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Economic and social effects  
of export processing zones  
in Costa Rica

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## Preface

This paper has been prepared within the framework of a research project on analysing the employment effects of multinational enterprises (MNEs), coordinated and edited by Ann Harrison of the University of Berkeley and Kee Beom Kim of the Multinational Enterprises Programme of the ILO.

In this paper, Mauricio Jenkins analyses the economic and social impacts of export processing zones (EPZs) in Costa Rica and tests for backward linkages from firms in these zones to the local economy. Such a country case study of EPZs is particularly interesting and useful as many developing countries have encouraged EPZs as a tool to reap some of the benefits associated with globalization.

The paper starts by providing an overview of the Costa Rican EPZ regime and proceeds to show that firms in EPZs have played an important role in: (a) reducing dependence on traditional exports; (b) providing export revenues; and (c) providing jobs, particularly to low-skilled women. In terms of the qualitative aspects of these EPZ jobs, the author provides some preliminary evidence suggesting that workers in these zones are on average paid more than workers outside of zones and that working conditions in zones are in general similar or better than those found in the rest of the economy.

The author then turns to an econometric study of the types of enterprises most likely to generate backward linkages with the local economy. One surprising result is that service firms are most likely to generate backward linkages - even more than manufacturing plants. Since services are a growing component of multinational activity, this suggests that the spillovers generated from multinational activity in coming years may increase. Jenkins also finds that more capital-intensive firms are more likely to generate backward linkages, possibly because it is more difficult for them to relocate easily. Finally, Jenkins finds that locally-owned firms in zones are more likely to source their intermediate inputs locally, suggesting that encouraging participation of local firms in EPZs is important if a country wishes to ensure that there are spillovers to local suppliers from the establishment of EPZs.

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## 1. Introduction

At the beginning of the 1980s, the well-known inefficiencies associated with import substitution policies that were in place in Costa Rica for almost two decades coupled with the debt crisis that severely affected the country, prompted a change in economic development strategy. As a consequence, the Costa Rican Government began to promote the switch from an import substitution strategy of economic development to a strategy based on an outward orientation and export promotion. At the end of 1981 the Costa Rican EPZ regime was formally created as one of the main instruments to stimulate the export sector.

Since the promulgation of the EPZ law in the early 1980s, activity in the EPZs of Costa Rica has experienced rapid expansion. As we will see, in terms of exports, manufacturing employment and the attraction of foreign investment, the EPZ regime is currently quite important for the Costa Rican economy. In addition, the Costa Rican EPZ regime has followed an interesting development pattern since its inception. By the end of the 1980s, the regime had attracted, for the most part, labour-intensive operations in the textile/garment industry. Through the 1990s, however, operations that embodied more sophisticated technologies as well as greater capital intensity have been set up in the Costa Rican zones. The industry composition of the firms in the zones has also changed. Even though textile/garment firms are still one of the most important groups in the zones, the relative importance of other industries has been steadily increasing in recent years. In all, since its enactment in 1981, the Costa Rican EPZ regime has evolved according to a pattern that encompasses a larger presence of more technologically advanced companies, greater capital intensity and a more skilled EPZ workforce.

Given the current economic significance of EPZs and the development pattern they have experienced, the Costa Rican EPZ regime constitutes a particularly interesting case to study and learn from. This is the main purpose of this chapter. More specifically, this chapter examines the evolution of the EPZ regime in Costa Rica, and attempts to assess the economic and social impact that the regime has had in the Costa Rican economy. Based on that analysis, the paper draws valuable lessons and proposes policy recommendations for EPZ authorities around the world.

The remaining parts of this paper are as follows. Section 2 gives an overview of the Costa Rican EPZ regime. In particular, that section discusses the current EPZ legislation, the development of EPZ activity in Costa Rica, the economic importance of the regime for the Costa Rican economy, and other relevant characteristics of EPZ firms in that nation. Section 3 reviews the effect of EPZ activity on employment, the gender composition of the EPZ workforce, its age, level of education, salaries and other important characteristics of EPZ workers. Section 4 examines statistically the creation of linkages in the Costa Rican economy by EPZ firms. Section 5 summarizes the most significant findings of this paper and offers some policy recommendations.

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## 2. An overview of the Costa Rican EPZ regime

### 2.1 Origin and development

As mentioned, the law that gave birth to the EPZ regime in Costa Rica was enacted at the end of 1981. This law stipulated that only the Costa Rican Government through *Corporación de Zonas Francas*, a parastatal entity specifically created for that purpose, could develop and manage EPZs in the Costa Rican territory.<sup>1</sup> Also, the law stipulated the achievement of regional development as one of the main objectives of the newly created regime. As a consequence, only zones located in less-developed regions were authorized to operate.

Under the umbrella of the 1981 law the first two EPZs in Costa Rica were set up near the two main Costa Rican port cities in Puntarenas and Limón. Similarly, to zones in other nations that were established in economically depressed areas and managed by public entities,<sup>2</sup> the performance of these two zones have been quite disappointing. Only a small number of firms have located there and the zones have had recurrent legal and infrastructure problems.

Since its enactment, the EPZ law has been reformed several times throughout the 1980s and 1990s. These reforms eliminated most of the restrictive regulations contained in the original 1981 EPZ law. For instance, the 1984 reform permitted for the first time the private development of EPZs in Costa Rica. The first concession to build a privately developed EPZ was awarded shortly thereafter. Specifically, in 1985 a private developer was authorized by *Corporación de Zonas Francas* to build an industrial park in Cartago, the fourth largest city in the country, located not far away from the capital San José.

The success of this first private EPZ attracted other developers interested in building industrial estates for EPZ firms. Between 1988 and 1991, six additional concessions to build private zones were awarded: one in 1986, two in 1988, and one in each 1989, 1990 and 1991. Activity under the Costa Rican EPZ regime greatly accelerated with the award of these concessions.

### 2.2 Legislation

Currently, there are six types of enterprises that can be granted EPZ status according to the Costa Rican EPZ legislation. These are:

- (a) manufacturing firms that produce or assemble intermediate inputs or final goods that are eventually exported;

<sup>1</sup> During the early 1990s, *Corporación de Zonas Francas* was merged with the Center for the Promotion of Exports (Cenpro) to form Procomer. Procomer is presently in charge of managing and monitoring the EPZ regime in Costa Rica.

<sup>2</sup> See the discussion in ILO/UNCTC (1988, p. 107), World Bank (1992, p. 15), and UNIDO (1995, p. 27).

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- (b) commercial enterprises that manipulate, store, package, distribute and resell goods to foreign markets;
  - (c) service firms that sell services to companies located in foreign markets or to firms in Costa Rica with EPZ status;
  - (d) companies that develop and manage industrial parks where EPZ firms operate.
  - (e) enterprises dedicated to research and development;
  - (f) firms that operate shipyards and dry docks to construct, repair and maintain vessels and ships.

Table 1 contains a summary of the most relevant characteristics of the current EPZ legislation in Costa Rica. The current provisions in the EPZ law all grant EPZ firms in manufacturing an income tax holiday of 100 per cent until 2008. For the other five types of firms permitted by the law, the income tax holiday varies depending upon whether the firm is located in a developed or backward region, according to a classification of the Costa Rican territory developed by Procomer. In developed regions the income tax holiday for 100 per cent is given for eight years, plus a 50 per cent exemption for four additional years. For EPZ firms established in backward regions, the income tax holiday runs on for 12 years (instead of eight) and the 50 per cent holiday lasts for six additional years (instead of four). In the past, firms located in backward regions were also entitled to a yearly bonus equal to ten per cent of the salaries paid. In this scheme, firms in backward regions submitted a report of the salaries paid during a particular year. After revising and approving the report, Procomer sent it to the Finance Ministry, who then paid in cash ten per cent of the reported salaries to the EPZ firm. This benefit decreased two percentage points every year, which implied that the benefit expired at the end of the fifth year.<sup>3</sup>

All EPZ firms also enjoy exemption from import duties on raw materials and equipment, exemption of sales taxes, as well as streamlined import/export procedures, which are offered at the firm's location. Firms are also exempt for ten years from municipal and other taxes.

Upon payment of the corresponding import duties, the Costa Rican EPZ law allows manufacturing firms to sell up to 25 per cent of their output in the local market. Service firms can sell up to 50 per cent of their output. EPZ firms are not subject to withholding taxes on repatriated capital or profits and can manage foreign exchange freely.

The present provisions of the Costa Rican legislation also permit the establishment of EPZ firms anywhere within the Costa Rican territory. That is, enterprises that wish to apply for EPZ status and benefits can do so even if they are located outside industrial estates specifically developed to host such firms. In order to qualify for EPZ status, however, firms need a minimum investment of \$150,000 if the firm operates inside an industrial park or a minimum investment of \$2,000,000 if the firm operates outside an industrial park.

<sup>3</sup> The Costa Rican law stipulated 31 October, 2003 as the final deadline before which all EPZ firms in backward regions had to apply for the mentioned benefit if they wished to benefit from it. Firms were not given this benefit after that date.

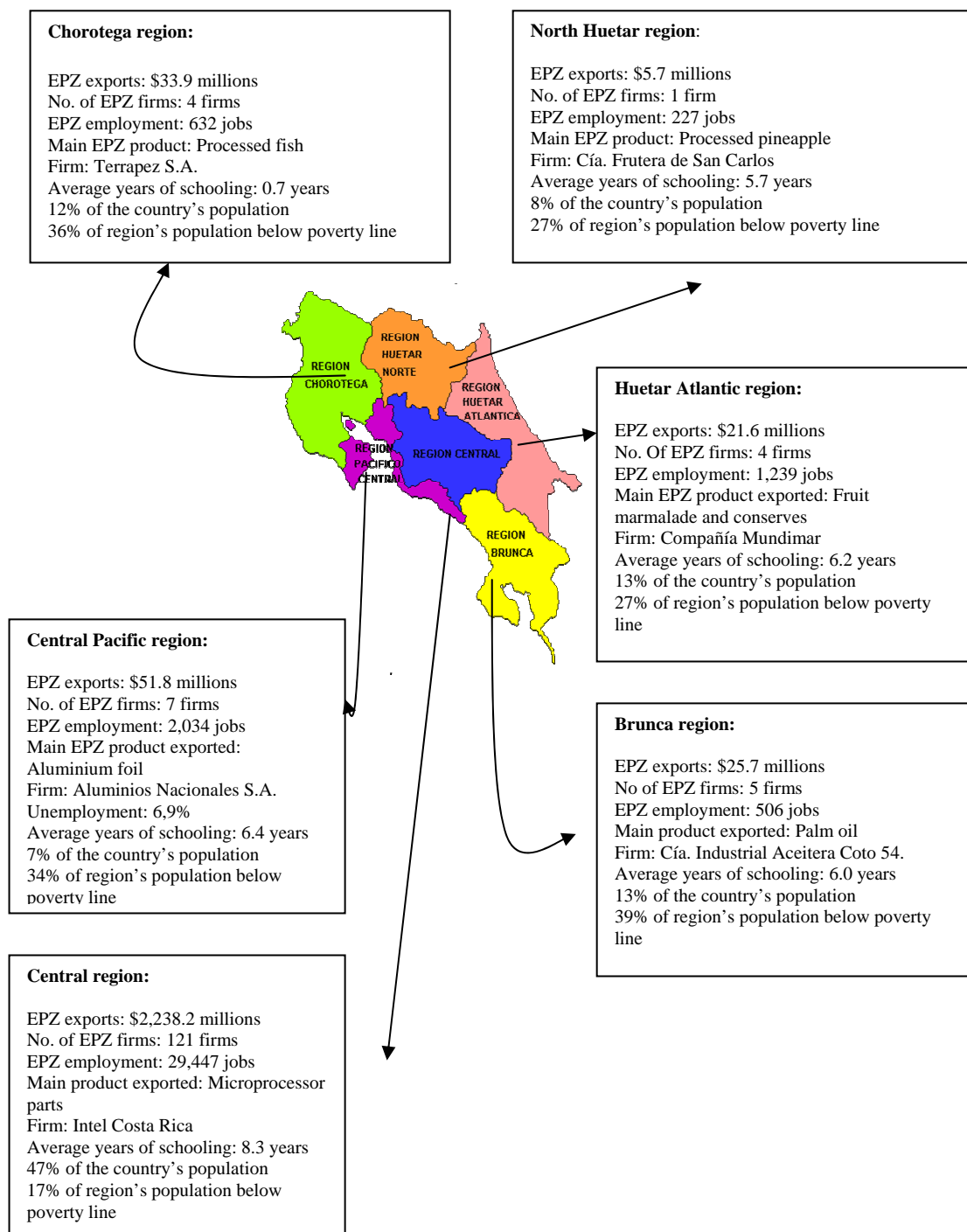
Table 1. EPZ legislation in Costa Rica

Item	Stipulation
Import duties on machinery, equipment and raw materials	Exempt 100 per cent
<b>Income tax</b>	
Manufacturing firms	100 per cent exempt until 2008
Other types of firms	(a) Developed regions 100 per cent exempt for first eight years 50 per cent exempt for subsequent four years (b) Backward regions 100 per cent exempt for first 12 years 50 per cent exempt for subsequent six years
Sales taxes	Exempt 100 per cent
Municipal and net worth taxes	Exempt 100 per cent for the first ten years
Import procedures	Streamlined procedures at the EPZ location
Local sales	Up to 25 per cent of output for manufacturing companies, 50 per cent for service firms, and 0 per cent for commercial enterprises
	Must pay corresponding import duties
Foreign exchange	Free management
Repatriation of profits and capital	Tax exempted

Source: Decree 7210 and data provided by Procomer.

Even though the current legislation gives fiscal and other incentives to firms located in less-developed regions, the vast majority of EPZ activity is presently located in the central region of the country, where the four principal urban centres are, including the capital, San José. More backward regions in the country, as measured by population size, years of formal education of the inhabitants, and the proportion of residents living under poverty, host only a few firms and jobs. Thus, despite the fiscal and other incentives that the EPZ legislation offers for firms in those locations, the great majority of EPZ firms in Costa Rica have opted for setting up their operations where there are better infrastructure facilities, where they have access to better and more specialized services and where there is a larger pool of skilled workers available. Figure 1 summarizes the limited regional impact of EPZs in Costa Rica.

