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Employment effects of MNEs in twin plants in the Caribbean with special reference to Puerto Rico

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Note:
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are intended to stimulate discussion and
critical comment.

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Introduction: The rise of twin plant phenomenon
in the Caribbean and the role of Puerto Rico

Twin plants are a form of complementary production between firms operating in two or more country locations. Usually, intra-firm specialisation is based on unique locational advantages, notably cheap labour, easy transport and market access, and the like. In the main, complementary production involves assembly operations. The production process is twinned in the sense that sister plants supply each other with assembling inputs.

With respect to the Caribbean, semi-finished manufactured products are assembled in low-wage economies and then trans-shipped to Puerto Rico where finishing, engineering and other high technology phases of production take place for final marketing in the United States.

Thus, for purposes of this study, twin plants can be said to involve a form of intraregional specialisation in the Caribbean, with Puerto Rico specialising in technology-intensive phases of production, and other countries in routine assembling operations.

Since 1985 there has been a surge of twin plant investment in the Caribbean involving United States firms operating in Puerto Rico. Between 1985-89, 35 twin plants went into operation in Barbados, Costa Rica, Dominican Republic, Dominica, Grenada, Haiti, Jamaica, Panama and St. Kitts.¹ Before 1985, however, twin plant investments involving Puerto Rico and the rest of the Caribbean were non-existent.² Normally, United States firms would set up subsidiaries or joint ventures which would do assembling operations and the link in the chain of production was usually between these subsidiaries and the parent company in the United States.

Twin plant investments, on the other hand, are linked to complementary production by United States firms operating in Puerto Rico. In fact, they tend to specialise in phases of production hitherto carried out in Puerto Rico, but which subsequently became too expensive to be performed in Puerto Rico (due to rising production costs) among other things. Labour-intensive phases of production involving routine operations were therefore "shed off" to low-wage economies in the Caribbean to cope with global competitive pressures and to enhance profits. Factors governing the growth of twin plant investment in the Caribbean, to be dealt with more fully in the study, can be said to include: the rising labour costs in Puerto Rico, the provisions of the Caribbean Basin Initiative (CBI) allowing for duty-free export of manufactured goods to the United States, and conscious public policy attempts in Caribbean countries to attract overseas investment as a means of stimulating economic development in the 1980s.³ This latter factor can be regarded as important since, in an effort to attract international capital, countries bid for scarce investment capital and in the process try to make their respective domestic business environment attractive.

This study is an attempt to make a contribution to the analysis of the twin plant phenomenon in the Caribbean by looking at the employment effects of MNEs involved in such investment. To do so, a background of Puerto Rican industrialisation must be provided, as well as a fuller treatment of the dynamics of twin plant investment.

Puerto Rican industrialisation

Puerto Rico is the earliest case of assembly-oriented industrial development in the Caribbean geared for exports to the world market.

In 1942, the Industrial Development Company and the Government Development Bank were set up to supply capital for industrial development. In 1950, the Economic Development Administration (Fomento) was established to spearhead the drive for industrialisation. The Industrialisation Tax Exemption Act (1948) provided a series of tax exemptions to new industries and 42 designated industries already in operation and/or in need of expansion. Industrial estates and training grants were also part of the incentive package developed by Fomento.

These incentives have been improved from time to time to enhance the attractiveness of Puerto Rico as a haven for international investors.

The results of Puerto Rico's industrialisation strategy can be gauged from the following: in 1950, there were 82 industrial plants in Puerto Rico; in 1986, there were 1,985 manufacturing firms operating. At the same time, of total manufacturing employment of 152,000, Fomento assisted in the creation of 133,000 whereas in 1970 total manufacturing employment stood at 137,000, and Fomento's assisted ones at 105,000.⁴

Whereas GDP (market prices) rose from US\$4,687 million in 1970, to US\$15,194 million in 1986, the contribution of manufacturing rose from US\$1,190 million to US\$8,166.⁵ GNP growth (market prices) ranged between 10.7 per cent (1960), 12.5 per cent (1970), 10.1 per cent (1980) - the growth rate of 7 per cent in 1986 being somewhat below the norm.⁶ Exports of manufactured goods rose from US\$612 million (1960) to US\$11,571 million (1986).⁷ When allowance is made for price movements, however, real changes in the foregoing aggregates are likely to be substantially less than that depicted in the nominal figures quoted.

It is estimated that about 800 subsidiaries of American companies currently operate in Puerto Rico.⁸ These include 150 of Fortune magazine's 500 largest corporations.

The overall investment by these corporations was estimated at US\$16 billion in 1987.⁹ Most of these have benefited from investment incentives administered by Fomento.

Within recent times, the experience of industrialisation has been far from rosy. Plant closures have been on the increase.¹⁰ Employment generated by new plants dropped from 6,300 in 1970 to 3,541 in 1985.¹¹

International division of labour and twin plant investment

It is useful to provide a framework for the study, given the link between twin plant investment and international firms.

Theorising on a new international division of labour has attempted to place assembly-oriented manufacturing productions of developing countries into perspective.¹² In a nutshell, the theory concerns the Ricardian principle of comparative advantage, the process of geographical fragmentation of intra-firm production process, and competitive strategies of international

firms. Production activities which are labour-intensive are said to be best suited for poor countries given low relative wage rates.

