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## *Service Offshoring: Threats and Opportunities*

When asked to provide a framework piece on offshoring, I decided it would be much easier to have the work done by an Indian consulting firm. A quick bit of research turned up a perfect corporate partner. Not surprisingly, the company has a London-based front end—it is a fact of the industry that many customers prefer to work through a Western intermediary. The company quoted the job at \$63,000, no taxes. That’s about one-tenth of what an American management consulting firm would charge, but still too rich for my academic salary. So you are stuck with me.

The experience taught me two things. First, you can outsource abroad just about anything, from which I conclude that all of our jobs are threatened. Second, the big money in offshore outsourcing goes to the OECD business analysts who help customers communicate their needs to business process outsourcers in low-cost countries. I conclude from this that offshoring brings remarkable opportunities to us all. Therein lies the paradox of offshoring: it is both a threat and an opportunity.

In considering international offshoring, two trends scream out for our attention. The first is the rise of China as the world’s manufacturer. Surprisingly, many American firms have yet to wake up to this sea change in their sourcing possibilities. Better information about the strategic offshoring options available to American firms is desperately needed. Aside from this, the rise of China’s

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manufacturing sector poses no new public policy issues. All the familiar arguments hold. On the one hand, international trade is disruptive for workers and firms engaged in import-competing industries. On the other hand, international trade provides the benefits of lower prices to consumers and offers new opportunities for producers (both workers and firms) to expand into foreign markets. In aggregate, the benefits outweigh the costs. What remains for policymakers is the crucial task of ensuring that we generously care for our most disadvantaged, since these unskilled workers are the ones who will bear the brunt of the Chinese offshoring onslaught.

The second extraordinary development in international trade has been the rapid growth of traded services involving innovative, technology-intensive processes and employing high-paid white-collar workers. In the past it was unheard of for low-cost countries such as India to be exporting high-value-added services. Now it is common to find Indian software programmers customizing sophisticated software applications for businesses worldwide. This development fundamentally alters the way we must think about innovation-based corporate strategy and public policies that affect the flexibility of the white-collar labor market.

The United States faces a choice. It can insulate itself from the global competitive pressures that come with offshoring to low-cost countries. Such policies will protect firms and workers in the short run. However, there is at least some weak evidence that protectionism retards growth.<sup>1</sup> In addition, insulating policies will likely encourage foreign countries to deny us market access. Considering that the United States is a major supplier of traded services to the rest of the world, insular policies are about as useful as a blow-dryer in an igloo.

Alternatively, the United States can pursue domestic framework policies that promote the competitiveness of U.S. firms and workers. These framework policies would encourage productivity-enhancing investments both by individuals (for example, in human capital) and by firms (for example, in R&D and advanced technologies). The building blocks for globally competitive American firms are domestic policies that encourage continual investments in upgrading and innovation by individuals and firms. When it comes to the U.S. public policy response to offshoring, my best advice is: think globally, invest locally.

Finally, let's not forget about compassion. The American government must be prepared to generously help its most disadvantaged, for they are at greatest risk from the downside of offshoring.

1. See Nunn and Trefler (2005) for support of this view and Rodriguez and Rodrik (2001) for a scathing rebuke of the openness-and-growth literature.

## What Is Offshoring?

There is no universal definition of offshoring, and one task of the Brookings Trade Forum is to decide how broad a set of phenomena to examine. The approach taken by all commentators on offshoring is to attempt a careful definition. This is a natural but misguided approach. We must first start by identifying America's broad public policy objectives and then identify which aspects of offshoring enhance or impinge on our ability to meet these objectives. In my view there are two complementary objectives: (1) promoting competitiveness and raising incomes; and (2) advancing core values of community and caring through redistributive policies. The most interesting policies are the few that promote both objectives. These objectives will help us delineate the boundaries of a discussion of offshoring by answering three definitional questions.

### *Offshoring, Nearshoring, Inshoring, or All of the Above?*

As I have already stated, the most interesting aspects of new trends in the tradability of services is the offshoring of technology-intensive, high-end services to low-wage countries. There are two other phenomena of interest: (1) *Nearshoring*: Much of U.S. offshoring is nearshoring to Canada—for example, to a call center in Toronto that services customers in Chicago. Yet Canada is a country that is very close to the United States (whence nearshoring), and more important, a country that is hardly a low-wage producer. (2) *Inshoring*: The United States is a major supplier of traded services to the rest of the world. This exporting of services or inshoring cannot be ignored. (Slaughter [2004] calls this “insourcing.”) Offshoring, nearshoring, and inshoring must all be examined.

### *Offshore Outsourcing or Foreign Direct Investment (FDI)?*

“Offshore outsourcing” describes an arm's-length transaction between a U.S. firm and a foreign firm. In contrast, FDI describes a domestic firm with a controlling equity investment in a foreign establishment. Recent theories of international trade make it clear that the distinction between offshore outsourcing and FDI is intimately related to the question of whether the United States will retain the highest-paying jobs in the value chain or watch them migrate both to other OECD countries and to emerging low-cost countries such as China and India. One cannot understand this process without looking at what is called the make-

or-buy decision—that is, the decision about whether to produce in-house using FDI or to offshore outsource using arm’s-length transactions.

In a nutshell, the new theories state that when a project is sufficiently routinized that it can be fully scoped or described, then outsourcing is the appropriate relationship with a foreign service provider. When the project is difficult to describe from its outset, it should be done in-house via FDI. For example, see Antràs (2005). The difficult-to-describe projects are typically the innovative projects that generate the highest value added. Thus we need to understand how firms choose between offshore outsourcing and FDI if we are to understand how to keep high-paying jobs in the United States.

My suggestion is thus to study both offshore outsourcing and FDI. Not all economists will agree. For example, Bhagwati, Panagariya, and Srinivasan (2004) argue that we should only be thinking about offshore outsourcing. On this one point, I think that Bhagwati, Panamanian, and Sinicising are wrong.<sup>2</sup>

It is fitting to develop this discussion of offshoring by providing examples of its pervasiveness and the difficulties of further definitional refinements.

*Example 1.* Traditional “mode 3” FDI in the service sector: Citibank sets up an office in Hong Kong that provides limited services to Chinese customers. The office is staffed primarily by Chinese, and most of the key decisions are made in the United States.

*Example 2.* Traditional “mode 4” FDI in the service sector: A U.S. architectural firm sets up an office in Shanghai to bid and work on local contracts. The firm sends its American architects to Shanghai on a long-term basis to do the design work. What distinguishes this from the previous example is that the control of decisions is largely in the hands of Americans who have temporarily migrated to Shanghai.

*Example 3.* The service-trade revolution using an FDI mode of entry: Verizon sets up an information technology (IT) center in Bangalore that hires Indian programmers to write software for Verizon’s U.S. operations.

*Example 4.* The service-trade revolution with an offshore outsourcing mode of entry: Satyam (India) sets up a contact center that makes Wells Fargo VISA marketing calls to potential customers in Seattle.

The use of the term “mode” comes from the IMF (2005) *Balance of Payments Manual* and is used by all OECD countries in presenting their data.<sup>3</sup>

2. These misspelled names were introduced by a Chinese student who typed up my corrections to this paper. The typos typify the monitoring and agency problems associated with offshore outsourcing.

3. The manual distinguishes four modes based on the location of the supplier and consumer of the traded service. Mode 1: The supplier is in one country and the consumer is in another. Each

**Table 1. Definitions of Export-Oriented FDI Projects Related to Offshored Services**

<i>Contact center services</i>	<i>Back-office services</i>	<i>IT services</i>
Help desk	Claims processing	Software development
Technical support/advice	Accounts processing	Application testing
After-sales support	Transaction processing	Content development
Employee inquiries	Query management processing	Engineering and design
Claims inquiries	Customer administration	Product optimization
Customer support and advice	processing	<i>Other high-end services</i>
Market research	HR and payroll processing	
Answering services	Data processing	
Prospecting	IT outsourcing	
Information services	Logistics processing	
Customer relationship management	Quality assurance	Radiology, X-ray
	Supplier invoices	Distance education

Source: UNCTAD (2004) and author.

Table 1 provides many more examples of the types of activities that I believe we should focus on. These examples are classified into four areas: contact centers or what are commonly called call centers, back-office services, IT services, and other high-end services.

It is worth noting a problem with refining the definition of offshoring. Most of us would be comfortable with the following statement: “Manulife is *offshore outsourcing* development of its new human resources software to India, while the plastic products industry is *importing* shopping bags from China.” Why is one “offshore outsourcing” and the other “importing”? In both cases, products currently made in Asia were previously made in-house in America, and in both cases there has been phenomenal growth over the past five years. There are no good answers to this question.

Given this problem of definition (and other problems as well), finer definition of offshoring seems impossible. I therefore adopt the approach of U.S. Supreme Court Justice Potter Stewart in his attempt to define pornography: I can’t define it, but I know it when I see it.<sup>4</sup>

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stays in his or her own country. Mode 2: The consumer moves to the supplier’s country to obtain the service. Mode 3: The supplier sets up a foreign affiliate in the consumer’s country. Mode 4: The supplier supplies the service by moving to the consumer’s country. For more, see International Monetary Fund, *Balance of Payments Manual* ([www.imf.org/external/np/sta/bop/BOPman.pdf](http://www.imf.org/external/np/sta/bop/BOPman.pdf) [2005]).

