International
Labour
Office
Geneva

Employment Sector
Employment Working Paper No. 4

2008

Offshoring and employment in the developing world: The case of Costa Rica

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Offshoring and employment in the developing world : the case of Costa Rica / Christoph Ernst, Diego Sanchez-Ancochea ; International Labour Office. - Geneva: ILO, 2008
1 v. (Employment working paper ; no.4)

ISBN 978-92-2-121259-1 (print) ; ISBN 978-92-2-121260-7 (web pdf)
ISSN 1999-2939 (Print) ; ISSN 1999-2947 (web pdf)

International Labour Office

employment creation / outsourcing / manufacturing / Costa Rica

13.01.3

ILO Cataloguing in Publication Data

Abstract:

This paper evaluates the impact of offshoring activities, particularly in the manufacturing sector, in the creation of quality employment through a detailed analysis of the Costa Rican experience. This country constitutes a particular interesting case study. The country began participating in the global apparel commodity chain in the early 1980s, when the Reagan administration introduced the Caribbean Basin Initiative. During the 1990s, Costa Rica adopted a selective policy of promoting high tech foreign direct investment, and succeeded in attracting Intel and other large multinational corporations.

Through a detailed analysis of the direct and indirect effects of offshoring on the quantity and quality of employment, we make two central arguments. First of all, foreign investment in offshoring activities in Costa Rica has contributed to the expansion of skilled, well paid jobs, particularly since the arrival of Intel and other high tech companies. Secondly, offshoring activities have created some spillovers into other areas of the economy. Nevertheless, offshoring activities have remained relatively marginal in the overall economy, even in the manufacturing sector. Offshoring activities are characterized by higher productivity, but create just a small number of direct and indirect jobs. Building new linkages between offshoring production and the rest of the economy and expanding the technological capabilities of small and medium firms have become an urgent but difficult challenge for the Costa Rican economy.

Printed in Switzerland

Preface

The primary goal of the ILO is to achieve full and productive employment and decent work for all, including women and young people, a goal which has now been widely adopted by the international community. Working towards this goal is the fundamental aim of the ILO.

In order to support member States and the social partners to reach the goal, the ILO pursues a Decent Work Agenda which comprises four interrelated areas: Respect for fundamental worker's rights and international labour standards, employment promotion, social protection and social dialogue. Explanations of this integrated approach and related challenges are contained in a number of key documents: in those explaining and elaborating the concept of decent work, [1] in the Employment Policy Convention, 1964 (No. 122), [2] and in the Global Employment Agenda.

The Global Employment Agenda was developed by the ILO through tripartite consensus of its Governing Body's Economic and Social Policy Committee. Since its adoption in 2003 it has been further articulated and made more operational and today it constitutes the basic framework through which the ILO pursues the objective of placing employment at the centre of economic and social policies.[3]

The Employment Sector is fully engaged in the implementation of the Global Employment Agenda, and is doing so through a large range of technical support and capacity building activities, advisory services and policy research. As part of its research and publications programme, the Employment Sector promotes knowledge-generation around key policy issues and topics conforming to the core elements of the Global Employment Agenda. The Sector's publications consist of books, monographs, working papers, employment reports and policy briefs.[4]

The *Employment Working Papers* series is designed to disseminate the main findings of research initiatives undertaken by the various departments and programmes of the Sector. The working papers are intended to encourage exchange of ideas and to stimulate debate. The views expressed are those of the author(s) and do not necessarily represent those of the ILO.

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[1] See the successive Reports of the Director-General to the International Labour Conference: *Decent work* (1999); *Reducing the decent work deficit: A global challenge* (2001); *Working out of poverty* (2003).

[2] In 1964, ILO Members adopted Convention No. 122 on employment policy which states that "With a view to stimulating economic growth and development, raising levels of living, meeting manpower requirements and overcoming unemployment and underemployment, each Member shall declare and pursue, as a major goal, an active policy designed to promote full, productive and freely chosen employment". To date, 97 member States have ratified this Convention.

[3] See www.ilo.org/gea. And in particular: *Implementing the Global Employment Agenda : Employment Strategies in support of Decent Work*, "Vision Document", ILO, 2006.

[4] See www.ilo.org/employment

Foreword

A key characteristic of globalization has been the steady expansion of Multinational Enterprises (MNEs) and their related trade and investment activities. The increased potential of trade and the rising importance of MNEs in the world economy have led to a dramatic alteration in the structure of production. Trade liberalization has generated increased trade in final goods, but even more so in intermediate goods. Technological changes have increased the "divisibility" of the production process into ever more discrete stages. The reduction of transport and communication costs has been a further catalyst in this trend. It could, therefore, be said that trade does not occur primarily in final goods, but rather in "tasks" between firms or within firms. The result has been profound change in the way goods are produced and in the international division of labour.

The MNEs of the 1970's were integrated horizontally. Whereas they relied on hierarchical forms of control through which they could manage and control the economic and social aspects of production, many began to break up the manufacturing process into distinct segments and outsource particular segments, or send them offshore. Where fragmentation of production is technically possible, MNEs have tended to retain core activities in which they were able to compete and adopt a variety of outsourcing (buying intermediate goods world-wide) and offshoring (productive activities world-wide) arrangements. Production processes are allocated to plants around the world, according to efficiency criteria. Factor costs, especially labour as it is less mobile, are crucial in this regard. Rather than substitutes, international trade and FDI are likely to be complementary elements of a global strategy to access lower-cost inputs, gain market share and supply domestic and foreign markets.

Offshoring, and thus the relocation of production in its different stages, has led to changes in employment, which has raised concerns, especially in industrialized countries, which have seen their jobs re-allocated to lower-cost producers in developing countries. However, empirical research has shown that the job losses are rather limited in industrialized countries, which are specialized more in upper stream and higher productive activities. In the developing world, many countries have been beneficiaries of offshoring. Nevertheless, not all countries were able to make effective use of this new opportunity for their general industrial and economic development. This paper is part of a world-wide research program on offshoring and employment in developing countries. The main question of the research programme is: What are the circumstances that will make participation in global production networks and thus offshoring beneficial from an employment point of view?

This paper evaluates the impact of offshoring activities, particularly in the manufacturing sector, in the creation of quality employment through a detailed analysis of the Costa Rican experience. This country constitutes a particular interesting case study. The country began participating in the global apparel commodity chain in the early 1980s, when the Reagan administration introduced the Caribbean Basin Initiative. During the 1990s, Costa Rica adopted a selective policy of promoting high tech foreign direct investment, and succeeded in attracting Intel and other large multinational corporations.

Through a detailed analysis of the direct and indirect effects of offshoring on the quantity and quality of employment, the paper makes two central arguments. First of all, foreign investment in offshoring activities in Costa Rica has contributed to the expansion of skilled, well paying jobs, particularly since the arrival of Intel and other high tech companies. Secondly, while offshoring activities have created some spillovers into other areas of the economy, they have nevertheless, remained relatively marginal in the overall economy, even in the manufacturing sector. Offshoring activities are characterized by higher productivity, but create only a small number of direct and indirect jobs. Building new linkages between offshoring production and the rest of the economy and expanding the

technological capabilities of small and medium firms have become an urgent but difficult challenge for the Costa Rican economy.

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Abbreviations

BCCR	Central Bank of Costa Rica
Cinde	Costa Rican Investment Board
COMTRADE	United Nations Commodity Trade Statistics Database
ECLAC	Economic Commission for Latin America & the Caribbean (United Nations)
EPZ	Export processing zone
FDI	Foreign direct investment
FTZ	Free tax zone
IPR	Inward processing regime
ISIC	Int'l standard industrial classification
MNE	Multinational enterprise
OIT	Organización Internacional del Trabajo (ILO)
Procomer	Costa Rican Foreign Trade Corporation
SAM	Social accounting matrix
SITC	Standard International Trade Classification
TNC	Transnational corporation
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization
USD	Dollar of the United States

1. Introduction[5]

The expansion of offshoring – i.e. the relocation abroad of both material and service tasks, which are part of a larger process of production – is one of the defining characteristics of the current stage of globalization. Increasing competition between transnational corporations (TNCs) in oligopolistic markets, together with technological innovations in transport and communications and a reduction in tariffs, have all contributed to the relocation abroad of material and service tasks, which are part of a larger process of production (Gereffi, 2005; Kaplinsky, 2005, Milberg, 2004).[6]

Many observers in the academic and popular press believe that offshoring opens up new opportunities for the creation of skilled employment in the developing world. According to Moran (2007, p. 7), "the transformative impact of MNE [offshoring] manufacturing investment – on the composition of production, and on the resulting structure of employment – can be impressive". Offshoring activities are increasingly located in medium and high tech activities; they pay increasingly high wages and create linkages and spillovers (Moran, 2006). They have also contributed to the reconciliation of the mobility of capital with the relative lack of labour mobility between developing and developed countries (Beal, 2007). One of the best known authors within the popular business press, Thomas Friedman, goes even further. In his view, offshoring is flattening the world and giving millions of people in the developing world a new chance to compete in the global economy and secure well paid employment (Friedman, 2005).

Is this true? What overall employment results have the countries derived from offshoring? Can we expect offshoring to become an engine of employment growth in developing countries? Can it help countries to create high skill jobs and climb the technological ladder? This paper addresses these questions through a case study of the Costa Rican experience. Together with Mexico and the Dominican Republic, Costa Rica was one of the first Latin American countries to enter into the assembly of apparel for exports into the US market. Starting in the early 1990s and accelerating with the arrival of Intel in the country in 1997, Costa Rica also began assembling high tech products like semiconductors and medical equipment. The country soon became a good example of the benefits of a targeted policy of foreign direct investment and an illustration of the potential benefits of investing in health and education. A background paper for UNDP's 2001 Human Development Report argued that "over the last decade, Costa Rica has experienced a tremendous leap forward in the development of a technology and knowledge-driven economy" (Rodriguez Clare, 2001, 1), insisting on the importance of advanced offshoring in the process of technological innovation.

This paper explores the impact of offshoring in Costa Rica's employment creation and makes two basic claims. First of all, Costa Rica has succeeded in attracting offshoring manufacturing activities with increasing technological sophistication, which have created new jobs for skilled workers. Offshoring activities have gradually improved in technological content and created some spillovers into the rest of the economy. Secondly, offshoring activities have remained relatively marginal in the overall economy, and could not avoid the overall decline of manufacturing employment in total employment.

[5] The authors would like to thank Jose Antonio Cordero, Kevin Gallagher, José Manuel Salazar and Ajit Ghose for their helpful comments on a previous version of this paper. The standard disclaimer applies.

[6] The sociological and economic literature has discussed this growing trade in intermediate goods and the relocation of services under different, but related, theories and concepts. In this paper we follow the literature on foreign direct investment and use the term "outsourcing". For a detailed review of theories, definitions and impacts of this process, see Bottini, Ernst and Lübker (2008).

Offshoring activities have higher productivity but create a decreasing number of direct jobs and an insufficient number of indirect jobs. Building new linkages between offshoring production and the rest of the economy, and expanding the technological capabilities of small and medium firms, have become urgent challenges for the Costa Rican economy.

The paper is divided into four sections. Section 2 discusses the transformations that have taken place in the Costa Rican model since the early 1980s, concentrating on the dramatic change in its export structure. In this section we also explore the impact of offshoring on the development of new exports and the generation of new foreign exchange. Section 3 analyzes the direct contribution of offshoring to the quantity and quality of employment, relying primarily on data from some sub-sectors within the EPZs. We highlight the growth of productivity and the increasing technological content of offshoring activities, but also the slowdown in employment creation. Section 4 compares the evolution of offshoring with that of the rest of the economy in general and other manufacturing sectors in particular. We also highlight the limitations of offshoring in generating indirect employment through backward linkages. The paper concludes with a discussion of the main factors behind the impact of offshoring and identifying some challenges for the future.

2. Offshoring and the new economic model in the Costa Rican economy

Export promotion has been a primary goal of all Costa Rican Governments since the early 1980s. Export subsidies, together with trade liberalization and a sharp devaluation of the currency, become key policy instruments for the promotion of non-traditional primary and manufacturing exports to third markets. In the mid 1980s, the government also began promoting foreign investment in offshoring activities, first in apparel and later in more sophisticated products like medical equipment, electronics and semiconductors.

Two trade regimes were particularly useful for this task: the export processing zones (EPZs) and the inward processing regime (IPR), which, in Spanish, was called the Régimen de Admisión Temporal or de Perfeccionamiento Activo. The IPR, first launched in 1972 and later reformed in 1984, was geared towards firms that exported all their production to non-regional markets. It allowed for the duty-free import of all goods that were to be re-exported during the following year, after being stored, repaired or assembled in Costa Rica (Arriagada, 1992). The regime also established the duty-free importation of the capital goods used by exporting firms.

