

Offshoring: Threats and Opportunities

Daniel Trefler*[†]

July 22, 2005

A Paper Prepared for the Brookings Trade Forum 2005

'The Offshoring of Services: Issues and Implications'

May 12-13, 2005

Washington D.C.

ABSTRACT: The recent spectacular increase in trade volumes poses large challenges to businesses and workers who must adjust to a new level of global competition. This by itself does not call for a complete rethinking of U.S. trade policy. What does pose a new policy dilemma is the rise of service offshoring. Service offshoring is the use of workers located abroad to provide sophisticated services to U.S. customers. Service offshoring is currently small. As it grows it will undoubtedly have important effects on America. However, the real concern is that in the longer run of 10-20 years, Chinese and Indian exports will devastate the United States. This concern is misplaced for two reasons. First, it ignores the ironclad law of comparative advantage which states that no country can export all goods. Second, it ignores the fact that weak institutions in these countries will retard the rate at which these countries develop as powerhouses of innovation.

*Rotman School of Management and Department of Economics at the University of Toronto and the Canadian Institute for Advanced Research (CIAR). Address: Rotman School of Management, 105 St. George Street, Toronto, Ontario, Canada, M5S 3E6.

[†]I am indebted to Someshwar Rao and Prakash Sharma of Industry Canada for initiating this project and to both Runjuan Liu of the University of Alberta and Nathan Nunn of the University of British Columbia for help with completing this paper. Lael Brainard and Dani Rodrik provided many insightful comments as did Susan Collins who also provided extensive editorial direction. Industry Canada graciously funded most of this project. I am also grateful to the Brookings Institution for funding.

EXECUTIVE SUMMARY

A. *What is New About Offshoring?*

The recent spectacular increase in trade volumes poses large challenges to businesses and workers who must adjust to a new level of global competition. This by itself does not call for a complete rethinking of U.S. trade policy. What does pose a new policy dilemma is the rise of service offshoring. Service offshoring is the use of workers located abroad to provide sophisticated services to local customers. Two dilemmas stand out.

1. Service offshoring makes use of some of the most dynamic information and communication technologies (ICT). It thus has implications for the corporate innovation strategies that lie at the heart of U.S. competitiveness policies. Will U.S. firms be crowded out of the most innovative lines of business? There is already some evidence of this as Indian multinationals such as Satyam, HCL, and Tata secure an increasingly large share of markets currently dominated by U.S. firms.
2. Service offshoring employs highly skilled, white collar workers operating in low-cost countries such as India. This may be displacing good U.S. jobs and depressing salaries of high-paid workers, both of which would reduce the incentives of Americans to invest in their own human capital. In addition, the disruption caused by the growth of service offshoring may make it less worthwhile for firms to make long-term investments in their best workers. Unfortunately, the obvious policies that encourage human capital investments are likely to create Euro-sclerotic inflexibilities in America's high-end labour market. New approaches are need.

B. *The 64,000 job question: Wither China and India?*

Service offshoring is currently small. As it grows it will undoubtedly have important effects on America. However, the real concern is that in the longer run of 10-20 years, Chinese and Indian exports will devastate the United States. This concern is misplaced for two reasons. First, it ignores the ironclad law of comparative advantage which states that no country can export all goods. Even Japan, whose wages in 1959 were 10% of U.S. levels, has yet to devastate the United States and never will.

Unfortunately, the ironclad law of comparative advantage does not rule out the possibility that China and India will export high-tech goods and services to us, leaving Americans to mend the socks of Chinese business executives. This raises a second point. Current thinking about innovation-based long-term growth emphasizes the crucial role of (1) institutions that protect property rights from preying politicians and bureaucrats, (2) institutions that provide a fully functioning legal framework for arm's length transactions,

and (3) institutions that balance the needs of innovators inside the corporation against the needs of investors outside the corporation. These institutions are only beginning to take shape in China and India. It is unlikely that these institutions will evolve quickly, even over a quarter-century horizon. As a result, China and India are a long way from being the world's innovation giants.

C. Policy Responses

Most of the sensible policies aimed at fostering American competitiveness in the service offshoring market are investment-promoting framework policies. They encourage American 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 labour market inflexibilities that are the source of Euro-sclerosis. Third, it is important politically to find ways of helping workers displaced by service offshoring. Past trade adjustment assistance programs have largely been a waste; however, the skilled white collar workers that are currently in danger of being displaced are more easily helped than the unskilled workers displaced by low-end manufacturing imports.

Finally, offshoring will batter unskilled workers in low-end manufacturing jobs. They will need help. Thus, the United States must decide – does its compassion extend to those whose ship is being dragged out to sea by a Chinese tide?

1. Introduction

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 quotes 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 business analysts who help OECD 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 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 policy makers 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 labour 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.¹ 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-drier 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 (e.g., in human capital) and by firms (e.g., 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.

2. 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.
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 discussing of offshoring by answering three definitional questions.

A. *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

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

is nearshoring to Canada e.g., a call center in Toronto that services customers in Chicago. Yet Canada is a country which is very close to the United States (whence nearshoring) and, more importantly, 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.

B. *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 an American 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 Srinivisan (2004) argue that we should only be thinking about offshore outsourcing. On this one point, I think that Bhagwati, Panamanian and Sinicising are wrong.²

C. *The Many Faces of Offshoring*

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: The Bank of Hong Kong sets up an office in New York that provides limited services to U.S. customers. The

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

office is primarily staffed by Americans and most of the key decisions are made in Hong Kong.

- 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) centre in Bangalore which 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 centre that makes Wells Fargo VISA marketing calls to potential customers in Seattle.

