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(May 2012)

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Policy Challenges of Cross-Border Cloud Computing

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Abstract

Providers of cloud computing services are increasingly serving customers outside their home markets and using service delivery models that require the transmission of data across borders. In this article, we present an overview of the global market for cloud services and explore the role of cloud computing in U.S. exports. We then examine the main policy challenges associated with cross-border cloud computing—data privacy, security, and ensuring the free flow of information—and the ways that countries are addressing them through domestic policymaking, international agreements, and other cooperative arrangements. Finally, we identify the particular challenges faced by developing countries as they seek to participate in the market for cloud computing services. Our discussion includes case studies of two of the most important emerging markets for such services—China and India.

¹ The views expressed in this paper are those of the authors alone. They do not necessarily reflect the views of the U.S. International Trade Commission or any of its individual Commissioners. The authors would like to thank Michael Nelson of Georgetown University for his input and comments, James Fetzer for his comments, and contacts at the U.S. Department of Commerce and several firms in the cloud computing industry for sharing their insights.

Introduction

This article examines the international dimensions of cloud computing. Particularly, we are interested in exploring the many policy areas that are implicated as the cloud computing industry grows and becomes more global. We also provide some context on the pace of the industry's growth and possible level of exports. As cloud technology evolves, policies in the areas of data privacy, security, and the free flow of data struggle to keep pace. Policymakers use various tools, including international cooperative forums, bilateral and multilateral trade agreements, and domestic policy to address challenges in these areas. We review these major policy areas of importance to the cloud computing industry and the attempts to address them. Meanwhile, developing countries such as China and India seek to participate in this growing industry and need to consider both international policy uncertainties related to the cloud as well as their own domestic infrastructure and regulatory challenges in order to effectively contribute to the development of the industry. We provide brief case studies of what each of these countries is doing to meet these challenges.

Definition

The term “cloud computing” has entered common usage and has been used to describe a wide range of services offered over the Internet. As such, it can be difficult to differentiate the cloud from other, related Internet and IT services. Some familiar examples help highlight the characteristics that define cloud-based services. Among the cloud services most familiar to consumers are Web-based email (e.g., Gmail), photo hosting sites (e.g., Snapfish), and online financial management programs (e.g., mint.com). What all three of these familiar programs share is that they allow customers to access their data from any Internet-enabled device without installing any files on their computer. Emails, photos, and financial records are stored on the cloud provider's servers, and the provider supplies access to them anytime at the customer's request.

There are several additional technical aspects of cloud computing that differentiate it. The most commonly accepted definition of cloud computing was developed by the National Institute for Standards and Technology (NIST). According to that definition, “Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.”²

² USDOC, *The NIST Definition of Cloud Computing*, September 2011.

NIST goes on to describe five essential characteristics of cloud computing. These characteristics can be summarized as follows:

- On-demand self-service: This means that the customer can access and manipulate his or her data without interacting with the cloud service provider and that the service will adjust automatically to meet these needs.
- Broad network access: Because cloud services are accessed over a network, they can usually be accessed through any Internet-capable device. For example, a user of cloud-based email can access their up-to-date email inbox through a smartphone or any Internet-connected computer. Any changes the user makes will be reflected when they open their email inbox from another device, and newly received emails will be available.
- Resource pooling: Resources are shared between many or all of the customers of a cloud service provider. Although the service can often be customized to meet security requirements, generally, the provider's storage, processing, and network bandwidth capabilities (among other resources) are shared among customers.
- Rapid elasticity: The allocation of resources is easily adjusted as customers' needs change (that is, as a customer's demand for the cloud service grows or shrinks at any given time). In some cases, this can be managed automatically.
- Measured service: According to NIST, "Resource usage can be monitored, controlled, and reported, providing transparency for both the provider and consumer of the utilized service." For cloud services that are not free to the customer, the customer typically pays only for what he or she uses. This is different, for instance, from packaged software, for which a customer pays a set license fee and then receives a copy of the entire, standardized software package.³

There are three types of cloud services. Software as a Service (SaaS) is comprised of any software application accessed through the cloud. Most consumer cloud services and many business cloud services used to perform tasks by an end user (e.g., Salesforce) fall into this category. Platform as a Service (PaaS) is a cloud-based service for programmers to create or customize software applications. An example would be a platform that enables developers to create applications (apps) for a particular operating system. Finally, Infrastructure as a Service (IaaS) provides basic computing functions such as

³ Ibid.

data storage and processing via the cloud. For example, a company may archive old records in the cloud so that they do not take up space on in-house servers.

Finally, some cloud providers offer a range of options for making cloud services more private based on the customer's privacy and security requirements. At the most private level, providers may offer cloud-like services that are solely for use of the organization and are hosted in-house, sometimes being managed by the organization's own IT department. These services are cloud-like in that resources are shared and easily allocated among users, but all of the users happen to be within the organization. In between this most private option and the public cloud are a range of options. For example, multiple organizations with similar needs may agree to share a private cloud service. This is sometimes called a "community cloud." Or, a service provider may host a private cloud at its own premises rather than onsite at the organization.⁴ A public cloud is one that is available to the general public, whether for free to the user or for a fee. Of course, public cloud service providers also take many steps to ensure security and privacy and, in some cases, security measures may be customizable based on the user's needs even in a public cloud. The issues discussed in this article are most relevant to cloud services that are at least semi-public, so the public cloud will be our implicit focus.

Advantages for companies

Cloud computing offers several key benefits for businesses and consumers. As mentioned above, cloud services can usually be accessed at any time from wherever an Internet connection exists, and many cloud services offer greater potential for customization than is possible with traditional software. In some cases, data stored in the cloud may be more secure, since it is stored separately from the device. If a computer is lost, stolen, or malfunctions, the data remain secure.⁵

In addition to these benefits, the cloud also offers potential cost savings in a few ways. First, it can reduce the customer's need to hire and maintain a large in-house IT staff. Second, because most cloud services are metered and customers pay only for what they use, the costs can sometimes be lower than purchasing other forms of software to perform the same tasks. Finally, the shared nature of cloud services may provide a way for a business to access applications or computing power that would otherwise be unaffordable.⁶ Along these lines, cloud services may also reduce computer hardware costs, such as the cost of servers. The potential for cost savings varies and is dependent

⁴ Ibid.

⁵ Nelson, "Cloud Computing and Public Policy," October 2009.

⁶ Ibid.

on, for example, the nature of the individual organization's computing needs and how readily they can be served in the cloud.

The potential benefits of cloud computing need to be weighed taking into account the organization's needs in terms of privacy, security, regulatory compliance, existing hardware/infrastructure, and many other factors. Some of these factors are discussed in greater detail below. It is important to note that while the scope of the cloud is expanding, it is not suited to every application.

Market Characteristics

We now describe the global market for cloud computing services. We name some of the leading providers of these services, then explore how demand for them varies by service model, region and industry.

Leading Providers

Many companies from all corners of the broad IT and Internet-based industries are seeking to participate in the growing cloud market. This includes companies that solely offer cloud-based products, such as Salesforce, and traditional software companies such as Microsoft. It also includes companies that offer both hardware and IT services, such as IBM and HP. Finally, some of the key participants in the cloud market, such as Google and Amazon, are Internet-based companies that offer a variety of services, some of which are cloud offerings (as defined above). At present, the SaaS market is by far the largest among cloud services, while IaaS is a distant second and PaaS the smallest.⁷ Key SaaS providers include Salesforce.com, Google, Oracle, and NetSuite. In IaaS, key providers include Amazon Web Services (AWS), Rackspace, and Verizon.⁸ Top platforms (PaaS) include Microsoft's Windows Azure, Google's App Engine, and Salesforce's Force.com. As is implied in this list, many of the largest cloud service providers are U.S.-based firms, but firms from other countries are eager to participate in the market. One of the largest is SAP, a German software firm that has expanded its offerings to include SaaS for many business functions, including manufacturing, finance, and human resources.⁹

⁷ Pring et al., "Forecast: Public Cloud Services, Worldwide and Regions," June 29, 2011.

⁸ In 2011, Verizon acquired IaaS provider Terremark.

⁹ Deloitte, Cloud Computing: Forecasting Change, October 2009.

Demand

Estimates of the size of the global market for cloud computing services vary widely. Here, we compare recent estimates produced by two well-known IT consulting firms: Gartner and Forrester. For comparability, we focus on only a single deployment model (public cloud) and the three services models included in the NIST definition: IaaS, PaaS and SaaS.¹⁰

Table 1 compares estimates published by Gartner and Forrester in 2011 of the global market for public cloud services in 2010 and forecasts for 2015.

TABLE 1 Cloud market estimates and forecasts, 2010 and 2015 (\$ billions)¹

	2010				2015			
	SaaS	PaaS	IaaS	Total	SaaS	PaaS	IaaS	Total
Gartner	10.0	1.3	2.5	14.1	21.3	2.4	19.6	43.3
Forrester	13.4	0.3	1.0	14.7	78.4	9.8	5.8	94.1

Sources: Pring et al., “Forecast: Public Cloud Services, Worldwide and Regions,” June 29, 2011; Ried et al., “Sizing the Cloud,” April 21, 2011.

¹ Totals do not include Gartner’s estimates of public cloud revenues from “business process services” and Forester’s estimates for “business process as a service.”

The estimates are quite similar for 2010: both reports estimate that the global market for public cloud services totaled \$14–15 billion, with SaaS accounting for the bulk of revenues. However, the two sources’ estimates diverge markedly for 2015. While both firms predict growth across the three service models, they make very different predictions of the rate of growth in each: for example, Forrester predicts that the market for SaaS will grow nearly six-fold over the period, while Gartner expects it to double.¹¹

¹⁰ Gartner separately estimates public cloud revenues for “business process services,” which it values at \$60.3 billion in 2010, with projected growth to \$133.5 billion in 2015. The category is dominated by “cloud-based advertising services” (see the subsequent discussion above). Forrester produces estimates for a similarly-named category (“business process as a service,” or BPaaS), which it values at \$350 million in 2010, growing to \$2.9 billion in 2015. We omit Gartner’s and Forrester’s business process revenues from our analysis because the NIST Definition of Cloud Computing does not recognize BPaaS as a distinct service model.

¹¹ The factors behind the disparities in the two firms’ projections are unclear—in part because we were unable to access the full report accompanying Forrester’s data. Another well-known firm, IDC, estimated the market for public cloud services at \$21.5 billion in 2010, and forecast that it would grow to \$72.9 billion in 2015 (IDC, “Public IT Cloud Services,” June 20, 2011). We did not report these findings in the table above because we were unable to obtain disaggregated estimates for market size by service model.

Gartner separately estimates revenue “derived from [cloud-based] advertising services that is then used to deliver other IT services” at \$36.5 billion in 2010, with projected growth to \$77.1 billion in 2015. This estimate is useful because it yields a rough sense of the value of the many cloud-based applications that consumers use for free, but that generate revenues through advertising. Examples include photo-sharing applications (Flickr, Picasa), web-based e-mail (Gmail, Hotmail), and office software suites (Google Docs). Gartner’s estimates suggest that these services may yield more revenues for providers than cloud services sold directly as such.¹²

Industry estimates suggest that North America, led by the United States, is the largest consumer of cloud services. Gartner estimated that North America accounted for 61 percent of cloud revenues in 2010, followed by Western Europe (23 percent), Japan (10 percent), and other countries in the Asia Pacific region (3 percent). IDC also lists the United States as the leading market for public cloud services.¹³ These findings accord with broader trends in global spending on computer software and services, for which North America, Europe, and the Asia Pacific region are the leaders, in that order (table 2), although Gartner’s figures suggest that North America is more dominant within the market for cloud services than in the broader computer software and services markets.

TABLE 2 Spending on computer software and services (2009)

Region	Services	Percent of Total	Software	Percent of Total
Africa	5.4	0.8	2.8	0.9
Middle East	7.2	1.0	2.7	0.9
Latin America	12.2	1.7	4.2	1.4
Asia-Pacific	129.2	18.1	44.5	14.6
Europe	226.3	31.7	18.1	38.7
North America	334.6	46.8	132.6	43.5
Global Total	715.0		304.9	

Source: IHS Global Insight, *Digital Planet, 2010*, October 2010.

Gartner reports that the leading consumers of cloud computing services are manufacturers and financial services firms, followed by communications/high-tech companies and governments. Financial services firms are among the most important consumers of computer services more generally. For example, in fiscal year 2010, financial services firms accounted for over 40 percent of India’s exports of computer

¹² There is some debate about the extent to which advertising-related revenues should be included in estimates of the global market for cloud computing services. For example, see Treadway, “Gartner’s Cloud Numbers,” June 22, 2010.

¹³ Pring et al., “Forecast: Public Cloud Services, Worldwide and Regions,” June 29, 2011, 12; IDC, “Public IT Cloud Services,” June 20, 2011.

services and business process outsourcing exports.¹⁴ Among governments, the United States is notable for its adoption of a “Cloud First” policy requiring agencies to consider cloud options when making new investments. The Federal Cloud Computing Strategy, released in February 2011, estimates that one-fourth of federal IT spending (\$20 billion of \$80 billion) could be moved to the cloud.¹⁵

U.S. Exports of Cloud Computing Services

In this section, we estimate the value of U.S. exports of public cloud computing services. To our knowledge, we are the first to attempt such a calculation.

The base figures for our estimate are the statistics on international trade in services published by the U.S. Bureau of Economic Analysis (BEA). BEA publishes two sets of data relevant to international trade in services. The first focuses on cross-border trade, and the second on services supplied by majority-owned foreign affiliates (analogous to “Mode 3” trade under the World Trade Organization’s General Agreement on Trade in Services). We identify the categories within each dataset that appear most likely to contain cloud computing services, then estimate the share of transactions in each category that are such services.

In the cross-border trade statistics, the categories that appear most likely to include cloud computing services are computer and data processing services¹⁶ and royalties and license fees for general use computer software.¹⁷ In the affiliate sales data, those most likely to include cloud computing appear to be computer systems design and related services and software publishers. Several others also likely contain at least some cloud services, as firms in those industries are also prominent cloud services providers. Examples include telecommunications (e.g., Verizon), retail trade (e.g., Amazon.com), and computer and electronic product manufacturers (e.g., Apple).

¹⁴ NASSCOM, “Indian IT-BPO Industry,” February 2, 2011, 9. India’s 2010 fiscal year ran from April 1, 2009 to March 31, 2010.

¹⁵ Kundra, *Federal Cloud Computing Strategy*, February 8, 2011, 1–2. The date for the estimate of total federal IT spending was not stated in the text. The estimate is based on submissions by agencies to the Office of Management and Budget. One possibility is that the dates for the estimates differed by agency (although this is not indicated in the document).

¹⁶ The category is defined as follows on the form that respondents use to report revenues: “Data entry processing (both batch and remote), and tabulation; computer systems analysis, design, and engineering; custom software and programming services (including web design); integrated hardware/software systems; and other computer services (timesharing, maintenance, web site management, and repair).” USDOC, BEA, *Quarterly Survey of Transactions*, January 2010, 16.

¹⁷ Defined as “receipts and payments for rights to distribute general use software, and rights to reproduce or use general use computer software that was electronically transmitted or made from a master copy.” USDOC, BEA, *Quarterly Survey of Transactions*, January 2010, 15.

For our estimate, we assume that the share of public cloud computing in U.S. exports of computer and data processing services is equal to the ratio of global revenues from IaaS and PaaS in 2010 to global revenues for all IT services, as reported by Gartner (0.5 percent)¹⁸ The share of public cloud computing in U.S. exports of general use computer software is equal to the ratio of global revenues from SaaS in 2010 to global revenues from all enterprise software, as reported by Gartner (4.1 percent).¹⁹ Within affiliate sales, the same ratios are used for computer systems design and software publishers, respectively. We do not estimate cloud revenues for firms in other industries, even though, as noted above, firms in several of those industries are likely to sell cloud services through their foreign affiliates. Nor do we attempt to estimate the revenues from the deployment of private clouds inside individual companies. Thus, ours can be considered a conservative, lower-bound estimate.

TABLE 3 Estimated U.S. exports of public cloud computing services (\$ millions)¹

	Cloud	All (cloud + non-cloud)
<i>Cross-border exports (2010)</i>		
Computer and data processing services	45	8,771
General use computer software	1,436	35,040
Total	1,481	43,811
<i>Sales by majority-owned foreign affiliates (2009)</i>		
Computer systems design and related services ²	343	66,250
Software publishers	1,024	24,982
Total	1,366	91,232

Source: Cloud estimates by authors; data in “All” column from USDOC, BEA, “U.S. International Services,” October 2010.

¹ See text for description of calculation method.

² Excludes Canada, for which BEA suppressed data for 2009.

These estimates require caveats. First, the cross-border and affiliate sales data should be interpreted and compared carefully due to differences in how they are reported. BEA reports cross-border transactions by the type of service delivered, regardless of the chief industry of the firm delivering the service, while it reports affiliates’ services supplied by the industry of the firm, regardless of the service delivered. For example, data processing services delivered by a manufacturer to a customer in another country would be reported as “computer and data processing services” in the cross-border

¹⁸ Gartner estimated worldwide revenues from PaaS and IaaS at \$4.1 billion in 2010 (table 1), and total IT services revenues of \$793.0 billion. Gartner, “Gartner Says Worldwide IT Services Revenue Returned to Growth,” May 4, 2011.

¹⁹ Gartner estimated worldwide sales of SaaS at \$4.1 billion in 2010 (table 1), and total enterprise software revenues of \$244.0 billion. Gartner, “Gartner Says Worldwide Enterprise Software,” June 21, 2011.

trade data, whereas similar services sold by a manufacturer's foreign affiliate would be reported under manufacturers' sales of services in the affiliate sales data.

Secondly, it is possible that cloud services' share of traded software and IT services is different from the cloud share of the overall market for these products and services—if, for example, providers are more (or less) likely to serve foreign customers via the cloud. In light of the uncertainties about the actual share of cloud activities in each data category, the estimates should be interpreted with caution.

Despite these caveats, it seems highly likely that cloud computing is already a source of significant revenue for U.S. exporters and multinational firms. And should the global market for cloud services grow at anything approaching the rates suggested by Gartner, Forrester, and other analysts, the importance of cloud revenues for U.S. firms—and for U.S. exports—will grow rapidly in the next few years. For example, Gartner forecasts that SaaS will account for 6.1 percent of global software sales while IaaS and PaaS will account for 2.2 percent of global IT services sales in 2015.²⁰ If total cross-border exports and affiliate sales in that year were unchanged from the figures reported for 2010 and 2009, respectively (table 3), cross-border exports of public cloud services would increase by 58 percent and affiliate sales of such services would more than double.

Key Policy Issues

We now turn our attention to the principal issues that policymakers face with respect to cross-border provision of cloud computing services. We focus on three topics: data privacy, security, and restrictions on where data are housed (localization requirements).²¹

Data privacy

One area of policy that heavily affects the provision of cloud services is data privacy. Countries' domestic data privacy laws can vary quite substantially and often affect foreign companies seeking to provide any type of electronic service to consumers in that country. For example, the EU and the United States are often cited as having

²⁰ Gartner forecasts worldwide revenues from SaaS at \$21.3 billion and for PaaS and IaaS at \$22.0 billion in 2015 (table 1). It forecasts total enterprise software revenues of \$347 and total IT services revenues of \$983.0 billion. Pring et al., "Forecast: Public Cloud Services, Worldwide and Regions," June 29, 2011, 11; Gordon, "Forecast Alert: It Spending," January 3, 2012.

²¹ The section on developing countries' role in cloud computing (below) addresses several additional policy issues that are relevant, including protection of intellectual property and government filtering of Internet content.

very different domestic approaches to privacy, with the United States following a self-regulatory approach (with sector-specific regulations for certain sensitive types of data), and the EU favoring a “baseline common level of privacy...to protect the data privacy rights of Europeans regardless of where data are transferred and processed.”²² Meanwhile, third countries have their own approaches, and data privacy laws in some of these countries are in flux, creating a challenge for cross-border cloud providers and an opportunity for greater international harmonization. Here, we examine individual countries’ data privacy frameworks as well as international organizations’ efforts to address the issue.

