Intel: A Case Study of Foreign Direct Investment in Central America

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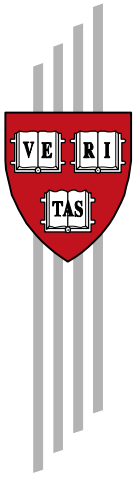

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Intel: A Case Study of Foreign Direct Investment in Central America[*]

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Abstract

This paper studies the advent of Intel, manufacturer of microprocessors, to Costa Rica. We use indicators of both direct effects and selected macroeconomic effects as evidence, even though these indicators are in some cases more qualitative than quantitative. We also examine training externalities, as well as the "signaling" effect that Intel has had on other firms' decision to enter the Costa Rican economy, thus making Intel itself into a factor of attraction.

The gross income generated by Intel in terms of net exports, investment, wages and benefits, and local purchases is very important for the Costa Rican economy. Net exports and the economy as a whole have been growing at a significantly higher rate since 1997, the year Intel started operations in the country. Also, the share of natural resource-based exports in total exports has declined while the share of manufactures has risen significantly. This has implied a dramatic change in the composition of Costa Rica's exports. Available evidence supports the view that Intel has generated positive externalities for the Costa Rican economy.

Keywords: Foreign Direct Investment, Linkages, Growth, Central America.

JEL Codes: F23, F43, H54

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1. Introduction

The attraction of foreign direct investment (FDI) constitutes a fundamental element to support strategies that aim to achieve sustained economic growth in developing countries. This is because globalization and the attendant opening of the economies to competition require increased financial resources and technology, which would be impossible to obtain under a policy of autarky.[1] Though relatively well-established principles exist to explain why a multinational company may decide to move into a specific country, each experience has its idiosyncratic elements from which both theorists and policymakers can learn important lessons. There is less consensus, however, on the potential positive or negative effects that FDI may have on the host economy, and on what factors determine these effects.

This chapter presents a case study of foreign direct investment (FDI) going into a small country. It analyzes the advent of Intel, manufacturer of microprocessors, to Costa Rica, a country that is very small indeed when compared with other potential locations for a company of that nature.

The literature on FDI contains theoretical formulations on the factors that attract FDI and on policies oriented towards increasing FDI flows to a country.[2] There are also models of the effects that such investment has on the host country at both the micro- and macroeconomic levels (see Blomstrom and Kokko 1997). Recent attempts to use cross-country data to analyze the determinants of FDI have faced identification problems, though researchers have managed to provide good insights on the issue (Shatz 1997b). The theoretical literature also highlights the impact of FDI on the development of the host country through technological spillovers and the increased availability of new inputs to both the multinational firm and to other local firms (Rodríguez-Clare 1996).

Case studies are not as common in the literature, mainly due to data constraints. Available case studies, however, do provide evidence of the positive effects of FDI on the host economy, either through systematic analysis or by providing anecdotal, non-systematic evidence (Ranis and Schive, 1985; Meyanathan, 1994; Lim and Fong, 1991). Country-level studies have

[1] See the discussion on international trade and investment in the region, contained in Larraín (2001a), Chapter 5.
[2] A classical work is Dunning's OLI model (Dunning 1977), focused on three factors: ownership, location-specific, and internalization (the way in which technology is transferred).

emphasized the macroeconomic impact, using aggregate data of FDI on country level aggregate variables (Galenson, 1985).

This chapter studies the impact on the Costa Rican economy of Intel's decision to move into that country in 1997. We use indicators of both direct effects and selected fiscal and macroeconomic effects as evidence; sometimes, however, these indicators are more qualitative than quantitative, due to the shortage of systematically collected data. We also examine training externalities, as well as the "signaling" effect that Intel has had on other firms' decision to invest in Costa Rica, thus making Intel itself into a factor of attraction. Costa Rican economy has had to overcome to be more effective in attracting FDI, this is an important part of the discussion that follows, as is the fact that large FDI firms like Intel may help bring about needed institutional reforms by influencing the political balance through a new arrangement of stakeholders.

The chapter starts by examining the rationale behind Intel's decision to move to Costa Rica, and the main obstacles it faced. The next section reviews the literature on the effects of FDI on the host economies. This is followed by a survey of the indicators that measure the effects of Intel's arrival on the economy. We first look at some partial equilibrium indicators—gross income generated, not at shadow prices—and then, discuss potential general equilibrium consequences, such as the pressure on prices in the inputs market. For this purpose, we detail the findings of a short survey we carried out in Costa Rica. We then describe a number of potential training externalities and linkages, also showing data from a survey to Intel suppliers. The chapter closes with some general conclusions.

2. The Decision Process and Its Rationale: Intel Chooses Costa Rica

A firm invests abroad either to exploit a foreign market (as have several companies that invested in Ireland to gain better access to the European Union) or to secure better access to certain inputs, especially cheap labor. This second motive is typical of FDI in small and poor countries, and certainly influenced Intel´s decision to invest in a microprocessor plant in Costa Rica in 1997.

But why Costa Rica? Spar (1998), after analyzing Intel´s decision process, concluded that Costa Rica was chosen because it offered important location-specific advantages. Among these, the most important ones were the already existing tax exemptions for any firms satisfying certain conditions under the free zone scheme, the high educational level of the labor force, a stable political scenario, and a relatively corruption-free environment.

Intel's Decision Making

During the process to select the location, the company carefully looked at six countries in addition to Costa Rica: Indonesia, Thailand, Brazil, Argentina, Chile, and Mexico. Some basic data about these countries is contained in Table 6-1. In the final stage, the short list included Mexico (State of Jalisco) and Costa Rica. Mexico seemed to have a better location in terms of transport costs to the North American market and the Pacific Basin, and it is also a much larger country. The relatively small size of Costa Rica to receive an investment of the dimension of Intel's (US$300 million or equivalent to 2.1 percent of Costa Rican GDP), over two years with a total committed investment of about US$600 million, made Bob Perlman, one of Intel's vice presidents, declare that bringing his company to Costa Rica was like "putting a whale in a swimming pool" (Spar, 1998). As discussed below, Intel would later recognize some bottlenecks, especially in the realm of infrastructure, whose elimination required a good deal of political and financial effort. There has been a consensus, however, that Costa Rica's political institutions and educated labor force, combined with the free-zone regime benefits, more than offset the potential weaknesses that its small size imposes on investors.[3] Executives of the company seem to have valued the fact that Intel's bargaining power would be greater in a smaller country, as opposed to a larger one like Mexico. They also felt that Mexico, with both Federal and state governments, represented a double risk of policy changes.

[3] A summary of the fiscal benefits offered to companies under the Costa Rican free-zone scheme is provided in Appendix I.

Table 6-1
Human Development Indicators

Indicator	Indonesia	Thailand	Brazil	Argentina	Chile	Mexico	Costa Rica
IDH	105	67	79	39	34	50	45
GNP (US$ billions) 1997	221.5	165.8	784.0	319.3	70.5	348.6	9.3
GNP annual growth rate (%) 1975-95	7.1	7.8	3.5	1.4	5.5	2.8	3.7
Average annual rate of inflation (%)							
1985-1996	8.6	4.8	569.8	162.9	16.0	40.7	17.8
1996	8.5	4.0	17.2	1.9	2.9	28.7	16.2
Real GDP per capita (PPP$ 1997)	1,110	2,740	4,790	8,950	4,820	3,700	2,680
Adult Literacy rate (%)	85.0	94.7	84.0	96.5	95.2	90.1	95.1
Combined first, second and third level gross enrolment ratio (%)	64	59	80	79	77	70	66
Life expectancy at birth (years)	65.1	68.8	66.8	72.9	74.9	72.2	76.0
Human Poverty Index (HPI-1 rank)	46	29	19	-	6	13	4

Source: Human Development Report. UNDP (1999).