4. *Jacobellis v. Ohio*, 378 U.S. 184 (1964).

*Occupations or Industries?*

What makes manufacturing interesting is the dramatic rise in manufacturing exports from low-cost countries, especially China. This export surge has already had a large impact on America's least-skilled workers in industries such as garments. See Feenstra and Hanson (1996, 1999) and Trefler (1998). It is now poised to threaten America's moderately skilled workers in such industries as auto parts. However, to my mind these developments pose no new public policy issues that have not already been discussed in the context of conventional import competition. The reason it is not new is that it affects occupations that have always been impacted by international trade.

On the other hand, the revolution in the world's ability to trade in services is something new. At least some of the new service trade involves highly skilled white-collar workers operating in low-cost countries such as India. Successful policy responses aimed at assisting skilled labor will likely be very different from policy responses aimed at assisting less-skilled labor. This distinction has had no play in the offshoring debate but is likely crucial for reasons to be explained below. Thus, service offshoring poses new policy challenges not raised by manufacturing offshoring because it involves white-collar workers.

My view will find critics. Most researchers argue that the rise of China as the world's manufacturer poses such important challenges that it must be included in every discussion of international trade policy. I look forward to a healthy debate of this point.

Another problem with focusing on industries rather than occupations stems from recent changes in traditional manufacturing. With the offshore outsourcing of back-office jobs by manufacturing firms, we tend to think that the line between manufacturing and services is becoming cleaner. However, the opposite is also happening. When Microsoft introduced its Xbox game player, it hired Singapore-based Flextronics (the contract manufacturing giant) to build a factory in low-wage Guadalajara, Mexico, that was supplied with standardized parts from China. Design of the core proprietary technology was outsourced to Nvidia Corp. of the Bay Area and manufactured in Taiwan. Clearly, Xbox could not have been brought to market in this way without tremendous logistics support. As such, Xbox is a manufactured product that embodies a significant service component. This example is commonplace. Accenture (2004) reports that 43 percent of its customers outsource their supply chain management. This reflects the rise of contract manufacturers that both manufacture and provide manufacturing service support. Thus, in many respects traditional industry distinctions are blurring. Focusing on occupations is much cleaner and more useful for policy.

### **White-Collar Workers and the New Trade Issues Raised**

What is most novel about the recent emergence of offshoring is that it affects white-collar workers employed in technology-intensive industries (be these services or manufacturing). We simply do not know what the net effects of this are because empirical trade economists have virtually no experience with this phenomenon. Three issues need to be researched:

—Many (though not all) white-collar jobs are high-paying jobs, paying \$70,000 or more a year. As a country, we are familiar with losing high-paying jobs (head-office service jobs and banking service jobs, for example) to other rich countries. What we are less familiar with is losing high-paying jobs to India. We certainly want to avoid losing these good jobs. However, these losses are somewhat offset by the jobs created for U.S. business analysts with IT expertise. These Americans work as highly paid intermediaries who interface between U.S. companies and Indian business service providers.

—When a white-collar job is offshored, the value of an American worker's industry-specific and firm-specific knowledge is destroyed. This stands in contrast to what happens when an unskilled worker is displaced. There is little valuable knowledge to be destroyed. It is unclear whether loss of such knowledge is an equity concern alone (because it hurts offshore-displaced workers) or whether it is also an efficiency concern (because it destroys valuable human capital). This needs to be investigated.

—There is now a large literature showing that retraining programs are not effective for most displaced workers (see, for example, Baicker and Rehavi 2004). The argument is that unskilled workers are unskilled for a reason: they are missing the most fundamental of abilities, namely the ability to learn (see Heckman and Carneiro 2003 and Trefler 2004). This means that displaced unskilled workers need income transfers to handle trade shocks. In contrast, IT professionals are likely to be highly motivated individuals who would do well in retraining programs.

### **The 64,000 Job Question: Whither China and India?**

Behind the alarm about service offshoring is a sense that OECD countries are in danger of being overtaken by China, India, and a number of other developing-country destinations for service offshoring. In the most alarming scenario, these countries have an infinite capacity to absorb OECD technologies and management strategies, to improve on them, and ultimately to compete head-to-head

with the OECD. Finally, in this scenario, China and India with their newly acquired high-tech status will continue to pay low wages for skilled labor and will use this advantage to create an economic steamroller that crushes all OECD countries.

There are two reasons why this argument is flawed. First, there is an ironclad economic law that prevents one country from ever dominating world trade. Second, there are political-economic reasons to doubt the speed at which this scenario can unfold. I review these reasons in detail.

### *The Ironclad Law of Comparative Advantage*

I am a better researcher than my secretary. Surprisingly, I am also a better typist than he is. That is, I have an *absolute advantage* over my secretary in both research and typing. Nevertheless, I find my secretary to be indispensable. That is because I am relatively better at research than typing. Thus if I typed an hour less a day I could write one page of this paper, whereas if my secretary typed an hour less a day he could only write one sentence of this report. In economic jargon, I have a *comparative advantage* in research, and my secretary has a comparative advantage in typing.

In the most alarmist scenarios about China and India, these countries will soon have an absolute advantage in producing all goods and services. However, the United States will continue to have a comparative advantage in the most knowledge-intensive goods and services. Thus, even in the most alarmist scenario, the United States will continue to export knowledge-intensive goods and services to China and India.

With their low wages, what prevents these countries from exporting everything and importing nothing? If they import nothing they will be giving their goods away for free. I doubt they would agree to this. In addition, the Americans will need yuan to buy Chinese goods. As we demand more of their currency it will rise in value. Eventually, the yuan will rise so much in value that Chinese wages are no longer so dominantly competitive. (This is exactly the problem the United States faces when its currency is strengthening.)

In real life there are things China can do to slow this process down, but China cannot forever keep the yuan undervalued. This is an ironclad law. Countries such as Germany in the 1960s and Japan in the 1970s ran afoul of the comparative advantage police. They ran huge trade surpluses that threatened to destroy U.S. manufacturing. Over time, however, their currencies strengthened to the point where these countries ceased being low-cost producers. In this context it is important to remember that in 1959 Japan had a highly skilled and disciplined

labor force that was paid 10 percent of U.S. wages. Japan in 1959 was, from the limited perspective of offshoring, not that different from China today. Yet Japan never was able to dominate world manufacturing. Why? Because Japan succumbed to the comparative advantage police by steadily revaluing the yen.

The same will eventually happen to China. It does not matter that they have hundreds of millions of citizens ready to work for next to nothing. If we buy too much from them, their currency will rise to the point where their low yuan-denominated wages are wiped out by the currency conversion. It does not matter that Chinese workers are paid 4 yuan an hour unchanged over the next hundred years. If the yuan strengthens, Chinese dollar-denominated wages will rise. Like the Mounties, the comparative advantage police always get their man.

### *Institutions and the Mystery of Modern Economic Growth*

The comparative advantage argument has one significant limitation. It is possible that China and India will develop a comparative advantage in knowledge-intensive goods and services, leaving the United States to produce T-shirts for the Shanghai market. In this scenario, the United States continues to export to China according to the law of comparative advantage. However, the United States becomes poor relative to China and possibly poor even in absolute terms. The argument for absolute impoverishment was first made by Graham (1923) and has been repeated by Hicks (1953), Johnson and Stafford (1993), Gomory and Baumol (2000), and most recently by Samuelson (2004). While the argument is logically correct, fortunately for the United States it is irrelevant. The problem with the argument is that it presumes that China and India will become the world's technological leaders. Such a presumption is in flagrant contradiction to what we know about the role of domestic institutions for promoting innovation.

Current thinking about the determinants of long-term economic growth focuses on the central role of domestic institutions. See Helpman (2004) for a review of the literature. In this view, there are limits to what China and India can produce under their current political-legal-economic regimes. As China and India expand the range of services they provide, they will eventually enter into services that depend on constant innovation. In the new institutions-and-growth view, innovation cannot occur without institutions that protect property rights, that provide a fully functioning legal framework for arm's-length transactions, that support thick equity and debt markets, and that balance the needs of inside innovators against those of outside investors.

Srinivasan (this volume) argues that these institutional constraints on growth were made irrelevant in India's IT sector because of special regulatory provisions

and protections afforded the sector. While I would certainly never want to disagree with Professor Srinivasan—wait, I think I already have once in this paper—my point is less about the development of a single sector and more about long-term, innovation-based, multisectoral, modern economic growth.

In short, China and India will not be able to compete in innovation-intensive sectors without the “institutions of modern capitalism” (Rosenberg and Birdzell 1986) and its handmaiden, “the invention of invention” (Mokyr 1990). For China and India to compete over the very long haul, their institutions will have to look a lot more like OECD institutions. This is unlikely to occur even over a quarter-century horizon.

