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OUTSOURCING INFORMATION TECHNOLOGY TO INDIA: EXPLAINING PATTERNS OF FOREIGN DIRECT INVESTMENT AND CONTRACTING IN THE SOFTWARE INDUSTRY

*Michael J. Meehan**

I. INTRODUCTION

Changes to the Indian economy in the 1980s and 1990s paved the way for U.S. companies to use lower-cost Indian labor, especially in the information technology (IT) sector. Over the past decade, U.S. software companies have increased their use of lower-cost Indian software developers. However, U.S. companies have not organized their use of the Indian software developers in a way consistent with prevailing foreign direct investment (FDI) theories of researchers like Williamson, Wells, and Huang. This paper will provide background on the Indian economy and FDI theories and refine previous FDI theory to recognize how U.S. companies are actually making use of lower-cost Indian labor force.

Part II will provide background on India's economic reform and the role of Indian software workers on the IT boom in the U.S. in the late 1990s and early 2000s. It also will discuss the current level of outsourcing to India in the software industry. Part III will examine the FDI theories, which predict that U.S. firms should utilize the lower-cost Indian IT labor. Part IV will provide evidence that U.S. software companies use the lower-cost Indian labor in a manner different from that predicted by prevalent FDI theories. This part will also attempt to explain actual investment patterns. Finally, Part V will propose a follow-up study to investigate the patterns of U.S. software outsourcing.

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II. BACKGROUND

A. *The Indian Economy*

Prior to economic reforms in the 1980s and 1990s, a bureaucratic system often called the “License Raj” controlled the Indian economy.¹ The system employed centralized government decision-making bodies to control companies’ entry into particular market sectors.² The Indian government instituted the system because it believed that centralized control of the market would better protect the Indian economy from domination by foreign actors.³ The system regulated domestic and foreign entry into industrial sectors, controlled diversification of companies, and determined the allocation of resources and government investments.⁴ As a result, once the government licensed a company to operate in a certain sector, it was relatively free from market competition.⁵ This system led to corruption and stifled the Indian economy; during that time India’s economic growth rate stood at a less than four percent in terms of gross domestic product (GDP).⁶

In the 1980s, the government of Rajiv Gandhi made minor reforms to “encourage capital-goods imports, relax industrial regulations, and rationalize the tax system.”⁷ Reforms continued in 1991, where the Indian government engaged in reducing the number of industry sectors covered by government licensing schemes, simplifying the procedural rules and regulations governing industry, opening previously public-only market sectors

¹ Ilyana Kuziemko & Geoffrey Rapp, *India's Wayward Children: Do Affirmative Action Laws Designed to Compensate India's Historically Disadvantaged Castes Explain Low Foreign Direct Investment by the Indian Diaspora?*, 10 MINN. J. GLOBAL TRADE 323, 347 (2001).

² JAGDISH BHAGWATI, *INDIA IN TRANSITION: FREEING THE ECONOMY* 49–51 (Oxford Univ. Press 1993).

³ Sunita Parikh & Barry R. Weingast, *A Comparative Theory of Federalism: India*, 83 VAND. L. REV. 1593, 1609 (1997).

⁴ BHAGWATI, *supra* note 2, at 49–51.

⁵ Kuziemko & Rapp, *supra* note 1, at 347.

⁶ J. Bradford DeLong, *India Since Independence: An Analytic Growth Narrative*, MODERN ECONOMIC GROWTH: ANALYTICAL COUNTRY STUDIES 3 (Dani Rodrik ed., 2001), available at <http://ksghome.harvard.edu/~drodrik/Growth%20volume/DeLong-India.pdf>.

⁷ Dani Rodrik, *Institutions, Integration, and Geography: In Search of the Deep Determinants of Economic Growth*, MODERN ECONOMIC GROWTH: ANALYTICAL COUNTRY STUDIES 19 (Dani Rodrik ed., 2002).

to private actors, reducing funding for selected public sector undertakings, and liberalizing foreign direct investment, trade, and exchange rate policies.⁸

Under the partially relaxed government controls of the 1980s, the Indian economy grew at a rate just under six percent per year.⁹ Following the 1991 reforms, the annual growth in Indian GDP continued at six percent.¹⁰ Some researchers, including Rodrick and DeLong, view these early reforms as the springboard for India's long-term economic growth, not only providing legal reforms, but also initiating a change in attitude towards relaxed government regulation.¹¹ On the other hand, Panagariya, an Indian economics professor, believes that expanded borrowing in the 1980s produced India's initial economic boom and that substantive reforms in the 1990s sustained the initial boom.¹² Regardless of the exact reasons, thirty-five years of sustained economic growth provides persuasive empirical evidence that the reforms in India enabled changes in its economy that opened the door for both domestic production and foreign investment.¹³

The 1991 reforms also included increased protection of intellectual property (IP). While IP laws are considered stronger in India than in China and other developing countries, they are not typically considered as strong as IP laws in the U.S.¹⁴ Starting in 1994, Indian copyright law provided copyright protection for computer programs.¹⁵ From 2002 to 2005, however, India completely excluded computer programs from patent protection.¹⁶ As of January 1, 2005, the legislators relaxed those restrictions to comply with the World Trade Organization Agreement on Trade-

⁸ MINISTRY OF FIN., GOV'T OF INDIA, THE ECONOMY SURVEY OF INDIA, ch. 7 (1997).

⁹ DeLong, *supra* note 6, at 3.

¹⁰ Sophi Beach, *The Tiger in Front: India and China*, ECONOMIST, Mar. 3, 2005, available at http://www.economist.com/surveys/displaystory.cfm?story_id=3689214.

¹¹ Rodrik, *supra* note 7, at 19; DeLong, *supra* note 6, at 5–6.

¹² Arvind Panagariya, *India in the 1980s and 1990s: A Triumph of Reforms* 4–7 (Int'l Monetary Fund, Working Paper WP/04/4, 2004), available at <http://www.imf.org/external/pubs/ft/wp/2004/wp0443.pdf>.

¹³ Panagariya provides evidence of increased foreign investment in India since 1990. *Id.* at 34.