The process of making Intel executives aware of the advantages that Costa Rica represented for the company was neither easy nor cheap in financial terms, though its cost-effectiveness soon became evident. Intel's decision process took more than one year, and involved four phases: prequalification, site research, contingent announcement and delivery, and start-up. Seven institutions were directly involved in the process on the side of the Costa Rican government, all under the direction of the Presidency and the Ministry of Foreign Trade, and with the coordination and support of CINDE (Coalición Costarricense de Iniciativas para el Desarrollo), a USAID-funded institution whose main responsibility is investment promotion. The

institutions involved included the Ministry of Education and the Costa Rican Technology Institute. This would later become an "Intel Associate," a status that allows its faculty and students to engage in educational exchange activities, share curricula with other Intel associates like the California Institute of Technology, and seek funding for technology development programs carried out by its own researchers.[4]

Strengths and Weaknesses

A study carried out in 1999 confirmed that other foreign investors' perceptions of Costa Rica coincided with Intel's assessment to a large extent (ARC 1999). The 61 foreign investors interviewed ranked "political stability" and "well-educated labor force" as the top strengths of Costa Rica's business environment (evaluated at above 8 on a scale from 1 to 10).[5] These companies cited "globalization and competition" as the most important force that was driving them to look for new locations to invest in. "Going abroad is often a defensive decision," they affirmed (ARC 1999, 11). The top ten strengths included "good governance" and "effective legal system" (with grades between 7 and 8 using the same scale as above). At the bottom of the list were "geographical proximity to markets" and "size of the domestic market" (between 4 and 6 in the scale). A very important piece of information to come out of the survey was that 72 percent of the respondents claimed that they had heard, seen, and read more about Costa Rica as an investment prospect after Intel's decision to set up a plant in that country. This reinforces the belief that investment decisions like Intel's have an important "signaling" effect on other potential investors. Within the "awareness" section of the interview, the recent information about Costa Rica included, as the top-five characteristics its political stability, "relationship with the US," "democratic government," "educated labor force," and "good governance" (ARC 1999, 30). Among Costa Rica's strengths, respondents also mentioned the bilingual education and the "good quality of life."

Shortcomings in infrastructure services, especially roads, ports, and the airport, are mentioned throughout the survey as major drawbacks of Costa Rica. To a lesser extent,

[4] Intel provides an annual amount of money from which Intel associates can withdraw funds on a competitive basis in order to carry out research and development activities.

[5] Among the companies that participated, 36 were in the electronics industry, 13 in medical devices manufacturing, 3 in business services, and 9 in other sectors.

shortcomings were noted in power generation and distribution, and telecommunications infrastructure. The small size of the domestic market was also considered a weakness

It is important to mention that Intel executives changed their perception of two factors after investing in Costa Rica. These were the quality and education of the labor force, and the quality of infrastructure services.[6] The former has been seen ex-post as one of the top strengths of Costa Rica as a location for production, and the latter as an important weakness whose correction requires a decisive effort on the side of the government. Training its workers, the so-called "*intel*ization" of its labor force, proved relatively successful in terms of cost and time, due to the high absorption capacity of the employees. However, Intel was reconsidering some investments after potential bottlenecks were discovered in the telecommunications and electricity services. Intel executives were hoping for structural reforms in those sectors to ameliorate potential problems and allow them to launch ambitious expansion plans. An internal document circulated by an Intel executive in July 1998 stated "It is clear from the outset that ICE (Instituto Costarricense de Electricidad) does not have a 'customer service' philosophy and is not used to dealing directly with a private firm."[7]

The explicit plan to promote investment in the country under a coordinated effort did pay off in the case of Costa Rica. The survey of potential investors and personal interviews with Intel executives reveal that search costs are considerably reduced when credible information is provided, and especially when there exists a well-coordinated effort to match the investor's needs. As Spar (1998) and the ARC (1999) survey suggest, two important factors explain Intel's decision to move into Costa Rica: the specific advantages the country offered—tax exemptions, good governance and institutional strength, and a highly educated labor force, among the top ones—and the explicit and coordinated effort by the Costa Rican government to convince Intel that going to that country was the right decision. A fundamental point, also emphasized in Spar (1998), is that the Costa Rican government did not promise Intel any special benefits, fiscal or other; rather, it offered existing advantages that any other foreign investment under similar conditions could obtain. The latter is a key factor in making FDI policy credible and reducing the perceived risk of policy change.

[6] This discussion is based on private interviews with an Intel executive in Costa Rica, in August 1999.
[7] ICE is the state monopoly that controls the electricity and telecommunications sectors.

3. The Impact of FDI on the Host Economy: Some Theoretical Considerations

The impact of FDI in the host economy can be divided into four main areas:

- the direct effects caused by the investment and subsequent operation of the company, including the impact on workers and on local suppliers of inputs;
- macroeconomic effects, such as the impact on exports and imports, on GDP, on unemployment, on wages, and on prices of other inputs;
- fiscal effects related to extra fiscal income generated by the multinational firm, its suppliers and employees; and
- the impact on productivity of the whole economy or at least the sector most related to the foreign investment, through externalities generated to other firms, including "forward" or "backward" linkages, technological spillovers, and employee training -that is not firm-specific.

The first three effects do not require explanation. Thus, the rest of this subsection focuses on the fourth effect. An important potential effect of FDI on host countries has to do with the impact on aggregate productivity, which happens through the externalities generated to other firms. This type of externalities is divided here into three main groups: i) knowledge and technological spillovers; ii) backward and forward linkages, which make available to domestic firms new or higher quality inputs that were not available before; and iii) training externalities.

Knowledge Spillovers

The discussion on the existence of knowledge spillovers, or a primitive version of it, can be traced back to the 1970s, when emphasis was placed on improving business practices and the business "atmosphere" (Findlay 1978). More important externalities, however, may take place at the level of technological sophistication that is transferred to other sectors by the technicians and

engineers of foreign firms in the form of tacit knowledge. This can be transmitted even informally, for example by the interaction of workers of different firms.[8] These externalities are very difficult to measure. Some indirect measures, however, have shown their positive impact on aggregate productivity in Kenyan and Philippine manufacturing (Pack 1987).

Linkages

Rodríguez-Clare (1996) has shown that FDI may have important positive effects by changing the environment so that it becomes profitable to invest in some activities that were not profitable before the arrival of the multinational corporation. In this way, multinationals can lead to the local availability of inputs that were previously not obtainable in the host economy, or to improvements in the quality of existing inputs. This important externality rests on the fact that those new products or services are made available not only to the multinational corporation, but also to other firms, both foreign and domestic. Moreover, because the inputs satisfy international quality standards, the competitiveness of the economy at the aggregate level is enhanced. These could be called "backward-forward" linkages.[9]

Reform and Training Externalities

There is one type of "backward-forward" linkage that is not discussed in the literature but becomes especially important in economies where opposition to structural reforms, such as privatization, is strong. Consider a case where there is opposition to private participation in some type of essential infrastructure, like electricity generation and distribution. Suppose that the strength of the opposition forces, measured by the number of supporters, is a function of the quality of the service provided by the existing monopoly and/or the demand-supply gap or relative scarcity of the service. The arrival of the multinational corporation, and its demand for the service, in terms of both quantity and quality, may become an important force to weaken opposition to the reforms, by making evident the insufficiency of the existing service and the

[8] An interesting discussion of this informal way of diffusing knowledge is in Arrow (1999).

[9] As shown in Rodríguez-Clare (1996), the positive effect of FDI is maximized if the input used by the multinational firms—and potentially made available to other firms—is less tradable, if the multinationals use few employees relative to the use of inputs, and if the transmission of information between the headquarters and the branch is more costly.

incapacity of the government to invest the required amounts to satisfy demand. Opening such infrastructure sectors to private participation may increase the quantity and quality of the supply of the input, and thereby raise the productivity of both foreign and domestic firms. Multinationals would in this indirect way play an important political role in pushing for the required structural reforms.

Training externalities are an obvious benefit from FDI. From a theoretical perspective, this could be seen as another way to make a better input available not only to the multinational firm itself, but eventually to other firms, provided that the training involves some general, non-firm-specific skills.

4. Intel in Costa Rica: A Whale in a Swimming Pool?

After the above theoretical considerations, there remains the important question of whether the effects of Intel's investment have been positive or negative for the Costa Rican economy as a whole. The next two sections provide evidence that Intel's investment has been positive for the Costa Rican economy in the short run and is likely to continue being so in the future. In this section we explore the direct effects of Intel; then, we discuss the macroeconomic effects.

Wages and Employment

The amount paid as wages and benefits (which includes contributions by both employees and employer to social security, the national training program and mandatory savings, among others) to Intel employees between September 1997 and September 1998 was US$5.5 million, and US$25.29 million for the same period one year later (see Table 6-2). This last amount is equivalent to 0.2 percent of Costa Rica's 1999 GDP.[10]

Table 6-2

[10] Of course, this is only mentioned for the sake of comparison. The actual value generated should be measured at the shadow price of labor.

