand.

The TPP is not generally estimated to have large income effects on nonmembers.[18] Some gain and others lose, the latter to the extent that the TPP diverts trade from nonmembers to members or erodes

17. GDP changes are presented on our website www.asiapacifictrade.org. These results are similar to income gains, but are an inferior measure of overall economic benefits first because of the pricing effects noted in the text, and second because the GDP measure is based on trade effects only and does not include benefits from additional foreign direct investment.

18. Early theories of free trade agreements emphasized trade diversion effects (Viner 1950, Lipsey 1960). Recent work recognizes, however, that economies with significant preagreement trade are "natural trading blocs" and their agreements are likely to lead to more trade creation than trade diversion (Frankel, Stein, and Wei 1995).

previous preferences in TPP markets. Losses are tangible for China, India, and Thailand, which compete with TPP members for TPP markets, and for Korea, because the TPP will erode that country's advantage in US markets under KORUS. But except for Thailand, these losses are small compared with GDPs. Some nonmembers, including the European Union and Hong Kong, experience net gains, in part because of the assumption that TPP provisions liberalize some trade with nonmembers.

Table 3 reports the effects of the TPP on trade and foreign direct investment in 2030. Annual exports for the United States increase by $357 billion or 9.1 percent, and for all TPP countries together by $1,025 billion or 11.5 percent. The pattern of export increases is similar to that of income increases; in dollar values the United States, Japan, Vietnam, and Malaysia lead the list—Japanese, Vietnamese, and Malaysian exports each expand by 20 percent or more. Effects on nonmembers are mixed; some register export gains and others losses. Because import effects are similar to export effects under the normal trade balance assumption, they are not reported.

Inward investment stocks in all TPP countries expand by $446 billion or 3.5 percent over the 2030 baseline, and outward investment stocks by $305 billion or 2 percent. These effects are due partly to GDP growth in different regions, and partly to reductions in investment barriers. The largest recipients of inward FDI due to the TPP are the United States, Canada, Japan, and Malaysia, and the largest sources of outward FDI are the United States, Japan, and the European Union. TPP countries attract more inward investment stocks ($446 billion) than they spend on outward investment stocks ($305 billion), reflecting net investments from the rest of the world due to an improved investment environment. In the analysis of benefits, these investments raise incomes in both investing and host countries.

### Sectoral Trade and Output

Debate about the changing structure of the US economy typically focuses on manufacturing, but many dynamic changes today occur *within* sectors, as innovative and sometimes disruptive firms gain market share. Manufacturing as a whole declined in recent decades (Kehoe, Ruhl, and Steinberg 2013) as demand shifted toward services, technology reduced the demand for labor, and manufacturers abroad, especially in China, became more competitive. US manufacturing in 2014 was a modestly sized, capital-intensive sector accounting for 12 percent of GDP and 9 percent of employment, down from 13 and 11 percent, respectively, a decade earlier.[19] This decline, at least relative to the rest of the economy, is expected to continue regardless of trade policy (Acemoglu et al. 2014).

19. These estimates are based on Bureau of Economic Analysis data, www.bea.gov/iTable/iTable.cfm?ReqID=51&step=1#reqid=51&step=51&isuri=1&5101=1&5114=a&5113=22r&5112=1&5111=2000&5102=1 (accessed on December 20, 2015). The model's sectoral definitions indicate somewhat higher percentages for both value added and employment than BEA data.

Yet US manufacturing also contains dynamic subsectors and firms. Baseline projections show manufacturing value added growing by almost 2 percent annually between 2015 and 2030, only a little slower than US GDP. Reversing a long-established negative trend, baseline manufacturing employment also grows from 12.1 million in 2015 to 12.6 million workers in 2030,[20] although manufacturing's share of the labor force continues to decline from 9 to 8 percent. Advances in the service sector are more broadly based—from financial, computer, and internet services to logistics and entertainment—reflecting high productivity and wide-ranging comparative advantages in this sector in the United States.

Figure 1 presents the effects of the TPP on trade and output in different sectors of the US economy. These shifts describe structural reallocations that ultimately result in higher productivity. They depend, on one hand, on the comparative advantages of different US industries and, on the other hand, on reductions in trade barriers by the United States and its partners. On the export side, the United States has strong comparative advantages in primary goods, advanced manufacturing, and services. Among these industries, the largest reductions in barriers are likely to occur in service sectors. On the import side, foreign producers have comparative advantages in labor-intensive manufactures and in some services and will be able to increase sales as US barriers are gradually removed in sectors such as textiles and apparel.

Figure 1a shows that US exports will increase substantially in durable and nondurable manufacturing industries and in traded services. Export gains are smaller in primary (agricultural and mining) products because this sector is small in the first place and because its products are often exported in processed form as food, beverages, chemicals, and other raw-materials based products. There is even some growth in nontraded services, where exports are limited by natural barriers. Figure 1b shows that imports will expand in similar sectors, bringing more varied and affordable products to US markets. Imports rise more than exports in manufacturing, while exports rise more than imports in primary goods and services, but net trade effects are small compared to gross trade changes, implying substantial opportunities for productive firms in every sector of the economy.[21]

Large or small, export and import effects reverberate through the economy and cause changes in sectoral value added and employment. These effects include indirect channels activated by the demand for intermediate goods for trade as well as demand for products and services stimulated by higher incomes under the TPP. Figure 1c shows the net effects on value-added changes in different sectors. Value-added changes reflect trade effects, as well as the rise in nontraded services due to increased US incomes with the TPP. Since the baseline projects increases in value added in all sectors over time, the changes shown in

20. Projections by the Bureau of Labor statistics assume somewhat higher labor productivity growth and therefore predict a slight decline. See www.bls.gov/emp/ep_table_207.htm.

21. The difference between total exports and imports is unchanged, but reported changes in total exports may not equal those in total imports because the trade balance is fixed in value terms while exports and imports are reported in constant prices.

figure 1c are *relative to the baseline*, not over time. Value added will grow also in manufacturing between 2015 and 2030, but at an annual rate that is slightly slower (1.79 percent vs. 1.85 percent) under the TPP than the baseline.

## Employment

Employment shifts between sectors, and the resulting addition to labor market churn, are of particular interest. Estimates of these shifts are derived by the model from changes in production and the relative prices of different factors of production. The value added changes shown in figure 1c drive the overall demand by industry sectors for primary factors of production—skilled labor, unskilled labor, and capital. While total value added in the economy rises as the economy becomes more productive, total employment does not; the supply of labor is expected to be at normal, long-run levels with or without the TPP. Thus, higher productivity translates into greater demand for labor and drives wages higher.[22]

Figure 2 shows how the TPP will affect the allocation of total employment in the different sectors of the US economy, comparing the growth rate of employment from 2015 to 2030 under the baseline projection and under the TPP. Note first that employment in the primary goods and service sectors grows faster than in manufacturing with or without the TPP, because of trends mentioned earlier. These relatively fast-growing sectors are also the ones that benefit from the TPP, given the structural changes shown in figure 1. The service sectors are very large—they will employ 90 percent of US workers in 2030—so the impact of the TPP is barely visible in their growth rates.

The effects are more clearly discernible, however, in manufacturing. While in absolute terms, employment in manufacturing continues to grow irrespective of the TPP, the agreement dampens the growth rate of manufacturing employment by about one-fifth. In absolute numbers, the lower trajectory of employment growth in manufacturing equals increases in employment in the service and primary goods sectors. More detailed results show 121,000 fewer jobs created in the sector relative to the baseline by 2030.

