CHAPTER 10

Intellectual Property Rights and Foreign Direct Investment: Lessons for Central America

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This chapter discusses the effects of intellectual property rights (IPRs) on foreign direct investment (FDI) and the role that regional economic integration may play in determining those effects. The discussion is applied to the Dominican Republic–Central American Free Trade Agreement (DR-CAFTA) region. In terms of GDP and population, the DR-CAFTA region is a relatively small market with geographic advantages related to its proximity to the U.S. market. The region accounts for a small share of U.S. outward FDI. Most U.S. FDI in the region is concentrated in the wholesale trade and manufacturing industries, such as textiles. Other FDI from Asia occurs in agriculture and fishing. Given the characteristics of the DR-CAFTA market and its potential growth, the aim of this chapter is to analyze how strengthening IPRs in the context of economic integration will influence the incentives of U.S. and other foreign firms to acquire or establish subsidiaries in this region.

Chapter 15 of the DR-CAFTA lays out a comprehensive set of provisions to raise intellectual property standards and enforcement mechanisms in the region. The agreement calls for the ratification of or accession to the Copyright Treaty of the World Intellectual Property Office, Patent

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Cooperation Treaty, Trademark Law Treaty, Madrid Agreement Concerning the Registration of Trademarks, and other global treaties. The agreement calls for national treatment, strengthens protection for digital products, and contains provisions for technological protection measures (such as prohibitions on circumvention devices). Enforcement levels and resources for IPRs are to be commensurate with the enforcement of laws in general. The agreement also protects pharmaceutical and agricultural chemical data that are submitted to regulators for purposes of evaluating safety and efficacy, the public disclosure of which may enable unfair commercial use of the data. The agreement has provisions to extend the terms of pharmaceutical patents if delays in marketing approval result in an unreasonable curtailment of the effective patent term. The question is, how influential are these and other intellectual property provisions for FDI into the region?

Regional economic integration (via a free trade agreement) can affect foreign direct investment, as can intellectual property rights in general. But intellectual property reforms induced by a free trade agreement may have particular characteristics and effects on FDI. For example, a strengthening of IPRs will influence FDI in combination with a change in market size and market access. Furthermore, IPRs may matter differently depending on the nature of the FDI—that is, whether it is for production, research, sales, or distribution.

This chapter is organized as follows. It begins by reviewing some descriptive statistics on intellectual property regimes and foreign direct investment within the DR-CAFTA region. Three measures of IPRs are examined: an index of patent protection based on statutory and case laws, an index of IPRs based on surveys of business executives, and rates of software piracy. Two sources of FDI data are examined: United Nations Conference on Trade and Development (UNCTAD) data and U.S. Bureau of Economic Analysis (BEA) data on U.S. outward FDI in the region. It then reviews some theoretical and empirical studies on the relationship between FDI and regional economic integration, followed by a review of some theoretical and empirical studies on the relationship between FDI and IPRs, of which there are two types of studies. One type focuses just on FDI, and the other examines FDI alongside other modes of technology transfer. The chapter then builds on the literature reviewed to analyze the effects of IPRs on FDI within the context of an economic region such as DR-CAFTA. A final section provides some concluding remarks.

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Trends in IPRs and FDI in the DR-CAFTA Region

It would be useful to start with a review of some trends in intellectual property rights as well as some trends in inward and outward foreign direct investment in the DR-CAFTA region. For perspective, these trends are compared to a reference group of countries in Latin America. These descriptive statistics are provided in tables 10.1–10.6. First, since the early 1990s, intellectual property laws have evolved in the DR-CAFTA region. In particular, patent rights have expanded. Table 10.1 shows an index of patent rights (from Park 2008). Although intellectual property protection encompasses many kinds of rights—patents, copyrights, trademarks, geographical indications, industrial designs, and so forth—patent rights are likely to be the most relevant type of IPR for businesses that engage in inventive activity and for technological transfers that involve new inventions. The index of patent rights ranges from 0 (weakest) to 5 (strongest). The value of the index is obtained by aggregating the following five components: extent of coverage, membership in international treaties, duration of protection, absence of restrictions on rights, and statutory enforcement provisions.[1]

As table 10.1 shows, El Salvador has the strongest patent system in Central America. The Dominican Republic has the weakest. All six DR-CAFTA countries have adopted stronger patent law provisions since the

Table 10.1 Strength of Patent Protection in DR-CAFTA Countries and Comparison Groups, 1990–2005

Country or region	*1990*	*1995*	*2000*	*2005*
Argentina	1.71	2.73	3.98	3.98
Brazil	1.28	1.48	3.59	3.59
Chile	2.26	3.91	4.28	4.28
Colombia	1.13	2.74	3.59	3.72
Mexico	1.36	3.14	3.68	3.88
Costa Rica	1.16	1.56	2.89	2.89
Dominican Republic	2.12	2.32	2.45	2.82
El Salvador	1.71	3.23	3.36	3.48
Guatemala	0.88	1.08	1.28	3.15
Honduras	1.25	1.9	2.86	2.98
Nicaragua	0.92	1.12	2.16	2.97
Latin America				
Mean	1.35	2.28	3.18	3.42
Standard deviation	0.44	0.77	0.73	0.42

Source: Park 2008.

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Trade Related Aspects of Intellectual Property Rights (TRIPS) agreement came into force in 1995. Five of the six DR-CAFTA countries are below the average strength of patent protection in Latin America. Only El Salvador is above the mean during 2000–05. As of 2005, the patent protection levels of the DR-CAFTA countries are all below those of the five largest Latin American economies: Argentina, Brazil, Chile, Colombia, and Mexico.

Table 10.2 provides an idea of the sources of the recent strengthening of IPRs in the DR-CAFTA region. All six member states are signatories to the TRIPS agreement, to the Paris Convention for the Protection of Industrial Property, and to the Berne Convention for the Protection of Literary and Artistic Works. However, none is a member of the Madrid agreement. Only Nicaragua thus far is a member of the International Union for the Protection of New Varieties of Plants. However, patent protection for pharmaceuticals and chemicals in Nicaragua remains an issue. Otherwise, the other five countries have expanded the subject matter of

Table 10.2 Intellectual Property Provisions in DR-CAFTA Countries, 2005–07

Provision	*Costa Rica*	*El Salvador*	*Guatemala*	*Honduras*	*Nicaragua*	*Dominican Republic*
TRIPS agreement	1	1	1	1	1	1
Paris convention	1	1	1	1	1	1
Berne convention	1	1	1	1	1	1
Patent Cooperation Treaty	1	0	0	0	1	0
Madrid agreement	0	0	0	0	0	0
Patentability of chemicals	1	1	1	1	0	1
Patentability of pharmaceuticals	1	1	1	1	0	1
Patentability of software	0	0	0	0	0	1
Utility model protection	1	1	1	1	0	0
Plant and variety protection	0	0	0	0	1	0
Pretrial injunctions	1	1	1	1	1	1
Compulsory licensing for not working	0	0	0	0	1	1

Sources: Sinnott, Sinnott, and Cotreau 2008; Park 2008.
Note: 1 = Signatory or available; 0 = Not a signatory or not available.

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patenting to include chemicals and drugs. The patentability of software remains an issue, except in the Dominican Republic. Four countries allow for utility model protection (that is, for adaptive and minor inventions, such as tools). All six countries allow for preliminary injunctions against an accused infringer while a patent case is pending. This is a useful mechanism for enforcing patent rights. Still, four of these countries issue compulsory licensing for patented inventions that are, from the authorities' perspective, inadequately exploited (either by local production or by importation).