Figure 1. The Regional impact of EPZ activity in Costa Rica

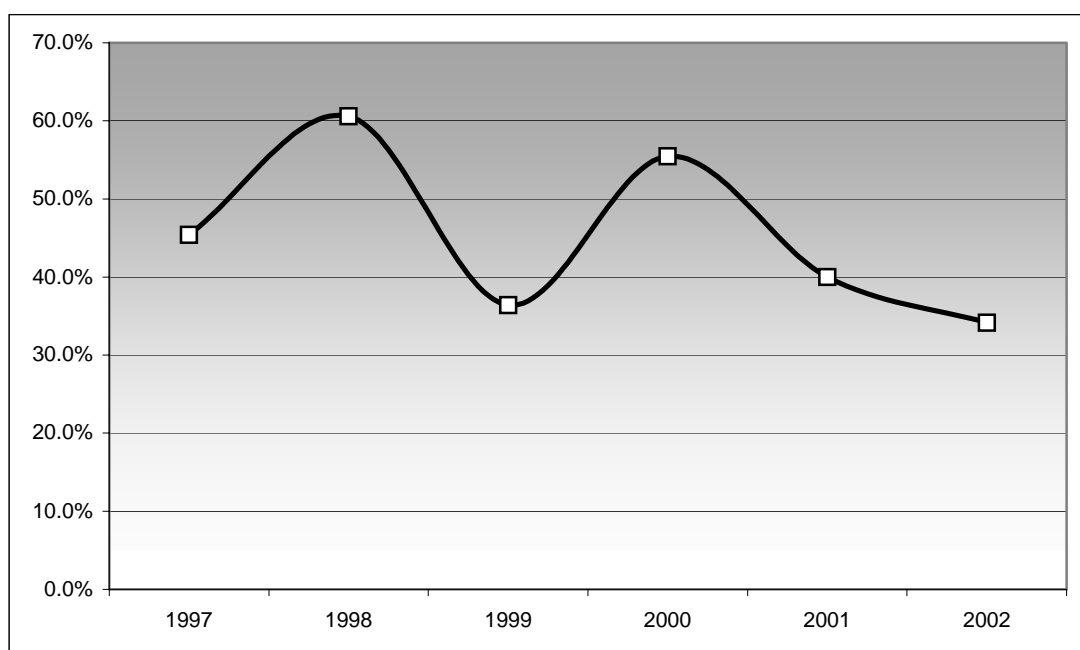


Source: Data provided by Procomer.

### 2.3 The economic significance of the EPZ regime

In economic terms, the EPZ regime is quite important for the Costa Rican economy. As an instrument to attract foreign direct investment (FDI), for example, Brenes et. al. (1993) points out that about 70 per cent of all foreign companies that established operations in Costa Rica in the late 1980s did so in the country's EPZs. Figure 2 depicts the share of total FDI entering Costa Rica under the umbrella of the EPZ regime for more recent dates. As shown, the percentage of FDI that came into the country under the EPZ regime has remained quite large, averaging more than 45 per cent of total between 1997 and 2002.

Figure 2. Share of total FDI that enters under the EPZ regime regional



Source: Grupo Interinstitucional de Inversión Extranjera Directa (2003).

To further gauge the economic importance of the EPZ regime for the local Costa Rican economy, Table 2 shows how investment, employment and exports of Costa Rican EPZ firms have increased between 1991 and 2001.<sup>4</sup> Investment in the zones has increased on average a healthy 19.0 per cent per year, while EPZ employment and EPZ gross exports have increased, respectively, 11.8 per cent and an impressive 32.3 per cent per year on average between 1991 and 2001.

<sup>4</sup> Investment figures reflect planned as opposed to actual investment and is taken from the agreement that the EPZ firm signed with the Costa Rican Government when it received EPZ status and benefits. The local authorities review actual investment every year to make sure it meets or exceeds planned investment, and thus it is likely that the figures in Table 2 actually underestimate actual EPZ investment.



Table 2. Economic importance of EPZ firms in Costa Rica

	EPZ investment <sup>(1)</sup> (\$ millions)	EPZ employment <sup>(1)</sup> (thousands)	EPZ employment <sup>(2)</sup> (thousands)	% Total	EPZ gross exports <sup>(1)</sup> (\$ millions)	Exports of goods <sup>(1)</sup> (\$ millions)	% Total
1991	138.9	11.2	1,006.7	1.1	145.0	1,490.0	9.7
1992	164.9	13.6	1,043.0	1.3	234.1	1,729.0	13.5
1993	223.2	18.6	1,096.4	1.7	273.6	1,874.0	14.6
1994	253.5	21.5	1,137.6	1.9	343.4	2,869.4	12.0
1995	311.4	25.4	1,168.1	2.2	434.2	3,453.0	12.6
1996	334.7	25.5	1,145.0	2.2	643.0	3,730.0	17.2
1997	484.1	25.7	1,227.3	2.1	891.5	4,200.1	21.2
1998	650.3	29.7	1,300.0	2.3	1,960.6	5,502.8	35.6
1999	719.6	31.0	1,300.2	2.4	3,624.9	6,720.1	53.9
2000	764.3	33.5	1,318.6	2.5	2,998.0	5,930.6	50.6
2001	788.8	34.1	1,552.9	2.2	2,376.7	5,040.0	47.2

Sources: <sup>(1)</sup>Data provided by Procomer; and <sup>(2)</sup>International Labour Office (2002).

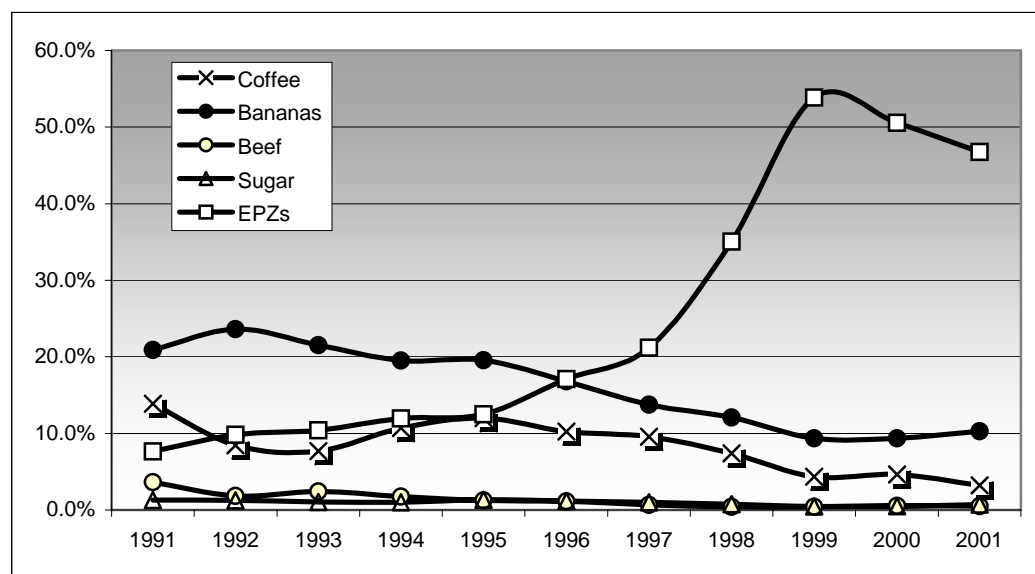
The growth in zone activity has resulted in an increasing share of EPZ firms in both employment and exports. In terms of employment, in 2001, EPZ firms accounted for 2.2 per cent of total employment in the country, up from 1.1 per cent in 1991. In terms of exports, in 2001 gross exports from EPZ firms represented about 47.2 per cent of total exports, up from 9.7 per cent in 1991.

The relatively small share of EPZ employment in total employment in the Costa Rican economy (2.2 per cent in 2001) overshadows the real significance of EPZ firms for manufacturing activities in the country. According to data in Gitli (1997) and Jenkins, et. al. (2001), manufacturing firms in the Costa Rican zones employed about 95-96 per cent of all EPZ workers. Using 95 per cent as an estimate, EPZ firms in Costa Rica employed about 32,400 thousand workers in manufacturing in 2001. According to ILO (2002), Costa Rica had about 232,900 thousand workers employed in manufacturing activities during that year, which meant that EPZ firms accounted for about 13.9 per cent of manufacturing employment in the country in 2001.

The growing importance of the EPZ regime in the last decade has also contributed in diversifying the industrial composition of national exports, making the Costa Rican economy less vulnerable to adverse changes in commodity prices as well as to export market restrictions. Figure 3 depicts the share of EPZ exports in total Costa Rican exports of goods and services, as well as the corresponding share for the so-called "traditional" exports (i.e., coffee, bananas, sugar and beef) between 1991 and 2001.<sup>5</sup> As the figure clearly shows, the relative importance of these traditional products has decreased greatly as a consequence of the expansion of EPZ activity, especially in the second half of the 1990s.

<sup>5</sup> These so-called "traditional products" comprised the bulk of Costa Rican exports before the 1990s, and according to the provisions of the EPZ law companies producing these products are not allowed to apply for EPZ status.

Figure 3. EPZ and traditional exports share in total Costa Rican exports



Source: Costa Rican Central Bank (<http://websiec.bccr.fi.cr/indicadores>).

With respect to the diversification of export markets, the contribution of the EPZ regime to the Costa Rican economy has been less clear. Tables 3 and 4 show the relative importance of selected countries or regions as destination markets for Costa Rican exports between 1997 and 2001. Particularly, Table 3 shows the relative importance of these markets for all Costa Rican exporters, while Table 4 shows the relative importance of these markets for Costa Rican EPZ exporters. As can be seen, EPZ exports are more dependent on the United States as a destination market than the rest of the Costa Rican economy, although the dependence has been decreasing steadily since the mid 1990s.<sup>6</sup> On the other hand, in relative terms, EPZ exporters sell more goods and services to the Mexican, Canadian and Asian markets than the Costa Rican economy as a whole, and relatively less to the other Central American nations. Thus, EPZ firms in Costa Rica have been able to penetrate non-traditional markets like Canada, Mexico and Asia better than non-EPZ exporting firms, but at the same time depend more on the United States market than the rest of the Costa Rican export sector.

In addition to the economic importance of the EPZ regime as measured by the statistics just mentioned, the firms in the zones affect the local economy in other more-subtle but equally-important ways. The case on Intel Corporation in Costa Rica is quite illustrative of these other avenues through which the local economy may benefit from the presence of foreign firms in the zones.

<sup>6</sup> According to data in Cenpro (1996), 83.6 per cent and 80.9 per cent of EPZ exports had the United States market as a final destination in 1994 and 1995, respectively.

**Table 3. Destination markets for all Costa Rican exports**

Country/region	1997 %	1998 %	1999 %	2000 %	2001 %
Canada and Mexico	3.3	3.1	2.8	2.3	2.3
United States	52.4	49.0	54.0	54.6	52.7
Europe	21.7	23.2	22.5	20.8	17.1
Asia	3.5	6.9	6.5	5.1	6.9
Central America	13.3	11.6	10.5	12.8	15.8
Caribbean	1.6	2.2	1.2	1.8	2.6
South America	3.1	2.6	1.6	1.7	2.2
Other	1.2	1.4	1.0	0.9	0.3
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Sources: Costa Rican Central Bank (<http://websiec.bccr.fi.cr/indicadores>).

**Table 4. Destination markets for Costa Rican EPZ exports**

Country/region	1997 %	1998 %	1999 %	2000 %	2001 %
Canada and Mexico	1.8	6.1	5.1	5.0	6.3
United States	79.9	58.8	60.4	61.8	59.9
Europe	1.8	15.7	20.5	19.9	13.2
Asia	3.2	14.8	10.8	8.2	12.8
Central America	4.5	3.1	1.8	2.8	4.6
Caribbean	7.5	0.2	0.2	0.9	1.6
South America	1.0	0.9	0.7	1.0	1.4
Other	0.3	0.4	0.7	0.3	0.2
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Sources: Procomer (2002a).

In 1997 Intel began the construction of a \$600 million assembly plant for microprocessors in Costa Rica. Soon after Intel announced its decision to build a manufacturing plant in Costa Rica and primarily as a consequence of it, many other companies began considering Costa Rica as a potential site to invest (Larraín et. al. 2001). In this regard, Intel's investment did play and continues to play an important role as a (positive) "signal" for international investors, an indirect effect from the firm's decision to invest in Costa Rica that has to be stressed.

According to Intel sources, the company has more than 230 local suppliers of inputs and services. Among the most important inputs sourced locally are computer equipment, office equipment, packing materials, office supplies, spare parts, construction materials and security equipment. Among the most important services purchased in the local economy are electricity, telecommunications, water, cafeteria services, translation of documents, security, engineering and maintenance services, garbage disposal and hotel and transportation services. In a particular day Intel has between 200-300 people at their site

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who are not Intel employees, but employees of local suppliers. Overall, Intel manifests that the company purchases around \$60 million annually of inputs and services from the local Costa Rican economy.

In terms of training received by suppliers from Intel, in a sample of 43 suppliers of goods, about 17 per cent indicated they received some training before becoming a company supplier, while almost 18 per cent indicated they changed their organizational practices as a result of becoming a supplier. Of 37 suppliers of services, 35 per cent indicated they did receive training (mostly at Intel's plant) in order to become an Intel supplier (Larraín et. al. 2001).

Intel is nowadays among the top five customers of public utilities in Costa Rica and its presence in the local economy has forced significant improvement in the logistics area in the country. In part because of Intel, FedEx and UPS have set up operations in Costa Rica and there are now daily cargo flights to several destinations in the United States. Health and safety norms have also been affected as a consequence of Intel's practices, which have been adopted as a new standard by many private companies as well as local regulatory institutions.

In all, the effect of Intel in Costa Rica seems to have been quite positive. The presence of the Company in this nation has increased and diversified Costa Rican exports, has helped to attract other companies into the country, has contributed to the development of local suppliers and has established business practices that have become the new standard for other local companies and regulatory institutions.