Domestic Data Privacy Regimes *European Union*

The EU Data Privacy Directive establishes standards that member states must follow in their domestic data privacy laws. These standards apply anytime someone (whether a company or an individual) collects personal data that can be linked to a specific individual (an EU citizen). Data collection or processing that does not meet the standards is prohibited (box 1).

These standards apply to all personal data. Examples include internal personnel records that employers keep on their EU employees and online travel booking systems accepting reservations from EU customers.

The Directive has far-reaching international implications. As implied in these examples, U.S. firms must comply with the Directive whenever they possess personal data involving EU citizens. In fact, not all U.S. firms may legally possess this data. The EU prohibits export of personal data unless the importing country “ensures an adequate level of protection” as certified by the EU Commission.²³ The United States is not among the nine countries that have been recognized. However, the EU and the United States have a compromise in place, called the safe harbor provision. Under this system, U.S. firms may voluntarily self-certify that they meet the requirements of the Directive. This allows U.S. firms to qualify individually even though the United States does not qualify at the country level.²⁴

²² Movius and Krup, “U.S. and EU Privacy Policy: Comparison of Regulatory Approaches,” 2009, 172.

²³ Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the Protection of Individuals with regard to the Processing of Personal Data and on the Free Movement of Such Data.

²⁴ Wolf and Tobin, “Chapter 28: Privacy Laws,” 2007, n.p.

Box 1 Data privacy standards in the EU Privacy Directive

An international law firm summarizes the key standards in the EU Privacy Directive as follows:

- Fairness: process data “fairly and lawfully”;
- Specific purpose: process and store data “for specified, explicit, and legitimate purposes and not further processed in a way incompatible with those purposes”;
- Restricted: ensure data are “adequate and relevant, and not excessive in relation to” the purposes for which they are collected;
- Accurate: ensure data are “accurate and, where necessary, kept up-to-date,” so that “every reasonable step [is] taken to ensure” errors are “erased or rectified”;
- Destroyed when obsolete: maintain personal data “no longer than necessary” for the purposes for which the data were collected and processed.
- Security: data must be processed with adequate “security” (a “controller must implement appropriate technical and organizational measures to protect personal data against . . . destruction or . . . loss, alteration, unauthorized disclosure or access, in particular where the processing involves the transmission of data over a network. . . .”)
- Automated processing: “decision[s]” from data processing cannot be “based solely on automated processing of data” that “evaluate[s] personal aspects.”

Source: Wolf and Tobin, “Chapter 28: Privacy Laws,” 2007, n.p.

Additionally, it is worth noting that while the Directive is intended to ensure a uniform standard of data protection throughout the EU, in practice, there is variation in how the member countries implement and interpret it. The experience of companies collecting data in EU countries confirms this reality, as reflected in a 2003 survey of European companies.²⁵

United States and other countries

The U.S. approach to data privacy is much different. Generally speaking, the United States only regulates the collection and use of personal data in certain sensitive sectors, such as healthcare (under the Health Insurance Portability and Accountability Act, or HIPAA) and financial services (under the Gramm-Leach-Bliley Act).

Outside the EU and US, data privacy regimes are mixed. A number of countries have adopted data privacy laws that, like the EU Directive, apply to all types of personal data, although many are not as wide-ranging as the EU's laws. Among the major markets that have adopted some form of comprehensive data privacy law are India, Japan, Malaysia, South Korea, and Taiwan. China, Singapore, and Thailand are among the countries that, like the U.S., have not adopted comprehensive, mandatory regulations.²⁶

The differences in data privacy laws are of major significance for cloud computing providers seeking to serve customers in multiple countries. Cloud computing providers may need to collect personal data from customers in order to serve them. For example, a cloud-based travel booking site for employees may store personal information about the users, such as their full names and addresses. Providers may also store or process personal data relating to their customers' customers. For example, a cloud-based customer relationship management database is likely to contain contact information or other personal details about the client firm's customers. Cloud providers must ensure that data storage and processing complies with laws in all relevant jurisdictions, and this can become even more complicated when data are stored and processed globally, not just in the cloud provider's home country or the customer's home country. In some cases, this complexity may limit a provider's ability to do business in multiple markets.

²⁵ EOS Gallup Europe, "Data Protection in the European Union," December 2003, 3.

²⁶ USDOC, "Selected Asia and Oceania Data Protection Laws," June 2011.

International organizations' efforts to address data privacy

Recognizing the differences in domestic data privacy regimes, there have been a number of international efforts through multilateral organizations to develop a common framework for cloud-related policy. The two most notable of these are the efforts of the Organization for Economic Cooperation and Development (OECD) and the Asia-Pacific Economic Cooperation (APEC) forum. Both organizations have focused primarily on developing a shared set of principles for data privacy.

The OECD Guidelines were adopted in 1980, making them the first multilateral effort to address privacy issues related to cross-border data flows. The Guidelines establish several rights of the individual pertaining to his or her personal data and lay out framework principles that national governments should follow in protecting these rights. Of most relevance for international trade in cloud services are paragraphs 15–18 outlining these principles, which read as follows:

15. Member countries should take into consideration the implications for other Member countries of domestic processing and re-export of personal data.

16. Member countries should take all reasonable and appropriate steps to ensure that transborder flows of personal data, including transit through a Member country, are uninterrupted and secure.

17. A Member country should refrain from restricting transborder flows of personal data between itself and another Member country except where the latter does not yet substantially observe these Guidelines or where the re-export of such data would circumvent its domestic privacy legislation. A Member country may also impose restrictions in respect of certain categories of personal data for which its domestic privacy legislation includes specific regulations in view of the nature of those data and for which the other Member country provides no equivalent protection.

18. Member countries should avoid developing laws, policies and practices in the name of the protection of privacy and individual liberties, which would create obstacles to transborder flows of personal data that would exceed requirements for such protection.²⁸

²⁷ OECD, Guidelines on the Protection of Privacy and Transborder Flows of Personal Data, September 23, 1980.

²⁸ Ibid.

The Guidelines also encourage countries to support industry self-regulation where possible. Overall, while the Guidelines established some principles that have guided the direction of countries' data privacy laws, they also preserve a great deal of flexibility, as evidenced by the very different data privacy regimes among OECD countries.²⁹ From the perspective of one cloud policy expert, the main contribution of the OECD Guidelines is that they seek to “keep governments out of the way” in most cases.³⁰

The OECD is currently in the process of conducting a review of the Guidelines to evaluate whether they need to be revisited or revised. Clearly, cross-border data flows have increased dramatically since 1980. Highlighting the ways in which technology has changed the scope of the issue, one author noted:

In the past, transborder data flows often occurred when there was the explicit intent to transfer data internationally (e.g., when a computer file was sent to a specific location in another country). Nowadays, the architecture of the Internet means that even a transfer to a party in the same country may result in the message or file transiting via other countries, without the sender ever being aware of this.³¹

A more recent set of international principles for cross-border data privacy is the 2004 APEC Privacy Framework. While the OECD Guidelines address the rights of individuals and the responsibilities of governments, the APEC Framework primarily addresses the responsibilities of companies and organizations that collect personal data.

The core principle in the APEC Framework is “accountability” — that is, that the entity that collects personal information is responsible for ensuring it is handled in accordance with the privacy guidelines in the Framework (as implemented by the participating country), regardless of where that information travels. While cloud industry officials generally feel the APEC Framework was a good step, more than one mentioned that the implementation remains in flux.³² One commented that he found APEC's approach potentially very useful and views it as a counterbalance to the European approach.³³

²⁹ Kuner, “Regulation of Transborder Data Flows,” October 2010.

³⁰ Michael Nelson, telephone interview by USITC staff, August 11, 2011.

³¹ Kuner, “Regulation of Transborder Data Flows,” October 2010, 10.

³² Industry representatives, interviews by USITC staff, Washington, DC, August 23 and November 22, 2011.

³³ Industry representative, telephone interview by USITC staff, December 1, 2011.

The most recent effort to develop international data privacy principles is the Madrid Resolution, adopted in late 2009 by about 50 countries participating in the annual International Conference of Data Protection and Privacy Commissioners. The principles laid out in the Madrid Resolution are broadly similar to the framework of the EU Directive, but the major difference is that the Madrid Resolution is non-binding. The goal is to eventually make the principles binding on the Resolution's signatories.³⁴ The United States is not a party to the Madrid Resolution.

Security

The concept of security in the context of cloud computing generally refers to ensuring that unauthorized parties do not obtain access to sensitive data. In that sense, security is related to privacy. Indeed, certain domestic laws that obligate service providers to protect data in certain sectors, such as the Gramm-Leach-Bliley Act for financial services and HIPAA for healthcare providers can be considered both privacy and security measures.

Outside of specially protected sectors, it is usually up to the parties to include a security framework in the contract for cloud computing services. Some organizations have valid concerns about entrusting the security of their data to a third party, especially when the information being stored with the cloud provider is proprietary or sensitive. Cloud providers, however, argue that the cloud actually offers some security advantages. Because services are centralized and resources are pooled in the cloud model, providers may be able to better predict and detect threats to the network. In the event that a security breach occurs, a cloud provider may be able to more quickly eliminate the threat since the solution does not need to be applied to multiple end users' machines.³⁵ Large cloud providers are also able to recruit top computer security talent.

In some cases, governments themselves may present a threat to data security. In some countries, the instances in which government bodies, such as police or intelligence agencies may access personal data are not clear to cloud providers or their customers.³⁶ A challenge for U.S. cloud providers is convincing customers in other countries that the PATRIOT Act, which broadened the U.S. government's ability to access data in support of intelligence-gathering activities, does not present a risk that their data will

³⁴ ICDPP, "Data Protection Authorities from over 50 Countries Approve the Madrid Resolution," November 6, 2009.

³⁵ SIIA, "Guide to Cloud Computing for Policymakers," 2011, 12.

³⁶ Michael Nelson, telephone interview by USITC staff, August 11, 2011.

be turned over to the U.S. government.³⁷ While U.S. officials and cloud firms stress that concerns about the PATRIOT Act in the context of the security of cloud services are often overstated, the Act remains a sticking point for some foreign customers.³⁸

In the United States, a variety of interested firms (including a number of large cloud providers) and individuals created the Digital Due Process initiative in 2010. The initiative seeks a simpler, clearer standard for U.S. government and law enforcement access to electronic communications and other personal data and argues that the 1986 framework currently in place, called the Electronic Communications Privacy Act (ECPA), is outdated and applied in inconsistent ways.³⁹ The initiative's central goal is to persuade Congress to update ECPA to better reflect current technology.⁴⁰

In the EU, the Data Retention Directive came into force in 2006 and requires communication service providers to retain certain identifying data for all communications for 6–24 months so that they may be made available to law enforcement in connection with criminal investigations.⁴¹ The Directive is controversial, and its application has been inconsistent between countries. Courts in three countries have ruled implementing laws to be unconstitutional. The European Commission acknowledges that “the diversity of approaches—in terms of limitations to the use of data, data storage periods and other aspects...—means that there is no level playing field for service providers and consumers across the EU. This has presented considerable difficulties for the industry.”⁴² Potential modifications to the Directive are currently being considered.

Cloud providers operating in international markets are concerned that an interest in ensuring security can sometimes lead to “knee-jerk reactions” by governments.⁴³ Especially when there is a major security breach, governments are more likely to pursue tighter regulation, which may inhibit the development of the market.⁴⁴ For

³⁷ Rauf, “PATRIOT Act Clouds Picture for Tech,” November 29, 2011.

³⁸ Ibid.

³⁹ Digital Due Process Web site. <http://digitaldueprocess.org> (accessed January 18, 2012).

⁴⁰ Ibid.

⁴¹ Directive 2006/24/EC of the European Parliament and of the Council of 15 March 2006 on the Retention of Data Generated or Processed in connection with the Provision of Publicly Available Electronic Communications Services or of Public Communications Networks and Amending Directive 2002/58/EC.

⁴² European Commission Home Affairs Web site, http://ec.europa.eu/home-affairs/policies/police_data_en.htm (accessed April 10, 2012).

⁴³ Industry representative, interview by USITC staff, Washington, DC, August 23, 2011.

⁴⁴ Nelson, “Cloud Computing and Public Policy,” October 2009, 10.

example, in the wake of the Mumbai terrorist attacks, the Indian government invoked national security to require access to all BlackBerry communications in India.⁴⁵

In terms of international cooperation on data security policy, a set of OECD Guidelines offers basic principles. These Guidelines for the Security of Information Networks and Systems (last updated in 2002) are broad and provide suggestions for how participants in information systems and networks can better anticipate risks, design and adapt security policies, and respond to threats, while preserving the rights of individuals. There are also international standards, developed by the International Standards Organization and the International Electrotechnical Commission that provide guidance on how best to manage information security and allow organizations to seek certification of their information security controls.⁴⁶

At the international level, the U.S. preference is to preserve flexibility by specifying a common security outcome that allows for differences in how it is implemented or applied.⁴⁷

Localization requirements

Cloud providers have expressed concerns about “localization requirements” that compel firms storing and processing data for clients from a given country to locate the data in that country. Governments typically create such requirements for the ostensible purpose of keeping data private and secure. Localization requirements are problematic for cloud providers, as “location independence” is a core aspect of the cloud delivery model.⁴⁸ Policies that require providers to locate facilities in a given location may leave them with the choice of selecting a sub-optimal location or not serving the targeted market at all.

Localization requirements are most often associated with two industries: finance and government. For example, South Korea requires that financial institutions process data within South Korea unless clients provide written consent otherwise, although

⁴⁵ Electronista, “India Testing BlackBerry Data Snooping,” October 3, 2011. BlackBerry’s parent company, Research in Motion, ultimately granted the government access to some communications, although not to business users’ data.

⁴⁶ See, for example, ISO/IEC standards 27001 and 27002.

⁴⁷ U.S. Government representative, interview by USITC staff, Washington, DC, August 18, 2011.

⁴⁸ The NIST Definition of Cloud computing says that “there is a sense of location independence in that the customer generally has no control or knowledge over the exact location of the provided resources but may be able to specify location at a higher level of abstraction (e.g., country, state, or datacenter).” Mell and Grance, The NIST Definition of Cloud Computing, September 2011, 2.

its trade agreements with the EU and United States provide exceptions to this rule.⁴⁹ Similarly, in 2011, the People's Bank of China (PBOC) issued a "Notice to Urge Banking Financial Institutions to Protect Personal Financial Information" which forbids banks from storing or processing personal financial information obtained in China outside of the country.⁵⁰

Governments may also restrict the locations at which official government data may be housed and processed. Although such requirements may sometimes be necessary to restrict access to sensitive or classified data,⁵¹ some government data may be sufficiently non-sensitive to make storage on foreign servers acceptable. The United States acknowledged this in a recent solicitation for cloud computing services, which included separate pricing for services provided from data centers within and outside the United States. This solicitation also generated a controversy that illustrates how governments' concerns about data security may conflict with their desire to promote freer trade (box 2).

⁴⁹ European Union Chamber of Commerce in Korea (EUCCK), "Trade Issues and Recommendations 2011," n.d.; Free Trade Agreement Between the United States of America and the Republic of Korea, Annex 13-B, Section B and Article 7.43. Each agreement allows a phase-in period of two years for the commitment.

⁵⁰ The PBOC branch in Shanghai reportedly issued a subsequent clarification to banks in that city outlining conditions under which branches of foreign banks could transmit such data outside of China, such as obtaining written consent from customers. Norton Rose, "Personal Financial Information in China," October 2011.

⁵¹ Commission on the Leadership Opportunity in U.S. Deployment of the Cloud (CLOUD2), *Cloud First, Cloud Fast*, August 2, 2011, 17–18.

Box 2 Security and Trade in the Cloud: Conflict at the GSA

In May 2011, the U.S. General Services Administration (GSA) issued a solicitation for a host of cloud computing applications, including e-mail, electronic record management, and other services. The solicitation provided separate pricing information for services provided from U.S. and foreign data centers. The latter were required to be based in “designated countries,” as specified under Federal Acquisition Regulation §25.003. Two firms protested that the designated-country provision was unnecessarily restrictive of competition.

GSA described the designated-country provision as a compromise between those federal agencies that wanted all of their data to remain in the United States, and the Office of the U.S. Trade Representative, which argued that such restrictions would violate U.S. trade commitments. In its decision on the protest, the U.S. Government Accountability Office (GAO) acknowledged that “it is apparent why agencies may be justified in requiring the maintenance of [some] data and data servers within the United States.” However, it ruled that the designated-country provision was unnecessarily restrictive and could not “withstand logical scrutiny.” In explaining its decision, GAO noted:

GSA has provided no explanation for why its security concerns would be less acute in relation to data stored or processed in designated countries, which include, for example, Yemen, Somalia, and Afghanistan, versus data stored or processed in non-designated countries, such as Brazil, India or South Africa.

The GAO recommended that the GSA “amend the RFQ to reflect its actual needs concerning non-U.S. data center locations.” Going forward, it is not clear what criteria GSA and other agencies will use to determine “actual needs”—but the choice of those criteria could provide a high-profile testing ground for resolving the tensions between open trade and data security concerns in the U.S. government’s cloud procurement policy.

Notes: “Designated countries” include parties to the World Trade Organization’s Government Procurement Agreement, countries with which the United States has free trade agreements, least developed countries, and Caribbean Basin countries. Brazil, China, India, and Russia are among the most notable countries absent from the list. Federal Acquisition Regulation §25.003. The firms also challenged other aspects of the solicitation which are not addressed here.

Source: U.S. Government Accountability Office (USGAO), “Decision,” October 17, 2011, 7, 13.

Cloud Computing in International Trade Agreements

We now examine the extent to which international trade agreements have addressed policy issues relevant to cloud computing, both multilaterally (at the World Trade Organization) and bilaterally (through free trade agreements). While multilateral trade agreements have included general provisions that apply to both cloud and non-cloud computer services, bilateral agreements are emerging as vehicles for addressing issues specific to cross-border cloud computing.

World Trade Organization (WTO)

No WTO members have made commitments related to cloud computing *per se*. Under the General Agreement on Trade in Services, 83 members' schedules include commitments on "computer and related services."⁵² However, most members' commitments refer to an industry definition published over twenty years ago (division 84 of the United Nations' Provisional Central Product Classification (CPC) system).⁵³ There is no consensus about the extent to which this definition applies to cloud computing activities, although some elements of it appear to be relevant (e.g., data processing).

A number of members have sought to clarify the coverage of division 84. For example, the United States and several other members submitted a proposal in 2007 that would define CPC 84 as covering "all computer and related services... regardless of whether they are delivered via a network, including the Internet."⁵⁴ But this proposal had not been adopted by members as of the time of writing of this article.

Members' commitments in telecommunication services are also relevant to cloud computing, for two reasons. First, cloud providers deliver their services over telecommunication networks, as when SaaS is delivered over the Internet. Thus, the conditions under which providers may access such networks have a direct effect on service delivery. Secondly, some activities included in WTO members'

⁵² WTO, Services Database, <http://tsdb.wto.org/default.aspx>. One of those schedules—the one for "European Communities"—pertains to twelve European countries.

⁵³ General Agreement on Tariffs and Trade (GATT) Secretariat, "Services Sectoral Classification List." MTN.GNS/W/120, July 10, 1991. http://wto.org/english/tratop_elserv_elserv_e.htm; United Nations, "Provisional Central Product Classification," 1991.

⁵⁴ WTO, Council for Trade in Services (CTS), "Communication from Albania," January 26, 2007, 1.

telecommunication services commitments (so-called “value-added” telecommunication services) may overlap with cloud computing. For example, 60 WTO members have made commitments on “on-line information and/or data processing” within their telecommunications commitments—which could be interpreted to include some cloud computing activities.⁵⁵

As numerous observers have noted,⁵⁶ the distinctions between telecommunication, computer, and audiovisual services have grown increasingly blurred. In recognition of this reality, the United States tabled a proposal in 2010 within the WTO’s Doha Round negotiations that would “draw attention to the relationships between sectors” among various information and communication technology services.⁵⁷

Free Trade Agreements (FTAs)

The U.S.-Korea Free Trade Agreement (KORUS FTA) contains more provisions relating to the cloud than previous U.S. trade agreements. Specifically, it states, “Parties shall endeavor to refrain from imposing or maintaining unnecessary barriers to electronic information flows across borders.”⁵⁸ While this is non-binding, it is unique in U.S. trade agreements to date. The KORUS FTA also establishes principles of non-discrimination and MFN treatment for digital products.