Intra-firm division of labour by international firms allows for geographical fragmentation of production with capital-intensive phases of a given production process ideally suited for developed economies as a result of their endowment of skilled factor inputs.

Geographical mobility is associated with this as firms are constantly seeking production outlets favouring low-cost production, easy market access, and a business environment hospitable to foreign direct investment.¹³

From the above point of view, preliminary evidence, as indicated at the outset, suggests that Puerto Rico specialises mainly in skill-intensive phases of activity in complementary assembly operations, notably quality control, finishing and engineering services.

It can be hypothesised that this probably represents technological learning effects from four decades of export-oriented industrial experience, and departs from its earlier advantages in low-skilled, low-wage activity when it first started in the late 1940s. Sub-assembling complementary operations in the Caribbean, on the other hand, specialise mainly in routine and manual operations embodying low levels of skills and relatively low wages. It can be argued that these two inter-related phases of production are likely to effect "economies of specialisation" based on some form of comparative advantage. Hence, a choice of production phases in respective locations.

In this respect, it might be observed that when Puerto Rico first embarked on its industrialisation programme, wages were relatively low. However, between 1970-86, hourly wage rate rose from US\$1.78 to US\$6.73.¹⁴ This rise in wage rates has tended to reduce the advantages of Puerto Rico as a low-wage economy for international investment.¹⁵ As indicated earlier, twin plants are associated with the movement of labour-intensive phases of production from Puerto Rico to the rest of the Caribbean.

On the other hand, countries in the Caribbean such as the Dominican Republic benefiting from "outward twin plant investments" from Puerto Rico offer wage rates substantially lower as will be shown in the next section.

For routine assembling operations therefore it can be argued that low-cost locations offer unique attractions for cost-minimising firms competing in the world market. This point is developed in the next section.

It is necessary to look at specific factors giving rise to the growth of twin plant investment between Puerto Rico and the rest of the Caribbean. For this purpose, it is appropriate to examine some main determinants of twin plant investment.

Twin plant investment: Some main determinants

For our present purpose, four main determinants of twin plant investment will be looked at.

First, section 936 of the United States Federal Inland Revenue Code which permits the repatriation of profits was amended in the mid-1980s, allowing firms to reinvest these tax-exempted profits before the expiration of the tax exemption period, normally 25 years.¹⁶ These proposed investments are in

turn subject to further tax exemptions. Current estimates by the Puerto Rican Government Development Bank put the total supply of 936 tax exemption funds accruing to firms presently operating in Puerto Rico as high as US\$12 billion. It is estimated that some US\$8 billion is deposited in private financial institutions in Puerto Rico waiting for investment outlets;¹⁷ 936 funds are available at below market rates of interest. A necessary condition for investment is the availability of savings. It can therefore be argued that 936 funds serve as a potential for overseas investment world-wide. Evidence suggests that most of the twin plant investment obtained 936 funds. In the words of the Governor of Puerto Rico: "We look upon the retention of 936 not as an excuse for inaction but as an incentive for expansion."¹⁸

The importance of 936 funds to recipient countries can be gauged from the fact that a number of Caribbean-Central American countries have set up offices in Puerto Rico to lure such funds. One recent case is Jamaica. Other countries work closely with Fomento to attract funds. Since only US\$70 million has been invested to date, it allows that a substantial portion of such funds remains unused.

Second, from what has already been stated, and following theorising on a new international economic order, it can be argued that competitive considerations have tended to exert a positive role in determining the movement of phases of production activity outside Puerto Rico. Between 1970-86, based on data already cited at the outset, plant closures in Puerto Rico have risen. At the same time, total manufacturing employment dropped from 155,000 to 152,000.¹⁹ Among factors which can be said to partly account for this with respect to United States firms in Puerto Rico, as indicated earlier, is the growing uncompetitiveness in some phases of assembly manufacture in Puerto Rico. With respect to export-oriented foreign firms, as stated in the previous section, it can be argued that this has been induced by a sharp rise in wage rates over the past decade which makes Puerto Rico a relative high-wage economy. In 1986, average hourly wages in manufacturing were estimated at US\$6.73 in Puerto Rico, compared with US\$13.09 in the United States, making wage levels in Puerto Rico higher than those of some developed economies, notably Austria - US\$6.65 - and Japan - US\$6.64.²⁰ As pointed out earlier, Puerto Rican wage rates were substantially lower, relative to the United States in the 1950s but have been moving in line with the latter because the island is now governed by the United States Minimum Wage Legislation, even though wages are still roughly 50 per cent lower than in the United States. In the 1970s, for example, hourly wage rates in Puerto Rico were as low as US\$1.78.²¹ At the same time, wage rates in the Dominican Republic are now estimated as low as 15 per cent of the United States average in manufacturing; those in Barbados are as low as US\$3.00 per hour, and in countries such as Grenada, Jamaica and Haiti, wage rates are considerably lower still.²² Thus, applying the framework based on theorising on a new international division of labour, it can be argued that this movement in wage rates has tended to affect unit production costs and to cause firms to seek alternative outlets for labour-intensive, low-skill phases of their operation, where wage rates are low enough to enhance international competitiveness.