¹⁴ Nathan E. Stacy, Comment, *The Efficacy and Fairness of Current Sanctions in Effecting Stronger Patent Rights in Developing Countries*, 12 TUL. J. INT'L & COMP. L. 263, 294–95 (2004).

¹⁵ The Copyright (Amendment) Act, 1994, No. 14, Acts of Parliament, 1994.

¹⁶ The Patents (Amendment) Act, 2002, No. 38, Acts of Parliament, 2002.

Related Aspects of Intellectual Property Rights. Specifically, India now excludes only “a computer programme per se other than its technical application to industry or a combination with hardware.”¹⁷ While this is not as broad as software patent protection in the U.S., which does not provide additional patentability restrictions on software,¹⁸ the 2005 changes did provide increased patent protection for software. However, as noted by Professor Agarwal of the Indian Institute of Management, India may need years to develop the expertise in its patent office and in its courts before the public can safely predict what is and is not patentable software.¹⁹

B. Indian IT Workers

During the worldwide IT boom that started in the mid-1990s, thousands of talented Indians immigrated to the U.S. to take up positions in the software industry. For example, in 2002, 47,000 (sixty-three percent) out of the 74,000 nonimmigrant temporary workers obtaining H-1B visas to work in the computer-related industries were from India. In fact, the U.S. provided more than four times as many H-1B visas to workers from India than to workers from China and Europe combined.²⁰ The two previous years reflect similar percentages—sixty-eight percent in 2000 and seventy-one percent in 2001.²¹ The National Science Foundation found in a recent survey that approximately one in four mathematicians and computer scientists are foreign born.²² The

¹⁷ The Patents Bill, 2005, No. 32, Acts of Parliament, 2005.

¹⁸ *State St. Bank & Trust Co. v. Signature Fin. Group*, 149 F.3d 1368, 1375 (Fed. Cir. 1998) (holding that software programs are not excludable from patent protection *per se*). See also *Diamond v. Diehr*, 450 U.S. 175, 187 (1981).

¹⁹ Anurag K. Agarwal, *Software Patent*, BUS. COGNIZANCE, Jan.-Feb. 2005, http://mba.iiita.ac.in/janfeb05/brainwave_software.htm.

²⁰ H-1B visas allow non-U.S. citizens to enter the United States to work in their field of specialization for three to six years. In 2002, the 47,000 software and computer-related workers from India represented seventy-three percent of the total specialized H-1B nonimmigrants from India in all specializations. Other specializations of note were “architecture, engineering, and surveying” at nine percent and “medicine and health” at four percent. U.S. DEPT. OF HOMELAND SEC., 2002 YEARBOOK OF IMMIGRATION STATISTICS 152 (2003), available at <http://uscis.gov/graphics/shared/statistics/yearbook/2002/Yearbook2002.pdf>.

²¹ U.S. DEPT. OF HOMELAND SEC., 2001 STATISTICAL YEARBOOK OF THE IMMIGRATION AND NATURALIZATION SERVICE 192 (2002), available at <http://uscis.gov/graphics/shared/statistics/yearbook/2001/yearbook2001.pdf>.

²² NAT'L SCI. FOUND., SCI. & ENG'G INDICATORS, O-13 (2004), available at <http://www.nsf.gov/statistics/seind04/pdf/overview.pdf>.

survey did not specify in what country the computer scientists were born, but related data for H-1B visas suggest that significant percentages were born in India.

The growing presence of people of Indian descent in the computer industry may have laid the foundation for the recent increase of software outsourcing to India. In fact, some of the Indian software workers have started their own software outsourcing companies. These workers, in particular, provide networks of previous colleagues and clients that augment their outsourcing companies.²³ While there is no empirical data on the subject, it is possible that Indian-trained workers enhanced confidence in the Indian software contracting industry with their high quality work and high productivity levels.

C. Outsourcing to India

Companies are outsourcing a significant amount of computer-related work to India. A recent survey from ITtoolbox found that approximately thirty percent of IT companies worldwide outsource overseas and that, of those, seventy-four percent outsource to India.²⁴ The survey also found that companies more often outsourced “technical jobs,” such as software development, maintenance, and support, than less technical jobs, such as help-desk support, training, and education.²⁵ As the core of an IT company, outsourcing technical jobs may lead to increased risk of theft or loss of IP for U.S. firms (discussed at length below).

III. FOREIGN DIRECT INVESTMENT THEORIES

Researchers like Williamson, Wells, and Huang laid the theoretical foundation for determining how firms should choose to capitalize on lower-cost foreign labor. These researchers consider two alternative business structures: the Contracting Model and the Foreign Direct Investment Model (FDI Model). In the Contracting

²³ One of the interviewees, whose experience is later related in this paper, is an Indian-born entrepreneur.

²⁴ ITTOOLBOX, 2004 ITTOOLBOX OUTSOURCING SURVEY (2004), http://security.ittoolbox.com/documents/research/dell1_survey.pdf (last visited April 3, 2006).

²⁵ *Id.*

Model, a U.S. software firm²⁶ hires an Indian software contracting firm to work on a per-contract basis. Under this scheme, the U.S. firm agrees to pay the Indian firm for work performed and the Indian firm in turn provides software or related services to the U.S. firm. In the FDI Model, the U.S. firm opens a subsidiary in India, hiring Indian IT workers to develop software and provide related services. In both models, the U.S. firm can reduce its overall software development costs by tapping into lower-cost Indian workers.

In a market without transaction costs or risk, companies will employ the Contracting Model in order to capitalize on the lower-cost Indian software professionals. In such a market, competitive bidding allows U.S. firms to capture the lower cost of software professionals without substantial overhead from the Indian contracting firm.

A. Williamson and Huang

Williamson identifies two combinations of environmental and human factors that render the Contracting Model untenable, prompting a firm to adopt FDI Model.²⁷ The first combination occurs when the human factor of *opportunism* combines with the environmental factor of *small numbers*.²⁸ If, for example, a few Indian firms begin to dominate a particular market, then the few remaining firms may engage in opportunism and escalate prices. Assuming that Indian labor remains cheaper than comparable U.S. labor, U.S. firms will internalize the lower-cost Indian labor through FDI, thereby bypassing the opportunistic Indian contracting firms. However, except in situations where an Indian software contracting firm holds a monopoly on expertise needed for a software project, this combination of factors is unlikely to occur in software outsourcing. So far, there has not been a shortage of Indian contracting firms willing to do business with U.S. companies.