An alternative perspective on IPRs is provided by a survey of business executives conducted by the World Economic Forum (WEF). One of the survey questions in the WEF's *Global Competitiveness Report* asks respondents in each country to rate, on a scale from 1 (lowest) to 7 (highest), whether intellectual property rights are well protected. The responses in each country are then averaged.[2] A shortcoming of the IPR part of the survey is that a single question (or response to it) lacks nuance. The question the survey poses is very broad, since IPRs include patents, copyrights, trademarks, geographical indications, trade secrets, industrial designs, and so forth. Other drawbacks are that the survey responses are subjective or based on perceptions, not on actual rulings or prevailing legal conditions. The overall rating for a country may also not be fully comparable to the ratings of other countries since a different sample of respondents rates each country. For example, it is hard to compare a score of 3.5 for Costa Rica and a score of 3.0 for the Dominican Republic. Had the same group of people scored both countries, at least the scores could be comparable in an ordinal sense. Notwithstanding these limitations, the surveys provide useful information on the actual experiences of firms with IPR protection in their countries. The statutes may, for example, provide for preliminary injunctions, but in practice obtaining one may be a time-consuming and bureaucratic process. Furthermore, what may drive business behavior is the firm's *perception* of the adequacy of IPRs rather than the stated provisions in the legal statutes.

Business perceptions of IPR adequacy fell in 2005 but rose thereafter to reach a peak in 2006. The signing of the United States and DR-CAFTA free trade legislation by the White House in August 2005 may have contributed to the spike in perception (but a more formal statistical test would better explain the temporal patterns). After 2006, perceptions appear to fall toward levels that may be more consistent with the levels of IPRs prevailing in these countries. In terms of the relative perception of the adequacy of IPR protection across countries, the Dominican

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Republic, Costa Rica, and Honduras are above the Latin American mean, while El Salvador, Nicaragua, and Guatemala are below.

Another perspective on the IPR regimes in DR-CAFTA can be gleaned from statistics on software piracy rates in the region. The Business Software Alliance estimates the rate of piracy as the ratio of the level of piracy to total sales (that is, the sum of legitimate sales and illegitimate sales). The level of piracy is the difference between total installations of software and legal shipments of software. Since the TRIPS agreement was enacted, piracy rates have fallen significantly in the region. In 1995 rates were in the 90–98 percent range. In 2008 they were between 60 and 80 percent. However, those rates are still relatively very high. Only Costa Rica's rate of piracy is below the mean rate of piracy in Latin America. The other five DR-CAFTA countries have piracy rates in the high 70 percent range. This may be why business perceptions of IPR adequacy remain low. To the extent that the software industry is representative, IPR enforcement remains an issue. More effective deterrents and resources for intellectual property agencies are needed.

Table 10.3 shows that the three measures of the state of IPRs are correlated in the Latin American region. Business perceptions of IPR adequacy are generally high in countries that have strong patent systems. Piracy rates have an inverse correlation with patent strength and business perceptions of IPRs; that is, they are lower if patent rights are stronger and if IPRs are more adequately enforced. As these are simply correlations, causality cannot be established without a more formal statistical analysis. For example, IPR issues and reforms may take on greater importance in regions that have high levels of piracy, imitation, and infringement. Thus IPR laws may respond to piracy and perceptions, as well as vice versa.

Table 10.3 Correlations among Intellectual Property Measures

	Patent law index	*Piracy rate*	*Intellectual property perception*
Patent law index	1		
Piracy rate	–0.46	1	
Intellectual property perception	0.42	–0.71	1

Sources: The patent law index is from Park (2008), the piracy rate is from the Business Software Alliance's estimates of software piracy, intellectual property perception is from the World Economic Forum's survey of business managers.

Note: Sample size = 18 Latin American countries (for 2005): Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, the Dominican Republic, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Paraguay, Peru, Trinidad and Tobago, Uruguay, and República Bolivariana de Venezuela.

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In order to reveal some trends in FDI in the DR-CAFTA region, table 10.4 presents statistics on inward and outward FDI *flows* in the region, while table 10.5 shows the same for *stocks*. The flows and stocks are in nominal U.S. dollars. As such, the growth rates of FDI activity are downplayed, since the figures are not in real terms. Some important and interesting cross-sectional observations can nonetheless be made. First, there are far more inward FDI flows into DR-CAFTA countries than outward FDI flows from them. DR-CAFTA countries are not a major source of global capital. The inward flows of capital are important to DR-CAFTA countries insofar as they represent a fairly significant percentage of gross fixed capital formation. In 2007 foreign capital inflows equaled almost half of domestic investment in El Salvador (see table 10.4) and about a third in Costa Rica. However, in Guatemala, FDI inflows are just 10 percent of domestic fixed investment. For Latin America as a whole, FDI inflows account for about a fifth of gross fixed capital formation. Over time, for all six countries, the ratio of FDI inflows to gross fixed capital formation has increased, indicating greater exposure to global supplies of capital and some trend expansion in inward FDI flows.

FDI flows into and out of DR-CAFTA pale in comparison to those of the world or even of Latin America as a whole. The inward and outward stocks of FDI in DR-CAFTA tell a similar story (see table 10.5). As a percentage of GDP, the inward stock of FDI in 2007 was 55 percent for Nicaragua, about 20 percent for the Dominican Republic, almost 14 percent for Guatemala, and about 30 percent for the other countries in the group. Again, the stock of FDI in DR-CAFTA is a small percentage of the stock of FDI capital in Latin America and the world as a whole. Again, while the stock of FDI is in nominal rather than real dollars, the ratio of FDI stock to GDP suggests that it has expanded relative to market size, measured by GDP.

Table 10.6 presents data on U.S. outward FDI to the DR-CAFTA region. The United States is, of course, an important player in the DR-CAFTA and has been a significant source of inward FDI for the region. In 2008 the United States accounted for about a fifth of the stock of inward FDI in Costa Rica and about half of the stock in El Salvador. Altogether, about 47 percent of the stock of inward FDI in Latin America (and other Western Hemisphere) countries is due to the United States.[3]

Table 10.7 shows the industry composition of U.S. FDI in DR-CAFTA, along with the composition in some reference groups. The figures here are an average of 2004 and 2008. Most of U.S. FDI occurs in

Table 10.4 Flows of Foreign Direct Investment in DR-CAFTA Countries and Comparis[[COLS 9]]on Groups, 1980–2008

Country and mode	*1980*	*1990*	*1995*	*2000*	*2005*	*2006*	*2007*	*2008*
Costa Rica								
Inward flow	52.7	162.4	336.9	408.6	861.0	1,469.1	1,896.1	2,021.0
Inward flow as % of GrossCap	4.0	11.1	15.1	14.4	22.7	32.6	33.4	
Outward flow	4.5	2.1	5.5	8.5	–43.0	98.1	262.5	5.9
Outward flow as % of GrossCap	0.3	0.1	0.2	0.3	–1.1	2.2	4.6	
Dominican Republic								
Inward flow	92.7	132.8	414.3	952.9	1,122.7	1,528.3	1,578.9	2,884.7
Inward flow as % of GrossCap	5.5	8.0	16.4	19.7	20.5	23.5	20.5	
Outward flow	0.0	0.0	14.6	61.0	20.8	–61.3	–16.8	–19.1
Outward flow as % of GrossCap	0.0	0.0	0.6	1.3	0.4	–0.9	–0.2	
El Salvador								
Inward flow	5.9	1.9	38.0	173.4	511.1	241.1	1,508.5	784.2
Inward flow as % of GrossCap	1.1	0.3	2.1	7.8	19.6	8.0	46.0	
Outward flow	0.0	0.0	–2.3	–5.0	112.9	–26.4	100.3	65.4
Outward flow as % of GrossCap	0.0	0.0	–0.1	–0.2	4.3	–0.9	3.1	
Guatemala								
Inward flow	110.7	59.3	75.3	229.6	508.3	591.6	745.1	837.8
Inward flow as % of GrossCap	8.1	5.7	3.4	7.0	10.2	9.7	10.8	
Outward flow	2.0	0.0	–19.1	40.1	38.2	40.0	25.4	16.3
Outward flow as % of GrossCap	0.1	0.0	–0.8	1.2	0.8	0.7	0.4	