Speaking about twinning operations between Puerto Rico and the Dominican Republic, the General Manger of Westinghouse is quoted as saying: "Blended hourly rates resulting from this combination could be as low as 15 per cent of our current stateside rates. The new twin plant combines low-cost competitive labour with 396 tax incentives without sacrificing quality and producing a maximum return to shareholders."²³

As indicated earlier, operations involving higher skills, i.e. finishing, quality control, and engineering services, are generally retained in Puerto

Rico, and tend to represent the final phases in production prior to marketing. It can be posited that this probably represents forms of technological learning associated with years of industrial experience. From this vantage point, it can be contended that to the extent this is true, the acquired comparative advantage in certain phases of assembly operations which Puerto Rico seems to have developed, allows her to specialise in high-wage, skill-intensive assembling, in keeping with her relatively high wage structure vis-à-vis other low-wage economies in the rest of the Caribbean. In short, technical substitution occurs in keeping with her changing factor proportions configuration and in response to changing relative factor prices.

Another factor explaining the rise of twin projects is access to the United States market under CBI for recipient countries. The evidence shows that all twin plants so far promoted through Fomento go to CBI beneficiaries.²⁴ Caribbean countries have traditionally faced stiff tariff barriers in the United States markets, particularly with respect to manufactured products. The CBI provisions eliminate duties on most manufactured products entering the United States from CBI countries, provided that the direct processing operations performed in a beneficiary country is not less than 35 per cent of the appraised value of the product at the time of entry.

It can be said that CBI provisions offer scope for the export of manufactures and semi-manufactures from the Caribbean to the United States. In the words of a noted American industrialist engaged in twin plant investment: "Thanks to the CBI, we were able to put up plants, lower our production costs, beat back the competition (Asia), provide jobs to those that sorely needed them, and protect United States mainland jobs."²⁵ Another twin plant investor puts it this way: "This combination of a CBI plant and a Puerto Rican plant is very much an answer to Far East competition faced by the American shoe industry. What Milton (a United States shoe manufacturer) is doing in the Dominican Republic and Puerto Rico is giving United States manufactures the chance of a 'second life'.²⁶"

It is true that a number of CBI beneficiaries have so far failed to benefit from twin plant investment (Antigua and Barbuda, Bahamas, Belize, Honduras, Montserrat, St. Lucia, Netherlands Antilles). While these are undoubtedly low-wage economies, most of them tend to lack an adequate infrastructure. It is also true, as will be shown later, that twin plant investment is highly concentrated in two countries in the Caribbean, Costa Rica and the Dominican Republic.

Lome and Caribcan, which offer duty-free access of manufactured goods to the EEC and Canada, respectively, also provide additional market access considerations for potential twin plant investment, particularly with respect to the English-speaking Caribbean. This remains so even though the main driving force presently appears to be the CBI, offering duty-free access to the United States.

Finally, political and institutional factors must be examined. The modification of the United States Tax Act for the use of 936 funds (already referred to) was the result of a process of lobbying in the United States Congress by political groups in Puerto Rico, in order to make available to potential investors a pool of investment funds. From this point of view, reference was already made to plant closures. It can be argued that the promotion of twin plant industrial strategy in Puerto Rico is partly seen as saving the goose that lays the golden egg. One possible way of doing so is to harmonise joint comparative advantage by seeking to promote complementary operations. In this way, the Government can at least aim at retaining United States firms in Puerto Rico. Geographical proximity can aid this process

since it allows for easy co-ordination, control and adjustment, to marketing and management changes. For example, a survey of United States businessmen operating in Puerto Rico has singled out geographical closeness as a factor allowing for the viability of joint production specialisation with Caribbean economies for facilitating easy management of labour-intensive production operations.²⁷ As the Governor of Puerto Rico put it: "Here is where firms carved out a new opportunity to cut costs and provide jobs ... Here is where American industry answered the Asian challenge and answered the hopes of Caribbean leaders."²⁸

Thus, a case can be made that Fomento's efforts at promoting complementary investment between Puerto Rico and the Caribbean is partly induced by recent years of experience of economic slack in Puerto Rico and from the fear of deindustrialisation stemming from complete withdrawal of existing assembly operations to the Far East, or the failure to establish prospective ones due to reasons already mentioned.

Additionally, it can be argued that recipient governments are inclined to welcome such investments, prima facie, as a means of stimulating industrialisation, exports and employment.²⁹ This is so under world conditions where international investment resources have been rapidly drying up and debt problems make international finance less freely available to such countries.³⁰ It can be said that this partly explains why some Caribbean governments have been active lobbyists in Puerto Rico for 936 investment funds, and why many have set up offices in Puerto Rico to lure such investment, taking care at the same time that proper conditions for international investment including infrastructure and incentives are in order.

United States multinational enterprises in twin plant investment, capital invested, and inter-country distribution

Essentially, as was clear from the outset, the centre-piece of the industrialisation strategy initiated after the Second World War was industrial location in Puerto Rico. In the mid-1980s, a number of United States subsidiaries operating in Puerto Rico began twin plant operations in other Caribbean countries. It is estimated that between 1985-89 US\$80 million were invested in twin plant operations between Puerto Rico and the rest of the Caribbean. Of this, US\$28 million were invested in Puerto Rico so that the bulk of investment, US\$52 million, took place outside Puerto Rico (see tables I and II).

To date, a total of 35 projects exist in nine Caribbean countries. This, however, is a small number of investment undertakings compared with nearly 1,985 industrial plants in operation in Puerto Rico at the end of 1986. Twin plant investments include electronics, food processing, garment manufacture, pharmaceuticals, sporting goods, leather goods manufacture, telecommunications, among others.