²⁶ This paper assumes a U.S. software firm throughout. However, most of this analysis is generally applicable to non-U.S. firms that are utilizing Indian outsourcing for cost savings. In addition, the theories described are applicable to non-Indian contracting firms that are able to provide services below the market rate for U.S. software development.

²⁷ OLIVER WILLIAMSON, *MARKETS AND HIERARCHIES: ANALYSIS AND ANTITRUST IMPLICATIONS* 9 (Free Press 1975).

²⁸ *Id.* at 9–10.

Williamson identifies a second combination of environmental and human factors that better apply to India's current situation. According to Williamson, a U.S. firm may have incentive to open an Indian subsidiary under the FDI Model when *environmental uncertainty* combines with the human factor of *bounded rationality*.²⁹ Bounded rationality occurs when the human mind's capacity "for formulating and solving complex problems is [overwhelmed by] the size of the problems whose solution is required for objectively rational behavior."³⁰ In the case of cross-border projects discussed herein, the environmental uncertainty may include exchange-rate risk, expropriation risk, and legal risk, as well as economic and market uncertainty.

1. Exchange-rate risk

The FDI Model and the Contracting Model both present a similar exchange-rate risk. Under the Contracting Model, if a contract is negotiated in Indian rupees, the U.S. firm will take on the risk of the rupee-to-U.S. dollar exchange-rate fluctuation. This risk could be substantial, especially for longer-term contracts, considering that the U.S. dollar has nearly tripled in value relative to the Indian rupee over the last 15 years.³¹ If the contract is negotiated in U.S. dollars, the Indian contracting company may build a premium into the contract to account for potential exchange-rate fluctuations. Under the FDI Model, if a U.S. firm opens an Indian subsidiary, the U.S. firm takes on the exchange-rate risk of paying employees, taxes, property costs, and incidentals in rupees. If a U.S. firm can negotiate a contract in U.S. dollars, it may prefer the Contracting Model to the FDI Model in order to pay an up-front premium to minimize exchange-rate risk. However, given that the premium charged by the Indian contracting firm should be at least as high as the expected exchange-rate risk, the U.S. firm may be generally better off negotiating the contract in rupees or adopting the FDI Model. Consequently, the similarity in effect makes exchange-rate risk a less important consideration in choosing between the two models.

²⁹ *Id.*

³⁰ HERBERT A. SIMON, *MODELS OF MAN: SOCIAL AND RATIONAL* 198 (Taylor & Francis 1957) (emphasis removed).

³¹ X-rates.com, *Historic Exchange Rates*, <http://www.x-rates.com/cgi-bin/hlookup.cgi> (last visited Mar. 28, 2006).

2. *Expropriation risk*

India is attempting to reassure potential investors that investment in India is safe. In an address to a joint session of the U.S. Congress in July of 2005, Indian Prime Minister Manmohan Singh showcased India as a safe destination for foreign investment and strongly encouraged U.S. investment in India.³² However, the ongoing battle between the Indian government, Bechtel, and General Electric in the Dabhol power project attests to the potential for expropriation risk in India.³³ Vernon and Moran note that foreign investors hold considerable leverage over the sovereign government; however, when a project spends funds on fixed infrastructure in the foreign country, the leverage shifts, and one can expect an increased risk of expropriation.³⁴ In regards to the Dabhol power project, where over one billion U.S. dollars in infrastructure were fixed in India, Vernon and Moran would argue that expropriation became possible once the physical infrastructure was in place.

The obsolescing bargain noted by Vernon and Moran is less likely to affect FDI in the software industry. The software industry is human capital-intensive, where the ratio of buildings and equipment costs, relative to the cost of staff is much lower in the software industry than in the energy or manufacturing industries. The software industry, rarely, if ever, incurs large infrastructure costs. The government would have little incentive to expropriate a software subsidiary in order to obtain computers, desks, chairs, and an office building or a lease to an office building. Therefore, unlike the energy and manufacturing industries, in the software industries the FDI Model poses little risk of expropriation. As a result, expropriation risk is unlikely to affect a U.S. firm's choice between the FDI Model and the Contracting Model in the software industry.

³² Manmohan Singh, Prime Minister of India, Address at the Joint Session of the U.S. Congress (July 19, 2005) (transcript available at http://www.indianembassy.org/press_release/2005/July/23.htm).

³³ Even though an independent tribunal ruled in favor of Bechtel and General Electric as to the expropriation in September of 2003, Bechtel and General Electric continued to struggle to regain their investment. *See id.*

³⁴ THEODORE H. MORAN, FOREIGN DIRECT INVESTMENT: THE NEW POLICY AGENDA FOR DEVELOPING COUNTRIES AND ECONOMIES IN TRANSITION 142–43 (Inst. for Int'l Econ. 1998); *see also* RAYMOND VERNON, SOVEREIGNTY AT BAY: THE MULTINATIONAL SPREAD OF US ENTERPRISES 46–48 (Basic Books 1971).

3. Market and economic risk

Market uncertainty may provide U.S. software companies incentive to adopt the FDI Model. Consider the situation where a U.S. firm hires an Indian software development team (either through FDI or contracting) to expand into an area expected to grow—for example, enterprise software. The software will take one year to build and test. If, while the firm is still developing the software, Microsoft deploys substantially identical enterprise software at half the price that the U.S. firm expects to sell its product, the U.S. firm may have to terminate its enterprise software project. If the firm adopted the FDI Model, it may be able to terminate the project and recoup the human capital costs by altering the project. If the altered project is sufficiently similar, some of the software code may be reusable. Even if the altered project were not similar, the expertise of the team working on the project would be useful on other projects.