Cloud industry officials also see the in-progress Trans-Pacific Partnership agreement as an opportunity to establish cloud-friendly trade policies, especially given that the TPP is being negotiated as a “gold standard” agreement, with commitments in emerging areas that have not previously been covered by FTAs. A recent statement issued by the National Foreign Trade Council, “Promoting Cross-Border Data Flows,” mentions the TPP as an opportunity to establish new commitments on cross-border data flows.⁵⁹ The principles outlined in the statement reflect many large cloud providers’ ambition for future FTAs (as well as for collaboration in multilateral forums). These principles call on parties to prohibit restrictions on legitimate cross-border data flows; prohibit localization requirements; promote convergence toward international

⁵⁵ The Services Sectoral Classification list includes data processing services (CPC 843) under both computer and related services and telecommunication services. 76 schedules (including twelve European members in one schedule) include commitments for data processing within their computer and related services commitments.

⁵⁶ For example, see WTO Secretariat, “Telecommunication Services: Background Note by the Secretariat,” June 10, 2009, 4.

⁵⁷ Office of the U.S. Trade Representative, 2010 Annual Report of the President of the United States on the Trade Agreements Program, March 2011, 5.

⁵⁸ U.S.-Korea Free Trade Agreement, chapter 15.

⁵⁹ NFTC, “Promoting Cross-Border Data Flows,” November 3, 2011, 5.

standards; improve transparency; address the legal complexities of cross-border data flows (such as those discussed in this paper); expand trade in digital goods; and create trade agreements that can adapt as technology changes.⁶⁰

When asked to compare the relative importance of multilateral cooperative forums and principles and binding bilateral agreements, industry officials interviewed generally agreed that for the cloud, both the cooperative approach and binding rules are necessary and should be pursued in parallel since the two move at different speeds.⁶¹ One contact estimated that binding agreements may be ten years behind the technology, which highlights the usefulness of non-binding, collaborative activities.⁶²

Box 3 describes a non-traditional approach to fostering cooperation on cloud-related policy: the International Digital Economy Accords (IDEA) Project, led by the nonprofit Aspen Institute.

Box 3 A Private Initiative—the Aspen Institute’s IDEA Plan

In 2011, the nonprofit Aspen Institute’s International Digital Economy Accords (IDEA) project published a draft “Implementation Plan for a Common Digital Market of Goods, Services, and Ideas.” The plan proposes a new non-governmental organization called the Protocol Certification Organization (PCO) and associated “subject matter multistakeholder organizations” (SMOs) that would seek to ensure that countries and companies uphold the “Aspen IDEA Principles.” Several of the principles relate closely to cross-border provision of cloud computing services. For example, the Principles state that “IP-based and converged services (e.g., cloud computing and environmental services)” should “enjoy maximum regulatory flexibility”; and that “Governments should allow the free flow of information globally... [they] should not require that facilities or information be located in a specific country or region.” The principles would be legally binding, but sanctions would not extend beyond “name and shame.” It is unclear what level of support the IDEA Plan enjoys among governments and the private sector, but high-level officials from the United States, the European Union, and individual European governments as well as representatives of prominent technology firms have participated in the project’s meetings.

Sources: Aspen Institute, “The Aspen IDEA Plan,” September 12, 2011, 3, 10, 11–12; Aspen Institute, “Brussels Plenary Meeting,” March 23–24, 2011.

⁶⁰ NFTC, “Promoting Cross-Border Data Flows,” November 3, 2011.

⁶¹ Industry representatives, interviews by USITC staff, Washington, DC, August 23 and November 22, 2011.

⁶² Michael Nelson, telephone interview by USITC staff, August 11, 2011.

Developing Countries in Cloud Computing

As noted above, developed countries account for most of the supply and consumption of cloud computing services, and have been at the forefront of international policymaking on cross-border data flows. Yet governments and private parties in many developing countries are eager to expand those countries' role as suppliers and consumers of cloud computing services. They see cloud computing and other IT service industries as potential sources of high-paying jobs and drivers of economic growth—both directly, through the success of firms providing IT services, and indirectly, via the “spillover” benefits to other industries of increased access to advanced technology. Some countries may also hope to reduce dependence on foreign service providers for strategic reasons.⁶³

A variety of factors determine whether a country has a propitious environment for supply and consumption of cloud computing services. The Asia Cloud Computing Association (ACCA) published a list of ten such factors for its “Cloud Readiness Index.”⁶⁴ They include:

- regulatory conditions (including intellectual property protection)
- international connectivity (including price and availability of bandwidth for international connections)
- quality of data protection policies
- broadband quality (including penetration levels as well as reliability of connections)
- power grid quality
- pervasiveness of Internet filtering
- “business efficiency” (including a variety of conditions that affect the ease of doing business, such as labor costs, productivity, financial market development, and the quality of corporate governance)
- risk (including macroeconomic, security, social, and environmental factors)

⁶³ This objective is not exclusive to developing countries. For example, the desire to counter the dominance of U.S. IT firms appears to underlie, at least in part, in the efforts of some Western European countries to expand their cloud computing industries. Rahn, “Europe Won’t Let U.S.,” January 17, 2012.

⁶⁴ Asia Cloud Computing Association, “Cloud Readiness Index,” September 2011, 4. The authors draw their data from a variety of sources; see the report for details

- level of development of information and communication technologies (ICTs)
- level of government support for development of ICTs, and cloud computing specifically.

While the ACCA gives each of these factors equal weight, one might argue that the factors vary in importance according to the cloud service in question. For example, labor costs and workforce skills are less important for data center operations, because each center requires only a few workers.⁶⁵ On the other hand, skilled software developers are critical for the development of PaaS and SaaS. Cheap electricity and the cost and reliability of water supply are especially important for ensuring that large data centers—one of the key building blocks for IaaS—are properly cooled.⁶⁶ Internet filtering is particularly problematic for SaaS, as censors may hinder or block entirely the public's use of specific applications, but filtering may also cause broader connectivity problems (e.g., slower data transfers) that affect the full range of cloud services.⁶⁷ There may also be factors not included in the index that are important. One example is the cost of land, which may affect providers' decisions on where to locate data centers in light of their massive size.⁶⁸

Satisfying all of these enabling factors is challenging for any country, but particularly so for developing countries. Many developing countries have made less progress than wealthier countries in creating and enforcing legal frameworks important for cloud computing (e.g., for data privacy and protection and intellectual property rights), and the quality of water, power, and broadband infrastructure in such countries often lags that in richer countries. Yet governments and companies in numerous developing countries are working to address these challenges. The following case studies document the experiences of two such countries: China and India.

China

With the largest population of Internet users in the world, China holds promise as a market for cloud computing services. At present, however, China is mostly a potential market rather than an established one. The Asia-Pacific region (excluding Japan) only

⁶⁵ For example, Apple's data center in Maiden, North Carolina, which cost \$1 billion to construct, employs 50 people on a full-time basis. Rosenwald, "Cloud Centers," November 8, 2011.

⁶⁶ Industry representative, interview with USITC staff, December 1, 2011; Thibodeau, "Apple, Google, Facebook," June 3, 2011.

⁶⁷ Bakhtiari, "Cloud Computing in China," October 17, 2011.

⁶⁸ For example, Apple's data center in Maiden, North Carolina is housed in a building measuring 500,000 square feet. Thibodeau, "Apple, Google, Facebook," June 3, 2011.

accounts for 3 percent of the market for cloud services.⁶⁹ Even among the largest organizations in China, less than 20 percent use any form of cloud services, compared with over 40 percent of large organizations in the United States.⁷⁰

The Chinese government recognizes the potential for the development of the cloud in China and is seeking to ensure that Chinese researchers and firms contribute to the direction of the cloud. The government has invested heavily in the development of cloud standards.⁷¹ Most recently, cloud computing was one of seven strategic industries included in the latest Five-Year Plan (2011–15), giving it a share of a \$600 billion investment by the government.⁷² Within the plan, there is also a focus on developing indigenous hardware and software to enable the cloud.⁷³

National-level, government-funded cloud research in China is headed by the Ministry of Industry and Information Technology and centers on five research centers in major cities.⁷⁴ Investments in research and data centers have also been made by cities (such as Shanghai and Chongqing) and corporations (most notably, Chinese telecom and network companies such as China Mobile and Huawei). In total, China's investment in the cloud is expected to reach \$154 billion in the next few years.⁷⁵ Perhaps due to the current small size of the domestic market, Chinese firms are also engaging in outbound investment in the cloud. For instance, Huawei has established a cloud research center in Silicon Valley.

For foreign firms, the uncertain legal environment for cloud computing in China can create a number of challenges. Comprehensive, national regulations on data privacy remain in the draft stage,⁷⁶ so, for now, data privacy rules are “vague and at the mercy of government interpretation.”⁷⁷ Industry officials interviewed agreed that the legal framework for cloud services is flexible to the point of being unpredictable, especially since the Chinese government may claim national security as a rationale for almost any measure pertaining to data security and the Internet.⁷⁸

⁶⁹ Pring et al., “Forecast: Public Cloud Services, Worldwide and Regions,” June 29, 2011.

⁷⁰ Larson, “The Man Behind Cloud Valley,” October 24, 2011.

⁷¹ U.S. Government representative, interview by USITC staff, Washington, DC, August 18, 2011.

⁷² Larson, “The Man Behind Cloud Valley,” October 24, 2011.

⁷³ Bakhtiari, “Cloud Computing in China,” October 17, 2011.

⁷⁴ Beijing, Hangzhou, Shanghai, Shenzhen, and Wuxi.

⁷⁵ Bakhtiari, “Cloud Computing in China,” October 17, 2011.

⁷⁶ Livingston, “China's Local Data Privacy Regulations Foreshadow National Efforts,” December 16, 2011.

⁷⁷ Bakhtiari, “Cloud Computing in China,” October 17, 2011.

⁷⁸ Industry representative, telephone interview by USITC staff, December 1, 2011.

Additional challenges for foreign firms seeking to provide cloud services in China include:

- *Localization expectations.* In some cases, customers' preference for localization of certain types of data prevents companies from launching products there, if the company does not wish to or cannot establish local data centers.⁷⁹
- *Joint venture requirements.* Several cloud-related activities are only open to foreign firms via joint venture. Among these are online data processing and data hosting.⁸⁰ Several major Western software firms have formed joint cloud ventures with Chinese companies – notably, Microsoft with China Mobile and SAP with China Telecom.⁸¹
- *Infrastructure and security challenges for data centers.* Sufficient power availability for data centers remains a challenge in some locations in China. In addition, China does not yet have any data centers of the highest security level (tier 4).⁸²
- *Internet speeds when hosting outside of China.* While many multinational companies choose to host Internet-based services for the Chinese market in Singapore or Hong Kong, this can greatly reduce the speed for Chinese customers, especially given that this traffic must pass through China's firewall. The firewall adds at least 450 milliseconds to the time it takes a single object hosted on a server outside of China to load.⁸³ In addition, if a provider's content is hosted on the same server as objectionable content, it may be blocked by the firewall along with the objectionable content, even if it is perfectly legitimate.⁸⁴

India

India's rise to prominence in the global computer services industry is among the country's great economic success stories. India is the world's leading exporter of computer and information services, with exports totaling \$33.8 billion in 2009.⁸⁵

⁷⁹ Ibid.

⁸⁰ Determann, "Internet Business Law in China for U.S. Companies," April 2009.

⁸¹ Bakhtiari, "Cloud Computing in China," October 17, 2011.

⁸² Ibid.

⁸³ CDNNetworks, Webinar: Extending Your Web Business into China, n.d.

⁸⁴ Ibid.

⁸⁵ WTO Statistics Database,
<http://stat.wto.org/StatisticalProgram/WSDBViewData.aspx?Language=E>.

Indian firms such as TCS, Wipro, and Infosys are among the most important in the industry worldwide. India's computer services industry has succeeded due to a liberal policy toward foreign investment in the industry; government support for the industry's development through programs such as the Software Technology Parks of India (STPI), which granted eligible firms benefits such as lower taxes and duty-free imports;⁸⁶ and a supply of skilled, English-speaking workers willing to work for wages lower (albeit rising) than those paid to similar workers in developed countries.

Some observers view cloud computing as a potential threat to India's computer services industry. One of the principal offerings of India's largest computer services firms is information technology outsourcing, in which the provider fulfills a broad range of information technology services for the client, such as management of data centers and processing of data (on-site or remotely). IaaS is sometimes viewed as a replacement for elements of traditional IT outsourcing—and thus, a potential threat to the present industry leaders. One recent survey of corporate decision-makers lends credence to this view: 47 percent of respondents said cloud specialist companies (such as Rackspace and Amazon Web Services) were best suited to manage private clouds, compared to 39 percent who said that traditional IT outsourcers were best.⁸⁷

At the same time, numerous information technology firms in India are moving aggressively into cloud services, across all three service models (SaaS, PaaS, and IaaS). Some are "pure play" cloud specialists—cloud services are their core, or only, offerings. For example, Cnergyis is a SaaS provider notable for its early entry into the market: it began offering web-based human resources management software in 2001. It offers a range of web-based applications for managing tasks across the "employee life-cycle," from hiring to separation.⁸⁸ OrangeScape, a PaaS provider founded in 2003, offers a "studio" for developing enterprise applications that is accessed via a Web browser.⁸⁹ Netmagic, which bills itself as India's "first and largest pure-play Managed IT Hosting Services Provider," offers public, private, and hybrid cloud infrastructure services. It runs seven data centers in four Indian cities.⁹⁰

India's IT industry leaders have responded to the growth of customers' interest in cloud computing by developing their own cloud offerings. The firms have portrayed themselves as experts at assisting clients in their transition to the cloud. The firms'

⁸⁶ Software Technology Parks of India (Chennai) Web site, <http://www.chennai.stpi.in/scheme.htm> (accessed November 2011).

⁸⁷ PwC, "The Future of IT Outsourcing and Cloud Computing," November 2011

⁸⁸ Cnergyis Company Web site, <http://www.cnergyis.com/> (accessed December 9, 2011).

⁸⁹ OrangeScape Company Web site, <http://www.orangescape.com> (accessed December 9, 2011).

⁹⁰ BusinessWire, "Indian IaaS Leader, Netmagic, Adds Clout to Cloud," July 27, 2011.

services include integration of IT operations across in-house data centers and cloud infrastructure, movement (“migration”) of data to the cloud, and development of customized SaaS applications. Wipro is an example of a leading Indian IT company that offers all of these services.⁹¹ It also exemplifies another route to success in the cloud market: partnering with multinational market leaders. For example, it is a “Premier” partner of Salesforce.com, and was recently named one of the two leading companies in the world for implementation of Salesforce.com applications.⁹²

Demand for cloud computing services in India is growing along with supply. One consulting firm estimated the size of the Indian market for public cloud services at \$88 million in 2010, and the private cloud market as three-and-a-half times larger. The same source estimated that the share of India’s IT spending devoted to cloud services would increase from 1.4 percent in 2010 to 8.2 percent in 2015.⁹³

Indian firms in numerous industries are adopting cloud services. For example, Hungama, which bills itself as the “largest aggregator, developer, publisher and distributor of Bollywood and South-Asian entertainment content in the world,”⁹⁴ has moved most of its data from in-house data centers to the cloud via Amazon Web Services. The company claims to have lowered its IT costs as a result of the move.⁹⁵ Bajaj Auto Finance adopted Salesforce.com’s customer relationship management (CRM) software in 2009 in order to link over 300 employees across more than 50 cities; the company believes the software was a key factor behind the subsequent, significant increase in Bajaj’s loans.⁹⁶

While these examples suggest that Indian firms have had notable successes in supplying and adopting cloud computing, there are factors that pose long-term challenges to India’s competitiveness in cloud services provision, and IT services more broadly. One is the challenge of securing affordable and reliable sources of energy. The data centers which store and process data for cloud activities use great amounts of energy,

⁹¹ Wipro Company Web site, <http://www.wipro.com/services/cloud-services/Pages/index.aspx>

⁹² Herbert, McCarthy, and Grannan. “Wipro is a Leader,” May 13, 2011.

⁹³ EMC Corporation and Zinnov Management Consulting, “Private Cloud Market in India,” July 19, 2011, 7 and 14. This source estimated that the global market for public cloud services totaled \$21.0 billion in 2010, larger than the estimates by Forrester and Gartner referenced above, but about equal to that produced by IDC.

⁹⁴ Hungama Company Web site, http://www.hungama.org/about_us.php (accessed December 16, 2011).

⁹⁵ Amazon Web Services, “AWS Case Study: Hungama,” n.d.

⁹⁶ Salesforce.com, “Bajaj FinServ Lending,” n.d.

but electricity is expensive, scarce, and unreliable.⁹⁷ While firms have often relied on private sources of power, such as generators, to ensure that their needs are met, the growth of data centers could ultimately be constrained by the weak electricity infrastructure.

The legal environment also poses challenges for the growth of cloud computing. India's Information Technology (Amendment) Act (ITAA), passed in 2008, includes unclear provisions relevant to firms managing large volumes of data. In particular, section 43A of the act states,

Where a body corporate, possessing, dealing or handling any sensitive personal data or information in a computer resource which it owns, controls or operates, is negligent in implementing and maintaining reasonable security practices and procedures and thereby causes wrongful loss or wrongful gain to any person, such body corporate shall be liable to pay damages by way of compensation to the person so affected.⁹⁸

Rules promulgated in 2011⁹⁹ were intended to clarify the meaning of “reasonable security practices” and the circumstances under which parties can be held liable for damages, but only led to further confusion. Notably, the extent to which the rules apply to data associated with individuals outside India (and thus, to cross-border data flows) was not made clear. The implications of this ambiguity for trade could be significant. For example, Indian providers of data storage and processing services might demand that their clients adjust their internal data protection procedures, for fear of unwittingly falling afoul of section 43A. The full implications of this provision on cross-border data flows will depend on additional government guidance.¹⁰⁰

Further Research

This article focuses on cross-border provision of cloud computing services and some of the key challenges countries and providers are facing globally as the cloud grows, such as privacy, security, and localization requirements. While we consider these challenges to be the most pressing ones at present from an international policy perspective, there are additional issues that merit further research. Among these are contract enforcement and liability of the cloud provider for service failures; intellectual property law and its

⁹⁷ Alejandro et al., “An Overview and Examination,” August 2010, 55.

⁹⁸ Information Technology (Amendment) Act, 2008, section 43A, <http://www.cyberlaws.net/itamendments/IT%20ACT%20AMENDMENTS.PDF>

⁹⁹ IBN Live, “Read: The Controversial Internet Control Rules,” April 27, 2011.

¹⁰⁰ Nicholson, “New Indian Privacy and Data Security Rules,” June 2, 2011.

application to cloud providers' services that (intentionally or unintentionally) enable intellectual property infringement; the effect of national regulations on development of open cloud standards and portability of users' data between cloud providers; and whether broadband network capacity can keep pace with the growth of the cloud.

Conclusion

Estimates of the size of the global market for cloud computing services vary, but few observers doubt that it is a multi-billion dollar industry that is growing rapidly. Provision of cloud services across borders is already substantial, and is likely to grow along with the broader market for such services.

Policymakers are struggling to keep pace with the industry's growth and the rapid pace of technological change. Governments have sought to address the chief policy challenges associated with trade in cloud services—ensuring data privacy, security, and the free flow of data—through domestic policies, bilateral agreements, and multilateral institutions. On the international level, approaches have included establishing non-mandatory, best-practice guidelines as well as binding commitments. Industry observers describe both approaches as important: the former may be developed rapidly and are more able to keep pace with technological change, while the latter emerge more slowly, but provide investors a greater sense of certainty about countries' policies.