The data show that the largest number of twin plants, namely 20 out of 35, are located in the Dominican Republic. This country also accounts for most of the twin plant investment so far. Most of these are located in export processing zones aimed at facilitating assembly-oriented manufactured goods by overseas firms. One example of this is Jumping Jack Shoes, a firm operating in Ponce, Puerto Rico, for over 30 years, producing shoes from American leather. The company found it needed to reduce costs to meet foreign competition. It established a twin plant operation in the Dominican Republic and now sends leather pieces cut and fit in the Dominican Republic to Puerto

Rico for final assembly. The Ponce plant has gained 60 additional workers because of this venture.³¹

Table I. MNEs investment by projects, 1985-89

Country	Twin plants	Other*
Barbados	3	1
Costa Rica	5	3
Dominican Republic	20	7
Dominica	1	1
Grenada	2	1
Haiti	1	1
Jamaica	1	3
Panama	1	0
St. Kitts	1	1
Total	35	18

* Mainly joint ventures and subcontracting.

Source: Fomento's Caribbean Highlights, Vol. 3, No. 5, May 1989, and data supplied by the Economic Development Administration.

Table II. MNEs investment in twin plants/other with reference to Puerto Rico, 1985-89

Country	Twin plant (value)	Other* (value)
Barbados	830 000	20 000 000
Costa Rica	6 018 000	390 000
Dominican Republic	39 685 000	5 630 000
Dominica	2 300 000	500 000
Grenada	1 084 000	2 118 000
Haiti	915 000	0
Jamaica	1 000 000	83 250 000**
Panama	140 000	0
St. Kitts	500 000	15 000
Total	52 472 000	111 903 000

* From Puerto Rico to the Caribbean involving non-twin plants.

** Jamaica Airport, US\$57M.

Source: Data supplied by the Economic Development Administration.

Westinghouse's competitive position is said to have enhanced as a result of combining new facilities in the Dominican Republic with its Puerto Rican operations because of a sharp reduction in costs which shifting operations to the Dominican Republic brought about.³²

Another example of such twin plant projects is Johnson & Johnson's twin plant operation in Grenada: "Johnson & Johnson brings in synthetic fabric processed in the United States, cuts it in Puerto Rico, sews the pieces in St. George's, and ships out semi-finished surgical caps."³³

Table III provides yearly data on twin plants. As can be seen, these took off in 1986 rising to a peak in 1988. Two countries account for the bulk of twin plant projects, namely Dominican Republic and Costa Rica. Other twin plant investment from firms operating in Puerto Rico are relatively insignificant and, in the case of Jamaica, an airport project involving US\$57 million explains the large amount of other investment shown in table II.

Table III. Yearly breakdown of twin plant projects, 1985-89

Country	1985	1986	1987	1988	1989*	Total
Barbados	0	1	1	0	1	3
Costa Rica	0	0	0	5	0	5
Dominican Republic	0	3	8	7	2	20
Dominica	0	0	0	0	1	1
Grenada	0	1	1	1	0	2
Haiti	1	0	0	0	0	1
Jamaica	0	0	0	0	1	1
Panama	0	0	1	0	0	1
St. Kitts	0	0	1	0	0	1
Total	1	5	12	13	5	35

* First half of 1989.

Source: Fomento's Caribbean Highlights, Vol. 3, No. 5, May 1989.

The greatest single investment in Puerto Rico - US\$17.1 million or 61 per cent of total twin plant investment so far - is attributable to a twin plant project in Dominica (see table IV). Since data being reviewed are recent, one can hardly comment on trends. In the main, the investment involves sub-assembly operations carried out by affiliates of United States firms operating in Puerto Rico. Overall, twin plant operations are mainly geared for re-export to the United States, through Puerto Rico.³⁴ It is therefore a vehicle for export-oriented manufactured goods.

As already indicated, the evidence suggests that twin plant investment is still small in terms of overall United States investment in Puerto Rico. For example, in 1986, there were 112 new plants established in Puerto Rico; in 1985 the number was 145. It will also be recalled that, at the end of 1986, 1,985 manufacturing enterprises were operating in Puerto Rico. On the other

hand, between 1985-89, 35 twin plant investments between Puerto Rico and the Caribbean were established.

For the Caribbean Basin countries as a whole, total investment by United States multinational enterprises stood at US\$874 million between 1984-89. This shows how relatively small investment in twin plants are, by comparison.³⁵ And overall foreign direct investment during this period was US\$1.6 billion, of which third countries and areas (France, Netherlands, Federal Republic of Germany, Canada, the area of Hong Kong, and the Republic of Korea) accounted for US\$362 million and local investors in the Caribbean investing roughly the same amount.³⁶

Table IV. Twin plant investment in Puerto Rico, 1985-89

Country	Puerto Rico (\$M)
Barbados	1.7
Costa Rica	n.a.
Dominica	17.1
Grenada	0.7
Guatemala/Costa Rica	1
Haiti	n.a.
Jamaica/Dominican Republic	0.6
Jamaica	n.a.
Panama	0.3
St. Kitts	n.a.
Trinidad	0.2
Dominican Republic	6.7
Total	28.1*

* Does not add up because of rounding.

Note: n.a. = not available.

Source: Data drawn from Fomento's Caribbean Highlights, various issues.