Structural changes drive up the demand for factors of production that are used in expanding industries. In the case of the United States, the shifts under the TPP favor labor relative to capital, because service sectors are relatively skilled-labor intensive whereas import-competing manufacturing is generally capital and unskilled-labor intensive. As US resources shift from general manufacturing toward traded services and advanced manufacturing, the returns of skilled labor rise. While the TPP increases the returns of all three factors (skilled labor, unskilled labor, and capital) due to increases in productivity, it causes

22. In short-term models wages are often assumed fixed and the supply of labor expands or contracts in response to changes in aggregated demand. In long-term models, such as this one, the labor force is fixed and wages rise or fall in response to demand changes.

wages overall to rise more than returns on capital (0.53 percent vs. 0.39 percent), and the wages of skilled workers, who make up 60 percent of the labor force, to rise more than those of unskilled workers (0.63 percent vs. 0.37 percent).

Structural changes also imply labor market adjustments, and research warns that such adjustments can weigh heavily on some workers (Autor, Dorn, and Hanson 2014). The model's results can be used to estimate the number of jobs affected by the TPP. One approach for constructing this estimate is to count *jobs that are eliminated in one sector and added in another*. This yields an estimate of 189,000 required job shifts by 2030, or 18,900 jobs per year in the ten-year period between 2018 and 2028, when most policy changes associated with the TPP are implemented. This should be thought of as adding to the ongoing flow of employment changes in the US labor market, often described as job churn.

A second approach is to count *all jobs directly displaced by imports.* This is an expansive and possibly unrealistic measure, since it assumes that jobs no longer required for imports will result in layoffs, even in sectors that have offsetting growth due to increased exports or domestic demand. This calculation yields 71,900 job shifts per year. A third approach is to count *all jobs directly and indirectly displaced* by imports, including in supplier firms. This yields 160,700 job shifts per year.[23] Using the middle estimate and subtracting 25.3 percent for voluntary and other separations (from 2014 US data) leaves 53,700 annual additional job changes that will be involuntary and attributable to the TPP during its implementation period. However, such churn takes place on a vast scale in the United States every year in the absence of any further trade liberalization. Given a flow of 55.5 million such job changes in 2014, a broadly typical number outside of a recession, this would be an addition to churn of less than 0.1 percent.

Under normal labor market conditions, most workers displaced by the TPP are, therefore, likely to find new jobs. As Lawrence (2014) notes, however, some may face greater challenges, perhaps because of age or location in an economically depressed area; the costs to those displaced workers could include significant periods of unemployment and/or wage reductions. He estimates those costs in a similar context and finds that they are overshadowed by the agreement's benefits. Lawrence and others (OECD, ILO, WTO, and World Bank 2010) have proposed targeted strategies to support workers who bear the costs; affordable policies to eliminate unfair adjustment burdens appear to be available.

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23. These estimates are based on results not reported in this paper. They are derived using the input-output tables that form the core of the simulations model (and are derived from the GTAP 9 data system) to find displacements in industries that supply intermediate input to import-competing industries. The first calculation may underestimate the number of workers who leave jobs, while the last will almost certainly overestimate it. The low estimate does not include intrasectoral job shifts that may result in difficult transitions, while the high estimate also includes shifts that may have no effect other than changing client to whom a given product or service is sold.

### Contributions of TPP Liberalization Components

Figure 3a divides the gains associated with the TPP into the separate effects of the liberalization of tariffs, NTBs, and FDI barriers. Each component includes gains from an economy's own policy actions as well as liberalization by partners. All components contribute positively in nearly all member economies.

Despite the nearly complete elimination of tariffs, tariff liberalization accounts for only 12 percent of the benefits of all TPP members, and an even smaller share for the United States. The liberalization of goods NTBs makes the biggest contribution; goods trade is the key link among TPP economies and NTBs are higher than tariffs in most sectors. Goods liberalization is especially important for Japan, Malaysia, Mexico, and Vietnam. For some advanced economies the liberalization of service NTBs and FDI is also important, accounting for more than half of the gains in Australia, Canada, Singapore, and the United States, and nearly half for Japan.

Figure 3b focuses on nonmembers. Economies that lose from the TPP (on the right-hand side of the chart) do so mainly because of goods provisions, and those that benefit (on the left-hand side of the chart) do so because of service and FDI provisions. Nonmembers that compete in the goods sectors face a tough challenge, because many TPP members are also competitive in the goods sector. There is less international competition within the TPP in services (the United States is the only dominant exporter), and the nonpreferential portion of service liberalization by the United States thus favors external service exporters such as the European Union.

The sizes of components highlight the challenges of next-generation trade agreements. Given large reductions in tariffs in the past, even agreements that eliminate virtually all tariffs need to focus on other barriers to deliver meaningful benefits. The TPP appears to have done so, with 12 percent of the gains of all members derived from tariff reductions, 43 percent from reductions in goods NTBs, 25 percent from reductions in service NTBs, and 20 percent from reductions in investment barriers.

## 5. ADDITIONAL ESTIMATES

Uncertainties are inevitable in modeling, but some assumptions have an especially significant impact on the results. This section explores the effects of critical assumptions, and box 2 compares our results with others that have appeared since our earlier publications.

### High and Low Scenarios

Table 4 reports alternative scenarios with more pessimistic and optimistic assumptions about economic growth, the size of NTB reductions, and the percentage of tariff cuts that are utilized by firms. The low scenario lies further below the central scenario than the upside scenario lies above it; several parameters could fall well below expectations (for example, projected global growth rates are still above historical

**Box 2 Estimates of the effects of the TPP by other researchers**

Since our 2012 study, several other estimates of the effects of the TPP have been published. Despite inevitable differences, the estimates are broadly similar.

Some studies examine the overall agreement. Inkyo Cheong and Jose Tongzon (2013) find that the TPP would have no significant effects, in contrast to significant gains in most other estimates. However, they model only tariff reductions and assume more prior tariff liberalization among members than is likely to have occurred. Hiro Lee and Ken Itakura (2014) represent the TPP with a 20 percent cut in service NTBs and estimate income gains of 0.8 percent for Australia, Canada, Japan, Mexico, and the United States vs. 0.9 percent in this study. Using a similar methodology, Kenichi Kawasaki (2014) estimates annual gains of 1.8 percent of GDP for TPP members vs. 1.1 percent in this study. His estimates assume that 50 percent of TPP liberalization is nonpreferential, rather than 20 percent in this study.

Other studies focus on individual TPP members. Mary Burfisher et al. (2014) focus on US agriculture and find that tariff reductions would not have significant macroeconomic effects. A study for Vietnam by the World Bank (forthcoming) estimates that the TPP will increase Vietnamese GDP by 8.1 percent by 2035 vs. 8.1 percent for 2030 in this study. Anna Strutt, Peter Minor, and Allan Rae (2015) analyze results for New Zealand and estimate a GDP increase of 1.4 percent vs. 2.2 percent in this study. PWC (2015) projects large benefits for Malaysia, as does this study, but does not report results that can be directly compared. Finally, Japan's Cabinet Secretariat projects a Japanese GDP increase of 2.6 percent vs. 2.5 percent in this study, albeit with a different mix of assumptions.[1]

1. See Japan's Cabinet Secretariat, www.cas.go.jp/jp/tpp/kouka/index.html.

averages) but sharp improvements in the performance of the global economy or in policy are less likely. The low scenario estimates the income effects of all TPP members at 67 percent of the central estimate, and the high scenario at 113 percent of the central scenario. US results range from 70 to 109 percent, varying somewhat less than average. Countries with larger gains (Japan, Malaysia, and Vietnam) are exposed to greater variations. Effects on nonmembers vary most in percentage terms, but bracket smaller central estimates.

## Nonpreferential Liberalization

Twenty percent of NTBs are assumed to be reduced on a nonpreferential basis increasing estimated gains for TPP members and especially nonmembers. Table B.1 (in appendix B) shows that, without this component, estimated gains from the TPP would be 30 percent lower for the United States and 21 percent lower for all TPP members. For the United States, service liberalization is important in this context, because it stimulates additional trade with the European Union.