The use of the term ‘mode’ comes from the IMF Balance of Payments Manual and is used by all OECD countries in presenting their data.³

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: (i) Contact centres or what are commonly called call centres, (ii) Back-office services, (iii) IT services, and (iv) 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 last 5 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 Stewart in his attempts to define pornography: I can’t define it, but I know it when I see it.⁴

³The 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 stays in his/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.

⁴Jacobellis v. Ohio, US Supreme Court, 378 U.S. 184, 1964.

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

Contact Centre Services	Back-Office Services	IT Services
Help desk	Claims processing	Software development
Technical support/advice	Accounts processing	Application testing
After-sales support	Transaction processing	Content development
Employee enquiries	Query management processing	Engineering and design
Claims enquiries	Customer administration processing	Product optimization
Customer support/advice	HR/payroll processing	Other High-End
Market research	Data processing	Regional Headquarters
Answering services	IT outsourcing	Architectural services
Prospecting	Logistics processing	Biotech and pharma R&D
Information services	Quality assurance	Radiology, X-ray
Customer relationship management	Supplier invoices	Distance education

Notes : Information from UNCTAD and author.

D. 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 haven't already been discussed in the context of conventional import competition. The reason it is not new is that it affects occupations which 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 labour will likely be very different from policy responses aimed at assisting less-skilled labour. 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 focussing 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 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% 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. Focussing on occupations is much cleaner and more useful for policy.

3. 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.

1. Many (though not all) white collar jobs are high paying jobs e.g., \$70,000 a year. As a country, we are familiar with losing high paying jobs to other rich countries e.g., head office service jobs and banking service jobs. 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 high-paid intermediaries that interface between U.S. companies and Indian business service providers.
2. 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 (it hurts offshore-displaced workers) or whether it is also an efficiency concern (it destroys valuable human capital). This needs to be investigated.

3. There is now a large literature showing that re-training programs are not effective for most displaced workers e.g., 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 learn. See Heckman and Carneiro (2003) and Tre-
fler (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.

4. The 64,000 Job Question: Wither 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 have low wages for skilled labour 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 a 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.

A. 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 report 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 labour force that was paid 10% 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.

B. Institutions and the Mystery of Modern Economic Growth

The comparative advantage argument has one significant limitation. It is possible that China and India 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 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 (2005) 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 already have once in this paper – my point is less about the development of a single sector and more about long-term, innovation-based, multi-sectoral, modern economic growth.

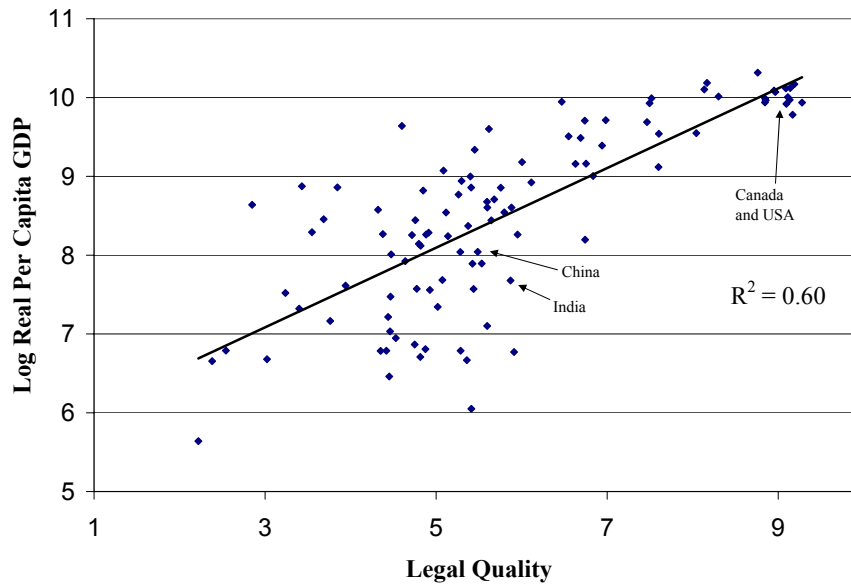
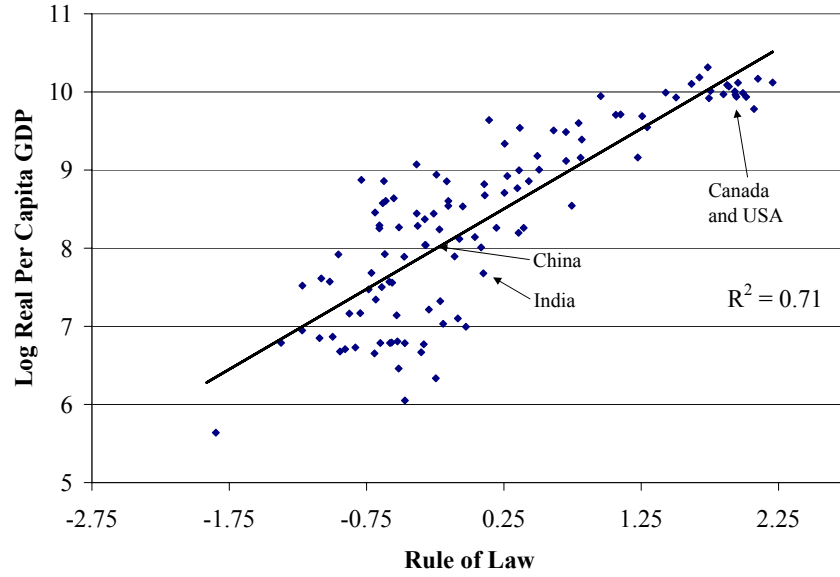
In short, China and India will not be able to compete in innovation-intensive sectors without the 'institutions of modern capitalism' (Rosenberg and Birdzell, 1986) and its handmaiden, 'the invention of invention' (Mokyr, 1990). For China and India to compete over the very long haul, their institutions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

C. 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 behaviour 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% shows just how much rent-seeking behaviour 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. In section 5, I will show just how important it is for understanding offshoring. The bottom panel of figure 1 shows just how important is the quality of legal institutions for growth.