Honduras								
Inward flow	5.8	43.5	69.4	381.7	599.8	669.1	815.9	877.0
Inward flow as % of GrossCap	0.8	6.0	6.2	20.6	24.7	22.3	21.8	
Outward flow	1.0	–1.0	–2.0	6.5	1.0	0.6	1.0	1.8
Outward flow as % of GrossCap	0.1	–0.1	–0.2	0.4	0.0	0.0	0.0	
Nicaragua								
Inward flow	12.5	0.7	75.4	266.5	241.1	286.8	381.7	626.1
Inward flow as % of GrossCap	4.6	0.1	11.7	23.6	17.4	19.3	22.5	
Outward flow	0.0	0.0	0.4	8.0	18.1	21.0	9.2	16.1
Outward flow as % of GrossCap	0.0	0.0	0.1	0.7	1.3	1.4	0.5	
Latin America and Caribbean								
Inward flow	6,415.8	8,926.1	29,513.0	98,354.6	77,069.7	93,303.2	127,491.4	144,377.1
Inward flow as % of GrossCap	3.3	4.0	8.8	25.8	16.2	15.9	17.8	
Outward flow	898.8	299.7	7,459.2	49,579.0	35,967.2	63,619.4	51,741.1	63,207.0
Outward flow as % of GrossCap	0.5	0.1	2.2	13.0	7.6	10.9	7.2	
World								
Inward flow	54,076.4	207,273.3	341,144.3	1,381,675.2	973,329.1	1,461,074.1	1,978,837.9	1,697,353.2
Inward flow as % of GrossCap	2.1	4.1	5.3	20.0	10.0	13.6	16.2	12.3
Outward flow	51,549.8	239,111.1	361,679.3	1,213,794.8	878,987.7	1,396,915.5	2,146,521.6	1,857,734.0
Outward flow as % of GrossCap	2.1	5.0	5.6	17.6	9.0	13.0	17.5	13.5

Source: UNCTAD 2009.
Note: Figures are in millions of current U.S. dollars. %GrossCap denotes percentage of gross fixed capital formation.

Table 10.5 Stocks of Foreign Direct Investment in DR-CAFTA Countries and Comparison Groups, 1980–2008
current US$, millions, unless otherwise noted

Country or region and mode	*1980*	*1990*	*1995*	*2000*	*2005*	*2006*	*2007*	*2008*
Costa Rica								
Inward stock	497.1	1,323.7	409.1	2,709.1	5,416.9	6,780.5	8,802.8	10,818.0
Inward stock as % of GDP	8.1	18.2	3.5	17.0	27.1	30.5	34.0	36.8
Outward stock	7.2	44.1	66.3	86.1	153.6	262.9	525.8	531.6
Outward stock as % of GDP	0.1	0.6	0.6	0.5	0.8	1.2	2.0	1.8
Dominican Republic								
Inward stock	238.7	571.5	–1,835.0	1,672.8	5,276.0	6,960.6	8,523.3	11,408.0
Inward stock as % of GDP	2.9	6.1		7.1	15.7	19.5	20.8	24.8
Outward stock	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Outward stock as % of GDP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
El Salvador								
Inward stock	154.3	212.1	293.0	1,973.1	4,166.5	4,407.8	5,916.3	6,701.4
Inward stock as % of GDP	4.1	4.4	3.1	15.0	24.4	23.6	29.0	30.3
Outward stock		56.1	53.3	74.0	310.1	283.7	384.0	449.4
Outward stock as % of GDP		1.2	0.6	0.6	1.8	1.5	1.9	2.0
Guatemala								
Inward stock	701.0	1,734.2	2201.6	3,419.9	3,319.2	3,897.8	4,617.6	5,455.4
Inward stock as % of GDP	10.0	25.4	16.9	19.9	12.2	12.9	13.8	14.3
Outward stock			23.7	92.8	250.3	293.4	315.6	331.9
Outward stock as % of GDP			0.2	0.5	0.9	1.0	0.9	0.9

Honduras								
Inward stock	5.8	292.9	555.6	1,391.6	2,708.3	3,333.9	4,223.8	5,112.2
Inward stock as % of GDP	0.2	8.1	11.8	19.4	27.8	30.8	34.3	36.3
Outward stock	0.0	0.0	0.0	0.0	23.5	24.6	26.1	24.6
Outward stock as % of GDP	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2
Nicaragua								
Inward stock	121.4	144.8	384.2	1,414.5	2,461.0	2,747.8	3,129.5	3,755.6
Inward stock as % of GDP	5.8	5.3	12.1	35.9	50.7	51.8	55.1	59.3
Outward stock			0.4	22.4	93.9	114.9	124.1	140.2
Outward stock as % of GDP			0.0	0.6	1.9	2.2	2.2	2.2
Latin America and Caribbean								
Inward stock	40,959.5	110,546.8	185,122.7	502,487.2	817,560.1	933,610.3	1,125,109.4	1,181,615.7
Inward stock as % of GDP	5.3	9.5	10.3	24.4	31.5	30.9	32.0	25.7
Outward stock	47,518.1	57,642.9	87,892.1	204,387.9	335,424.2	430,344.6	500,548.1	561,432.9
Outward stock as % of GDP	6.2	5.0	4.9	9.9	12.9	14.2	14.2	8.3
World								
Inward stock	705,211.4	1,942,207.2	2,915,311.4	5,757,359.9	10,050,885.0	12,404,439.0	15,660,498.0	14,909,289.0
Inward stock as % of GDP	6.5	8.8	9.8	18.0	22.3	25.4	28.7	24.4
Outward stock	548,932.5	1,785,583.9	2,941,724.2	6,069,881.8	10,603,662.0	12,953,546.0	16,226,586.0	16,205,663.0
Outward stock as % of GDP	5.3	8.4	9.9	19.0	23.5	26.6	29.7	26.4

Source: UNCTAD 2009.

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Table 10.6 Amount of U.S. Foreign Direct Investment in DR-CAFTA Countries and Comparison Groups, Historical Cost Basis, 2004–08
current US$, millions

Country	*2004*	*2005*	*2006*	*2007*	*2008*
All countries	2,160,844	2,241,656	2,477,268	2,916,930	3,162,021
Latin America and other Western Hemisphere	351,709	379,582	418,429	508,711	563,809
Costa Rica	2,687	1,598	2,105	2,265	2,525
Honduras	755	821	864	640	700
El Salvador	851	934	626	1,559	3,215
Guatemala	410	386	436	614	915
Nicaragua	131	163		237	162
Dominican Republic	1,028	815	789	766	960

Source: U.S. Bureau of Economic Analysis, http://www.bea.gov/international/di1fdibal.htm.

the manufacturing sector of DR-CAFTA. About half of U.S. FDI is in the manufacturing sector of the Dominican Republic. The exception is Nicaragua, where about 43 percent of U.S. FDI is in wholesale trade. Within manufacturing, the food and beverages sector in Guatemala is a major recipient of U.S. FDI. The food and electrical equipment sectors receive a significant share of U.S. FDI in Costa Rica. The sectoral distribution of U.S. FDI is somewhat distinct in DR-CAFTA than in Latin America as a whole, where about a third of U.S. FDI is in finance and insurance and almost 40 percent is in holding companies. This reflects U.S. FDI across the world as a whole. Less than a fifth of U.S. global outward FDI is in manufacturing, a little more than a fifth is in finance, and a little more than a third is in holding companies. Wholesale trade accounts for just over 5 percent of U.S. global outward FDI. Thus in comparison to these reference groups—that is, Latin America and the world as a whole—U.S. FDI in DR-CAFTA exhibits a difference in specialization or motivation. For example, manufacturing production (due to lower labor costs) and wholesale trade (due to geographic location between North and South America) appear to be the key areas of focus in the DR-CAFTA region.