## **2.4 Tax concessions**

Many EPZ nations, including Costa Rica, offer income and other tax concessions to EPZ firms.<sup>7</sup> It is sometimes argued that these tax breaks represent an enormous and expensive concession from domestic governments. Evidence from countries where export-oriented firms do not enjoy income and other tax breaks seems to indicate otherwise. In particular, tax collections from EPZ and similar firms in nations like the Philippines (see, for example, Warr 1990), where these types of firms do not enjoy preferential tax treatment, have been very small. The reason is that these firms, especially those that are subsidiaries of a foreign company, are operated as cost centres and therefore generate no profits that can be taxed. In fact, the current income tax provisions coupled with the prevailing tariff schedule in many developed nations, gives MNEs strong incentives to operate their export-oriented affiliates as cost centres. For example, in the United States, parent companies may claim an income tax credit for taxes paid by a foreign affiliate that completely offsets their income tax liability in the United States. Thus, in the absence of import tariffs, the United States MNE should be indifferent to a price transfer scheme that shifts profits from one location to another since the firm will end up paying the same amount on income taxes, i.e., the corresponding United States corporate rate. If, however, the parent firm buys products from its foreign affiliate, and these products are subject to import duties when entering the United States customs territory, then the MNE has an incentive to declare the lowest price possible for these goods in order to minimize import duty payments. This helps explain why many foreign firms in EPZs operate with no profits or even losses for many years.

<sup>7</sup> Very often these concessions are conditioned upon the firm's export performance, and thus, will represent (starting 1 January 2008) an illicit export subsidy under World Trade Organization guidelines.

In the Costa Rican case, an internal study done by Procomer in the middle of 2001 showed that in a sample of more than 125 EPZ firms, a little more than one-third of the companies reported losses in each of the fiscal periods 1999 and 2000. The income tax obligations of the other two-thirds of the EPZ companies were \$58.4 and \$97.1 millions, respectively, during those fiscal years. Although these figures seem to represent significant tax concessions, it is important to point out that the top ten companies with the largest income tax obligation (forgone because of EPZ status) represented between 70-80 per cent of these amounts (depending upon the year examined). These companies were in almost all cases subsidiaries of well-known multinational firms whose leeway to shift profits from one location to another is probably quite substantial and therefore it is likely that even without income tax exception, the Costa Rican Government would have collected very little tax income from EPZ operations.

In this subsection about taxes, it is also important to mention that all firms operating in the Costa Rican domestic territory (EPZ firms are no exception) are required by law to pay social security and pension fund contributions each month. In particular, all firms in Costa Rica must report all salaries paid during a particular month and pay in cash 23 per cent of that amount to the Costa Rican social security system. This is in itself a form of taxation that is used in the Costa Rican case to finance the public health and pension systems and represents an important source of income for the Costa Rican authorities from EPZ operations.

## 2.5 Industry composition

Textile/garment firms represented the largest industrial sector in the Costa Rican EPZs at the end of the 1990s. They accounted for 23 per cent of all firms and for 40 per cent of employment (see Table 5). The electric/electronics industry was the second largest sector, accounting for 21 per cent of firms and 24 per cent of employment. Footwear/leather and machinery/metal products were the next largest manufacturing sectors, accounting for 5-6 per cent of firms and employment. The rest of the manufacturing activities corresponded to a large variety of industries, including pharmaceutical/medical products, jewellery, precision instruments and sporting goods.

Table 5. Industry distribution of EPZ firms in Costa Rica (1999)

	No. of firms	Per cent of total	Employment	Per cent of total
Textile/garment	33	23	11,971	40
Electric/electronics	30	21	7,107	24
Footwear/leather	7	5	1,578	5
Machinery/metal	9	6	1,646	6
Pharmaceutical/medical	4	3	1,688	6
Other manufacturing	40	28	4,334	15
Services and commercial	22	15	1,485	5
<b>Total</b>	<b>145</b>	<b>100</b>	<b>29,809</b>	<b>100</b>

Source: Data provided by Procomer.

Also, about 22 per cent of firms, which accounted for five per cent of employment, were service and so-called commercial firms.<sup>8</sup> The percentage of service and commercial firms is noteworthy since EPZs have traditionally been related to manufacturing operations (i.e., assembly type). However, more and more service and commercial firms have been attracted to the EPZs of several nations. In fact several nations (Jamaica, Ireland, and recently Costa Rica) have set up EPZs specially designed to host service firms.

Compared to other EPZ nations, the Costa Rican regime appears well diversified in terms of the economic sectors represented in the zones. In particular, the coexistence of relatively large textile/garment and electric/electronics sectors is very distinctive (see Jenkins et. al. 2001, p. 235).

The industrial composition of EPZ activity in Costa Rica has been changing in the last few years. According to data in Procomer (1998, Table 3), at the beginning of the decade textile/garment firms represented about 36 per cent of total firms in the zones, while electric/electronics firms represented just 11 per cent. Comparing these figures with the figures in Table 5, it is evident that there were relatively fewer textile/garment firms and more electric/electronics firms in the Costa Rican EPZs at the end of the 1990s than at the beginning of the decade.

## 2.6 Nationality of EPZ firms

With respect to the nationality of EPZ firms, about 62 per cent of firms, which accounted for 82 per cent of employment, were from the United States at the end of the 1990s (see Table 6). Domestic Costa Rican firms accounted for 15 per cent and six per cent of firms and employment, respectively. European firms represented eight per cent of firms and three per cent of employment, while firms of Asian origin accounted for just one per cent and two per cent of firms and employment, respectively.

Table 6. Ownership distribution of EPZ firms in Costa Rica (1999)

	No. of firms	Per cent of total	Employment	Per cent of total
United States	90	62	24,417	82
Costa Rica	22	15	1,924	6
Europe	11	8	1,008	3
Korea, Republic of	2	1	548	2
Other	20	14	1,912	6
<b>Total</b>	<b>145</b>	<b>100</b>	<b>29,809</b>	<b>100</b>

Source: Data provided by Procomer.

Compared to the nationality of EPZ firms in neighbouring Central American nations, there is a larger presence of United States companies and smaller presence of firms of Asian origin in Costa Rica than in those nations (see Jenkins et. al. 2001, p. 236).

<sup>8</sup> Recall that the Costa Rican legislation allows commercial firms in the zones, which are enterprises engaged in distribution activities with little or no manufacturing involved.

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## 2.7 Textile/garments firms

Because of its past and present importance in the Costa Rican EPZs, the development and characteristics of the textile/garment sector deserves further comment.

The textile and garment industry in Costa Rica, including those firms that operate under the EPZ regime, has been for many years highly dependent of the United States market.<sup>9</sup> As a consequence the trade policy, with regards to textiles and apparel, the United States has had and continues to have a great effect in the production of these articles in Costa Rica. In particular the 807.00 provisions in the United States tariff code,<sup>10</sup> the Multi Fibre Agreement (MFA), the Agreement on Textiles and Clothing (ATC), the North American Free Trade Agreement (NAFTA), and the Caribbean Basin Initiative (CBI) as well as the Caribbean Basin Trade Partnership Act (CBTPA), have all helped to shape the Costa Rican textile and garments sector in general, and the Costa Rican EPZ textile and garment sector in particular.

Both the 807.00 provisions in the United States tariff code and the signing of the MFA agreement constituted important elements in the United States strategy aimed at protecting their local textile and garment industry, which was seriously affected by imports from developing nations, especially Asian countries, during most of the 1960s, 1970s and 1980s (Chacón 2002, p. 19).

The 807.00 provisions in the United States tariff code were introduced in the middle of the 1960s. Under these provisions, imports of apparel into the United States made with US-made fabric were subject to duties only on the value added abroad and enjoyed very flexible quotas. The objective of these provisions was to stimulate the usage of United States-made cloth by firms in developing nations. As a result of them, the effective tariff for apparel assembled abroad was much lower if the cloth was made and cut in the United States than if the item was manufactured with cloth made and cut outside the United States. The difference in effective tariff rates was quite significant given the relatively high tariff rates that existed for imports of apparel into the United States, which could range between 11 and 60 per cent (Gitli 1997, p. 23). On the other hand, for products that qualified under the 807.00 provisions the effective rate has been estimated to be less than 6 per cent (Chacón 2000, p. 26).

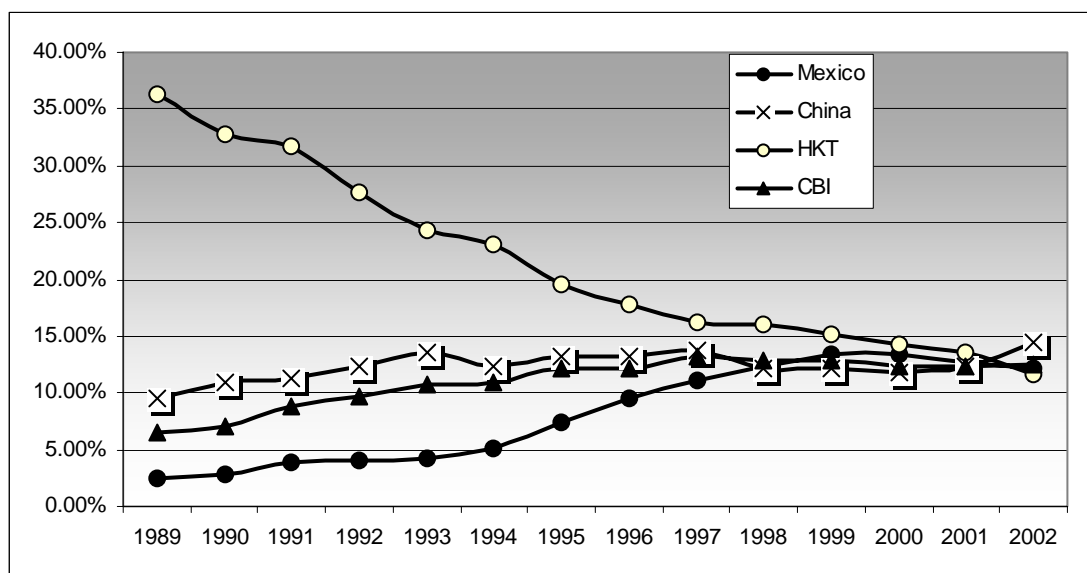
The MFA was instituted in 1974, to presumably, facilitate the orderly development of international trade in textiles and apparel. Originally the agreement was conceived for four years, but its life was extended five times. In all, the agreement existed for 21 years, until the end of 1994 when it was substituted by the ATC. Under the MFA agreement, developed nations could unilaterally impose quotas on textile and apparel imports from developing nations. This allowed developed countries to effectively protect their textile and clothing industries by selectively restricting access to their local market. The United States made extensive use of the quota scheme allowed under the MFA during the 21 years of its existence. The substitution of the MFA by the ATC agreement at the end of 1994 did not have a significant impact on the evolution of imports of textiles and apparel items into the United States as the ATC agreement allowed quotas on the most sensible items from the import country perspective (including the United States) until the beginning of 2005.

<sup>9</sup> According to industry sources, about 95 per cent of textiles and garments produced in Costa Rica have the United States market as a final destination.

<sup>10</sup> The 807.00 provision was changed to provision 9802.00.80 in 1989 when the United States adopted the Harmonized Tariff Schedule (HTS).

The combination of the restrictive quotas imposed on imports into the United States under both the MFA and the ATC agreements, as well as the 807.00 provisions in the United States tariff code, proved to be quite successful in slowing the growth of textile and apparel imports from the Newly Industrialized Economies (NIEs) of Asia and in stimulating the use of US-made fabric among developing nations, many of them, nations in the Caribbean and Central American regions. Figure 4 shows the share of United States imports of textiles and apparel accounted for by Mexico, China, the Caribbean Basin Initiative (CBI) nations and Hong Kong (China), Republic of Korea, and Taiwan Province of China as a group of countries (HKT) between 1989 and 2002. All these nations together accounted for more than 50 per cent of all United States imports of textiles and apparel between 1989 and 2002. As clearly shown, the share of United States imports accounted for by HKT has decreased significantly during the last decade. On the contrary, the shares accounted for by China, Mexico and CBI nations have all increased during the same period.

Figure 4. Share of United States imports from selected countries and groups of countries



Source: United States Department of Commerce.

In the first half of the 1990s, the growth of textile and apparel imports from Mexico and the CBI countries can be explained in large part by the existence of the 807.00 provisions in the United States tariff code. Table 7 compares the percentage of United States imports of textiles and apparel from Mexico and CBI nations that claimed 807.00 benefits between 1987 and 1997 with the corresponding share for all countries put together. As shown, the percentage of textile and apparel imports from Mexico and CBI nations that entered the United States under 807.00 status is both very high and several times larger than that of all the countries put together.

The rapid growth of Mexican imports in the second half of the 1990s is also explained by the introduction of the NAFTA agreement at the end of 1994. The provisions of the NAFTA agreement gave Mexico quota- as well as tariff-free access to the United States market as long as the products complied with the established rule of origin. In the case of the NAFTA agreement, the rule of origin is the so called “yarn forward rule”, which means that a particular product would be considered of regional origin, if the product has been manufactured from yarn produced in any of the three country members. These provisions gave Mexican producers of textile and apparel items an important advantage over most nations in terms of access to the United States market.