Figure 1. Good Institutions Promote Growth



Notes: Data from Kaufmann et al. (1999) and Gwartney and Lawson (2002).

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 which 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 labour. 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.

D. 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 private conversation with Wendy Dobson at the Rotman School of Management, she identifies 5 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 labour market inflexibilities. (4) A lack of an endogenous capability to innovate, in part because entrepreneurs are hemmed in by the rent-seeking behaviour of bureaucrats. (5) A one party state in China and a corruption alliance between bureaucrats and politicians in India that retards the development of a local entrepreneurial class. While some of these institutional impediments are slowly evaporating, it will take decades before they all disappear.

E. An Application to the Worldwide Software Industry

To make the argument about institutions less abstract, consider how it plays out in the emerging centres of the worldwide software industry, that is, in China, India, Brazil, Ireland, and Israel. Table 2 from Arora and Gambardella (2005) presents data on the software industry. 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

Table 2. The Software Industry Worldwide

Countries	Sales (\$US billion)	Employment (1000s)	Sales / Employment (1000s)	Software sales / GDP
Brazil	7.7	160	46	1.5%
China	13.3	190	38	1.1%
India	12.5	250	50	2.5%
Ireland (MNE)	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%

Notes : The software industry in Brazil, China, India, Ireland, and Israel compared to the United States, Japan, and Germany in 2002 or latest available year. The source is Arora and Gambardella (2005).

into higher valued added segments? Three significant institutional factors may prevent this.

1. *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, 2005). Banking and telecommunications drive software growth in Brazil and China, software growth in Israel was driven by Israel's high-tech sector and software 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.

2. *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. Thus, 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, 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 of the cluster, R&D continues to occur inside the cluster. Jaffe, Trajtenberg and Henderson (1993) explain why. Much of what is important for on-going innovation involves the local exchange of tacit information, that is, information which cannot be codified and which 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.

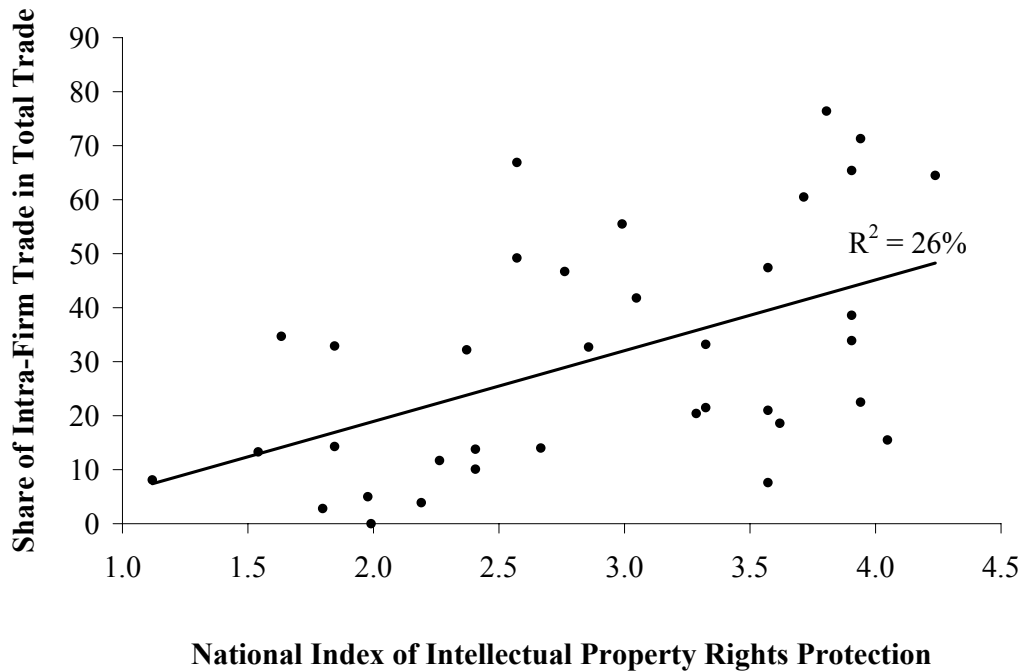
2. *National Innovation Systems*: A skilled labour force is critical for the growth of a domestic software industry. China, Brazil, and India each have a large and growing university system. Each turns out about as many natural science and engineering degrees as the United States e.g., Bardhan and Kroll (2003) and Arora and Gambardella (2005); Arora (2005). It is often argued that this provides these countries with cheap skilled labour. I am more skeptical. If skilled labour is so abundant, why are IT-sector wages rising by 15% 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 in bridging this gap has been the United States. Rosenberg (1997) shows how the U.S. university system co-evolved with private sector needs. 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 amongst 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 amongst themselves to fund the best projects. As a result, there is 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.

3. *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 under-pricing 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? Figure 2 provides evidence on this point. It plots the share of a country's imports that are done as intra-firm trade. This is plotted against the country's intellectual property-rights regime (Ginarte and Park, 1997). Countries with strong protection of intellectual property rights are the favoured 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

Figure 2. Good Institutions Promote Multinational Activity (Intrafirm Trade)



Notes: From author's calculations from the U.S. Bureau of Economic Analysis data on FDI.