In the same hypothetical situation, the U.S. firm adopting the Contracting Model may choose to terminate the contract. In such case, the U.S. firm is likely to be held liable for damages. Theoretically, the U.S. firm could renegotiate with the Indian contracting company in order to gain some of these post-termination advantages seen for the FDI Model such as software code reuse and access to expertise. However, in reality, the U.S. firm will be in an unfavorable bargaining position because the Indian contracting company will have exclusive rights on the expertise created by the programmers from the first project and will be able to negotiate a higher price (relative to its costs) for this retained expertise. According to duration calculations, a new software team could take up to eighty percent more time on a follow-on software project than would the original team.³⁵

In a world of perfect information, the Indian contracting company may be able to negotiate up to the value that the expertise would provide to the U.S. firm. Even in a world of imperfect information, the Indian contracting firm will be able to negotiate some of the value of the expertise created by the first project, thereby forcing the U.S. firm to repay for the expertise it originally paid the Indian contracting company to develop. Given the better

³⁵ William Roetzheim, *Estimating and Managing Project Scope for Maintenance and Reuse Projects*, CROSS TALK, J. OF DEF. SOFTWARE ENG'G, Dec. 2004, at 9, available at <http://www.stsc.hill.af.mil/crosstalk/2004/12/0412Roetzheim.html>.

potential to recoup losses, in terms of expertise and code reuse, market uncertainty may lead U.S. firms to favor the FDI Model over the Contracting Model.

4. Legal uncertainty

The area of biggest environmental uncertainty in Williamson's framework for the software industry is the legal uncertainty. An area of particular legal uncertainty in India is the protection of IP. The uncertainty surrounding IP in India should lead U.S. firms to adopt the FDI Model over the Contracting Model. In order for an Indian contract firm or a foreign subsidiary to function, the U.S. firm must transfer IP and expertise to the Indian development team. The expertise and IP comes in many forms. In some software projects, the U.S. firm may transfer to the Indian team knowledge of how internal software modules operate. In more complex software projects, such as revamping software systems, the U.S. firm transfers the entire code or portions of the code to the Indian team. With that code and experience working on it, the Indian team gains knowledge of the algorithms and its application. All of these things are IP in the broad sense. Some are trade secrets and some are patented or patentable. Particularly, the code will be protectable under copyright law. Some of this IP may constitute part of the U.S. firm's significant competitive advantage.

Although under the Contracting Model, the IP and expertise transferred to the Indian contracting firm are protected to some extent by the contract agreement and the IP laws in India, uncertainty still remains, as noted above. Furthermore, some of the transferred expertise is not protectable under contract or IP law, such as the ability to use the U.S. firms' internal software system modules.

Under the FDI Model, U.S. firms gain protection through employment law and workforce coherence in addition to IP law. For example, employment law allows U.S. firms to enter into non-disclosure and other legal agreements with their employees, thereby increasing the number of legal devices at the firms' disposal. Because the Contracting Model does not provide these additional legal protections, Huang predicts that U.S. firms are more likely to apply the FDI model if they transfer expertise.³⁶

³⁶ YASHENG HUANG, *SELLING CHINA: FOREIGN DIRECT INVESTMENT DURING THE REFORM ERA* 51–52 (William Kirby ed., Cambridge Univ. Press 2003).

Workforce coherence, which is easier to attain under the FDI Model, will also cause U.S. software firms to favor the FDI Model over the Contracting Model. Workforce coherence is easier to maintain under the FDI Model because U.S. firms have direct control over the hiring and firing of India-based employees. By contrast, under the Contracting Model, U.S. firms maintain workforce coherence only if two conditions exist: (1) the U.S. firm uses the same Indian contracting company for subsequent projects, and (2) if the Indian company retains its employees and places the same employees on subsequent projects for the same U.S. firm. Furthermore, a U.S. firm has limited influence over which employees the Indian contracting company retains and less likely knows which employees of the Indian contracting company are important to retain.

Workforce coherence is important for several reasons. First, increased workforce coherence leads to a decrease in employee divulgence of expertise or other IP. Often expertise and other unprotectable IP are not valuable enough or recognizable enough for third party elicitation. If the employee leaves, however, the new employer might recognize and have access to the expertise or other unprotectable IP held by the employee. Therefore, workforce coherence makes it less likely for a competing firm or a third party to acquire the expertise.

Second, retained expertise can save costs. Consider, for example, a U.S. firm with experience in designing and building applications for cellular phones that does not have in-house development capacity to make a new solitaire card game for the phones. If the U.S. firm hires an Indian software contracting company to build the game, the firm would increase its return on investment by training the Indian team to develop software for cellular phones.

Under the Contracting Model, the only way that the U.S. firm can continue to benefit from the initial training investment is to continue to hire the same Indian software contracting company for future cellular phone software projects. Doing so, however, may bring about the situation where contracting becomes less desirable—the combination of the environmental factor of reduced numbers with the human factor of opportunism. The Indian company will be in a position to negotiate a higher price for the contracting work. It can negotiate the price up to the amount the U.S. firm would spend on a competing Indian company to perform the same task. In doing so, the Indian software contracting

company can fairly accurately estimate the competing company's cost by calculating how much it would cost a different, non-expert team inside their own company to perform the task. The net result is that under the Contracting Model, the Indian company can capture part of the cost savings inherent in repeat-player expertise, thereby diminishing cost savings to the U.S. firm. In contrast, under the FDI Model the U.S. firm captures its entire cost savings associated with repeat-player expertise.