The EPZ regime was created in 1981 with Law 6695 for the Processing Zones for Export and Industrial Parks (Ley de Zonas Procesadoras de Exportación y Parques Industriales). The Law set up a public corporation to create and promote new export zones located in underdeveloped regions. Law 6695 established the following incentives for firms located in the FTZs (Arriagada, 1992): partial exemption of local taxes for five years (the exemption would go down from 80 per cent in the first year to 15 per cent in the last); preferential loans to national firms that generated at least 35 per cent of value added domestically, and reductions in the rents for the buildings for the first two years.

Costa Rica's policy shift contributed to a modification of the country's export structure, which took place in two distinct stages; from 1984 to 1996 and from 1996 to the present day. Between 1984 and 1996, total exports increased at an annual rate of growth of 10.6 per cent, increasing from US$1,124 million to US$3,758 million. The initial expansion was primarily driven by non-traditional exports produced outside the two special regimes, which multiplied by four in the period 1984-1996 and accounted for more than 40 per cent of total exports in the latter year. Export growth was driven during this first stage by export subsidies organized through export contracts ('contrato de exportacion') created

in 1984. Export contracts, which were signed by the state and each individual firm, incorporated all the incentives that a firm received for exporting to third markets. While those incentives had existed since the early 1970s, the contract grouped them together, thus increasing the transparency of the system. The tax-based incentives for exports (Certificados de Abono Tributario or CATs) were the most important component of this export promotion package. They consisted of a payment of 15 to 25 per cent of the free-of-board value of exports that could be used to reduce the company's tax payments. The CATs, which could be used for 42 months from the time that the foreign currency from exports was received, could also be sold to other companies. As such, a CAT resulted in an immediate increase of more than 15 per cent in the profit margin of any export.

The export structure changed dramatically during this period, moving from traditional primary goods to non-traditional primary goods. Costa Rica left behind its traditional specialization in coffee and bananas, which had dominated its economy since independence, and began exporting goods with larger demand potential. In 1982, coffee and bananas accounted for 56 per cent of total exports, which were dominated by traditional primary exports, along with a few manufactured products destined for the Central American market. In 1995, the share of the two main commodities had decreased to just 40 per cent, and new exports, such as tropical fruit, flowers and jewellery assembly to third markets, had appeared on the list for the first time.

Since 1996, the country has continued its rapid expansion into the global economy, with exports growing at an annual average rate of 8.1 per cent between 1996 and 2006, surpassing US$ 8.2 billion in the latter year. Contrary to most other countries in Latin America, the export expansion has been accompanied by a dramatic improvement in its technological content, something clearly reflected in table 2.1. In 2005, high technology exports accounted for 29.0 per cent of all exports of goods from Costa Rica, as compared to only 4.1 per cent in the whole region excluding Mexico.

Table 2.1: Exports of goods by technological content in Costa Rica and Latin America (without Mexico), as a percentage of the total

	1987		1990		1995		2000		2005	
	CR	LA	CR	LA	CR	LA	CR	LA	CR	LA
Primary goods	**68.4**	**50,7**	**57.6**	**49.7**	**58.3**	**39.1**	**25.9**	**41.1**	**23.0**	**47.4**
Manuf. based on natural resources	8.7	24.8	11.4	24.5	15.6	30.7	13.7	27.6	14.0	22.9
Manuf. low technology	12.1	9.7	12.8	10.3	10.8	11.1	16.8	8.6	14.4	7.5
Manuf. medium technology	5.2	11.7	6.1	12.2	7.1	14.8	16.6	14.0	18.7	15.8
Manuf. high technology	3.2	2.0	3.2	2.0	2.9	2.0	26.6	6.0	29.0	4.1
Other transactions	**2.4**	**1.1**	**9.0**	**1.3**	**5.3**	**2.3**	**0.5**	**2.6**	**0.8**	**2.2**

Source: ECLAC (2007) Panorama de la inserción internacional de América Latina y el Caribe, 2006-2007.

The development of new manufacturing exports has improved Costa Rica's competitive position and boosted the dynamism of its exports. Ciarli and Giuliani (2005) evaluate the countries' performance using the Trade Competitiveness Analysis of Nations (TradeCAN). Between 1985 and 2000, Costa Rica's expanding exports were growing sectors in the global economy. In particular, 25 sectors, representing 56 per cent of exports in value, were "growing stars" i.e. sectors with a growing share in Costa Rica's exports, as well as in global trade. The key growing stars were medical equipment, semiconductors and related items, and various apparel products.

2.1 The role of offshoring in the creation of the new export structure

A more detailed look at Costa Rica's exports reveals the importance of offshoring activities in the new insertion of the country into the world economy. Table 2.2 classifies exports by industry for the period 2002-2005, and includes some of the largest sub-sectors at the four digit level. Between 2002 and 2005, machinery and transport equipment and other manufacturers jointly accounted for almost half of total exports. Their expansion was primarily the result of offshoring assembly activities. Three high tech offshoring activities accounted for more than a quarter of total exports in the most recent period: parts of accessory for machinery, electronic integrated circuits (both measuring the activities of various IT companies) and medical equipment. The assembly of apparel was also important.

Table 2.2. Accumulated exports, 2002-2005, Millions of US dollars and percentage of total following classification SITC rev3

SITC rev.3	Name of sector	X total	% total
	Total	23854,1	
0	Food and live animals	6995	29.32
2	Crude materials, inedible, except fuels	859,1	3.60
3	Mineral fuels, lubricants and related materials	117,7	0.49
5	Chemicals and related products, nes	1768,4	7.41
5429	*Medicaments, nes*	*755,3*	*3.17*
6	Manufactured goods, classified chiefly by material	2172,5	9.11
7	Machinery and transport equipment	7274,9	30.50
7599	*Parts and accessory for machinery…*	*3846,8*	*16.13*
7764	*Electronic integrated circuits…*	*1131,9*	*4.,75*
8	Miscellaneous manufactured articles	4280,3	17.94
84	*Articles of apparel and clothing accessories*	*1427,4*	*5.98*
8722	*Instruments and appliances used in medical…*	*1459,7*	*6.12*

Source: COMTRADE.

Note: nes = not elsewhere specified.

Various measurement tools (e.g. input-output, trade statistics, business surveys) have been used to identify which sectors in industrialized countries are highly involved in offshoring activities (see Bottini, Ernst, Lübker, 2007). The definition of offshoring sectors in developing countries is less complex. Firstly, these sectors generally benefit from high FDI inflow, or have stable contracts with global buyers. Secondly, they are characterized by a high import and export share in value added as production is for the international market. Third, offshoring activities often benefit from a special trade regime.

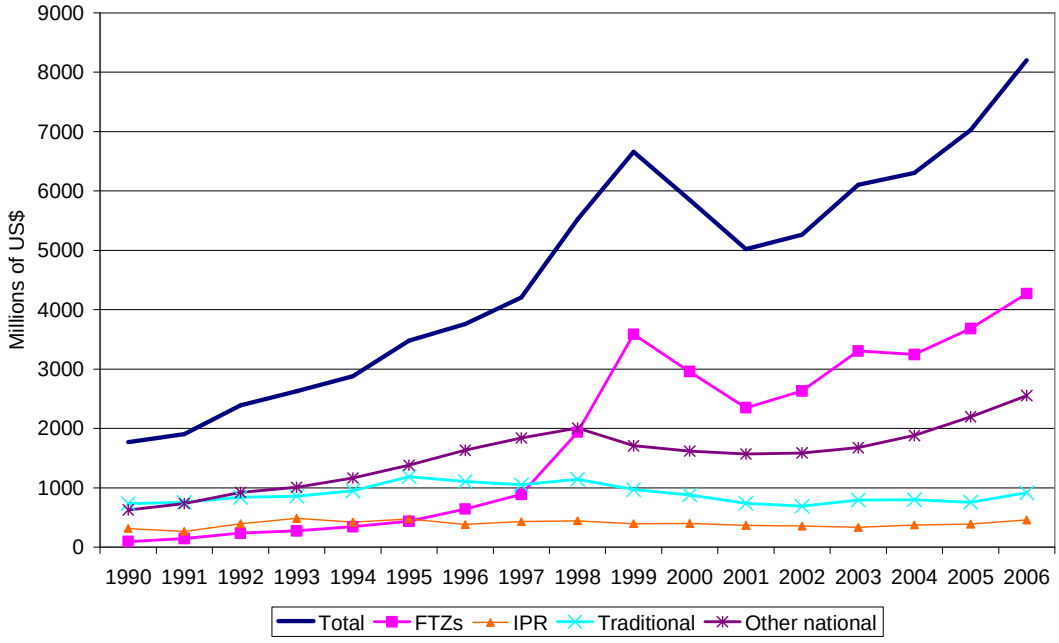
The majority of offshoring activities in Costa Rica benefit from special trade regimes and are located in EPZs and in the IPR, although not all productive activities under these regimes should be regarded as offshoring. In particular, and using the classification of the Costa Rican export promotion agency (PROCOMER), we assume that textiles, apparel, leather and shoes, machinery, electrical material and its parts, medical equipment and chemical and pharmaceutical products are all part of TNC-driven global production networks. Exports of these goods increased from US$697m in 1997 to US$2,859m in

2005.[7] These sectors are characterized by a high level of exports and imports (figure 2.1 and table 2.3 and 2.4) and a strong direct involvement of TNCs (figure 2.2).

Table 2.3 reflects the exports from the EPZs by sector for the period 1997-2005. The share of the four offshoring sectors in the total was between 75 per cent and 90 per cent for the whole period. While production of apparel products remained stagnant in absolute terms and decreased significantly in relative terms (from 38 per cent of exports from the EPZs in 1997 to just over eight per cent in 2005), machinery and medical equipment expanded rapidly.

Offshoring activities within the EPZs contributed to the expansion and diversification of exports. Between 1990 and 2006, exports from EPZs, which were dominated by offshoring, grew much faster than traditional and non-traditional ones (figure 2.1). They increased from just US$94m in 1990 to US$891m immediately before the arrival of Intel in 1996 and US$4,273m in 2006, more than 50 per cent of total exports. Meanwhile, traditional primary goods and goods benefiting from the IPR remained stagnant throughout the whole period.

Figure 2.1. Costa Rica. Exports by broad category, 1980-2006, Millions of US dollars



Source: Banco Central de Costa Rica (BCCR)

[7] Costa Rica has also expanded offshoring service operations in recent times. Service exports from the EPZs increased from $76m in 1997 to $172m in 2005.

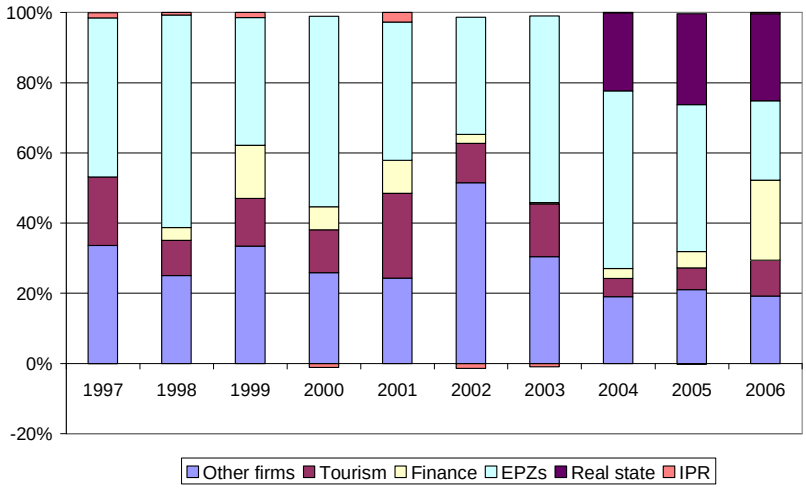
Table 2.3. Costa Rica. Exports from the export processing zones divided by offshoring and non-offshoring sectors, 1997-2005, Millions of US dollars and percentage of total

	1997		1998		1999		2000		2001		2002		2003		2004		2005	
		%		*%*		*%*		*%*		*%*		*%*		*%*		*%*		*%*
Machinery, electrical material and its parts	272	*30.4*	1.271	*64.7*	2.812	*77.6*	2.025	*67.6*	1.218	*51.1*	1.256	*47.1*	1.789	*53.8*	1.560	*48.1*	1.878	*50.8*
Textiles, apparel, leather and shoes	338	*37.9*	368	*18.7*	431	*11.9*	419	*14.0*	404	*17.0*	425	*15.9*	347	*10.4*	334	*10.3*	328	*8.9*
Medical equipment	67	*7.5*	84	*4.2*	107	*3.0*	217	*7.2*	330	*13.9*	412	*15.5*	529	*15.9*	541	*16.7*	585	*15.8*
Chemical and pharmaceutical products	20	*2.3*	30	*1.5*	31	*0.9*	30	*1.0*	40	*1.7*	39	*1.5*	51	*1.5*	68	*2.1*	68	*1.8*
Total offshoring	**697**	***78.1***	**1.753**	***89.2***	**3.381**	***93.3***	**2.691**	***89.8***	**1.991**	***83.6***	**2.132**	***80.0***	**2.717**	***81.7***	**2.503**	***77.2***	**2.859**	***77.3***
Services	76	*8.5*	59	*3.0*	27	*0.8*	76	*2.5*	106	*4.4*	128	*4.8*	143	*4.3*	147	*4.5*	172	*4.6*
Agro-industry	22	*2.5*	36	*1.8*	45	*1.3*	57	*1.9*	97	*4.1*	204	*7.6*	246	*7.4*	307	*9.5*	336	*9.1*
Plastics, rubber and its manufactures	5	*0.6*	9	*0.5*	55	*1.5*	66	*2.2*	67	*2.8*	81	*3.1*	93	*2.8*	139	*4.3*	163	*4.4*
Metal manufactures	4	*0.4*	18	*0.9*	23	*0.6*	29	*1.0*	33	*1.4*	30	*1.1*	34	*1.0*	49	*1.5*	57	*1.6*
Agriculture	0	*0.0*	0	*0.0*	0	*0.0*	3	*0.1*	18	*0.8*	21	*0.8*	27	*0.8*	25	*0.8*	23	*0.6*
Others	88	*9.9*	91	*4.6*	94	*2.6*	76	*2.5*	70	*2.9*	70	*2.6*	67	*2.0*	73	*2.3*	89	*2.4*
Total	**892**		**1.965**		**3.625**		**2.998**		**2.381**		**2.665**		**3.327**		**3.242**		**3.699**	

Source: PROCOMER.