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 20 years we will be reduced to mending the socks of Chinese businessmen.

5. The Determinants of Offshore Outsourcing: The Contracting Environment

The rise of service offshoring has two main drivers.

1. *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 15 years, developments of the past five years have dramatically reduced costs to the point where ICTs are cheaply available to all.
2. *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% a year. Likewise, the 1991 financial

Figure 3. Importance of Factors in Choosing an Offshore Outsourcing Provider



Notes: Data are from Accenture (2004).

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, 85% of U.S. service offshoring is with other OECD countries. For another, many firms enter foreign markets to improve access to skilled workforces, to enter rapidly growing markets and to be closer to 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 3. The first two are service providers' expertise and/or capability and service providers' flexibility.

What is most interesting about the list in figure 3 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.

A. The New Theories of Offshoring: Trade and Contracting

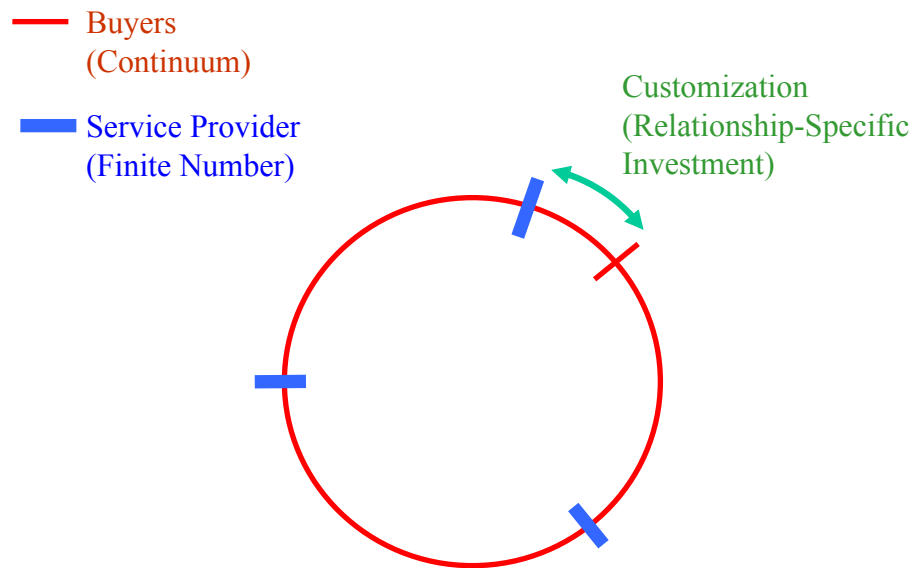
The difficulty of writing and enforcing contracts has led to a new generation of theories about offshoring that focuses on contractual incompleteness. The core idea is that parties to a contract cannot specify all possible future contingencies, particularly when an American firm is operating in a foreign 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 either because the Indian court is corrupt or lacks the expert judges need 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.

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 4 illustrates this point. There are a continuum of buyers spread out on a circle. Each point on the circle represents one buyer's ideal HR software needs. There are a finite number of Indian service providers, three in figure 4. A buyer wants to find a service provider who is a perfect match, but in general 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.

1. The U.S. buyer enters India in search of a local service provider.
2. The buyer and service provider match.
3. 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.

Figure 4. *Ex Post* Renegotiation Leads to Inefficient Underinvestment in Customization



4. The service provider chooses a level of relationship-specific investment in customization.
5. 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 incentivize 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 (i) the outside options available to the service provider and (ii) the quality of contract-enforcement institutions such as the legal system and government rent-seeking behaviour.

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 under-invest 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.

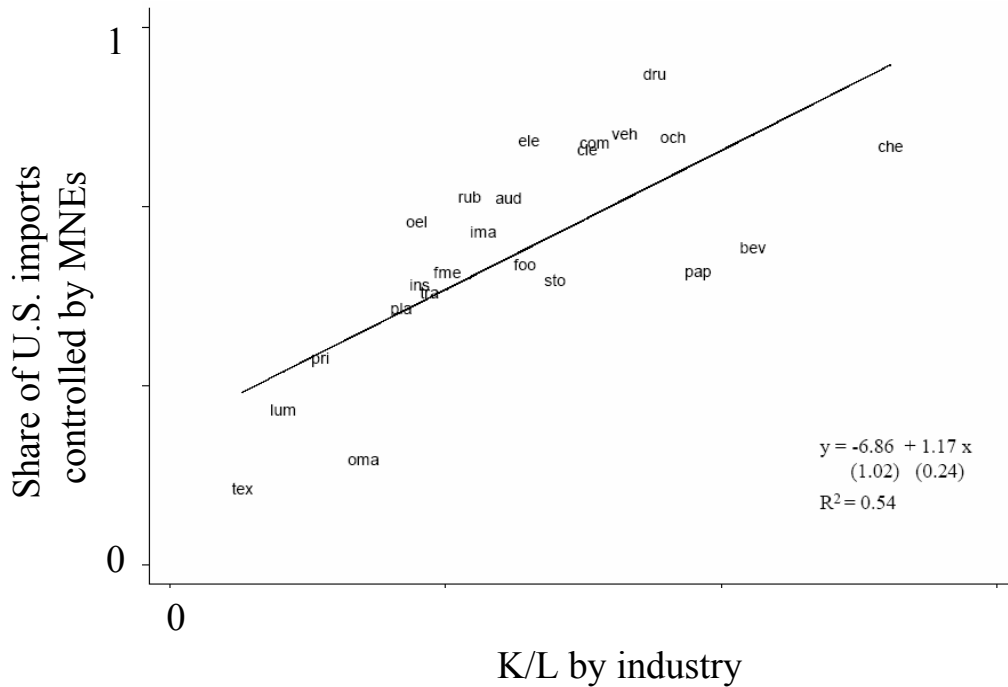
In particular, control of the relationship-specific asset is given to the party whose effort most influences profits. If the buyer's input into developing customized HR software is crucial, then it should be done using FDI. If the buyer can scope the project with precise specifications then what is needed most is to provide high-powered incentives to the service provider. This is done by making the service provider the residual claimant on profits i.e., 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).