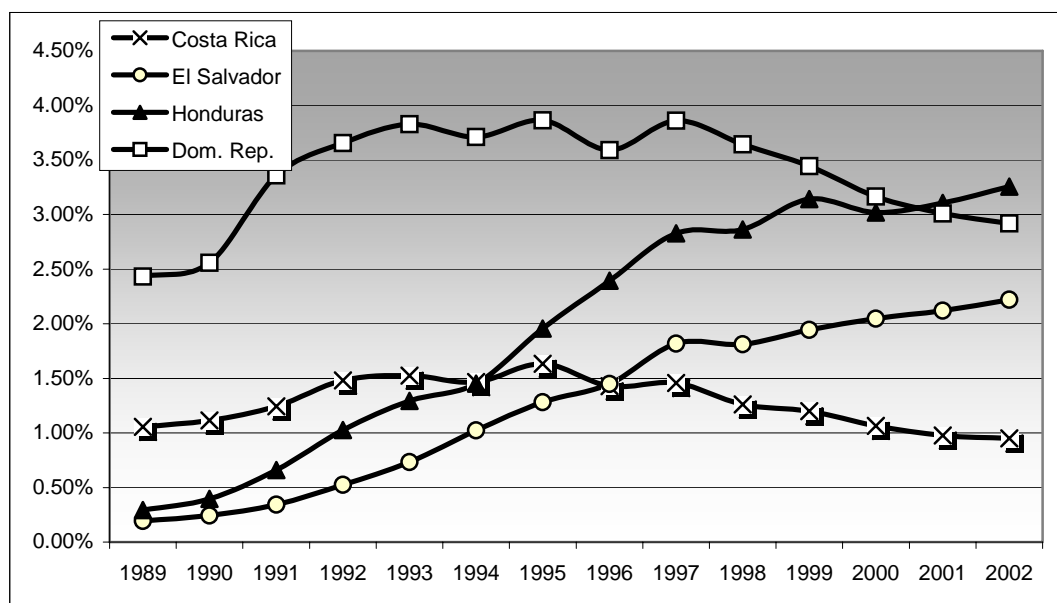
Table 7. Share of United States imports that claimed 807.00 benefits

Year	Mexico %	CBI %	World %
1987	67.7	79.4	6.0
1988	71.9	77.9	7.7
1989	76.1	76.5	8.0
1990	73.2	73.5	8.2
1991	75.3	76.3	10.4
1992	79.2	76.0	11.6
1993	80.5	77.1	13.3
1994	82.4	78.9	14.6
1995	78.4	81.3	17.7
1996	73.3	82.0	19.4
1997	71.4	83.6	21.3

Source: USITC (1998).

It is important to note here that the expansion of United States imports from CBI nations in the 1990s varied significantly among nations in that region. Figure 5 depicts the share of United States imports of textiles and apparel between 1987 and 2002 for selected CBI nations. As shown, some countries experienced rapid growth in their share of United States imports during the whole period depicted, like El Salvador and Honduras, while others experienced growth in the first half of the 1990s, but began to experience a decrease in the second half, like Costa Rica and the Dominican Republic.

Figure 5. Share of United States imports from selected CBI countries



Source: United States Department of Commerce.

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The introduction of NAFTA at the end of 1994 does not explain well the distinct development pattern of the share of United States imports accounted for by individual CBI nations. NAFTA does give Mexico an advantage in terms of access to the United States market over all CBI nations. Therefore, if the agreement was to produce a significant effect, presumably negative, on the development of the textile and apparel sectors in the CBI, it should have impacted adversely all CBI nations, not just a few. The explanation of why the textile and apparel sector of distinct CBI nations has behaved differently must reside in differences between countries within that group, not between the group and Mexico.

What explains the readjustment process among CBI nations as sources of United States imports of textiles and apparel items seems to be the difference in labour costs that exist among countries in that region. In particular, there seems to have been a shift in production from the countries with higher labour costs to the countries with lower labour costs in the region.<sup>11</sup> According to field data compiled by Gitli (1997, p. 53), labour costs for unskilled workers in Costa Rica employed in export-oriented textile and apparel firms in 1997 was about \$2.00 per hour, while in the Dominican Republic that cost was about \$1.00 per hour. In El Salvador and Honduras the corresponding cost was about \$0.90 per hour. The relatively lower labour costs in El Salvador and Honduras helped these nations to increase their share of United States imports of textiles and apparel in the second half of the 1990s, even though Mexico enjoyed quota and tariff advantages under the provisions of NAFTA.

In sum, the rapid growth of Mexico as a source of United States imports of textiles and apparel items during the 1990s is explained by the coexistence of the MFA/ATC agreements, the 807.00 provisions in the United States tariff code and the NAFTA agreement implemented in the second half of the decade. The Mexican share gains came primarily at the expense of Asian NIEs, most notably Hong Kong (China), Republic of Korea, and Taiwan Province of China. As a group, the CBI nations also grew as a source of United States imports of textiles and apparel during the 1990s. Their growth can also be traced back to the MFA/ATC agreements and the 807.00 provisions, and came primarily at the expense of the Asian NIEs as well. Nonetheless, the behaviour of individual CBI nations during that period varies significantly. Those countries with lower labour costs were able to increase their share in United States imports, while those countries with higher labour costs, Costa Rica among them, saw their share eroded, especially during the second half of the 1990s.

Data at the firm level compiled by the Costa Rican textile and apparel quota office tend to confirm the fact that the erosion in the Costa Rican share of United States imports of textiles and apparel in the second half of the 1990s is the result of relatively high operating costs, especially labour costs. According to the data, of the 43 exporting textile and apparel firms that have ceased operations in Costa Rica since 1994, about half have closed their plants because of reasons associated with high operating costs. Interestingly, of these 43 firms, only one indicated that it was closing its Costa Rican plant and moving to Mexico because of the advantages NAFTA offered.

With regard to the future of the textile and garment sector in Costa Rica, there are two events that will have a significant effect on the industry. On the one hand is the elimination starting in 2005 of textile quotas provided for in the ATC agreement. As result of this, it is expected that the Costa Rican textile and garments sector will most likely continue to loose

<sup>11</sup> Labour costs account for 55-65 per cent of total local expenditures by export-oriented textile and apparel firms in Mexico and the Caribbean (Cepal 1996, p. 191; Gitli 1997, p. 55).

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market share in the United States. The main reason will be the relatively high labour costs in Costa Rica compared to those in many developing countries in Asia (e.g., China) and countries in the region (e.g., El Salvador, Honduras). Without quotas, Costa Rican producers of textile and garments will most likely not be able to defend their share of the United States. On the other hand is the free trade agreement that all Central American nations are negotiating with the United States (i.e. the Central American Free Trade Agreement, CAFTA). Central American producers of textiles and garments are pushing for relatively flexible rules of origin in order to have preferential access to the United States market, at least until quotas on textiles and garments are completely eliminated (i.e., until 2008 for China). However, the probable outcome of the negotiating process with regard to the rule of origin is what the United States has negotiated with Mexico and Chile, which is the “yarn-forward” rule mentioned above. This would mean that textiles and garments produced in Central American nations would have to be made with yarn from either the United States or any of the Central American nations in order to qualify for tariff-free entry into the United States. Since fabrics made in other parts of the world (mostly Asia) are significantly less expensive than those produced in the United States or Central America, the proposed rule of origin limits the competitiveness of Central American producers at least with respect to price. Thus Central American nations are also pushing for what they hope will be very flexible Tariff Preference Levels (TPLs), which are quantities of textiles and garments that would be allowed to enter the United States at reduced tariffs even if they do not comply with the rule of origin proposed for CAFTA. In the event that Central American nations are able to negotiate such TPLs, and if they are able to negotiate TPLs for individual countries instead of for the region as a whole, then the Costa Rican sector may not shrink that much or may even grow a bit until United States quotas are finally lifted for all exporting nations in 2008. Whether such TPLs can be negotiated under CAFTA, or whether all the parties involved will finally approve the agreement itself, remains to be seen. Without them, the Costa Rican textile and garment sector will most probably shrink significantly in the years ahead.

### 3. Employment

One of the most important objectives of many developing nations when setting up EPZ in their domestic territory is the generation of employment (see, for example, UNCTC 1985, p. 4). In fact, since EPZ operations are for the most part labour intensive, it is not uncommon that salaries paid by EPZ firms constitute the largest expense these firms make in the local economy. Thus, the wage bill may constitute the most important “link” between EPZ firms and the host nation, and the most likely channel through which the local economy may benefit from EPZ activity. It is clear then, that knowing the characteristics of the labour force EPZ firms demand and employ, as well as the salaries they pay is a key issue for policy makers in EPZ nations. The remainder of this section analyses several dimensions of the EPZ labour force in Costa Rica. Most of the data used in this section comes from a survey on employment carried out by Procomer in all exporting firms in Costa Rica during 2001.<sup>12</sup> A total of 1,753 firms were surveyed and 1,173 valid answers were received. Of the 1,173 valid answers, 69 were from EPZ firms.

<sup>12</sup> For the purpose of the survey, an exporting firm was defined as a firm that exported in 2001 more than \$1,000 per month on average (or \$12,000 during that year).

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### 3.1 Gender Composition

According to the survey just mentioned, nearly 52.5 per cent of EPZ workers in Costa Rica are male. Compared with the gender composition of the labour force in other EPZ nations, the gender composition of EPZ workers in Costa Rica is quite unusual. Several studies have reported a much smaller proportion of male workers in the EPZs of other nations (see, for example, Jenkins et. al. 2001, p. 206, UNIDO 1995, p. 17, Kreye et. al. 1987, p. 17).

The survey results also show that for all non-EPZ exporting firms in Costa Rica, 73.1 per cent of the workers are male.<sup>13</sup> Thus, even though Costa Rican EPZ firms tend to hire less female workers than their counterparts in other countries, they do hire more female workers than the rest of the Costa Rican exporting sector.

Having a larger proportion of female workers is an important characteristic of EPZ regimes since in many cases EPZ firms offer formal employment opportunities to a segment of the domestic population whose alternative employment opportunities may be rather limited (i.e., young female workers with little or no education). Under those circumstances, the social impact of EPZs in the domestic economy can be quite beneficial (see, for example, Warr 1987 and ILO/UNCTC 1988). In the Costa Rican case, there is at least anecdotal evidence supporting that argument coming from EPZ firms located in rural areas where alternative employment opportunities for young uneducated women are minimal.

Table 8. Gender Composition of EPZ workforce by industry

	% Male	% Female
Textile/garments	51.4	48.6
Electric/electronic	39.8	60.2
Other manufacturing	59.9	40.1
Services	63.7	36.3

Source: Data provided by Procomer.

In the EPZ literature, the share of women in the labour force has been linked to the industrial composition of firms. In particular, ILO/UNCTC (1988, p. 62) and UNIDO (1995, p. 17) argue that the large proportion of women in the labour force of many EPZs around the world is more a reflection of the industrial composition of the firms (fundamentally electric/electronic and textile/garments) than anything else. According to that line of reasoning, the relatively small proportion of women in the EPZs of Costa Rica is perhaps the reflection of the fact the Costa Rican EPZ regime is relatively diversified in terms of the industrial sectors represented in the zones (see above).

The data available from the employment survey offers some support for that claim (see Table 8). In particular, the survey results show that the proportion of women in firms involved in the assembly of textile items and garments, as well as the corresponding share of firms involved in the assembly of electric/electronic articles (48.6 and 60.2 per cent,

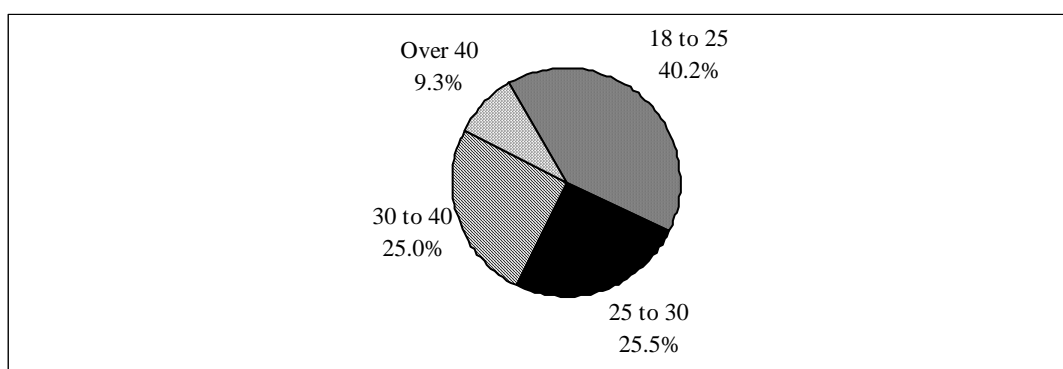
<sup>13</sup> For non-EPZ exporting firms involved in manufacturing, the corresponding percentage was 68.9 per cent.

respectively) are larger than the share of women in firms in all other manufacturing (just 40.1 per cent), and much larger than the corresponding share for firms in the service sector (36.6 per cent). Thus, zones with a larger proportion of textile/garments and electric/electronic firms should be expected to have a larger share of women in the labour force.

### 3.2 Age distribution

Just as other EPZ regimes around the world, EPZ firms in Costa Rica tend to hire predominantly young workers. In particular, 40.2 per cent of workers are between the ages of 18 and 25 years, while another 25.5 per cent are between 25 and 30 years old (see Figure 6).

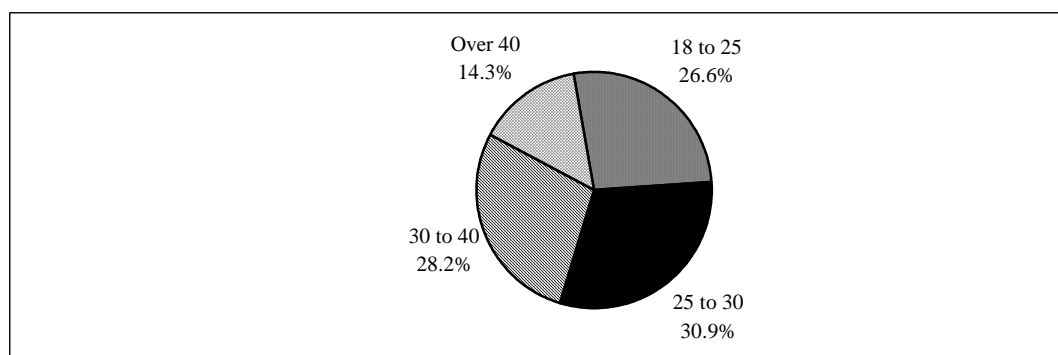
Figure 6. Age distribution of EPZ workforce



Source: Data provided by Procomer.

When compared with other exporting firms in the Costa Rican economy, EPZ firms also seem to hire younger workers as well (see Figure 7). Particularly salient is the fact that only 26.6 per cent of workers in exporting firms in Costa Rica are less than 25 years of age, while in EPZ firms that percentage is 40.2 per cent.<sup>14</sup>

Figure 7. Age distribution of labour force in non-EPZ exporting firms



Source: Data provided by Procomer.

<sup>14</sup> The percentage of workers that are less than 25 years of age in non-EPZ exporting firms involved in manufacturing activities in Costa Rica was 27.4 per cent.

Among EPZ firms, textile/garment and electric/electronic firms tend to hire more young workers than any of the other sectors in the zones (see Table 9). In particular the proportion of workers who are less than 25 years of age in these firms represents almost half or more of the workers, while that proportion in the rest of the activities present in the zones is about one-third or less.