Intel Wages Sept. 97 to Sept. 99
(Millions of Dollars)

	Sept 97 **Sept 98**	**Sept 98** **Sept 99**
Wages	3.73	16.35
Benefits	1.77	9.24
Total	**5.50**	**25.59**

Source: PROCOMER. Annual Report of Intel Operation.

The number of employees increased from 441 between September 1997 and September 1998, to 2,217 over the next 12 months, with an important component of professional employees (see Table 6-3). The total work force in Costa Rica was 1,383,452 in 1999.

Table 6-3
Intel Employment
Sept. 97 to Sept. 99

	Sept 97 **Sept 98**	**Sept 98** **Sept 99**
Professional Employees	359	562
Technicians	80	554
Operators and Others	2	1101
Total Employees	**441**	**2,217**

Source: PROCOMER Annual Report of Intel Operation.

As can be seen in Table 6-4, the average wage per employee is higher at Intel than the corresponding figure for the total manufacturing sector in Costa Rica. We lack the data required to tell how much of this difference is due to the fact that Intel hires better-qualified workers, and how much to the fact that Intel pays higher wages than other companies to retain workers after they have been trained or "Intelized."

Table 6-4
Manufacturing Sector
(dollars per month)

Wage per employee	Sept-98	Sept-99
Intel	562	615
Average	389	406

Source: Own estimates with data from PROCOMER.

Domestic Purchases

Another indicator of the direct effect of a company like Intel on the host economy is its domestic purchases. Intel's confidentiality policies did not allow access to the whole range of links with domestic suppliers, especially those that provide more sophisticated inputs. However, using data from non-specialized providers of goods and services in 1998 allows us to set the lower bound on domestic purchases at US$19 million. The latter only includes providers of goods and services that are not related to the production process itself, but are related to construction, safety, office appliances, etc. As a company benefiting from the "free-zone" arrangement, Intel has to disclose information on purchases "imported" into the zone, i.e., purchases from suppliers outside this scheme. Information is not available, however, on purchases from other electronic companies or more sophisticated suppliers that are also within the free-zone scheme. As an example, if Intel had bought inputs from, let us say, Protek—a company within the free-zone plan that produces high tolerance electronic components—that would not be reported in Table 6-5 below.

Table 6-5
Intel, Lower Bound on
Domestic Purchase 1998-1999
(million dollars)

	1998	1999
Services	14.5	17.5
Others	4.9	5.7
Total Purchases	**19.4**	**23.2**

Source: Own estimates with data from PROCOMER

Investment

The amount invested by Intel to December 1999 was close to 390 million dollars (equivalent to 2.6 percent of GDP), which is more than the US$300 million they originally planned to invest. The extra investment occurred in 1999, when Intel decided to start production of the Pentium III processor. Around 65 percent of the total investment consisted of machinery (Table 6-6). To understand the importance of this investment, notice that total FDI into Costa Rica in 1998 was $612 million.

Table 6-6
Intel Investmet 1997-1999
(Millions of dollars)

	1997	**1998**	**1999**
Land	16.4	5.8	1.4
Buildings	36.5	50.6	15.1
Machinery	20.3	156.7	72.1
Transportation	0.0	0.0	0.0
Equipmet	1.3	4.3	2.5
Total Investment	**74.5**	**217.4**	**91.0**

Source: Own estimates with data from PROCOMER

Total FDI as a share of GDP was 2.5 percent in 1991 and 3.2 percent in 1997. That share represented 4.4 percent and 3.9 percent of GDP in 1998 and 1999, respectively, according to the levels of investment committed by Intel and other companies, which places Costa Rica among the top countries in the world in that respect. Among countries in South-East Asia, the FDI contribution is, on average, 6 percent of GDP (Central Bank of Costa Rica, 1997).

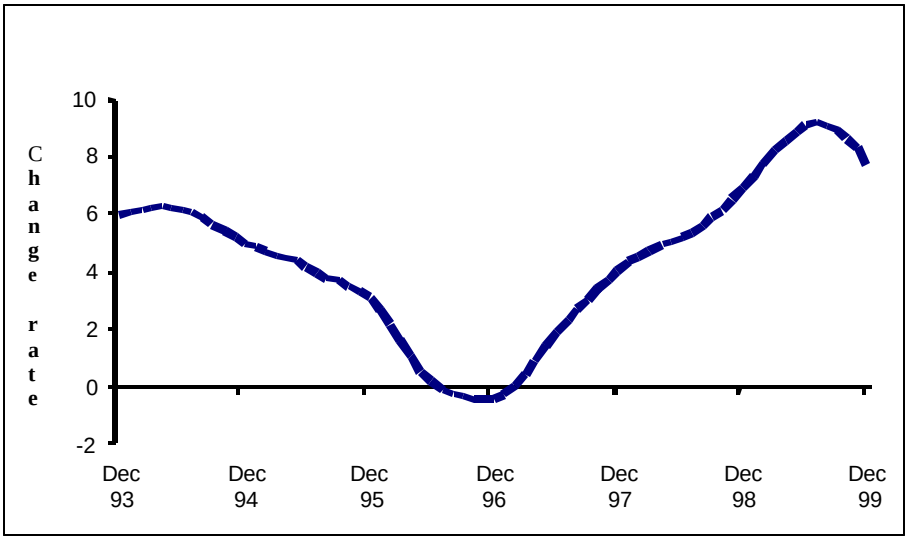
5. Macroeconomic Effects of Intel

Overall Growth

The growth rate of the Costa Rican economy went from an average 4.9 percent between 1990 and 1996 to an average 7.3 percent between 1997 and 1999. More importantly, the growth rate in Costa Rica in the two years after Intel started operations—8 percent in both 1998 and 1999—was the highest in Latin America; taking the two years combined, it has been the highest in the last three decades for Costa Rica. Considering that Intel started operations on November 1997, this appears to confirm that Intel had a large impact on the growth rate of GDP. This is shown more clearly in Graph 6-1, where one should take into account that although Intel started operations only on November 1997, the investment took place throughout the year.[11]

Graph 6-1
Monthly Index of Economic Activity

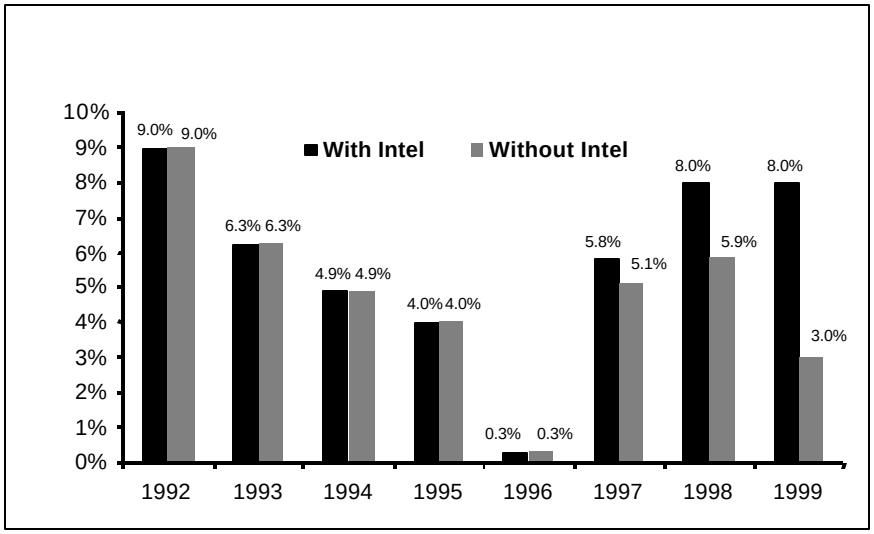
[11] The Monthly Index of Economic Activity measures the real variation on monthly production. Figure 6-1 represents the 12-month average rate of change.



Source: Central Bank of Costa Rica

The increase in the growth rate during 1997 and the high growth rates of 1998 and 1999 could also be explained by the fact that Costa Rica was coming out of a recession in 1996. On that year, GDP grew by a mere 0.3 percent. Thus, to confirm that Intel was key in these very high growth rates, we must turn to Central Bank data that decomposes the growth rate with and without Intel (see graph 6-2).