B. 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 labour. 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 δ of the provider's output. Thus, the buyer's outside option is δ 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 is capital's share of an industry, the more sensitive are profits 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 5. Each point in the plot is an industry. The data plot an industry's capital-labour ratio against the share of U.S. imports for that industry that

Figure 5. The Share of U.S. Imports Controlled by MNEs Rises in the Capital Intensity of the Industry



Notes: Data are from Antras (2003).

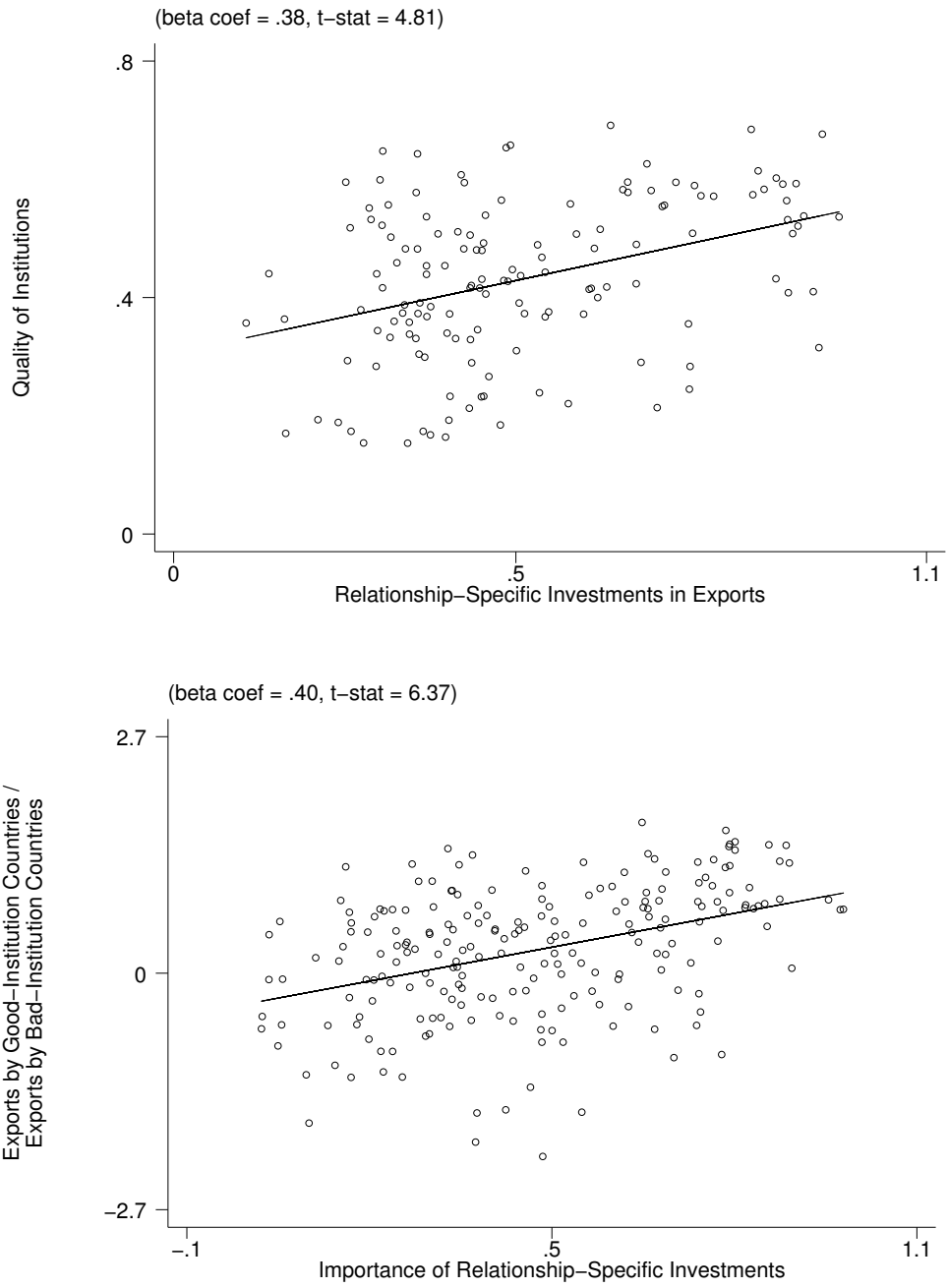
are imported by MNEs from their affiliates. The more capital intensive is the industry, the larger is the share of U.S. imports involving MNEs.⁵

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 6 provides Nunn's evidence on this mechanism. In the top panel of figure 6 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 of figure 6 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 towards goods

⁵ Note that this is manufacturing trade rather than service trade and that offshore outsourcing is any arm's length transaction.

Figure 6. Contract Enforcement and Comparative Advantage



Notes: Data are from Nunn (2005).

requiring large relationship-specific investments.