Developing countries have played a smaller role than developed countries in the market for cloud services and international policymaking related to the cloud. Many developing countries lack the domestic policies and infrastructure needed to more fully develop their cloud industries, but governments and private parties in some of these countries are seeking to address these gaps. China and India illustrate the great potential for growth of cloud computing in developing countries as well as the scope and variety of the challenges that these countries must overcome.

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Implications and Interpretations of Value-Added Trade Balances

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Abstract

Recent academic work has suggested that China's exports to the United States contain a large portion of non-Chinese value added. This paper looks at what the findings of this work could suggest for U.S. and Chinese trade balances, provides some theoretical cautions in interpreting value-added trade findings, and applies those cautions to U.S. and Chinese trade balances.

The paper begins by showing that a country's reported trade balance with the world is always the same as its value-added trade balance with the world. Thus, to the extent that China's net exports to the United States are lower on a value-added than on a reported basis, China's net exports to some other countries must be correspondingly higher on a value-added basis than on a reported basis. China must also have a substantially smaller market for imported final goods than reported import data suggest. Additionally, the paper discusses data and theoretical issues in comparing Chinese value added to value added in other countries.¹

¹ This article represents solely the views of the author and not the views of the United States International Trade Commission or any of its individual Commissioners. This paper should be cited as the work of the author only, and not as an official Commission document. The author thanks Willam Powers for his comments. All errors are the author's. Please direct all correspondence to John Benedetto, Office of Economics, U.S. International Trade Commission, 500 E Street, SW, Washington, DC 20436, email: John.Benedetto@usitc.gov.

Implications and Interpretations of Value-Added Trade Balances

Recent academic work has suggested that China's exports to the United States contain a large portion of non-Chinese value added. This paper shows that these findings are subject to some arithmetic constraints that frame trade balance considerations within the context of China's changing trade relationship with the world. Additionally, this paper suggests several interpretive questions that merit further consideration.

I. Background

In GDP accounts, "value added" is gross output less intermediate inputs. From a trade standpoint, national value added is the value of national work performed (i.e., the contribution of all national factors of production) in a country's exports, thus excluding the contribution made by component production in other countries. For example, if a Chinese company imports \$4 of inputs from Japan, assembles those parts in China, and exports the final product to the United States for \$5, then Chinese output and reported exports are \$5, but Chinese value-added exports are only \$1. Thus, a country's value-added exports can be less than its total exports, as it may have imported some inputs, done some additional work, and then included those imported inputs in its own exports. There has always been the potential to misinterpret one country's exports as entirely the product of that country; recent economic work has suggested that because supply chains are more globalized than ever before, reported exports are a less useful proxy for value added performed in a country than ever before.²

As Charles McMillion points out,³ some of these recent results have been used in popular media to make it sound as if China is not really performing much value

² See, for example, Hammer, Koopman, and Martinez, "Overview of U.S.-China Trade in Advanced Technology Products," May 2011, on the issue of Chinese value added in Chinese exports of advanced technology products to the United States.

³ McMillion, "China Trade Apologists Know a 'Reality' That is NOT True," October 21, 2011.

added, and therefore the U.S. trade deficit with China may not be a large concern.⁴ For example, the *Wall Street Journal* reported that some researchers claimed that traditional trade balance measures “exaggerate” trade imbalances.⁵ This paper discusses trade balances in the context of the new work being performed on value-added trade, and asks what conclusions about trade balances can be drawn from the recent work on value-added in trade.

II. The Constraint: Trade Balances With the World Must be the Same on Both the Reported and the Value-Added Basis

To understand the effect of using value-added trade balances rather than reported trade balances, one must recognize that at the level of trade with the entire world, any country’s reported and value-added trade balances must be the same. For this discussion, a “reported trade balance” will refer to the common measures of a country’s trade balance as currently used, i.e., reported exports⁶ minus reported imports. A “value-added trade balance” will refer to the usually unmeasured trade balances of a country as the domestic value added in its own exports that stays in foreign markets minus the foreign value added in its imports that stays in the country.

As an example of the differences in these definitions, consider the following hypothetical transaction. China imports components from Japan and assembles them into a cellular phone that it exports to the United States. On a reported basis, China

⁴ McMillion also critiques the findings of Linden et al on the Apple iPod. Those findings alleged that roughly 4 percent of the value of an iPod is performed in China. The author of this paper notes that Linden et al attribute the Broadcom processor in an Apple iPod either to the United States or to Singapore and Taiwan, but that Broadcom’s own website notes that it may produce processors in China as well. See Linden, Kraemer, and Dedrick, “Who Captures Value in a Global Innovation System?” 2007, and Broadcom, “Factsheet,” 2011. Later work by Linden et al. acknowledges that the majority of the production jobs in the iPod production chain are in China (Linden, Kraemer, and Dedrick, “Innovation and Job Creation in a Global Economy,” 2009).

⁵ Batson, “Not Really ‘Made in China,’” December 15, 2010. Other examples are cited by McMillion. Often articles on the subject may not overtly state that the recent value-added work shows that the China is not running a large trade surplus with the world. However, the articles will place the work in the context of critiquing those who have raised concerns about China’s currency policies or trade surpluses. See, for example, Gang, “Behind China’s Trade Deficit,” April 30, 2010.

⁶ This definition is equivalent to the “gross exports” term used in Koopman et al., “Give Credit Where Credit is Due,” 2010. This author prefers the term “reported” as “reported” makes clear that the reference is to the actual data as reported by countries’ governments.

now runs a trade deficit with Japan (the value of the imported components) and a trade surplus with the United States (the value of the entire exported cellular phone, with both Chinese and Japanese content). However, on a value-added basis, China runs no trade deficit with Japan (Chinese imports do not stay in China but are instead exported to the United States), and a smaller trade surplus with the United States (only the value of the assembly work performed in China).

To understand how value-added analysis will affect trade balances, one must recognize a crucial constraint: *a country's reported trade balance with the world must be the same as its value-added trade balance with the world.* The following analysis will demonstrate this point.

A country's reported trade balance includes the trade in intermediate products that will go into final products that are in turn re-exported or re-imported, whereas its value-added trade balance does not.

Thus, a country's reported exports include three types of value added: domestic value added that stays overseas, domestic value added that will return home embedded in imports, and foreign value added embedded in the country's reported exports. Similarly, a country's reported imports include three types of value added: foreign value added that will stay in the country for consumption, domestic value added that was previously exported, and foreign value added that will be re-exported (and counted within reported exports).⁷ The reported trade balance is the difference between these reported exports and reported imports.

On the other hand, a country's value-added trade balance with the world is the difference of only two items from above: its exports of domestic value added that stay overseas less imports of foreign value added that stay in the country.

Importantly, as shown in table 1, with regard to a country's trade balance with the entire world, the additional terms in the reported trade balance will always cancel out exactly, i.e., have no net effect. In the table, the terms marked (1) are equivalent and will net each other out, as will the terms marked (2). The (1) and (2) terms represent value added that must travel both as an import and as an export, and so will always cancel out exactly. Thus, at the level of trade with the entire world, a country's reported trade balance with the world must be the same as its value-added trade balance with the world.

⁷ This paragraph reflects the analytical framework in Koopman et al., "Give Credit Where Credit is Due," 2010.

As an example of (1), assume China exports steel to Korea. Korea takes the Chinese steel and makes auto parts that it exports to the United States. The United States takes those parts (containing Chinese-made steel) and uses them to make autos, which China then imports. The Chinese value-added in its steel is counted both as a Chinese export of value-added to Korea and as a Chinese import of value added from the United States (embedded in China's auto imports). Thus, from the standpoint of China's trade balance with the world, the exports and imports of steel will cancel each other out exactly.

TABLE 1 The equivalence of reported and value-added trade balances at the level of trade with the entire world

Item	Exports	Imports	Net
Reported trade balance with the world	Domestic value added that stays overseas	Foreign value added that stays home	Domestic value added that stays overseas minus foreign value-added that stays home
	+	+	
	(1) Domestic value added that will return home in imports	(1) Domestic value added that is embedded in imports	
	+	+	
	(2) Foreign value added that is embedded in exports	(2) Foreign value added that will be embedded in exports	
Value-added trade balance with the world	Domestic value added that stays overseas	Foreign value added that stays home	Domestic value added that stays overseas minus foreign value added that stays home

Source: Author, 2012.

Similarly, as an example of (2), assume China imports components from Japan and uses those components to make cellular phones, which it then exports to the United States. Considering China's trade balance with the world, the Japanese value added in the components will count both as a Chinese import from Japan and as a Chinese export to the United States (embedded in China's exports of the cellular phones), and thereby cancel out.

At the level of bilateral trade, the (1) and (2) terms do not necessarily cancel and so a bilateral value-added trade balance can be different from a reported bilateral trade balance, as discussed in the "background" section above. This potential difference between bilateral value added and reported trade balances is a key insight of most of the value-added literature. However, it is also important to remember the constraint that at the level of trade balances with the world, value-added and reported trade balances must be equal.

As a corollary to the constraint, *all of a country's bilateral value-added trade balances must sum to its reported trade balance with the world.* This is so because a country's value-added trade balance with the world is the sum of all of a country's bilateral value-added trade balances. Since the value-added and reported trade balances with the world are the same, then so too the sum of all of a country's bilateral value-added trade balances must sum to its reported trade balance with the world.⁸

This corollary means that, while any country's bilateral value-added trade balance with one country might be different than its reported bilateral trade balance with that country, the difference must be accounted for in its total trade balance with all other countries.

The analysis can be applied to the current value-added trade literature. For example, the USITC estimated that in 2004, the U.S. value-added trade deficit with China was about \$75 billion rather than the reported 2004 U.S. trade deficit with China of about \$125 billion.⁹

⁸ The constraint and its corollary come from the definition of value added. At the firm level, value added is the firm's output less its inputs. While it may buy inputs from some supplier firms and sell outputs to other purchasing firms, the sum of all those relationships (all its outputs less all its inputs) is the same as its total value added. Similarly, while a country may be a net importer from some countries and a net exporter to others (including importing inputs from some countries that it assembles into exports to other countries), the sum of all of its bilateral value-added trade balances with individual countries is the same as its reported trade balance with the world.

⁹ Figures are author's estimates based on box 3.4 from USITC, *Economic Effects of Significant Import Restraints*, 2011. Using a different aggregation of data, the U.S. Commerce Department reported a 2004 U.S. trade deficit with China of \$162 billion.

However, China's 2004 reported and value-added trade surplus with the world is still the same. Thus, if China's trade surplus with the United States is \$50 billion lower on a value-added basis, then China's trade surplus with all other countries (i.e., the rest of the world) must be \$50 billion higher on a value-added basis.

Similarly, in 2011, economists Johnson and Noguera wrote, based on 2004 data, that "the US-China imbalance is approximately 40 percent smaller when measured on a value-added basis."¹⁰ This magnitude is similar to the results reported by the USITC, and again suggests that China exported a substantial amount of value added to other countries in 2004.

As a general point, any claim that the Chinese trade surplus with the United States is substantially lower on a value-added basis than on a reported basis mandates a fascinating corollary—China is running a much higher value-added trade surplus with other countries than is currently known.

To which countries did \$50 billion of 2004 Chinese net exports go? One possible answer is that China's value-added trade balance with certain countries, such as Japan, is more positive (or less negative) than its reported trade balance with those countries. That is, Chinese reported exports to Japan may have substantial Chinese value added, while its reported imports from Japan could be mostly exported again to third countries, meaning that they would not count as part of China's value-added trade balance. However, no matter which countries China's net exports end up being assigned to on a value-added basis, one should remember that the \$50 billion cannot disappear from China's net exports.

III. China Has a Large Trade Surplus With the World; Therefore It Is Not Just a Final Assembly Point

Some have used the work done on value-added trade balances to suggest that China is mostly a final assembly point that adds little value to its exports. For example, in a December 2011 presentation, economists Kee and Tang postulated that "[d]omestic value added in Chinese exports may be far less than actual gross export[s]."¹¹ Similarly, in 2008, former U.S. Labor Secretary Robert Reich stated that if one were to "subtract

¹⁰ Johnson and Noguera, "The Value-added Content of Trade," June 2011.

¹¹ Kee and Tang, "Domestic Value-added in Chinese Exports," December 2011.

what's merely assembled in China" then "more than half of China's trade deficit [sic]¹² disappears."¹³ The Cato Institute's Daniel Griswold described China as "the final assembly operation in a global factory."¹⁴

These claims are not consistent with some of the work that has been performed so far. In 2011, the USITC estimated that in 2004, about 15 percent of Chinese value added imported into the United States went through third countries, and that Chinese imports had low Chinese value added.¹⁵ In this report, the USITC did not make any claim that China is merely a final assembly platform for products produced elsewhere. Indeed, by dividing the USITC estimate of China's 2004 share of U.S. value-added imports (7.7 percent) by China's 2004 share of U.S. reported imports (11.1 percent), one can estimate that the 2004 U.S. imports of Chinese value added were equal to about 70 percent of the value of 2004 reported U.S. imports from China. This 2004 finding is not consistent with China being mostly a final assembly platform, at least for China's exports to the United States.

Moreover, the analysis in section II above (i.e., that trade balances with the world must be the same on a reported and value-added basis) provides some context and implications for these claims. The constraint shows that, if China's reported trade surplus with the world is large as a percentage of its reported imports, then it must be exporting substantial value-added somewhere. In such a situation, it cannot be mostly a final assembly point.¹⁶

¹² Reich may have intended to mean the U.S. trade deficit with China, but his misstatement is perhaps indicative of a wider problem of confusing the possibility that the U.S. value-added trade deficit with China is lower than the reported U.S. trade deficit with China with the impossibility of China's trade surplus with the world being lower on a value-added basis than on a reported basis.

¹³ Reich, "Don't Blame China for the Trade Deficit," January 2008.

¹⁴ Griswold, "U.S.-China Trade a Collaborative Effort," April 2010.

¹⁵ USITC, *Economic Effects of Significant Import Restraints*, 2011.

¹⁶ The reverse is not necessarily true. That is, a small reported trade surplus is not necessarily a sign that a country is a final assembly point. Instead, the country could be importing and exporting completely unrelated products in roughly the same volumes.

IV. When China has Lower Value-Added Exports Than Reported Exports, Then It Must Also Have a Smaller Final Import Market Than the Reported Data Show

It is also important to note that if China's value-added exports are lower than its reported exports, then its final consumption of imports is also lower than its reported imports. In other words, if China is importing a lot of products for processing into further exports, then China's imports of products for final consumption are that much lower than its reported imports.

China's imports of goods include both (1) imports that stay in China (i.e., are not re-exported) and (2) imports of foreign value added that will be re-exported after further Chinese processing. China's market for goods that stay in China will consist of (1), but not (2). That is, China's imports of goods that stay in China and are not re-exported are equal to its reported imports minus the non-Chinese value-added in China's exports.¹⁷

Using a simple numerical example, assume that only 60 percent of China's reported exports to the world consisted of Chinese value added. (This assumption closely matches the 60.6 percent estimate from China's National Bureau of Statistics, and used in Koopman et al. (2010)).¹⁸ If so, then we must subtract the other 40 percent of China's reported exports from China's reported imports to understand how much of China's imports are actually intended for Chinese final consumption, and not for re-export as part of another product.

Using this assumed ratio (60 percent of China's reported exports are China's value added) on China's 2010 exports of \$1.6 trillion yields an estimate that \$630 billion of China's 2010 reported exports were actually value added from other countries. In turn, however, such an estimate also means that of China's 2010 reported imports of \$1.4 trillion, only \$760 billion¹⁹ was actually for Chinese final consumption. Thus, when China is not adding much value to its exports, then it must be true that the size

¹⁷ Here, for ease of analysis, "goods that stay in China and are not re-exported" include imports of Chinese value added previously exported and now embedded in imports. If such imports exist, then Chinese imports of foreign value added will be less than reported imports minus the non-Chinese value added in Chinese exports, by the amount of imported Chinese value added.

¹⁸ Koopman, et al., "Give Credit Where Credit is Due" 2010.

¹⁹ That is, China's reported imports of \$1.4 trillion less the foreign value added in China's exports of \$630 billion.

of the Chinese market for imported final goods is also substantially smaller than might be assumed from the reported import data or press reports.

It is common in the press to see descriptions of China's market for imports as potentially "vast."²⁰ However, if China's exports consist of a large portion of foreign value added, then its market for imports for consumption must be less vast than reported import data may suggest.

V. Chinese Data and Value Added

Another important reason for recognizing the constraint (i.e., that a country's reported trade balance with the world must be the same as its value-added trade balance with the world) is that the constraint can act as a way to examine the likely growth of Chinese value-added over time. Economic data may not always keep up with rapid changes in the Chinese economy. The analysis in Koopman, Wang, and Wei (2008)²¹ was based on a 2002 domestic value-added multiplier, and resulted in China adding only 50 percent of the value added in its exports, and a much lower percentage in high-tech products. Koopman et al. (2010)²² uses a higher 2007 domestic value-added multiplier of 60 percent of Chinese value-added in Chinese exports. This increase is consistent with economic literature showing that China is moving up the value chain.²³

Data for some broad categories covering China's trade in machinery and electronics illustrate the difference in the nature of China's trade from 2002 to now. In the Harmonized System (HS) of tariff classifications, HS 84 covers machinery and HS 85 covers electronics products, two broad categories that account for a large portion of China's trade with the world. Table 2 shows the change in China's trade balances from 2002 to 2011 in these categories. Irrespective of the reasons for this change, it will

²⁰ See, for example, Hepker, "US to Meet China in Washington to Tackle Thorny Issues," May 2011, and Xinhua, "A Billion Buyers," January 2011.

²¹ Koopman, Wang, and Wei, "How Much of Chinese Exports is Really Made in China?" 2008.

²² Koopman, et al., "Give Credit Where Credit is Due," 2010.

²³ In 2007, economists Li Cui and Murtaza Syed ("The Shifting Structure of China's Trade and Production," 2007) described the processing trade story as a "caricature." Their analysis suggests that by 2006 and 2007, China's production profile had shifted its emphasis away from export processing and toward more sophisticated production. See also Preeg, "U.S. and Chinese Trade Imbalances in Manufactures Surge," 2011, which discusses China's success at moving up the value chain of exports.

affect any work based on the older data. As can be seen from the tables, China's global trade in these categories changes dramatically from 2002 to 2011. In 2002, China's trade flows are consistent with the profile of a country that imports a large amount of parts from other countries and assembles them for export to the United States. By 2010, that profile is no longer accurate, because China is a large net exporter of machinery and electronics to both the United States and the rest of the world.

TABLE 2 China's trade balance in HS 84 and HS 85, selected years between 2002 and 2011

Category	2002	2004	2007	2010	2011
	<i>Trade balance (billions of dollars)</i>				
HS 84 with the United States	6.5	22.2	41.0	58.1	66.5
HS 84 with the rest of the world	-7.9	4.6	63.3	79.5	87.9
HS 85 with the United States	8.5	19.1	43.2	46.1	54.1
HS 85 with the rest of the world	-16.7	-31.4	-0.4	28.4	40.8

Source: Global Trade Atlas data for China, February 2012.

Indeed, for electronics products (HS 85), even the difference between 2007 and 2010 is stark. China goes from running a trade deficit in these products with the rest of the world to running a trade surplus, even as its trade surplus in these products with the United States grows steadily.

While trade data are available within a few months of the events they represent, domestic value-added data are not so quickly available. This gap may indicate a need for caution in applying results from past years, even relatively recent past years, to the current time period.

VI. What Do the Measurements Actually Mean?

Another cause for exercising caution in the interpretation of value-added trade lies in how to interpret the value-added in a country's exports, and is best illustrated with a hypothetical example. Imagine a three-country world consisting of the United States, China, and Taiwan. At first, Taiwan manufactures widgets and exports them to the United States at a cost of \$100 per widget. Widget production consists of producing widget inputs (which cost \$50) and assembling them (which also costs \$50 in Taiwan).

Then, Taiwan offshores the second stage, manufacturing widget inputs with a value of \$50 and exporting them to China. China assembles the inputs for only \$25 per unit. Finally, China exports the \$75 finished widget to the United States.

Caution is recommended in claiming now that China only adds one-third (\$25) of the value added of the finished widget (\$75). Using Taiwan production costs as the metric, China is adding half the value (\$50). From a Taiwan cost basis, \$50 does not buy as much production as \$50 in China does.