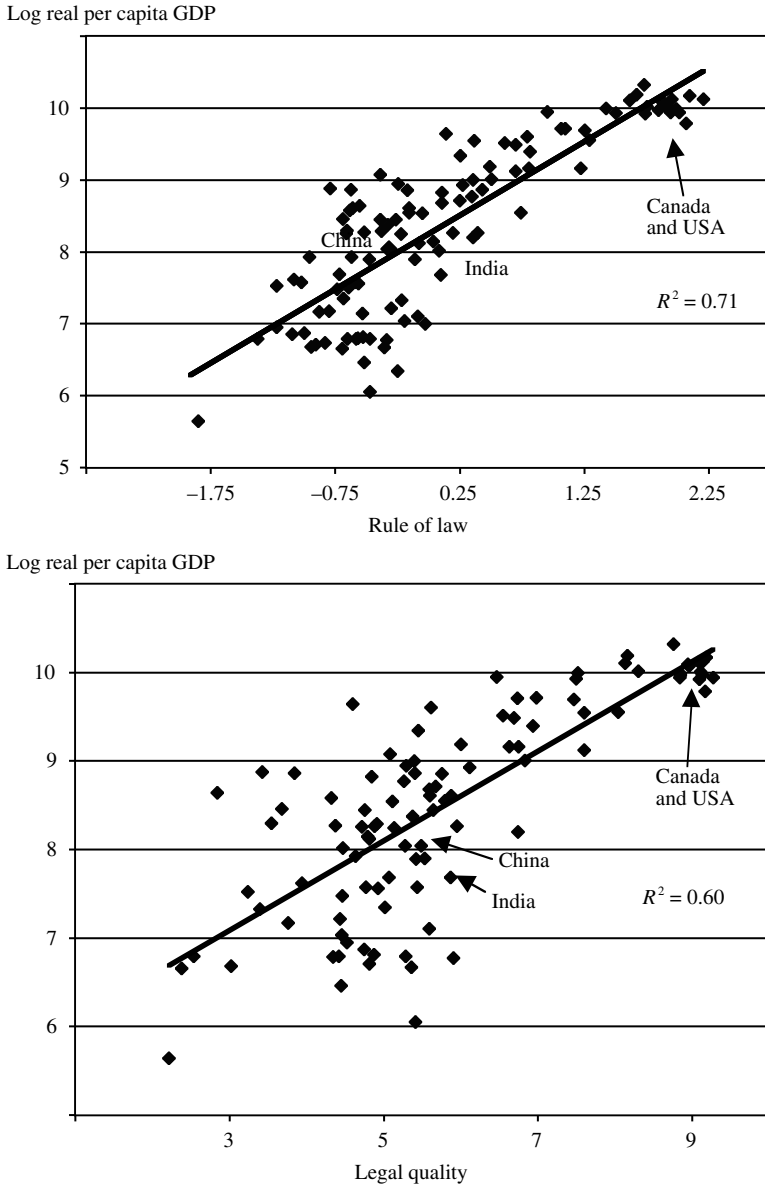
### *Evidence on the Importance of Institutions for Long-Run Growth*

Figure 1 provides two examples of a now-burgeoning institutions-and-growth literature. The top panel plots GDP per capita in 1997 against the Kaufmann, Kraay, and Zoido-Lobaton (1999) rule-of-law index. This index ranks countries based on the degree of rent-seeking or opportunistic behavior that investors are exposed to. For example, when I make an equity investment in a U.S. company I have some confidence that I will see my money again—not always, but usually. In contrast, my equity investment in China is much more likely to be siphoned out of the company and forever lost to me. The figure 1  $R^2$  of 71 percent shows just how much rent-seeking behavior can retard growth.

The bottom panel plots GDP per capita against the Gwartney and Lawson (2003) legal-quality index. This index captures the ability of firms to write enforceable contracts. The need for rule of law governing commercial transactions is obvious. Later in this paper I discuss how important it is for understanding offshoring. The bottom panel of figure 1 shows how important the quality of legal institutions is for growth.

Of course, India and especially China have grown rapidly with weak institutions. But as Alwyn Young (1992, 1994) has pointed out, much of this growth is based on unsustainable factor supply growth rather than on productivity growth. It is the latter that is the basis for modern economic growth. For example, reforms in China and India have led to a movement of workers from farms to cities, thus providing manufacturing with an almost infinite supply of cheap labor. In contrast, long-run sustainable growth of the kind experienced in OECD countries is driven by innovation-induced productivity growth. And rock-solid institutions are the supporting architecture for innovation.

Figure 1. Good Institutions Promote Growth



Source: Data from Kaufmann, Kraay, and Zoido-Lobaton (1999) and Gwartny and Lawson (2003)

*Institutions in China and India*

Rich countries have good institutions. The quality of Chinese and Indian growth-enhancing institutions is at best moderate. Historically, very few countries experience rapid improvements in their domestic institutions. Rather, institutions develop at a glacial pace, over a century or more. The idea that China or India can rapidly develop these institutions is a complete misread of the sources of modern economic growth.

How does this pan out in the specific contexts of China and India? In personal conversation, Wendy Dobson of the Rotman School of Management has identified five weaknesses in Chinese and Indian institutions: (1) the role of the government—particularly state-owned enterprises and corrupt officials—in preventing the efficient reallocation of resources such as capital; (2) a weak financial system that leaves firms under-resourced; (3) a social safety net that leads to labor market inflexibilities; (4) a lack of an endogenous capability to innovate, in part because entrepreneurs are hemmed in by the rent-seeking behavior of bureaucrats; (5) a one-party state in China and a corrupt alliance between bureaucrats and politicians in India that retards the development of a local entrepreneurial class. Although some of these institutional impediments are slowly evaporating, it will take decades before they all disappear.

*An Application to the Worldwide Software Industry*

To make the argument about institutions less abstract, consider how it plays out in the emerging centers of the worldwide software industry, that is, in China, India, Brazil, Ireland, and Israel (see table 2). The industry is very large in India, China, and Brazil. The combined employment of these three countries is 600,000, approaching the U.S. level of 1,024,000. On the other hand, sales per employee are very small in these countries. A U.S. software employee generates almost \$200,000 of sales per employee, four times more than an Indian employee. This means that China, India, and Brazil are providing low-value-added programming skills. Will the software industry in these low-cost countries grow and enter into higher-valued-added segments? Four significant institutional factors may prevent this.

—*Long-term software growth must be primarily driven by domestic developments.* Apart from India, the software industries in these countries developed in response to local needs (Arora and Gambardella 2005; Arora, this volume). Banking and telecommunications drive software growth in Brazil and China,

**Table 2. The Software Industry Worldwide, 2002 or latest available year**

<i>Countries</i>	<i>Sales (\$U.S. billion)</i>	<i>Employment (1,000s)</i>	<i>Sales/ employment (1,000s)</i>	<i>Software sales/GDP (percent)</i>
Brazil	7.7	160	46	1.5
China	13.3	190	38	1.1
India	12.5	250	50	2.5
Ireland (multinational enterprises)	12.3	15	804	10.1
Ireland (domestic)	1.6	13	127	1.3
Israel	4.1	15	273	3.7
United States	200.0	1,024	195	2.0
Japan	85.0	534	159	2.0
Germany	39.8	300	133	2.2

Source: Arora and Gambardella (2005).

software growth in Israel was driven by Israel's high-tech sector, and software firms in Ireland developed by providing services to multinationals using Ireland to enter the European market. In each case, domestic factors drove the initial growth: exports came later. The message, then, is that the institutions that promote domestic-led growth must be in place.

—*Clusters.* In order to have domestic-led growth, many pieces must fall into place simultaneously. For example, the weak financial systems in China, India, and Brazil leave firms under-resourced because insiders routinely steal from outside investors. Thus, firms in these countries are short not only on capital, but also on sophisticated financial advice provided by banks and venture capital firms. Further, downstream demanders of software such as banks are also underdeveloped because of poor national institutions. Therefore, software firms are missing sophisticated buyers who will push them to innovate and upgrade their products (Porter 1998). It is sometimes argued that R&D follows production. Thus, as the low end of the software industry migrates to India, product development will also migrate. Indeed, India's National Association of Software and Service Companies (NASSCOM) boasts many new products. However, available evidence suggests strong limits to this process. Audretsch and Feldman (1996) show that as an industry matures and manufacturing moves to low-cost locations outside the cluster, R&D continues to occur inside the cluster. Jaffe, Trajtenberg, and Henderson (1993) explain why. Much of what is important for ongoing innovation involves the local exchange of tacit information, that is, information that cannot be codified and that can only be communicated face-to-

face. All of this implies institutional limits to the development of an increasingly sophisticated software industry in China, India, and Brazil.

—*National innovation systems.* A skilled labor force is critical for the growth of a domestic software industry. China, Brazil, and India all have large and growing university systems. Each country turns out about as many natural science and engineering degrees as the United States (see, for example, Bardhan and Kroll 2003; Arora and Gambardella 2005; and Arora 2005). It is often argued that this provides these countries with cheap skilled labor. I am more skeptical. If skilled labor is so abundant, why are IT sector wages rising by 15 percent a year in India? The answer is that there is often a significant gap between what the university provides and what the private sector needs.