We tend to think that offshoring is almost exclusively driven by the search for low-cost labour. This is simply not true. 85% 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 behaviour by local entrepreneurs, bureaucrats and politicians leads to hold-up problems, underinvestment in the relationship, and ultimately, in 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.

6. Offshoring and Dynamic Comparative Advantage

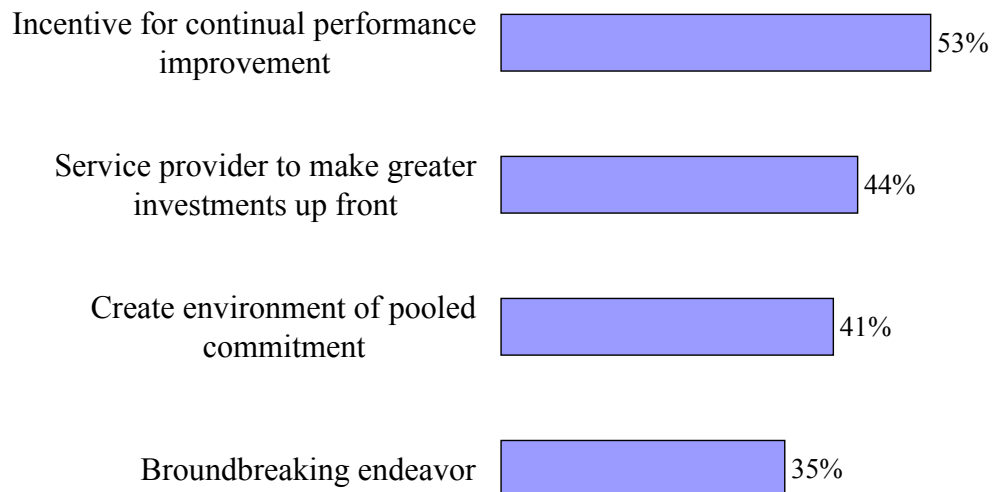
The best way to understand the economic aspects of the spectacular ascendancy of East and South Asia is that it has *not* been driven by high-tech innovation. Rather, it has been driven by *Kaizen* which means 'improvement' or 'idiot-proofness' and is translated into English as 'total quality control.' 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 incremental growth, not path-breaking innovations dominated by the Western countries who invented invention.

For firms thinking about offshore outsourcing, the single most important incentive issue is how to incentivize service providers to ensure continual performance improvements. As figure 7 shows, this is the single most important thing to incentivize. It is much more important than 'ground-breaking 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 aggravated by the fact 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

Figure 7. Incentives: What Are Firms Trying to Achieve?

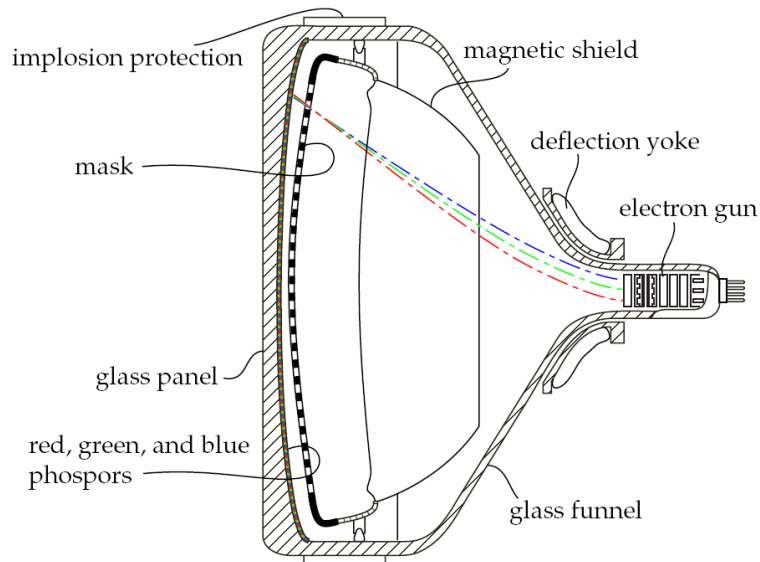


Notes: Data from Accenture (2004).

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 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 8. 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 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

Figure 8. A Complex System



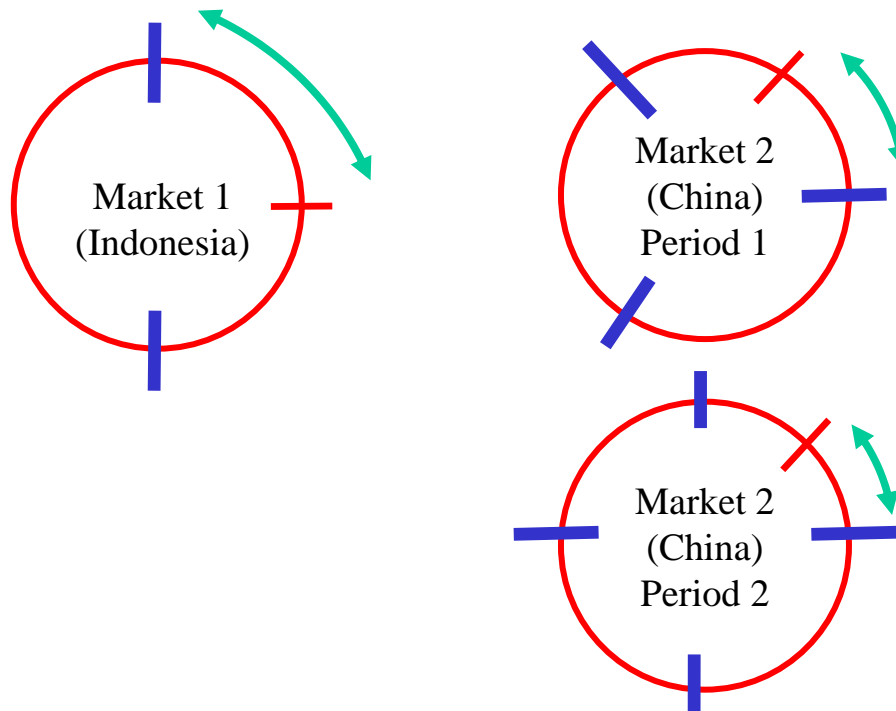
Notes: From Puga and Trefler (2002).

which it will accept Asahi's solution. The broader these conditions are, the more likely is Asahi's solution to be adopted and the more resources Asahi will funnel into the project. That is, delegation of control over knowledge is an incentive device.