Regional Integration and FDI

This section briefly reviews previous studies on the relationship between regional integration and FDI. There is a large literature on this, so this chapter defers to studies cited in this section, which provide a more thorough

Table 10.7 U.S. Foreign Direct Investment in DR-CAFTA Countries and Comparison Groups, by Industry, 2004–08 Average
share of total industries (%)

Industry	*All countries*	*Other Western Hemisphere*	*Costa Rica*	*Honduras*	*El Salvador*	*Guatemala*	*Nicaragua*	*Dominican Republic*
Mining	4.8	5.4	0.0	0.0	0.5	0.0	–18.0	0.0
Manufacturing	17.7	11.7	37.8	22.2	14.3	33.9	0.0	52.0
Food	1.3	1.2	5.9	0.4	0.0	13.5	0.0	2.7
Chemicals	4.1	2.6	3.8	1.1	0.0	0.0	0.0	5.9
Metals	1.0	1.0	1.5	0.5	–1.0	0.1	0.0	2.6
Machinery	1.1	0.6	0.0	0.0	0.0	0.2	0.0	0.0
Computers and electronics	2.4	0.1	0.0	0.0	0.0	0.0	0.0	–1.0
Electrical equipment and related	0.7	0.3	4.6	0.0	0.0	0.0	0.0	0.0
Transportation	2.1	1.5	0.0	–0.6	0.0	0.0	–1.5	0.0
Other manufacturing	5.1	4.4	0.0	0.0	0.0	0.0	0.0	39.5
Wholesale trade	5.7	4.0	4.8	9.2	0.0	11.6	43.3	13.5
Information	3.2	1.7	0.3	0.0	0.3	0.6	–0.7	0.0
Depository institutions	3.7	0.3	0.0	0.0	0.0	0.0	13.3	0.0
Finance and insurance	20.1	33.3	0.0	7.7	1.6	19.2	0.0	0.1
Professional, scientific, technical services	2.5	0.4	3.3	0.0	0.0	0.2	3.5	0.1
Holding companies	35.5	38.5	0.0	–0.1	0.0	–1.1	0.0	–0.1
Other industries	6.8	4.8	–4.7	0.0	31.1	19.3	–1.2	5.8

Source: World Bank, World Development Indicators 2009.

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background. As of yet, there are limited, if any, empirical economic studies on DR-CAFTA, since this is a new agreement. Most of the evidence is based, therefore, on other experiences with regional integration; for example, the European Community (EC), Mercosur, the North American Free Trade Agreement (NAFTA), the Association of South East Asian Nations (ASEAN), and the U.S.-Canada Free Trade Agreement. In reviewing previous empirical studies, it would, of course, be useful to examine which prior cases best approximate DR-CAFTA. It would be especially useful to understand the basic principles or mechanisms by which regional integration influences FDI. It then becomes an empirical issue as to which mechanisms are most applicable to or observed in the DR-CAFTA region.

Regional economic integration typically leads to a reduction in within-region trade barriers and investment restrictions. Studies on the relationship between integration and foreign direct investment focus mostly on the impact on inward, rather than outward, FDI. Theoretically, on the one hand, the easing of investment restrictions should enhance inward FDI. On the other hand, the easing of trade barriers may reduce FDI to the extent that the main motivation for FDI is to evade tariffs (that is, tariff-jumping motivation) or defuse tariffs by setting up a subsidiary that employs and produces locally. Another important motivation for FDI is to exploit intangible assets, such as a firm's intellectual property assets (trademarks, copyrights, patents, or trade secrets) or marketing expertise. Another channel by which regional economic integration should affect FDI is through market size. In addition to providing a source of greater demand for a multinational firm's products (which may be served more efficiently through local production rather than through exports), the larger common market enables a firm to spread the fixed costs of affiliate investments. To the extent that freer trade and investment stimulate economic growth, regional economic integration also produces dynamic effects: increased growth enhances the future profitability of the common market, thereby attracting more FDI. The larger and faster-growing market may, in turn, feed the incentives of multinational firms to innovate—to create new products or improve the quality of existing products. This should stimulate the research and development (R&D) of parent firms and augment the stock of intangible assets.[4]

Empirical studies on the effects of regional economic integration on foreign direct investment are based either on descriptive statistical analyses or on formal econometric modeling. Examples of the former include Mirus and Scholnick (1998), a study that focuses on U.S. FDI into Canada

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after the bilateral trade agreement between the United States and Canada. The data analysis here suggests a positive response of U.S. FDI to the agreement. The authors argue that this evidence dispels the notion that U.S. FDI was motivated by tariff jumping (since FDI continued and intensified after Canadian tariffs were lowered). They also dispel the notion that U.S. FDI occurred to take advantage of Canada's natural resources (such as oil and timber). The evidence indicates that U.S. FDI increased in the manufacturing sectors, not in resource extraction. Lastly, the study finds evidence of agglomeration effects—that is, economies enjoyed by firms from clustering. One source of these effects may be knowledge spillovers and improved opportunities to learn about new technologies and markets; another may be the availability of more supporting industries (producers of components and services) that would not otherwise be available in less dense markets. Mirus and Scholnick (1998) find that FDI is greater in those sectors where U.S. firms were already present in Canada.

Blomstrom, Globerman, and Kokko (2000), however, do not detect any significant cross-border affiliate activity between Canada and the United States after the free trade agreement. They argue that the U.S.-Canada Free Trade Agreement constituted a minor environmental change in the business climate. The two countries had already engaged in much cross-border investment such that increased regional economic integration had a marginal effect. Instead they find that regional economic integration has larger effects on FDI if the integration involves a northern country and a southern country (as in the case of NAFTA) or a southern country and another southern country (as in the case of Mercosur), rather than a northern country and another northern country (as in the case of the U.S.-Canada Free Trade Agreement). Blomstrom, Globerman, and Kokko (2000) identify two critical factors that determine the extent to which regional economic integration boosts FDI. The first is the existence of sufficient trade and investment liberalization. The second is the presence of good locational advantages in the regions concerned. For example, post-NAFTA, Mexico received a larger influx of FDI, not so much from U.S. and Canadian firms, but from firms outside NAFTA. Mexico has a locational advantage: proximity to the United States. Along with cheaper Mexican labor, foreign firms would find easier supply routes into the United States and thus have an incentive to invest in Mexican subsidiaries. Moreover, NAFTA occurred alongside other reforms in Mexico, such as investment and regulatory reforms, that may have been the more significant drivers of inward flows of FDI.

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FDI in the Mercusor region also increased substantially, but was not evenly distributed within the region. Inward FDI increased especially in the larger markets of Argentina and Brazil, but not significantly in the smaller markets of Paraguay and Uruguay. Of course, other factors were involved (in addition to regional economic integration); namely, macroeconomic stability in the larger member countries, which helped to reduce investor risk and uncertainty. Where the southern region can serve as an export platform for the products of foreign multinational firms, regional economic integration can attract vertical FDI in particular. In this case, different regions can contribute to the different stages of a product's value added. A free trade and liberalized investment region can allow different multinational affiliates to specialize more efficiently according to their location-specific advantages, whether they are resources or local know-how and skills.

Balasubramanyam and Greenaway (1993) also study a regional economic integration case involving a northern country and a group of northern countries, namely, Japan and the European Community. In this case, the European common market had a significant influence on Japanese FDI into the EC. For Japan, the EC represented an important environmental shift, since prior Japanese affiliate activity in the EC was limited. However, Balasubramanyam and Greenaway (1993) argue that Japanese FDI was driven more by protection-defusing motives. There was concern that a "Fortress Europe" would block imports from Japan—hence the motivation for establishing Japanese branches within Europe. However, because the EC common market had tremendous growth potential, Japanese FDI continued to expand into the EC. Ultimately, the longer-run driver of Japanese FDI was the desire to serve consumers in the EC.

The studies cited above have rested on descriptive statistical analysis. More recent work has used econometric analysis to disentangle the effects of regional economic integration on FDI from other potential determinants. Cuevas, Messmacher, and Werner (2005) use cross-country data to find a positive association between regional economic integration and FDI flows, controlling for the increase in worldwide FDI flows. The results are applied to the case of Mexico under NAFTA. The authors estimate that Mexican inward FDI was 60 percent greater than it would have been in the absence of NAFTA.