Graph 6-2
Real GDP Growth



Source: Central Bank of Costa Rica

The impact is clearer for 1999, when Intel accounted for 5 points out of the 8 percent growth rate. On that year, Intel accounted for $330 million of value added, approximately 7 percent of

GDP at domestic real prices. In addition to its contribution to GDP, Intel also had important macroeconomic effects through its impact on international trade figures. In terms of the trade balance, the data shows Intel's net exports of about $205 million and $1496 million dollars for the years 1998 and 1999, respectively (Table 6-7). Those amounts represent around 1.5 percent and 9.8 percent of GDP in the respective years.

Table 6-7
Intel Trade Balance 1998-1999
(Millions of dollars)

Year	Exports	Imports				Balance
		Total	Inputs	Capital Assets	Others	
1998	987.2	781.7	616.8	158.2	6.7	205.5
1999	2,558.6	1,062.6	983.8	73.0	5.8	1,496.0

Source: PROCOMER

Foreign Trade

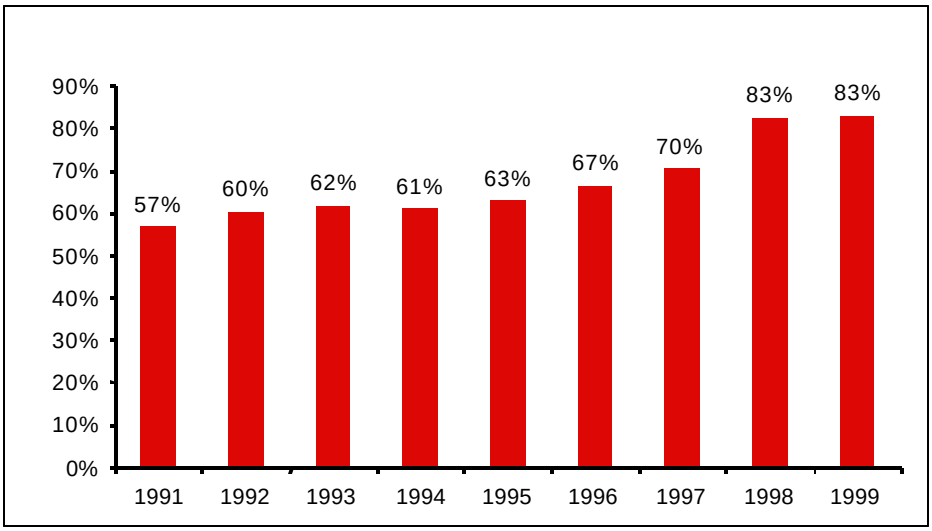
Intel´s gross exports represented 17.8 percent of the total amount of exports of the Costa Rican economy in 1998, and 38.7 percent in 1999. This contributed to an increase in the ratio of exports to GDP, which went from 33.2 to 43.5 in the 1997– 99 period. Moreover, the ratio of external-debt service to exports fell from 4.1 percent to 3 percent in the same years (without Intel exports, this ratio would have been 4.9 percent in 1999).

The openness ratio, that is exports plus imports over GDP, increased from 70 percent to 83 percent between 1997 and 1999. It was already growing before then, but, as graph 6-3 shows, this trend clearly accelerated in 1997. Intel's most dramatic impact has been on the trade balance, which went from a deficit of $497.6 million in 1997 to a surplus of $632.1 million in 1999.[12] This was Costa Rica's first surplus in 50 years. Most of the impact is purely an accounting matter, however, since Intel's surplus is then repatriated as profits, and this shows as a strong deficit in the "rents" component in the current account. This component went from a deficit of $254.5 million in 1997 to a deficit of $1,67 billion in 1999. What is the net effect? In 1999, Intel's net exports were $1.5 billion, and it repatriated profits for $1.2 billion so the net effect on

[12] This happened at the same time that the real exchange rate remained relatively stable.

the current account was almost $300 million positive. Appendix II has the complete balance of payments for the years 1996 through 1999.

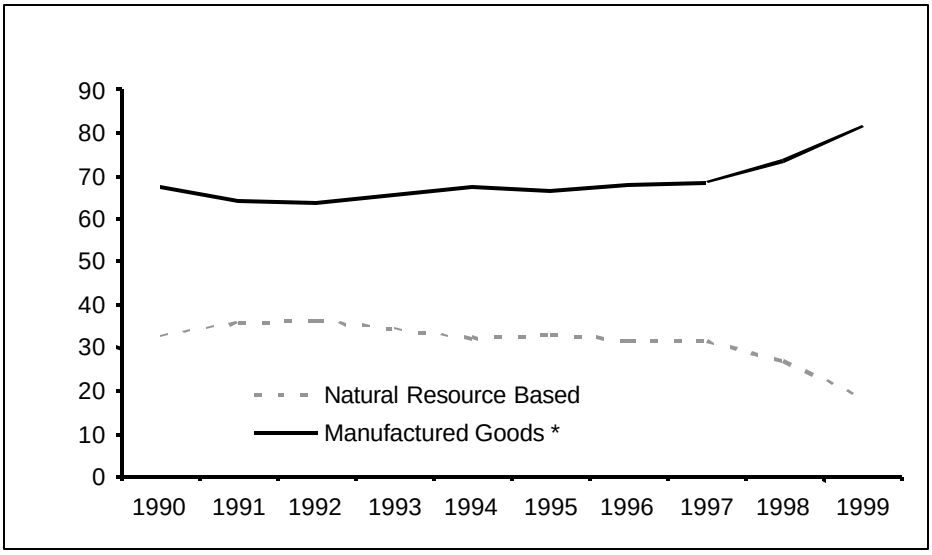
Graph 6-3
Openness ratio



Moreover, Intel helped to strengthen the diversification of Costa Rican trade patterns, increasing the number of countries with which that nation trades as well as the types of goods that are traded. The share of exported goods from the primary sector fell from 42.4 percent to only 23.8 percent in the 1997–1999 period, while the participation of goods manufactured within the free zones in total exports went from 21 percent to 54 percent in the same period. As the next Graph 6-4 shows, the share of exported goods from the primary sector was already declining before Intel arrived, but the tendency clearly accelerated after 1997.

Graph 6-4

Composition of Exports
(% of total exports)



**includes industrials and free-zone exports*
Source: Central Bank of Costa Rica

Intel has a very diversified trade pattern in terms of the countries to which the production is exported. Its imports are more concentrated, as can be seen in Tables 6-8, 6-9, and 6-10.

Table 6-8
INTEL Imports and Exports 1998-1999
American Countries
(Millions of dollars)

Country	1998			1999		
	Exports	Imports	Balance	Exports	Imports	Balance
Brazil	1.8	0.1	1.7	4.5	0.0	4.5
Mexico	14.2	1.3	12.9	60.4	1.6	58.8
United States	409.2	718.8	-309.6	1,391.2	988.6	402.7
Canada	1.1	0.7	0.4	5.7	0.0	5.7

Source: PROCOMER

It is worth noticing the amount exported to Malaysia (although this falls significantly in 1999) and, in general, the important commercial links Intel has developed with major South East Asian economies and Japan.

Table 6-9

INTEL Imports and Exports 1998-1999
Asian Countries
(Millions of dollars)

Country	1998			1999		
	Exports	**Imports**	**Balance**	**Exports**	**Imports**	**Balance**
China	0.4	0.0	0.4	0.6	0.0	0.6
Korea	22.2	0.0	22.2	35.0	0.0	35.0
Japan	32.9	30.3	2.6	104.2	49.7	54.5
Malasya	114.5	5.5	109.1	62.8	6.0	56.8
Hong Kong	31.4	0.1	31.4	28.3	9.9	18.4
Philippines	5.8	8.4	-2.6	30.5	0.0	30.5

Source: PROCOMER

The company also has a positive trade balance with European countries, as observed in Table 6-10. The strongest links are with the United Kingdom and Germany. That has helped Costa Rica strengthen commercial links with the European Union, which has historically been a difficult market for manufactured exports from developing countries. In this respect, although the externalities are discussed below, one can think of Costa Rican executives "learning" about doing business in markets otherwise closed, and becoming potentially important assets for other companies interested in having access to those foreign markets. In terms of regional diversification, the most important change Intel introduced in the country's historical patterns was an increase in the trade flows with Asian countries (exports to Asian countries almost tripled between 1997 and 1999, increasing from $148.1 million to $434 million). Intel has important investments in Malaysia, the Philippines, and more recently, China (Spar, 1998). Table 6-11 shows the important role of Intel in strengthening Costa Rica's trade relations with Asia and Europe.