There are two possible reasons why China is able to perform the second step of the production process at lower cost than Taiwan: a market reason and a policy reason. Each reason would affect the analysis of China's lower value-added differently.

The first possibility, the market reason, is that China is able to perform the assembly less expensively because free trade has allowed the use of less-expensive Chinese labor in a global market. If so, then it may be accurate to describe China as adding \$25 of value, or one-third of the value of its export. In this case, the less-expensive widget is the result of a gain from trade.

The second possibility is that Chinese Government policies have allowed Chinese firms to perform the second step at a lower cost. These policies (as with those of any country) could include labor regulations, currency policy, and sectoral support policies. To the extent one believes Chinese Government policies are the explanation for lower value added in China, then interpreting China's value-added as only \$25, or otherwise suggesting that this final stage of production is economically less important than the first stage may not be correct.²⁴

As a general point, if any government provides support to its industry, that industry may appear to be adding little value if the government support is not counted in the data on its value-added. Similarly, if two countries have very different labor regulations that reflect different political systems or preferences, those different regulations could lead to different labor costs and thus different value-added for similar work. Depending on the larger issue being examined, interpreting value-added trade flows between countries may require more consideration of these kinds of potential policy differences.

²⁴ In such a circumstance, if one measures trade flows using reported exports rather than value added, one may actually end up with a more accurate measure of real work being performed, albeit for the wrong reasons. However, the point here is not necessarily to advocate using reported exports with this interpretation, but to note that value-added trade still does not account for the issues described above.

VII. Conclusion

There is no question that investigation of the value added in countries' reported trade flows will allow a much greater understanding of value-added trade flows between countries, as the work to date already has. However, it is important to remember the constraint that any country's value-added trade balance with the world must equal its reported trade balance with the world. The implications of that constraint for China's trade include that, if China has high foreign value added in its exports, (1) then its market for imported products that stay in China is also smaller. Additionally, while China runs a large trade surplus with the world, so (2) it cannot be mostly a final assembly point. Keeping the constraint in mind may also help interpretation of recent value-added work in light of some potential data issues. Finally, (3) the theoretical question of why one country is able to produce one stage of production less expensively than another remains important in interpreting any results.

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**The USITC's Roundtable on
Quantifying the Economic Effects
of Trade Agreements:
Discussion Summary**

Web Version:
August 2012

Author:
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Abstract

The roundtable on quantifying the economic effects of trade agreements hosted by the U.S. International Trade Commission brought together professionals representing a variety of ideas, perspectives, and expertise. The discussion presented in this summary represents major topics that were covered by speakers at the roundtable. Overarching themes throughout the discussion included the need to ensure that both analytical methods and results are accessible to policymakers and the public as well as the necessity of expanding economic analysis beyond tariffs to incorporate investment and services.

¹ Correspondence may be addressed to both the author (Caitlyn.Carrico@usitc.gov) and the principal organizer of the event Michael Ferrantino (Michael.Ferrantino@usitc.gov). The author would like to thank Michael Ferrantino for organizing the roundtable as well as his input in the writing of this article. This article summarizes views expressed by roundtable participants. These views are strictly those of the participants and do not represent the opinions of the United States International Trade Commission or of any of its commissioners. This paper should not be cited as an official Commission document. Even though the summary often cites instances of general agreement among some participants, this does not necessarily reflect a consensus view of every participant.

Introduction

The U.S. International Trade Commission (USITC) hosted a roundtable on quantifying the economic effects of trade agreements on April 25, 2012. The roundtable facilitated discourse between representatives of government, think tanks, academia, and other organizations, including both producers and users of economic analysis. The first part of the discussion addressed how economists and policymakers can effectively communicate results from analyses of free trade agreements amongst themselves as well as with the public at large. The second part dealt with the analysis of new issues in free trade agreements. Participants presented a variety of ideas and perspectives on key topics, including the perceived gap between policy questions and economic answers, ensuring public access to data and resources, issues related to the numerical presentation and interpretation of results, the effects of trade on labor, and challenges to analyzing new provisions in free trade agreements. These are discussed in more detail below.

The gap between policy questions and economic analysis

Several roundtable speakers discussed a gap between questions asked by policymakers and answers provided by economists. Attendees noted that whereas economic studies analyzing the effects of trade agreements tend to emphasize market access issues, important topics such as tariffs, services trade, and foreign direct investment (FDI) are often neglected. Attendees also discussed the possibility of incorporating more case studies into analyses, and combining more specific modeling results with the case studies. Participants suggested that less aggregated results would be helpful for policymakers.

One attendee asserted that political decisions precede economic analyses, which then are used to justify pre-existing political positions. In contrast, other discussants emphasized the importance of economic analyses in informing policy. One participant noted that changes in economic trends naturally precede policies, citing as an example the growth in trade flows that anticipates the implementation of certain institutional arrangements, such as trade agreements. The participant suggested that, once in place, these agreements are only the institutionalization of the pre-existing economic forces.

Public access to information

Roundtable speakers discussed the difficulty of ensuring public access to data, much of which is confidential. One discussant emphasized that data should be considered a public good. Attendees also suggested: (1) that economists publicly post the data inputs for their computer models as well as the code used to perform quantifications; (2) that the names of large exporting and importing firms be identified in order to demonstrate the benefits of trade agreements; and (3) that the heterogeneity among firms should be more strongly emphasized, enabling policymakers to better assess the potentially different economic impacts of trade agreements on firms. One speaker specifically discussed how multinational firms dominate trade through strategic interactions with other firms and by seeking to induce competition among governments offering financial support. Revealing the identities of these multinationals, the speaker contended, would not only permit a greater understanding of their roles in global trade and agreements but also allow for more accurate economic modeling.

Several attendees noted that much of the currently available public data may not be appropriate to address policy questions because of issues with quality and availability. For example, mismatches in mirror trade data were said to illustrate discrepancies within trade data sets. In response, one participant emphasized the need for more investment in public data.

Presentation and interpretation of numerical results

Roundtable attendees discussed the public emphasis on the numerical results presented in economic analyses of trade agreements. One discussant mentioned that often the public will focus on key numbers presented in the report without actually reading the entire report for context. Suggestions included assessing results in terms of magnitude and sign as opposed to an absolute number, as individual numbers reported often overshadow other important results, and reporting results in ranges as opposed to providing a single number so as to help economists convey the complexity of their analyses.

Several attendees stressed the importance of making the results accessible to policymakers. Speakers repeatedly discussed issues of transparency and the necessity to explain the nuances embedded in the models and methodology employed in economic analysis without extraneous jargon. One discussant recommended that

economists should take more responsibility to provide better context to accompany analytic results. Additionally, participants suggested that economists should make an explicit distinction between net and gross trade when presenting results, as a misunderstanding between the two may result in a misleading analysis of the impact on jobs. One attendee discussed this distinction in the context of bilateral trade agreements, noting that third country effects may be overlooked in analyses focusing on bilateral effects. Another discussant asserted that although current analyses may only consider the effects of exports on the job market, the impact of imports, which were cited as displacing jobs, also needs to be considered.

Trade effects on labor

A recurring topic was how to appropriately quantify and present the effects of trade on the labor force. One attendee described common misconceptions of economic analyses of trade as stemming from misunderstandings of economic drivers behind the labor market, of relations between labor and trade, and of the distinction between economic simulation and economic projection.

Several participants discussed misinterpretations of the employment figures reported in economic analyses. One roundtable speaker emphasized the difference between jobs and job opportunities, conveying the importance of transparently presenting analytical results. Other participants discussed the need for an enhancement of labor-related analytical results. For example, citing the current convention of quantifying labor as skilled or unskilled, discussants contended that results should be reported at more detailed levels in terms of skill types. One speaker suggested that labor data from the Bureau of Labor Statistics be integrated into economic models.

Attendees addressed concerns over how labor may adjust to economic changes brought on by free trade agreements, stating that economic models do not account for the full cost of adjustment to a worker. One speaker suggested increased collaboration between trade economists, industrial organization economists, and labor economists. Other discussants recommended relaxing the “full employment” assumption typically used in computable general equilibrium (CGE) models and providing transparent documentation highlighting how differences in model assumptions will affect the results.

Quantifying the effects of new issues in free trade agreements

Speakers indicated that modern free trade agreements contain provisions which may not be directly accounted for in current, tariff-focused economic analyses. They discussed the challenges that economists face in assessing these non-tariff provisions, including building appropriate economic models and determining how these provisions may be incorporated into existing CGE models. One attendee noted that although FDI is not accounted for in a typical tariff-focused model, FDI does have the ability to influence trade flows and should be reflected in the analytical framework. Another speaker asserted that institutions and infrastructure play an important role in attracting investment and discussed the difficulty of incorporating these structural factors into economic models. One participant also brought up the need to develop stronger economic analysis incorporating services trade. Although services data are less reliable than commodity data, the participant emphasized the importance of including services in analysis because of the unique ways that the sector influences employment and financial flows.

Roundtable attendees also discussed techniques to expand current economic analysis of free trade agreements. One discussant recommended that the effects of tariffs and other barriers should be modeled using a hurdle approach, e.g. raising the hurdle would prohibit trade whereas lowering the hurdle would promote trade. Another speaker advised implementing more econometric analysis, as econometric modeling of past free trade agreements and provisions could be used to assess current trade agreements. The speaker also noted that econometric analysis could be used to model changes in uncertainty resulting from adjustments to trade barriers.

Concluding Comments

The U.S. International Trade Commission's roundtable on quantifying the effects of trade agreements included a wide variety of participants, representing the public and private sectors, academia, think tanks, and other organizations. Throughout the roundtable, speakers emphasized the importance of fostering the accessibility of economic analyses for policymakers and the public at large, as well as the need to expand current economic models beyond a tariff-focused style of analysis. Participants also discussed current efforts to address issues discussed during the roundtable. One

individual cited a current project to incorporate FDI into a CGE model, while another noted recent work that combined econometric analysis of previously implemented policies as part of an analysis of the economic impact of intellectual property rights. Others discussed boards within various government agencies established to oversee model validation. Overall, participants agreed on the need for more research addressing the issues discussed, and looked forward to continuing the discussions initiated by the roundtable.

**List of external participants at the USITC Roundtable on
Quantifying the Economic Effects of Trade Agreements on
April 25, 2012**

<u>Participant</u>	<u>Title and Affiliation</u>
Laura Baughman	President, The Trade Partnership and Trade Partnership Worldwide, LLC
Douglas Bell	Counselor and the Assistant U.S. Trade Representative for Trade Policy and Economics, Office of the U.S. Trade Representative
Joseph Francois	Professor of Economics, International Business Joahannes Kepler University of Linz, Austria
Mitchell Ginsburg	Senior International Economist, Office of the U.S. Trade Representative
Paolo Giordano	Lead Economist, Trade and Intergration Sector, Inter-American Development Bank
Gary Hufbauer	Reginald Jones Senior Fellow, Peterson Institute for International Economics
Jason Kearns	International Trade Counsel, House Ways and Means Committee
Sean Kulkarni	International Trade Policy Fellow, House Ways and Means Committee

David Leborde Debucquet	Senior Research Fellow, International Food Policy Research Institute
Thea Lee	Deputy Chief of Staff, American Freedom of Labor and Congress of Industrial Organizations
Rodney Ludema	Professor of Economics and Foreign Service, Georgetown University
Renee Mathieu	International Economist, U.S. Department of the Treasury
Travis McArthur	Trade and Finance Researcher, Public Citizen
Sherman Robinson	Senior Research Fellow, International Food Policy Research Institute
Howard Rosen	Resident Visiting Fellow, Peterson Institute for International Economics
Robert Scott	Director of Trade and Manufacturing Policy Research Economic Policy Institute
Bill Shpiece	Deputy Assistant U.S. Trade Representative for Economic Affairs, Office of the U.S. Trade Representative



Labor Standards and Trade: A Review of Recent Empirical Evidence

Web Version:
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Abstract

Over the last two decades, labor standards have become a major issue in international trade. Three developments mark the rise of this issue: first, an international consensus was reached on a set of core labor standards established by the International Labour Organization (ILO); second, bilateral and regional trade agreements have increasingly included more labor standards provisions; and third, consumers have increasingly demanded products produced under better labor conditions. This study evaluates research on the effects of labor standards commitments on labor conditions; the influence of trade openness on labor conditions; and the impact of compliance with labor standards on trade performance.

The research suggests that the ratification of ILO conventions does not result in improved labor conditions. On the other hand, research appears to show that agreements, when reinforced by factors such as enforcement mechanisms, positive incentives, and market forces, may improve compliance with labor standards, bringing about better labor conditions. Another line of research suggests that trade openness may improve rather than degrade labor conditions. Finally, the research finds no clear evidence that

¹ The views expressed in this paper are those of the authors alone. They do not necessarily reflect the views of the U.S. International Trade Commission or any of its individual Commissioners. The authors would like to thank Jennifer Baumert Powell for her insightful comments.

countries can improve their trade performance by maintaining poor labor conditions, contrary to the “race to the bottom” point of view.

Labour union lobbies and their political friends have decided that the ideal defence against competition from the poor countries is to raise their costs of production by forcing their standards up, claiming that competition with countries with lower standards is “unfair.” “Free but fair trade” becomes an exercise in insidious protectionism that few recognise as such.

—Jagdish Bhagwati, “Obama and Trade: An Alarm Sounds,” Financial Times, January 9, 2009.

As long as poor labor standards exist in one country, workers everywhere will be hurt. Governments that neglect or oppress their laborers make the choice to strip their own citizens of their rights as human beings. Not only this, but they create unfair pressure in the global economy. If one country offers oppressively cheap labor, other countries become compelled to do the same to merely remain competitive. This global “race to the bottom” creates poor conditions and loss of freedom in the global South, and causes workers in the global North to lose their jobs to cheap outsourced labor.

—International Labor Rights Foundation, “Changing Global Trade Rules” (accessed February 15, 2012).

<http://www.laborrights.org/creating-a-sweatfree-world/changing-global-trade-rules>.

Introduction

For a long time critics and advocates have debated the merits of linking labor standards and trade. Critics of moves to include labor standards provisions in trade agreements argue that protectionist motives underlie what masquerades as a welfare-improving agenda. They argue that developing countries that raise standards for their workers risk losing their comparative advantage and suffering a decline in export performance, which may lead to dwindling per capita income. On the other hand, advocates of trade-linked labor standards aim to halt a “race to the bottom” in which national labor conditions are degraded in an attempt to lower production costs in the face of expanding international trade and competition. These advocates maintain that the labor standards provided in trade agreements level the playing field because they require countries to meet an acceptable level

of labor conditions and eliminate a source of “unfair” economic advantage.² News exposés of poor labor conditions in the supply chains of multinational corporations bolster the advocates’ case and fuel popular concern. However, empirical research adds another twist to the protectionism versus “race to the bottom” debate by suggesting that low labor standards actually erode competitiveness by reducing incentives to invest in human capital.³ Furthermore, some advocates argue that adherence to labor standards can actually improve competitiveness, as higher labor standards motivate firms to invest in such things as productivity-enhancing training to justify the expense of adopting the standards.⁴ This paper examines recent empirical evidence aimed at clarifying the links between labor standards, trade openness, and trade performance.

Although labor standards are not part of the World Trade Organization (WTO) agenda due to opposition from many developing countries, the inclusion of such standards in bilateral and regional trade agreements is becoming more common.⁵ The United States and the European Union (EU) have used bilateral and regional free trade agreements (FTAs) in addition to unilateral trade preference programs to link labor standards to market access, imposing trade sanctions on countries that do not enforce international standards. Indeed, since 1993, all FTAs with the United States have included labor standards provisions, with varying degrees of enforceability.⁶

² Most developing countries reject the linking of labor standards to trade, while industrialized countries tend to support this linkage.

³ Luinstra, “Labor Standards and Trade,” 2004.

⁴ Ibid.; Brown, Deardorff, and Stern, “International Labor Standards and Trade,” 1996; Kochan and Nordland, “Reconciling Labor Standards and Economic Goals,” 1989.

⁵ Brown and Stern, “What are the Issues in Using Trade Agreements?” 2008. The heated debate about the linking of trade and labor standards continues. Indeed, the Washington Trade Daily (2011) reports that as recently as the 2011 ILO Ministerial Conference, industrialized countries pushed for the establishment of a “social protection floor,” which they argued is “essential for addressing the rights of the workers in a post-crisis economic world” (WTD, “Labor and Trade—Again,” June 2011). Luinstra (2004) points out that most stakeholders from industrialized and developing countries agree on the importance of having minimum standards (Luinstra, “Labor Standards and Trade,” 2004). However, when it comes to labor conditions, many developing countries reject the proposal to link trade and labor standards. One trade minister commented that, “Since the Seattle trade ministerial conference in 1999, we have consistently maintained that there cannot be any linkage between trade and labor standards. We fear that these standards would be used as a protectionist tool.” WTD, “Labor and Trade—Again,” June 2011.

⁶ Bolle, “Overview of Labor Enforcement Issues,” 2008.

Problems with the measurement of labor standards compliance and a lack of comparable cross-country data have historically hampered efforts to analyze the trade-labor standards relationship. However, more extensive and better data have accompanied the growing presence of labor standards in trade agreements, allowing for more sophisticated analysis. There is also a growing acknowledgement of endogeneity problems (discussed below), and empirical approaches are being developed to address the resulting biases. Disentangling the links between labor standards, trade openness, and trade flows remains a challenge.

In this paper, we evaluate research that looks at the effects of labor standards commitments on labor conditions, the effects of trade openness on labor conditions, and the impact of labor conditions on trade performance.⁷ The literature examining the relationship between labor commitments and labor conditions is limited, but available evidence indicates that the ratification of labor clauses does not influence labor conditions. However, the research suggests that when commitments are accompanied by enforcement mechanisms, positive incentives, and/or certain market factors, such as increasing consumer and corporate buyer demands for products produced under better labor conditions, they may have a positive effect on labor conditions. Another line of empirical research on labor standards responds to critics that suggest that openness to trade leads to a degradation in labor conditions. This research finds that trade openness is actually associated with improved labor conditions. And finally, studies examining labor conditions and trade performance have not found clear evidence that countries can improve their trade performance through poor labor conditions.

The first section of this paper defines labor standards and discusses its emergence as a trade issue in the 20th century. The second section considers labor standards enforcement mechanisms and the challenges surrounding their application. The second section also reviews recent literature that examines the impact of labor standards provisions in trade agreements and International Labour Organization (ILO) convention ratifications on labor conditions.⁸

⁷ Given that we are interested in evaluating the relationship between trade and labor standards, we do not evaluate literature that focuses exclusively on trade and wages. This is because there is a separate and well-developed literature on trade and wages. For a discussion of the trade and wages literature, see the report by the OECD, ILO, World Bank, and WTO, *Seizing the Benefits of Trade*, 2010. In addition, there are important mechanisms such as international migration, capital flows, and economic growth that influence labor conditions that are not explicitly considered here. For an examination of these issues, see Flanagan, *Globalization and Labor Conditions*, 2006.

⁸ For a survey of earlier literature examining labor standards and trade, see Brown, "International Trade and Core Labour Standards," 2000.

The third section of the paper presents empirical evidence on the relationship between a country's level of openness to trade and its labor conditions, while the fourth considers research on the impact of labor conditions on export performance. A summary follows with suggestions for further research.

International Trade and Labor Standards

Defining National and International Labor Standards

According to the Organisation for Economic Co-operation and Development (OECD) (1996) labor standards are “norms and rules that govern working conditions and industrial relations.”⁹ They cover a wide range of issues, from those considered fundamental human rights—such as freedom from forced labor, freedom of association, and the elimination of exploitative child labor—to others issues that, according to Portes (1994), fall into categories such as civic rights (e.g., collective bargaining) and security rights (i.e., rights that capture the characteristics of a labor contract, such as protection against arbitrary dismissal).¹⁰

The literature divides labor standards according to whether they cover (1) working conditions (e.g., minimum wage and hours, occupational health and safety, and social security); or (2) labor rights (e.g., nondiscrimination, freedom of association, and elimination of child labor).¹¹ Throughout this paper the term “labor standards” is defined as a set of norms and rules, following the OECD definition, while the term “labor standards compliance” is used as an indicator of “labor conditions.” In turn, “labor conditions” refers to on-the-ground conditions (i.e., working conditions and/or labor rights).