The most successful country in the world at bridging this gap has been the United States. As is well known, the U.S. university system co-evolved with private sector needs. The development of the state university system is a typical example. As a result, the U.S. university system has an unparalleled curriculum vitality. Further, Rothschild (2003) argues that the continued success of the U.S. university system has been driven by competition. On the one hand, U.S. universities compete fiercely among themselves for the best faculty and ideas. On the other hand, the system has diverse revenue sources, and the many funders of U.S. university research compete among themselves to fund the best projects. As a result, there are no misdirected top-down injunctions about how to run engineering schools, and good ideas are rarely suppressed. Universities in China, Brazil, and India are able to crank out large numbers of graduates, but they will be unable to train the world's best graduates for many decades to come.

—*International technology transfer.* There can be little doubt that OECD multinationals are teaching China and India how to compete. There is also an argument that we are selling ourselves short by underpricing these technology transfers. However, for better or worse, in an open society it is virtually impossible to act differently than we are currently doing. How far will the process of international technology transfer go? Countries with strong protection of intellectual property rights are the favored destination of multinational enterprises (MNEs): these companies go where institutions are strong. Thus weak institutions in China, India, and Brazil will place a limit on technology transfer in the software industry.

This section has demonstrated in the context of the software industry that weak Chinese, Indian, and Brazilian domestic institutions will prevent these countries from migrating too far up the software value chain. The United States need not worry that in the next twenty years we will be reduced to mending the socks of Chinese businessmen.

## **The Determinants of Offshore Outsourcing: The Contracting Environment**

The rise of service offshoring has two main drivers:

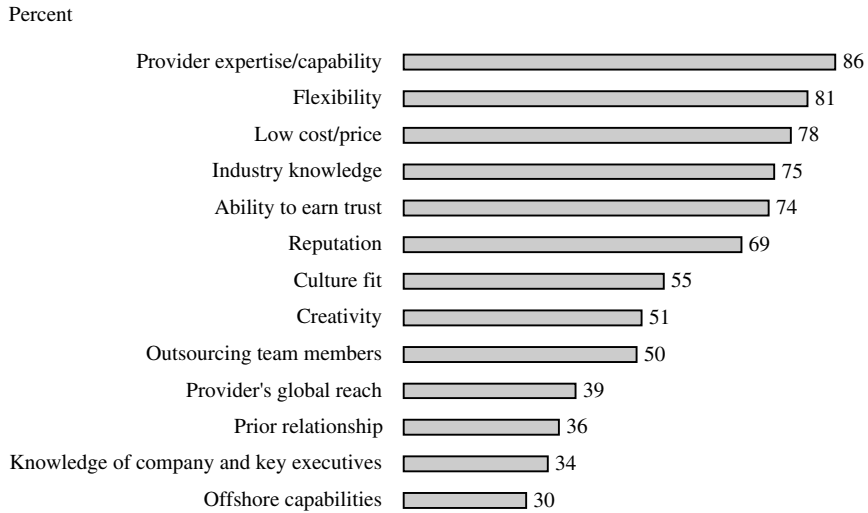
—*Technological improvements in the information and communications technology (ICT) sector.* These improvements launched what UNCTAD (2004) calls the “service tradability revolution.” While the financial sector has been using ICTs for fifteen years, developments of the past five years have dramatically reduced costs to the point where ICTs are cheaply available to all.

—*The new “openness” consensus among political coalitions in developing countries.* In the spring of 1992, Deng Xiaoping used a tour of southern China to call for a radical opening up of the Chinese economy to both domestic and foreign competition. Since then, southern China has been growing at 25 percent a year. Likewise, the 1991 financial crisis in India led to the dismantling of tariffs and restrictions on FDI. Across the developing world there has been a wave of reforms aimed at integrating these low-cost countries into the world economy.

The rise of manufacturing offshoring has also been greatly facilitated by reductions in transportation costs and improvements in transportation logistics.

Conventional wisdom has it that firms go offshore to reduce costs, usually to low-cost countries. This is a misleading view. For one thing, 85 percent of U.S. service offshoring is with other OECD countries. For another, many firms want access to foreign markets in order to tap into new sources of skilled workers, to position themselves in rapidly growing markets, and to be closer to foreign customers. Accenture (2004) reports that lower costs is only third on the list of the most important factors in choosing an offshore outsourcing provider (see figure 2). The first two are service providers’ expertise or capability and service providers’ flexibility.

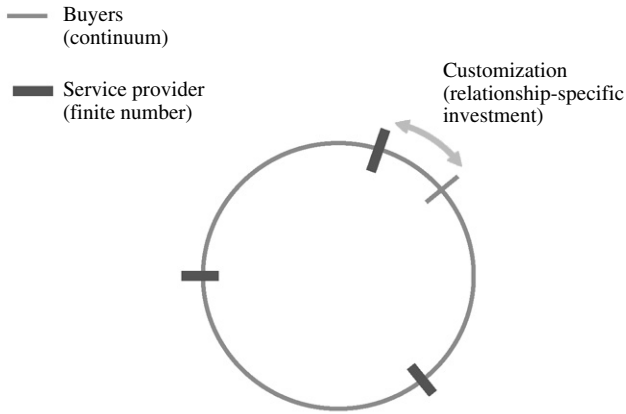
What is most interesting about the list in figure 2 is that most of the items cannot be easily codified or written down in a contract. Mirroring this fact, less than a third of the firms in the Accenture study feel that their offshore outsourcing contract is the key framework for managing the offshore outsourcing relationship. The former CEO of one huge corporation related to me the story of the lengthy contract negotiations he had for a greenfield investment in China. Years of negotiating with the Chinese culminated in a party to celebrate the conclusion of the contract talks. At the party, the Chinese host turned to the CEO and candidly told him that the contract meant nothing to the Chinese partners and that it was only signed to make the CEO comfortable! For the Chinese partners, the important thing was that they trusted the CEO.

**Figure 2. Importance to Firms of Factors in Choosing an Outsourcing Provider**

Source: Data are from Accenture (2004).

### *The New Theories of Offshoring: Trade and Contracting*

The difficulty of writing and enforcing contracts has led to a new generation of theories about offshoring that focuses on contractual incompleteness. The core idea is that parties to a contract cannot specify all possible future contingencies, particularly when an American firm is operating in a foreign environment with which it is not entirely familiar. For concreteness, suppose that an Indian service provider is required to make an up-front investment in customizing software for a U.S. buyer's human resource (HR) needs. Also suppose that there is only a single outcome of interest, namely the "quality" of the software. I make the extreme assumption that a court cannot judge quality or observe anything that might be informative of quality. The contract is incomplete in the sense that the court cannot properly enforce it. In addition, the contract may not be enforceable because the Indian court is corrupt or lacks the expert judges needed to properly adjudicate the dispute. As a result, *after* the customization investment is made, there is a bilateral hold-up problem. The buyer would like to offer a lower price for the software than initially agreed to, perhaps arguing that the customization is incomplete.

**Figure 3. Ex Post Renegotiation Leads to Inefficient Underinvestment in Customization**

Of course, the Indian service provider is no fool. He fully anticipates that the buyer will renegotiate and so takes steps to protect himself. In particular, the Indian service provider will underinvest in customization. Figure 3 illustrates this point. There is a continuum of buyers spread out on a circle. Each point on the circle represents one buyer's ideal HR software needs. The number of Indian service providers is finite, three in figure 3. A buyer wants to find a service provider who is a perfect match, but usually will not find one. Instead, the buyer will have to ask the service provider to make a relationship-specific investment in customization.

There are several steps in the timeline of this analysis:

- The U.S. buyer enters India in search of a local service provider.
- The buyer and service provider match.
- The buyer chooses an organizational form. That is, the buyer decides whether to offshore outsource or to vertically integrate using FDI to buy the service provider's firm.
- The service provider chooses a level of relationship-specific investment in customization.
- The buyer renegotiates.

The question is, should the buyer use offshore outsourcing or FDI as the mode of securing customized HR software? The answer depends on the outside options of the service provider. If the service provider can turn around and find

another buyer whose HR software needs are similar to the original buyer's needs, then the service provider can walk away from the old relationship and start up a new one at little cost. In this case of good outside options, the service provider is not overly concerned with hold-up problems and so makes most of the necessary customization investments. This means that the buyer does not have to provide incentives to the service provider to make up-front investments. Logic dictates that in this scenario the buyer should offshore outsource. In contrast, if the service provider's outside options are poor, he will be concerned about hold-up, will not make the customization investments, and will provide low-quality service. The buyer will then have to use FDI if the buyer wants to control up-front investments in customization. Thus, the decision to offshore outsource or use FDI depends on the degree of hold-up, which in turn depends on (a) the outside options available to the service provider and (b) the quality of contract-enforcement institutions such as the legal system and government rent-seeking behavior.