Evidence from past studies and conversations with business experts, academics and negotiators suggest that nonpreferential liberalization is an unavoidable and useful byproduct of next-generation trade agreements, although more research is needed to improve the measurement of its scope and the assessment of its impacts.

### Delay of TPP Implementation

As the TPP awaits ratification, the timing of its implementation is uncertain. The central results assume EIF in 2017. In an alternative simulation, we repeat the TPP experiment but delay the launch of implementation—the start of staged reductions of trade barriers—to 2018, keeping other assumptions unchanged.

In the simulation of a one-year delay, the benefits in every future year are lower than in the central scenario with EIF in 2017. Given that gains consist of a stream of future benefits, the "value" of the agreement can be calculated as a present value, the discounted sum of future benefits. This is similar to the calculation a business would apply in determining the value of an investment project. Table 5 shows the present value of the TPP with several plausible discount rates, ranging from $961 billion to $2,316 billion for the United States if the TPP is implemented in 2017, and across lower values if it is delayed. A one-year delay thus results in permanent losses from $77 billion to $123 billion for the United States and $308 billion to $525 billion for the world.

Delaying the TPP could generate still further, unquantified risks for the conduct of US commercial diplomacy. Given political uncertainties in many TPP member economies, some that are prepared to ratify the TPP now may be unwilling to do so later, and in that case the benefits to be realized will shrink. The benefits might be also reduced if, while waiting, TPP members choose to advance alternative free trade arrangements to hedge their bets. And other trade and investment initiatives that the United States is or could be involved in—including high-valued negotiations with Europe and on the enlargement of the TPP itself—would have to be delayed or possibly abandoned, with corresponding costs.

## 6. CONCLUSIONS

The TPP appears to have met its two most important negotiating objectives. First, based on the concluded agreement and more recent data and assumptions, the TPP will substantially benefit its members, and in particular raise real incomes in the United States by $131 billion in 2030 and a similar amount in subsequent years. To be sure, the TPP will also generate adjustment costs; some workers may face difficult transitions as less productive jobs are lost and more productive jobs are created. Policies to mitigate those effects are ethically compelling (Weisman 2016) and likely to be affordable.

Second, the TPP has developed comprehensive rules for economic integration in areas of commerce that have raced far ahead of the WTO rulebook, including services, investment, telecommunications, the digital economy, and other critical industries. If the TPP is ratified and implemented smoothly, these rules will renew progress—now stalled for more than two decades—in strengthening the world trading system.

The estimates presented here for the United States are 35 percent higher than those reported in Petri, Plummer, and Zhai (2012). "News" from the concluded agreement is not the main cause of this

difference; while the agreement's tariff reductions are more ambitious than the earlier study anticipated, provisions that affect NTBs are weaker, so taking the concluded agreement into account reduces benefits slightly. There are two reasons the results are higher than projected in 2012: first, data on nontariff barriers (based on work by other researchers) are higher than those we used in 2012, perhaps because NTBs are rising or because estimates are becoming more accurate, and second, the present study takes into account the effect of nonpreferential provisions in the TPP agreement. Both effects enhance the value of reducing trade barriers via the TPP.

Once in place, the TPP is likely to promote additional integration in the Asia-Pacific region and beyond, with larger attendant gains. It is potentially a pathway to the Free Trade Area of the Asia-Pacific (FTAAP), which could include all APEC members and, based on our earlier studies, more than double the gains for the United States. The Transatlantic Trade and Investment Partnership, in negotiation since 2013, would also have large effects. And broader global negotiations may pick up steam. These and other initiatives would benefit from competitive pressure from the TPP.

This study, like the earlier work, addresses only economic issues, although of course geopolitical factors are also at stake. The TPP is a key element of the US rebalancing strategy toward the Asia Pacific. The United States has had close economic and political relations with this region, for 70 years or more with some countries, and deeper economic ties and political stability in the Asia Pacific are among its core interests.

Given the scope and complexity of topics addressed, the diversity of the negotiating parties, and the backdrop of inaction on urgent trade issues, the TPP is a notable accomplishment. It is a substantial positive response to slowing world trade growth and rising trade barriers, and a major contribution toward a rules-based global economy.

**Table 1 Trade barriers between the United States and TPP partners** (percent, including ad valorem equivalent percent for nontariff barriers)

| | US barriers on imports | | | | Foreign barriers on US exports | | | |
|---|---|---|---|---|---|---|---|---|
| | 2015 | 2020 | 2025 | 2030 | 2015 | 2020 | 2025 | 2030 |
| **Sector** | **Tariffs** | | | | | | | |
| **Primary products** | | | | | | | | |
| Grains | 0.0 | 0.0 | 0.0 | 0.0 | 4.8 | 0.3 | 0.3 | 0.3 |
| Other agriculture | 0.1 | 0.0 | 0.0 | 0.0 | 1.9 | 0.5 | 0.4 | 0.3 |
| Mining | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Manufacturing** | | | | | | | | |
| Food, beverages, tobacco | 1.0 | 0.4 | 0.4 | 0.3 | 8.9 | 1.4 | 0.9 | 0.8 |
| Textiles | 3.8 | 1.7 | 0.9 | 0.3 | 0.6 | 0.1 | 0.1 | 0.1 |
| Apparel and footwear | 11.2 | 4.8 | 3.2 | 0.7 | 3.9 | 0.3 | 0.3 | 0.3 |
| Chemicals | 0.6 | 0.1 | 0.1 | 0.1 | 0.3 | 0.1 | 0.1 | 0.1 |
| Metals | 0.2 | 0.0 | 0.0 | 0.0 | 0.2 | 0.1 | 0.1 | 0.0 |
| Computers and electronics | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Machinery | 0.3 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.0 | 0.0 |
| Transport equipment | 0.2 | 0.1 | 0.1 | 0.1 | 0.3 | 0.1 | 0.1 | 0.1 |
| Other manufacturing | 0.2 | 0.0 | 0.0 | 0.0 | 0.4 | 0.2 | 0.1 | 0.1 |
| **Total (goods)** | **0.6** | **0.2** | **0.2** | **0.1** | **1.0** | **0.2** | **0.1** | **0.1** |
| | **Nontariff barriers** | | | | | | | |
| **Primary products** | | | | | | | | |
| Grains | 10.6 | 10.0 | 9.5 | 9.0 | 22.5 | 20.1 | 18.1 | 17.0 |
| Other agriculture | 5.0 | 4.4 | 3.9 | 3.6 | 10.3 | 8.9 | 7.5 | 6.9 |
| Mining | 1.0 | 0.9 | 0.8 | 0.8 | 2.5 | 2.4 | 2.3 | 2.1 |
| **Manufacturing** | | | | | | | | |
| Food, beverages, tobacco | 8.2 | 7.2 | 6.1 | 5.7 | 15.5 | 13.7 | 11.9 | 11.1 |
| Textiles | 17.9 | 14.1 | 10.7 | 9.6 | 5.8 | 5.4 | 4.5 | 3.5 |
| Apparel and footwear | 13.1 | 9.3 | 5.0 | 3.9 | 6.2 | 5.3 | 3.5 | 2.7 |
| Chemicals | 1.6 | 1.4 | 1.1 | 0.9 | 3.6 | 3.0 | 2.5 | 2.1 |
| Metals | 0.0 | 0.0 | 0.0 | 0.0 | 2.4 | 2.3 | 2.1 | 1.9 |
| Computers and electronics | 0.7 | 0.6 | 0.5 | 0.5 | 5.9 | 4.8 | 3.7 | 3.3 |
| Machinery | 3.4 | 2.9 | 2.4 | 2.2 | 5.4 | 4.7 | 4.1 | 3.7 |
| Transport equipment | 2.6 | 2.4 | 2.2 | 2.1 | 2.8 | 2.6 | 2.3 | 2.1 |
| Other manufacturing | 1.3 | 1.1 | 0.9 | 0.8 | 2.3 | 2.0 | 1.8 | 1.5 |
| **Services** | | | | | | | | |
| Utilities | 1.3 | 1.3 | 1.2 | 1.1 | 1.2 | 1.2 | 1.1 | 1.0 |
| Construction | 55.5 | 46.5 | 36.8 | 33.6 | 20.5 | 17.2 | 13.7 | 12.5 |
| Trade and transportation | 23.5 | 20.9 | 17.9 | 15.9 | 25.7 | 22.3 | 18.5 | 16.4 |
| Communications | 11.0 | 9.7 | 8.2 | 7.3 | 17.5 | 15.7 | 13.4 | 11.9 |
| Finance | 26.3 | 23.2 | 20.1 | 18.7 | 21.6 | 19.2 | 16.2 | 14.3 |
| Business services | 20.2 | 17.9 | 14.9 | 13.2 | 23.2 | 18.8 | 13.8 | 12.2 |
| Social services | 4.8 | 4.2 | 3.5 | 3.3 | 20.3 | 17.9 | 15.5 | 14.4 |
| **Total (goods and services)** | **4.1** | **3.6** | **3.0** | **2.7** | **7.9** | **6.9** | **5.8** | **5.3** |