The expansion of offshoring exports was made possible by the steady increase in foreign direct investment (FDI) into the EPZs. Between 1997 and 2006, EPZs received an average of US$281m per year. As reflected in figure 2.2, EPZs were responsible for a significant share of total FDI during this period, with a high of 61 per cent in 1998 (in the midst of Intel's initial expansion) and a low of 23 per cent in 2006.

Figure 2.2. Foreign Direct Investment by sector, 1997-2005, percentage of total



Source: BCCR (2007) Informe de la inversión extranjera directa, 2006.

The expansion of FDI and exports from outsourcing activities contributed to an increase in the foreign exchange available to import capital goods. In this way, offshoring relaxed the foreign exchange restriction that limits economic growth in small, open economies like Costa Rica (Sanchez-Ancochea, 2004), and help to finance the purchase of capital goods from abroad. This type of imports grew at an annual average rate of 8.3 per cent in current dollars, from just US$467m in 1990 to $1,680m in 2006.

The effect of offshoring on the foreign exchange constraint, however, should not be overestimated. A significant problem of offshoring activities in the Caribbean Basin is the limited value added (measured here as net exports) that they generate, a point we will discuss at length below. The two dominant sectors within offshoring activities (apparel, and machinery and electrical equipment) generated even less net exports than other sectors in the EPZs.[8] Net exports from machinery and electrical equipment were US$271m per year, just 17 per cent of total exports. Meanwhile, net exports in agriculture within the EPZs were equivalent to 96 per cent of total exports (table 2.4).

[8] Table 2.4 uses net exports to measure value added, which is somewhat problematic. For various reasons, the value of exports and imports from the EPZs is not totally credible. Companies manipulate transfer pricing for tax purposes, exaggerating the prices of imports in certain years. This measurement problem is evident when one considers the evolution of the balance of payments in Costa Rica. Total reserves are higher than expected, based on the balance of the current and financial accounts and the omissions have increased steadily in the last few years.

Table 2.4. Net exports by sector within the EPZs, 1997-2005, total in millions of US dollars and percentage of exports

	1997-2005	% exports
Machinery, electrical material and its parts	271,6	17.4
Chemical and pharmaceutical products	26,2	62.4
Textiles, apparel, leather and shoes	47,3	12.6
Medical equipment	190,1	59.6
Agro industry	134,0	89.3
Plastics, rubber and its manufactures	32,6	43.3
Metal manufactures	11,0	36.0
Agriculture	12,4	95.6
Services	1,3	1.2
Others	21,1	26.5
Total	**747,6**	**27.1**

Source: Own calculations, from Gamboa et al (2006).

2.2 Offshoring and employment: direct implications

As we have seen, offshoring activities increased significantly during the period of analysis. The following section will now explore the impact of offshoring activities on manufacturing employment, addressing some of the following questions. Has offshoring contributed to the improvement of the quantity and quality of employment (as measured by wages and productivity)? Has there been a shift towards higher skilled employment? To what extent is there a trade-off between employment creation and productivity growth in offshoring?

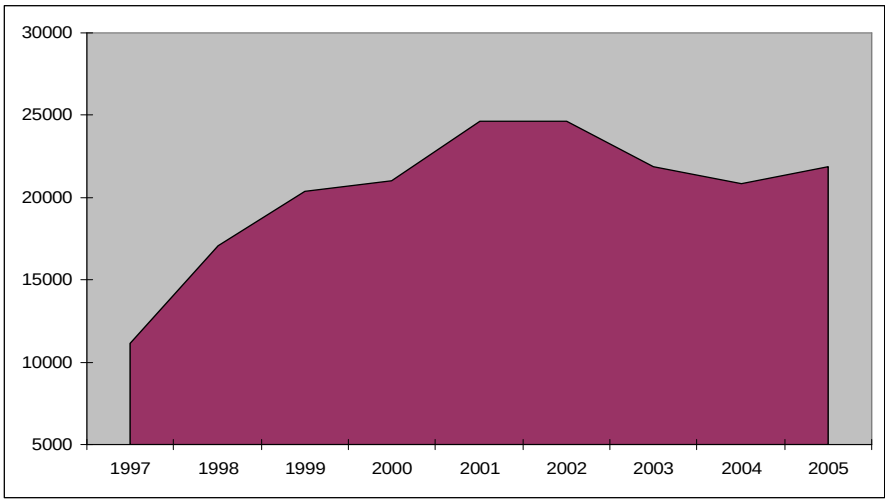
A. The evolution of offshoring employment by sector and skill

Job creation was one of the primary reasons behind the attraction of FDI in offshoring activities.[9] Between 1997 and 2005, manufacturing employment in offshoring within the EPZs increased by a solid average annual rate of 10.2 per cent.[10] Most of the job creation occurred in the early 1990s and was followed by a decline in employment during the early 2000s (figure 2.3). Offshoring employment recovered only quite recently.

[9] While EPZs still employs dominantly male workers, its share in total employment has declined recently. The share of male workers decreased from 63 per cent in 2004 to about 60 per cent in 2006, (ILO, 2007a).

[10] Procomer did not start collecting employment data by sector until 1997, which explains why we do not have earlier data. Unless otherwise indicated, our data only reflect manufacturing offshoring sectors,.

Figure 2.3: Evolution of employment in offshoring in EPZ, 1997-2005



Source: Own calculation based on Procomer data.

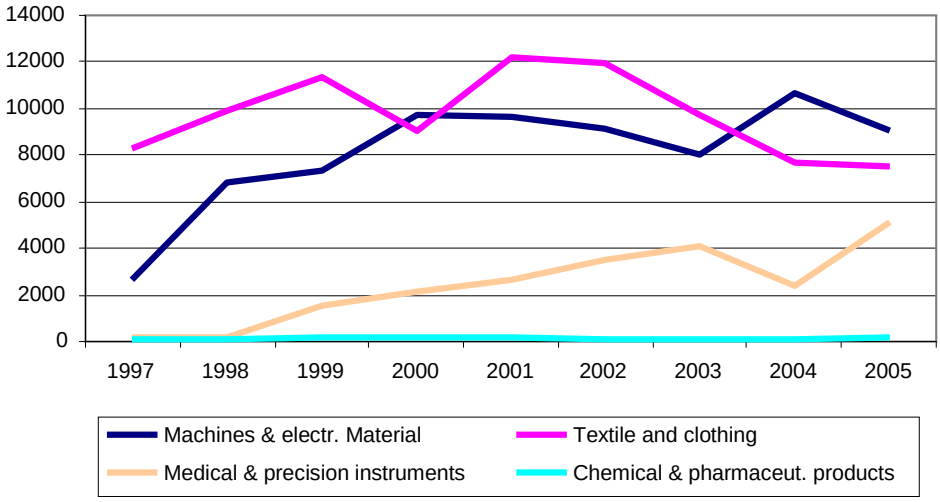
The growth of employment in electrical material and machinery is particularly important in explaining the initial expansion (figure 2.4). The arrival of Intel triggered a rapid expansion of new jobs in the sector. In less than three years, from 1997 to 1999, Intel created 2,217 new jobs, as well as accelerating investment in the sector (Larrain et al, 2001). The sector as a whole increased its share in total offshoring employment in the EPZs from 24 per cent in 1997 to 42 per cent in 2005. During the period under study, there was also a solid rise of employment in medical and precision instruments, which contributed 23 per cent of offshoring employment in 2005.

Textile and clothing, which was the main employment sector in 1997, experienced a less positive evolution. After a rise at the end of the 1990s, the sector declined sharply between 2002 and 2005, decreasing from 12,000 to less than 8,000 in 2005. In 2005, the sector was responsible for just 24 per cent of offshoring employment, down from 74 per cent in 1997. The chemical and pharmaceutical sector remained stagnant during the whole period and made a relatively minor contribution to the total.

Analyzing the evolution of employment within the IPR—the other regime with offshoring activities—is more complicated because of the absence of accurate data.[11] The information available from the BCCR and Procomer reveals a rapid reduction of its contribution to the economy. In terms of employment, offshoring activities within IPR declined from 8,800 workers in 2002 to just 4,500 in 2006. The dominance of textile and clothing within this special regime is the main factor behind this sharp reduction. Between 2002 and 2006, textile and clothing offshoring jobs in IPR declined from 7,100 to 3,600. Companies in other sectors decided to move to the EPZ regime, which is more generous in terms of income tax holidays and other incentives. Employment in the machinery and electrical material sector with the IPR regime, for example, decreased by almost 300 per cent between 2002 and 2006, dropping from 1,400 to just 500.

[11] All companies can use the IPR regime and there is no registry of how different companies use it every year. As a result, it is difficult to obtain disaggregated data on offshoring in this sector.

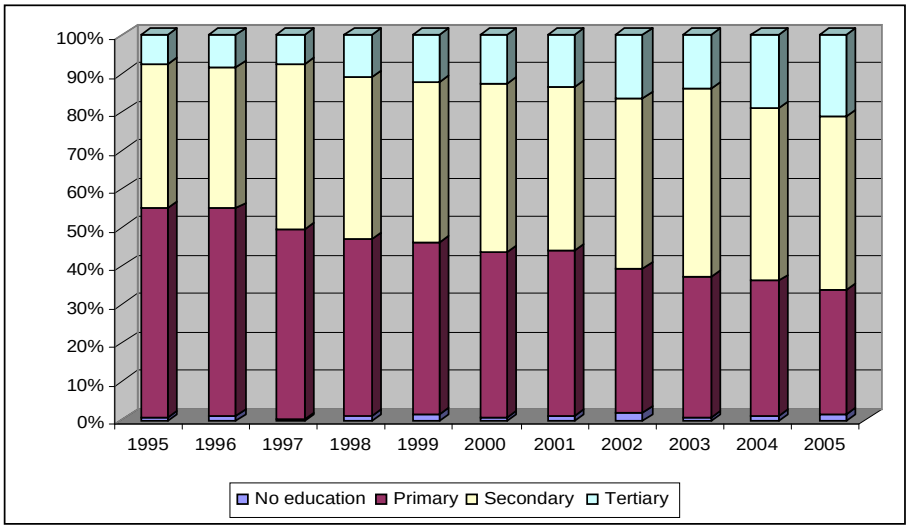
Figure 2.4: Evolution of employment within offshoring sectors in EPZ



Source: Own calculation based on Procomer data[12].

The shift in the composition of employment just described — with a move from apparel to machinery and electrical equipment — had a clear impact on the skill content of offshoring sectors in Costa Rica. Figure 2.5 presents the distribution of workers by skill level in offshoring activities, revealing the trend towards more highly educated workers. The share of workers with secondary education rose from 37 per cent in 1995 to 45 per cent in 2005 and those with tertiary education from seven to 21 per cent. In contrast, the share of workers with primary education declined from 54 to 32 per cent.

Figure 2.5: Evolution of the distribution of offshoring according to skill level



Source: Own calculation based on OIT-SIAL data, three and four digit level.

Note: The sectors are sectors dominated by offshoring activities.

[12] An analysis of data collected by CINDE, focusing exclusively on foreign companies, shows similar results.