Formal labor standards are established at the national level through national labor laws and regulations and at the international level through global institutions such

⁹ OECD, *Trade, Employment, and Labour Standards: A Study of Core Workers' Rights and International Trade*, 1996, 25.

¹⁰ Portes, “When More Can Be Less,” 1994.

¹¹ The literature also refers to working conditions as “cash standards” because they directly impact labor costs and labor rights as “noncash standards.”

as the ILO and regional institutions.¹² National governments are responsible for statutory regulation and enforcement of national labor standards, which are typically mandatory and which include sanctions for noncompliance.¹³ Many governments, especially those of low-income countries, have neither established nor enforced labor standards effectively.¹⁴ By contrast, high-income countries tend to have an enabling environment (i.e., better institutions and a stronger rule of law) that makes it easier to establish and enforce labor standards. It is therefore not surprising that higher national income is correlated with compliance with core labor standards.¹⁵ Indeed, Flanagan (2006) finds a positive relationship between a country's level of economic development and its labor conditions.¹⁶

ILO labor standards can take the form of either conventions or recommendations. The former represent international treaties that are legally binding on states that ratify them, while the latter are nonbinding guidelines. The ILO, created in 1919 as part of the Treaty of Versailles that followed World War I, became the first specialized UN agency in 1946. According to its mandate, the ILO “seeks the promotion of social justice and internationally recognized human and labour rights.”¹⁷ Among its four strategic objectives is to “promote and realize standards and fundamental principles and rights at work.” The ILO comprises representatives of governments, employers, and workers who work together to achieve the organization's strategic objectives. ILO conventions and recommendations articulate international labor standards, which include freedom of association, the right to organize, collective bargaining, the abolition of forced labor, equality of opportunity and treatment, and other standards that address work-related conditions.¹⁸

¹² In addition, informal labor standards and a myriad of private voluntary standards exist. The former are established through norms embedded in institutions and communities (DFID, *Labour Standards and Poverty Reduction*, 2004). The latter have emerged as a response to market pressures. These are typically defined and enforced at the firm level by private sector actors. Private voluntary standards will be discussed further in the next subsection.

¹³ Luinstra, “Labor Standards and Trade,” 2004.

¹⁴ *Ibid.*

¹⁵ *Ibid.*

¹⁶ Flanagan, *Globalization and Labor Conditions*, 2006.

¹⁷ ILO, “ILO Mandate,” 2000.

¹⁸ *Ibid.* In addition, the ILO provides technical assistance in a variety of labor-related fields, including occupational health and safety, workforce development, labor justice, and social safety nets. It also promotes the development of independent employers' and workers' organizations and provides training and advisory services to those organizations.

Member states that ratify an ILO convention must incorporate its principles into national labor law, and they are required to submit reports to the ILO on their compliance with the convention. However, compliance with reporting requirements is low. The ILO is empowered to investigate noncompliance complaints through Article 26, and it may, following an investigation and report, recommend that a country change its laws and practices. On the other hand, the ILO has no meaningful enforcement tools, such as sanctions for noncomplying countries. Instead, it has “soft” enforcement mechanisms, which include a supervisory system that reinforces compliance through information distribution and transparency.¹⁹

By 1997, the ILO had adopted 181 conventions relating to a wide range of labor standards.²⁰ The international community recognized that this maze of standards coupled with low ratification rates was a problem.²¹ In response, the ILO created a hierarchy of ILO conventions through its *Declaration on Fundamental Principles and Rights at Work* (ILO Declaration) (1998). According to the ILO, the core labor standards established by the ILO Declaration represent a global consensus on the minimum standards to apply universally to the treatment of labor.²²

The ILO Declaration establishes basic human rights in the workplace, focusing on worker rights rather than direct economic outcomes.²³ It obligates all member states, regardless of their level of development, to promote four fundamental labor principles even if they have not ratified the corresponding conventions. These principles, referred to as the ILO’s core labor standards, are defined with reference to eight ILO conventions.

These are:

1. Freedom of association and effective recognition of the right to collective bargaining (Conventions 87 and 98);
2. Elimination of all forms of forced or compulsory labor (Conventions 29 and 105);

¹⁹ Flanagan, “Labor Standards and International Advantage,” 2003.

²⁰ ILO, “Official Titles of the Conventions,” 2011. As of 2011, the number of ILO conventions had increased to 189.

²¹ DFID, Labour Standards and Poverty Reduction, 2004, 9.

²² ILO, A Fair Globalization, 2004, 92.

²³ OECD, International Trade and Core Labor Standards, 2000 and Flanagan, “Labor Standards and International Competitive Advantage,” 2003.

3. Effective abolition of child labor (Conventions 138 and 182); and
4. Elimination of discrimination in respect of employment and occupation (Conventions 100 and 111).

The core labor standards enjoy a special status because the ILO Declaration refers to them as “enabling rights.” This means that they are meant to enable people to claim (on the basis of equality of opportunity) fair compensation and to fully achieve their potential as human beings.²⁴ A variety of international institutions consistently refer to core labor standards in their work on labor issues.²⁵ The standards are incorporated into the United Nations’ Global Compact, the OECD Guidelines for Multinational Enterprises, and the International Covenant on Economic, Social, and Cultural Rights. Some of these standards are also included in other international instruments, such as the Universal Declaration on Human Rights.²⁶

The nature of the obligation that member states have vis-à-vis the ILO’s core labor standards is ambiguous. This ambiguity is due to the fact that all member states automatically ratify the ILO Declaration by virtue of their accession to the ILO, but not all choose to ratify the ILO core conventions. Cabin (2009) maintains that the ILO Declaration promotes open-ended principles that encourage the proliferation of divergent international labor standards.²⁷ In seeking to clarify the meaning of labor standards provisions in trade agreements, it is important to recognize how inconsistently countries apply them.²⁸

In addition, there is some question about what ratification means. The OECD maintains that there is a big difference between the act of ratifying conventions on

²⁴ Luinstra (2004) clarifies that core labor standards “are distinct from ‘cash standards’... which mandate particular outcomes and may directly affect labor costs” (Luinstra, “Labor Standards and Trade,” 2004, 3).

²⁵ Doumbia-Henry and Gravel, “Free Trade Agreements and Labour Rights,” 2006.

²⁶ DFID, Labour Standards and Poverty Reduction, 2004.

²⁷ Cabin, “Labor Rights in the Peru Agreement,” 2009.

²⁸ Ibid.

paper and actually enforcing the conventions on the ground.²⁹ Does the ratification of ILO conventions imply that a country aims to improve its labor standards? Or do countries ratify conventions because they have already achieved the standard in question? As will be discussed later, Flanagan (2003) finds that the adoption of international labor standards is typically a symbolic act that does not impact labor rights or working conditions.³⁰ Discussions of this issue tend to evoke methodological questions, as will be discussed in more detail below.

Linking International Trade and Labor Standards

Labor rights protection manifested itself as a trade issue in a brief article of the Havana Charter in 1948. Arguing that unfair labor conditions in the export sector could distort international trade flows, the article pressed governments to work closely with the ILO and to address labor rights in subsequent conventions and trade agreements.³¹ The General Agreement on Tariffs and Trade (GATT) and the WTO succeeded the failed Havana Charter; however, the protection of labor rights was excluded from both.

Following the establishment of the WTO, a number of developed countries again raised the issue of “unfair economic advantage” stemming from weak enforcement systems and low labor standards. They also voiced concern about the potential for a race to the bottom, as countries might feel pressure to degrade their labor standards to maintain their competitiveness.

The developed countries pressed the WTO to incorporate labor standards into its mandate, but developing countries opposed these efforts. The WTO 1996 Singapore Ministerial Conference represents a consensus position in this tug-of-war between developed and developing countries on labor standards (box 1). At the conference, WTO members repeated their rejection of labor standards as a WTO issue, but affirmed their support for the ILO’s role as the body responsible for labor standards,

²⁹ OECD, *International Trade and Core Labor Standards*, 2000, 30.

³⁰ Flanagan, “Labor Standards and International Competitive Advantage,” 2003

³¹ Interim Commission for the International Trade Organization, “Havana Charter,” 1948.

and their commitment to respect internationally recognized fundamental labor standards as long as these standards are not used for protectionism.³²

Bilateral and regional free trade agreements (FTAs) have made more progress than multilateral accords in linking labor standards provisions to trade. Since 1993, the United States has negotiated 13 FTAs that include varying levels of labor commitments and enforceability.³³ Increasingly, FTAs include labor provisions in the main body of the agreement rather than in a side agreement. For example, although the North American Free Trade Agreement (NAFTA) included a side agreement on labor (the North American Agreement on Labor Cooperation), U.S. FTAs signed with Jordan; Chile; Singapore; Australia; Morocco; Bahrain; Oman; the Dominican Republic and the Central American countries of Guatemala, El Salvador, Honduras, and

Box 1. 1996 WTO Singapore Declaration

“We renew our commitment to the observance of internationally recognized core labour standards. The International Labour Organization (ILO) is the competent body to set and deal with these standards, and we affirm our support for its work in promoting them. We believe that economic growth and development fostered by increased trade and further trade liberalization contribute to the promotion of these standards. We reject the use of labour standards for protectionist purposes, and agree that the comparative advantage of countries, particularly low-wage developing countries, must in no way be put into question. In this regard, we note that the WTO and ILO Secretariats will continue their existing collaboration.”

http://www.wto.org/english/thewto_e/whatis_e/tif_e/bey5_e.htm

³² WTO, “Labour Standards: Consensus, Coherence, and Controversy,” online report at http://www.wto.org/english/thewto_e/whatis_e/tif_e/bey5_e.htm.

³³ Bolle, “Overview of Labor Enforcement Issues,” 2008. In addition to FTAs, the United States has established unilateral trade preference programs such as the Generalized System of Preferences (GSP), the Caribbean Basin Initiative (CBI), the African Growth and Opportunity Act (AGOA), and the Andean Trade Preferences Act (ATPA) with developing countries, which link eligibility to respect for labor rights (Polaski, “Protecting Labor Rights through Trade Agreements,” 2003). With respect to GSP, the office of the U.S. Trade Representative (USTR) adopted regulations and procedural guidelines for filing petitions to challenge GSP status based on noncompliance with labor commitments (Compa and Vogt, “Labor Rights in the Generalized System of Preferences,” 2001). Further, the U.S. recently released the 2012 model Bilateral Investment Treaty (BIT), which includes expanded labor obligations such as an obligation not to “waive or derogate” from domestic laws; an obligation to “effectively enforce” domestic laws; a provision whereby parties reaffirm their commitments under the ILO Declaration; and stronger consultation procedures than those found in the 2004 BIT. USTR, “Model Bilateral Investment Treaty,” 2012.

Nicaragua (CAFTA-DR); Peru; Colombia; Panama; and Korea all include labor provisions in the bodies of the agreements.

Increasing consumer, investor, and multinational company demands for products produced under decent labor conditions are also shaping the rules of international trade. Starting in the 1990s, a consumer backlash against sweatshop labor grew alongside trade liberalization, adding another dimension to the trade-labor standards linkage. The anti-sweatshop campaigns were damaging to the reputations of a number of multinational companies. As a result, the firms most averse to risking their reputations among this group developed voluntary workplace codes of conduct and made compliance a factor in their sourcing decisions.³⁴ In addition, socially responsible investment (SRI) strategies that consider financial, environmental, and social performance—including labor standards compliance—are another channel through which market forces are influencing the international trade agenda.³⁵ Together, these developments have contributed to the emergence of labor standards as a major trade issue, prompting academics to examine the relationship between labor commitments, market openness, and labor conditions.

Labor Standards Commitments and Labor Conditions

Do the labor standards commitments of various countries—as represented by labor provisions in trade agreements or the ratification of ILO conventions or both—have any impact on labor conditions? Despite the growing inclusion of labor provisions in trade agreements, there is little research that examines how these commitments affect labor conditions. Current research suggests that ratification is endogenous—that is, countries that already have high standards tend to ratify conventions because the cost is low. Additionally, the research has found no evidence that ratification improves labor conditions. A second strand of the literature has found, however, that certain factors may influence how trade agreements affect adherence to labor standards. Overall, given the paucity of research so far, more work is needed to confirm these results.

We begin this section by surveying the labor commitments and enforcement mechanisms included in recent trade agreements. We next present empirical findings about the relationship between ILO convention ratification and labor conditions,

³⁴ Salem, “CIMCAW, Final Report,” 2008.

³⁵ ILO, *A Fair Globalization*, 2004, 95.

and then we discuss research examining factors (such as enforcement mechanisms) that influence the impact of trade agreements on labor standards compliance at the regional, national, and factory levels.

Labor Commitments and Enforcement Mechanisms

Labor provisions in U.S. FTAs generally cover the majority of the ILO core labor standards: freedom of association, the right to form unions and bargain collectively, limitations on child labor, and the elimination of forced labor.^{36, 37} In addition, some of these agreements include cash standards on minimum wages, hours, and occupational health and safety. All U.S. FTAs require parties to enforce their national laws; however, with the exception of the last four FTAs (with Peru, Colombia, Panama, and Korea), they do not require that parties' national laws conform to ILO core labor standards.³⁸ ILO core labor standards are mentioned in many agreements, but they generally represent aspirations rather than enforceable commitments.³⁹ By contrast, the EU GSP/GSP+⁴⁰ offer additional market access to countries enforcing the ILO core labor standards.⁴¹

³⁶ Polaski, *Protecting Labor Rights through Trade Agreements*, 2003. Note that nondiscrimination rights are not part of the U.S. labor-trade provisions. In addition, the North American Agreement on Labor Cooperation (NAALC) is unique in that it goes beyond the ILO core labor standards by including protection for migrant workers' rights and workers' compensation for injury or illness, among others (see <http://www.dol.gov/ilab/media/reports/nao/naalcd.htm#Obligations>).

³⁷ U.S. unilateral trade preference programs require that the recipient countries comply with "U.S. internationally recognized worker rights," as defined by the U.S. Trade Act of 1974. The standards are similar to the ILO core labor standards; however, they exclude the standard on the elimination of all forms of discrimination. In its place, the U.S. substitutes labor standards on minimum wages, maximum hours, and occupational health and safety. Bolle, "Overview of Labor Enforcement Issues," 2008.

³⁸ Elliott and Freeman, *Can Labor Standards Improve under Globalization?* 2003; Bolle, "Overview of Labor Enforcement Issues," 2008.

³⁹ Polaski, "Protecting Labor Rights through Trade Agreements," 2003.

⁴⁰ First introduced in 1971, the Generalised Scheme of Tariff Preferences (GSP) is an autonomous trade agreement through which the EU provides preferential market access to approximately 176 developing countries and territories. EU GSP covers around 6,350 products, provides duty-free access to non-import-sensitive products, and a 3.5 percent reduction in most favored nation (MFN) tariff levels for import-sensitive products. The Special Incentive Arrangement for Sustainable Development and Good Governance (EU GSP+), introduced in 2006, incentivizes especially vulnerable developing countries to ratify and implement 27 international conventions in the fields of human rights, core labor standards, sustainable development, and good governance. The incentives include an expanded number of covered products (6,421) and the elimination of duties on all covered products. UNCTAD provides an overview of the EU GSP preference scheme at http://unctad.org/en/docs/itcdsbmisc25rev3_en.pdf.

⁴¹ Doumbia-Henry and Gravel, "Free Trade Agreements and Labour Rights," 2006; Bakhshi and Kerr, "Labour Standards as a Justification for Trade Barriers," 2010.

The U.S. FTAs recently concluded with Peru, Colombia, Panama, and Korea incorporate a bipartisan agreement on labor enshrined in the 2007 Bipartisan Agreement on Trade Policy.⁴² In contrast to earlier FTAs, the policy establishes a fully enforceable commitment requiring FTA countries to adopt, maintain, and enforce the ILO core labor standards in their laws and practices; refrain from lowering their standards; apply the same enforcement provisions for labor and commercial disputes; and refrain from defending their inability to enforce core labor standards on the basis of limited resources.⁴³

Polaski (2003) suggests that the legal framework for enforcement may influence the degree of compliance with labor standards on the ground.⁴⁴ She outlines a continuum of enforceability, with fully enforceable labor obligations that carry the same status as commercial obligations at one end, and hortatory commitments that are not enforceable through the trade agreement at the other end. For example, under the North American Agreement on Labor Cooperation (NAALC)—the NAFTA side agreement—only a party’s systematic failure to enforce its own occupational safety and health, child labor, or minimum wage standards is enforceable, under certain circumstances, with sanctions. Meanwhile, all commercial provisions are enforceable under the NAFTA.⁴⁵ By contrast, the last four U.S. FTAs have included identical enforcement provisions for commercial and labor disputes.⁴⁶ Under some agreements, a country’s labor commitments may be subject to supranational review by a neutral, international dispute settlement panel, which might include binding dispute settlement procedures and penalties, (e.g., fines and sanctions) if a party fails to carry out its commitments.⁴⁷ The NAALC, the U.S.-Chile FTA, and the U.S.-Singapore FTA dispute settlement panels can impose fines used to fund programs that improve labor conditions.⁴⁸

⁴² Bolle, “Overview of Labor Enforcement Issues,” 2008. A summary of the agreement is available at http://www.ustr.gov/sites/default/files/uploads/factsheets/2007/asset_upload_file127_11319.pdf.

⁴³ Ibid., 3.

⁴⁴ Polaski, “Protecting Labor Rights through Trade Agreements,” 2003.

⁴⁵ Bolle, Overview of Labor Enforcement Issues, 2008. See also http://new.naalc.org/naalc/naalc-full-text/part_five_resolution.htm.

⁴⁶ Ibid.

⁴⁷ Polaski, “Protecting Labor Rights through Trade Agreements,” 2003.

⁴⁸ The NAALC and the Canada-Colombia Agreement on Labor Conditions (CCALC) have a two-tiered system in which not all labor rights violations are subject to sanctions (ibid.).

Although the agreements' dispute settlement mechanisms have the potential to improve the effectiveness of FTA labor provisions, settlement panels may find resolution of disputes challenging because the obligations are unclear. Cabin (2009) argues that the nature of the obligations under the U.S.-Peru Free Trade Agreement is ambiguous because neither party has ratified all eight of the underlying ILO Declaration conventions.⁴⁹ Bolle (2010) finds a similar discrepancy in the Colombia Free Trade Agreement (CFTA), under which the four ILO core labor standards, but not explicitly the ILO conventions behind them, are enforceable through the same dispute settlement mechanism that applies to all other provisions in the agreement.⁵⁰ She adds that even those agreements that call for fully enforceable labor provisions include language suggesting that trading partners are obligated to uphold the principles in the ILO Declaration and not the details of the conventions.⁵¹ Bolle (2008) points out that because the principles in the ILO Declaration are less detailed than the commercial obligations, labor disputes may be more difficult to resolve.⁵²

Clearly, there are challenges to ensuring that enforcement mechanisms elicit compliance. Some critics argue that the traditional enforcement mechanisms, which provide negative incentives to comply, are insufficient. Indeed, Doumbia-Henry and Gravel (2006) claim that some developing countries lack capacity, resources, and/or the political will to enforce labor standards. They, along with Berik and van der Meulen (2010) and Polaski (2003), suggest that it might be possible for positive incentives to elicit compliance.⁵³ Polaski (2003) also maintains that faster and sustained improvement in labor conditions can be obtained if capacity building and technical assistance accompany economically meaningful enforcement mechanisms.⁵⁴ Doumbia-Henry and Gravel (2006), Berik and van der Meulen Rodgers (2010), and

⁴⁹ Cabin, "Labor Rights in the Peru Agreement," 2009. Doumbia-Henry and Gravel (2006) add that when a country ratifies an ILO convention on a specific principle, the ILO has an effective supervisory system in place to determine compliance. However, when the relevant convention is not ratified, there is no mechanism to rigorously assess compliance. In such a case, it is difficult to evaluate whether national laws conform to ILO standards due to a lack of impartial criteria for assessing the compliance of all FTA signatories. Doumbia-Henry and Gravel, "Free Trade Agreements and Labour Rights," 2006.