Third, workforce coherence is important because it enables U.S. firms to negotiate directly with particularly valuable employees. Consider the example of a U.S. firm developing software for telephones. If only one India-based employee can consistently and efficiently program the graphical display on the phones, she becomes particularly valuable to the U.S. firm. Under the FDI Model, if the employee attempted to leave, the U.S. firm might retain her by negotiating a raise up to the cost savings she provides on projects. By contrast, an Indian software contracting firm operating under the Contracting Model would have less incentive to retain the employee. Given the plenary nature of the software contracting industry, the Indian company will not utilize the employee's specialized skills to the fullest as U.S. firms would under the FDI Model—causing a relative under-valuation of specialized skills. Therefore, compared to the U.S. company, the Indian company will have fewer surpluses with which to negotiate a higher salary and will be more likely let the employee go.³⁷

Trade secret law is also available to U.S. firms for protection of IP or expertise transferred to an Indian team under either the Contracting Model or the FDI Model. Trade secret law, often through the use of non-disclosure agreements or other contracts, can protect U.S. firms from theft of trade secrets by either employees or contractors, and therefore is applicable to both the Contracting Model and the FDI Model. However, the FDI Model provides a further protection for trade secret through increased workforce coherence. Since most of the cases in which trade secrets

³⁷ This assumes that the Indian software contracting firm has fewer cellular phone software development projects than the U.S. firm. If the Indian firm were more specialized and had more telephone software jobs, it would have more incentive and available surplus to pay the specialized worker; however, this is not generally the case. Software contracting firms tend to perform a broader range of work than in-house software development teams.

are stolen are brought against former employees or contractors,³⁸ the FDI Model should expose U.S. firms to much less opportunity for theft of trade secrets. Furthermore, as noted above, employees with valuable knowledge are more likely to be retained under the FDI Model than the Contracting Model.

U.S. firms may have additional incentive to utilize the FDI Model over the Contracting Model when the Indian team creates expertise or IP. Consider an example similar to the one above: a U.S. firm wants to develop a solitaire game for cellular phones and has never done so before. By adopting the Contracting Model and hiring an Indian software contracting firm to develop the game, the U.S. firm will obtain the game at a lower cost than it would if it hired U.S.-based developers to produce the game. While the U.S. firm can negotiate patent rights before entering into a contractual agreement, absent such an agreement, the Indian firm will be the default owner of any protectable IP it develops and may seek additional rents with respect to the IP developed during the job. However, given the desire to obtain the contract with the U.S. firm and the uncertainty as to the protectability of and value of any IP developed, the Indian contracting firm may forego negotiating the rents with respect to developed IP.

Even if the Indian firm does not seek rents for IP that it develops under the Contracting Model, the U.S. firm may still be in an unfavorable negotiating position if non-patentable expertise is created by the Indian team—such as the ability to efficiently program graphics for cellular phones. In order to benefit from the expertise created by the Indian team, the U.S. firm must expose itself to Williamson's reduced numbers dilemma. The Indian firm will have the ability to negotiate follow-on contracts at a higher price relative to its costs; costs are reduced due to the expertise gained during the first contract with the U.S. firm. Difficulty identifying the developed expertise places the U.S. firm at a further disadvantage. In the telephone software example, where programming graphics is particularly difficult, the Indian firm may not even know to tell the U.S. firm that they developed expertise in telephone graphics programming. Without first-hand knowledge, the U.S. firm cannot identify or value the created expertise, thereby incapable to negotiate for any of the cost savings created by the

³⁸ Don Wiesner & Anita Cava, *Stealing Trade Secrets Ethically*, 47 MD. L. REV. 1076, 1080 (1988).

expertise before the contract is signed, after the product is delivered, or upon negotiation of follow-on contracts.

On the other hand, under the FDI model, a U.S. firm can better benefit from and protect the expertise and IP created by the Indian team through increased workforce retention in a way similar to how it protects transferred expertise and IP. Given the closer relationship between the Indian team and the U.S. firm under the FDI Model, the U.S. firm is more likely to discover the IP or expertise created by the Indian team and better position itself to retain particularly valuable employees.

In sum, although expropriation and exchange-rate risks do not weigh in favor of either the Contracting Model or the FDI Model, market and legal uncertainty factors, weigh in favor of U.S. firms choosing the FDI Model. Therefore, the theories put forth by Williamson and Huang predict that most U.S. software firms will utilize the FDI Model over the Contracting Model.

B. Wells

Wells theorizes that a U.S. firm will follow the FDI Model in India only when the U.S. firm has an advantage over Indian competitors and when it has a reason to internalize that advantage.³⁹ Because U.S. firms have greater access to the more lucrative Western customer markets, U.S. software firms have a market advantage over potential Indian competitors, which may want to utilize the same low-cost Indian IT labor. Although India's domestic software market is growing, it is still just a fraction of the size of the U.S. and European software markets.⁴⁰

Access to and understanding of the lucrative U.S. software market is important for a software development firm to successfully produce viable software products. Understanding of the U.S. software market comes from a variety of sources: potential customers, who describe needs during customer meetings; investors, who often look to fulfill particular needs for other

³⁹ Louis T. Wells, Jr., *Mobile Exporters: New Foreign Investors in East Asia*, in FOREIGN DIRECT INVESTMENT 182 (Kenneth A. Froot ed., 1993).

⁴⁰ In 2004, the Indian domestic IT market was just under US\$600 millions while India's IT market grew to US\$21.9 billion in the United States. *Indian's IT Market Grows to US\$21.9 Billion in 2004*, ASIA PULSE, Feb. 16, 2005. The U.S. domestic software market was estimated at US\$70 billion. THE SOFTWARE & INFO. INDUS. ASS'N, PACKAGED SOFTWARE INDUSTRY REVENUE AND GROWTH, available at http://www.siiia.net/software/pubs/growth_software05.pdf.

companies in which they invest; strategic partners, who often look to fill needs in their organization; and employees who come from other companies and have an understanding of the needs of those companies and their customers. Taken together, the network of customers, employees, and employers provides an understanding of the software market that is difficult to replicate.

The market advantage provides U.S. firms with the ability to produce valuable software innovations. After determining market demands, U.S. firms can design and develop software products to meet those demands. The process of creating innovative products will lead to market risk, creation of IP and expertise, and transfer of IP and expertise among software development teams for the reasons discussed above. Consider the example of a U.S. software firm that has developed numerous software applications for cellular phones. If the U.S. firm finds a customer demand for a solitaire card game (the firm's market advantage) and decides to utilize an Indian software team for its development, it will transfer expertise or IP to the Indian team under either the FDI Model or the Contracting Model. On the other hand, if the U.S. software firm has never developed software for cellular phones, the U.S. firm's India-based software team will create the needed expertise. Regardless of whether the expertise or IP is transferred by the U.S. firm or created by the Indian team, the U.S. firm should internalize the market advantage using the FDI Model rather than the Contracting Model for the reasons discussed above. Therefore, under Well's theories, the U.S. firm will choose the FDI over the Contracting because it has a market advantage over potential Indian software competitors, and it has reasons to internalize that advantage.