MNEs and employment dimensions of twin plants

Available evidence shows that total direct employment from twin plant investment between 1985-89 amounted to 10,774 (see table V). The bulk of total direct employment created, namely slightly under 8,000, took place in CBI countries, with the Dominican Republic accounting for the lion's share - 5,528; followed by Costa Rica, with 864. Seven other countries account for the remaining 30 per cent of total employment outside Puerto Rico. At the same time, direct employment in Puerto Rico amounted to 2,835. Most of this employment is attributable to complementary projects including the Dominican Republic (1,545). This is followed by Barbados (714) and Haiti (400).

Table V. Employment in twin plants, 1985-89

Country (CBI)	Direct employment	Puerto Rican direct employment
Barbados	329	714
Costa Rica	864	60
Dominican Republic	5 528	1 545
Dominica	50	15
Grenada	158	11
Haiti	438	400
Jamaica	500	0
Panama	17	25
St. Kitts	55	65
Total	7 939	2 835

Source: Compiled from data supplied by the Economic Development Administration and MNEs.

Table VI compares twin plant employment in the Caribbean with other employment involving United States firms based in Puerto Rico. It shows that twin plant employment is substantially higher; notably 7,939 compared with merely 2,223 attributable to other investment. This is so in spite of the fact that the latter investment was twice as high in value terms. However, this is substantially smaller than 48,672 full-time jobs created by total United States direct investment in the Caribbean (excluding Puerto Rico) between 1984-89. And overall foreign direct investment (including non-United States sources) at the same time created 95,535 full-time jobs.³⁷ This makes twin plant employment even comparatively smaller.

At the same time, and more relevant for comparative purposes, CBI-related investment of US\$447 million created 15,603 full-time jobs.³⁸ This makes twin plants an important contributor of CBI full-time jobs - more than half between 1985-89 (i.e. nearly 8,000 jobs). As such, it can be said that twin plant investment assumes crucial importance to the analysis of employment creation in assembly-oriented manufacture in the Caribbean Basin countries aimed at exports to the United States markets.

With respect to inter-country distribution of twin plant employment, table VII provides a year-to-year breakdown. Most of aggregate employment took place between 1986-88. For the first half of 1989, nearly 900 jobs were created; if this trend continues, 1989 can find close to 2,000 jobs created by twin plants in the rest of the Caribbean.

In terms of country distribution of direct employment, the Dominican Republic has seen the most consistent yearly spread of jobs since 1986. For the others, yearly twin plant employment is somewhat haphazard. Since 1985, no new twin plant jobs were created in Haiti and, in the case of Costa Rica, 1988 represented the only year that twin plant jobs were created. In the case of Dominica, 1989 represented the first round of twin plant employment; in Jamaica, twin plant jobs were all created in 1989; St. Kitts in 1987, and Panama in 1987. Grenada's total twin plant employment was spread between two

years, namely 1986 and 1987. Apart from the Dominican Republic, Barbados has proven to be the most regular annual beneficiary of twin plant jobs (1986, 1987 and 1989).

Table VI. Twin plants/other jobs - Comparison, 1985-89

Country	Twin plant jobs	Other jobs
Barbados	329	0
Costa Rica	864	210
Dominican Republic	5 528	1 163
Dominica	50	30
Grenada	158	150
Haiti	438	400
Jamaica	500	200
Panama	17	0
St. Kitts	55	70
Total	7 939	2 223

Source: Economic Development Administration and MNEs.

Table VII. Yearly breakdown of twin plant employment, 1985-89

Country	1985	1986	1987	1988	1989	Total
Barbados	0	260	60	0	9	329
Costa Rica	0	0	0	864	0	864
Dominican Republic	0	1 750	2 340	1 098	340	5 528
Dominica	0	0	0	0	50	50
Grenada	0	68	90	0	0	158
Haiti	438	0	0	0	0	438
Jamaica	0	0	0	0	500	500
Panama	0	0	17	0	0	17
St. Kitts	0	0	55	0	0	55
Total	438	2 078	2 562	1 962	899	7 939

Source: Economic Development Administration and MNEs.

Based on the above, it can be said that the data on inter-country employment distribution do not show any consistent trend.

On the aggregate front a different tale is told. This shows a growth of twin plant jobs from 1985 to 1987, namely from 438 to 2,562. In 1988, a decline stepped in (1,962) and if existing trends continue, yearly employment will decline still further to 1,798 in 1989.

With respect to Puerto Rico, yearly employment rose from 400 in 1985 to 1,300 in 1986; it was 689 in 1987 and 407 in 1988. If trends for 1989 continue, new employment will not exceed 100 for this year.

Sectoral distribution of employment

In Caribbean host countries, twin plants in the services sector hardly exist. In fact, the main services sector for twin plant is located largely in Puerto Rico.

Sectoral distribution of twin plant employment is shown in table VIII. Electronics make up nearly 50 per cent. This is followed by pharmaceuticals and textiles and apparel. These three product groups account for a preponderant share of total employment generated in CBI countries.

The lion's share of total employment in electronics and pharmaceuticals is to be found in the Dominican Republic - 2,650 out of 3,403 and 1,517 out of 1,979, respectively.

Electronics also predominate in the case of Barbados - 260 out of total employment of 329; and in Haiti and St. Kitts where all twin plant employment is found. In the case of Grenada, pharmaceuticals predominate. In the case of Costa Rica - pharmaceuticals and textile and apparel account for over 500 of total employment of 864. And in the case of Jamaica, textiles and apparel predominate. Only in the case of Costa Rica is agro-processing recorded.