A key issue is the question of precisely how FDI provides the right incentives for the service provider to invest in customization. The earliest forms of these models were based on what is called the *transactions cost theory* of the firm (see Coase 1937; Williamson 1975, 1985; Klein, Crawford, and Alchian 1978; and Grossman and Helpman 2002, 2003). A problem with this approach is that it assumes that vertical integration (FDI) magically eliminates hold-up problems within the firm. But how does this happen? After all, service providers within the firm still have incentives to underinvest by shirking. To address this concern, Grossman and Hart (1986) and others developed the *property rights theory* of the firm. In this theory, the focus is on how the service provider's incentives are altered by allowing or not allowing the service provider control over the buyer's core asset.

In particular, control of the relationship-specific asset is given to the party whose effort most influences profits. If the buyer's input into developing customized HR software is crucial, then it should be done using FDI. If the buyer can scope the project with precise specifications, then what is needed most is to provide high-powered incentives to the service provider. This is done by making the service provider the residual claimant on profits—that is, by offshore outsourcing. This insight has been built into models of offshoring by Antràs (2003, 2005), Grossman and Helpman (2005), and Antràs and Helpman (2004).

Three related papers that are less about the inability to write complete contracts than about the unwillingness of courts in developing countries to enforce them appear in Ethier and Markusen (1996), Markusen (2001), and Nunn (2005).

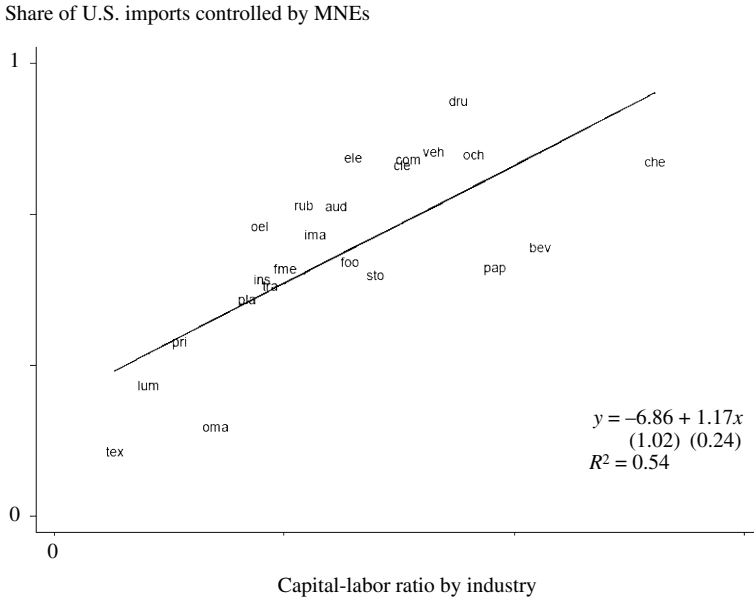
*Empirical Evidence Supporting the New Trade Theories*

It is useful to review the two papers that combine theoretical insights with empirical support. These are Antràs (2003) and Nunn (2005). In Antràs (2003), both the buyer and the service provider make relationship-specific investments. The buyer invests capital and the provider invests labor. With offshore outsourcing, each party's outside option in the renegotiation stage is 0, so there is underinvestment by both parties. With FDI, the buyer is allowed to take a fraction  $\delta$  of the provider's output. Thus the buyer's outside option is  $\delta$  and the provider's outside option is 0. Thus, relative to offshore outsourcing, FDI induces more investment by the buyer and less investment by the provider. Restated, activities done via FDI will be relatively more capital-intensive than offshore outsourced activities. This yields an important empirical prediction. The larger capital's share of an industry, the more sensitive profits are to the buyer's capital underinvestment. Hence the property rights approach predicts that FDI will be the dominant organizational form. This is exactly what we see in figure 4 (see the notes to figure 4 for a complete explanation).

Nunn (2005) changes the focus slightly. Instead of being interested in the inability to write complete contracts, he is interested in the extent to which a country's legal system appropriately enforces contracts. In particular, in countries with poor contract enforcement institutions, buyers and service providers will be unwilling to make relationship-specific investments for fear that they will expose themselves in court to hold-up problems. Thus, goods requiring substantial relationship-specific investments will tend to be produced in countries with good contract-enforcement institutions. Figure 5 provides Nunn's evidence on this mechanism (see the notes to figure 5 for a complete explanation).

We tend to think that offshoring is driven almost exclusively by the search for low-cost labor. This is simply not true. Eighty-five percent of U.S. service offshoring is with other OECD countries. Many firms enter into service offshoring relationships in order to gain access to a skilled workforce, to be in a rapidly growing market, or simply to be closer to customers. For many firms, the problem of offshoring to low-cost countries is the contracting environment. These countries do not have the legal institutions that allow firms to write complete and enforceable contracts. As a result, opportunistic behavior by local entrepreneurs, bureaucrats, and politicians leads to hold-up problems, underinvestment in the relationship, and ultimately an unsatisfactory offshoring experience. China in the 1990s was massively subject to these hold-up problems. Clissold (2004) provides a vivid description of just how terrifying the weaknesses of China's legal system were to foreign investors. Things are improving, but only slowly.

**Figure 4. The Share of U.S. Imports Controlled by MNEs Rises with the Capital Intensity<sup>a</sup>**



Source: Data are from Antràs (2003).

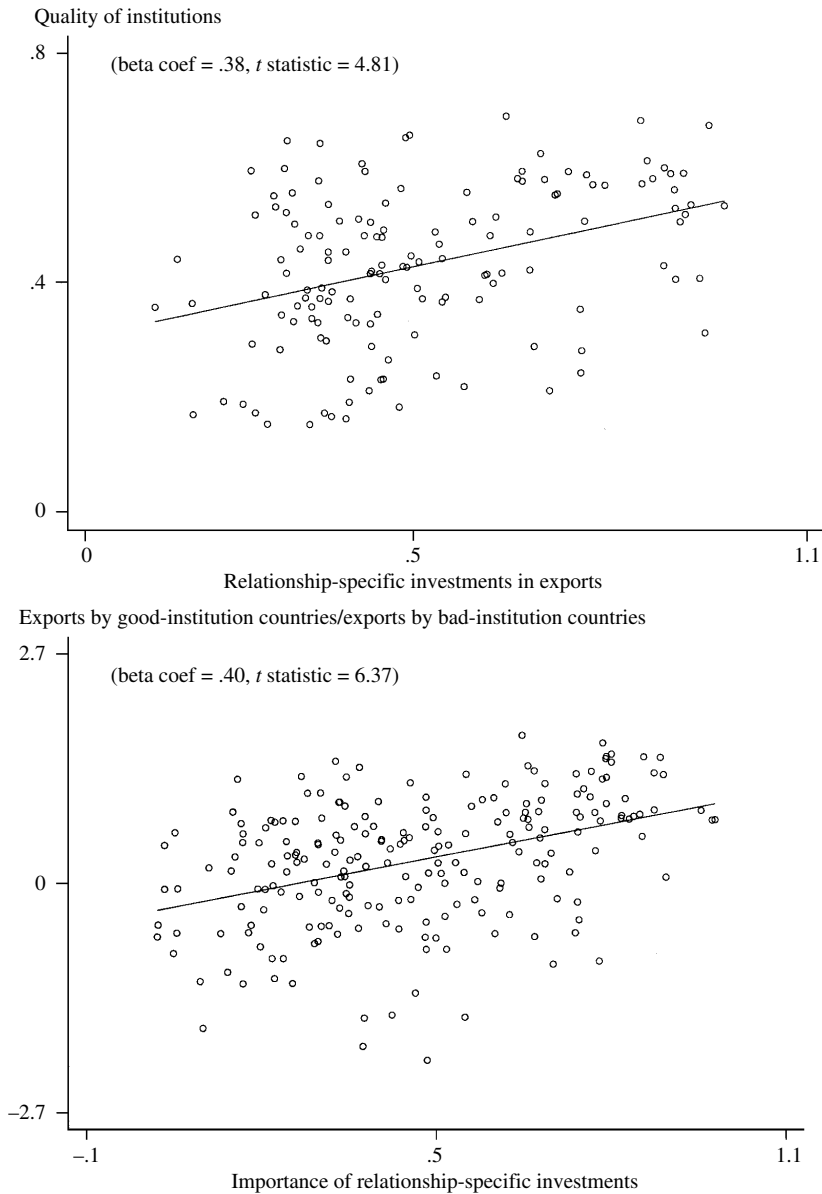
a. Each point in the plot is an industry. The data plot an industry's capital-labor ratio against the share of U.S. imports for that industry that are imported by MNEs from their affiliates. The more capital-intensive the industry, the larger the share of U.S. imports involving MNEs. Note that this is manufacturing trade rather than services trade and that offshore outsourcing is any arm's-length transaction.

## Offshoring and Dynamic Comparative Advantage

The best way to understand the economic aspects of the spectacular ascendancy of East and South Asia is that it has *not* been driven by high-tech innovation. Rather, it has been driven by *kaizen*, which means “improvement” or “idiot-proofness” in Japanese and is translated into English as “total quality control.” The reason that Asian economies have stormed on to the scene one by one is that quality or reliability competition is discontinuous. Once a firm meets or surpasses the quality of its lead competitors, it grabs huge market share.