*Sources:* Authors' calculations and data sources listed in appendix A.

**Table 2 Real income effects of the TPP**

| | Baseline (billions of 2015 dollars) | | | | Change with TPP (billions of 2015 dollars) | | | Percent change from baseline | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Country** | **2015** | **2020** | **2025** | **2030** | **2020** | **2025** | **2030** | **2020** | **2025** | **2030** |
| **Americas** | **21,962** | **25,177** | **28,473** | **31,544** | **41** | **129** | **205** | **0.2** | **0.5** | **0.7** |
| Canada* | 1,981 | 2,227 | 2,472 | 2,717 | 8 | 22 | 37 | 0.4 | 0.9 | 1.3 |
| Chile* | 269 | 329 | 397 | 463 | 0 | 2 | 4 | 0.1 | 0.5 | 0.9 |
| Mexico* | 1,339 | 1,598 | 1,868 | 2,169 | 3 | 11 | 22 | 0.2 | 0.6 | 1.0 |
| Peru* | 219 | 287 | 363 | 442 | 1 | 6 | 11 | 0.4 | 1.6 | 2.6 |
| United States* | 18,154 | 20,736 | 23,372 | 25,754 | 29 | 88 | 131 | 0.1 | 0.4 | 0.5 |
| **Asia** | **22,806** | **29,752** | **38,179** | **47,386** | **52** | **135** | **203** | **0.2** | **0.4** | **0.4** |
| Brunei* | 20 | 24 | 27 | 31 | 0 | 1 | 2 | 1.1 | 3.3 | 5.9 |
| China | 11,499 | 16,058 | 21,689 | 27,839 | –1 | –8 | –18 | 0.0 | 0.0 | –0.1 |
| Hong Kong | 300 | 358 | 412 | 461 | 2 | 4 | 6 | 0.5 | 1.0 | 1.2 |
| India | 2,210 | 3,086 | 4,197 | 5,487 | 0 | –2 | –5 | 0.0 | –0.1 | –0.1 |
| Indonesia | 927 | 1,240 | 1,687 | 2,192 | 0 | –1 | –2 | 0.0 | –0.1 | –0.1 |
| Japan* | 4,214 | 4,462 | 4,693 | 4,924 | 39 | 91 | 125 | 0.9 | 1.9 | 2.5 |
| Korea | 1,384 | 1,672 | 1,967 | 2,243 | –1 | –5 | –8 | –0.1 | –0.2 | –0.3 |
| Malaysia* | 349 | 444 | 553 | 675 | 7 | 28 | 52 | 1.6 | 5.0 | 7.6 |
| Philippines | 329 | 436 | 547 | 680 | 0 | –1 | –1 | 0.0 | –0.1 | –0.1 |
| Singapore* | 320 | 380 | 437 | 485 | 2 | 8 | 19 | 0.5 | 1.9 | 3.9 |
| Taiwan | 511 | 619 | 707 | 776 | 0 | 1 | 1 | 0.1 | 0.1 | 0.2 |
| Thailand | 411 | 516 | 656 | 812 | –1 | –4 | –7 | –0.2 | –0.6 | –0.8 |
| Vietnam* | 209 | 281 | 378 | 497 | 7 | 22 | 41 | 2.3 | 5.8 | 8.1 |
| ASEAN nie | 124 | 175 | 228 | 283 | 0 | –1 | –1 | –0.1 | –0.2 | –0.4 |
| **Oceania** | **1,896** | **2,203** | **2,533** | **2,854** | **2** | **12** | **21** | **0.1** | **0.5** | **0.7** |
| Australia* | 1,704 | 1,986 | 2,292 | 2,590 | 1 | 8 | 15 | 0.0 | 0.4 | 0.6 |
| New Zealand* | 192 | 217 | 241 | 264 | 1 | 4 | 6 | 0.5 | 1.5 | 2.2 |
| **Rest of world** | **34,371** | **39,492** | **45,506** | **52,017** | **16** | **44** | **62** | **0.0** | **0.1** | **0.1** |
| European Union | 17,893 | 19,746 | 21,451 | 23,189 | 12 | 34 | 48 | 0.1 | 0.2 | 0.2 |
| Russia | 2,244 | 2,462 | 2,903 | 3,371 | 0 | 1 | 2 | 0.0 | 0.0 | 0.1 |
| ROW | 14,235 | 17,283 | 21,152 | 25,456 | 3 | 8 | 12 | 0.0 | 0.0 | 0.0 |
| **World** | **81,035** | **96,623** | **114,690** | **133,801** | **111** | **319** | **492** | **0.1** | **0.3** | **0.4** |
| *Memorandum* | | | | | | | | | | |
| TPP members | 28,969 | 32,971 | 37,094 | 41,011 | 98 | 291 | 465 | 0.3 | 0.8 | 1.1 |
| Non-members | 52,066 | 63,652 | 77,596 | 92,790 | 13 | 28 | 27 | 0.0 | 0.0 | 0.0 |

ASEAN = Association of Southeast Asian Nations; nie = not included elsewhere; ROW = rest of world

Note: Asterisk denotes TPP member.

*Source:* Authors' simulations.