One 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, there are more likely to be some good matches in the sense of relatively little customization is needed. In these cases, the MNEs will delegate control over knowledge to their Chinese service providers. This will incentivize the Chinese to do more incremental innovation which in turn will make them more knowledgeable. This means that in the next period, these Chinese service providers will have a greater ability to serve MNEs.

This sets off the dynamic illustrated in figure 9. Compare two markets, one in which relatively few MNEs enter (e.g., Indonesia or market 1) and one in which many MNEs enter (e.g., 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 next period. 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. This is exactly the process that took Taiwan from being a country of original equipment manufacturers (OEMs) to a country

Figure 9. Success Breeds Success



of original design manufacturers (ODMs) and 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 imbedded in an institutional and organizational context.

7. 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, we will find ourselves falling 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 we 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.

A. Two Dumb Ideas

It is very 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 centres, management consultants, financial institutions, or insurance companies. Sure, China does it and Japan did it. But we forget the dumb mistakes that Japan made e.g., 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.

B. 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 high-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. labour markets stems from differences in the specificity of human capital investments. Martin and Moldoveanu (2003) offer substantial evidence on 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 (it hurts offshore-displaced workers) or whether it is also an efficiency concern (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.

C. 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 labour 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.

References

Accenture, “Driving High-Performance Outsourcing: Best Practices from the Masters, Executive Survey Results,” Technical Report 2004.

- Antràs, Pol**, "Firms, Contracts, and Trade Structure," *Quarterly Journal of Economics*, November 2003, 118 (4), 1375–1418.
- , "Incomplete Contracts and the Product Cycle," *American Economic Review*, September 2005.
- **and Elhanan Helpman**, "Global Sourcing," *Journal of Political Economy*, 2004, 112, 552–580.
- Arora, Ashish**, "From Underdogs to Tigers: The Emerging Offshore Software Industries and the U.S. Economy," in Lael Brainard and Susan M. Collins, eds., *Offshoring white-collar work – The issues and implications*, Washington D.C.: Brookings, 2005.
- **and Alfonso Gambardella**, "The Globalization of the Software Industry: Perspectives and Opportunities for Developed and Developing Countries," *Innovation Policy and the Economy*, 2005, 5, 1–32.
- Audretsch, David B. and Maryann P. Feldman**, "Knowledge Spillovers and The Geography of Innovation and Production," *American Economic Review*, June 1996, 86 (3), 630–640.
- Baicker, Katherine and M. Marit Rehavi**, "Policy Watch: Trade Adjustment Assistance," *Journal of Economic Perspectives*, Spring 2004, 18 (2), 239–255.
- Bardhan, Ashok D. and Cynthia Kroll**, "The New Wave of Outsourcing," Working Paper No. 1103, Fisher Center for Real Estate and Urban Economics, 2003.
- Bhagwati, Jhagdish, Arvind Panagariya, and T.N. Srinivisan**, "The Muddles over Outsourcing," *Journal of Economic Perspectives*, Fall 2004, 18 (4), 93–114.
- Clissold, Tim**, *Mr. China*, London: Constable and Robinson Ltd., 2004.
- Coase, Ronald**, "Nature of the Firm," *Economica*, November 1937, 4 (4), 386–405.
- Ethier, Wilfred J. and James R. Markusen**, "Multinational Firms, Technology Diffusion and Trade," *Journal of International Economics*, August 1996, 41 (1/2), 1–28.
- Feenstra, Robert C and Gordon H Hanson**, "Globalization, Outsourcing, and Wage Inequality," *American Economic Review Papers and Proceedings*, May 1996, 86 (2), 240–245.
- Feenstra, Robert C. and Gordon H. Hanson**, "The Impact of Outsourcing and High-Technology Capital on Wages: Estimates for the United States, 1979-1990," *Quarterly Journal of Economics*, August 1999, 114 (3), 907–940.
- Ginarte, Juan Carlos and Walter Park**, "Determinants of Patent Rights: A Cross-National Study," *Research Policy*, October 1997, 26 (3), 283–301.
- Gomory, Ralph E. and William J. Baumol**, *Global Trade and Conflicting National Interests*, Cambridge, Mass.: MIT Press, 2000.
- Graham, Frank D.**, "Some Aspects of Protection Further Considered," *Quarterly Journal of Economics*, February 1923, 37 (2), 199–227.