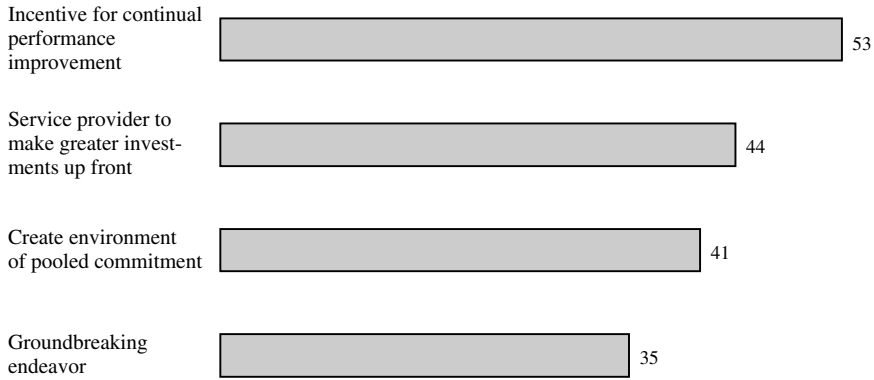
What has been happening in East and South Asia has been a steady process of incremental innovation. This is Rosenberg's (1982) unsung hero of modern economic growth. As Rosenberg has argued persuasively, incremental innovations lead year in and year out to the modest but steady productivity gains underlying modern economic growth. Thus, to understand offshoring one must understand

**Figure 5. Contract Enforcement and Comparative Advantage<sup>a</sup>**



Source: Data are from Nunn (2005).

a. In the top panel each point is an industry. Countries with strong institutions (as measured by the rule of law) tend to export goods that require large relationship-specific investments. In the bottom panel each point is a pair of countries. Relative to countries with a weak rule of law, countries with strong rule of law have exports that are skewed toward goods requiring large relationship-specific investments.

**Figure 6. Incentives: What Are Firms Trying to Achieve through Outsourcing?**

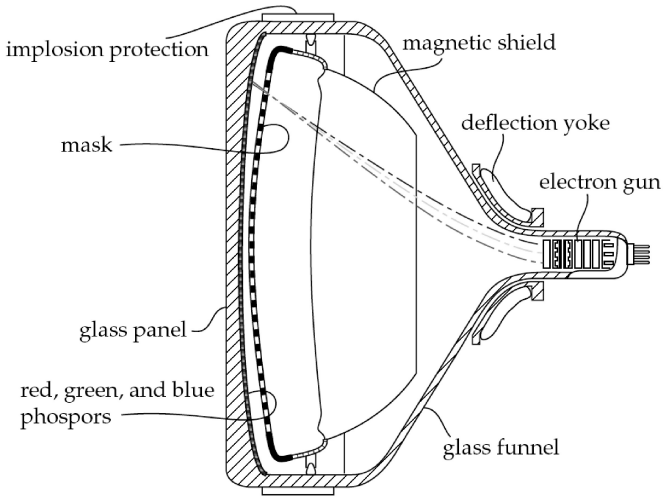
Source: Data are from Accenture (2004).

incremental growth, not pathbreaking innovations dominated by the Western countries that invented invention.

For firms thinking about offshore outsourcing, the single most important incentive issue is how to encourage service providers to continually improve their performance (see figure 6). Improving performance is much more important to firms than “groundbreaking endeavor.” It is even more important than the up-front investments that we focused on in the previous section.

The problem that most firms face is that what is being offshore outsourced is a small component of a larger system. This creates a tension. On the one hand, a buyer would like a service provider to contribute ever-improving component services. On the other hand, ironing out incompatibilities between interdependent components can be a drain on the buyer’s energies. The buyer can conserve its energies by tightly controlling the improvement process, but this may inadvertently stifle the service provider’s incentive to innovate. Puga and Trefler (2002) explore this tension using the novel concept of the *imperfect substitutability* of innovative effort. Imperfect substitutability is a measure of the costs imposed on one party (the buyer or service provider) by the innovative efforts of the other party (the service provider or buyer).

To illustrate, consider the key component of a television, namely, the cathode ray tube (CRT). A CRT is basically an electron gun aimed at the phosphor-coated front screen of a vacuum tube. Rising consumer preference for flatter screens has created a tension between electron gun manufacturers such as

**Figure 7. The Cathode Ray Tube (CRT): A Complex System**

Source: Puga and Trefler (2002).

Sony and vacuum tube manufacturers such as Asahi Glass. From the perspective of Asahi Glass, domes are better than flat surfaces at withstanding the implosion forces of the vacuum tube. Asahi would thus prefer the solution illustrated in figure 7. The CRT screen is flat from the viewer's perspective but domed from the electron gun's perspective. Sony would prefer a flat screen from the perspective of both the viewer and the gun because the variable thickness of the glass creates a prism effect that reduces the sharpness of the picture. This distortion can only be remedied by modifying the electron gun. Asahi's solution imposes costs on Sony, while Sony's solution imposes costs on Asahi. In our terminology, the innovative efforts of Asahi and Sony are imperfectly substitutable. Sony must decide in advance the conditions under which it will accept Asahi's solution. The broader these conditions are, the more likely Asahi's solution is to be adopted and the more resources Asahi will funnel into the project. That is, delegation of control over knowledge is an incentive device.

What makes this view of how innovation is organized so useful is its implication for long-term growth. As multinationals from the developed world use more Chinese service providers, good matches, in the sense that relatively little customization is needed, are more likely. In these cases, the MNEs will delegate

control over knowledge to their Chinese service providers. This will give the Chinese incentives to do more incremental innovation, which in turn will make them more knowledgeable. In the next period, therefore, these Chinese service providers will have a greater ability to serve MNEs.

Compare two markets, one in which relatively few MNEs enter (such as Indonesia or market 1) and one in which many MNEs enter (such as China or market 2). On average, the service providers in China will require less customization in order to meet the needs of MNEs. This will encourage MNEs in China to delegate control over knowledge creation. This will create more knowledgeable service providers in the next period, which in turn will make them even more attractive to MNEs in the period after that. This will lead to even more MNEs arriving in the next period and thus to even less need for customization. In short, the market becomes more and more attractive as a place for offshore outsourcing. Such a process is exactly what took Taiwan from being a country of original equipment manufacturers (OEMs) to being a country of original design manufacturers (ODMs), and it is moving China from being an auto-parts supplier to producing passenger cars for Southeast Asia and engine blocks for the United States.

This analysis explains what is currently happening in China and India and offers further insights into how these developments are embedded in an institutional and organizational context.

## **Policy Challenges**

By any international yardstick the United States is a rich and successful economy. However, it could do better, and if it does not actively work on doing better it will fall behind. The problem is that offshoring has raised the stakes in the global competition game. *The primary effect of offshoring is that it makes it all the more important for the United States to adopt productivity-enhancing domestic policies.* What follows is a list of the key policy issues. I start with what the United States should not do. It is perhaps worth focusing on three policies, two of which receive inappropriate attention and one of which may be receiving too little attention.

### *Two Dumb Ideas*

It is tempting to approach the problem of how to benefit from offshoring as a problem of designing an industrial policy that successfully picks winners.

This is a dumb idea. We should not be in the business of subsidizing contact centers, management consultants, financial institutions, or insurance companies. Sure, China does it and Japan did it. But we forget the dumb mistakes that Japan made (see, for example, Saxonhouse 1998). And do we want a Chinese-style command economy that is great at catching up but unproven at leapfrogging and horrible at allowing individuals the personal freedoms to make economic choices?

Another dumb idea is to adopt a protectionist stance. This will help in the short run, but it will provide the wrong long-run incentives for investing in productivity. Without the spur of international competition, U.S. productivity in protected industries will languish, leading to even deeper structural problems.

### *The Destruction of Human Capital*

The new competition from offshoring will lead to lost jobs and bankruptcies. Each time a worker is separated from her firm, firm-specific human capital is lost. This reduces the incentives of both managers and workers alike to invest in developing firm-specific knowledge. For example, a highly paid IT consultant will typically know much more than just IT. She will know about the unique needs of her firm. Offshoring leads to more frequent separations between workers and firms, thus destroying important dimensions of American human capital.

There is solid evidence to support concerns about the destruction of human capital. Wasmer (2002) demonstrates that the major differences between European and U.S. labor markets stem from differences in the specificity of human capital investments. Martin and Moldoveanu (2003) offer substantial evidence of the rising importance of human capital for firm value. For example, in 2000 Cisco Systems employees earned between \$5 and \$8 billion in option profits alone at a time when the company only made \$4.6 billion.

It is unclear whether the loss of knowledge that arises from worker-firm separations is an equity concern alone (because it hurts offshore-displaced workers) or whether it is also an efficiency concern (because it destroys valuable human capital). It becomes an efficiency issue if there are incomplete contracts governing worker-firm relationships. Specifically, after relationship-specific training has occurred, workers cannot credibly commit to staying with the firm. This contractual incompleteness leads to an underinvestment in training relative to some unattainable first-best contract. The main point is that offshoring may be exacerbating this inefficiency by leading to more frequent separations.