**Table 3 Trade and investment effects of the TPP** (billions of 2015 dollars)

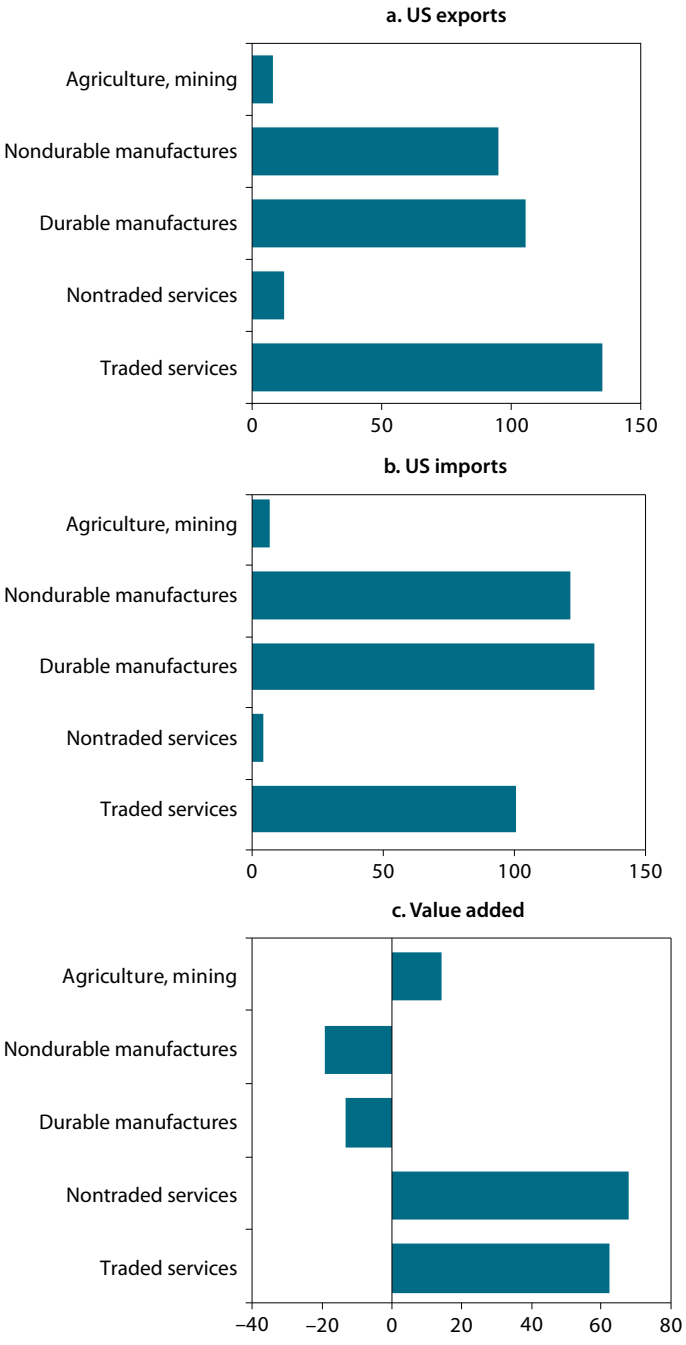
| | Exports | | | | Inward FDI stocks | | | | Outward FDI stocks | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline | | TPP in 2030 | | Baseline | | TPP in 2030 | | Baseline | | TPP in 2030 | |
| **Country** | **2015** | **2030** | **Change** | **Percent** | **2015** | **2030** | **Change** | **Percent** | **2015** | **2030** | **Change** | **Percent** |
| **Americas** | **3,274** | **5,693** | **469** | **8.2** | **5,792** | **9,348** | **250** | **2.7** | **7,028** | **11,768** | **169** | **1.4** |
| Canada* | 560 | 835 | 58 | 7.0 | 934 | 1,487 | 107 | 7.2 | 851 | 1,383 | 16 | 1.2 |
| Chile* | 87 | 147 | 8 | 5.3 | 149 | 281 | 0 | 0.0 | 54 | 114 | 2 | 1.7 |
| Mexico* | 396 | 670 | 32 | 4.7 | 424 | 774 | 8 | 1.1 | 141 | 265 | 2 | 0.6 |
| Peru* | 46 | 135 | 14 | 10.3 | 49 | 117 | 7 | 5.8 | 2 | 5 | 0 | 3.9 |
| United States* | 2,184 | 3,906 | 357 | 9.1 | 4,236 | 6,690 | 128 | 1.9 | 5,980 | 10,002 | 149 | 1.5 |
| **Asia** | **6,168** | **12,095** | **509** | **4.2** | **6,788** | **16,055** | **220** | **1.4** | **5,152** | **11,931** | **140** | **1.2** |
| Brunei* | 10 | 16 | 1 | 9.0 | 0 | 0 | 0 | 11.3 | 7 | 18 | 1 | 3.3 |
| China | 2,339 | 4,976 | 9 | 0.2 | 3,078 | 8,153 | 19 | 0.2 | 750 | 2,064 | 8 | 0.4 |
| Hong Kong | 199 | 357 | 4 | 1.0 | 1,452 | 3,069 | 8 | 0.3 | 2,253 | 5,485 | 15 | 0.3 |
| India | 488 | 1,360 | 1 | 0.1 | 322 | 999 | 1 | 0.1 | 119 | 359 | 2 | 0.6 |
| Indonesia | 205 | 446 | –4 | –1.0 | 233 | 621 | 5 | 0.8 | 22 | 58 | 1 | 1.1 |
| Japan* | 849 | 1,190 | 276 | 23.2 | 222 | 310 | 92 | 29.8 | 983 | 1,575 | 63 | 4.0 |
| Korea | 623 | 1,089 | –11 | –1.0 | 177 | 327 | 1 | 0.2 | 277 | 628 | 2 | 0.3 |
| Malaysia* | 261 | 491 | 99 | 20.1 | 128 | 279 | 48 | 17.2 | 140 | 345 | 24 | 7.0 |
| Philippines | 74 | 184 | –1 | –0.4 | 60 | 145 | 1 | 0.5 | 13 | 38 | 0 | 0.3 |
| Singapore* | 304 | 470 | 35 | 7.5 | 847 | 1,555 | 28 | 1.8 | 450 | 1,018 | 23 | 2.2 |
| Taiwan | 348 | 506 | 4 | 0.8 | 41 | 69 | 0 | 0.7 | 69 | 155 | 1 | 0.7 |
| Thailand | 275 | 561 | –9 | –1.6 | 176 | 386 | 1 | 0.2 | 66 | 179 | 1 | 0.4 |
| Vietnam* | 161 | 357 | 107 | 30.1 | 40 | 108 | 16 | 14.4 | 2 | 4 | 0 | 7.2 |
| ASEAN nie | 31 | 93 | –3 | –2.8 | 11 | 33 | 0 | 0.1 | 2 | 6 | 0 | 0.7 |
| **Oceania** | **349** | **673** | **38** | **5.6** | **699** | **1,194** | **12** | **1.0** | **443** | **802** | **24** | **3.0** |
| Australia* | 296 | 589 | 29 | 4.9 | 609 | 1,049 | 10 | 0.9 | 414 | 751 | 23 | 3.0 |
| New Zealand* | 53 | 84 | 9 | 10.2 | 90 | 145 | 2 | 1.4 | 30 | 51 | 2 | 3.2 |
| **Rest of world** | **11,784** | **17,689** | **91** | **0.5** | **23,745** | **37,846** | **65** | **0.2** | **24,401** | **39,942** | **213** | **0.5** |
| European Union | 7,472 | 9,706 | 49 | 0.5 | 17,526 | 26,052 | 48 | 0.2 | 19,780 | 30,566 | 169 | 0.6 |
| Russia | 575 | 851 | 5 | 0.5 | 660 | 1,078 | 1 | 0.1 | 502 | 821 | 2 | 0.2 |
| ROW | 3,736 | 7,132 | 37 | 0.5 | 5,559 | 10,716 | 17 | 0.2 | 4,119 | 8,555 | 41 | 0.5 |
| **World** | **21,575** | **36,149** | **1,106** | **3.1** | **37,025** | **64,443** | **547** | **0.8** | **37,025** | **64,443** | **547** | **0.8** |
| *Memorandum* | | | | | | | | | | | | |
| TPP members | 5,208 | 8,890 | 1,025 | 11.5 | 7,730 | 12,794 | 446 | 3.5 | 9,053 | 15,530 | 305 | 2.0 |
| Nonmembers | 16,366 | 27,260 | 81 | 0.3 | 29,295 | 51,649 | 101 | 0.2 | 27,972 | 48,913 | 242 | 0.5 |

ASEAN = Association of Southeast Asian Nations; FDI = foreign direct investment; nie = not included elsewhere; ROW = rest of world

Note: Asterisk denotes TPP member.