Table 6-10
INTEL Imports and Exports 1998-1999
European Countries
(Millions of dollars)

Country	1998			1999		
	Exports	Imports	Balance	Exports	Imports	Balance
Germany	37.0	0.5	36.5	1.0	0.1	0.9
Switzerland	0.4	0.0	0.4	0.0	0.8	-0.8
United Kingdom	100.4	0.7	99.7	320.1	0.0	320.1
Ireland	11.7	0.0	11.7	36.7	0.1	36.6
Italy	16.1	0.7	15.4	0.0	0.0	0.0

Source: PROCOMER

Table 6-11
Composition of Costa Rica's Exports 1999

	Without Intel	With Intel
USA	49	51
México	2	2
Canada	1	1
Rest of America	26	16
European Union	18	21
Rest of Europe	1	1
Asia	2	6
Others	1	1
	100	100

Source: PROCOMER

Fiscal Effects

There is a now a discussion in Costa Rica about the "dual economy" arrangement that exempts firms in the Export Processing Zones (EPZs) from paying taxes. This imposes a burden on the rest of the economy and is made all the more problematic by the fact that the firms in the EPZs constitute the most dynamic sector of the economy. Thus, unless other measures are taken,

tax revenue as a share of GDP will fall progressively in the years ahead, leading to either higher taxes for domestic firms, higher deficits and the associated macroeconomic problems, or imposing the need of an expenditure cut.

If there is unemployment, so that no opportunity cost is associated with the workers hired by the Export Processing Zone companies, then all the profits generated by the EPZ companies are additional profits; that is, they do not reduce the profits generated by the domestic economy. In other words, in the presence of unemployment, there is no fiscal cost attributable to the EPZ companies. But, of course, even if there is aggregate unemployment, the kind of workers hired by EPZ companies in general, and Intel in particular, have a high probability of getting alternative job opportunities. The latter implies the existence of a positive fiscal cost. To put it simply, if Intel had not come to Costa Rica, the domestic economy would be larger, as it would have more highly qualified workers at its disposal, and thus it would generate more tax revenue for the Government.

One hypothesis is that the fiscal cost changes over time. In the short run, it is likely that FDI in EPZs generates extra employment, and thus the fiscal cost is low. In the medium run, the fiscal cost increases, because of the argument laid out above. Then, in the longer run, the fiscal cost disappears, since the EPZ entails a tax holiday of 12 years, after which the company starts paying taxes like domestic firms. This is reinforced by the possible reaction of supply to increased labor demand. For example, the supply of electrical engineers will surely increase greatly as a consequence of demand from Intel, so it is unlikely that any other firm will suffer a shortage of electrical engineers because of Intel in the long run.

Presumably, the "gamble" with the EPZ scheme is that the revenue lost is minimal for two reasons: first, because unemployment exists, there is little displacement of labor from domestic firms, and second, domestic firms will not go to the EPZs due to the requirements of the scheme. Moreover, whatever displacement there is, the resulting reduction in tax revenue is presumably more than justified (and compensated for or even reversed in the long run) by the positive effects of FDI through other channels. Certainly, this topic needs further empirical work to be clarified.

Externalities

In order to have some indicators of the general equilibrium effects Intel has had on the economy, a survey was carried out on twenty firms that were considered potential competitors of Intel in the market for inputs. Special emphasis was placed on determining the effect on wages, because of the obvious theoretical implications and also because of comments made in the newspapers about the so-called "Intel effect." Firms in the electronics industry claimed that Intel had put pressure on the wages for skilled labor (*La Nación*, 1997). The survey asked respondents about the effect Intel's arrival had had on the prices of certain inputs and their general perception of the fact that Intel had become a local competitor in the inputs market.[13]

The survey also asked several questions to determine whether these "competitor" firms perceived some positive effects on their productivity as a consequence of Intel's operations. The firms surveyed, on average, export more than 60 percent of their production but also sell an important fraction in the internal market (around 30 percent). The composition of their work force was 20 percent engineers, less than 15 percent administrative employees, and the rest relatively unskilled labor, the equivalent of what Intel calls "technicians." The firms were selected from the pool of firms registered at CINDE. The fact that the firms that we chose to survey are involved with CINDE may indeed have introduced a selection bias. The survey firms perhaps showed a special interest in CINDE because they may have benefited more from Intel's arrival to the country. The results of the survey are summarized below.

Effect on the Labor Market and Other Input Prices

The average effect of Intel on the labor market—measured by the pressure on overall wages—was estimated as a 4.5, measured on a scale from 1 (no effect) to 7 (a very large effect).[14] When specifically asked about wage increases and changes in the benefits to employees, seven firms said they had increased wages after Intel's arrival, but five of those increased wages only to engineers. Increases were, on average, 10 percent to 12 percent in nominal terms over and above the hypothetical contractual increase those employees would have

[13] Eleven firms responded to the request for information.
[14] In most of these questions the scale chosen was from 1 to 7, 1 being always the "best" outcome, and 7 being the "worst" outcome. Values closer to one are thus "better."

received in the absence of any pressure in the labor market. All of those who granted increases, however, declared that those increases did not affect their competitive position in the market over the medium term.[15]

Also, 80 percent of them perceived the increase in real wages as temporary, especially given the new programs established by the Costa Rican Technology Institute and the University of Costa Rica, and the expected increase in the supply of engineers and technicians in the future.[16]

At the time of the survey, only three firms said that they had hired personnel previously employed at Intel, and all of them perceived performance of these employees as above the average or average. Eight firms said they had hired graduates of the "Electronics Diploma," a one-year program aimed at preparing potential employees in electronics firms at the level of technicians. This program was specifically created after Intel's arrival in Costa Rica, under an agreement with the Technology Institute. Those firms that hired people from such program believed that they had significantly benefited from its creation. All the firms interviewed, with the exception of one, declared that Intel's arrival was good for the formation of human capital in the country and the training of labor. Only two firms admitted to having changed their training policies—including expenditures devoted to training—as a result of Intel's competitive pressure on the labor market.

From the answers of the firms surveyed it is possible to conclude that Intel did indeed have an effect on the price of labor, especially skilled labor. The "Intel Effect" was thus a reality. This effect, however, may well be temporary. Intel's arrival in Costa Rica apparently increased not only the demand for labor with specific skills, but also its supply, through the agreements with the educational institutes and the creation of specific programs to train potential workers in the electronics industry.

The survey included questions regarding the prices of inputs, other labor, and changes in their prices as a result of Intel's pressure on the market. On a scale from 1 (a decrease in prices) to 7 (an increase in prices), the declared effect was, on average, 4.5, that is, practically no

[15] Moreover, most of these companies are foreign-owned, so the increase in wages was a net benefit to Costa Rica, since the owners of capital who lost as a consequence were foreigners.

[16] According to the data, enrollment in the engineering schools at the Universities almost doubled after 1997 (interview with officials of the Costa Rican Technology Institute, August 1999).

change. The firms did notice an increase (5.5 on average) in the price of certain services but that increase might not be linked to Intel's pressure on the market, according to the survey.

Training and the Intel Associate Status

The survey had questions designed to shed some light on the training externalities, potential spillovers, and linkages derived from Intel's arrival. In terms of training externalities, some answers were already discussed above, for instance, the fact that firms were hiring people graduated from the new program created at the Technology Institute, as well as the fact that the enrollment in engineering fields in the two most important higher education institutions of the country almost doubled in two years. At the Technology Institute, for instance, the number of students enrolled in engineering fields grew from 577 in the first quarter of 1997 to 874 in the year 2000, that is, from 9.5 percent to 12.5 percent of the total number of students enrolled. More details on this issue are worth mentioning.

In 1999, faculty members of the Costa Rican Technology Institute visited Cal Tech with the objective of redesigning the curriculum of the local programs in Costa Rica and opening new exchange possibilities for students and faculty. On the other hand, as mentioned earlier, these "Intel Associates" can apply for Intel-provided funds devoted to specific research and development programs, competing on an equal basis against other Intel Associate institutions around the world. An estimate of the funds Intel channels through this mechanism every year is about US$300 million.