⁵⁰ Bolle, Proposed U.S.-Colombia Free Trade Agreement, 2010.

⁵¹ Bolle, Overview of Labor Enforcement Issues, 2008.

⁵² Ibid.

⁵³ Doumbia-Henry and Gravel, "Free Trade Agreements and Labour Rights," 2006; Berik and van der Meulen Rodgers, "Options for Enforcing Labour Standards," 2010; Polaski, "Protecting Labor Rights through Trade Agreements," 2003.

⁵⁴ Polaski, "Protecting Labor Rights through Trade Agreements," 2003.

Polaski (2003) identify the 1999 U.S.-Cambodia Textile Agreement as an example of how capacity building and positive incentives can support compliance with labor standards.⁵⁵ The agreement provided for a factory-monitoring and capacity-building program administered by the ILO. Polaski (2006) and Doumbia-Henry and Gravel (2006) report progress on wages and labor conditions in Cambodia's apparel sector between 1999 and 2004. This was achieved without jeopardizing export or job growth. However, Berik and van der Meulen Rodgers (2010) point out that there is some dispute as to the extent of the improvements over this period.⁵⁶ There is also evidence that the improvements in labor conditions occurred alongside continued violations of freedom of association and collective bargaining rights. Polaski (2006), Doumbia-Henry and Gravel (2006) and Berik and van der Meulen Rodgers (2010) suggest that the positive incentives and capacity building were important factors in bringing about the improvements in compliance with labor standards that occurred.⁵⁷

Empirical Evidence

As previously discussed, there is limited empirical evidence on the impact of ILO conventions and trade agreements' labor provisions on labor conditions. This is due, in part, to measurement problems and the scarcity of reliable data. Although measurement methods have become more sophisticated with the creation of new indicators and subindicators, as well as new methods for weighting and aggregating indicators (Barenberg 2011), there is no consensus on how to evaluate labor conditions.⁵⁸ Cross-country comparisons are particularly risky because data are produced by national statistical offices that may not use common definitions for the indicators.⁵⁹ In addition, endogeneity issues surround the relationship between the ratification of conventions and labor conditions. However, it is important to consider that there are countries such as the United States that have achieved many if not all of the standards, but have not ratified all of the ILO conventions because, in part, of technical inconsistencies between their national legislation and the ILO conventions. Resolving these inconsistencies could prove costly.⁶⁰

⁵⁵ The agreement, in force between 1999 and the end of 2004, raised quotas for textile and apparel exports from Cambodia to the United States in exchange for Cambodia achieving 'substantial compliance' with its national labor laws and the ILO's core labor standards.

⁵⁶ Berik and van der Meulen Rodgers, "Options for Enforcing Labour Standards," 2010.

⁵⁷ Ibid.

⁵⁸ Barenberg, "Formulating and Aggregating Indicators of Labor Rights Compliance," 2011.

⁵⁹ Flanagan, *Globalization and Labor Conditions*, 2006.

⁶⁰ Elliott, "Labor Standards and the Free Trade Area of the Americas," 2003.

Flanagan's results (2003) support this point.⁶¹ Flanagan attempts to understand whether the adoption of ILO labor standards improves labor conditions, particularly with regard to child labor, civil liberties, and the health of the workforce ("exogenous ratification"), or whether labor conditions influence a country's ratification of labor standards ("endogenous ratification"). In order to map the direction of influence, Flanagan estimates a simultaneous equation model using a three-stage least squares (3SLS) estimation strategy, which corrects the endogeneity problem by instrumenting for the ratification variables. His analysis—which incorporates 1980 and 1990 data for 100 countries—reveals that ratification does not improve labor conditions; rather, ratification is determined by a country's current labor conditions, which are generally linked to the country's level of economic development.

The remaining studies we evaluate examine such factors as enforcement mechanisms, positive incentives, and market forces that may influence the impact of trade agreements on labor conditions. The first of these studies is by the Washington Office on Latin America (WOLA).⁶² WOLA conducted a qualitative study examining the effectiveness of U.S.-funded projects aimed at strengthening labor rights in countries party to the Dominican Republic-Central America-United States Free Trade Agreement (CAFTA-DR) for the period 2006 to 2009. The study finds that projects aimed at improving Central American countries' ability to comply with their labor-related commitments did not result in better labor conditions in the areas of gender discrimination, child labor, or freedom of association. It also, however, finds that weak enforcement mechanisms decrease the effectiveness of labor obligations. In particular, it asserts that one of greatest barriers to improving labor conditions through CAFTA-DR is the unequal treatment of labor and commercial violations.

Somewhat different results were obtained from an examination of labor conditions in Bangladesh and Cambodia. In a 2010 study, Berik and van der Meulen Rodgers use data from surveys, focus groups, and inspections to examine the paths countries take in response to pressure to improve price competitiveness in one key export sector: textiles and apparel.⁶³ Both countries are among the poorest Asian economies, have some of the lowest labor costs in the world, and have a history of poor labor conditions.⁶⁴ However, while Bangladesh's labor conditions have not improved over a period of two decades, labor conditions in Cambodia have improved modestly over

⁶¹ Flanagan, "Labor Standards and International Competitive Advantage," 2003.

⁶² WOLA, "DR-CAFTA and Worker's Rights: Moving From Paper to Practice," April 2009.

⁶³ Berik and van der Meulen Rodgers, "Options for Enforcing Labour Standards," 2010.

⁶⁴ *Ibid.*

the last decade. The authors find that the primary explanation for the divergence in outcomes is the ILO “Better Factories Cambodia” (BFC) program (initially the ILO Garment Sector Working Conditions Improvement Project), which was set up as part of the 1999 U.S.-Cambodia trade agreement on textiles and apparel. Under the agreement, an expansion of Cambodia’s export quota is conditional on the country’s compliance with its own labor laws and ILO conventions. The BFC program was set up to assess and improve labor conditions by monitoring factories, providing technical assistance, and sponsoring capacity-building programs.

Oka (2011) also analyzes the Cambodian garment sector, using firm-level data for 400 firms participating in the BFC program to gauge compliance with labor standards during the years 2006–10.⁶⁵ The author finds the highest compliance rates among firms producing for specialty retailers and reputation-sensitive mass merchandisers. In addition, like Berik and van der Meulen Rodgers (2010),⁶⁶ Oka finds that the ILO BFC, which has multinational brand partners, played a role in driving improvements in factory compliance.

Finally, Elliott and Freeman (2003) evaluate the effectiveness of petitions under the U.S. Generalized System of Preferences (U.S. GSP) and the threat of sanctions in improving labor conditions.⁶⁷ Between 1984 and 1998, the U.S. Trade Policy Staff Committee accepted 47 petitions for review, mainly from union organizations and human rights groups. Thirty-two of these petitions involved a trade threat or changes unrelated to U.S. GSP conditionality requirements. Of these 32, conditions improved in 15 cases (47 percent success rate) and failed to improve in 17 cases. The authors also point out that 13 countries out of the 47 reviewed had their U.S. GSP eligibility either terminated or suspended. Using qualitative methods, the authors find that successful petitions were associated with a higher degree of democracy in a country, involvement of human rights groups in the petition, more trade, less politically sensitive labor standards (i.e., standards aimed at issues other than forced and child labor, which are rooted in political, institutional, and social conditions that are difficult to change), and enough resources in target countries to carry out promised changes. Overall, they conclude that the threat of trade sanctions is not always an effective means of enforcement. This is especially the case when countries with weak labor systems promise improvements, but are unable to deliver because of insufficient capacity and

⁶⁵ Oka, “Does Better Labor Standard Compliance Pay?” 2011

⁶⁶ Berik and van der Meulen Rodgers, “Options for Enforcing Labor Standards,” 2010.

⁶⁷ Elliott and Freeman, “Can Labor Standards Improve under Globalization?” 2003.

resources. In such cases, the authors suggest that the threat of sanctions would be most effective if accompanied by technical and financial help in making the needed changes.

Trade and Labor Standards

Does trade impact labor conditions? Proponents of linking labor standards and trade policy fear that increased trade and deeper integration of global supply chains may lead firms to move production to low-cost and low-standards locations; depress wages in countries that maintain and enforce high labor standards; and motivate governments to weaken or remove costly standards in an effort to improve or preserve their countries' competitive position.⁶⁸ This section considers research that investigates the effects of trade openness on labor conditions. The evidence suggests that increased trade may enhance, rather than degrade, labor conditions, since export growth may raise employee incomes, expand opportunities for workers to move from unprotected informal sector jobs to relatively better protected export-oriented sectors, and fuel stronger international pressure and activism aimed at compliance.

The literature suggests several channels through which trade might affect labor conditions. According to Luinstra (2004), the increased allocation of capital and labor to the sector with national comparative advantage will improve or worsen overall labor conditions, depending on the relative level of labor conditions in the expanding sector.⁶⁹ For example, if a labor-intensive, export-oriented sector with relatively poor labor conditions expands, then on balance, labor conditions in the country will deteriorate. However, if a labor-intensive, export-oriented sector with relatively good labor conditions expands, then labor conditions in the country will, on balance, improve.⁷⁰

Using plant-level data, Harrison and Scorse (2003) assess the impact of globalization on compliance with minimum wage legislation in Indonesia in the 1990s.⁷¹

⁶⁸ Brown, Deardorff, and Stern, "International Labor Standards and Trade: A Theoretical Analysis," 1996.

⁶⁹ Luinstra, "Labor Standards and Trade," 2004.

⁷⁰ *Ibid.*, 8–9.

⁷¹ Harrison and Scorse, "The Impact of Globalization on Compliance with Labor Standards," 2003.

They find that multinational and exporting firms are more likely to comply with minimum wage legislation than inward-oriented domestic firms. When they include controls for capital intensity and technical change, the authors find that exporters were less likely to comply with minimum wage laws for most of the 1990s, but by the end of the 1990s exporting sectors were significantly more likely to adhere to the minimum wage. The authors suggest that the improved compliance was linked to both internal pressure resulting from the establishment of independent unions and external pressure from the U.S. government (in the form of GSP provisions) and human rights activists.

These results are supported by a series of case studies published in a 2009 World Bank report.⁷² The case studies, which rely on a mix of qualitative and quantitative evidence, contribute to the literature by developing a micro-based framework for analyzing the effects of globalization on working conditions and systematically applying this framework to five country case studies. The report gives particular attention to the influence of foreign direct investment (FDI) on labor conditions. It finds that for countries like Cambodia, El Salvador, and Indonesia, workers in an FDI-intensive exporting industry (apparel) enjoy higher wages and better working conditions than those in an import-competing industry with little FDI (agriculture).^{73, 74} As employment in apparel manufacturing increased and employment in agriculture fell, following an influx of export-oriented FDI, overall wage premiums increased, and working conditions improved in these countries.⁷⁵ The report claims that the positive correlation between wages and working conditions supports the theories of efficiency wages and rent sharing rather than that of compensating differentials.⁷⁶

⁷² Robertson et al., *Globalization, Wages and the Quality of Jobs*, 2009.

⁷³ Nonetheless, anecdotal and qualitative evidence suggests that even though conditions might be better in exporting sectors than nontradable sectors, this does not mean that there is full compliance with established labor standards or that the level of working conditions are acceptable by international standards. See, for example, Salem, *CIMCAW: Final Report*, 2008; Record, "Labor Practices and Productivity in the Lao Garment Sector," 2011; Rossi, "Workers and Social Upgrading," 2011.

⁷⁴ The report also points out that better working conditions and wages may have represented quota rents from the Multi-Fiber Arrangement or the Agreement on Textiles and Clothing, which have since expired.

⁷⁵ Robertson et al., *Globalization, Wages and the Quality of Jobs*, 2009, 9. These results correspond to the 1995 to 2005 time period in El Salvador and 1996 to 2005 for Cambodia. In the case of Indonesia, the period spanning 1991 to 2004 was considered.

⁷⁶ The efficiency wage hypothesis suggests that one way to increase workers' productivity and/or efficiency is to pay them more than the market-clearing wage dictated by supply and demand. Models of rent sharing suggest that firms share their profits with workers. Finally, the theory of compensating differentials, attributed to Adam Smith, suggests that workers who experience poor (non-wage) working conditions are compensated with higher wages. Robertson et al., *Globalization, Wages and the Quality of Jobs*, 2009.

The studies reinforce the theory that globalization is correlated with improvements in working conditions in the outward-oriented sectors.

Another theory assumes a Heckscher-Ohlin model by which, as a result of endowment-based trade, the wages of low-skill workers in countries where low-skill labor is abundant increase.⁷⁷ This theory, known as “the income theory,” suggests that low-skill workers in such countries will demand high labor standards because they will want to protect their increasing income against dismissal and injury.

Edmonds and Pavcnik (2006) use data from 1995 for 113 developed and developing countries to demonstrate that use of child labor is lower on average in countries in which trade accounts for a relatively high share of gross domestic product (GDP), even when they control for the endogeneity with trade based on geography.⁷⁸ However, this relationship between trade and child labor is primarily a consequence of a positive relationship between trade and income. When the authors controlled for income differences across countries, the association between trade and child labor was no longer significant. Their results suggest that on average, countries that trade more because of their advantageous location report higher income levels, which correspond to lower levels of child labor. They argue that the lack of evidence supporting a direct effect of trade on child labor does not rule out the possibility that circumstances or types of trade exist whereby trade might lead to an increase in child labor.⁷⁹ For example, trade might affect the propensity to employ child labor because it alters the relative return to unskilled labor. Nevertheless, and contrary to the assertions of some critics of globalization, the authors find no evidence that trade is a significant factor perpetuating the high levels of child labor found in low-income countries.

Without explicitly considering the specific channels through which trade openness might impact a country’s labor conditions, Flanagan (2003) examines the general question of the relationship between trade openness and labor conditions, which he defines to include child labor, civil liberties, and life expectancy.⁸⁰ The author uses

⁷⁷ Luinstra, “Labor Standards and Trade,” 2004.

⁷⁸ Edmonds and Pavcnik, “International Trade and Child Labor: Cross-Country Evidence,” 2006. Edmonds and Pavcnik’s measure of trade based on geography considers bilateral trade openness based on the distance between countries, their population, the commodities produced by the countries, whether the countries considered share a common language or border, and whether a country is landlocked.

⁷⁹ *Ibid.*, 136.

⁸⁰ Flanagan, “Labor Standards and International Competitive Advantage,” 2003.

three measures for trade openness—the ratio of exports to GDP, trade volume as a share of GDP, and whether a country has an open trade policy⁸¹—and data from the years 1980 and 1990. His results suggest that countries with an open trade policy or a large trade sector tend to have superior labor conditions and rights, given their stage of economic development (as defined by GDP per capita).⁸² It should be noted that, with the exception of child labor, the author’s measures for labor standards are fairly blunt and likely capture other drivers. Flanagan claims that the period covered by his study is one in which labor “regulation was more form than substance.” However, it is important to point out that in subsequent years there was an increase in both the substance of labor regulations and the emphasis on them in international circles (e.g., the promotion of the ILO core labor standards and the inclusion of enforceable labor provisions in trade agreements). These trends suggest that more robust results might be obtained from a study that incorporates more recent years.

In a subsequent analysis, Flanagan (2006) evaluates cross-sectional and panel data to determine the effects of liberalized trade (as measured by open trade policies and by trade as a share of GDP) on two important sets of factors: working conditions (compensation, work hours, fatal accidents, and life expectancy) and labor rights (civil liberties, freedom of association and collective bargaining, nondiscrimination in employment, child labor, forced labor, and slavery).⁸³ He uses instrumental variables to control for the possibility that working conditions and labor rights might be jointly determined with some measures of openness, and he includes a number of control variables throughout the specifications. The author finds that with the exception of nondiscrimination in employment, there is no evidence that countries with liberalized trade are more likely to have inferior working conditions or inadequate labor rights than countries with restricted trade. Moreover, his results suggest that countries that adopt liberalized trade policies do not experience a subsequent decline in labor conditions. His results suggest that free trade improves working conditions principally by raising per capita income, and that open trade policies have a direct and positive impact on job safety. Flanagan’s analysis of the relationship between trade volume and labor rights yields mixed results, but where the relationship is significant, he finds a positive correlation.

⁸¹ Flanagan uses a dummy variable to capture whether a country is open or closed. He defines a country as closed if any of the following are true: nontariff barriers cover at least 40 percent of trade; the average tariff rate is at least 40 percent; the “black market premium” is at least 20 percent; the economy is characterized by a socialist economic system; or major exports are dominated by a state monopoly (Flanagan 2003, 22).

⁸² *Ibid.*, 16.

⁸³ Flanagan, *Globalization and Labor Conditions*, 2006.

Labor Conditions and Trade Performance

Increased trade among countries with varying levels of worker protection has long raised questions as to whether low-standards countries have an unfair comparative advantage over countries with higher standards, and whether this generates competitive pressure to reduce standards in a race to the bottom. As previously discussed, these concerns have led the United States and the EU to link preferential market access to compliance with labor standards. In this section, we discuss research on the channels through which labor conditions influence comparative advantage and, ultimately, trade. We then present recent empirical research that evaluates the effects of labor standards compliance on trade performance. Overall, we find no compelling evidence that countries can enhance their trade performance through poor labor conditions.

Labor Conditions and Trade: Conceptual Considerations and Empirical Evidence

How do labor conditions influence a country's trade performance? Neoclassical trade theory teaches that comparative advantage is determined by relative endowments of land, labor, and capital (factor endowments). The impact of labor conditions on comparative advantage is contingent on (1) how a particular type of labor standard affects factor endowments, and (2) the environment in which the standards are applied.⁸⁴ The elasticity of demand for a country's products with respect to changes in costs may also have implications for trade performance.⁸⁵ Proponents of the "race to the bottom" position assume that compliance with labor standards is costly, and thus that countries with better labor conditions are at a disadvantage in international markets.⁸⁶ However, the literature suggests that the relationship between labor standards and labor costs is less straightforward. The application of some labor standards might entail capital expenditures, while adherence to other labor standards might enhance productivity or increase a country's labor supply. For example, although some improvements in health and safety standards may entail costs, these same improvements may improve worker health and reduce accidents, resulting in higher worker productivity.⁸⁷ Some research suggests that reducing hours at work raises labor costs by diminishing the amount of

⁸⁴ Bakhshi and Kerr, "Labour Standards as a Justification for Trade Barriers," 2010; Elliott, "Labor Standards, Development and CAFTA," 2004.

⁸⁵ Freeman, "International Labor Standards and World Trade," 1997.

⁸⁶ Flanagan, "Labor Standards and International Competitive Advantage," 2003.

⁸⁷ Brown, Deardorff, and Stern, "International Labor Standards and Trade," 1996.

available labor, but that reducing discrimination increases labor supply and reduces the cost of labor, thereby improving comparative advantage. Elliott (2004) points out that in many developing countries reducing gender discrimination could have the opposite effect, raising the cost of labor used to produce exports and reducing comparative advantage if, for example, reduced discrimination against female workers facilitates their move out of the export sector and into sectors oriented toward domestic markets, which have historically discriminated against women.⁸⁸ Further, Bakhshi and Kerr (2010) suggest that a ban on child labor might reduce a country's unskilled labor supply in the short run, but might increase skilled labor supply and productivity in the long run if children who were previously part of the workforce are enrolled in school.⁸⁹

Looking at the period 1980-1999, Flanagan (2003) uses cross-country panel data for the manufacturing sector to test whether a relationship exists between labor standards and labor costs and to examine whether differences in labor productivity among countries worldwide (cross-country productivity differentials) influence international labor costs (total compensation).⁹⁰ The econometric evidence suggests that nearly 90 percent of the disparity in real labor costs across countries is associated with cross-country labor productivity differentials. Further, his results do not find a significant relationship between the ratification of labor standards and labor costs, when holding the influence of productivity constant. It is important to note that Flanagan uses data for a period that preceded the establishment of the ILO core labor standards and in which there was less emphasis on labor standards in international circles. Different results might be obtained from a study that considers more recent years.