Another econometric study is by Antras and Foley (2011), which looks at the case of South-South economic integration, namely, the ASEAN agreement of 1992 involving Brunei, Indonesia, Malaysia, the Philippines, Singapore, and Thailand.[5] This study provides comprehensive evidence

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from firm-level data. The focus of attention is U.S. outward FDI to the ASEAN countries before and after the agreement. The United States accounts for about a fifth of the inward FDI of this region. The key finding is that there is a statistically significant increase in U.S. affiliate activity after the agreement. There is an increase in the extensive margin (that is, growth in the number of U.S. affiliates in the ASEAN region) and in the intensive margin (that is, expansion in affiliate activity per affiliate, such as sales, capital investment, and asset growth). U.S. affiliates grew faster and larger in ASEAN countries than in other Asian countries. Hence there appears to be an effect associated with ASEAN membership. Overall, this study finds evidence to support the view that regional economic integration among smaller countries can attract FDI. The ASEAN experience offers probably the closest test case for DR-CAFTA, given that the DR-CAFTA region also consists of small developing economies, although the ASEAN countries are more populous. Antras and Foley (2011) identify lower trade costs within the ASEAN as an important factor driving the growth of inward FDI into the ASEAN countries. The lower trade costs make the establishment of a subsidiary plant within the ASEAN especially attractive as a platform for exporting goods to other countries in the region.

Intellectual Property Rights and FDI

This section discusses theoretical and empirical work on the relationship between FDI and IPRs. In theory, firms engage in FDI to maximize profits or value. Thus their FDI is influenced by the strength of IPRs to the extent that intellectual property protection affects the ability of firms to capture rents and returns on their investments.

The North-South theoretical literature has some relevance here since it studies the effects of IPRs in developing countries on FDI into the developing world. However, the predictions in this literature regarding the effects of stronger IPRs on FDI are mixed. For example, Lai (1998) develops a model in which northern firms innovate, while southern firms imitate. If and when a southern firm successfully copies a northern innovation, it becomes the producer and exporter of the good due to its factor cost advantage, thereby displacing the northern firm that was the original innovator of the good. Northern firms, however, have the option to produce in the South—that is, to be a multinational firm. Wages are lower in the South, but imitation risks are higher. Thus stronger IPRs in the South reduce the risks of imitation and increase the expected returns

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to being a multinational firm. As a result, more production is transferred from the North to the South. In this model stronger IPRs are associated with higher rates of foreign direct investment.

In Glass and Saggi (2002), imitative activity in the South is assumed not to be a costless activity. Imitators incur fixed costs in order to imitate successfully. Imitators in the South target the goods of both northern and multinational firms for imitation. An increase in the strength of IPRs reduces the incentives to imitate but raises the total resources devoted to imitative activities. Southern imitators expend greater resources to invent around foreign goods (that is, resource absorption effect). Thus stronger intellectual property protection in the South results in greater resource scarcity. Less FDI would occur due to the higher costs of production. This model predicts a decline in FDI due to stronger IPRs.

One shortcoming of these North-South models is that they examine only one form of technology transfer, in this case, FDI. The models ignore the composition of technology transfer, among, say, exporting, FDI, and licensing. The strength of IPRs in the host country can affect not only the volume of technology, but also the mode of entry. For example, stronger IPRs may appear to reduce inward FDI but actually increase technology transfers overall if another mode of entry is expanded (say, licensing).

However, a shortcoming of studies that examine the composition of technology transfers is that they are either partial-equilibrium analyses or single-country analyses; they do not model the reaction of agents in the home country. Nonetheless, by using a choice-theoretic framework, they provide useful insights into the ways in which the intellectual property regime in a host country affects the decision making of foreign investors.

First, IPRs have ambiguous effects a priori on the overall volume of technology transfers. Maskus and Penubarti (1995) and Yang and Maskus (2001) identify two opposing effects of stronger IPRs on technology transfers: *a market expansion effect* and *a market power effect*. Consider a firm in country A that transfers IP-sensitive commodities to country B, and suppose that country B strengthens its IPRs. On the one hand, the firm perceives an expansion in its market due to a reduction in imitation by local firms. The demand curve it faces in country B shifts out. On the other hand, stronger IPRs in country B increase the firm's market power, reducing the elasticity of the demand it faces. The market expansion effect is likely to dominate in countries where the market environment is competitive, and the market power effect is likely to dominate in regions where local competitors pose a weak threat of imitation.

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Next, the composition of technology transfers depends on a variety of factors. These factors can be organized conceptually using the ownership, location, and internalization (OLI) framework of Dunning (1980). The *ownership* factor influences a firm's decision to enter a foreign market. A firm selling a good abroad has a disadvantage competing with producers who know the local market better. To compensate, the firm needs to have some advantages, such as ownership of a superior technology. The *location* factor influences a firm's decision to enter via exports or FDI. For example, exporting may involve lower agency or setup costs than locating a subsidiary abroad. To compensate, the foreign market needs to provide some locational advantage, such as lower factor costs. The *internalization* factor affects a firm's decision to produce the good through its subsidiary or to license the production to another party (affiliated or unaffiliated). The firm chooses to internalize production if there are advantages to controlling the production process, such as the avoidance of transaction costs.

Stronger IPRs in the host country can affect each of these factors—the ownership value of technology, the attractiveness of locating production abroad, and the incentive to deal with agents external to the firm. First, the possession or ownership of a valuable intangible asset helps a firm to overcome the costs of setting up a subsidiary abroad (versus exporting), as its product would be in demand and be profitable. To the extent that stronger intellectual property protection in the host country stimulates a multinational firm's incentive to innovate, the multinational firm would make greater investments in R&D that yield more valuable intangible assets. These assets, in turn, would become the basis for future FDI or other technology transfers. Second, the strength of intellectual property protection in a host country, along with other institutional factors, makes up part of the local business investment climate. Hence, the strength of IPRs provides a locational advantage for firms to establish a presence in the host country. Third, IPRs can affect the choice between FDI and licensing at the margin. If intellectual property rights are strong and very secure, firms that own valuable intangible assets are more likely (and more willing) to license the production and distribution of the product to arm's length parties. The advantage of licensing to other parties is that firms can tap into the sales and distribution capabilities of other agents. Few plants or affiliates of a multinational parent firm may have the capacity to satisfy local demand on their own, particularly if the local market is large—hence the desirability of licensing to a third party. However, if IPRs are not sufficiently strong, firms are more likely to internalize the value

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of the asset by producing the good in-house (within a local plant or a subsidiary) or by licensing it to a close affiliate.

Thus IPRs may have a nonmonotonic relationship with FDI. That is, FDI may rise as IPR levels strengthen. The volume of FDI rises as local markets appear more profitable due to the increased protection of intellectual property rights. The volume of FDI also rises as firms shift from exporting to setting up subsidiaries abroad. But as the level of IPR increases further, the volume of FDI may remain stable or even decline as firms shift toward licensing as a means of marketing their products. This nonlinear relationship may help to explain why some empirical studies find a negative effect of IPRs on FDI (particularly if the studies do not control for the mode of entry of foreign firms).

Industry differences may also affect how intellectual property protection affects FDI through these OLI channels (see Nicholson 2007; Vishwasrao 1994). In particular, industries vary by complexity of technology and therefore by the setup costs of plants. These setup costs tend to be very high for technologies that are quite complex. Indeed such costs can act as a natural barrier against imitation. For industries where technologies are relatively hard to replicate, firms may choose or switch to licensing at relatively lower levels of intellectual property protection. In contrast, for technologies that are relatively easy to replicate, the threshold strength of intellectual property that would induce licensing would be much higher. Thus the internalization motive for conducting FDI (and keeping production within a local subsidiary) is greater for technologies that are easy to replicate and for industries characterized by such technologies (chemicals, software).

Such theoretical discussions have abstracted from the type of technology transferred. A firm that transfers technology can choose not just the mode of transfer but also the vintage of the technology to be transferred (see Fosfuri 2000; Taylor 1994). For example, if intellectual property protection is weak and risks of imitation are consequently high, the firm may transfer an older version of the technology or not transfer its best-practice research technology.

In summary, the theoretical literature is divided as to whether developing countries would attract increased technology transfers by strengthening their intellectual property rights. On the one hand, stronger IPRs could increase developed-country incentives to increase technology transfers to the South (by reducing imitation risks and contractual costs). On the other hand, developed-country firms could enjoy increased market power as stronger IPRs in the South raise the cost of imitation or erect

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barriers to inventing. Thus the effect of IPRs on FDI, particularly in developing countries, is an empirical issue.