IV. INVESTMENT PATTERNS IN INDIA

A. Investments are not Following the Patterns Predicted by the FDI Theories

As predicted by Williamson, Wells, and Huang, many U.S. firms adopted the FDI Model. For example, Agile (an enterprise software company), SAP (a collaborative business solution company), and Intel (a leading computer chip manufacturer) have

all opened IT development centers in India.⁴¹ However, there are also a number of firms hiring Indian contracting companies to capitalize on the low-cost and well-trained Indian IT workers.⁴² Although it is difficult to tell what percentage of companies use Indian software contracting firms as opposed to engaging in the FDI, empirical evidence suggests that companies utilize the Contracting despite the predicted benefits of the FDI.

In their work on New Institutionalism, DiMaggio and Powell explain that a few U.S. firms may have adopted the Contracting Model over the FDI for rational reasons and that other U.S. firms may have simply followed even when doing so was less efficient.⁴³ However, as noted in Powell's critical analysis of his previous work, sub-optimal practices may arise from a complex accommodation of internal and external forces as well as from differences among industries.⁴⁴

To better understand why U.S. software firms are choosing the the Contracting over the FDI, the author interviewed two vice presidents (VPs) of Indian software contracting firms who have experience with U.S. firms that opt the Contracting over the FDI. The following section draws freely, without citation, from the information obtained from the two interviews.

B.D. Goel is VP of solutions at Aztec Software and is responsible for Aztec's creation of client software solutions and for Aztec's IP service capabilities. Aztec is an Indian software contracting firm with offices in Silicon Valley and London as well as a development center in Bangalore, India. Over ninety percent of Aztec's 1,500 employees work in the Bangalore development center. Aztec provides clients with a broad range of software systems: from small projects, such as software installation

⁴¹ Bruce Richardson, *Highlights From Agile Software and Agility*, AMR RESEARCH, Mar. 2, 2005, http://www.agile.com/news/2005/amr_030205.pdf; *Innovative India; Research and Development*, ECONOMIST, Apr. 3, 2004, at 65.

⁴² Approximately thirty percent of the IT companies surveyed in the 2004 ITtoolbox survey outsource to foreign contract agencies. Of those, seventy-four percent outsourced to India. ITTOOLBOX, *supra* note 24.

⁴³ Paul. J. DiMaggio & Walter Powell, *The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields*, in THE NEW INSTITUTIONALISM IN ORGANIZATIONAL ANALYSIS 65 (Paul. J. DiMaggio & Walter Powell eds., 1991).

⁴⁴ Walter Powell, *Expanding the Scope of Institutional Analysis*, in THE NEW INSTITUTIONALISM IN ORGANIZATIONAL ANALYSIS 194-96 (Paul. J. DiMaggio & Walter Powell eds., 1991).

programs, to large projects, such as customer support management (CSM) software suites.

Dr. Shafy Eltoukhy is VP of manufacturing operations at Open Silicon. Open Silicon, an Indian software contracting firm with offices in Silicon Valley and Bangalore, provides computer chip design services. Both offices house software development teams. Although Open Silicon is not a traditional software company, its interaction with customers is software-based and its business shares many similarities with traditional software contracting firms.⁴⁵

Aztec and Open Silicon operate with similar project models. In both companies, a U.S.-based management team provides project leadership and daily software design management while India-based developers (and occasionally U.S.-based developers in Open Silicon's case) provide the work product. The U.S.-based management acts as the primary interface between the U.S.-based customer and the India-based development team.⁴⁶

B. Contracting Companies are Providing a Hybrid Model

To understand why U.S. firms are not adopting the FDI Model with the expected frequency, one must look to the structure of Indian software contracting companies like Aztec and Open Silicon. These Indian contracting firms internalize some of the FDI structure to provide U.S. firms with a hybrid of the FDI and the Contracting Models in the following manners.

⁴⁵ Open Silicon's clients provide the company with software code that describes the desired functionality of the client's chip. Open Silicon utilizes software-based computer chip simulators to incorporate other functions that the clients may desire and to examine the overall chip design. For example, a client may come to Open Silicon with a design for a new mobile central processing unit (CPU) for a personal data assistant (PDA). The client provides Open Silicon with a software program that defines the functionality of the CPU. Open Silicon incorporates other functionality needed to complete the PDA design in the software design, for example off-the-shelf display processor and memory chips. Open Silicon will then design the "layout" for the chip and test the completed PDA board to ensure that the integration of the various components works properly. When completed, Open Silicon provides the completed design as software to the client, and the client will send the design to a computer chip fabrication facility to create and test the physical chip.

⁴⁶ Open Silicon also provides some customers the option of U.S.-based development teams. However, even in this case, the U.S.-based client rarely interacts with the U.S.-based development team. All communication is handled by the U.S.-based management teams.

First, software contracting companies like Open Silicon and Aztec provide U.S. firms with U.S.-based corporations with which to negotiate. Aztec has sales, marketing, and management teams in the U.S. while Open Silicon has the majority teams of the company in the U.S., including software development teams. Though the mere existence of a U.S. corporation on paper is unlikely to improve the relations of U.S. firms and foreign contracting firms, it is likely that the extent of the U.S. presence that the Indian contracting firms provide does improve its relations with its U.S. customers. The extent of onshore presence combined with the legal structure provides potential U.S. customers with a familiar accountability structure, which improves their comfort in utilizing an India-based development team.

Second, the hybrid contracting firms have substantial on-shore assets. The software industry is human-capital intensive. Therefore, unlike other traditional outsourcing industries such as manufacturing industry where companies have expensive fixed assets like factories and machinery overseas, the fixed assets maintained overseas in the software industry (computers, licenses, etc.) are similar to the assets maintained in the U.S. for use by the U.S.-based management teams (at least on a per-employee basis). Therefore, a U.S. firm can tap into the lower-cost Indian IT labor while maintaining a substantial portion of their total assets in the U.S. Moreover, many of the assets maintained by Indian software companies, and software companies in general, may be held as liquid assets or easily liquefiable assets, such as stocks and other securities.