B. The technological content of employment

The data from Procomer, discussed above, highlights the sectoral shifts in employment and the improvements in its skill composition. However, the data are too aggregated to provide us with enough information about the technological composition of offshoring activities. Particularly in the machinery and electrical machinery sector, we have sub-sectors with different technological content as defined by the OECD classification (OECD, 1997). To solve this problem, we use the UNIDO database at the four digit level and concentrate in twelve sub-sectors that provide a narrower definition of outsourcing and are described in table 2.5.

Table 2.5 Offshoring sectors based on a narrower definition, ISIC rev2, four digits

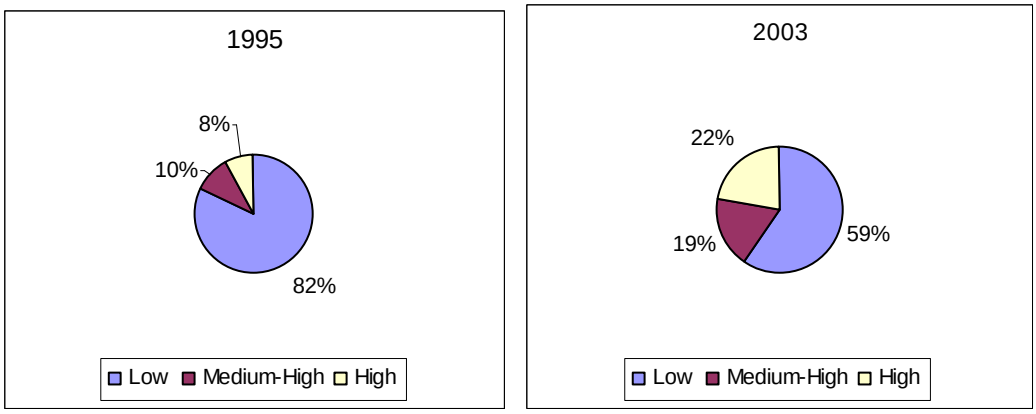
ISIC code	ISIC description
3212	Manufacture of made-up textile goods
3220	Manufacture of wearing apparel, except footwear
3231	Tanneries and leather finishing
3232	Fur dressing and dyeing industries
3233	Manufacture of leather products
3240	Manufacture of footwear
3522	Manufacture of drugs and medicines
3825	Manufacture of office, computing and accounting machinery
3831	Manufacture of electrical industrial machinery
3833	Manufacture of electrical appliances and houseware
3851	Manufacture of professional and scientific, and measurement goods
3852	Manufacture of photographic and optical goods

The results of our calculations based on the narrower definition of offshoring and the UNIDO database are summarized in figures 2.6(a) and 2.6(b). The share of employment in medium tech sectors increased from 10 per cent in 1995 to 19 per cent in 2003, while that of high tech sectors increased even faster from 8 per cent to 22 per cent. Yet the low tech sectors still provided a larger share of total employment in offshoring activities in 2003.

Between 1995 and 2003 (figures 2.6), employment rose in medium to high technological sectors (including electrical material) from 10 to 19 per cent and in high tech sectors from eight to 22 percent,[13] while in low technological sectors it declined from 82 per cent in 1995 to 59 per cent. Nevertheless, while the shift towards employment in high tech sectors is very significant, the shift towards higher skilled workers is less so. How can we explain this phenomenon?

[13] Using the broader definition of offshoring applied by Procomer, the trend is the same and the data are quite similar.

Figures 2.6(a) and 2.6(b). Share of employment according to technological level in offshoring sectors, 1995, 2003



Source: Own calculation based on UNIDO, INDSTAT 2007, rev.2.

Note: The classification by technological level is based on OECD, 1997. L: Low technology, M-L: medium-low technology, M-H: medium-high-technology, H: high-technology industries.

The main reason for this result is that many jobs located within sectors that are regarded as high tech by the OECD are rather standardised and require few skills. The example of Intel is illustrative, but hardly unique. The company has built wafer production facilities in countries like Ireland, whereas in Costa Rica it built only a testing and assembly chip factory, which demands far fewer highly trained workers. A comparison between high tech employment in Costa Rica and Denmark clarifies these differences even further. According to OIT-SAL data for Costa Rica, the share in electrical material was as follows: 16 per cent with primary education, 57 per cent with secondary and 27 per cent with tertiary education.[14] The employment composition by skill level in electrical and optical equipment in Denmark is startlingly different.[15] In 2004, only 6.3 per cent of workers had primary education, 63.9 percent had secondary education and 29.9 percent had tertiary education. A closer look at the professions of the workers in electronics and medical devices also reveals a high share of non-skilled workers, with 36 per cent, which rises to 41 per cent if technicians are included[16]. Costa Rica was thus concentrated in the low end of the spectrum of the high tech sectors, a point also highlighted by Paus (2002).

C. Productivity and wages

Costa Rica's success in creating employment in high tech offshoring (albeit in relatively simple activities) contributed to a spectacular expansion of labour productivity in this sector; between 1991 and 2005, it increased by an annual average of 25 per cent. The expansion of productivity has been particularly fast since 1997, following the arrival of Intel and other large TNCs.

[14] The shares in the medical devices sector were similar: 14 percent of workers had primary education, 68 percent secondary and 18 percent tertiary education.

[15] Information from EU-KLEMS on-line database at http://www.euklems.net/),

[16] In addition, engineers correspond to 10 per cent and skilled workers to 23 per cent of the workforce.

Table 2.6 Annual average rate of growth of value added, employment and productivity in the EPZs, 1991-2005

	Value added	Employment	Productivity
1991-2005	35,76	9,80	24,57
1991-1997	30,54	15,53	15,06
1997-2005	39,67	5,49	31,71

Source: own calculations from national accounts statistics (BCCR) and Procomer.

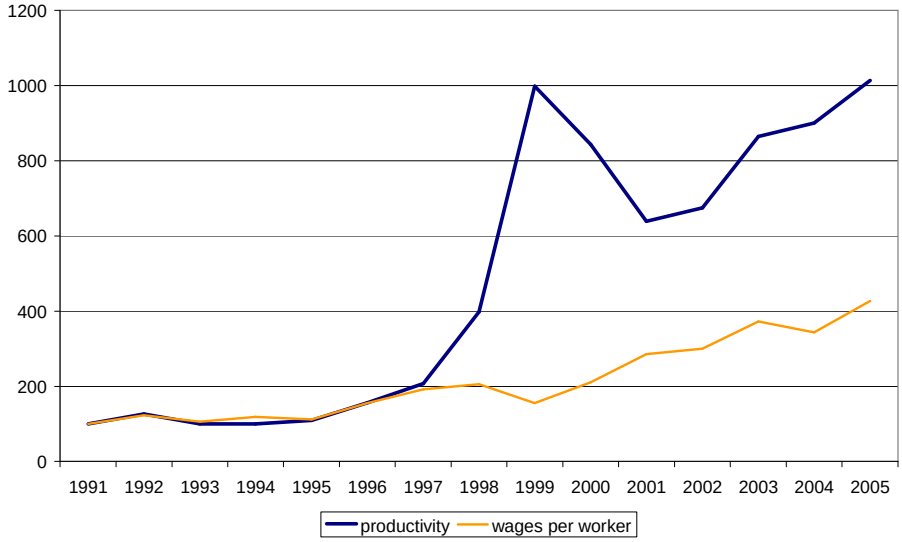
Note: this data refers to all sectors within the EPZs and not just to offshoring sectors. This explains why the rates of growth are different than in other sectors. Growth rates are calculated as averages of annual rates of growth (as in the rest of the paper)

At the same time, however, the development of new specializations in higher tech offshoring gave rise to a trade-off between productivity growth and employment creation. Before the arrival of Intel and the expansion of new offshoring activities, productivity growth was accompanied by rapid creation of jobs. Between 1991 and 1997, when the apparel sector was larger than any other, productivity grew at 15 per cent per year and employment by nearly 16 per cent. After 1997, the relationship between both variables changed significantly. Between 1997 and 2005, employment grew by an average of only five per cent per year, while productivity skyrocketed to almost 32 per cent per year. The new offshoring activities thus created the opportunity to improve the efficiency of the economy, but caused significant job churning, in favour of higher skilled workers and to the detriment of low skilled workers.

The expansion of higher tech activities after the arrival of Intel also modified the relationship between productivity and real wages per worker in the EPZs.[17] Before 1997, both variables grew at similar rates, thus securing a stable factor distribution of income (figure 2.7). The subsequent acceleration of productivity growth did not benefit workers to the same extent. According to national account statistics (which give different results than the Procomer data discussed below), labour productivity grew more than twice as much as real wages.

[17] This analysis includes some sub-sectors that are not part of offshoring. Given the dominance of offshoring activities in EPZs, however, it is safe to assume that the offshoring trends are exactly the same.

Figure 2.7. Evolution of labour productivity and real wages per worker (in constant local currency) in the EPZs (1991=100), 1991-2005



Source: Own calculations based on data from national account statistics (BCCR) and Procomer.

Note: 1991 = 100. Real wages are calculated using the wage share in current value added, multiplying it by value added in constant colones and dividing by employment data from Procomer.

Table 2.7 uses Procomer statistics — which come from company surveys — to disaggregate the evolution of real wages in offshoring activities. [18] The annual average growth rate between 1997 and 2005 was 4.3 per cent.[19] A sectoral analysis shows mixed results depending on the sectors. Clearly on the winning side were workers in medical and precision instruments, who benefited from a high wage rise, with over 20 per cent, followed by machines and electrical material (8.5 per cent). However, workers in textiles and clothing had a below average wage increase, with 3.0 per cent); meanwhile workers involved with producing chemical and pharmaceutical products experienced negative growth rates of their real wages (-3.8 per cent).

Table 2.7 Growth of monthly average real wages per worker in offshoring sectors, 1997-2005

Machinery & electrical material	8.5
Textile and clothing	3.0
Medical & precision instruments	23.3
Chemical & pharmaceutical products	-1.6
Total Offshoring	4.3

Source: Own calculation based on Procomer data.

Note: Wages are converted from original US$ values into constant local currency. The growth rate is the average of annual rates of growth.

[18] Wages in IPR are similar to those in EPZ, but slightly higher.

[19] The value would have been even higher with 5.6 per cent if you include offshoring services, which saw a wage increase by 13.1 per cent.

3. Offshoring and employment: its relevance for the Costa Rican economy

As shown in the previous section, offshoring activities had a generally positive *direct* impact on the quality and quantity of employment in Costa Rica. Since the mid-1990s, new jobs for skilled workers have been created in high tech sectors. Although most jobs concentrated in standardized assembly, the dramatic expansion of productivity contributed to the expansion of real wages.

The indirect effect on the rest of the economy discussed in this section was more limited. Despite their rapid growth in absolute and relative terms, offshoring activities maintained a small share in the manufacturing sector and the overall economy. Their contribution to technological learning and upgrading in other sectors was also limited by the lack of linkages and the relatively few knowledge spillovers.

3.1 Employment

The first question regarding employment is to establish whether offshoring has become a motor of employment growth for the domestic economy. In this context, the study first compares the growth rates of different segments of the economy. Growth rates in EPZ, where the core of offshoring activities lies, has shown an average annual growth rate of 13.6 per cent for the period 1997-2003; this is significantly above the level of the economy (5.1 per cent) and even further above the level of other manufacturing sectors (3.6 percent). If, however, we combine EPZ and IPR, the second pillar of offshoring, which is losing importance, the growth figures are much more modest (5.2 per cent); including service offshoring improves those figures slightly (5.4 percent).[20] In brief, looking only at growth rates, offshoring seems to be an important engine for employment creation.

Table 3.1: Average annual growth rates of offshoring employment, comparison with other sectors of the economy, 1997-2003

EPZ	13.6 %
EPZ+IPR	5.2 %
EPZ+services+IPR	5.4 %
Other manufacturing	3.6 %
Manufacturing	3.8 %
Total economy	5.1 %

Source: Own calculation based on data from UNIDO, INDSTAT 2007, rev. 2, OIT-SIAL, BCCR

To gain a better understanding of the importance of offshoring to the economy, we shall put the values in relation to total manufacturing employment and total employment in the economy. According to the data presented in table 3.2, the importance of employment in offshoring activities increased considerably within total manufacturing. If we take the narrowest definition of offshoring employment in EPZ, it more than doubled from 7.3 per cent in 1997 to 15.8 per cent in 2003. Including IPR, the rise is less

[20] The improvement would have been even more significant, if we consider 1997 to 2005, as employment in services rose more recently. But for reasons of comparison, we limit our analysis here to the period 1997 to 2005.

spectacular (by just 6.5 percentage points), but the share, with 21.1 per cent, is even more significant. Offshoring employment is certainly a welcome phenomenon with a growth rate of 4.3 percent and even 10.5 percent excluding IPR between 1997 and 2003. But it also becomes clear that even though it is important and rising, the great majority of employment in manufacturing is still outside offshoring. This also explains why the creation of new jobs in offshoring activities was not sufficient to halt the decline of the manufacturing employment in total employment from 15.6 per cent in 1997 to 13.7 percent in 2003, even though the decline was not dramatic[21].