Table VIII. Employment by product groups, 1985-89

Country	Elec- tronics	Pharma- ceuticals	Textiles & apparel	Foot- wear	Agro	Others	Total
Barbados	260	0	60	0	0	9	329
Costa Rica	0	304	200	0	360	0	864
Dominican Rep.	2 650	1 517	636	575	0	150	5 528
Dominica	0	0	0	0	0	50	50
Grenada	0	158	0	0	0	0	158
Haiti	438	0	0	0	0	0	438
Jamaica	0	0	500	0	0	0	500
Panama	0	0	0	0	0	0	17
St. Kitts	55	0	0	0	0	0	55
Total	3 403	1 979	1 396	575	360	226	7 939

Source: Compiled from data from the Economic Development Administration and MNEs.

With respect to twin plant employment in Puerto Rico, a preponderant share, namely 2,013 out of 2,835, is in electronics; this is followed by footwear, and textiles and apparel. Most of the employment generated in electronics took place in 1986 (1,045) when peak employment was reached in this product group (see table IX). In terms of yearly trends, total employment in Puerto Rico rose from 400 in 1985 to 1,300 in 1986. It has since shown a downward trend. Electronics was the largest single employment creator between 1985-87. In 1988, it was overtaken by footwear and, for the first half of 1989, electronics failed to generate new additional employment in the twin plant sector in Puerto Rico.

Table IX. Yearly breakdown of twin plant employment in Puerto Rico, 1985-89

Year	Elec- tronics	Pharma- ceuticals	Textiles & apparel	Foot- wear	Agro	Others	Total
1985	400	0	0	0	0	0	400
1986	1 045	5	0	250	0	0	1 300
1987	465	16	119	0	0	85	685
1988	103	44	30	200	30	0	407
1989	0	6	12	0	0	25	43
Total	2 013	71	161	450	30	110	2 835

Source: Based on data from the Economic Development Administration and MNEs.

Aspects of labour and skill intensity

Based on comparisons, the evidence, as shown in tables X and XI, indicated that twin plants are the most labour-intensive of all forms of foreign direct investment in the Caribbean, concerned with export-oriented manufacturing and semi-manufacturing production.³⁹

This compares with US\$1 million creating 19 jobs for other investment from Puerto Rico to the rest of the Caribbean. When appropriate allowances are made for a major airport project, capital to labour ratios of other Puerto Rico investment show that US\$1 million yields 39 jobs.

At the same time, calculations show that with respect to aggregate overseas direct investment in the Caribbean involving manufactured exports, between 1984-89, US\$1 million created only 58 jobs. Specifically, in relation to United States foreign direct investment in the Caribbean (1984-89), US\$1 million created 56 jobs.⁴⁰ And in terms of Caribbean Basin-related investment, US\$1 million accounted for only 34 jobs.⁴¹

Thus, it can be concluded that even in terms of the relatively high-priced labour market in Puerto Rico, twin plants are more efficient creators of direct employment than all other forms of overseas direct investment taking place in the Caribbean between 1984-89. Theoretically, the opposite should hold, all things being equal - more jobs per unit of capital

should be created where wages are lower, namely in low-wage economies in the Caribbean. It may be recalled that twin plants create the greatest amount of employment per capital invested in activities in the rest of the Caribbean (namely 151 jobs for every US\$1 million invested).

Table X. Comparative capital to labour ratios - CBI and Puerto Rico, 1985-89

Twin plant investment	Twin plant jobs	Capital to labour ratio
Total CBI: US\$52.5M	Total CBI jobs: 7 939	US\$1M = 151 jobs (CBI)
Total PR: US\$28M	PR jobs: 2 835	US\$1M = 101 jobs (PR)

Source: Based on data supplied by the Economic Development Administration.

Table XI. Comparative capital to labour ratios involving foreign direct investment in the Caribbean, 1985-89

Investment	Full-time jobs	Capital to labour ratio (CBI countries)
Twin plant: US\$52.5M	7 939	US\$1M = 151
Other: US\$112M	2 183	US\$1M = 19*
Total foreign direct investment in the Caribbean: US\$1.6 billion	95 535	US\$1M = 58
Total United States foreign direct investment in the Caribbean: US\$875 million	48 672	US\$1M = 56
Total CBI related: US\$447 million	15 603	US\$1M = 34

* Other (excluding Air Jamaica) US\$1M = 39.

Source: Economic Development Administration and Caribbean Basin Investment Survey (Washington, United States Department of Commerce, 1989).

The above figures are, however, aggregated. It is of interest to disaggregate these in terms of product groups. For example, it is estimated that apparel companies as a group, although accounting for less than 10 per cent of US\$1.6 billion invested in the Caribbean between 1984-89, have created almost half the total number of new jobs; that roughly is 47,767 during this period.⁴² Hard research is required to shed greater sectoral light.

In this regard, it may be recalled that available evidence suggests that electronics is the biggest single provider of twin plant employment in both Puerto Rico and the Caribbean. As noted already, textiles and apparel accounts for the bulk of full-time direct employment involving multinationals in the Caribbean between 1984-89.