Table 9. Age of EPZ workforce by industry

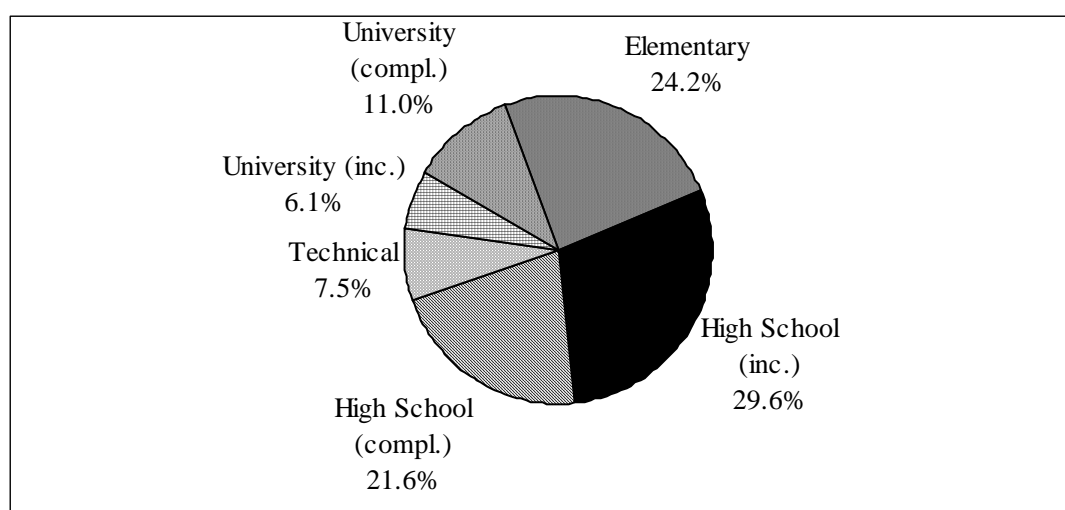
	Age (years)			
	18 to 25 %	25 to 30 %	30 to 40 %	Over 40 %
Textile/garments	48.3	23.9	18.6	9.3
Electric/electronic	59.3	25.9	13.1	1.7
Other manufacturing	32.3	24.5	31.3	11.8
Services	22.4	47.6	24.3	5.7

Source: Data provided by Procomer.

### 3.3 Education level and occupation

The vast majority of the EPZ employees in Costa Rica have only a small number of years of formal education. More than half (53.8 per cent) of labourers in Costa Rican EPZs have not completed their high school education, while a little more than three-quarters (75.4 per cent) have not received formal education beyond high school (see Figure 8).

Figure 8. Education level of workers in EPZ firms



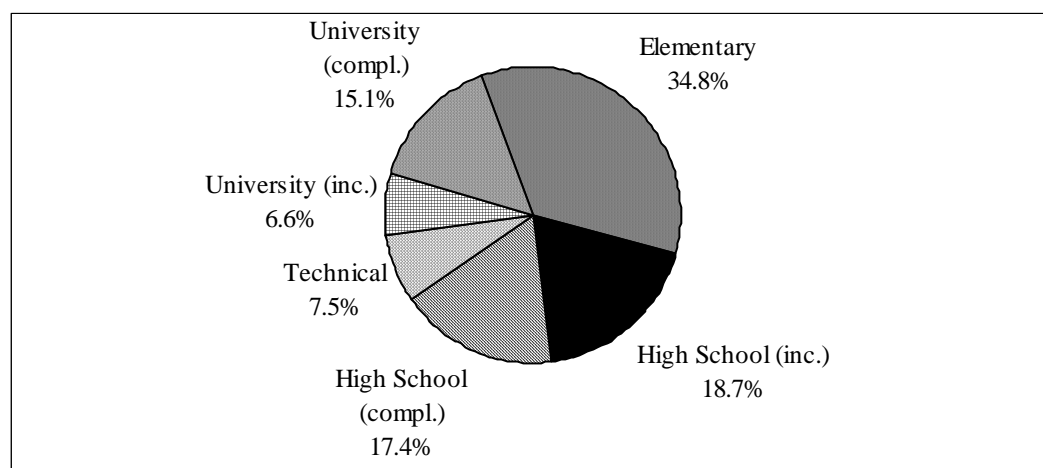
Source: Data provided by Procomer.

Having a large proportion of the workforce with relatively low levels of formal education is not unique to the EPZ sector in Costa Rica. The workforce in the rest of exporting firms in the Costa Rican economy has a similar structure. In these firms, more than half (53.5 per cent) of the workers have not completed their high school education,

while more than two-thirds (70.9 per cent) have not attended any kind of higher education beyond high school (see Figure 9).

The level of education of EPZ workers varies along industry lines (see Table 10). Textile/garment and electric/electronic firms tend to hire a larger proportion of workers with only elementary school education, while other manufacturing activities tend to hire more workers with at least some years of high school education.

Figure 9. Education level of workers in non-EPZ exporting firms



Source: Data provided by Procomer.

The proportion of workers with university studies in EPZ firms in the service industry (call centres, business services, software) is quite distinct. These firms hire very few workers with only elementary, high school or even technical education. More than 98.8 per cent of workers in these kinds of firms have at least some education at the university level.

Table 10. Education level of EPZ workforce by industry

	Elementary %	High School (inc.) %	High School (inc.) %	Technical %	University (inc.) %	University (compl.) %
Textile/garments	28.6	29.4	20.0	7.3	9.8	5.0
Electric/electronic	30.7	26.1	27.3	7.5	2.3	6.2
Other manufacturing	20.2	38.0	22.9	9.3	4.7	4.8
Services	0.4	0.1	0.3	0.3	14.2	84.6

Sources: Data provided by Procomer.

With respect to the type of work EPZ employees do, over three-quarters of workers in EPZ firms have jobs that require only few skills (see Table 11). Not surprisingly, this percentage is very similar to the percentage of EPZ workers who have not received formal education beyond high school (see above), and is not significantly different than the corresponding percentage in non-EPZ exporting firms (see Table 11).

Table 11. Occupation of EPZ and non-EPZ workforce

	EPZ firms %	Non-EPZ exporting firms %
Plant and machine operators	77.9	75.5
Administrative and clerks	6.4	13.2
Managers	1.9	3.2
Others	13.8	8.1

Source: Data provided by Procomer.

### 3.4 Salaries

The results of the Procomer survey indicate that the salaries paid by the great majority of EPZ firms are higher than the reported median salary paid in the Costa Rican local economy for the same occupation group. In fact, 96.8 per cent of EPZ firms indicated that they pay more than the reported median Costa Rican salary to their plant and machine operators (see Table 12), which comprise the bulk of EPZ workforce (see Table 11). For administrative employees/clerks as well as for managers, 87.1 per cent and 71.7 per cent of EPZ firms, respectively, indicated that they pay salaries that are higher than the reported median Costa Rican salary for those occupations.

Table 12. Reported salaries in EPZ firms

	Plant and machine operators %	Administrative and Clerks %	Managers %
More than median salary	96.8	87.1	71.7
Median salary	3.2	9.7	15.0
Less than median salary	0.0	3.2	13.3

Source: Data provided by Procomer.

The salaries reported by EPZ firms in the survey are also higher than the median Costa Rican salary more often than the salaries reported by non-EPZ exporting firms. As shown in Table 13, 77.1 per cent of non-EPZ exporting firms in the Costa Rican economy indicated that they pay a higher salary to their plant and machine operators than the reported median Costa Rican salary for that occupation group. This is significantly lower than the percentage of EPZ firms that indicated doing so. The percentages for administrative/clerks and for managers are 78.3 per cent and 47.8 per cent, respectively, which are also lower than the corresponding percentages of EPZ firms for those occupation groups.

Table 13. Reported salaries in non-EPZ firms

	Plant and machine operators %	Administrative and Clerks %	Managers %
More than median salary	77.1	78.3	47.8
Median salary	19.0	16.1	10.0
Less than median salary	3.9	5.6	42.2

Source: Data provided by Procomer.



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In all, the data from the Procomer survey on employment suggests that EPZ firms in Costa Rica pay competitive salaries.

### 3.5 Training and working conditions

Statistical evidence on training in EPZ firms is quite hard to compile. There is, however, some evidence of sizeable training done in some EPZ firms. For example, in a survey of 28 EPZ firms producing electronic, electric and medical products carried out by Cinde/Procomer (2001), it was found that all 28 firms surveyed had spent considerable time and money training employees before they were actually put in the production process.

Intel and Proctor & Gamble's Global Business Services (GBS) also constitute good examples of significant efforts to train their workers. Soon after its arrival in Costa Rica in 1997, Intel signed an agreement with one of the most important universities in Costa Rica to develop special programmes to train personnel in what the company needed for its operation in the country. In particular, The Costa Rican Technology Institute crafted a one-year programme, called "Electronics Diploma" and another one called "Intel's Associate Degree" designed to fit Intel's needs. Several other firms have indicated they have also benefited from the graduates of these programmes. Furthermore, Intel has also helped in improving the curricula of the electrical engineering as well as the computer sciences schools of the University of Costa Rica (the most important higher-education institution in the country).

Proctor & Gamble's GBS unit started operations in Costa Rica in late 1999. The company provides services (e.g., finance, account payable, account receivable, payroll, employee benefits, expense accounts) to Proctor & Gamble's subsidiaries throughout the Americas.<sup>15</sup> Presently the company employs more than 1,300 people, the majority of which have a university degree. The company selects its employees based on abilities like leadership, ability to work in teams and problem solving approaches. From there, the company provides the training the employee needs to become a member of the staff of the GBS unit in Costa Rica. The company provides its employees with two kinds of training: what they call "corporate" training and "technical" training. The first kind is mostly directed towards developing managerial skills and includes leadership skills and team building, while the second one intends to develop technical skills and includes accounting and taxation. Every employee receives a minimum of 40 hours of "corporate" training per year and the amount of hours in "technical" training is dependent on what the department head believes an individual employee requires. When the Company started operations in Costa Rica in 1999, they needed to "migrate" the business processes previously done at the Company's subsidiaries in other locations to Costa Rica. Consequently, Costa Rican employees were sent abroad to undertake training in those processes. At the end of 1999, the company had 135 employees, of which 100 were in the United States and another 15 in Venezuela being trained in those processes.

With respect to working conditions in the zones, the evidence is even scantier. Nonetheless, according to Procomer sources, working conditions and the treatment of workers in the great majority of EPZ firms are, on average, better than compared with the

<sup>15</sup> Proctor & Gamble has three such units around the world: one in Costa Rica, the Philippines and the United Kingdom.

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rest of the economy.<sup>16</sup> In this regard, it is important to indicate that many of the EPZ firms in Costa Rica are well known MNEs with internationally recognized brand names (e.g., Hanes, Levi's, Fruit of the Loom, Conair, Intel, Baxter, Proctor & Gamble). Working conditions in these firms tend to be at least as good as, and generally better than, those in other comparable operations in the rest of the economy. Employees in these firms work in a clean, well-ventilated (or air-conditioned) environment, and have access to medical attention, subsidized meals and transportation.

#### 4. EPZ linkages in the Costa Rican economy

The strength of linkages between EPZs and the rest of the domestic economy seems to play an essential role in determining whether, and to what extent, the host nation benefits from opening EPZs (e.g., Wei 1993, p. 242, UNCTAD 1993, p. 20, Din 1995, p. 100).<sup>17</sup> For example, by purchasing inputs in the domestic economy, EPZ enterprises may increase overall demand for domestically produced goods and services such as raw materials, intermediates, supplies, equipment, utilities, as well as maintenance, banking, insurance and construction services. To the extent that factor-owners' earnings in the linked industries exceed their opportunity costs, the host nation attains a positive social return from their stimuli, leading to an increase in domestic income and welfare. This is clearly true when, for example, there are large pools of unemployed people in the host nation. In that case, wages earned by unskilled workers employed in jobs indirectly created as a consequence of zone operations are very likely to exceed their opportunity cost since alternative employment opportunities may be rather limited.

There is statistical as well as anecdotal evidence of the positive stimulating effects that increased EPZ activity can have in the host economy. For example, in an econometric model estimated across 23 developing nations, (Lin 1993) found that spillover effects from export-oriented activities were a statistically significant factor affecting economic growth in host nations; the creation of backward linkages being one of the main channels through which the positive impact was presumably attained (Lin 1993, p. 174). According to Curimjee (1990, p. 111) the construction, transportation and financial sectors have all been greatly stimulated as a result of zone operations in Mauritius. In Sri Lanka, local producers of packing materials grew significantly and began to play an important role in supplying these materials to EPZ firms (Wijewardane 1990, p. 157).

Although the literature of linkages has categorized linkages into forward and backward linkages, it has long been recognized that the latter are much more relevant for EPZ industries. The reason lies in the fact that only a very small proportion of EPZ output

<sup>16</sup> Several researchers have also argued that working conditions in the zones are as good as or even better than outside of the zones (e.g., Willmore, 1995). For example, ILO/UNCTC (1988) reports that working hours in EPZs in Mexico, Malaysia, Mauritius, and Sri Lanka were not very different from working hours in other manufacturing industries, especially in the textile and electronic industries. Also, wages in EPZ firms tend to be roughly similar to those prevailing in the local manufacturing sector (ILO/ UNCTC, 1988; Basile and Germidis, 1984). Safety and health conditions have also been found to be better in EPZ firms than in comparable domestic enterprises (World Bank, 1992).

<sup>17</sup> Recent theoretical developments in the EPZ literature have also given support to the view that linkages created by foreign enterprises in the zones could constitute an important source of benefit for host economies. In particular, the models of EPZ backward linkages developed by Wei (1993) and Din (1994) show that linkages created by foreign EPZ firms can stimulate the production of intermediate inputs in the local economy, leading to an increase in national income and welfare.

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is sold in the domestic market, and therefore the possibility of developing significant forward linkages is quite small.