Ensuring that firm-relevant human capital continues to be created in the United States is always a key issue. Whether offshoring creates an environment

in which government intervention (new policies to promote human capital formation) is appropriate is an open question that demands to be researched. The policy issues that flow from this are simply not well understood. There is a tension between promoting long-term relationships and promoting flexibility. Flexibility describes how easy it is both for workers and for firms to terminate a relationship and find an alternative one. How do we design incentives for greater on-the-job training and formal job training programs in an environment where offshoring is likely to reduce the length and value of worker-firm relationships? How do we help workers carry accumulated skills across firms? Should corporate and personal taxes reflect our need to promote both greater specific investments as well as greater flexibility? Clearly, more research is needed in this area.

### **Policy Conclusions**

Most of the sensible policies aimed at fostering American competitiveness in the service offshoring market are investment-promoting framework policies. They encourage U.S. workers, firms, and governments to invest in building productive assets such as human capital and new technologies. Such framework policies address a whole host of domestic competitiveness issues and so are not unique to issues raised by service offshoring. Nevertheless, it would be a mistake to think that this makes framework policies less central to issues raised by service offshoring.

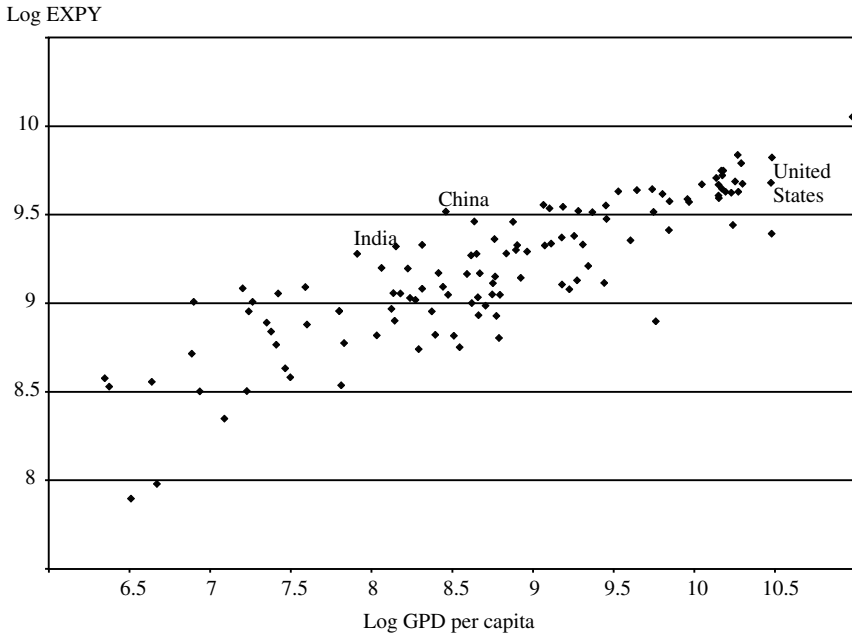
Offshoring creates only a few new policy issues. First, it forces U.S. firms to be part of a global market and hence to compete globally. It thus makes framework policies that encourage investment and competitiveness all the more important. Second, it creates more churning among firms and workers, thus destroying human capital that is specific to worker-firm matches. We must think of policies that encourage these investments without at the same time creating the kinds of labor market inflexibilities that are the source of Euro-sclerosis. Third, it is central both politically and morally to find ways of helping workers displaced by service offshoring. In Trefler (2004), I offer one approach—investing in children at risk so they grow up with skills that allow them to escape the pressures of foreign competition. This and other redistributive policies are clearly affordable for the richest country on the planet.

## *Comments and Discussion*

**Dani Rodrik:** Dan Trefler’s paper is full of valuable nuggets, but the core of the paper rests on two assertions: (1) by the very logic of comparative advantage, it is impossible for China, India, and other newcomers to take over everything that the United States and other advanced countries are currently producing; and (2) the weakness of institutions in these newcomers will necessarily retard the rate at which they converge with technology levels in the West. The first of these points is unassailable in its logic and is hardly controversial (at least in a roomful of economists). The second seems also on target and serves as a useful reminder that China and India remain by and large very poor countries with lots of work still ahead of them, despite their prowess in certain tradable activities. But putting the problem this way somehow minimizes the ability of these countries (and their emulators) to compete head-on with the United States in global markets. I would like to suggest a somewhat different angle on this question.

I have been doing some work recently (with my colleague Ricardo Hausmann) that attempts to measure the “quality” of the export baskets of different countries. We basically quantify the income level that is associated with each country’s exports, which we call *EXPY*. Without going into too much detail, we do this first by identifying the average income level of countries that are the main exporters of any six-digit level product. This gives us the income level associated with each traded product. Then we calculate *EXPY* as the weighted average of these values for each individual country. Figure 8 shows how *EXPY* stacks up against per capita GDP. As expected (and almost by construction), rich countries tend to export goods that other rich countries export. But upon closer look, two things are important in this figure. First, the range of *EXPY* is a lot narrower than the range of per capita GDP. Country export baskets exhibit considerably greater similarity

**Figure 8. Relationship between Per Capita GDP and Income Level Associated with Exports**



Source: Author's calculations.

than the underlying aggregate productivity of individual countries. Second, some of the key countries associated with outsourcing/offshoring have *EXPY* levels that are very high; in fact, several times higher than their GDP per capita.

Consider, for example, the following three countries: the United States, China, and India. Their respective values (for 2003) are shown below.

Overall productivity in the United States is about 7.5 times higher than that in China, and about 13 times higher than that in India. Treffer is right that these

	<i>GDP per capita (US\$)</i>	<i>EXPY (US\$)<sup>a</sup></i>
United States	35,484	15,977
China	4,726	13,575
India	2,732	10,701

a. Income associated with each country's exports.

huge gaps will not close until institutional quality in China and India come to resemble that of the United States, which is unlikely to happen in our lifetime. But now look at the second column of numbers (*EXPY*), which shows the productivity level associated with each country's exports. Here the differences are actually tiny in comparison with the previous gaps. The income level associated with U.S. exports exceeds that of China's exports by only 18 percent, and that of India's exports by about 50 percent. Furthermore, India's software exports are not included in this comparison, since the *EXPY* are calculated for commodity exports only.

The important lesson is that the nature of the competition that the United States faces (and will face in the future) is determined by the productivity not of the average foreign producer, but of the very best among them. What is special about international trade today is that the very best producers in these poor but huge economies are very good indeed. To the extent that one worries about such things (and it is not at all clear that one should), there is less reason to be complacent than Trefler would lead us to believe.

My other disagreements with Trefler, to the extent that there are any, also relate to differences in emphasis. For example, I think he underestimates the role played by industrial policy in most of the success cases, and he downplays the need to think about intelligent industrial policies. As I have argued elsewhere, the trick in successful industrial policy is not to "pick the winners" (an impossible task if there ever were one), but to know how to "let the losers go" (a much less demanding standard).<sup>1</sup> I also would have liked to see greater exploration of the circumstances under which the reduction in the value of job-specific human capital (due to outsourcing and offshoring) has an efficiency (as opposed to a purely distributional) consequence. After all, the key question in this debate is whether competition from China and India undermines technological dynamism in the United States. A plausible channel, to an economist at least, would be through the reduction in the incentive to invest in specific human capital. Trefler talks about this possibility but leaves us guessing as to how seriously we should take it.

1. Dani Rodrik, "Industrial Policy for the Twenty-First Century," Harvard University, 2004 (<http://ksghome.harvard.edu/~drodrik/UNIDOSep.pdf>).

**Pol Antràs:** In his insightful paper Daniel Trefler makes three basic points. First, the “offshoring debate” should focus on the offshoring of services because the enormous recent increase in the offshoring of manufactured goods poses no significant new challenges to conventional trade policy. Second, service offshoring is distinct because it affects high-skilled workers. This is important because unlike low-skilled workers, the skill of high-skilled workers is endogenous, and thus service offshoring may well affect U.S. workers’ incentives to acquire human capital. Trefler’s third main point is that although service offshoring poses threats to certain types of white-collar workers, the United States is not likely to lose comparative advantage in high-tech goods to China or India any time soon. This is due to the weak nature of institutions governing economic transactions in these countries. This last point can be paraphrased using international trade jargon: high-tech goods are “contract intensive,” China and India are “institutions scarce” relative to the United States, and the process of “institution accumulation” is a very slow one. Let me next discuss each of these three points in more detail.

I do not disagree with the claim that offshoring of manufacturing poses no new challenges to conventional trade policy. Still, I believe that the remarkable growth in the offshoring of manufacturing calls for a change in focus in trade policy debates. As a result of the increased offshoring of manufacturing processes, the role of intermediate inputs in the volume of international trade flows has grown in importance. Although the theoretical literature on the determinants of trade protection has not ignored the fact that trade taxes and subsidies fall not only on final goods but also on intermediate inputs (see, for instance, Grossman and Helpman 1994), these considerations have not been properly implemented in the empirical literature and are often not sufficiently stressed in policy discussions.