The empirical evidence on the effects of IPRs on FDI can be divided into two kinds: the first focuses on FDI as the dependent variable of interest; the second examines FDI jointly with other modes of foreign entry, such as exports and licensing. Both kinds of evidence are discussed below.

FDI as the Sole Dependent Variable

Most empirical studies employ U.S. data (that is, the outward FDI of U.S. multinational firms).[6] This section first discusses studies using U.S. data and then turns to studies using non-U.S. data or global panel data. Evidence using data prior to the TRIPS agreement is mixed. Primo Braga and Fink (1998), for example, examine the stocks of outward U.S. foreign direct investment in 42 countries in 1992 and find that they weakly correlate with the strength of patent protection, controlling for other factors. In contrast, Lee and Mansfield (1996) examine a panel of 14 developing countries around the same period and find that the strength of IPRs (as perceived by managers in the survey of Mansfield 1994) is a significant determinant of the volume of U.S. outward FDI flows. Lee and Mansfield (1996) also find that weaker IPRs can affect the composition of FDI, causing firms to invest in nonmanufacturing and non-R&D activities, like sales and distribution outlets.

More recent studies have used up-to-date U.S. data. Nunnenkamp and Spatz (2004) find that patent rights are a significant determinant of U.S. outward FDI stocks, particularly in developing countries. A reason that IPRs may matter more for FDI in less developed countries is that IPR strength is generally low in developing regions, so that a given change in IPRs represents a relatively major development. In larger countries, the environment for FDI is conducive for other reasons, such as market size, strong contract enforcement, quality of infrastructure, labor skills, and so forth, so that IPRs may matter relatively less. Moreover, a further strengthening of IPRs results in firms considering other options, such as licensing instead of expanding their subsidiaries.

Branstetter and others (2007) examine the activities of U.S. multinational firms in 16 countries during the period 1982–99. They examine multiple dependent variables associated with FDI activity, such as local affiliate sales, employment, capital stock, R&D, and industry output. The reason for examining a comprehensive set of variables is to ensure that IPR reforms did not merely increase firms' market power but led to "quantity" effects, such as increased production, employment, and

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investment in capital and technology. Their results indicate that an IPR reform is followed by an expansion in multinational sales, employment, investment, production, and technology transfer and that these expansions are especially prominent if the parent firms are heavy users of the patent system. Thus more recent evidence (which includes some post-TRIPS years) suggests a positive effect of IPRs on FDI by U.S. multinational firms, particularly in developing countries.

As for studies using non-U.S. data, Mayer and Pfister (2001) examine data on French multinational firms and find that stronger patent rights have a negative influence on the locational decisions of multinational firms. When they split their sample into developed and developing host countries, they find that the strength of a developing country's patent laws has a statistically insignificant influence on the probability that a French multinational firm will locate in the developing country. The strength of a developed country's patent laws has a quadratic (inverse-U) effect on the firm's probability of locating in the developed country; that is, increasing the probability and then decreasing it after some critical level of patent law strength is reached.

It is important to note that Mayer and Pfister (2001) study locational decisions, not FDI flows or stocks. For firms already located in a country, the intensity of technology transfer in response to changes in patent laws is not captured in the location data alone. A difficulty with interpreting their results is that they can be consistent with both the market power and market expansion hypotheses of IPRs. If firms are exercising greater market power, they would reduce the flow of new branches or affiliates being opened up so as to enjoy greater rents from existing outlets. Otherwise, if firms are taking advantage of expanded markets, they may be exploiting alternative modes of marketing their goods and services, such as licensing or joint ventures. Thus a key limitation of focusing on single modes like this is that it is difficult to draw decisive conclusions about whether stronger IPRs enhance or reduce technology transfer.

Using firm-level data for Eastern Europe and the former Soviet Union states, Smarzynska Javorcik (2004) finds that stronger patent rights have a positive and statistically significant effect on the probability of foreign investment in high-technology sectors and an insignificant effect in other sectors. Moreover, foreign investors are more likely to invest in sales and distribution outlets than in manufacturing or R&D facilities when patent protection is weaker. This propensity is found in all sectors, not just in high-technology ones. These findings conflict with those of Mayer and Pfister (2001), but are consistent with those of Lee and Mansfield (1996).

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Using Japanese firm-level data, Belderbos, Fukao, and Kwon (2006) study the R&D investment decisions of 605 Japanese multinational firms in 42 countries. Their survey data allow for a rough separation of R&D investments into research-related investments (*R*) and development-related (*D*) investments. Both *R* and *D* abroad are found to be positively influenced by the strength of a host country's patent laws.[7] This supports Smarzynska Javorcik's (2004) conclusions as well.

Thus the non-U.S. evidence on the effects of IPRs on FDI is varied. However, the breakdown of FDI by function and by sector is valuable in indicating that the effects of IPRs on FDI depend on whether FDI is largely for purposes of sales and distribution or for production and R&D or whether the investment is in technology-intensive industries.

Again, many of these studies employ data that are not very recent—either the sample period is before TRIPS or ends shortly thereafter. Park and Lippoldt (2008) assemble a panel data set of more than 90 countries from 1990 to 2005 using UNCTAD data. In their regression model, the real stock of inward FDI is a function of different IPRs (patent rights, copyrights, trademark rights, and perceptions of IPR enforcement) and a measure of openness (namely, an index of freedom to trade internationally), among other variables. The study finds that, individually, patent rights, copyrights, and trademark rights are statistically significant determinants of inward FDI. However, when all three measures are entered together, only the patent rights variable remains strongly significant. This suggests that, when the index of copyrights or trademark rights is examined alone (along with the control variables), it tends to pick up the effects of patent rights. If so, inward FDI that helps to establish plants or subsidiaries is largely sensitive to the protection of inventive output rather than business names, symbols, or artistic creations. But in some sectors, copyrights and trademark rights may be more important if they are the only legal means of protecting an intellectual property asset; for example, software may only be copyrightable, not patentable.

Of course, some of this FDI could be for the establishment of plants whose main purpose is sales and distribution or manufacturing rather than research. The fact that the investments of multinational firms are sensitive to patent rights, holding other factors constant, suggests that valuable intangible assets are at stake, whether they are for production, research, or sales.

Park and Lippoldt (2008) also find that IPRs are more effective when economies are more open to trade (particularly in developing economies). This is relevant for intellectual property reform that is part

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of a regional economic integration agreement. Furthermore, they find that business executives' perceptions of IPR strength are also a significant determinant of inward FDI. The positive relationship between IPRs and inward FDI is picked up for both developed- and developing-country samples. However, the quantitative relationship does vary by level of development. The impact is larger among developed countries. This may be due to the existence of complementary factors in the North that make FDI more profitable in developed-country markets.

An interesting finding is that business perceptions of a stronger intellectual property regime have a weak or negative effect on inward FDI in the least developed countries. There are a couple of possible reasons. What matters in least developed countries is not just the perception of strength but actual legislative changes and statutory rights that give a clear signal to agents as to what their intellectual property rights are and what means of enforcement exist. Also, the survey of business perceptions reflects not just patent strength but also intellectual property rights in general, including copyrights and trademark rights. A negative effect may then reflect the possibility that strong, comprehensive intellectual property enforcement exerts some market power effects. Firms that enjoy increased market power have an incentive to reduce the stock of inward FDI and accordingly reduce the output of plants.

FDI in Conjunction with Other Modes of Entry

The studies cited above focus on FDI in isolation from other modes of entry. But firms typically have a menu of choices for breaking into a foreign market. Recent empirical work has explored both the volume and the composition of technology transfers and how each mode varies relative to another in response to stronger IPRs. The results are often conditional on the presence of other factors. Using U.S. aggregate data, Smith (2001) finds that stronger patent rights expand the scale of all technology transfer activities considered (exports, FDI, and licensing), but in favor of licensing and FDI. This appears to support the OLI framework where strong intellectual property rights enhance locational advantages and alter internalization considerations. The effects depend, though, on the imitative capacity of the host country (measured by whether there are sufficient R&D scientists and engineers per million people). Weak imitative capacity itself provides de facto protection against imitation so that patent protection matters less when the threat of imitation is weak.