The remainder of this paper examines statistically the factors that are correlated with backward linkage formation at the firm level. The statistical evaluation of these factors is carried out employing EPZ firm-level data collected by the Government of Costa Rica. Since 1994, all EPZ firms in Costa Rica have been required to file an annual report of their operations. The report includes information on sales, exports, consumption of raw materials and other inputs, investment, employment, ownership and several categories of costs and expenses. The report is checked for inconsistencies and missing data and eventually approved by the Costa Rican authorities. The authorities are especially careful in checking the level of employment and investment of each individual firm as well as whether the reported expenses match the income tax returns these firms are also required to file.<sup>18</sup> A notarized certification of the names and equity participation of the owners of the firm must accompany their annual report.

The format of the report has been changed several times since it was first introduced in 1994. The 1997 version distinguishes foreign from domestic expenses, as well as whether raw materials and supplies were bought locally or imported. Given the detail of the expense categories of the 1997 report, it is possible to estimate the consumption of domestically produced intermediates for each individual firm during that year.

The Costa Rican authorities received a total of 126 annual reports from EPZ firms in 1997. After excluding firms that were in the pre-operating stages of production at the end of 1997 and therefore had no detailed information on expenses and raw material consumption to report; firms that reported serious production problems and were reorganized during the year; firms that reported expense items that could not be unambiguously classed as consumption of intermediate inputs of either domestic or foreign origin that represented more than ten per cent of total costs and expenditures during 1997;<sup>19</sup> and firms that showed serious inconsistencies in their annual report, a total of 84 firms were left. These 84 firms constitute the final sample for the statistical analysis performed below.

#### **4.1 General characteristics of the sample**

The main characteristics of the 84 sampled firms are summarized in the Tables 14 and 15. As shown in Table 14, of the eighty-four firms in the sample, 20 are textile/garment firms, 16 are electric/electronics firms, six are commercial firms, and five are service firms. The other 37 firms in the sample belong to other manufacturing sectors.

Of the 20 textile/garment firms, 15 firms manufacture garments made out of cotton fabric (fundamentally underwear, sleepwear, shirts and pants), two firms manufacture yarn, two firms manufacture garments made of non-cotton fabrics, and the remaining firms makes embroideries.

<sup>18</sup> Even though they are exempt from income tax, they are required to submit the return every year.

<sup>19</sup> Almost invariably there were some expense items that could not be unambiguously classified as intermediate consumption. The 10 per cent cut-off is believed to be small enough not to cause serious problems in the statistical analysis.

Within the 16 firms in the electric/electronics sector, there are six firms that manufacture different types of electronic components or equipment (e.g., circuit boards, measuring instruments), seven firms that produce electrical equipment of different kinds (e.g., hairdryers, power sources, telephone parts), and three companies that manufacture other electrical items.

Among the 37 firms that constitute the “other manufacturing” group are five companies that manufacture pharmaceutical or chemical products, six companies that manufacture precision instruments, five companies that manufacture jewellery, and four companies that manufacture leather products. The remaining companies in this group manufacture a wide-range of products including footwear, sporting goods, furniture, tobacco products and toys.

The six commercial firms in the sample, which are firms dedicated to distribution activities with practically no manufacturing involved, include two firms that distribute electrical items, one firm that distributes cosmetics, one firm that distributes yarn, and two firms that distribute plastic items.

The five service companies in the sample include two firms that develop computer software, a calling centre for a personal computer manufacturer, a data processing firm, and a clinical research laboratory.

**Table 14. Number of firms and average purchases of local intermediates according to industry group and ownership (1997)**

Industry	No. of firms	Share of local intermediates in total %
Textile/garment	20	22.5
Electric/electronics	16	25.9
Other manufacturing	37	48.0
Commercial	6	9.7
Service	5	94.0
Local firms	12	58.5
Foreign firms	72	37.3
All industries	84	40.2

Source: Data provided by Procomer.

On average the 84 firms in the sample bought about 40 per cent of all the intermediates used in production in the local Costa Rican local economy during 1997. There were significant differences in the propensity of industry groups to purchase domestic intermediates and raw materials. In particular, textile/garment firms, as well as electric/electronics firms, tended to buy less domestically than other manufacturing activities (see Table 14). On average, textile/garment firms procured locally about 23 per cent of their intermediates, while electric/electronics firms procured almost 26 per cent theirs locally. In comparison, the averages for other manufacturing activities were higher. Specifically, other manufacturing activities procured about 48 per cent of their intermediates in the domestic economy. Commercial enterprises purchased a little less than 10 per cent of total intermediates in the local Costa Rican economy during 1997. Service companies purchased locally over 94 per cent of their total consumption of intermediates.

The firms in the sample had an average investment of Costa Rican ¢348.8 million (see Table 15).<sup>20</sup> Electric/electronics and textile/garment firms tended to be the largest, with an average investment of ¢563.3 million and ¢424.5 million, respectively. Other manufacturing activities had an average investment of ¢284.3 million per firm. With an average investment of ¢302.3 million, service firms were smaller than both textile/garment and electric/electronics firms, but larger than other manufacturing activities. Commercial firms tended to be the smallest, with an average investment of just ¢24.0 million per firm.

The average capital intensity of the firms in the sample was ¢3.7 million per employee. Capital intensity varied greatly among industry groups. Textile/garment firms had an average investment of almost ¢2.0 million per worker, while electric/electronics firms had an average of ¢4.6 million per worker. Other manufacturing enterprises had an average investment of ¢4.2 million per worker. Commercial enterprises had an investment of ¢2.3 million per employee while service companies ¢5.3 million per employee. Firms in the sample were almost five years old on average. Ages varied from less than a year to more than 12 years. In terms of local sales, the firms in the sample sold about 1.4 per cent of their output in the local economy during 1997. Interestingly, electric/electronics firms sold a higher proportion of their output in the local market than firms in other industry groups, while textile/garment, commercial and service enterprises sold practically nothing outside the zones.

Table 15. Average characteristics of EPZ firms in the sample according to industry group and ownership

Industry	Investment (¢ 000s)	Capital intensity (¢ 000s/empl.)	Age (years)	Local sales (%)
Textile/garment	424,482	1,967	6.2	0.0
Electric/electronics	563,277	4,563	4.4	3.6
Other manufacturing	284,280	4,152	4.9	1.4
Commercial	24,967	2,269	3.8	0.0
Service	302,321	5,307	3.6	0.0
Local firms	251,027	5,173	4.1	1.0
Foreign firms	364,611	3,450	5.1	1.4
All industries	348,796	3,690	5.0	1.4

Source: Data provided by Procomer.

There was local equity participation in 18 of the 84 firms in the sample. In 12 of these, local investors held 50 per cent or more of equity. When firms in the sample were divided between foreign firms (firms in which overseas investors hold 50 per cent or more of equity) and domestic firms (firms in which local investors hold more than 50 per cent of equity), several interesting features surfaced (see Tables 14 and 15). In particular, local firms purchased over 58 per cent of their intermediates in the local economy, while the corresponding figure for foreign firms just a little over 37 per cent.

<sup>20</sup> The average exchange rate in 1997 was about 232 Costa Rican colones (¢) per United States dollar.

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As measured by total investment, foreign firms in the sample were larger than domestic firms. Foreign firms had an average investment of ¢364.6 million, while domestic firms had an average investment of just ¢251.0 million (see Table 15). Foreign firms were also less capital intensive and a bit older than domestic firms in the sample. In particular, foreign firms had an average capital intensity of a little more than ¢3.4 million per worker, while domestic firms an average capital intensity of almost ¢5.2 million per worker. Foreign firms were, on average, just over five years old, while domestic firms just over four years old. Interestingly, foreign firms did sell a higher proportion of their output in the domestic market than locally owned firms. Lastly, of the 84 firms in the sample, 22 were located outside industrial parks while 18 were located in rural areas.

## 4.2 Proposed proxy for EPZ firm-level backward linkages

Total intermediate inputs procured in the local economy as a share of total intermediates used in production is employed herein as a measure of the size of backward linkages created by individual EPZ enterprises. This measure is defined as:

$INTSHA_i$  = Total purchases of intermediates of local origin divided by total intermediates used in production for the  $i^{th}$  firm.

Purchases of intermediates of local origin include domestic expenditures on raw materials and supplies, electricity and fuel, personnel training, repairs and maintenance, research and development (R&D), advertising, consulting and professional fees, leasing of factory space and equipment, subscriptions and payments to professional associations and employee relations and activities. These items are included in the calculation of intermediate consumption following the recommendations of the United Nations System of National Accounts (1993).<sup>21</sup>

An alternative measure to gauge the ability of individual firms to forge backward linkages in the surrounding economy is the amount of raw materials procured locally as a share of total raw materials used in production. However, the share of total intermediate inputs obtained locally is judged here to be a better measure for at least a couple of reasons. First, these inputs do include raw materials used in production, and therefore is a more inclusive measure than the share of raw materials and components. Secondly, for a small economy, like many EPZ nations around the world (including Costa Rica), whose manufacturing sector is small in relative terms, forging substantial linkages with EPZ firms through supplying raw materials and components used directly in the production process is, to say the least, hard to do. These nations have a much better chance of forging linkages through supplying services and other inputs not necessarily used in the production line (i.e., repair, banking, insurance, and transportation services, office supplies, advertisement, professional fees). In fact, the vast majority of the linkages EPZ firms forge in small host economies are probably of this type.

<sup>21</sup> Also following those recommendations, local intermediate consumption does not include expenditure on wages and fringe benefits, relocation of employees, interest and depreciation, indirect taxes, donations and contributions, discounts on sales, amortization of pre-operating expenses, and expenses originated from sales of assets, inventory obsolescence, uncollected receivables and exchange rate differentials.

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### 4.3 Determinants of EPZ firm-level backward linkages: Industry-level factors

Since industries differ with respect to their usage of intermediates in production, it is expected that backward linkages will vary across different industries. In the particular case of EPZs, it is interesting to investigate whether linkages tend to vary systematically between the two main industrial activities found in the Costa Rican zones, i.e., textile/garment and electric/electronics industries.

In addition to studying whether backward linkage formation varies systematically between the textile/garment and electric/electronics sectors, it is also interesting to investigate the relative importance of the linkages created by commercial and service enterprises in the zones. In an effort to diversify the range of activities in the zones, many EPZ nations have encouraged investment from these types of enterprises in recent years.<sup>22</sup> Hence, to investigate statistically how linkages vary across different industrial sectors, four dummy variables are employed (*DTEXT*, *DELEC*, *DCOME* and *DSERV*). These are defined as follows:

$DTEXT_i$  = A binary variable where  $DTEXT_i=1$  if the  $i^{th}$  firm is a textile/garment firm, 0 otherwise.

$DELEC_i$  = A binary variable where  $DELEC_i=1$  if the  $i^{th}$  firm is a electric/electronics firm, 0 otherwise.

$DCOME_i$  = A binary variable where  $DCOME_i=1$  if the  $i^{th}$  firm is a commercial enterprise, 0 otherwise.

$DSERV_i$  = A binary variable where  $DSERV_i=1$  if the  $i^{th}$  firm is a service enterprise, 0 otherwise.

According to the data in Table 14, it is hypothesized that textile/garment, electric/electronic and commercial enterprises in the zones forge less linkages than other EPZ sectors, while service enterprises are hypothesized to forge more.

### 4.4 Determinants of EPZ firm-level backward linkages: Firm-specific factors

There are a number of factors at the firm level that can affect the potential of individual enterprises to forge backward linkages in the domestic economy. The capital intensity (*CAPINT*) of the enterprise is probably one. In particular, it can be argued that relatively capital-intensive operations demand more supplies and intermediates such as electricity and water, as well as specialized professional and maintenance services, all of which are supplied mostly by enterprises located in the domestic economy. In fact, whether these intermediates are available at a particular location may influence the multinational firm's decision to locate an affiliate there in the first place. Interestingly, in the only empirical study where the capital intensity of firms is employed as an explanatory variable for backward linkage formation, McAleese and McDonald (1978, p. 326) found that a firm's domestic purchases (relative to total expenditures) was positively correlated with

<sup>22</sup> For instance, with the intention of attracting financial services firms, the Irish authorities established a specialized EPZ for that purpose near Dublin, while Jamaica and Barbados have established EPZs targeted to the attraction of data-processing activities.

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fixed assets per employee, although not significantly. In all, whether more capital-intensive operations give rise to a higher propensity to buy intermediates locally needs to be determined empirically. Herein the capital intensity of individual firms is defined as:

$CAPINT_i$  = Total investment per employee in the  $i^{th}$  firm.

Another firm-specific variable that might affect the degree of backward linkage formation is whether the firm is local or foreign-owned. In particular, foreign-owned firms may have a higher propensity to import intermediates from abroad. Several studies of the propensity of individual firms to purchase local inputs have found that companies with foreign participation are inclined to purchase a smaller proportion of their inputs in the host nation. For example, McAleese and McDonald (1978, p. 326) found that foreign firms in Ireland tended to buy less locally than domestically owned firms after controlling for age and other factors. Cohen (1973, p. 191) found among export-oriented firms in Republic of Korea that firms owned by local investors tended to purchase more inputs locally than foreign firms producing the same commodity. To determine whether foreign ownership as opposed to local ownership affects the creation of backward linkages in EPZs, two dummy variables are employed. These variables are defined as follows:

$MAJLOC_i$  = A binary variable where  $MAJLOC_i=1$  if local investors own more than 50 per cent of the  $i^{th}$  firm's equity, 0 otherwise.

$LOCPART_i$  = A binary variable where  $LOCPART_i=1$  if the  $i^{th}$  firm has local participation in its ownership structure, 0 otherwise.

Another firm-level variable commonly believed to affect the propensity of foreign firms to purchase domestic inputs is the age of the enterprise ( $AGE$ ). The positive effect of the firm's age on the propensity to buy raw materials in the host nation has been well documented in the FDI literature (Caves 1996, p. 232, Dunning 1993, p. 451). Presumably, as a foreign firm becomes more familiar with the domestic environment and ways of doing business, reliance on domestic suppliers of intermediate inputs increases. In his study of multinational firms' subcontracting relationships in developing economies, Halbach (1989, p. 7) argues that autonomous market forces lead to growing inter-firm linkages over time. In the particular case of EPZs, Wei (1993, p. 53) claims that the longer the EPZ exists, the tighter the linkages become. McAleese and McDonald (1978, p. 326) find a positive and statistically significant relationship between the length of time a project is in operation and its propensity to purchase domestically produced Irish goods. The age of the enterprise is defined herein as:

$AGE_i$  = The number of years that the  $i^{th}$  firm has been operating in the EPZ regime.