Given that there are few fixed assets tied to the Indian development teams, Indian software contracting companies can provide the lower-cost Indian IT labor while maintaining a substantial portion of their total assets in the U.S. Therefore, Indian software contracting companies can provide substantial U.S. assets for attachment to contracts. For example, Aztec Software provides bonding for the services it offers in addition to the implied potential to attach to its U.S. assets if one of its clients brings a suit against it.

Third, Indian contracting companies like Aztec and Open Silicon partially counter potential problems with IP creation and IP transfer. The approaches to countering these IP-related disadvantages include "IP isolation." Both Aztec and Open Silicon employ IP isolation techniques to 1) reduce the risk that one client's IP may leak to another client and 2) reduce the risk of IP

theft. The first step in IP isolation is identifying which clients have potentially conflicting IP. A contracting firm accomplishes this identification by disclosing current client lists to new clients and investigating any potential conflicts that the client identifies. Once the Indian firm identifies a potential client conflict, the firm engages in IP isolation.

A contracting firm can perform IP isolation physically or ethically. A firm may physically isolate teams from one another if they work on projects with potential IP conflicts. The physical isolation may include placing competitive projects in separate buildings or floors. Where physical separation is infeasible, Indian contracting firms can create “ethical walls” between groups that work on potentially conflicting projects by informing groups of the conflicts and directing workers not to discuss those projects. Both the ethical walls and physical separation reduce not only the risk of inadvertent leakage of IP from one client’s project to another’s but also the risk of IP theft by curtailing the number of workers with access to a particular client’s IP.⁴⁷ For example, Aztec Software has two clients that are direct competitors with one another, Metreo and Vendavo, both of whom develop price management software. Since Aztec identified the conflict, the firm can maintain an ethical wall between the projects by ensuring that employees are not cross-assigned between competitive projects, instructing the teams to avoid communicating about the projects with others working on competitive projects, and physically separating infrastructure and personnel as appropriate.

Indian contracting firms also encourage their clients to protect their IP by determining what is “strategic” to their business and what is merely “necessary” to the completion of a project. Mr. Goel noted that “getting a software installation program to work correctly is necessary for product roll-out, but it is not strategically important. The merely ‘necessary’ development is the kind of work we want from our clients.” He also noted that only a small percentage of the software and IP created for any particular system is strategic to the competitive advantage of the company. The rest of the software and IP are necessary but do not provide the client with competitive advantage. If U.S. software companies can

⁴⁷ Indian contracting companies also provide IP isolation over time. Aztec, for example, provides clients with a two-year non-compete agreement, which states that Aztec employees who have worked on a client’s project must wait two years before working on any competitive project.

successfully separate the strategic IP from the necessary IP and hire the Indian contracting firms to work only on what is necessary, they can reduce the potential damage due to theft or leakage of IP.

Dr. Eltoukhy noted a similar strategy used by Open Silicon. Open Silicon's clients can provide their IP (their chip functionality) in two ways: 1) as computer code representing the actual "logical structure" of their chip or 2) as "black box" computer code describing the size, connections, and functionality of the chip but hiding the logic used in the chip. The code describing the logical structure exposes the client's IP more than the black box code does. Open Silicon can supplement either type of code with additional functionality to design the chip that the client desires. If the client provides logical structure, Open Silicon can better modify the chip layout to optimize chip size or improve power usage. By providing a black box code, Open Silicon will have less flexibility in optimizing the chip design but will be able to design the completed chip without having access to the strategic IP related to the client's chip design. Therefore, Open Silicon's clients can provide strategic IP in black box form and avoid potential loss of strategic IP, although they lose optimization.

It may be difficult for a U.S. software firm to determine what constitutes the firm's strategic IP. The U.S. firm will know how it differentiates itself from competitors, but the IP related to that differentiation may not be the company's strategic IP. For example, the U.S. firm developing games for a cellular phone may feel that it differentiates itself from its competitors by providing more exciting games. However, the company's strategic IP may not be related to game play in particular but, instead, may be an algorithm for efficiently displaying graphics on the cellular phone. If the U.S. firm successfully identifies and avoids outsourcing strategic IP, then the firm will have more actual IP protection.

Dr. Eltoukhy also noted that reputation for IP protection is of high importance in U.S. companies' choosing among the Indian contracting companies. Indian contracting firms must demonstrate not only that they can efficiently create the software required by the clients, but also that they can protect their clients' IP. Since information on the Indian contracting firms is widely available, any failure to protect a client's IP may be litigated and publicized, and U.S. software firms have the knowledge they need to identify reliable Indian contracting firms. If an Indian firm acquires a bad reputation for IP protection, it will lose most or all of its business. By contrast, the Indian firms with good reputations will keep

thriving. Therefore, market forces will lead to the survival of Indian firms that protect IP well and the demise of those that do not.

Perhaps the Indian contracting firms described here as “hybrid” could be considered variations on the contracting firms traditionally considered under the Contracting Model. However, the fact that these firms have substantial U.S. presence, tend to have significant attachable U.S. assets, and are structured to provide some of the advantages of the FDI Model seems to warrant a discussion of them separate from the foreign contractors typically considered under the Contracting Model.

C. Advantages and Disadvantages of the Hybrid Model

1. Advantages of the hybrid model

The Hybrid Model combines some of the advantages of the Contracting and the FDI. The Hybrid Model reduces exposure to Williamson’s dilemma of bounded rationality combined with environmental uncertainty by avoiding some of the legal uncertainty associated with the Contracting Model. Under Hybrid Model, the two parties to the contract are the U.S. firm and the U.S. branch of the Indian contracting agency, which are both incorporated and maintain substantial assets in the United States. Therefore, contract disputes or other litigation will be likely governed by U.S. law, adjudicated by U.S. courts, and have judgments rendered against U.S. assets. Because U.S. law and subsequent judgments are more familiar and may be, or at least appear to be, more predictable than international arbitration or adjudication in Indian courts, U.S. firms may be more comfortable with Indian contracting companies that provide the Hybrid Model. Furthermore, the Hybrid Model can reduce the legal uncertainty associated with transfer and creation of IP, primarily through IP isolation and client retention of strategic IP.