Beyond its effect on trade policy, the increasing international fragmentation of manufacturing production also has significant implications for the optimal design of fiscal policy and monetary policy. To understand this, it is important to remember that a significant fraction of international offshoring is actually conducted within the boundaries of multinational firms. These firms thus have the ability to use transfer pricing (that is, the pricing of goods and services transacted within the firm) to shift profits across locations in order to minimize their tax burden. The public finance literature has studied this phenomenon, but more work is needed in this important area. A much less emphasized point is that transfer pricing may also have important consequences for the optimal design of monetary policy. In particular, transfer pricing may allow multinational firms to cope better with exchange rate movements (see Lawrence and Rangan 1999 for

some suggestive evidence). This asymmetric pass-through between internal and external vertical relationships may influence the effectiveness of exchange rate devaluations, and through this channel it may affect the way monetary policy ought to be conducted in countries that host a large number of affiliates of foreign-based multinational firms.<sup>1</sup>

Having stressed that much more work is needed in the study of the policy implications of manufacturing offshoring, let me now turn back to service offshoring. This brings me to Treffer's second main point, namely that service offshoring poses new challenges because it affects relatively skilled white-collar workers. He emphasizes the dynamic costs associated with the offshoring of services jobs, which stem from the reduced incentives to acquire skills that are specific to certain occupations that may eventually be offshored to lower-wage countries. This is certainly a reason for concern, but I would also stress the importance of static costs related to the loss of occupation-specific human capital. Every time a U.S. white-collar worker is displaced and his job is offshored, a significant fraction of the knowledge he acquired on the job gets lost. This destruction of occupation-specific human capital may have important aggregate effects. A challenge for future research is trying to quantify these negative productivity effects of service offshoring. A source of inspiration should be the recent work of Kambourov and Manovskii (2004), who have found that the increase in occupational mobility in the United States during the 1980s generated productivity effects able to account for up to 90 percent of the increase in wage inequality recorded over that period.

Service offshoring is different from manufacturing offshoring not only because it involves different types of agents. It is also distinct because it involves the offshoring of relatively knowledge-intensive tasks. Traditional theoretical frameworks for understanding offshoring do not explicitly consider the transmission of knowledge inherent in the international offshoring of services. In Antràs, Garicano, and Rossi-Hansberg (2006) we provide a model of offshoring that places knowledge flows and communication technologies at center stage. We show that characteristics of offshoring and its consequences for "northern" workers are critically affected by the state of information and communication technologies (ICTs). For instance, in the model, an improvement in ICTs is associated with a larger amount of offshoring in the world economy, but also with larger increases in "northern" within-worker inequality resulting from the delocation of certain stages of production. Furthermore, and given that in equilibrium

1. I am grateful to Marc Melitz for suggesting this link between transfer pricing and monetary policy.

the industrialized North is a net exporter of knowledge services, we also show that if knowledge flows are not appropriately recorded in official statistics, the trade balance of the North will tend to appear in deficit. We view this misrecording as a potential contributor to explaining recent U.S. trade imbalances.

Finally, let me move to Trefler's third main point. His argument rests on the premises that (a) innovation or high-tech sectors are "contract intensive" and that (b) China and India will not become relatively "institution abundant" for years to come. My knowledge of institutional economics is rather limited, so I do not have much to add to the latter point. This brings me to the question: what makes a production process contract-dependent? There is a burgeoning literature analyzing the effects of institutions on comparative advantage, from both a theoretical and an empirical perspective (see Levchenko 2004; Costinot 2005; Nunn 2005; and Antràs 2005). A caveat of these pioneering studies is that they fail to convincingly map the theoretical concept of contract dependence to some observable variables in the data. In Acemoglu, Antràs, and Helpman (2005) we model explicitly the frictions that emerge in multi-agent production in the absence of fully enforceable contracts and show that contract-dependence can naturally be related to task complementarities in production. A salient result of our analysis is that countries with good institutions will gain comparative advantage in production processes that feature high complementarities. In light of our results, Trefler's first premise can be empirically validated by testing whether indeed innovation is a process that involves high levels of complementarity between the agents engaged in it.

I conclude by noting another implication of service offshoring on which Trefler does not comment. In particular, service offshoring leads to a shrinkage of what in international macroeconomics is commonly referred to as the "nontradable sector." Surely this effect is qualitatively identical to that created by manufacturing offshoring. But quantitatively, this further reduction of the nontradable sector may have important implications for several issues in international macroeconomics. In an influential paper, Obstfeld and Rogoff (2000) showed that six major puzzles in international macroeconomics could be jointly rationalized by appealing to the nontradable nature of certain economic transactions. If this were indeed the common explanation for all these puzzles, we would expect these puzzles to gradually vanish with the advent of service offshoring. Future research should establish whether this is indeed what we observe in the data.

**General Discussion:** The formal presentations in this session launched a lively discussion. Alan Deardorff questioned the extent to which the types of services

being offshored really do rely on firm-specific human capital that would be subject to the kinds of hold-up problems Daniel Trefler emphasized in his paper. Giving an example to the contrary, his impression was that workers who could speak English and had strong, up-to-date programming skills could move easily from job to job. He also noted that he did not believe that firm-specificity was likely to help explain what he views as one of the main puzzles raised by offshoring—that products that require skilled labor are being offshored to locations where that skilled labor is relatively scarce. Referring to results from his recent surveys of Indian firms, Rafiq Dossani pointed out that workers who undergo long and extensive training programs are not necessarily more valuable to the firm. For instance, a programmer with four years experience in C++ immediately earns more than someone who has gone through a year and a half of in-house training. Thus he argued that it was important to consider value to the firm when examining the role of firm-specific human capital.

Thea Lee raised three sets of issues. First, she expressed the view that previous speakers had been overly dismissive of the potential role for trade policy responses to problems associated with offshoring. She stressed that many current trade rules were not designed to address trade in services. For example, the subsidies rules and countervailing duties remedy do not apply to services. And workers laid off from service sector jobs are not eligible for Trade Adjustment Assistance. If these tools are legitimate for goods, should they not also be legitimate for services? Second, she believed that Trefler's analysis downplayed the threats posed by India and especially China. She saw his posing the scenario of China exporting everything and the United States exporting nothing as an unhelpful caricature. The question she sees as more relevant is whether China, through currency manipulation and industrial policies, might gain an edge in the products that the United States would wish to expand its exports of. Third, Lee focused on the distributional implications of Trefler's analysis. She asked if there was evidence that the group of winners was narrowing to very highly skilled workers whose skills are nontransferable, as well as to owners of capital. She was particularly struck by the large share of the gains from trade that appeared to be going to intermediaries. She wondered whether middlemen were more prominent in services than in goods trade, and what this meant for the extent to which consumers gained through lower prices.

Trefler responded that there have been large gains for consumers, and that this was reflected in lower import prices and improving U.S. terms of trade. As an example, he cited the PCs and other consumer electronics now commonplace in homes and offices. These have been standardized abroad and have become

substantially cheaper. Catherine Mann cautioned, however, that a lack of data on prices for trade in services makes it very difficult to assess what has happened to the terms of trade.

Dossani also saw industrial policy in a much more positive light than Treffer's portrayal in his presentation. Dossani pointed out that less-developed economies such as China can find successful models to follow, making industrial policy more promising and less risky than it would be for countries on the leading edge. Treffer agreed that there may be the potential for successful industrial targeting in developing countries attempting to catch up but reiterated his view that this approach was not appropriate for countries at the technological forefront, such as the United States.

Claire Brown cautioned against making the assumption that the relevant skilled labor markets clear. Instead, drawing from interview results of firms in the semiconductor industry, she argued that they are in fact highly rationed. For example, her work suggested there were two distinct groups of engineers: Asian engineers who have been educated and trained in the United States and who could work in either the United States or Asia, and American engineers who do not have the option of repatriating to Asia. Although we talk about the rising skill and educational levels in countries such as India and China, they have a very small cadre of people who can run companies and manage projects. Thus, she noted, the distributional issues for these two groups are very different; and these characteristics imply that the labor markets may be far from functioning efficiently.

Theodore Moran emphasized that offshoring of services is, in many key respects, very similar to the offshoring of manufactured products that occurred in previous decades. In particular, both affect white- as well as blue-collar workers, and both involve internationalization of production within multinational corporations. In his view, the two are part of the same phenomenon. Susan Collins noted that the initial title of the project and conference had been services offshoring. This was changed to offshoring of white-collar work to reflect the fact that manufacturing has also been important in explaining white-collar employment trends.

Robert Feenstra raised some issues of interpretation about Dani Rodrik's graphs, which he found very interesting. First, he assumed that the actual income levels reflected averages for each country as a whole. In China, income in the coastal provinces, which do most of the exporting, have been considerably higher than the country average, and thus closer to the constructed trade income level. Second, he wondered whether the observed catch-up of actual income to constructed trade income was really due to continued innovation in China's most dynamic sectors and provinces, or simply to the spread of these gains to the rest

of the country, causing income in the hinterlands to catch up with income in the coastal areas.

Finally, Collins asked whether the increased fractionalization of production and trade might have implications for the institutional constraints stressed in Trefler's paper. She raised the possibility that the ability to siphon off particular pieces of a production process could provide new opportunities for countries with less well developed institutional structures to expand and that this dynamic could limit the informativeness of historical data relating institutional development and composition of production and trade.

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