The overall size of the enterprise is also a factor presumed to affect linkages. According to Halbach (1987, p. 7), company size was a significant determinant of the magnitude of subcontracting relationships in plant-level studies.<sup>23</sup> Presumably, larger enterprises may have more access to, knowledge of, or leverage with overseas suppliers of intermediates than small ones. Smith and Barkley (1991, Table 2) find a negative and marginally significant relationship between company size (measured by total employment) and the propensity to purchase non-labour inputs from the local economy. Total investment ( $TINV$ ) is used to proxy firm size and is defined as:

$TINV_i$  = Total investment by the  $i^{th}$  firm.

<sup>23</sup> He does not mention the direction of the effect, however.



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Several authors have argued that the market orientation of a particular firm is related to its propensity to source inputs domestically. For example, Halbach (1989, p. 7) claims that import-substitution investments require less time to develop a network of inter-firm linkages than export-oriented ones. In addition, according to Blomström and Kokko (1997, p. 13), Reuber et al. (1973), using information provided by the head offices of multinational enterprises, found that export-oriented firms tend to purchase fewer inputs in the domestic economy than domestic-oriented ones. In their study of backward linkages created by non-metropolitan high-tech companies in the western United States, Smith and Barkley (1991, Table 2) also found a positive and statistically significant relationship between local sales and domestic purchases of local inputs. Thus, the amount of local sales (*LOCSALE*) may affect the degree of backward linkage formation. *LOCSALE* is defined as:

$LOCSALE_i =$  Percentage of the  $i^{th}$  firm's total sales in the local market.

Lastly, EPZ linkages may vary systematically along other dimensions that are useful to investigate. For example, linkages with the domestic economy may depend on whether EPZ firms are located inside industrial estates. Some nations (e.g., Mauritius) have what could be called an "open" EPZ regime where export-oriented firms may locate anywhere in the domestic territory, while others (Republic of Korea, Taiwan Province of China, India) have a "closed" EPZ regime where firms can locate their operations only in industrial parks specifically developed for that purpose. It is interesting for policymaking purposes to know whether the likelihood of backward linkage formation is systematically different if firms are located inside or outside an industrial estate. Likewise, it is also interesting to investigate whether linkages are less likely to form if firms are located in rural areas. The use of EPZs as instruments for rural development has been criticized in part because linkages may be harder to forge in rural areas (e.g., Basile and Germidis 1984, p. 54, Kumar 1987, p. 1316, World Bank 1992, p. 12). To determine whether the firm location inside an industrial state or in a rural area affects backward linkage creation, two dummy variables are employed (*DPARK* and *DRURAL*). These variables are defined as:

$DPARK_i =$  A binary variable where  $DPARK_i = 1$  if the  $i^{th}$  firm is located inside an industrial park, 0 otherwise.

$DRURAL_i =$  A binary variable where  $DRURAL_i = 1$  if the  $i^{th}$  firm is located in a rural area, 0 otherwise.

The discussion in the last two subsections identified a total of 12 industry-level and firm-specific variables that can potentially affect the formation of backward linkages in EPZs. The hypothesized effect of these variables on backward linkage formation is summarized in Table 16.

Table 16. Hypothesized effect of the determinants of EPZ backward linkages

Factor	Variables	Hypothesized effect
<b>Industry-level</b>		
Industry dummies	<i>DTEXT, DELEC, DCOME, DSERV</i>	-
		+
<b>Firm-specific</b>		
Capital intensity	<i>CAPINT</i>	+
Local ownership dummies	<i>MAJLOC, LOCPART</i>	+
Age	<i>AGE</i>	+
Size	<i>TINV</i>	-
Local sales	<i>LOCSALE</i>	+
Location dummies	<i>DPARK</i>	-
	<i>DRURAL</i>	-

## 4.5 Empirical results

This section discusses the main empirical results of the statistical analysis on backward linkage formation. A brief discussion of the econometric model employed, estimation issues and detailed statistical results are presented in the Appendix. Further details are available from the author upon request.

The main empirical results are summarized in Table 17. This table contains the signs and significance levels of the variables found to help explain the share of intermediate inputs (*INTSHA*) purchased by individual EPZ firms in the local economy.

Table 17. Summary of empirical results

Sign	<i>INTSHA</i>	
-	<i>DTEXT</i>	***
-	<i>DELEC</i>	**
+	<i>DSERV</i>	***
-	<i>DCOME</i>	***
+	<i>CAPINT</i>	***
+	<i>MAJLOC</i>	
-	<i>TINV</i>	**

\*\*\* denotes statistical significance at the 1 per cent level or higher,  
 \*\* denotes statistical significance at the 5 per cent level or higher,  
 \* denotes statistical significance at the 10 per cent level or higher.

As shown, the four industry dummies employed in the econometric analysis are significantly related to the share of total intermediates acquired in the local market (*INTSHA*). In particular, the textile/garment dummy (*DTEXT*) coefficient, the electric/electronics dummy (*DELEC*) coefficient and the commercial dummy (*DCOME*) coefficient are all negative and significant at the five per cent level or higher, implying that these types of enterprises purchase a smaller share of their intermediate inputs in the local

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market than EPZ firms in other industries. The results also show that the service dummy (*DSERV*) coefficient is positive and significant at the one per cent level, indicating that service firms in the zones purchase a larger share of their intermediates in the local market.

The explanation of why textile/garment and electric/electronics firms tend to form fewer backward linkages in the host economy probably resides in the nature of the products that these types of EPZ enterprises manufacture. In particular, the products manufactured in these two sectors tend to be relatively valuable compared to their weight and volume. Because of this, for EPZ enterprises in these two industries, transporting raw materials, components and semi-finished products from one location to another to exploit differences in the cost of production factors or inputs across nations is comparatively less expensive than for EPZ firms in other industries. As a consequence, the separation of the assembly-type operations from the rest of the manufacturing process in these two sectors tends to be relatively less costly. Hence, in the textile/garment and electric/electronics sectors, nations where wages are relatively low are selected more often for assembly-type operations only, while raw materials and other intermediates are manufactured or procured more frequently from overseas locations. The relative ease with which the assembly-type stages of production are separated from the rest of the production process in the textile/garment and electric/electronics EPZ industries probably explains why the bulk of EPZ activity in many nations is mainly specialized in these two economic sectors (see Jenkins et. al. 2001, p. 205).

The explanation of why commercial enterprises are also less likely to forge backward linkages as measured by the propensity of these firms to purchase intermediate inputs in the local market is straightforward. Enterprises of this type are mainly engaged in the distribution of goods manufactured abroad, and therefore consume only a very small amount of local intermediates (mostly packing materials) from domestic suppliers.

The reason for the high consumption of local intermediates in service enterprises can also be explained easily. These firms report a very small amount of imported intermediates, if any. For example, in a data processing firm, pretty much all intermediate inputs consumed are reported to have been procured locally since the data received from overseas operations has no declared commercial value.

The econometric results furthermore show that the firm's capital intensity (*CAPINT*) exerts a positive and highly significant effect on the share of intermediate inputs bought locally by EPZ firms. Particularly, in the preferred econometric model, the *CAPINT* coefficient is positive and significant at the one per cent level, implying that relatively capital-intensive firms procured a larger share of their intermediates in the local economy (*INTSHA*). The positive and significant relationship between the firm's capital intensity and its propensity to forge backward linkages in the host nation may be related to the degree of "footlooseness" of EPZ firms. In particular, relatively capital-intensive firms are probably less footloose. Thus, when these firms select a particular location to set up their operations they tend to remain in that location for a longer period of time. In the long run, these firms might find it in their best interest to develop local relationships with domestic suppliers and to be "good corporate citizens" in the host country. In comparison, less capital-intensive firms probably want to keep their flexibility to move from one location to another as soon as economic conditions change and therefore have less incentive to develop links with local suppliers. In addition, as explained before, the finding that more capital-intensive EPZ firms tend to purchase more intermediates in the local market may be explained (at least in part) by the fact that some of these enterprises may have been attracted to a particular EPZ precisely because certain intermediates were available there. If that were the case, a positive correlation between the capital intensity of EPZ firms and their propensity to purchase local intermediate inputs would be expected.

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Of the two dummies proposed to examine the effect of local ownership on EPZ backward linkages (*MAJLOC* and *LOCPART*), only *MAJLOC* seems to be positively related to the share of intermediate inputs acquired in the local market (*INTSHA*). In particular, the *MAJLOC* coefficient is positive and just marginally insignificant (its *p-value* is 10.1 per cent), implying that firms majority-owned by local investors tend to buy a larger share of their intermediates in the local economy (*INTSHA*). The *LOCPART* coefficient, however, is insignificant (see Appendix).

With respect to the age of the firms, the empirical results indicate that the age of the enterprise does not affect the share of intermediates purchased in the local market (*INTSHA*). In the econometric analysis, the *AGE* coefficient turns out positive, as expected, but is highly insignificant in statistical terms.

The econometric model indicates that the firm's size (as measured by total investment *TINV*) is significantly related to the share of intermediates acquired in the local economy (*INTSHA*). In particular, the *TINV* coefficient is negative and statistically significant at the five per cent level, implying that larger firms tend to purchase a smaller proportion of their intermediates domestically. This finding offers support to the hypothesis that larger firms have better access and perhaps more leverage with overseas suppliers, or are part of a multinational system and therefore import more of their intermediates than a stand-alone entity.

The export orientation of individual firms as measured by the proportion of sales in the domestic market (*LOCSALE*) does not seem to affect the share of intermediates purchased locally (*INTSHA*). The coefficient on the *LOCSALE* variable is positive, as expected, but highly insignificant.

Lastly, the empirical results also indicate that the location of firms inside industrial parks or in rural areas does not affect the share of local intermediate inputs (*INTSHA*). Particularly, the coefficients on the location dummies employed to identify firms located in industrial parks (*DPARK*) and firms located in rural areas (*DRURAL*) are statistically insignificant.

In all, the statistical examination of the factors that are correlated with backward linkage formation in EPZs indicate that textile/garment firms, electric/electronics firms and commercial firms, as well as larger enterprises in the zones tend to purchase a smaller share of their intermediates in the local market. In comparison, service firms, relatively capital-intensive firms and firms majority-owned by local investors tend to purchase a larger share.<sup>24</sup>

## 5. Conclusions and policy implications

There are a number of lessons and policy implications that can be drawn from the review of the development and main characteristics of the Costa Rican EZP regime, as well as from the statistical analysis on backward linkage formation performed in this paper. The most significant ones are summarized in the following paragraphs.

With respect to lessons learned, the Costa Rican experience has showed that the EPZ regime can be an effective policy instrument to help in the diversification of the industrial

<sup>24</sup> As explained above the *MAJLOC* coefficient in the *INTSHA* preferred econometric model in the Appendix has a *p-value* of 10.1 per cent and therefore is just marginally insignificant.

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composition of the host nation's exports. In 1989, exports of coffee, bananas, sugar and beef, the so-called "traditional" exports, comprised almost 40 per cent of total Costa Rican exports. By 2001, these products represented just about 15 per cent of that total, making the Costa Rican economy much less vulnerable to the dramatic price changes that affect these products every so often. EPZ exports, which by law have to be non-traditional products, represented less than 8 per cent of total Costa Rican exports in 1989, but almost 47 per cent in 2001.

In addition, the EPZs in Costa Rica have also been an important policy instrument for the attraction of foreign investment. As we discussed, during most of the 1990s, a large share of foreign investment received by the Costa Rican economy has entered the country under the umbrella of the EPZ regime.

The experience of Costa Rica with EPZs has furthermore showed that in spite of fiscal and other incentives for EPZ firms to locate their operations in less developed areas, the regional impact of the EPZ regime in Costa Rica has been very limited. By and large EPZ firms have concentrated their activity in the central region of the country, not far from the capital San José, where they have access to better infrastructure, where they have greater availability of services of all kinds and where labourers are relatively more skilful and educated. Thus, the Costa Rican experience indicates, just as the experience in many other countries, that the role that EPZs can play as policy instruments to assist in the development of backward regions within a particular nation is quite limited.

EPZ firms in Costa Rica tended to hire relatively more young and uneducated women than other sectors in the Costa Rican economy. This is especially true in textile/garment and electric/electronic firms. Although alternative opportunities of formal employment for these female workers might be rather limited, it is also important to point out that the local authorities have to monitor the labour practices of EPZ firms to prevent the abuse of this segment of the labour force in the zones. The Costa Rican laws in this regard are relatively strict but more importantly enforced, something other EPZ nations should also accomplish, considering the obvious vulnerability of this segment of the labour force.

Regarding policy implications, several important recommendations for EPZ authorities around the world can be drawn from the analysis of this paper. First, since textile/garment and the electric/electronics firms were less likely to create backward linkages in the host economy, policy makers particularly concerned with the development of these linkages may opt to put special effort in promoting the establishment of firms that are neither textile/garment nor electric/electronic enterprises in their EPZs. This, of course, could signify additional costs and they would have to be weighed against the benefits of backward linkages in determining whether the host economy indeed obtains a net benefit from the operation of these enterprises. In any case, the important implication is that textile/garment and electric/electronic firms in the EPZs may be less prone to forge linkages with the domestic economy than other industrial sectors.

EPZ regulators may also seek to prefer relatively capital-intensive operations in the zones since these activities have a higher propensity to forge linkages with domestic suppliers of intermediate inputs. Furthermore, the promotion of service firms in EPZs is desirable from a host nation perspective. Not only do these enterprises buy a large share of their intermediates in the domestic market, but also hire a much larger proportion of skilled and educated workers. The increasing importance of services industries like back-office support, call centres, software production and data processing offer an interesting opportunity for many EPZ nations. Lastly, the empirical results in this paper suggest that host nations should not necessarily preclude or discriminate against the participation of local investment within the boundaries of the zones, for domestic participation may

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improve the likelihood of positive welfare effects from EPZ operations through the creation of backward linkages.