The remaining studies move away from a consideration of how labor standards ratification influence trade to an examination of how labor standards compliance influences trade performance. In the literature, the ratification of ILO conventions is widely used as an indicator of labor standards and, in some cases, labor conditions. However, several analysts consider this tendency problematic because, as previously discussed, ratification of a convention does not necessarily imply compliance⁹¹ and because the indicator suffers from endogeneity.⁹² Further, the failure to ratify does

⁸⁸ Elliott, "Labor Standards, Development and CAFTA," 2004.

⁸⁹ Bakhshi and Kerr, "Labour Standards as a Justification for Trade Barriers," 2010

⁹⁰ Flanagan, "Labor Standards and International Competitive Advantage," 2003. The panel includes five-year averages for 84 countries over 1980-84 and for 51 countries over 1995-99.

⁹¹ Samy and Dehejia, "Trade and Labor Standards: New Empirical Evidence," 2009; Flanagan, "Labor Standards and International Competitive Advantage," 2003.

⁹² Flanagan, "Labor Standards and International Competitive Advantage," 2003; Flanagan, *Globalization and Labor Conditions*, 2006; Bonnal, "Trade Performance and Labor Standards," 2008.

not necessarily imply poor labor conditions, as evidenced by the fact that the United States—a high-standards country—has ratified only two of the eight conventions that constitute the ILO core labor standards.⁹³ Indeed, in some cases a country that meets or exceeds a particular standard may not ratify an associated convention because of, for example, technical inconsistencies between the convention and national laws. Research is also challenged by the endogeneity of labor standards, whereby a country's level of worker protection is typically a function of its level of social, political, and economic development.⁹⁴ Proxy indicators such as number of strikes and lockouts, worker injuries, union density, and degree of civil liberties⁹⁵ are increasingly used in the literature to work around endogeneity issues.

Despite these limitations, a growing body of literature has examined the relationship between labor standards compliance and trade, and is advancing analysis in the field through the use of increasingly sophisticated methodologies. The literature has yielded mixed results, but contrary to the “race to the bottom” position, it does not produce clear evidence that countries can improve their trade through poor labor conditions.

Using a standard Heckscher-Ohlin model and 2003 data for 48 developing countries, Bakhshi and Kerr (2010) examine whether developing countries can enhance their comparative advantage—especially in industries producing unskilled-labor-intensive goods—by suppressing labor standards and labor conditions.⁹⁶ In addition to using control variables, the model incorporates an indicator for the number of ILO conventions ratified and measures for four core labor standards (child labor, forced labor, gender discrimination, and the level of union rights). The article's econometric evidence suggests that developing countries could increase their exports by lowering labor standards compliance related to forced labor and union rights, but the effect would be very small. However, their findings indicate that reducing labor standards compliance related to child labor and gender discrimination would not affect comparative advantage.

⁹³ The United States has ratified ILO Conventions 105 on forced labor and 182 on the worst forms of child labor.

⁹⁴ Bonnal, “Trade Performance and Labor Standards,” 2008.

⁹⁵ This data typically comes from surveys conducted by Freedom House, which include questions on freedom of association and collective bargaining.

⁹⁶ Bakhshi and Kerr, “Labour Standards as a Justification for Trade Barriers,” 2010.

Flanagan (2003) considers the question of whether low labor standards are associated with superior export performance (as measured by the ratio of exports to GDP) or higher inbound FDI or both.⁹⁷ Relying on cross-section data for 80 countries for 1980–84, he finds no significant relationship between the number of ILO conventions a country ratifies and its export performance. Using cross-section data for 70 countries for 1980–85 and 1986–91, Flanagan finds no evidence that labor standards ratification reduces FDI.

Using qualitative methods, a widely cited 1996 OECD study also finds no evidence that countries with low labor standards compliance (in terms of freedom of association and collective bargaining rights) post better export performance than countries with high levels of labor standards compliance.⁹⁸ Based on the report's findings, the OECD suggested that developing countries' concerns about the impact of labor standards on their economic performance are unfounded.⁹⁹ Some suggest that the OECD conclusion is not definitive because its findings are based on a comparison of outcomes that only minimally control for potentially confounding factors.¹⁰⁰

Kucera and Sarna (2006) use a gravity model to evaluate the effect of trade union rights and democracy on exports in four classifications of manufacturing industries characterized by differing levels of labor intensity—labor-intensive manufacturing trade, capital-intensive manufacturing trade, in-between manufacturing trade, and total manufacturing trade.¹⁰¹ The model uses data for 192 countries for the 1990–93 period and eight indicators of trade union rights and democracy, including unionization rate, Freedom House indexes on civil liberties and political rights, OECD indexes of freedom of association and collective bargaining (FACB), FACB indexes constructed by Kucera and Sarna and indexes of FACB in export processing zones, among others. A robust result emerges, indicating that generally stronger FACB rights are associated with higher total manufacturing exports, and that higher levels of democracy are associated with higher overall and total manufacturing sector exports. The authors admit that this result may be surprising, given the export success of countries with relatively weak democracies and FACB rights. They suggest that these experiences, while high profile, may not be representative. In addition to this result, Kucera and

⁹⁷ Flanagan, "Labor Standards and International Competitive Advantage," 2003.

⁹⁸ The 2000 OECD report supported these results. OECD, *International Trade and Core Labor Standards*, 2000.

⁹⁹ *Ibid.*, 7.

¹⁰⁰ Freeman, "International Labor Standards and World Trade," 1997.

¹⁰¹ Kucera and Sarna, "Trade Union Rights, Democracy, and Exports," 2006.

Sarna find that five of the eight indicators—the unionization rate, their two FACB indices, and the two OECD FACB indices— yield statistically significant results of the opposite sign, depending on the classification of labor-intensive industries and the model specification. They conclude that none of the coefficient estimates for these five indicators are robust when it comes to labor-intensive trade.

Dehejia and Samy (2004) evaluate cross-sectional developed- and developing-country data for 1995 and Canadian time-series data for 1950–98 to find the effects of labor standards on export performance (defined as the ratio of the manufacturing sector exports over GDP).¹⁰² Dehejia and Samy formulate indexes for labor rights based on the ratification of ILO conventions, the number of hours worked, the number of days of paid annual leave, the rate of occupational injuries, and the degree of unionization. They also advance the literature by including control variables, which were not systematically used in earlier research efforts. In general, the analysis does not find a clear relationship between labor standards and a country’s comparative advantage. Specifically, the authors find that when both developed and developing countries are considered in the estimation, only one of the variables—the rate of injuries—is significant and positively correlated with export performance. However, when only developing countries are considered, ratified conventions and the number of days of paid annual leave also emerge as significant and are negatively correlated with export performance. Their analysis of the Canadian data alone generated mixed results. The authors conclude that there is weak evidence to suggest that countries that maintain poor labor conditions have a comparative advantage in trade.¹⁰³

Although most studies use cross-sectional or time-series data to evaluate the effects of labor standards compliance on trade performance, Bonnal (2010) advances the literature by introducing a dynamic panel data framework covering a large number of countries (112) over a significant period of time (1980 to 2004).¹⁰⁴ His model corrects for endogeneity and potential biases by using two factors—work injuries, and strikes and lockouts—as proxies for core labor standards. He also explicitly considers the role of institutions in promoting more robust trade. Specifically, he uses three measures to estimate the quality of institutions: the number of years a country’s chief executive is in office, the concentration of a country’s legislature as

¹⁰² Dehejia and Samy, “Trade and Labor Standards: Theory and New Empirical Evidence,” 2004.

¹⁰³ *Ibid.*, 191.

¹⁰⁴ Bonnal, “Export Performance, Labor Standards, and Institutions,” 2010.

measured by the Herfindahl-Hirschman Index,¹⁰⁵ and whether the legislature is controlled by a party representing a special interest. Bonnal finds that improved labor conditions support countries' export performance.¹⁰⁶ In particular, a one-standard-deviation increase in the rate of work injuries is associated with a reduction in the export/GDP ratio of 1.01 percentage points, and a one-standard-deviation increase in the rate of strikes and lockouts is associated with an increase in the export/GDP ratio of 0.47 percentage points. Although this result may seem counterintuitive, Bonnal argues that one interpretation is that economies where core labor standards are upheld are well-functioning economies. He cites research finding that higher labor standards may lead to a higher rate of economic growth. Bonnal also finds evidence that better quality institutions have a positive effect on export performance.

Conclusion

Labor standards have become a major trade issue, as labor standards provisions are increasingly given equal importance to commercial obligations in trade agreements. Methodological challenges (such as the endogeneity issues) and the lack of reliable data on compliance have hampered research examining the relationship between labor standards and trade. Nevertheless, the literature that examines this relationship is growing and advancing through the use of increasingly sophisticated approaches. This research indicates that diverse factors, such as enforcement mechanisms, positive incentives, and market forces, influence the impact of trade agreements on labor standards compliance; that trade openness may enhance labor standards compliance; and that there is no clear evidence that poor labor conditions are associated with improved trade performance.

A more nuanced understanding of the relationship between labor standards and trade requires the consideration of a broader yet still reliable set of indicators. Recently, there have been efforts to improve measurement of labor standards compliance.¹⁰⁷ However, in the absence of more robust data across a larger set of indicators, research

¹⁰⁵ The Herfindahl-Hirschman Index, used to measure the level of concentration of a country's legislature, increases with a decrease in the number of parties in the government and an increase in the disparity in size between the parties increases. Bonnal, "Export Performance, Labor Standards, and Institutions," 2010.

¹⁰⁶ *Ibid.*, 62.

¹⁰⁷ Barenberg, "Formulating and Aggregating Indicators of Labor Rights Compliance," 2011.

will continue to focus on indicators such as child labor, freedom of association, and collective bargaining rights for which data is more readily available.

A number of issues would benefit from further research. For example, research examining the impact of the costs and benefits of compliance on firm behavior could lead to a better understanding of how policy might encourage compliance. More qualitative and quantitative research into the effects of trade agreements on labor standards compliance would also be useful, especially if it could identify the most effective mix of enforcement mechanisms and positive incentives for eliciting compliance. The example of the U.S.-Cambodia textile agreement, which improved labor standards compliance in the Cambodian garment export sector through positive incentives and capacity building, raises the question of whether positive incentives are more effective than regulation and sanctions, and future research should rigorously evaluate this question.

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**The U.S. International Trade
Commission's
High-technology Trade
Roundtable (2012)**

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Author:
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Discussion Summary

Abstract

On June 13, 2012, the United States International Trade Commission (USITC) hosted a roundtable discussion on high-technology (high-tech) trade. Participants from industry, government, academia, and non-governmental organizations shared their perspectives on current and emerging high-tech trade issues.

¹ At the time of writing, Patrick Schneider was an intern in the Office of Industries at the U.S. International Trade Commission. This article summarizes views expressed by roundtable participants. These views are strictly those of the participants and do not represent the opinions of the U.S. International Trade Commission or of any of its commissioners. Even though the summary often cites instances of general agreement among participants, it does not necessarily reflect consensus views of every participant. Correspondence may be addressed to Michael Anderson, Chief, Advanced Technology and Machinery Division (Michael.Anderson@usitc.gov).

Introduction

The USITC held the roundtable to provide an informal forum for participants to discuss current and potential issues of interest in the high-tech trade area. The first part of the discussion was focused on emerging trade issues for U.S. high-tech industries and future technologies over the next five to ten years; the second, on measuring value creation in high-tech trade. The participants addressed a number of major issues including international regulatory diversity, cloud computing, liberalization of information technology trade, innovation and development in emerging markets, trade policy, statistical resources, and data collection challenges. A brief summary of the issues discussed is provided below.

Emerging High-tech Trade Issues for U.S. High-tech Industries

Rapid Growth of Global Data Flows

Participants noted the profound impact that the immense volume and rapidly-growing exchange of data is having on the global economy, trade, and industry. Some emphasized that as the number of smartphones, tablets, and computers continues to grow, and people become more and more connected to the Internet through billions of electronic devices, the world economy will generate a flood of data that is substantially larger than what is generated today. As a corollary, several attendees commented that advances in such areas as smart grids, sensors, and nanotechnology are changing the way industry works, allowing industrial machines to be monitored remotely or even adjusted automatically so that advanced models will be able to make predictions and adjust variables—what one participant called “M to M” (machine to machine) communication. According to roundtable participants, this “industrial Internet revolution” may have a tremendous impact on trade, in particular on the capacity to provide services across borders. One participant provided the example of a power-generating turbine, where previously a repairman would be sent periodically to assess its functionality and make repairs. Increasingly, similar machines can be monitored and repaired remotely, possibly even without much human involvement.

Some participants expanded on the idea and described the emerging “cloud of things.” As the size of computer chips approaches zero, they are being built into devices used

by consumers, grocery stores, healthcare providers, and many other industries. These devices are exchanging a large and growing amount of data over the Internet, but there is little agreement on the appropriate rules governing these flows. Attendees remarked that these high-tech advances are raising many social, privacy, human rights, and regulatory concerns as the lines between business and social data become blurred. Participants also noted that there is little accurate measurement of the importance of the Internet to the economy.

International Regulatory Issues

Countries regulate the Internet and flow of information in different ways, in what some participants characterized as a “regulatory Mardi Gras.” While governments may have different visions and motivations for the Internet in their respective societies, one participant noted that the United States can fulfill a much-needed leadership role by educating its trading partners and collaborating with like-minded players around the world.

Participants noted that the heterogeneity of global regulatory regimes may reflect divergent values related to the costs and benefits of increased connectivity. For example, some governments in the Middle East worry about the potential effects of freer information flows on political stability. In addition, one attendee reiterated that as the boundaries between firms and private individuals become blurred, the social consequences are uncertain. Additional regulatory issues mentioned include classification issues caused by the convergence of digital goods and services, data privacy, and local content requirements. One participant noted that in the ongoing Trans-Pacific Partnership negotiations, the Administration is attempting for the first time to create binding commitments on cross-border data flows.

Trade Policy

Another key topic was how to craft effective trade agreements and institutions for a new era. Several participants remarked that current U.S. trade policy (like that of other nations) is inadequate to deal with the challenges that arise from developments in technology and cross-border service trade. One participant noted the positive steps being taken by the current Administration, the EU, the Organisation for Economic Co-operation and Development (OECD), and others to develop “declarations of principles” in regard to Internet governance and data flows. Some participants suggested that industry leaders share their roadmaps for the future with the U.S. government to explain where they are going and what is needed. Attendees also discussed the best practices for future U.S. trade policy, but debated what the focus

should be, particularly with regard to the issue of organizing policy around sectors and functions, or looking at crosscutting issues. One attendee suggested that a unified plan for development of America's high-tech sector could be useful for identifying policy priorities.

Participants engaged in a lively discussion about some of the challenges facing the United States in international trade. Some participants noted that trade in ideas, knowledge, and innovation is challenging the traditional models for analyzing costs and benefits of trade. Others raised the issue of how to deal with intellectual property rights problems and "indigenous innovation" policies in countries like China and Brazil. One participant remarked that a takeaway from this discussion is the need to try to influence the shape of public discourse on trade policy and innovation. Other participants commented that in the current economic environment, policymakers will want to know how high-tech trade and innovation policy will translate to jobs.

Innovation and Development

In terms of innovation, participants identified lowered transaction costs, both as a result of and within high-tech industries, as a catalyst for diminishing vertical integration and the development of a transnational innovation ecosystem. Participants also noted the need to better explain the complex relationships between technology, productivity, economic growth, and employment. Additionally, some participants noted the importance of documenting productivity improvements from technology, the positive effects of digital technologies on manufacturing, and the need to think globally rather than nationally when considering innovation and the Internet.

With regard to global development, panelists stated that in order to induce major emerging markets to liberalize their information technology (IT) sectors, U.S. government and industry need to demonstrate the value of more open markets. For example, instead of saying why they should lower tariffs on U.S. imports of IT equipment in terms of trade promotion, U.S. interest groups should instead point out the negative effects of high tariffs on economic growth, technology diffusion, standards of living, education, and competitiveness. Panelists also noted that governments might find it more persuasive if young innovators in emerging markets countries were leading the charge, by lobbying their own governments about the need to open markets and make high-tech industries a more integral part of the economy.

Measuring Value Creation in High-tech Trade

One of the moderators noted that there are at least two reasons for discussing and improving the manner in which value creation is measured in high-tech trade: first, to help economists analyze global technology advances and their effect on trade; and second, to help educate the general public and policymakers about how advances in technology create opportunities for trade and innovation.

Problems with Current Methods of Measuring Trade

Participants noted that current trade data are inadequate to accurately reflect the changing global landscape of value creation. Some attendees commented that traditional trade data are designed to measure the old economy with vertical integration and clear geographic origins, despite the fact that today's global economy increasingly relies on complex global supply chains for goods and services. A panelist raised the issue of new and innovative products like smartphones and tablets, as well as social media, providing services and value that current trade agreements were not designed to address. Another panelist noted that the move away from a primarily goods-based economy makes it difficult to assess the impact of the international flow of goods, services, and information at the domestic level. Others commented that advanced technologies like semiconductors and nanotechnology create substantial value that isn't necessarily captured by current data collection methods. Some attendees identified the lack of quality data in services trade as a primary issue, and discussed the inadequacy of traditional statistical methods in this regard. USITC staff informed the panel that there was a services roundtable earlier in the year where this topic was highlighted.²

Statistical Collection and Resources

Participants identified issues related to data collection, particularly the effects of decreased government funding for such efforts. Attendees discussed the need for additional federal resources, efficiency improvements—the possibility of a national statistical agency was mentioned—and better access to existing data, particularly at the firm level. Others raised the issue of more collaboration and discussion between private companies and government statisticians as a way to improve data collection and identify the gaps in current collection efforts. Participants noted the increasing importance and promise of “big data”: for example, Google has experimented with

² A summary of this event is available in USITC, *Recent Trends in U.S. Services Trade: 2012 Annual Report*, July 2012 (<http://www.usitc.gov/publications/332/pub4338.pdf>).

using large volumes of data from Web sites to create real-time price indices, and the Anderson School at UCLA uses data from credit card transactions to analyze economic trends.

Final Comments

Participants at the High-tech Roundtable highlighted the profound impact the Internet and data flows are having on the global economy and raised challenging policy questions related to trade, regulation, innovation, and development. Participants noted that the global exchange of data on a massive scale is changing traditional notions of value creation and measurement, requiring government and industry leaders to alter their thinking to be successful. Despite lively debate, attendees generally agreed that traditional economic and business models may no longer be appropriate and encouraged further dialogue to better grasp and take advantage of the implications of high-tech innovation.

**External participants at the Commission’s High-tech Trade
Roundtable held on June 13, 2012**

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Grant Aldonas	Principal Managing Director Split Rock International
Robert Atkinson	President, Information Technology and Innovation Foundation
Melika Carroll	Senior Director, Global Government Affairs, salesforce.com
Sage Chandler	Senior Director, International Trade, Consumer Electronics Association (CEA)
Jake Colvin	Vice President, Global Trade Issues, National Foreign Trade Council
Dorothy Dwoskin	Senior Director, Global Trade Policy and Strategy, Microsoft Corporation
Ed Gresser	Director, ProgressiveEconomy GlobalWorks Foundation
Brian David Johnson	Futurist, Consumer Experience Architect, Intel
Bill Morin	Director, Government Affairs, Applied Materials
Jennifer Mulveny	Director, Global Trade Policy, Hewlett-Packard (HP)
Michael Nelson	Adjunct Professor, Communication, Culture, and Technology, Georgetown University
John Neuffer	Vice President for Global Policy Information Technology Industry Council
Michelle O’Neill	Deputy Under Secretary for International Trade U.S. Department of Commerce, International Trade Administration

Tim Richards	Managing Director, International Energy Policy, General Electric (GE)
Matthew Slaughter	Senior Fellow, Council on Foreign Relations, Associate Dean, MBA Program, Tuck School of Business, Dartmouth
Ian Steff	Vice President, Global Policy and Technology Partnerships Semiconductor Industry Association (SIA)
Steve Stewart	Director, Market Access and Trade, IBM
Frank Vargo	Vice President, International Economic Affairs, National Association of Manufacturers