- Grossman, Gene and Elhanan Helpman**, "Intergration versus Outsourcing in Industry Equilibrium," *Quarterly Journal Economics*, 2002, 117, 85–120.
- **and** – , "Outsourcing versus FDI in Industry Equilibrium," *Journal of the European Economic Association*, 2003, 1, 317–327.
- **and** – , "Outsourcing in a Global Economy," *Review of Economic Studies*, 2005, 72, 135–159.
- Grossman, Sanford J. and Oliver D. Hart**, "Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration," *Journal of Political Economy*, August 1986, 94 (4), 691–719.
- Gwartney, James and Robert Lawson**, *Economic Freedom of the World: 2003 Annual Report*, Vancouver: The Fraser Institute, 2003.
- Heckman, James and Pedro Carneiro**, "Human Capital Policy," Working Paper No. 9495, National Bureau of Economic Research, February 2003.
- Helpman, Elhanan**, *The Mystery of Economic Growth*, Cambridge, MA: Harvard, 2004.
- Hicks, John R.**, "An Inaugural Lecture," *Oxford Economic Papers*, June 1953, 5 (2), 117–135.
- Jaffe, Adam B., Manuel Trajtenberg, and Rebecca Henderson**, "Geographic Localization of Knowledge Spillovers as Evidenced by Patent Citations," *Quarterly Journal of Economics*, August 1993, 108 (3), 577–598.
- Johnson, George E. and Frank P. Stafford**, "International Competition and Real Wages," *American Economic Review*, August 1993, 82, 127–130.
- Kaufmann, Daniel, Aart Kraay, and Pablo Zoido-Lobaton**, "Governance Matters," Policy Research Working Paper No. 2196, World Bank 1999.
- Klein, Benjamin, Robert G. Crawford, and Armen A. Alchian**, "Vertical integration, appropriable rents, and the competitive contracting process," *Journal of Law and Economics*, 1978, 21 (2), 297–326.
- Markusen, James R.**, "Contracts, Intellectual Property Rights, and Multinational Investment in Developing Countries," *Journal of International Economics*, 2001, 53 (1), 189–204.
- Martin, Roger and Mihnea C. Moldoveanu**, "Capital Versus Talent: The Battle That's Reshaping Business," *Harvard Business Review*, July 2003.
- Mokyr, Joel**, *The Lever of Riches: Technological Creativity and Economic Progress*, New York: Oxford University Press, 1990.
- Nunn, Nathan**, "Relationship-Specificity, Incomplete Contracts, and the Pattern of Trade," 2005. Mimeo, University of Toronto.
- **and Daniel Trefler**, "The Political Economy of Tariffs and Growth," 2005. Mimeo, University of Toronto.

- Porter, Michael E.**, "The Competitive Advantage of Nations," in Michael E. Porter, ed., *On Competition*, Cambridge, MA: HBS Press, 1998, pp. 155–195.
- Puga, Diego and Daniel Trefler**, "Knowledge Creation and Control in Organizations," Working Paper No. 9121, National Bureau of Economic Research, August 2002.
- Rodriguez, Francisco and Dani Rodrik**, "Trade Policy and Economic Growth: A Skeptic's Guide to the Cross-National Evidence," in Ben S. Bernanke and Kenneth Rogoff, eds., *NBER Macroeconomics Annual 2000*, Cambridge, MA: MIT Press, 2001, pp. 261–325.
- Rosenberg, Nathan**, "Technological interdependence in the American economy," in Nathan Rosenberg, ed., *Inside the black box: technology and economics*, Cambridge: Cambridge University Press, 1982, pp. 55–80.
- , "Universities as Economic Institutions," Technical Report, Canadian Institute for Advanced Research, October 1997.
- **and L.E. Birdzell**, *How the West Grew Rich: The Economic Transformation of the Industrial World*, New York: Basic Books, 1986.
- Rothschild, Michael**, "What Makes American Public Universities Great?," *NBER Reporter*, Winter 2003.
- Samuelson, Paul A.**, "Where Ricardo and Mill Rebut and Confirm Arguments of Mainstream Economists Supporting Globalization," *Journal of Economic Perspectives*, May 2004, 18 (3), 135–146.
- Saxonhouse, Gary R.**, "Structural Change and Japanese Economic History: Will the 21st Century Be Different?," *American Economic Review Papers and Proceedings*, May 1998, 88 (2), 408–411.
- Slaughter, Matthew J.**, "Insourcing Jobs: Making the Global Economy Work for America," Working Paper, Tuck School of Business, 2004.
- Srinivasan, T.N.**, "Information Technology Enabled Services and India's Growth Prospects," in Lael Brainard and Susan M. Collins, eds., *Offshoring white-collar work – The issues and implications*, Washington D.C.: Brookings, 2005.
- Trefler, Daniel**, "Immigrants and Natives in General Equilibrium Trade Models," in James P. Smith and Barry Edmonston, eds., *The Immigration Debate: Studies on the Economic, Demographic, and Fiscal Effects of Immigration*, Washington D.C.: National Academy Press, 1998, pp. 206–238.
- , "Looking Backwards: How Childhood Experiences Impact a Nations's Wealth," February 2004. Mimeo, University of Toronto.
- UNCTAD**, *World Investment Report*, Geneva: United Nations, 2004.
- Wasmer, Etienne**, "Intepreting Europe and US Labor Market Differences: The Specificity of Human Capital Investments," Discussion Paper No. 549, IZA, August 2002.

Williamson, Oliver E., *Markets and Hierarchies: Analysis and Antitrust Implications*, New York: Free Press, 1975.

—, *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting*, New York: Free Press, 1985.

Young, Alwyn, “A Tale of Two Cities: Factor Accumulation and Technical Change in Hong Kong and Singapore,” in Oliver Jean Blanchard and Stanley Fischer, eds., *NBER macroeconomics annual*, Cambridge, MA: MIT Press, 1992, pp. 13–54.

—, “Lessons from the East Asian NICs: A Contrarian View,” *European Economic Review*, 1994, 38, 964–973.