The strongest link was created by Intel and the Costa Rican Technology Institute (ITCR). The "Intel Associate" status also involved: i) the creation of an additional one-year "certificate" program for technical high school or academic high school graduates to update their technical skills; ii) the creation of a one-year "associate degree" program for qualified applicants and graduates of the one-year "certificate program" focused on manufacturing semiconductors and iii) a program of language training that ITCR would provide to foreigners arriving in Costa Rica (Spanish) and Intel employees hired in Costa Rica (English). All this required the approval and supervision of the Ministry of Education.

Informal transmission of knowledge spillovers

Even though it is difficult to measure the spillovers properly in terms of know-how and technological capacity, questions were asked about the interaction of technicians and engineers of different companies—including Intel—and potential gains from such interaction. Concretely, firms were asked whether they had formal channels of interaction between their employees and people working at Intel. Only two of them mentioned some type of formal interaction at the level of skilled labor, but none at the level of unskilled labor. To the question of whether such interaction took place in the academic world, in professional organizations, or some other way, the answer was that there had been only informal contacts with Intel personnel. No firm had evidence that their employees benefited from informal or formal contact with Intel employees.

It is important to mention here that companies like Intel have very strict confidentiality policies due to the competitive pressure in the market. These policies notwithstanding, Intel agreed to allow us to carry out a survey to the suppliers. The results are described in the next section.[17]

6. Linkages: back to suppliers

The attraction by Intel of other, more sophisticated suppliers is another important effect of Intel's operations in Costa Rica. In 1998, for example, the American company Photocircuits announced a 40 million dollar investment in Costa Rica, and projected a work force of 700 employees.

The different suppliers and their reactions

According to available information, there are more than 200 Intel suppliers locally, ranging from very small service providers to larger companies especially created to supply a specific input to Intel. Intel declared that the most important suppliers of inputs were 63 firms and more than 100 were providing services. The areas in which these suppliers are involved include:

[17] A total of 43 suppliers of goods and 37 suppliers of services answered the questionnaire.

Group 1, Services. Cafeteria service, computer services, document translation, garbage disposal, janitorial, pest control, security, training services (including language courses), hotel services, transport, consulting.

Group 2, Manufactured goods. Computer equipment, office equipment, packaging material, office supplies, spare parts, construction material, security equipment.

The assessment of the economic effect generated through the suppliers, including indicators of linkages and technological spillovers, would require a detailed analysis of Intel's purchases, training programs with suppliers, etc. We would have liked more specific information from some important companies that had set up in Costa Rica and supply Intel, such as RVSI, NTK, Phillips, Magnéticos Toroid de Costa Rica, Tiros, Alphasem Corp., Delta Design S.A. and Esec USA, Inc. The data obtained through the survey, however, allowed us to give some insights of the Intel effect.[18]

Among providers of goods and services to Intel, the arrival of Intel to Costa Rica was perceived as "very positive" for the economy (60% of the firms). Tables 6-12 shows the composition of the activities in which suppliers are involved.

[18] Ideally, a "linkage index" could be created and compared for different FDI firms to measure potential technological externalities. This index is based upon the idea of the spillover effect of FDI and is an imperfect way to approximate the ideal linkage index as discussed in Rodríguez-Clare (1996), which links the labor input requirements by the FDI and supplier firms.
The index could be of the following, rather rough, form:

$$LI = \frac{\sum_i VHI_i}{TE} \quad ii$$

where LI is the linkage index, VHI_i is the value of the total amount of high technology input i purchased locally, and TE is the number of employees at the lowest level of skills (técnicos u operarios). Inputs will be classified as technologically more or less demanding. The rationale is that some firms could indeed be demanding a large amount of local inputs per employee, but those inputs could be technologically not demanding, which reduces the scope of potential technological externalities of that firm.

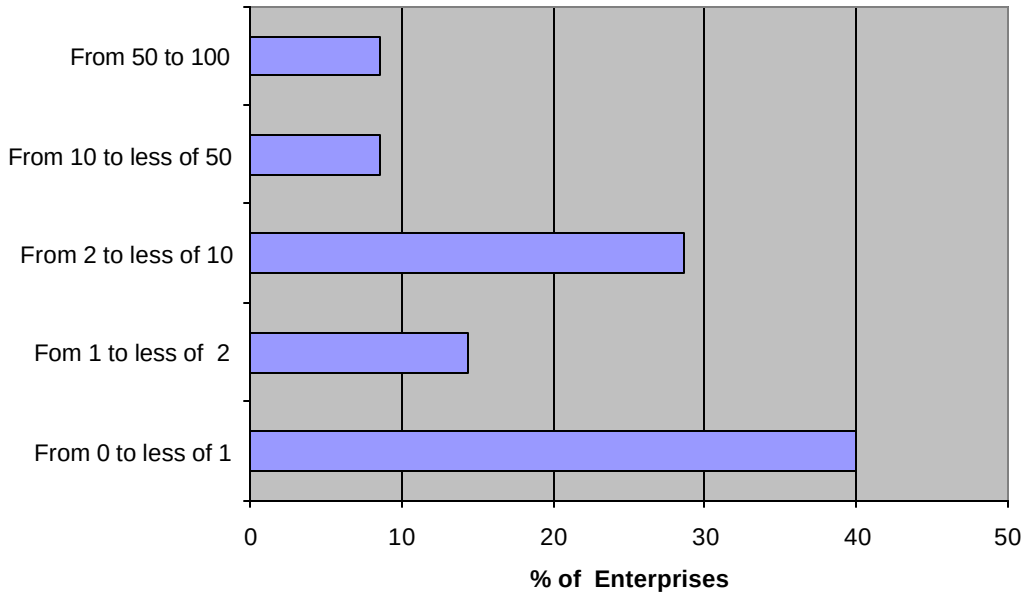
Table 6-12
Intel Suppliers in the Survey by Activity

	Frequency	Percentage	Cumulative percentage
Packing	4	9,3	9,3
Aluminum	4	4,7	14
Lithographic products	9	20,9	34,9
Products and reparation of metal-mechanical parts	5	11,6	46,5
Furniture	3	7	53,5
Gas bottling	2	4,7	58,1
Computing Products (software, hardware)	2	4,7	62,8
Architecture	2	4,7	67,4
Office appliances	3	7	74,4
Electronic equipment	2	4,7	79,1
Products for industrial maintenance	2	4,7	83,7
Painting and construction	2	4,7	88,4
Plastic	1	2,3	90,7
Uniforms	1	2,3	93,0
Other appliances	1	2,3	95,3
Optics	1	2,3	97,7
Security	1	2,3	100,
Total	43,0	100,0	

Source: Authors´ calculation from survey results.

In terms of training externalities, 35% of the providers of services declared to have received training from Intel (around 80% of the training took place at Intel´s plant). Among providers of inputs, 17% of the firms declared to have engaged in some kind of training by Intel. It is important to mention that 40% of the providers of inputs carry out more than 60% of the production process inside Costa Rica. Around 18% of the providers of goods stated that they had changed their organizational practices due to their activities with Intel. Around 8% of the providers of goods and 9% of the providers of services reported some changes in their product variety due to Intel, which is very important in terms of the backward-forward linkages discussed above.

Graph 6-5
Suppliers of goods to Intel
Percentage of sales to Intel out of total sales in 1999



Only two years after Intel had been established in Costa Rica –by the time of the survey-- around 10% of the firms surveyed were selling more than 50% of their total output to Intel. Another 8% were selling between 10 and 50%. The latter, along with the reported changes in lines of products and organizational forms in only two years, leads us to believe that the backward-forward externalities –making available newer and better goods and services to firms other than Intel—could indeed be taking place.

In term of joint ventures with foreign partners, 12% of goods providers reported to be associated with a foreign firm. Among those, 80% have received training by the foreign partner, both in Costa Rica and abroad. Training externalities and forms of technology transfers were thus already showing up after a short period of time.

A first glance at the aggregate results of the survey, considering the fact that Intel had been in Costa Rica for only two years at the time the questionnaire was sent to them, allows us to

say that the effects discussed in the theoretical literature seem to be already taking place. Important gains are showing not only at the macro, but also at the microeconomic level.