Table 3.2: Evolution of the share of offshoring employment in manufacturing and total economic employment, 1997-2003 (in percentage)

	1997	1998	1999	2000	2001	2002	2003
				Share in manufacturing			
EPZ	7.3	11.0	12.7	13.5	16.8	17.7	15.8
EPZ & IPR	14.6	18.1	18.5	19.3	22.2	23.4	21.1
				Share in economy			
EPZ	0.9	1.3	1.6	1.6	1.6	1.6	1.3
EPZ & services	1.2	1.6	1.7	1.7	1.8	1.8	1.7
EPZ & IPR	1.8	2.2	2.3	2.3	2.1	2.0	1.8
EPZ & services & IPR	2.1	2.5	2.4	2.4	2.3	2.3	2.1
Manufacturing	15.6	15.7	15.7	14.4	15.0	14.3	13.7

Source: Own calculation based on data from UNIDO, INDSTAT 2007, rev. 2, OIT-SIAL, BCCR.

While offshoring, and in particular EPZ, have shown a rising relevance for manufacturing employment, its importance is much more limited for the whole economy. The share is between 1.3 and 2.1, depending on the definition of employment, and the rise between 1997 and 2003 was rather small, or even non-existent. The large bulk of employment is in services, with 63 per cent, followed by agriculture and mining, with 15 per cent, and then by manufacturing, with 13 per cent in 2005. These results are confirmed by an ILO study (2003a), which established that employment linked to offshoring activities had a rather limited impact on the Costa Rican economy, whereas micro and small enterprises are the backbone of employment in the country.

The weight of offshoring employment in the economy is similar to that of other Central American countries like El Salvador (2.0 per cent), Panama (1.8), Honduras (2.2) and Nicaragua (2.0). Yet there are some countries like Mexico (3.4) and the Dominican Republic (4.8) where offshoring creates more employment in relative terms. It is thus clear that the low share of offshoring may be a common trend, but that Costa Rica has still some potential to expand it further. [22]

[21] Taking a ten year period from 1995 to 2005, the decline was more pronounced (from 16.5 per cent to 13.7 per cent)

[22] Data for this paragraph comes from ILO (2007a).

3.2 Wages

Average monthly wages in offshoring sectors in EPZ were almost three times higher (2.8) than the minimum wage and 32 per cent higher than the average monthly labour income according to ILO data[23] and both values have increased significantly since 1997[24]. Real wage growth in offshoring sectors is also higher than in other manufacturing sectors, which have a value of 3.4 per cent on average[25]. It is mainly the high tech sectors that experienced a wage increase significantly higher than the average manufacturing wage, as illustrated in table 2.7. These findings are confirmed by Jenkins (2005), who pointed out that the great majority of the salaries were higher than the reported average salary paid in Costa Rica for the same occupation group.[26] In contrast to Mexico, offshoring activities are concentrated mostly in higher wage categories in Costa Rica, i.e. within manufacturing and within the economy.

Working conditions constitute another important dimension to evaluate the quality of employment. Various studies show that workers in offshoring sectors benefit from better working conditions than workers in other manufacturing sectors, as TNCs set higher labour standards and new enforcement mechanisms. Moreover, they exert a positive influence on domestic companies to do so as well and are more exposed to labour inspections (Jenkins, 2005, World Bank, 2006). In general, working conditions can be assumed to be above the national average, even though some effort has to be undertaken to reach the standards of industrialized countries.

3.3 Skill level

As we have seen above, there is a trend in offshoring sectors towards a higher skill level among the workforce. Figure 3.1 shows the evolution of the distribution of workers with different skill levels within manufacturing, taking the average of two periods, 1995 to 1997 and 2003 to 2005. It illustrates that the trend towards a higher skilled workforce was not an exclusive phenomenon of offshoring-dominant sectors. In offshoring sectors, however, the share of workers with primary education declined more steeply (by almost 18 per cent) and the rise of secondary (7.1 per cent) and tertiary education (10.3 per cent) was significantly higher than in other manufacturing sectors.

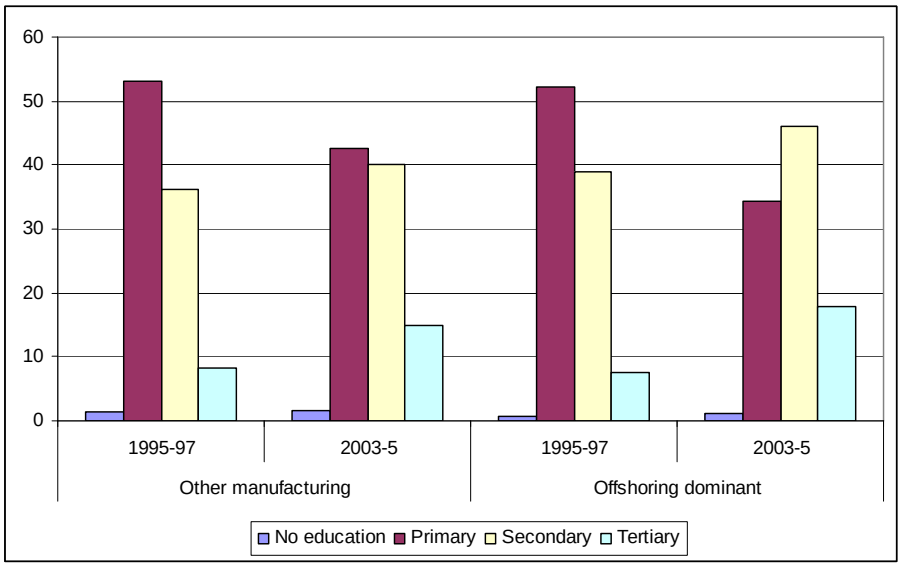
[23] See Gonzalez and Del Cid (2005). Values for minimum wage and average monthly labour income from 2003 are taken as a reference (in current US$).

[24] Average offshoring wages were 1.8 times higher than the minimum wage, but only represent 87 percent of average monthly labour income in 1997.

[25] Data should be taken with caution, as offshoring sector wages are taken from Procomer, while wages for other manufacturing sectors are taken from UNIDO, Instat data.

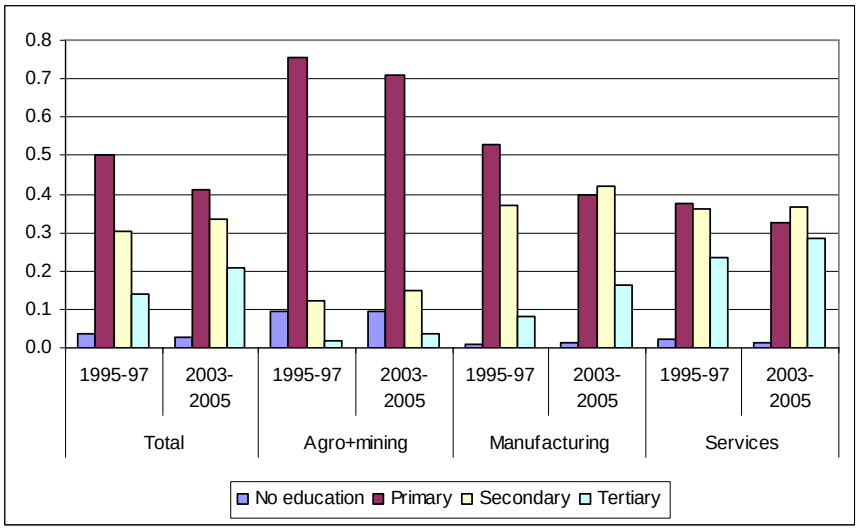
[26] 96.8 per cent of companies in EPZ reported to pay more than the median to their firm and machine operators, 87.1 per cent to pay more to administrative employees/clerks and managers.

Figure 3.1: Comparison of skill level within each manufacturing group, 1995-2005



Source: Own calculation based on OIT-SIAL data, 3 and 4 digit level (narrow definition of outsourcing).

Figure 3.2: Evolution of skill level in the total economy, share within each sector, 1995-1997 and 2003-2005



Source: Own calculation based on OIT-SIAL data, 3 and 4 digit level.

A comparison of the manufacturing sector with the rest of the economy (figure 3.2), however, confirms a general trend towards higher skilled workers in Costa Rica, which was more pronounced in manufacturing than in services and other sectors. The share of tertiary educated workers increased by eight percentage points in manufacturing, but only by five percentage points in services. A similar trend can be observed in secondary education. Yet given its larger contribution to overall employment, services are still the

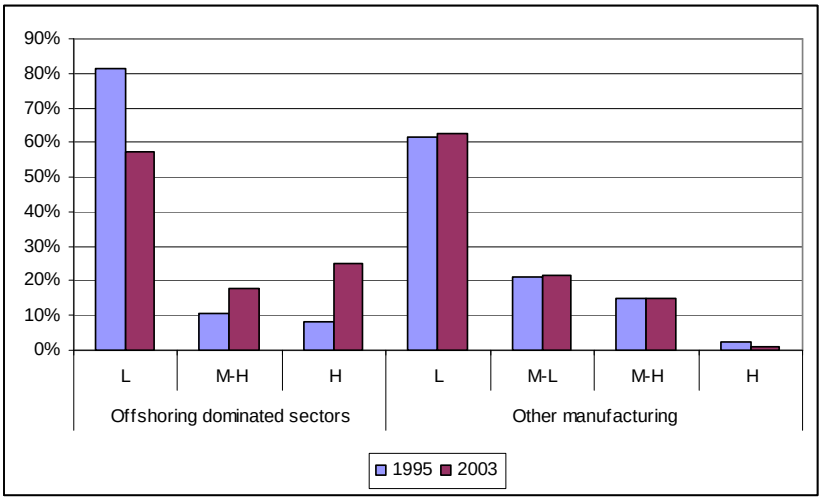
dominant provider of jobs for skilled workers with a share of 86 per cent in workers with tertiary education and of 68 per cent for those with secondary education[27].

In brief, there was a shift in offshoring employment towards higher skilled workers. This higher demand for skilled workers had a positive impact on the manufacturing sector in general, but less so for the whole economy.

3.4 Technology

As we have seen above, offshoring sectors are mostly positioned in low tech sectors, but while their share declined strongly, that of high tech sectors increased significantly. How did other manufacturing sectors perform compared with offshoring sectors? Figure 3.3 shows that the move towards high tech sector is specific to offshoring sectors.[28] High tech sectors have never had an important role in other manufacturing sectors and its share even declined to an insignificant level. However, the share of offshoring activities in medium to high tech sectors is not much different from other manufacturing sectors. Moreover, while the share within offshoring sectors increased to 18 per cent in 2003, it remained stable in other manufacturing sectors, at around 15 per cent between 1995 and 2003.

Figure 3.3: Evolution of technological level within each manufacturing sector



Source: Own calculation based on UNIDO, Indstat 2007.

Note: The classification of technological level is taken from OECD, 1997.

Additionally, the contribution of each technological category, by sector, to total manufacturing was calculated. It confirms the rising importance of "offshoring" employment in high tech sectors for the total manufacturing sector, as its share increased from three per cent in 1995 to seven per cent in 2003, but also in medium to high tech

[27] Figures come from our own calculations, based on OIT-SIAL date, three and four digit level and are not comparable to those in figure 4.2. Labour supply data (ILO/KILM 2007b) confirm the trend towards a higher share of secondary (16 per cent on average in 1995-97 to 20 per cent in 2003-2005) and tertiary educated workers (from 15 to 17 per cent) and a lower share of low skilled workers.

[28] Once again we take the narrow definition of offshoring, but as before, the values of the narrow and broad definition are quite close.

sectors (from three to five per cent). And it also confirms the declining share of low skill "offshoring" employment from 26 to 16 percent during the period of analysis, which is mostly explained by the decline of textile employment. In brief, offshoring activities shifted towards higher technological sectors and provided a non negligible contribution to the manufacturing sector in general.

3.5 A new phenomenon: Rising offshoring in services

This study focuses on the manufacturing sector, but we cannot ignore a trend towards rising offshoring in services, as it has recently shown great dynamism in economic and employment terms. Some of the services are provided directly to the manufacturing offshoring sectors (e.g. packaging and cleaning, security), but there are many new entrants linked to those sectors indirectly, or even not linked at all. Costa Rica has managed to develop an incipient software industry. Call centres have grown steadily in the last few years and now include companies like SYKES, an IT technical support provider, which has more than 2,000 workers providing financial services and customer support, Fujitsu, People Support and Hewlett-Packard. Costa Rica has also been successful in attracting foreign investment in shared services and back offices from large companies like Procter & Gamble, which created a global business centre, and other customer services, such as Western Union (BCCR, 2007, Monge, forthcoming). Accumulated investment flows rose from USD 115 million in 1997 to USD 360 million in 2005, becoming the second most important sector after machinery and electrical material. During the same period, service exports rose from USD 76 million to USD 172 million, the fifth largest exporter (out of ten sectors in EPZ) and imports from USD 41 to USD 192 million. What were the main reasons to the boom of offshoring services in Costa Rica? In addition to the improvement in telecommunications, human capital has been the most cited argument that has attracted FDI. Costa Rica possesses appropriately qualified workers in areas such as business administration, informatics and technical engineering and a high English literacy of the workforce (Granados et al., 2007).