Nicholson (2007) works with count data on the number of U.S. firms engaged in FDI or licensing in 1995 by industry. The count data help to

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provide a perspective on the quantity effects of IPR changes, but obviously leave out information on the value of the transactions. As discussed earlier, firms in capital-intensive industries are likely to enjoy de facto protection from imitation due to their complex, hard-to-replicate inputs. This is reflected in the empirical results: in countries where capital costs are high and patent protection is strong, firms prefer licensing to FDI. But where capital costs are high and patent protection is weak, firms prefer to internalize production in their affiliated subsidiaries. Thus how IPRs influence the choice of mode is conditional on the capital intensity of firms. For destinations other than the Organisation for Economic Co-operation and Development (OECD), this study finds patent protection to have no significant influence on FDI or licensing counts, regardless of the capital intensity of an industry. This could suggest that much of the positive effects on technology transfer (especially licensing) in developing countries may be price effects, not quantity.

The above studies use data from U.S. multinationals. Fosfuri (2004) examines plant-level data for the global chemical industry. The data set tracks the technology transfer investments of 153 firms (for example, U.S., Japanese, and European firms). The investments refer to the costs of establishing a wholly owned subsidiary, a joint venture, and a licensing deal. The finding here is that patent protection plays no role in any of the three technology transfer investments. There is one qualification: if patent protection is interacted with a variable representing imitative capacity (that is, average years of schooling), stronger patent rights are found to reduce investments in licensing in countries where imitative capacity is weak. These results, however, are partly attributable to the fact that the sample of chemical plants largely consists of firms with process innovations. For such innovations, patents may not be the most effective mechanism for appropriating the returns to innovation. The results therefore do not preclude the importance of other kinds of IPRs, such as trade secrecy.

These empirical studies do not explicitly treat North-South issues.[8] For different country income groups, Park and Lippoldt (2003) study the relationship between IPRs and the various modes of technology transfer (such as trade, FDI, and affiliated and unaffiliated licensing) using both aggregate and U.S. firm-level data. They also consider various kinds of IPRs—patent protection, copyright laws, and trademark protection. Consistent with other studies, they find that stronger patent rights increase FDI or licensing relative to exports in both developed and developing countries. The response of FDI to stronger patent rights is larger in developing countries (where IPR regimes are relatively weaker) than in

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developed countries (where IPR regimes are relatively stronger). Thus patent rights appear to have a positive, but diminishing association with FDI as the strength of patent rights increases, controlling for other factors. The diminishing association is consistent with findings that firms prefer licensing in countries where IPRs are relatively much stronger, namely, in the relatively richer countries.

Some evidence from international patenting may provide insight into the types of technology transferred to developing countries. Allred and Park (2007), for example, find that patent rights in developing countries have a statistically insignificant influence on foreign patenting in developing countries. Yet some studies find that stronger patent protection increases inward FDI in developing countries. Thus it is odd that stronger patent protection in developing countries attracts FDI but not foreign patents. The explanation might be that the technologies being transferred to the South are relatively older or that FDI is geared largely toward sales and distribution rather than R&D and production. Transferring older vintages obviates the need to file foreign patent applications, since the technologies are "prior knowledge" (and thus do not qualify for a new patent). To the extent that developing countries receive transfers of older vintages or not-best-practice research technologies, foreign patenting is less sensitive to variations in patent rights in developing countries.

Indeed, Contractor (1981) provides evidence that U.S. firms tend to transfer older technologies to unaffiliated parties in developing countries than they transfer to agents in industrial economies. The commercial age of a technology is defined as the time from commercial introduction to the inception of a technology transfer agreement. In Mansfield (1994), chemical and manufacturing firms reported that they would not transfer new technologies to countries with weak intellectual property laws. More recently, Nunnenkamp and Spatz (2004) find that weaker IPRs are associated with lower-quality FDI, as judged by the small increases in local R&D, employment, and value added.

Implications for DR-CAFTA

As mentioned in the previous section, IPRs have both market expansion and market power effects on technology transfers. Controlling for other factors, a strengthening of IPRs is likely to enhance FDI if the market expansion effects of IPRs dominate the market power effects. Intellectual property reforms combined with regional economic integration should help to tilt the balance in favor of market expansion effects. An agreement

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that opens up markets and creates competitive pressures can act as a check on the exercise of market power. In the case of DR-CAFTA, significant trade liberalization has occurred in the region. According to the index of the freedom to trade internationally,[9] since the mid-1980s, the trade regimes of DR-CAFTA countries have become freer. By 2007, these countries had index values in the range of 7–8. For comparison, the United States and the United Kingdom had scores of 7.6 that same year.

Another factor that determines the relative importance of market power effects is the capacity of local agents to imitate protected technologies. As work by Smith (2001) has shown, in countries where the threat of imitation is weak, stronger IPRs are more likely to enhance the market power of intellectual property owners since the absence of imitative threats acts as a de facto form of protection against copying. But if the data on piracy are any indication, the capacity to make copies is not weak in the DR-CAFTA area.

Furthermore, the IPR provisions of DR-CAFTA are quite comprehensive, covering not just patent rights, but also trademarks, copyrights, geographical indications, and trade secrets. These comprehensive provisions should be applicable to a wide variety of business activities: technology markets, cultural and creative industries, and the food and agriculture sector. DR-CAFTA countries are starting from initially low levels of IPR strength. Thus intellectual property reform in this region is not likely to push DR-CAFTA into zones of excessive protection. Moreover, to the extent that stronger IPRs stimulate incentives for innovation by local agents and foreign affiliates in the region, they generate dynamic competition, which could mitigate the market power effects of IPRs. That is, innovation results in the creation of new products that can compete with existing technological (intellectual property–protected) goods. Often, long before IPRs expire, intellectual property–protected goods may become obsolete or displaced as a result of technological innovations by rivals. This creates incentives on the part of the incumbent owners of intellectual property–protected goods to continue to innovate and compete, rather than to exploit monopoly power. The main point here is that the market expansion effects of IPR reform in DR-CAFTA should offset the market power effects of stronger IPRs.

However, a question to consider is, how big is the change in market size due to an expansion of IPRs in DR-CAFTA? An examination of the real GDP of the DR-CAFTA countries suggests that together they represent a very small share of the world market. The sum of the GDP of the DR-CAFTA countries is just over 6 percent of the GDP of Latin America

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and the Caribbean. Holding other factors constant, a change in IPRs may not expand GDP significantly enough to alter the size of the DR-CAFTA market. Furthermore, the change in IPRs is likely to affect GDP with a lag. Typically, IPRs are assumed to affect inventive and creative activity. These, in turn, affect the stock of knowledge (which helps to generate future innovations) and the productivity of existing resources. The latter, in turn, affects incomes and eventually market size (GDP). However, each step involves a lag (of uncertain length), and the elasticities are likely to be modest, though there is no solid consensus on the estimates of those elasticities (that is, the percentage change in innovation due to a given percentage change in IPRs, the percentage change in productivity due to a percentage change in the stock of innovations, and so forth). Thus it is likely that, in the short run, market size will not change radically as a consequence of intellectual property reform. Of course, internally, the DR-CAFTA market is more liberalized as a result of economic integration. The reduced barriers to intraregional trade work to expand market *access* from that perspective. However, it is moot whether the IPR reforms will significantly expand the *size* of the DR-CAFTA market in the short run.

Increased economic integration, freer trade, and FDI (resulting from regional economic integration) should provide *growth* benefits so that market size expands in the longer run. There may be some positive feedback effects, in which larger market size attracts FDI and increased FDI boosts the marginal productivity of other resources, local production potential, income growth, and future market size.