The evidence broadly suggests that manual, unskilled or semi-skilled, and routine operations involving minimal training are performed in complementary plants in the Caribbean. Highly skilled activities such as engineering, design, finishing and the like are performed in Puerto Rico - a point made several times before. Generally, these activities involve in-depth training and experience.

Caribbean operations are made compatible with the reservoir of low-pay, unskilled labour, seeking industrial employment. A significant portion of these workers are female, particularly in electronics, and apparel and textiles. These are said to be suited for assembly-type operations since such operations do not call for much technical training. Accordingly, minimum educational qualifications are required - often not exceeding secondary school.

Wages and working conditions

Precise data are not available on wages and working conditions in twin plants, given the recent occurrence of the phenomenon and the failure, at times, to differentiate it from other firms operating in, for example, free zones. The bulk of twin plants in the Dominican Republic and Costa Rica operate in free zones. In Barbados, Grenada, St. Kitts, and Dominica, they are found in enclaves which are set up to promote international exports.

Since union activity is not strongly encouraged by firms operating in free zones, collective bargaining does not always take place. While wage rates in some free zone occupations are at times higher than the national average, it is another question, given higher productivity levels in such zones whether wage rates are really satisfactory. For example, a recent study shows that labour productivity in export manufacture in the Caribbean varied from 50 to 90 per cent at the United States level. At the same time, wage rates in semi-skilled export manufactures were substantially less than this in all Caribbean countries where twin plant operations are found.⁴³ For example, a recent study found that adjusted hourly wages (including fringe benefits) were Barbados, US\$2.10; Costa Rica, US\$1.15; Dominican Republic, US\$0.55; Dominica, US\$0.83; Grenada, US\$0.75; Haiti, US\$0.58; Jamaica, US\$0.88; Panama, US\$1.77; St. Kitts, US\$0.90; and Puerto Rico, semi-skilled wages were US\$4.28.

The problem of working mothers, day-care facilities, transportation, sick benefits and severance pay, among others, tend to be important issues, affecting workers in twin plants located in free zones. In this respect, indications are that twin plants employ predominantly female labour.

Given low levels of training provided in the Caribbean, occupational mobility in the workplace tends to be limited. In some instances, we have found that night shift work is put into effect. Overtime pay is the rule then.

We were unable to ascertain how common was the occurrence of strikes, and the overall industrial relations climate - although available evidence suggests that this is reasonably healthy.

The potential problem of sudden unemployment is also critical in view of the footloose nature of twin plant operations and geographical shiftability in response to global competitive pressures and the related problem of product costs. This has not yet surfaced. To date, most twin plants set up are still in operation.

Top management in Caribbean twin plant is made up largely of expatriates, whereas in Puerto Rico a high percentage of nationals occupy senior management positions in twin plants.

Full and part-time workers in direct employment

Information reveals that twin plants hardly employ part-time workers; employees are engaged, namely, in full-time work.⁴⁴ This contrasts with an estimated 21,100, part-time employment created between 1984-89 by all multinational enterprises operating in the Caribbean. At the same time, it is estimated that other United States multinational firms created 10,761 part-time employment in the Caribbean during this period.⁴⁵

With respect to CBI-related investment, 10,000 part-time jobs were created out of total full-time employment of 15,603. Part-time employment is largely due to seasonal employment considerations. There is a built-in insecurity associated with this type of employment since the number of hours of work, and the number of part-time workers to be employed at a given time, is not automatically determined.

MNEs, twin plants and indirect employment issues

Over the years, several attempts have been made at evaluating indirect employment effects of MNEs in developing countries.⁴⁶ Research shows that the size of indirect employment effects is associated with the length of operations of MNEs in a host country - the longer established the firm, the more it contributes to indirect employment.⁴⁷ In this respect, the older established foreign firm tends to have a less disruptive impact on local employment than new ones. At the same time, it was found that labour-intensive industries tend to generate less indirect employment than capital-intensive firms. An earlier study attempted to link indirect employment effects to corporate policy and see if some firms deliberately sought to develop backward and forward linkages in host countries.⁴⁸ The magnitude of these effects were, in turn, found to be associated with supportive policies of host governments.⁴⁹ Research has also found that the growth rate of enterprises influences indirect employment effects - high growth leads to high indirect effects and vice versa. One investigation found that fully owned subsidiaries tend to have fewer indirect employment effects than joint ventures, for example.⁵⁰

The nationality of multinational enterprises was also found to influence indirect employment effects.⁵¹ For example, Japanese firms were found to have fewer backward and forward linkages, whereas European and Third World multinational enterprises tended to have stronger linkages in the domestic economy.

Precise data are non-existent on indirect employment effects of twin plants in the Caribbean. Indirect employment, however, is likely to be insignificant on account of:

- (1) The recent origin of the phenomenon. It is barely 4 years old.
- (2) Assembly-oriented nature of production means that linkages tend to be intra-corporate rather than host-country-specific.
- (3) Limited subcontracting is encouraged between twin plants and domestic enterprises. Further, joint ventures do not generally exist in twin plant operations.
- (4) Local raw materials are hardly used in production processes except in the case of Costa Rica where agro-processing takes place, hence the scope for some backward linkages into agriculture and related indirect employment. But this is likely to be small, given the size of this subsector.
- (5) Forward linkages are virtually non-existent in the host countries. These exist mainly with Puerto Rico plant counterparts.
- (6) Industrial policy is not generally geared to stimulate intersectoral linkages between twin plants and the rest of the economy. This is sometimes looked upon as imposing too many conditions on foreign investment.
- (7) Twin plants are new and fairly small in number compared to ongoing investments in free zones and enclaves. They are not likely to contribute heavily to employment related to initial infrastructure services associated with export-oriented manufacture which in some cases is nearly two decades old.