During the same period, employment in services in EPZ rose strongly and steadily by an average annual growth rate of 14.7 per cent between 1997 and 2005, and accounted for 8,600 workers in the latter year. Real average wages improved by an annual rate of 12.2 per cent and, with a value of USD 840 per month, are the highest among all EPZ sectors. A particularly interesting aspect of services is the fact that they are located in high growth sectors and thus have a high potential for employment in the future. Machinery and electrical material, as well as textiles, are also important in terms of employment, but are placed in low growth sectors (Gamboa et al, 2006).

As we have seen that wages are high and growing in offshoring services, we may assume that higher skilled workers dominate this sector. Computer and related services (classification 72 according to ISIC revision 3) and other business services (74) are used as a proxy for the major offshoring services sectors to analyze the skill level of the workforce. [29] Educational data show quite clearly the high and rising share of higher educated workers in these sectors with a value of 46 per cent (up from 31 per cent in 1992) for workers with tertiary education in 2005, while the share of workers with primary education remained stable (22 per cent in 1992 and 2005) and with secondary education strongly declined (from 48 to 31 per cent).

[29] Data refer to the whole economy and are just a proxy for the skill level of "offshoring" employment. The study assumes that there are no big differences between domestic and EPZ/IPR service activities. There is certainly a risk of underestimating the results, as, presumably, higher skilled workers are attracted to EPZs/IPR.

In summary, services offshoring is a recent and quite interesting phenomenon. It rose in economic terms, but also in terms of employment and wages. Moreover, it was an important new provider of employment for higher skilled workers.

3.6 The creation of linkages and spillovers

A. Linkages

The lack of linkages between the offshoring activities and domestic firms also limits their employment impact. The assembly of apparel and electronic equipment is intensive in imported goods and thus builds relatively few relations with domestic suppliers. Table 3.3 reflects the local purchases of EPZs as a percentage of their total spending in inputs of goods and services. Firms in the EPZs purchase around 10 per cent of their goods and services locally. Linkages are particularly low in the largest offshoring sectors: the producers of machinery and electrical equipment (which includes companies like Intel) bought just two per cent of their input locally and in the case of apparel, just six per cent. In absolute numbers, the four offshoring sectors from the EPZs bought just US$368m from domestic firms in 2005.[30]

Table 3.3. Costa Rican EPZs: Local purchases as percentage of the total, 1997-2005

	1997	1998	1999	2000	2001	2002	2003	2004	2005
Machinery, electrical material and its parts	6.6	5.8	4.4	2.7	3.1	2.4	2.6	2.6	2.0
Textiles, apparel, leather and shoes	5.4	12.1	15.3	4.7	6.2	5.7	5.5	7.6	6.0
Medical equipment	5.7	10.8	8.1	8.4	4.0	5.0	6.1	6.1	7.8
Chemical and pharmaceutical products	54.8	34.2	32.2	30.4	36.0	28.3	41.4	47.2	23.3
Agro-industry	63.1	64.1	44.7	74.3	82.7	77.7	86.2	84.0	78.1
Plastics, rubber and its manufactures	15.7	33.7	27.2	33.4	25.2	27.4	15.5	24.4	24.7
Metal manufactures	33.2	6.0	1.4	1.9	7.1	7.8	14.9	37.9	41.0
Agriculture	0.0	0.0	0.0	32.1	97.6	97.8	96.7	97.2	90.6
Services	54.8	34.2	32.2	30.4	36.0	28.3	41.4	47.2	23.3
Others	4.4	12.8	21.1	27.0	20.0	23.6	20.8	21.7	18.9
Total	**7.8**	**9.7**	**9.0**	**7.1**	**9.0**	**9.6**	**10.5**	**11.9**	**10.4**

Source: Own calculations, with data from Procomer.

Note: Total purchases refer to local purchases plus imports.

Various studies on the Costa Rican economy have revealed the extent of the problem. In her comparative study of FDI in high tech sectors in Ireland and Costa Rica, Paus (2005) shows that the foreign exporters are significantly more dependent on imports than local firms producing for the Costa Rican market. Most of the links created by

[30] Data from 1994 to 1997 reveal a lower level of domestic purchases, as discussed in Sanchez-Ancochea (2006). The increase does not reflect any significant change in firms' behaviour, but is the result of changes in the way local purchases are calculated. Local purchases for 1997-2005 are based on a broad definition that includes interests and commissions, public services, post and couriers, petrol and other oils, office material and general services like cleaning (Gamboa et al, 2006), some of which should actually be considered as forward linkages.

TNCs do not take place with manufacturing firms, but with basic service providers and intermediaries, who can benefit less from learning processes. Using information from a survey of 26 TNCs in the sectors of electrical products, and components and medical equipment, for example, Ciari and Giuliani (2005) found that 36 per cent of local firms were producers of agricultural and manufacturing inputs.

To complement these survey studies, we use a social accounting matrix (SAM) to measure the linkages between the EPZs—which are dominated by offshoring activities—and other sectors of the economy. The SAM represents the basic skeleton of the economy, including the interaction between different institutions and sectors (Taylor, 2004). For this exercise, we rely on a new SAM elaborated for Costa Rica by Sánchez (2006), which includes 41 activities and 78 commodities. To make the exercise more realistic, we use a fixed price model instead of an accounting model, as the former can take into account the behaviour of agents or price formation. Details of the methodology are included in the appendix "Social accounting matrix: Methodology and issues".

With this model we can determine the impact that the increase in production of a commodity will have on the rest of the economy.[31] We are, therefore, measuring the backward linkage effects, which include the aggregate demand effects generated by income.[32] This can give a clearer effect of the macroeconomic impact that outsourcing can have on the economy. Unfortunately, however, we were only able to measure the effect of EPZs and IPR on the aggregate, thus including some sectors like agro-business and metal production that should not be regarded as offshoring.

Table 3.4 reflects the impact that an injection of one colon in each sector would have on the rest of the economy. An increase in one colon in the EPZs will, through a multiplier effect, create a total value of 4.4 colones in the whole economy. The exercise reveals the low linkages of both EPZ and IPR when compared to other sectors. They are located seven and 13 out of the 33 manufacturing sectors including in this social accounting matrix. These values are overestimates as non offshoring activities in EPZ and IPR have much higher backward linkages.[33] Despite paying higher wages, the EPZ generate less than half of the effect of coffee or canning, processing and preserving of meat, owing to its low linkages to the rest of the economy. [34]

As an extension to the SAM, the calculation of employment multipliers shows that the lack of linkages led to limited employment effects.[35] The value found for EPZ is low, with 0.34, which means an injection of one unit will lead to rise in employment by 0.34, as well as for IPR with 0.52. The values of many other sectors are significantly higher, such as coffee with 5.5, public administration with 6.2, other food products with 10.2.

[31] We focus our calculation on commodities (and not on activities) to avoid the inclusion of imports, as the off-shoring sector has a high level of imports. If we weight backward linkages by imports, EPZ has by far the highest values and IPR is among the highest.

[32] We neglect the analysis of forward linkages, as they do not play an important role in the case of off-shoring sectors. Goods are produced for the export market and not for the domestic market and are immediately and exclusively (EPZ), or almost exclusively (IPR) (re-)exported . Some limited services are related to it, as mentioned above.

[33] Table 3.3. shows a much higher share of local purchases by non-offshoring sectors such as agroindustry (78 per cent) or metal manufactures (41 per cent) in 2005.

[34] Agro-business is known for its high backward linkages in those economies in which agro-business depends on goods cultivated and harvested within the country.

[35] See appendix: "Social accounting matrix- Methodological issues", for details of the calculation.

Table 3.4 Unweighted backward linkages, manufacturing sector, 2002

Ranking	Code	Item	Value
1	107	Reconstruction and repair of vehicles	2.652
2	93	Petroleum and basic chemical products	3.060
3	90	Leather products, including footwear	3.653
4	106	Machine and equipment	3.675
5	104	Basic metals	3.952
6	97	Pharmaceutical products and drugs	4.133
7	110	Export processing zone	4.378
8	92	Paper and paper products	4.971
9	100	Other chemical products	5.080
10	105	Metal products	5.164
11	94	Fertilizers and pesticides	5.359
12	89	Textile and clothing	5.482
13	109	Temporal admission (maquila)	5.506
14	86	Other food products	5.665
15	95	Synthetic resins and plastic materials	5.836
16	85	Cocoa, chocolate, etc.	6.097
17	91	Wood and wood products (including furniture)	6.255
…	…	…	
27	80	Dairy products	8.035
28	87	Prepared animal feeds	8.042
29	77	Canning, processing and preserving of fish	8.222
30	79	Vegetable and animal oils and fats	8.251
31	82	Coffee gold	9.038
32	76	Canning, processing and preserving of meat	9.121
33	84	Sugar	9.170

Source: Own calculation, based on SAM developed by Sanchez (2006a & b).

The lack of backward linkages is partly the result of the insufficient capabilities of domestic firms. Traditionally, Costa Rica has not been a producer of manufacturing inputs, and domestic firms are small and have difficulties in meeting high quality standards and production levels (Gamboa et al, 2006). Based on evidence from interviews with firms, Paus (2005, p. 173) concludes that "linkage development between TNCs in the Free Zones and national producers have been unsatisfactory" due to lack of domestic capabilities.

Even if the number of domestic firms that are capable of offering quality inputs was to grow, total linkages would still be constrained by the supply strategy of most TNCs. Global corporations are building international supply networks, with small and medium firms from all over the world competing with each other to service them (Kaplinsky, 2005). Many TNCs—particularly in the medium and high tech sectors—prefer to maintain relations with a small number of suppliers, or produce inputs in-house. The limits to linkage expansion are clearly demonstrated by the example of the pharmaceutical producer Baxter (Sánchez-Ancochea, 2006). The company has shown interest in expanding its local supplying base as a way of increasing its flexibility and

reducing costs. Nevertheless, Baxter only bought eight per cent of its input materials locally in 2002. When asked what the maximum share of local purchases in the total would be, a manager from the company answered that should increase this above 20 per cent because most inputs and raw materials are produced by Baxter itself, or come from few global suppliers.

There are some indications that foreign offshoring companies may be increasing their linkages with domestic firms.[36] Costa Rica Provee — a public-private partnership that aims to build supplying arrangements between TNCs and domestic companies — has contributed to the creation of new business relations. The number of new projects connecting client companies and suppliers has increased from just one in 2001 to 108 in 2005. A World Bank report identified a growing number of linkages between the electronics sector and domestic services — including software development and financial and engineering services — and some manufacturing activities, such as packing, metalwork and plastic injection moulding (World Bank, 2006). A similar pattern of interaction is also emerging in the sector of medical equipment.

In the end, however, the employment effect on the rest of the economy of outsourcing activities remains limited. For all its unquestionable successes, for example, the linkages promoted by Costa Rica Provee were worth just USD 3 million in 2005. Monge et al (2005) — who identify many positive effects of EPZs on the Costa Rican economy — found only 145 firms working as service or manufacturing suppliers for companies in the EPZs — the number of companies supplying offshoring activities may be even lower. Most of them were small firms with five to 20 workers, thus leaving the overall employment impact of outsourcing rather low.

B Spillovers

The lack of linkages between foreign investors in outsourcing activities and domestic firms has limited the potential to create technological spillovers. Since there is little contact between different types of firms, there are just a limited number of learning opportunities. Yet in the few cases in which different firms have built linkages, some positive upgrading has taken place. Costa Rica's ability to lure foreign investors in high tech activities has generated some positive process upgrading of Costa Rican firms. TNCs have pushed a few supplying firms to adopt high standards with regard to on-time delivery and quality (Paus, 2005, World Bank, 2006). Some companies have also offered some training to local firms. In the case of Intel, for example, 35 per cent of service providers and 17 per cent of input providers have participated in some kind of training organized by the TNC (Larrain et al, 2001). Intel has also facilitated local technological development through limited direct activities (World Bank, 2006). Many of these upgrading efforts only favour companies in low tech sectors — only 17 per cent of indigenous firms supply goods that can be regarded as 'diffusers of technical progress' (Ciravegna and Giuliani, 2005). Ciarli and Giuliani (2005) also show that the majority of knowledge flows still occur horizontally among foreign subsidiaries. They have more incentives to share knowledge among themselves, as mutual benefits are more likely to appear.