In addition, the Hybrid Model allows U.S. firms not only to avoid any marginally higher costs associated with setting up an Indian subsidiary under the FDI Model,⁴⁸ but also to engage in

⁴⁸ It takes approximately seventy-one days to set up a business in India and costs an average of US\$383. Additionally, a U.S. firm adopting the FDI Model must consider the cost and difficulty associated with the termination of employees in India where firing costs amount to approximately seventy-nine weeks of the employee’s wages. THE WORLD BANK GROUP, DOING BUSINESS: ECONOMY SNAPSHOT—India,

short-term expansion of its development team. If Mr. Goel's description is representative, U.S. firms develop strategic IP for particular products in-house and rapidly expand their software development capabilities using Indian contracting firms. Under such scheme, the Indian contracting firms swiftly create the software and IP necessary to bring the products to market. As the need for the expanded development team declines, U.S. firms can scale back the involvement of the Indian contracting firm. In the FDI Model, as in any model where employees are hired, such expansion and reduction of development teams is difficult.

U.S. software firms adopting the FDI Model may opt to hire a smaller team of Indian employees to complete the software development, thereby increasing the time to complete the software project. The smaller teams and longer tasks result in a more stable need for the employees' services under the FDI Model. In contrast, the Hybrid Model, like the Contracting Model, results in an opportunity for the U.S. firm to utilize as large a development team as is efficient to work on a particular software project, thereby creating the product in a shorter time than can be achieved by a smaller development team hired under the FDI Model.

2. Disadvantages of the hybrid model

The Hybrid Model has some disadvantages, mostly associated with the Contracting Model. First, although the risk of IP theft and IP leakage under the Hybrid Model is lower than that under the Contracting Model, the Hybrid Model does not eliminate the risk. The FDI Model will better protect IP transferred to the Indian development team due to improved workforce retention and the additional legal protection of employment law. However, as noted above, the U.S. firm may greatly reduce the potential damage caused by IP theft or leakage by sending only necessary IP to the Indian contracting company.

Second, the Hybrid Model, like the Contracting Model, has the disadvantage of loss of expertise. In the FDI Model, the U.S. firm retains employees and, therefore, retains the expertise gained by working on its projects. In both the Hybrid and the Contracting,

<http://www.doingbusiness.org/ExploreEconomies/Default.aspx?economyid=89> (last visited Mar. 28, 2006).

employees of the Indian contracting company gain that expertise while working on client projects.

Finally, where a U.S. firm utilizes the same Indian contracting company in multiple, related software projects, the Indian company will be in a position to negotiate for a portion of the savings associated with the retained expertise, thereby reducing some of the benefit to the U.S. firm of using the same Indian contracting firm. However, the Hybrid and the Contracting have some advantage over the FDI Model in that the U.S. firm will have access to the aggregate expertise built up during the Indian contracting company's work with other clients.

D. The Hybrid Model and the Software Industry

The Hybrid Model is particularly compatible with the software industry for two reasons. First, the Hybrid Model functions well in the software industry due to its higher proportions of liquid assets available for attachment to contracts and U.S. litigation. In an industry requiring many fixed assets, a contracting firm will not be able to shift as substantial a portion of its total assets to the U.S. For example, in the manufacturing industry, where project costs such as machinery and manufacturing facilities are physically tied to a foreign country with inexpensive labor, the foreign-based assets will be difficult to use as collateral or attach in a U.S. legal action. By contrast, the software industry does not face the same problem because a large portion of corporate assets consists of moveable, liquid assets.

Second, contracting is practicable for software development because it is location-agnostic. Indian software contracting companies can send the products they built to their clients at the speed of light and at marginal cost. Geographically distributed software development teams can work from anywhere in the world on software systems, even systems tied to particular hardware servers in particular locations. Additionally, because lower-cost Indian software developers are not tied to fixed assets in India, they can go to the U.S. client's site if needed. This is in sharp contrast to traditional, non-digital outsourcing, where manufacturers have to ship products among geographically disparate locations, and transportation of the inexpensive labor would be impossible because the labor force must have access to fixed assets such as machinery. The location-agnostic nature of software development overcomes the multi-site coordination problems normally inherent

in establishment of new contract-based projects in India, thereby improving the viability of contracting in the software industry.

E. The Future of Outsourcing in India

With the increasing strength of IP protection in India, U.S. software companies should be less likely to adopt the FDI Model and more likely to adopt the Hybrid Model or the Contracting Model. As India toughens its IP laws, U.S. firms will have more confidence in Indian contracting companies. Given the discussion above, this trend may result in greater use of the Hybrid Model. If, however, U.S. firms regard Indian IP laws as sufficient to protect their interests, even against Indian contracting firms with no substantial U.S. assets, the Contracting Model may prevail over the Hybrid Model.

The primary reason for favoring the Contracting Model would be that India-only contracting companies should have lower overhead. Indian software contracting companies under the Hybrid Model will be inefficient relative to their India-only counterparts because of the resources expended in U.S. sales, marketing, and management. On the other hand, it is conceivable that, in order to compete with the Hybrid Model firms, the India-only firms would have to maintain a similarly substantial presence in the U.S., thereby reducing the Contracting Model's comparative advantage.

V. CONCLUSION

This paper explores an expansion of the theories of foreign direct investment and contracting in the Indian software outsourcing industry, showing how a new breed of Indian software contracting companies adopting the Hybrid Model are approaching the opportunities in that industry. However, much more work is needed. First, understanding differences in the investment patterns among large, medium, and small U.S. firms outsourcing software projects to India⁴⁹ may illuminate more about what drives U.S. firms to engage in the FDI versus the contracting as well as traditional contracting versus the Hybrid Model. In addition, an examination of various outsourcing patterns among various types of

⁴⁹ Large companies of over 1,000 employees are two to three times more likely than their smaller counterparts are to outsource foreign contracting companies. NAT'L SCI. FOUND., *supra* note 22.

IT functions such as software development, maintenance, testing, and technical support may provide insight into how U.S. firms make decisions in entrusting software-related projects to foreign entities.