Supporting the Development of Suppliers

There have been initiatives by the government to develop and support suppliers of firms in the free-zones. One is the Program for High Technology Multinational Enterprises, supported by the IADB, which will start in 2000. On the other hand, CINDE and PROCOMER have carried out a program to develop suppliers since 1997. Such programs are not meant to support specifically suppliers of Intel, but to help any firm whose intention is to supply inputs to exporting firms under the free-zone agreement. Of course, given the high proportion of the total demand for inputs generated by Intel, since 1997 this firm has become a fundamental player in the latter program.

A fundamental characteristic of the inputs that Intel requires is that they have to satisfy international standards of quality. In addition, they must satisfy norms of environmental safety.[19] Quality and environmental safety have indeed been the two most important areas of advisory work with suppliers. The idea of the program to support Intel suppliers was supported by the United Nations and the Inter-American Development Bank (IDB) from 1997, and the program itself was formulated in 1998. It is finally being implemented in 2000, with IDB support. The three main sectors in which firms will be developed are machinery and parts, plastics, and packaging (including the materials for shipping at the ports).

In the program carried out previously by CINDE and PROCOMER, successful examples are companies that provide freight transportation services to firms in the free-zones, as well as one that produces high-electric-resistance packaging materials for Intel. There are also several small firms that now provide services to Intel's machinery and manufacture parts for repairing sophisticated equipment at Intel. Again, all the inputs and services under this program are made available not only to Intel or to firms in the free-zone, but also to all firms in the economy.

The survey of Intel competitors in the inputs market, already discussed above, also allowed us to obtain some indicators of Intel effects. The arrival of FDI firms such as Intel have

made available inputs that did not exist before. These new inputs can be used, as mentioned, not only by the FDI firm, but also by all firms in the economy, thereby enhancing aggregate competitiveness. Eight firms maintained that some supplier of inputs had improved their quality after Intel's arrival, and specifically mentioned a certain type of service. As an example, packaging was mentioned as an input that had become more sophisticated in some specific firm, directly or indirectly due to Intel demand for similar services. The firms surveyed did not observe a reduction in prices of inputs after 1997, though they claimed that more specialized input providers had started businesses in Costa Rica, which could potentially benefit their firms. They did not mention any specific example of inputs under this category. Summarizing, only two years after Intel's arrival in Costa Rica, similar firms were seeing some evidence of backward-forward linkage effects through new or better input providers.

Two questions were asked regarding the general perception or assessment of the Intel effect: first, the perception of the effect on the specific firm being surveyed, and second, the perception of the overall effect in the economy.[20] Firms ranked Intel's effect on their own companies at 2.5, within a scale ranging from 1 (very positive) to 7 (very negative). The impact on the overall economy was estimated as highly positive as well (between 1 and 2). These rankings thus turned out surprisingly positive, even among firms that could be seen as competitors of Intel in certain input markets in Costa Rica.

Institutional Reforms and the Signaling Effect

An important component of the effect of FDI in host countries, as discussed throughout, consists of the so-called backward-forward linkages. In this respect, by 1999 Intel had started to play an important role in the political discussion about the reform of the power and telecommunications sectors in Costa Rica. Intel has very clearly avoided any intervention in the political debate about opening up telecommunications, but it has been used by the proponents of reform as an element in favor of opening up the market. The opponents also use it, saying that a firm such as Intel decided to come to Costa Rica despite the supposedly bad telecommunication

[19] These international standards are under the classification ISO-9000 (quality) and ISO-4000 (environmental norms).

[20] Specifically, these questions were: "In general, for your company, Intel's arrival has been…?", and "In your opinion, the effect of Intel investment on the Costa Rican economy has been…?".

services. The political balance among stakeholders in this realm seems to have changed after Intel's arrival, and the reforms are more likely to take place, benefiting not only Intel, but also all other companies in the Costa Rican economy, and even the consumers themselves. This development could be seen as a clear effect of the backward-forward linkage type, in which an institutional reform was required.

A very important externality that arises from Intel's decision to move into Costa Rica is the "signaling" or informational externality to other firms that could potentially invest in the country. As mentioned above, the survey carried out with multinational firms reflected that those firms had heard more about Costa Rica after 1997, the year in which Intel moved into Costa Rica (ARC 1999). If we consider the research costs that firms have to undergo when deciding where to invest abroad as a fixed entry cost, relatively small firms might decide not to enter because of their inability to cover such costs. The signaling effect by Intel could trigger entry decisions by smaller firms under such conditions. A second possibility in this respect is that large firms which could financially afford those entry costs, would anyway "free-ride" on Intel's location-search investment, and thereby reduce part of their costs of going into the country. This is especially the case considering that Intel did not get any legal or fiscal firm-specific benefits, but only the same type of arrangement any other firm could get in the same conditions. The fact that potential entrants into foreign markets benefit from previous entrants, who already incurred the research costs and developed commercial linkages has been explored by Aitken et al. (1997) from a theoretical perspective.

7. Conclusions

Though the decision of Intel to move into Costa Rica in 1997 came as a surprise in some academic and policy circles, this paper strongly suggests that the conditions of the country could clearly justify this decision from a theoretical and practical perspective. Previous research and interviews with Intel executives confirmed that the most important factors attracting Intel to Costa Rica were its political stability, highly educated labor force, relatively corruption-free environment, and the credibility of the legal institutions. Some weaknesses were also found: the small size of the country and its poorly developed and maintained infrastructure services,

especially its roads, ports, and airports, and to a lesser extent electricity and telecommunications. The process of attracting Intel required a well-coordinated effort that involved ministries, independent agencies, and institutions of higher education. The fiscal benefits under the Costa Rican free-zone regime for FDI companies was also a key determinant in Intel's decision process.

The gross income generated by Intel in terms of net exports, investment, wages and benefits, and local purchases is very important for the Costa Rican economy. Net exports, and the economy as a whole have been growing at a significantly higher rate since 1997. Also, the composition of Costa Rica's exports has shown a decline in the share of natural resource-related exports and an increase in manufactures.

There were some worries, however, regarding the potential negative effects of Intel's arrival from a general equilibrium perspective. Concretely, it was believed that the increase in demand for certain inputs would raise their price, affecting other sectors negatively. The survey carried out with Intel competitors in the inputs market showed that such negative effects have indeed been felt, especially in terms of an increase in wages for skilled labor. Most firms, however, saw the effect as temporary and foresaw an increase in the supply of skilled labor through the creation of new programs in higher education institutions and the higher enrollment in existing engineering programs. A majority of them saw Intel's arrival in Costa Rica as good for themselves and the Costa Rican economy. A survey of Intel local suppliers was initially thwarted by Intel's strict confidentiality policies, which do not allow Intel executives to disclose the names of their suppliers and prevent the suppliers from giving any information regarding their commercial relation with the company. After gaining access to those records, subsequent research will analyze that aspect in more detail.

Available information supports the existence of positive externalities generated by Intel in the Costa Rican economy. Specifically, Intel has helped to create new training programs in higher education institutions, and these institutions have become "Intel Associates," which allows them to exchange curricula, faculty, and students with Intel Associates around the world, and to obtain substantial research funds. New investors and potential investors in Costa Rica claimed to have heard more about Costa Rica after Intel's decision, showing that the investment by Intel does play a signaling role to other multinationals. Moreover, new suppliers of Intel have

arrived in Costa Rica. In terms of informal communication among employees, especially at the engineering level, the survey say that there is no evidence of knowledge spillovers. Data shown above, collected through a survey to Intel suppliers, has shown the effects predicted by the theoretical literature are indeed taking place. The latter was so in spite of the fact that the survey was carried out only two years after Intel´s arrival to Costa Rica.

The overall effect of Intel moving into Costa Rica appears to be unambiguously positive. Though the data shown in this chapter has shortcomings, the evidence points in the direction of a positive net effect, especially when the medium- and long-term effects are considered. Intel has increased the export capacity of the country, has diversified exports, has helped to attract other companies into the country, has established important links with the education community to develop human resources for the benefit of the whole economy, and has changed the balance among stakeholders in the public discussion regarding important institutional reforms. Moreover, the development of local suppliers has been fast and ambitious, thanks to a coordinated effort by the government. Even though the free-zone regime implies a substantial fiscal sacrifice in terms of tax collection, the figures shown above suggest that those foregone revenues could be money well spent, if they help establish an industrial base that becomes the engine of Costa Rica's future economic growth.