Training of the labour force has been identified as an alternative channel for spillovers. Some TNCs offer training to their workers in areas that are not available in

[36] Jenkins (2005) gives data on linkages based on a survey of 84 firms in the EPZs for 1997; 51 firms in the sample specialize in offshoring activities. Jenkins obtains higher shares on local inputs as a percentage of total inputs than any other study. However, he does not mention whether he is referring to the number of linkages or to the total value and he does not give any indication of the employment effects of relations between clients and customers.

Costa Rica; Paus (2005, 183), for example, discusses the example of a TNC producing precision instruments, which is one of the few using computing numerical control. Technical training led to a faster expansion of an already existing national software industry. Intel invested in a component design group and in software development, which is used in industrial applications at other Intel facilities.

The problem, however, is that there is relatively little movement of workers between TNCs and domestic suppliers. According to Ciarli and Giuliani (2005), 83 per cent of skilled workers in the electrical products and medical equipment sectors, who change jobs move to foreign firms in the same sectors. Better working conditions, wages and career paths are behind this negative trend, which reduces the likelihood of creating successful supplies and consolidating learning spillovers. We could even talk about a "negative" spillover for domestic firms. Skilled workers are attracted to TNCs and domestic firms may even face restrictions in their labour supply for skilled workers. In fact, even though the labour supply for skilled workers increased, Costa Rica faces a labour supply bottleneck.

Where foreign firms have exerted a particularly positive—although still small—influence is the improvement in upgrading the college-level technical curriculum and building positive partnerships with Costa Rica's universities (Cordero and Paus, 2007). Intel helped to improve the curricula of electrical engineering and computer sciences schools at the University of Costa Rica, UCR (Jenkins, 2005). The company also signed an agreement with the UCR and the Technological Institute of Costa Rica to train students according to its specific needs, and has collaborated with the Ministry of Public Education to train Costa Rican teachers (Ciravegna and Giuliani, 2005; Jenkins, 2005).

The public sector has provided some partial support in maximizing the positive impact of outsourcing operations. While there were some Intel-driven initiatives to cooperate with public educational institutes, the government also promoted its own programmes to adjust to the new labour demand, such as the Costa Rican Technology Institute's "Electronics Diploma". This new diploma benefited foreign firms like Intel, and also had some impact on local firms (Jenkins, 2005, Larrain, 2001). Despite these efforts, however, public expenditure in research and development has remained low, and there are few scientists and engineers and registered patents.[37] The National System of Innovation is still underdeveloped and there are insufficient programmes to support specific activities, such as the software industries (Ciarli and Giuliani, 2005; ILO, 2003a).[38]

In conclusion, the development of offshoring activities in new sectors has opened up some opportunities for technological learning and upgrading. Nevertheless, the small number of linkages between TNCs and suppliers, as well as the segmented nature of the labour market limits the aggregate impact of these positive trends.

[37] According to data collected by Ciarli and Giuliani (2005), Costa Rican expenditure in R&D was just 0.35 per cent of GDP in 1998, the amount spent in scientific and technological activities was 1.5 per cent of GDP. The number of scientists working on R&D is also lower than in other middle income countries.

[38] Other channels of spillover, such as "demonstration effect" or higher competition are expected to be rather limited in the case of Costa Rica and have been neglected in this analysis.

4. The successes and challenges of offshoring in Costa Rica

The preceding analysis has shown that Costa Rica has succeeded in attracting offshoring activities in both low tech (apparel) and high tech (semiconductors, medical equipment) assembly. Offshoring has contributed to the creation of relatively high skilled, well paid jobs and a more diversified export structure. Costa Rica thus offers important lessons on how to create employment through the selective attraction of offshoring tasks. In the first part of this section, we concentrate on two of these: the long term accumulation of institutional and knowledge assets, and the selective attraction of foreign investment.

At the same time, however, important challenges remain to deepen and consolidate the positive effect of offshoring on the Costa Rican economy. In order to accelerate linkage creation and generate new spillovers, the state must support domestic firms in the creation of new technological capabilities and marketing skills. The final objective should be to "endogenize" the dynamic process of technological upgrading in the Costa Rican economy. To succeed in this task, we identify three additional challenges: the tax challenge, the learning challenge and the external challenge, which we could also call the China challenge.

4.1 Costa Rica's success in developing new offshoring activities

Along with Mexico, Costa Rica has been the most successful Latin American country in attracting offshoring activities. While some Latin American countries (e.g. Honduras, the Dominican Republic) have only been able to enter into apparel assembly and others have failed to participate in this process altogether (because of geographical and cost disadvantages), Costa Rica has succeeded in attracting offshoring investment in increasingly sophisticated activities. In a comparative analysis of fragmentation in electronics in East Asia and Latin America, Lall et al (2004) demonstrate that Latin America has failed to enter into the global networks in this sector, but do identify Costa Rica as an exception. As we saw in section 3, offshoring jobs have increased steadily in Costa Rica since the mid-1990s, despite a recent deceleration. Moreover, the country has succeeded in moving from apparel assembly to more sophisticated offshoring of good and services when it was losing its labor cost advantages.

Geographical factors are important in explaining Costa Rica's success. The country is close to the US and has benefited from the creation of the Caribbean Basin Initiative and the growing attention of TNCs to Mexico and Central America. However, Costa Rica's neighbours shared similar advantages but have not reaped the benefits of them (Mortimore and Vergara, 2004). There are thus key policy choices that are even more fundamental. We briefly discuss two: the selective promotion of foreign investment, and the long term accumulation of institutional and human capital assets.

A. Selective promotion of foreign investment

Costa Rica was one of the first countries in the Caribbean Basin to attract foreign investment in apparel, thus rapidly increasing its market share in the US from less than 1 per cent of total US apparel imports in the late 1980s to 1.8 per cent in 1993. In the early 1990s, however, the Costa Rican Government came to realize that it could no longer expand exports of apparel and other low wage assembly products. Consequently, Costa Rica decided to actively promote foreign investment in other sectors, an effort that accelerated during the administration of José María Figueres Olsen (1994-1998). His

government aimed to develop "an aggressive policy of investment attraction" in sectors that made "a sophisticated and well paid use of productive resources and not extensive and poorly rewarded use of cheap labour" (MIDEPLAN, 1998, 51).

This selective policy of FDI promotion was extremely useful in attracting Intel to Costa Rica in 1996, a landmark for the country. A combination of high level political commitment, political stability and effective institutional structure convinced Intel that Costa Rica was the optimum location for its new assembly factory. Intel's selection committee was impressed with Figueres when they met with him in April 1996 (Spar, 1998). President Figueres spent more than two hours with them and responded to all their concerns. Immediately after the meeting, he appointed Jose Rossi, Minister of Foreign Trade, to coordinate Costa Rica's pitch to attract Intel. The Costa Rican Government was assisted at all times by the Costa Rican Investment Board, CINDE (Nelson, 2003). CINDE is a non-profit organization created in 1982 with financial assistance from USAID. CINDE was part of the US government efforts to promote a new economic model in Central America and to convert the region into an export platform for US corporations.

Intel's decision had a signalling effect, triggering a new wage of FDI from some of leading TNCs such as Abbot, Procter and Gamble and Microsoft, and leading to praise by experts all over the world (see, for example, UNCTAD, 2002).

B. Long term accumulation of intangible assets

Recent studies have shown that the supply of skilled labour was an important argument to receive FDI, particularly in high tech manufacturing and services (Granados et al., 2007; Larrain et al, 2001; Rodríguez Clare, 2001, Spar, 1998). Interviews in 2002 with three of the largest offshoring TNCs in Costa Rica — Baxter, Procter & Gamble and Intel — confirmed the importance of Costa Rica's long-term investment in education, and also highlighted the role of political stability and institutional strength.

For most of the past four decades, Costa Rica has constantly invested more than five percent of its GDP in education. Since the late-1980s, the government has been placing special emphasis on English as a second language, and on expanding coverage of computer literacy. High schools and universities have also been urged to design higher technology curricula, with a focus on electronics. These measures have helped to develop an incipient electronic industry, led by small TNCs even before the arrival of INTEL (Spar, 1998). The Costa Rican Government was also quick to respond to the specific requirements set out by INTEL, before its arrival in 1997, to improve technological education (World Bank, 2006). Nevertheless, Costa Rica is now facing a bottleneck in the supply of skilled workers, which may affect its future development. Offshoring sectors may face problems to expand their activities and domestic companies cannot benefit from the new opportunities created by the presence of TNCs in high tech sectors.

4.2 The challenges: how to expand the potential positive effects of offshoring

Costa Rica's success in luring TNCs in high tech offshoring has opened development opportunities that are absent in many other developing countries. As we have seen, offshoring results in the creation of well paid jobs and increases the technological level of the labour force. And yet the diffusion of the development impacts of offshoring has been slow, because of the lack of linkages between offshoring firms and domestic suppliers. In many ways, Costa Rica has suffered from the same problem of "technological enclave" that Gallagher and Zarsky (2007) describe in the Mexican case. If offshoring is to become a successful tool for economic development in the future, the

process of technological upgrading has to be rooted in the domestic economy. We believe that this is a difficult task and, below, discuss three major challenges to realize it.

A. The learning challenge: technology and skills

Costa Rica's success in luring companies like Intel should now be followed by a new effort to expand the capabilities of domestic firms. Small and medium firms, particularly those in the manufacturing sector, must slowly expand their knowledge-based assets and build fruitful interactions with TNCs. Otherwise, the process of technological upgrading will remain exogenous to the internal economic structure—triggered by global accumulation process and not by internal dynamics.

The diffusion of technology requires continuous collaboration between different actors in the private and public sector. As we saw when discussing linkages and spillovers, Costa Rica has already made some efforts in promoting collaboration between suppliers and TNCs and between TNCs and the university system, but they have been relatively marginal. The experience of the software industry is interesting.[39] The sector emerged in the early 1990s thanks to autonomous initiatives from university professors and several entrepreneurs. The UCR and other universities have made an active contribution by providing a relatively large pool of computer engineers. By the late 1990s, when Intel, Microsoft and other high tech firms invested in Costa Rica, some medium and large software firms were able to build new supplying relations with them. Yet the relationship was relatively sporadic and there was no real effort to build a software cluster and create more dynamic interactions between TNCs, domestic firms and the university system.

Cordero and Paus (2007, 17) emphasize the need to create a real development strategy that can "map out priorities and the role of different sectors and actors in achieving these priorities". This government effort cannot merely be a sum of individual initiatives; in fact, there are some indications that Costa Rica has already developed too many small and uncoordinated programmes to promote technological transfers and the development of small and medium firms (Buitelaar et al, 2000). Instead Costa Rica must identify the main constraints that both large TNCs and small and medium firms in medium and high tech sectors have, and build a coordinated effort to overcome them. The university system can play a particularly important role in this regard, by becoming an entrepreneurial nexus between TNCs and small and medium firms in a range of projects. A more ambitious and organized effort to expand research and development initiatives would also contribute to root technology learning in the country.

Public-private partnerships could also facilitate technological upgrading of domestic firms through business development programmes, improved access to financial resources and promotion of clustering and collaborating between different firms. The expanding of financing opportunities is particularly important, as Costa Rica still lacks sufficient venture capital (Paus, 2005). The country should maintain its recent efforts to expand the development focus of public banks and thus consolidate a real development banking system.

A particularly contentious issue in the Costa Rica case is the role that some leading state-owned enterprises should play in the process of technological upgrading and diffusion. Due to the high level of polarization around the liberalization of the telecommunication sector, the country has failed to explore the development potential of

[39] The following discussion is based on Ciravegna and Giuliani (2005) and interviews with a manager from the Chamber of Software Producers of Costa Rica (Camara de Productores de Software, CAPROSOFT), as well as from the company Art-in-Soft, San Jose, August 2002.

productive partnerships between the Costa Rican Institute of Electricity ('Instituto Costarricense de Electricidad', ICE)—the sole provider of electricity and telecommunication services—domestic suppliers and TNCs in outsourcing sectors. Given its past success in providing high quality sectors and its knowledge of the specific characteristics of the Costa Rican economy, the ICE could contribute to technological upgrading and promote a telecom cluster (Sanchez-Ancochea, forthcoming). This would, however, require a more flexible institutional structure and greater concentration on efficiency and technological learning.

To maximize the employment potential of outsourcing, Costa Rica should also improve its education system, particularly in areas like technical education and English. Costa Rica is facing a bottleneck in terms of appropriate workforce, in particular IT specialists, workers with English language skills and instructors for training institutes (Granados et al, 2007, Monge, forthcoming). There is also a need to improve the quality of secondary education and build tertiary curricula that respond with even greater flexibility to the demands of both outsourcing TNCs and potential domestic suppliers.