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## Appendix A

### The econometric model and results

#### *Estimation issues*

The econometric model employed in this paper to examine backward linkage formation in EPZs can be formally expressed in the following way:

$$y_i = \beta' x_i + \varepsilon_i \quad (\text{A.1})$$

where  $y_i$  is the  $i^{\text{th}}$  firm's measure of backward linkages in the host economy,  $\beta$  is a vector of parameters to be estimated,  $x_i$  is the  $i^{\text{th}}$  firm's vector of independent industry-level and firm-specific characteristics, and  $\varepsilon_i$  is a well-behaved error term.

In general, the model in (A.1) can be estimated using standard Ordinary Least Squares (OLS) techniques. However, when the dependent variable is a limited (censored) variable, OLS estimates are biased and inconsistent. A variable is censored if it is observed only when it takes values within a certain range. Suppose, for instance, that a particular variable of interest  $y^*$  has a normal distribution. Furthermore, suppose that the values of  $y^*$  smaller than a certain limit  $c_1$  are recorded as if they were at the limit, that the values greater than that limit but smaller than a second limit  $c_2$  are recorded as such, and that the values greater than the second limit  $c_2$  are recorded as if they were at that second limit. In particular, denoting the recorded (observed) variable by  $y$ , for  $y^* \leq c_1$ , the value of  $y$  equals  $c_1$ , for  $c_1 < y^* < c_2$ , the value of  $y$  equals  $y^*$ , while for  $y^* \geq c_2$ , the value of  $y$  equals  $c_2$ . The resulting sample composed of the observed values of  $y$  is said to be left-censored at  $c_1$  and right-censored at  $c_2$ .

The dependent variable employed in this paper is a censored dependent variable. In particular, being shares, these variables can only take values between zero and one. To estimate the coefficients of the model when the dependent variable is censored, a TOBIT procedure is employed.<sup>25</sup> The model underlying a TOBIT model left-censored at zero and right-censored at one can be formally expressed as:

$$\begin{aligned} y_i^* &= \beta' x_i + \varepsilon_i \\ y_i &= 0 \quad \text{if } y_i^* \leq 0 \\ y_i &= y_i^* \quad \text{if } 0 < y_i^* < 1 \\ y_i &= 1 \quad \text{if } y_i^* \geq 1 \end{aligned} \quad (\text{A.2})$$

where  $y_i$  is the observed variable, and  $y_i^*$  is a latent variable observed only when the value of  $\beta' x_i + \varepsilon_i$  is larger than zero or smaller than one.

<sup>25</sup> For further discussion of the problems associated with limited depended variable models, as well as of the methods available for their estimation, see Maddala (1996, Chapter 6) and Green (1993, Chapter 22).

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TOBIT models are estimated using maximum likelihood techniques. In particular, assuming that the latent variable  $y^*$  has a normal distribution with conditional mean  $\beta'x$  and standard deviation  $\sigma$ , the likelihood function of the above TOBIT model is given by:

$$L(\beta, \sigma|y) = \prod_{y_i=0} \Phi\left(\frac{-\beta'x}{\sigma}\right) \prod_{0 < y_i < 1} \frac{1}{\sigma} \phi\left(\frac{y_i - \beta'x}{\sigma}\right) \prod_{y_i=1} \left[1 - \Phi\left(\frac{1 - \beta'x}{\sigma}\right)\right] \quad (\text{A.3})$$

where  $\phi(\cdot)$  and  $\Phi(\cdot)$  are, respectively, the probability density function and the cumulative density function of the standard normal distribution.<sup>26</sup>

### Statistical results

Table A.1 contains the econometric results for purchases of intermediate inputs in the local market as a share of total intermediates inputs used (*INTSHA*).<sup>27</sup> Column I in this Table shows the results of a base model when the industry dummies (*DTEXT*, *DELEC*, *DCOME*, and *DSERV*) and the firm's capital intensity (*CAPINT*) are used as explanatory variables. The remaining columns show the results after dropping some of the statistically insignificant variables from the base model and adding other potential explanatory variables to the model.

The model in Column V of Table A.1 (i.e., the shaded column) appears to provide the best explanation for the share of intermediate inputs procured locally by individual firms (*INTSHA*). Particularly, with the exception of the *MAJLOC* variable, which is insignificant just marginally, all the other independent variables included in this TOBIT model are statistically significant at the 5 per cent level or higher. Furthermore, the overall significance of this model, as indicated by its LLR statistic is among the highest in the table.

<sup>26</sup> The maximization of the likelihood functions is achieved following a Newton-Raphson algorithm, which according to Green (1993, p. 347) is a method very well suited for maximum likelihood estimation.

<sup>27</sup> The figures in parentheses in Table A.1 are the coefficient's pseudo-maximum likelihood standard errors (also known as Hubert/White standard errors). These errors are robust to certain misspecifications of the underlying distribution of the dependent variable assumed herein to be normal. For further details on this, see Green (1993, p. 574) and Quantitative Micro Software (1997, p. 465).



**Table A1. TOBIT results for the share of intermediates inputs acquired in the local market (INTSHA)**

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
CONSTANT	0.406 *** (0.058)	0.390 *** (0.059)	0.370 *** (0.078)	0.405 *** (0.062)	0.395 *** (0.060)	0.392 *** (0.061)	0.441 *** (0.074)	0.430 *** (0.087)
DTEXT	-0.245 *** (0.058)	-0.228 *** (0.060)	-0.233 *** (0.062)	-0.244 *** (0.062)	-0.214 *** (0.059)	-0.217 *** (0.060)	-0.186 *** (0.070)	-0.210 *** (0.059)
DELEC	-0.159 *** (0.067)	-0.151 ** (0.067)	-0.150 ** (0.068)	-0.158 ** (0.069)	-0.133 ** (0.068)	-0.139 ** (0.069)	-0.124 ** (0.070)	-0.120 * (0.073)
DSERV	0.555 *** (0.086)	0.563 *** (0.086)	0.571 *** (0.088)	0.554 *** (0.086)	0.565 *** (0.086)	0.569 *** (0.087)	0.588 *** (0.092)	0.579 *** (0.090)
DCOME	-0.320 *** (0.057)	-0.325 *** (0.060)	-0.319 *** (0.060)	-0.321 *** (0.058)	-0.330 *** (0.060)	-0.329 *** (0.063)	-0.310 *** (0.069)	-0.319 *** (0.066)
CAPINT	0.013 *** (0.005)	0.013 *** (0.005)	0.013 *** (0.005)	0.013 *** (0.005)	0.015 *** (0.005)	0.015 *** (0.005)	0.014 *** (0.005)	0.014 *** (0.005)
MAJLOC		0.107 * (0.084)	0.108 (0.085)		0.105 (0.082)	0.106 (0.083)	0.116 * (0.085)	0.110 * (0.085)
AGE			0.004 (0.010)					
LOCPART				0.007 (0.075)				
TINV					-0.00004 ** (0.00002)	-0.00004 ** (0.00002)	-0.00005 ** (0.00003)	-0.00004 ** (0.00002)
LOCSALE						0.148 (0.368)		
DPARK							-0.068 (0.081)	
DRURAL								0.046 (0.091)
R <sup>2</sup>	0.51	0.52	0.52	0.51	0.52	0.51	0.53	0.53
R <sup>2</sup> (Adj.)	0.45	0.45	0.44	0.44	0.45	0.43	0.45	0.44
Sigma	0.2197	0.2174	0.2172	0.2197	0.2160	0.2195	0.2147	0.2154
LLR	47.02 ***	48.51 ***	48.68 ***	47.03 ***	49.33 ***	46.75 ***	50.18 ***	49.66 ***
Chi-Squared	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Censored	2	2	2	2	2	2	2	2
Uncensored	60	60	60	60	60	58	60	60

Notes: Pseudo-maximum likelihood standard errors in parentheses

\*\*\* denotes significance 1 per cent or higher, \*\* significance of 5 per cent or higher and \* significance of 10 per cent or higher

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## References

- Basile, A. and Germidis, D.(1984).*Investing in Export Processing Zones*. Paris: OECD.
- Blomström, M., and A. Kokko (1997). *How Foreign Investment Affects Host Countries*. Policy Research Working Paper No. 1745, The World Bank.
- Caves, R. E. (1996). *Multinational Enterprises and Economic Development*. New York: Cambridge University Press.
- Cenpro (1996). *Principales Resultados del Régimen de Zona Franca.*” San José: Departamento de Estudios Económicos.
- Cepal (1996). *México: La Industria Maquiladora. Chile: Naciones Unidas*.
- Chacón, Francisco (2000). *Comercio Internacional de los textiles y el vestido: Reestructuración global de las fuentes de oferta de EE.UU. durante la década de los años noventa, Integración y Comercio*, 4, 18-52.
- Cinde/Procomer (2001). *Condiciones del Mercado Laboral para los Sectores de Alta Tecnología en Costa Rica: Electrónica, eléctrica y dispositivos médicos. Convenio Cinde-Procomer. San José, Costa Rica: Gerencia de Estudios Económicos de Procomer*.
- Cohen (1973). *Comparative Behavior of Foreign and Domestic Export Firms in a Developing Economy, Review of Economics and Statistics*, 55, 190-7.
- Curimjee, A. (1990). *Linkages in Mauritius*. In R. L. Bolin (ed.), *Linking the Export Processing Zone to Local Industry*, 109-114. Arizona: The Flagstaff Institute.
- Din, M. (1994). *Export Processing Zones and Backward Linkages, Journal of Development Economics*, 43, 369-85.
- Dunning, J. (1993). *Multinational Enterprises and the Global Economy*. Great Britain: Addison-Wesley.
- Gitli, E. (1997). *La Industria de la Maquila en Centroamérica. San José, Costa Rica: Oficina Internacional del Trabajo*.
- Green, William (1993). *Econometric Analysis*. New York: Macmillan.
- Grupo Interinstitucional de Inversión Extranjera Directa (2003). *Informe Trimestral Sobre los Flujos de Inversión Extranjera Directa en Costa Rica: 1997-2003*. San José, Costa Rica: Gerencia de Estudios Económicos de Procomer.
- Halbach, A. (1989). *Multinational Enterprises and Subcontracting in the Third World; A Study of Inter-industrial Linkages*. Working Paper No. 58, International Labour Office.
- International Labour Office (2002). *Yearbook of Labour Statistics 2002*. Geneva: ILO.
- ILO/UNCTC (1988). *Economic and Social Effects of Multinational Enterprises in Export Processing Zones*. Geneva: International Labour Organization.

- 
- Jenkins, M., Esquivel, G., and Felipe Larráin (2001). *Export Processing Zones in Central America*. In Felipe Larraín (Ed.), *Economic Development in Central America, Vol I: Growth and Internationalization, 197-250*. Boston: The John F. Kennedy School of Government, Harvard University.
- Kreye, O. et al. (1987). *Export Processing Zones in Developing Countries: Results from a New Survey*, International Labour Organization Working Paper No. 43. Geneva: ILO.
- Kumar, N. (1987). *Performance of Foreign and Domestic Firms in Export Processing Zones*, *World Development*, 15 (10/11), 1309-19.
- Larraín, F., López-Calva, L.F., and Andrés Rodríguez-Clare (2001). *Intel: A Case Study of Foreign Direct Investment in Central America*. In Felipe Larraín (Ed.), *Economic Development in Central America, Vol I: Growth and Internationalization, 197-250*. Boston: The John F. Kennedy School of Government, Harvard University.
- Maddala, G. S. (1996). *Limited Dependent and Qualitative Variables in Econometrics*. New York: Cambridge University Press.
- McAleese, D., and McDonald, D. (1978). *Employment Growth and the Development of Linkages in Foreign-Owned and Domestic Manufacturing Enterprises*, *Oxford Bulletin of Economics and Statistics*, 40, 321-39.
- Procomer (1998). *Estudio sobre el Régimen de Zonas Francas en Costa Rica (versión preliminar)*. San José, Costa Rica: Gerencia de Estudios Económicos, Procomer.
- Procomer (2002a). *Zonas Francas en Costa Rica: Compendio Estadístico*. San José, Costa Rica: Gerencia de Estudios Económicos, Procomer.
- Procomer (2002b). *Encuesta de Empleo al Sector Exportador en Costa Rica: Resultados Preliminares*. San José, Costa Rica: Gerencia de Estudios Económicos, Procomer.
- Quantitative Micro Software (1997). *Eviews 3: User's Guide*. Irvine, California: Quantitative Micro Software.
- Reuber et al. (1973). *Private Foreign Investment in Development*. Oxford: Clarendon Press.
- Smith, S. M., and D. L. Barkley (1991). *Local Input Linkages of Rural High-Technology Manufacturers*, *Land Economics*, 67, 472-83.
- Spar, Deborah (1998). *Attracting High Technology Investment: Intel's Costa Rican Plant*. Foreign Investment Advisory Service Occasional Paper 11. Washington D.C.: The World Bank.
- UNCTAD (1993). *Export Processing Zones: Role of Foreign Direct Investment and Development Impact*. Geneva: United Nations Conference on Trade and Development.
- UNCTC (1985). *Export Processing Free Zones in Developing Countries: Implications for Trade and Industrialization Policies*. Geneva: United Nations Conference on Trade and Development
- UNIDO (1995). *Export Processing Zones: Principles and Practice*. Vienna: United Nations Industrial Development Organization.
- United Nations (1993). *System of National Accounts*. United Nations: New York

- 
- USITC (1998). *Annual Statistical Report on U.S. Imports of Textiles and Apparel: 1997.* Washington, DC.: USITC.
- Warr, P. (1987). *Export Promotion via Industrial Enclaves: The Philippines' Bataan Export Processing Zone*, *The Journal of Development Studies*, 220-41.
- Warr, P. (1990). *Export Processing Zones*. In C. Milner (ed.), *Export Promotion Strategies: Evidence from Developing Countries*, 130-61. New York: New York University Press.
- Wei, G. (1993). *Export Processing Zones, Multinational Firms, and Economic System Transformation* Ph.D. Dissertation, University of Pennsylvania.
- Willmore, L. (1995). *Export Processing Zones in the Dominican Republic: A Comment of Kaplinsky*, *World Development*, 23, 529-35.
- Wijewardane, N. (1990). *Linkages in Sri Lanka*. In R. L. Bolin (ed.), *Linking the Export Processing Zone to Local Industry*, 155-60. Arizona: The Flagstaff Institute.
- World Bank (1992). *Export Processing Zones*. Washington: The World Bank.