Appendix I

Summary of Benefits Under the Costa Rica's Free-Zone Incentive Package

The following are the benefits program under which 190 companies had come to Costa Rica as of June 1997. These firms are distributed in eight different industrial parks. Intel is geographically located in a different area but receives the benefits as though it were in one of such parks.

i) 100 percent exemption on import duties on raw materials and capital goods.
ii) 100 percent exemption on taxes on profits for eight years, and 50 percent for the following four years.
iii) 100 percent exemption on export taxes, local sales, and excise taxes, as well as taxes on repatriation of profits.
iv) 100 percent exemption on municipal and capital taxes.
v) No restrictions on repatriation of profits or foreign currency management.
vi) Fully expedited on-site customs clearance.
vii) Possibility of selling products to local exporters.
viii) Possibility of selling up to 40 percent of the production locally, exempt from sales tax.

Intel also received the benefits offered to firms located in the Puntarenas free trade zone:

i) Longer exemption from taxes on profits: 100 percent for twelve years and 50 percent for the following six years.
ii) Every year, for five years, the government repays the investors a percentage of its payroll in the chosen base year (15 percent the first year, 13 percent the second, 11 percent the third, 9 percent the fourth, and 7 percent the fifth year).
iii) Subsidized training programs in a way that practically results in three months of free labor for the firm, provided workers receive on-site training.

Source: **Spar (1998).**

Appendix II

Balance of Payments

	1996	1997	1998	1999 *
I. Current Account (A+B+C+D)	**-264.1**	**-480.9**	**-520.7**	**-583.7**
A. Goods	**-249.2**	**-497.6**	**-399.0**	**632.1**
Exports FOB	3,774.1	4,220.6	5,538.3	6,616.0
Imports FOB	-4,023.3	-4,718.2	-5,937.3	-5,983.9
B. Services	**20.3**	**140.2**	**233.6**	**357.9**
Transportations	-250.8	-189.1	-213.6	-183.3
Travels	374.0	394.3	504.6	583.2
Others Services	-102.9	-65.1	-57.4	-42.0
C. Income	**-184.6**	**-249.0**	**-468.5**	**-1,685.2**
Compensation of employees	1.9	5.5	-7.1	-7.0
Investment income	-186.5	-254.5	-461.4	-1,678.2
D. Current Transfers	**149.5**	**125.5**	**113.2**	**111.5**
General Government	45.7	37.5	39.8	39.5
Other Sectors	103.8	88.0	73.4	72.0
II. Capital and Financial Account (A+B)	**67.5**	**508.5**	**547.7**	**1,063.7**
A. Capital Account	**28.1**	**0.0**	**0.0**	**0.0**
Capital transfers	28.1	0.0	0.0	0.0
Non-produced non-financial assets	0.0	0.0	0.0	0.0
B. Financial Account	**39.4**	**508.5**	**547.7**	**1,063.7**
Direct Investment Abroad	**421.3**	**402.5**	**606.9**	**578.3**
Portfolio Investment	**-21.5**	**74.4**	**-85.6**	**232.5**
Other Investment	**-360.3**	**31.6**	**26.5**	**252.9**
III. NET ERRORS AND OMISSIONS	**142.0**	**189.1**	**-176.6**	**-**
IV. Reserve Assets	**54.5**	**-216.7**	**149.6**	**-480.0**
V. Total Balance of Payments (I+II+III+IV)	**0.0**	**0.0**	**0.0**	**0.0**

* "Net errors and omissions" for 1999 include "Other Investment" from B. Financial Account.

Source: Central Bank of Costa Rica.

References

Aitken, B., H. H. Gordon, and A. E. Harrison. 1997. "Spillovers, Foreign Investment, and Export Behavior." *Journal of International Economics* 43:

ARC (Applied Research and Consulting). 1999. Foreign Investment in Costa Rica and Other Developing Countries. Coalición Costarricense de Iniciativas para el Desarrollo (CINDE). Mimeographed. San José.

Arrow, K. 1999. "Knowledge as a Factor of Production." *Paper Presented at the ABCDE 1999 Conference*. Washington, D.C.: World Bank.

Blomstrom, M. 1989. *Foreign Investment and Spillovers: A Study Of Technology Transfer To Mexico*. London: Routledge.

———. 1997. "The Effects of Foreign Direct Investment in Host Countries."

Blomstrom, M. and A. Kokko. 1997. "How Foreign Investment Affects Host Countries." *Policy Research Working Paper No. 1745*. Washington, D.C.: World Bank International Economics Department, International Trade Division.

.

Buffie, E. 1993. "Direct Foreign Investment, Crowding Out, and Underemployment in the Dualistic Economy." *Oxford Economic Papers* 45: 639-667.

Caves, R. 1971. "International Corporations: The Industrial Economics of Foreign Investment," *Econometrica* 38:149.

———. 1976. *Multinational Enterprise and Economic Analysis*. London: Cambridge University Press.

Central Bank of Costa Rica 1997. Indicadores Económicos. San José.

Dunning, J.H. 1977. "Trade, Location of Economic Activity, and the MNE: A Search for An Eclectic Approach." In *The International Allocation of Economic Activity*, edited by B. Phlin, P.O. Hesselborn, and P.M. Wijkman. London: Macmillan.

Haddad, M. and A. Harrison. 1993. "Are there Positive Spillovers from Direct Foreign Investment? Evidence from Panel Data for Morocco." *Journal of Development Economics* 43: 51-74.

Hymer, S. H. 1976. *The International Operations of National Firms: A Study of Direct Foreign Investment*. Cambridge, MA: MIT Press.

La Nación. 1997. “Falta Mano de Obra Calificada.” October 3.

Lim, L.Y.C. and P. E. Fong. 1991. *Foreign Direct Investment and Industrialization in Malaysia, Singapore, Taiwan, and Thailand*. Paris: Organization for Economic Cooperation and Development (OECD).

Meyanathan, S. D. 1994. *Industrial Structures and the Development of Small and Medium Enterprise Linkage*s. Washington D.C: World Bank

Pack, H., and L. Westphal. 1986. “Industrial Strategy and Technological Change: theory vs. Reality." *Journal of Development Economics* 22: 87-128.

Pack, H. and A. Rodríguez-Clare.1998. "A Firm-Level Analysis of the Effect of FDI: A Case Study of Intel Costa Rica." Mimeographed. San José.

Phlin, B., P.O. Hesselborn, and P.M. Wijkman, eds. 1977. *The International Allocation of Economic Activity*. London: Macmillan.

Ranis, G. and C. Schive (1985); “Direct Foreign Investment in Taiwan’s Development.” In, *Foreign Trade and Investment: Economic Development in the Newly Industrializing Asian Countries*, edited by Walter Galenson. Madison, WI: University of Wisconsin Press.

Rodríguez-Clare, A. (1996); “Multinationals, Linkages, and Economic Development.” *American Economic Review* 86:852-73.

Rugman, A. M. 1980. “Internalization as a General Theory of Foreign Direct Investment: A Critique.” *Weltwirtschaftliches Archiv* 116.

———. 1985. “Internalization is Still a General Theory of Foreign Direct Investment.” *Weltwirtschaftliches Archiv* 121.

———. 1986. “New Theories of the Multinational Enterprise: An Assessment of the Internalization Theory.” *Bulletin of Economic Research* 38.

Saito, M. 1998. “The Determinants of FDI: Theoretical Overview and Implications for the Baltics.” Washington, D.C.: International Monetary Fund (IMF). Mimeographed.

Shatz, H. 1997. “What does the Theoretical Literature on Foreign Direct Investment Tell Us About Location?” Cambridge, MA: HIID, Harvard University. Mimeographed.

———. 1997. “What Attracts FDI?” *The Global Competitiveness Report 1997*. Geneva: World Economic Forum.

Spar, D. 1998. “Attracting High Technology Investment: Intel’s Costa Rican Plant.” *Foreign Investment Advisory Service Occasional Paper 11*. Washington. D.C.: World Bank.

Stewart, J.C. 1976. “Linkages and Foreign Direct Investment.” *Regional Studies* 10 (2).

Todo, Y. 1999. Foreign Direct Investment, Licensing, and Technology Transfer. Stanford University, Stanford, CA. Mimeographed.

UNDP 1999. Human Development Report. United Nations.

Vernon, R. 1966. “International Investment and International Trade in the Product Cycles.” *Quarterly Journal of Economics* 80.