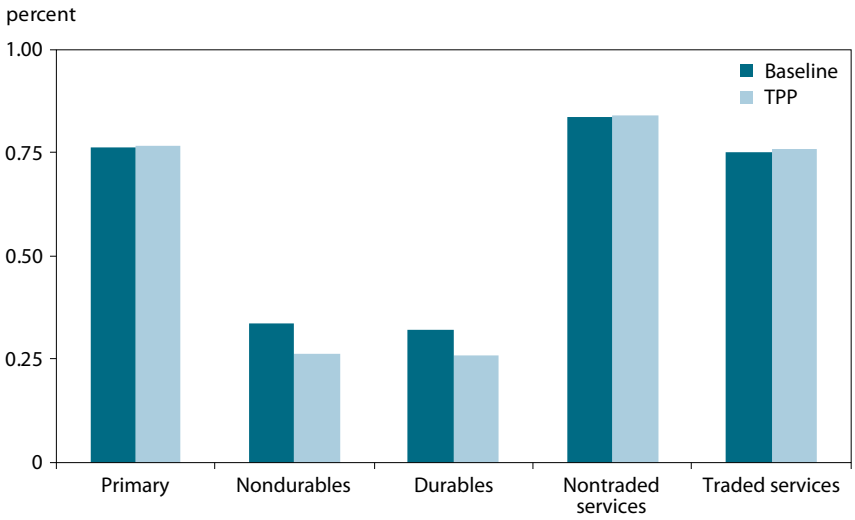
*Source:* Authors' simulations.

**Figure 1** **US trade and output under the TPP: Changes relative to the baseline in 2030** (billions of 2015 dollars)



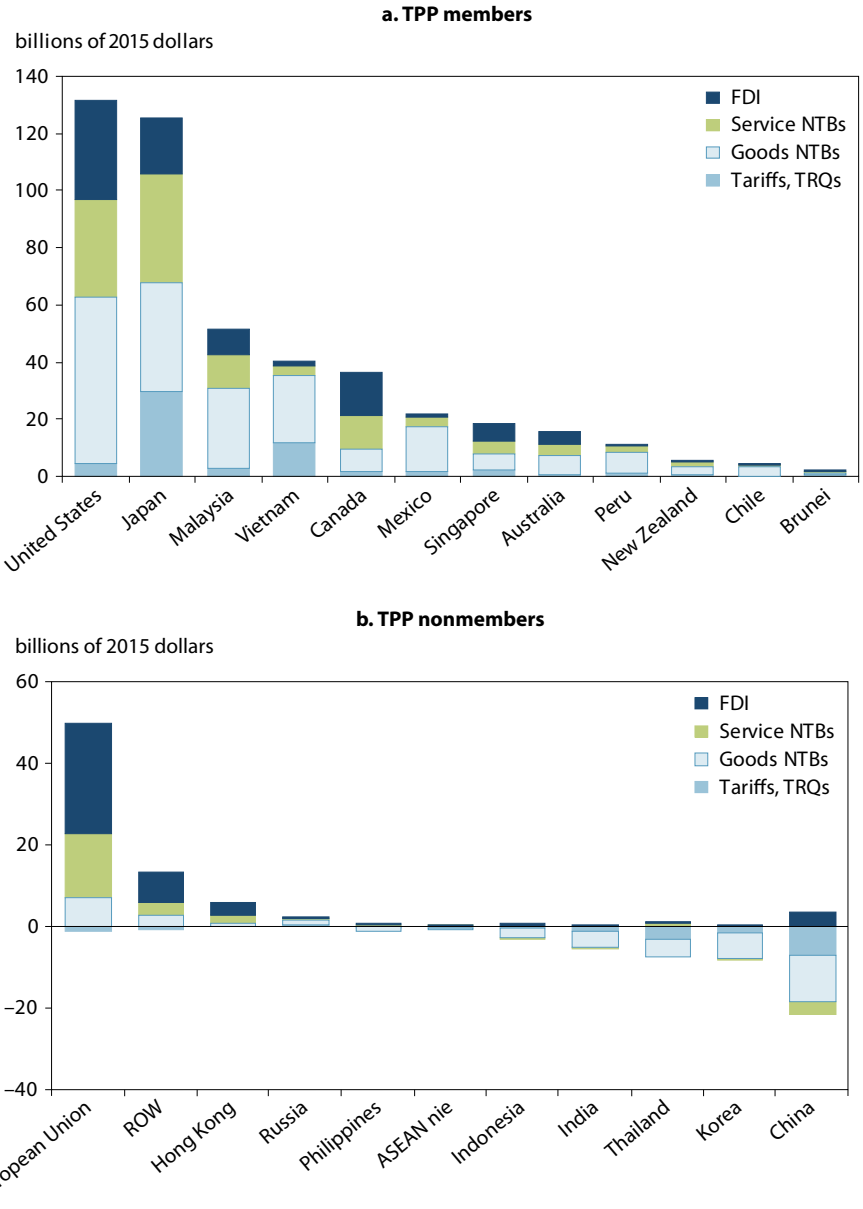

*Source:* Authors' simulations.

**Figure 2 Employment growth rates with and without the TPP, by sector, 2015–30**




*Source:* Authors' simulations.

**Figure 3 TPP income effects and their composition, 2030**




ASEAN = Association of Southeast Asian Nations; FDI = foreign direct investment; nie = not included elsewhere; NTBs = nontariff barriers; ROW = rest of world; TRQs = tariff rate quotas

*Source:* Authors' simulations.

**Table 4 Low and high estimates of the income effects of the TPP, 2030**

| | Baseline 2030 (billions of 2015 dollars) | | | TPP income effect 2030 (billions of 2015 dollars) | | | Percent change from baseline 2030 | | |
|---|---|---|---|---|---|---|---|---|---|
| **Country** | **Low** | **Central** | **High** | **Low** | **Central** | **High** | **Low** | **Central** | **High** |
| **Americas** | **29,355** | **31,544** | **32,697** | **139** | **205** | **218** | **0.5** | **0.7** | **0.7** |
| Canada* | 2,552 | 2,717 | 2,804 | 25 | 37 | 37 | 1.0 | 1.3 | 1.3 |
| Chile* | 416 | 463 | 488 | 2 | 4 | 4 | 0.5 | 0.9 | 0.9 |
| Mexico* | 1,972 | 2,169 | 2,274 | 13 | 22 | 21 | 0.7 | 1.0 | 0.9 |
| Peru* | 385 | 442 | 473 | 6 | 11 | 13 | 1.6 | 2.6 | 2.7 |
| United States* | 24,030 | 25,754 | 26,658 | 92 | 131 | 143 | 0.4 | 0.5 | 0.5 |
| **Asia** | **40,852** | **47,386** | **51,046** | **144** | **203** | **244** | **0.4** | **0.4** | **0.5** |
| Brunei* | 28 | 31 | 33 | 1 | 2 | 2 | 4.4 | 5.9 | 6.2 |
| China | 23,425 | 27,839 | 30,326 | –9 | –18 | –20 | 0.0 | –0.1 | –0.1 |
| Hong Kong | 423 | 461 | 481 | 4 | 6 | 6 | 1.1 | 1.2 | 1.2 |
| India | 4,595 | 5,487 | 5,991 | –2 | –5 | –6 | –0.1 | –0.1 | –0.1 |
| Indonesia | 1,853 | 2,192 | 2,383 | –1 | –2 | –2 | –0.1 | –0.1 | –0.1 |
| Japan* | 4,774 | 4,924 | 5,001 | 92 | 125 | 156 | 1.9 | 2.5 | 3.1 |
| Korea | 2,039 | 2,243 | 2,352 | –4 | –8 | –9 | –0.2 | –0.3 | –0.4 |
| Malaysia* | 593 | 675 | 720 | 31 | 52 | 57 | 5.2 | 7.6 | 7.9 |
| Philippines | 590 | 680 | 729 | –1 | –1 | –1 | –0.1 | –0.1 | –0.1 |
| Singapore* | 447 | 485 | 506 | 9 | 19 | 20 | 2.0 | 3.9 | 4.0 |
| Taiwan | 715 | 776 | 809 | 1 | 1 | 2 | 0.2 | 0.2 | 0.2 |
| Thailand | 710 | 812 | 868 | –4 | –7 | –7 | –0.6 | –0.8 | –0.8 |
| Vietnam* | 420 | 497 | 541 | 27 | 41 | 47 | 6.4 | 8.1 | 8.7 |
| ASEAN nie | 241 | 283 | 307 | –1 | –1 | –1 | –0.3 | –0.4 | –0.4 |
| **Oceania** | **2,632** | **2,854** | **2,971** | **13** | **21** | **24** | **0.5** | **0.7** | **0.8** |
| Australia* | 2,384 | 2,590 | 2,699 | 9 | 15 | 17 | 0.4 | 0.6 | 0.6 |
| New Zealand* | 248 | 264 | 273 | 4 | 6 | 8 | 1.5 | 2.2 | 2.8 |
| **Rest of world** | **47,808** | **52,017** | **54,273** | **51** | **62** | **70** | **0.1** | **0.1** | **0.1** |
| European Union | 22,025 | 23,189 | 23,793 | 39 | 48 | 54 | 0.2 | 0.2 | 0.2 |
| Russia | 3,110 | 3,371 | 3,509 | 2 | 2 | 2 | 0.1 | 0.1 | 0.1 |
| ROW | 22,673 | 25,456 | 26,972 | 10 | 12 | 13 | 0.0 | 0.0 | 0.0 |
| **World** | **120,647** | **133,801** | **140,987** | **346** | **492** | **556** | **0.3** | **0.4** | **0.4** |
| *Memorandum* | | | | | | | | | |
| TPP members | 38,248 | 41,011 | 42,468 | 312 | 465 | 525 | 0.8 | 1.1 | 1.2 |
| Nonmembers | 82,399 | 92,790 | 98,519 | 34 | 27 | 31 | 0.0 | 0.0 | 0.0 |