In any case, it is important to bear in mind that the challenge for Costa Rica is particularly daunting because it is starting at a relatively low level of development. As it was beginning to implement its offshoring-led strategy, Costa Rica had a lower level of relative income per capita than Singapore and Ireland, two countries that are usually considered best-practice examples. While Costa Rica was significantly below the world's average when it began its process of industrial upgrading through FDI, Ireland had twice the world's average in 1985—when the most recent upgrading process began—and more than three times the average in 1995. Higher levels of development facilitated the creation of linkages and the expansion of the upgrading process to some domestic firms.

B. The challenge of public revenues

Tax incentives have become a popular tool for attracting foreign investment in offshoring activities. The expectation of large benefits through employment creation, high wages and spillover effects have led both developed and developing countries to promote export processing zones and give other subsidies. Within small countries, Ireland and Singapore have been particularly active in this regard, establishing low corporate tax rates and giving special subsidies to targeted firms (Buckley and Ruane, 2006; Ermisch and Huff, 1999). In Costa Rica, offshoring activities are concentrated in the EPZs and thus benefit from tariff-free imports of inputs and a zero corporate income tax on profits.

Table 4.1 presents an estimate of the amount of taxes that Costa Rica could have received without the exemptions within the EPZs. The estimation is far from ideal, as it does not consider the potential reaction of firms to the imposition of a corporate tax. While most firms would stay, particularly in high tech sectors, they would probably change their global allocation of profits through the use of transfer pricing. We can still use these estimations to obtain a useful approximation of the costs for Costa Rica's public sector. In the last few years, the income tax loss as a result of total income tax revenues has increased rapidly. In 2005, income tax revenues would have been 312 billion colones higher (equivalent to 30 per cent of total income taxes received) if all companies within the EPZs had paid corporate taxes. If we incorporate the exemptions on sale taxes and tariffs for the inputs purchased by the EPZs, the tax loss was more than 1,290 billion colones. An elimination of all these tax holidays would increase Costa Rica's total tax burden by 5-10 per cent per year. This is particularly costly in an economy that has lower tax revenues than the expected level for similar countries (Agosin et al, 2005).

Table 4.1 Costa Rica. Estimated tax losses as a result of the EPZ incentives, million of current colones and percentage of income tax revenues and total revenues, 1997-2005

	Estimated income tax losses	Total revenues in income taxes	Income tax losses (% total)	Estimated total tax loss	Total tax revenues	Total tax losses (% total)
1997	5.427,45	55.924,30	9,7	22.141,75	363.540,30	6,09
1998	22.373,18	77.001,10	29,1	44.903,64	444.484,80	10,10
1999	10.088,93	118.859,10	8,5	37.522,10	547.434,40	6,85
2000	15.651,87	122.031,70	12,8	34.951,40	599.100,50	5,83
2001	22.416,32	152.653,50	14,7	50.786,66	704.130,30	7,21
2002	32.200,13	169.879,50	19,0	62.924,78	781.798,00	8,05
2003	53.432,37	217.494,00	24,6	79.297,25	925.481,70	8,57
2004	54.506,19	254.438,20	21,4	89.125,48	1.079.610,80	8,26
2005	96.226,20	312.169,40	30,8	126.563,38	1.290.285,80	9,81

Source: Own calculations, with data from Gamboa et al (2007) and Costa Rican Central Bank.

Eliminating the temporary tax holidays within the EPZs would obviously have some risks given the growing competition for foreign investment in offshoring. Yet tax incentives are just one factor within complex investment decisions. According to Te Velde (2001), tax holidays tend to attract footloose TNCs and are not particularly good for upgrading. Managers from Baxter, Intel and Procter and Gamble did not underestimate the importance of tax incentives, but all considered them secondary.[40] In fact, they were prepared to pay their income tax after their exemptions had expired.

The challenge facing Costa Rica is to devise a new tax system that succeeds in taxing new offshoring activities without reducing the attraction of TNCs.[41] The discussion that has taken place since 2004 to extend the corporate tax to all firms and establish a moderate tax rate is thus a welcome step. Nevertheless, approval of the tax reform has taken more time than expected and may be further delayed by a recent World Trade Organization decision to extend the waiver that Costa Rica and other small countries have on export subsidies.

C. The external challenge: The emergence of China

The emergence of China as the world's factory constitutes an additional threat to the expansion of offshoring in countries like Costa Rica (Gereffi, 2005; Kaplinsky, 2005). China's share of world exports has increased from one per cent in 1980-89 to four per cent in 2000-2004 thanks, in particular, to the expansion of offshoring activities in apparel, toys and other labour intensive activities. In the last few years, China has also become a formidable exporter of electronics and other technology intensive goods: the share of high tech exports in China's total exports increased from five per cent in 1990 to 30 per cent in 2004 (ECLAC, 2005).

[40] Interviews took place in September 2002, in the Costa Rican headquarters of each of the three firms.

[41] The government should also avoid any temptation to extend the incentives for those companies that are already in the country after they expire

Costa Rica is more affected by the threat from China than other countries in Latin America. According to calculations from Lall and Weiss (2005), the correlation between China's export structure and that of Costa Rica is the second highest in the region after Mexico and increased significantly between 1990 and 2002, from 0.023 to 0.274. More than three quarters of Costa Rican exports, in value, were located in sectors in which China is rapidly increasing its share in the world market. In apparel offshoring, Costa Rica has faced even more difficulties than neighbouring countries, in order to maintain its market share in the US.

Gallagher and Porzecanski (2007) follow Lall and Weiss's methodology to analyze the impact of China on Latin America's high tech exports. They find that Costa Rica—like the rest of the region—lost world market share between 2000 and 2005, while China has increased it rapidly. Their analysis of specific sectors shows that nearly 88 per cent of total high tech exports (representing a quarter of total exports of goods) were threatened by China in 2005.

Expanding offshoring activities in this global environment may be difficult, particularly when it is not easy to build regional production networks with other Latin American countries (Lall et al, 2004). There is, however, one significant positive factor in recent developments. Companies like Intel have incorporated Costa Rica in a global production network, helping the country to create new trade relations with China. In fact, Costa Rica's high tech exports to China have increased significantly in the last few years. Between 1997 and 2006 they have multiplied by ten, from just US$ 3 million to US$ 367. High tech exports to China represented 11 per cent of Costa Rica's total high tech exports in 2005 compared to less than one per cent in Latin America as a whole (table 4.2).

Table 4.2 Costa Rica and Latin America. Total high tech exports and high tech exports to China, 1997-2005, Millions of US dollars

	Costa Rica			Latin America		
	China	Total	China/Total	China	Total	China/Total
1997	3,2	305,8	1,03	19,8	29.855,2	0,07
1998	2,9	1.271,2	0,22	85,0	37.396,7	0,23
1999	0,6	2.785,4	0,02	127,1	46.334,3	0,27
2000	6,1	2.002,6	0,31	249,1	57.819,3	0,43
2001	6,9	1.203,5	0,57	381,2	56.817,5	0,67
2002	29,2	1.314,6	2,22	446,8	53.360,0	0,84
2003	82,5	1.891,1	4,36	497,7	53.707,3	0,93
2004	153,2	1.688,9	9,07	473,4	60.805,0	0,78
2005	229,9	2.043,8	11,25	596,9	67.453,3	0,88
2006	366,9	2.454,1	14,95	--	--	--

Source: Own calculations, with data from ECLAC (2007) Panorama de la inserción internacional de América Latina y el Caribe, 2006-2007.

5. Conclusions

Together with Mexico, Costa Rica has been the most successful Latin American country in attracting offshoring activities. While some Latin American countries (e.g. Honduras, Dominican Republic) have only been able to enter into apparel assembly and others have failed to participate in this process altogether (due to geographical and cost disadvantages), Costa Rica has succeeded in attracting offshoring investment in increasingly sophisticated activities. A liberal approach towards trade and investment, together with selective targeting of TNCs in high tech firms and the promotion of education have combined to explain Costa Rica's success.

The expansion of offshoring activities has resulted in significant economic gains for the Costa Rican economy. In addition, the initial growth of apparel production led to a rapid expansion of employment and a more moderate increase in labour productivity. The arrival, since the 1990s, of Intel and other high tech companies has contributed to a much faster increase in added value and labour productivity, while employment creation has decelerated. Real wages in offshoring sectors have also increased faster than in the rest of the economy, although not as rapidly as productivity, a similar phenomenon to the Mexican case.

There are also some indications of an incipient upward movement along the value chain, driven partly by the changing composition of offshoring activities. Yet the lack of linkages between TNCs in these sectors and the rest of the economy has limited the overall development impact of offshoring. While the government has already implemented some programmes to resolve this problem, more must be done to expand the technological capacity of the Costa Rican economy and maximize the impact of new investment on Costa Rica's workers. A new challenge is the rising shortage of skilled workers, which requires an additional effort by the public sector to invest more in higher education and technical training.

Designing new policies and new strategies to maximize the positive contribution of offshoring to employment in Costa Rica will not be easy. We have highlighted three key challenges that must be overcome: increasing the number of skilled workers, expanding public revenues, and overcoming a growing external threat. These three challenges are, to large extent, interconnected, giving rise to vicious and, potentially, virtuous circles. If Costa Rica is to realize all the potential benefits of offshoring, the government should try to tackle some of these problems simultaneously.

The upgrading of skills and the rooting of technology in the domestic economy require the active role of the state. The state should adopt a coherent development strategy (a point emphasized by Cordero and Paus, 2007), expand and unify different programmes to support small and medium firms and also improve the quality and spending in training and formal education. This will not be possible without a significant expansion of tax revenues. And yet, the incentives to attract FDI in offshoring activities make the expansion of revenues harder: given this, they can contribute to expand FDI in the short run, but reduce the likelihood of delivering long-term development benefits.

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Appendix: Social accounting matrix – methodological issues

Sanchez (2006a) developed a social accounting matrix (SAM) for Costa Rica using 2002 data. It has 41 activities, 78 commodities, nine factors of production (capital, workers by gender, wage employed or not, qualified, not qualified), institutions (household (urban, rural), enterprises, general government), saving-investment, taxes and the rest of the world (exports, imports). Our main interest is in the position (either commodities or activities) of export processing zones (EPZ) and inward processing regimes (IPRs), as off-shoring activities are found within the framework of these regimes.

A SAM is originally presented in the form of an accounting model, which considers neither the behaviour of agents nor the formation of price. The basic assumption is that all expenditure-income elasticities are equal to one, which is a rather restrictive and unrealistic assumption. One way of relaxing this assumption of unity elasticity would be to introduce marginal instead of average propensities to spend. Nevertheless, as we use marginal instead of average propensities, we need to keep relative prices fixed. In our calculation, therefore, we replace the accounting model with a fixed-price model applying the income elasticities of demand for urban and rural households, calculated by Sanchez (2006b). With the help of the Ordinary Least Squares (OLS) method, a logarithmic commodity-wise expenditure demand function was estimated as follows: $\log Cch=bo+b1\log Yh+\varepsilon$. [42] The marginal propensities are estimated by multiplying the respective average propensities to spend ($aij=yij/yj$ with i, j: type of commodity) with its elasticity. The analysis of fixed-price multipliers is analogous to that of accounting multipliers.

The sum total for a column or row can be calculated as for an input-output model, and they are equivalent to the backward and forward income or expenditure linkages. The interpretation of total and partial (within account or module) backward and forward linkages in a SAM framework is similar to that of an input-output model. Even though in an input-output model, the sum of all the elements, in any row (column) of the accounting multipliers matrix, could be read as the forward (backward) linkages of the expenditure-injection multipliers, the interpretation in the SAM framework is not so straightforward, as the linkages are composites of the effects of several kinds of accounts effects. In other words, given an exogenous injection into the system it will first result in an income rise of the respective account. This increase will have an impact on the incomes of all other endogenous accounts, and the sum of all these effects constitutes its total backward linkage. This rather crude indicator may help to assess the total expected impact at the macro level.

The calculation of total or partial forward linkages can be achieved by summing up all (within account) elements in any row of the multiplier matrix M_a. "M_a" is the matrix of cumulative production multipliers and gives a numerical assessment of the direct and indirect effects resulting from exogenous injections on the output of each commodity or activity. For example, an injection of one unit in reconstruction and repair of vehicles creates through a multiplier effect a value of 2.65 in the whole economy; the value for sugar is 9.17.

[42] C_{ch}: total consumption of commodity c in household h, which will change by a proportion of b_1 due to a change in Y_h, total income of household. Commodities produced under the special regimes of the export processing zone and IPR are normally produced for the export market and not for domestic consumption. Therefore, a value of 0.1 has been applied to both.

For that reason, we introduce employment as an exogenous factor at the bottom of the rows. Then, labour output will be calculated by dividing employment by expenditures. Here, we use INEC employment data for 2002 as they are compatible with the SAM. At the final stage, we calculate the employment multipliers, which correspond to labour output times M_a.

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