As discussed earlier, there are several determinants of FDI. Market size is one of them. But other factors should not be neglected. The DR-CAFTA region has certain locational advantages, such as its geography, natural resources, and factor costs. As the region experiences increased economic growth and inward FDI, factor costs are likely to increase. A substantial increase in wage costs—without a compensating increase in the skill level of labor—could offset the benefits of increased market size in attracting foreign capital. Other factors that could offset the gains from economic integration and IPRs are onerous business regulations. Thus predictions on FDI are conditional on what happens to these other factors.[10]

Given that FDI is one of several other modes of entry for foreign multinationals, as intellectual property protection and enforcement are strengthened, inward FDI may actually decline if stronger IPRs encourage foreign firms to engage in licensing. DR-CAFTA still benefits from an inflow of technologies. However, it will occur through a mechanism other than foreign direct investment. Being aware of this possibility will help

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researchers to avoid drawing the conclusion that IPRs have negative effects on technology transfers if FDI declines. In other words, it is important to control for the other modes of technological transfer, such as licensing, joint ventures, and imports. Whether or not foreign firms will increase their licensing to local agents in DR-CAFTA will depend not just on the IPR regime but also on whether local agents have sufficient manufacturing and distribution capacity. Presently, according to BEA data, U.S. foreign affiliates in the DR-CAFTA region conduct very few licensing transactions as a percentage of net income or sales, and what little they do is with other affiliates and the parent firm.[11] Thus in the short to medium term it is not likely that licensing will displace FDI much, if at all, in the region.

The discussion in this chapter has dealt with potential variations in the level of inward FDI due to IPR reforms combined with economic integration. Another important perspective is the *function* of FDI. What will the purpose of expanded FDI be in the DR-CAFTA region: sales, distribution, production, or research? Economic integration in this region should enable multinational firms to use the region as a platform for exports, particularly for exports to the United States and other neighboring markets. But would DR-CAFTA be involved in high value added production or assembly as an export-processing zone? This might be where IPRs could play an important role. More secure protection for IPRs could give foreign firms an incentive to transfer higher-value technologies to their affiliates or subsidiaries and direct some higher value added phases of the production process to this region. Presently, levels of R&D performed by foreign affiliates and local agents are relatively low. R&D in the DR-CAFTA region is less than 1 percent of GDP. The highest rate of R&D is in Costa Rica, where R&D expenditures equal 0.37 percent of GDP a year on average (from 2000 to 2008). The R&D conducted in other countries over the same period is less than 0.01 percent of GDP. These are all well below the average rate of R&D in Latin America, which is about 0.6 percent of GDP. It is not likely that IPR reforms will transform this region into multinational R&D centers, as levels of IPR are still relatively low compared to levels in OECD countries and since complementary factors are still lacking, such as a supply of trained scientists and engineers, university-industry collaboration, and state-of-the-art technological facilities. Thus inward FDI will likely be in sales and distribution outlets and manufacturing facilities. However, there is scope for economic integration and stronger IPRs to attract FDI for purposes of sourcing higher value added manufacturing in this region.

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To summarize, this section has discussed how economic integration can interact with IPRs to affect inward FDI. Economic integration and more openness should help to moderate the market power effects of IPRs and enable the market expansion effects of IPRs to dominate. However, there are some reservations about how significantly the intellectual property reforms will affect market size (although market access has widened). But to the extent that economic integration and stronger IPRs stimulate productivity and income growth, FDI could in the longer run respond more significantly to changes in market size. Another potential effect to look for is whether the IPR reforms in DR-CAFTA shift the nature of inward FDI away from low-wage manufacturing, sales, and distribution to higher value added production activities. Finally, any anticipated effects on FDI must control for other variables (factor costs, regulations) and other modes of technology transfer (that is, whether firms switch from FDI to licensing).

Concluding Remarks

What steps might the DR-CAFTA take if it seeks to use intellectual property rights to influence inward foreign direct investment?

The first step concerns factors that complement IPR policies. As Maskus (1998) points out, IPRs are one important element of a broader policy for attracting inward FDI and for promoting dynamic competition. Complementary policies include flexible labor markets, market liberalization, forward-looking regulatory regimes, and competition policy. Park and Lippoldt (2008) echo the point that technology transfers are facilitated by factors complementary to IPRs, such as absorptive capacity, quality of infrastructure, government policies, and regulations. For example, regional economic integration provides scope for agglomeration effects, which help to attract FDI. But for agglomeration effects to occur, adequate infrastructure and facilities for trade and communication must be available. One area to explore further is whether the business environment and public goods support FDI, production, and innovation.

A second step concerns the quality of FDI. How can DR-CAFTA countries design foreign investment and IPR policies to attract state-of-the-art technology or new-vintage capital? This may require tailoring IPR policies to reward specific high-value technologies or inputs relevant to sectors in which DR-CAFTA has a competitive advantage or structuring complementary policies, such as tax-subsidy incentives.

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Lastly, while the DR-CAFTA represents a comprehensive move to expand and strengthen IPR standards in the region, enforcement in practice has lagged the agenda to strengthen IPRs, according to reports filed by firms with the U.S. Trade Representative.[12] Piracy is still a serious issue in Costa Rica and Guatemala. Costa Rica and the Dominican Republic have established a special prosecutor's office within the Office of the Attorney General to deal with IPR violations. However, due to underfunding, IPR violators are not prosecuted fully, conviction rates are low, and delays in prosecution have arisen. Honduras and Nicaragua lack personnel and resources, and cases are still pending in the court system. Thus an important priority for the DR-CAFTA countries is to ensure that IPR laws are carried out effectively and to address the shortage of resources for enforcement, prosecution, and other IPR-related matters, such as the training of intellectual property specialists, judges, and other personnel.

Notes

1. Coverage refers to the subject material (type of invention) that can be protected; duration refers to the length of protection; restrictions refer to the less than exclusive use of those rights; membership in international treaties indicates the adoption into national law of certain substantive and procedural laws of those international agreements. The enforcement component consists of mechanisms that aid in enforcing one's patent rights (such as preliminary injunctions against infringers). Each of these components is scored on a scale from 0 to 1 (reflecting the fraction of legal features that are available). The overall value of the patent rights index is the unweighted sum of the component scores.
2. The WEF uses a *moving average* approach to calculate the score for a particular year—that is, a weighted average of this year's score and last year's score, where the weights are such that the more recent period gets a weight of 0.6 plus its share of the sample size. Taking a moving average of scores reduces the sensitivity of the responses to a specific time period when the survey is undertaken. Furthermore, the approach is more likely to capture the overall perception of IPRs during a whole year. Since the survey is conducted at a specific point during the year, a weighted average of this year's and last year's responses provides a better measure for the year as a whole.
3. This figure is arrived at by comparing data in table 10.6 to data in table 10.5.
4. The question is whether the feedback effect will be that significant from a relatively small market area, such as DR-CAFTA.
5. Four additional countries later joined: Vietnam in 1995, the Lao People's Democratic Republic and Myanmar in 1997, and Cambodia in 1999.

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6. The source of data is typically the BEA.
7. Further evidence on the responses of Japanese multinational firms to IPRs can be found in Nagaoka (2009) and Wakasugi and Ito (2009). These studies find technology transfers to be positively associated with the patent strength of host countries.
8. Nicholson (2007) examines non-OECD countries, but for one period only. Moreover, among non-OECD countries, there exist countries of different income classifications.
9. This index is from the Fraser Institute (http://www.freetheworld.com). The index takes into account five factors: impediments to trade due to taxes and tariffs; impediments to trade due to regulations; size of the trade sector; international capital controls; and black market exchange rates. The index ranges from 0 to 10. The higher the index value, the freer is the ability of agents to engage in international trade.
10. Political strife, such as the recent political turmoil in Honduras, the temporary closing of borders in Honduras (affecting trucking, among other things), and high crime rates in El Salvador and Guatemala, are also factors important to FDI.
11. See http://www.bea.gov/international/pdf/usdia_2004f/Table%20III%20Group/IIItables-j1_j10.pdf.
12. See U.S. Trade Representative (2009). Of course, the complaints of firms may largely reflect their perceptions of how the IPR regime works rather than the actual carrying out of IPR laws.

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