ASEAN = Association of Southeast Asian Nations; nie = not included elsewhere; ROW = rest of world

Note: Asterisk denotes TPP member. The central scenario is from table 2. The low scenario assumes 20 percent smaller growth rates, reductions in nontariff barriers, and use of tariff preferences. The high scenario assumes 10 percent higher growth rates and tariff use rates, and 2012 (preadjustment) assumptions for TPP provisions.

*Source:* Authors' simulations.

**Table 5 Present value of the TPP in 2015** (billions of 2015 dollars)

| | Discount rate | | |
|---|---|---|---|
| | **3 percent** | **5 percent** | **7 percent** |
| For the United States | | | |
| Present value of TPP, EIF in 2017 | 2,316 | 1,423 | 961 |
| Present value of TPP, EIF in 2018 | 2,193 | 1,328 | 884 |
| Effect of delay | –123 | –94 | –77 |
| For the world | | | |
| Present value of TPP, EIF in 2017 | 8,637 | 5,302 | 3,582 |
| Present value of TPP, EIF in 2018 | 8,112 | 4,914 | 3,275 |
| Effect of delay | –525 | –388 | –308 |

EIF = entry into force

Note: Based on real income gains calculated under the TPP. After 2030, real income gains are assumed to be 2030 gains, declining by 2 percent annually. An earlier version of this table reported results based only on trade-related real income gains. This corrected version, as other estimates of gains reported in this paper, includes both trade- and foreign investment–related income gains.

*Source:* Authors' simulations.

## APPENDIX A THE COMPUTABLE GENERAL EQUILIBRIUM MODEL

Computable general equilibrium (CGE) analysis of the TPP accounts for interactions among firms, households, and governments in multiple product markets in several regions of the world economy. Firms and consumers are assumed to maximize profits and welfare subject to prices. The model, built from the GTAP 9 database and other data sources and calibrated to yield an initial solution that matches 2015 data, calculates prices that equate supply and demand for each product and factor of production in every market. As with most CGE models, it represents medium- and long-term changes and assumes normal employment; it does not incorporate features to analyze macroeconomic fluctuations. Table A.1 summarizes data sources and also reports on changes since the 2012 study.

The CGE model used for this analysis has 19 sectors and 29 regions and is based on the theoretical specification of Fan Zhai (2008). Zhai's approach draws on Melitz (2003) and other work that recognizes heterogeneity in firms' productivity within sectors. Exports require additional fixed costs, which only the most productive firms can cover. Trade liberalization not only affects intersectoral specialization but also shifts the distribution of firms within sectors toward those that are most productive, raising sectoral productivity. This specification generates more trade than conventional CGE analysis and helps to remedy a source of underestimation in earlier CGE studies.

Simulations track changes in saving rates and capital accumulation over time. However, the model does not include other dynamic features proposed in the literature, such as endogenous productivity growth from the accumulation of knowledge, induced inflows of foreign technology and capital, and follow-up trade liberalization from further agreements. Such effects could sharply raise estimated benefits (Todo 2013). The model is described in Petri, Plummer, and Zhai (2012) and at www.asiapacifictrade.org.

Trade agreements are represented in unusual detail. A template is specified for each agreement, consisting of 0–100 scores in 21 issue areas to represent how fully the agreement addresses each. These scores are based on WTO and APEC data, the latter of which break past agreements into 1,500 possible provisions. Template scores are mapped into changes in trade barriers in each sector. The same method is used to predict the effects of both new and past agreements incorporated into the baseline. As table A.1 shows, tariff liberalization schedules are available from the TPP agreement. The model recognizes that free trade agreements, particularly smaller ones, are not completely utilized by firms (based on a formula that relates use rates to preference margins, the restrictiveness of ROO, and the size of the agreement) and includes estimates for extra production costs as firms adjust sourcing patterns to meet ROO requirements.

Nontariff barriers are adjusted by four factors before the simulations. First, only three-quarters of measured barriers are considered actual trade barriers (the rest are assumed to represent quality-increasing regulations). Second, half of remaining barriers are considered actionable in the case of services and three-quarters in the case of goods (the rest are assumed to be beyond the reach of politically viable

trade policies). Third, a share of actionable barriers is eliminated in each sector based on an agreement's template. Fourth, 20 percent of reductions in NTBs and investment barriers are applied to trade partners that are not members of the agreement. All NTBs are assumed to result equally from tariff-like mechanisms that create rents and cost-increasing requirements that create inefficiencies. Foreign direct investment barriers are handled using a similar methodology.

**Table A.1 Data sources of the Asia-Pacific trade model**

| Type of parameter | Data sources, 2015 |
|---|---|
| Model dimensions | 19 sectors, 29 regions |
| Population growth | Exogenous. IIASA scenario for 2015-30. Replaced 2010 CEPII projections |
| Baseline GDP growth | Exogenous. World Bank, Global Economic Prospects projections to 2017, SSP2 scenario from 2020-30, interpolated rates 2018-19. Additional World Bank projections for China and Vietnam. Replaced 2010 CEPII projections |
| Baseline investment/GDP rates | Exogenous in baseline, endogenous in simulations. World Bank Global Economic Prospects to 2017; difference between country rates and global average reduced 5 percent annually after 2017. Replaced 2010 CEPII projections |
| Labor force growth (skilled and unskilled) | Exogenously determined. Growth rates of IIASA population scenario multiplied by CEPII rates of economically active population. Replaced 2010 CEPII projections |
| Trade balance projections | Exogenous. Global Economic Prospects current account projections to 2017 less nontrade balances from IMF balance of payments projections (BOP), reduced 5 percent annually after 2017. Replaced assumption of fixed 2010 imbalances |
| Bilateral FDI stocks | Base year data from IMF Coordinated Direct Investment Survey, 2013 (CDIS), updated from 2010. Endogenously determined in simulations |
| CGE parameters | From GTAP 9, 2011 base year Social Accounting Matrix and related parameters. Replaced GTAP 8, 2007 dataset |
| Heterogenous firms parameters | Zhai (2008) |
| Tariff barriers | Baseline from GTAP 9, projected forward for concluded but incompletely implemented trade agreements. For TPP, schedule from the agreement provided by Sarah Oliver, Peterson Institute, November 25, 2015 |
| Nontariff barriers, goods | From Kee, Nicita, and Olarreaga HS6-level online data updated in 2012. Replaced Kee, Nicita, and Olarreaga (2008) 3-sector aggregates. Future values projected for TPP using methods described in text |
| Nontariff barriers, services | From Fontagne, Guillin, and Mitaritonna (2011). Replaced 2010 estimates by Hufbauer, Schott, and Wong (2010). Future values projected for TPP using methods described in text |
| FDI barriers | Econometric estimates as described in Petri, Plummer, and Zhai (2012, appendix E) substantially updated. Future values projected for TPP using methods described in text |
| Structure of trade agreements | Explained in the text, updating Petri, Plummer, and Zhai (2012, appendix D) |

CGE = computable general equilibrium model; FDI = foreign direct investment; CEPII = Centre d'Etudes Prospectives et d'Informations Internationales; IIASA = International Institute for Applied Systems Analysis

*Data sources referenced:* CEPII, www.cepii.fr/CEPII/en/bdd_modele/download.asp?id=11; World Bank, Global Economic Prospects, May 19, 2015; Global Trade Analysis Project (GTAP) 9, www.gtap.agecon.purdue.edu/databases/v9/default.asp; IMF Balance of Payments Statistics, http://data.imf.org/?sk=7A51304B-6426-40C0-83DD-CA473CA1FD52; IMF Coordinated Direct Investment Survey, www.imf.org/external/np/sec/pr/2014/pr14588.htm; Kee, Nicita, and Olarreaga (2008), updated in 2012, http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/0,,contentMDK:22574446~pagePK:64214825~piPK:64214943~theSitePK:469382,00.html; IIASA, https://secure.iiasa.ac.at/web-apps/ene/SspDb/dsd?Action=htmlpage&page=about.

## APPENDIX B COMPARISON OF RESULTS TO 2012 ESTIMATES

**Table B.1 Differences between the 2012 and current results** (billions of 2015 dollars)

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| **Country** | **2012 estimate for 2025** | **Scaled 2012 estimate for 2030** | **Data changes** | **New NTB approach** | **Realized NTB cuts** | **Realized tariff cuts** | **Adding nonpreferential element** | **2015 estimate for 2030** |
| **Americas** | **102** | **129** | **69** | **–61** | –2 | 3 | **67** | **205** |
| Canada* | 9 | 12 | 19 | –10 | 1 | 1 | 14 | 37 |
| Chile* | 2 | 4 | –1 | 0 | 0 | 0 | 1 | 4 |
| Mexico* | 10 | 11 | 3 | –3 | 1 | 1 | 9 | 22 |
| Peru* | 4 | 5 | 4 | –1 | 0 | 1 | 3 | 11 |
| United States* | 77 | 97 | 44 | –47 | –4 | 1 | 40 | 131 |
| **Asia** | **125** | **123** | **112** | **–74** | –29 | 13 | **58** | **203** |
| Brunei* | 0 | 0 | 2 | –1 | 0 | 0 | 0 | 2 |
| China | –35 | –56 | 22 | 0 | 1 | –3 | 17 | –18 |
| Hong Kong | –1 | –1 | –1 | 0 | 0 | 0 | 7 | 6 |
| India | –3 | –3 | –5 | 0 | 1 | –1 | 2 | –5 |
| Indonesia | –2 | –3 | 1 | 0 | 0 | 0 | 0 | –2 |
| Japan* | 105 | 97 | 78 | –51 | –25 | 13 | 14 | 125 |
| Korea | –3 | –3 | –7 | 2 | 1 | –1 | 1 | –8 |
| Malaysia* | 24 | 38 | 22 | –14 | –2 | 1 | 7 | 52 |
| Philippines | –1 | –2 | 1 | 0 | 0 | 0 | 0 | –1 |
| Singapore* | 8 | 9 | 6 | –3 | –1 | 2 | 5 | 19 |
| Taiwan | –1 | –1 | 0 | 0 | 0 | 0 | 3 | 1 |
| Thailand | –2 | –4 | –1 | –1 | 0 | –2 | 0 | –7 |
| Vietnam* | 36 | 52 | –7 | –6 | –4 | 4 | 0 | 41 |
| ASEAN nie | 0 | –1 | 0 | 0 | 0 | 0 | 0 | –1 |
| **Oceania** | **11** | **17** | **7** | **–7** | –2 | 0 | **6** | **21** |
| Australia* | 7 | 12 | 2 | –3 | 0 | 0 | 5 | 15 |
| New Zealand* | 4 | 5 | 5 | –3 | –2 | 0 | 0 | 6 |
| **Rest of world** | **–14** | **–20** | **2** | **2** | 1 | –1 | **79** | **62** |
| European Union | –4 | –4 | –8 | 3 | 0 | –1 | 58 | 48 |
| Russia | –1 | –2 | 2 | 0 | 0 | 0 | 2 | 2 |
| ROW | –9 | –14 | 8 | –1 | 1 | –1 | 19 | 12 |
| **World** | **223** | **251** | **190** | **–139** | –33 | 14 | **209** | **492** |
| *Memorandum* | | | | | | | | |
| TPP members | 285 | 343 | 178 | –142 | –37 | 23 | 99 | 465 |
| Nonmembers | –62 | –92 | 12 | 3 | 4 | –9 | 110 | 27 |

ASEAN = Association of Southeast Asian Nations; nie = not included elsewhere; NTB = nontariff barrier; ROW = rest of world

Note: Asterisk denotes TPP members. Column A shows 2012 estimates. B scales 2012 estimates for the shift to 2015 prices and the 2030 endpoint. Each country's estimate is multiplied by the ratio of its currently estimated GDP in 2030 in 2015 prices to its previously estimated GDP in 2025 in 2007 prices. C shows the effects of new data (listed in table A.1), including higher NTBs in services. D shows the effect of the more conservative approach to modeling NTBs now used (see appendix A). E shows effects of realized TPP NTB provisions relative to those conjectured (see table B.2). F shows effects of realized TPP tariffs relative to those conjectured. G shows nonpreferential liberalization effects absent from the 2012 estimates. H shows current estimates.

*Source:* Authors' simulations.

**Table B.2 Adjustments in NTB liberalization from 2012 assumptions**

| Sector | Adjustments from 2012 assumptions |
|---|---|
| Agriculture | More limited scope than expected. For grains, reduced liberalization by Japan by 80 percent. For other agricultural products, reduced liberalization by Japan by 70 percent, by Canada by 50 percent, and by the United States by 20 percent. |
| Food, beverages, tobacco | More limited scope than expected. Reduced liberalization by Japan by 70 percent, by Canada by 40 percent, and by the United States by 20 percent. |
| Automobiles | More limited scope than expected in US auto and truck liberalization. Reduced NTB liberalization by the United States by 70 percent. Given large tariff cuts, eliminated liberalization of NTB in Malaysia. |
| Textiles | Due to sustained restrictive rules of origin, reduced liberalization in the United States by 15 percent. |
| Service sectors | Service NTBs for New Zealand were probably overestimated due to unusual natural barriers related to distance and size of the market, therefore reduced liberalization in New Zealand by 25 percent. Due to the complexity of the US financial system and its state-level regulations, reduced NTB liberalization in financial services in the United States by 25 percent. |
| Foreign direct investment | Due to high frequency of nonconforming measures in annexes, reduced FDI liberalization by Brunei, Japan, Malaysia, and Singapore by 10 percent. |

FDI = foreign direct investment; NTBs = nontariff barriers

*Source:* Authors' judgments based on TPP text and annexes.

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