Twin plants hardly compete with local enterprises on the domestic market. On account of this, industrial displacement and attendant unemployment due to "foreign" competition are likely to be non-existent or minor. In the main, competitive pressures with local enterprises are likely to be in the form of wages and infrastructural services. We have been unable to measure the role of these factors on labour displacement in existing domestic enterprises due to the lack of data.

Benefits and costs of twin plant investment

Benefits and costs of twin plants cannot be firmly quantified because of the lack of data. Some preliminary observations can, however, be made. For recipient countries in the Caribbean, the main benefits include: employment, increased manufactured exports via re-exports, diversification of trade structures, and economic growth based on new economic activities. These effects will, of course, tend to vary from country to country depending on the extent of twin plant investment.

Based on current evidence, aggregate job creation and exports from twin plant investment are greatest in the case of the Dominican Republic. As already indicated, some CBI countries have so far failed to benefit from such investments, whereas others have benefited only marginally from these.

For Puerto Rico, the main discernible benefits are: retention of firms which would otherwise migrate to low-cost locations in the Far East or

elsewhere; employment retention based on this and new ones from additional projects, and exports which it would otherwise lose. At the same time, based on investment outlays in Puerto Rico, it is clear that twin plant investments in Puerto Rico are substantially small compared with aggregate investment by United States firms in Puerto Rico which amount to some US\$16 billion. Twin plant investment in Puerto Rico, it may be recalled, was at the same time US\$28 million.

Against these benefits one must consider costs associated with such investments. For third countries in the Caribbean, the major costs are likely to be in the potential shiftability of twin plant operations to new ones, in response to changing the international wage costs, among other things. This is a classic feature of branch plant investment, sometimes called "footloose" for this reason. In this respect, the Far East can be viewed as a competitor for alternative location sites because of low relative wage rates. Although Far East countries are not beneficiaries of the CBI, market access to the United States is guaranteed for some products under 806 and 807 of the United States Tariff Code. Furthermore, the Far East represents a market which is yet to be fully tapped by United States investors.

At the same time, cheaper transport costs with respect to intraregional Caribbean transport can offer a challenge to Puerto Rico and third countries in the Caribbean to maintain competitiveness vis-à-vis the Far East.

In addition, other likely costs include: high import content of production inputs given the "assembling" nature of production, and increased dependence on the United States for capital, finance, and markets and lack of meaningful transfer of technology. These can result in a high balance-of-payments burden and a fragile basis for industrialisation, in view of the easy shiftability of such operations. Sudden movements, for example, can adversely affect manufacturing employment and exports and, with these, economic buoyancy.

On the other hand, there is reason to believe that these costs can be reduced by concerted investment policies aimed at attracting a wider range of investors, notably from Europe, Canada and the Third World. The active incorporation of indigenous technology, raw materials, entrepreneurship and management in twin plant activity, and a strategy of technology transfer, can also help to create a local buffer against possible "external" shocks associated with the sudden migration of United States capital to new locations in response to changing global business conditions.

Available evidence, it may be recalled, leads to the view that twin plant investments from Puerto Rico are generally very small in overall foreign direct investment in a number of the Caribbean countries. For example, Jamaica, Barbados, Trinidad and Tobago, Grenada and Haiti are cases. Even so, it is possible for twin plants to assume a greater role in these economies if present trends continue, given among other things, the availability of a large pool of investment resources, namely 936 funds.

Summary and recommendations

We now summarise the main findings of this preliminary study:

- Twin plant investment represents a new dimension to export-oriented, assembly industrialisation in the Caribbean.

- It is a means through which MNEs attempt to cut labour costs, maintain global competitiveness, and seek to capitalise on market access to the United States through the Caribbean Basin Initiative. It, however, represents a small share of overall investment by MNEs in export-oriented manufacturing in the Caribbean, appearing only in 1985.
- At the same time, it is an important source of investment from Puerto Rico to the Caribbean.
- Labour intensity of twin plant investment was found to be much higher than other investments emanating from Puerto Rico. It was also (including Puerto Rico) significantly higher than all other forms of foreign direct investment in the Caribbean, taken as a group. This makes twin plant investment a specially attractive mechanism for employment in the Caribbean.
- The employment impact is largely limited to two countries: Costa Rica and Dominican Republic. To date, most twin plant employment in the Caribbean is in electronics. This is followed by pharmaceuticals. Textiles and apparel come third.
- Twin plants employ mainly full-time workers, whereas other forms of investment in the Caribbean involving MNEs tend to also use part-time workers.
- Twin plants tend to employ largely unskilled female labour. At the same time, Puerto Rico specialises in technology-intensive operations demanding highly skilled workers.
- Pay, although at times higher than domestic industries, tends to be below prevailing levels of labour productivity.
- Indirect employment effects seem to be minimal.
- There seems to be limited scope for occupational mobility in twin plants given the tendency to use mainly unskilled labour.
- Although there are definite advantages associated with twin plants (direct employment, new industries, exports, etc.) a major potential cost is the possible movement of investment capital to new geographical locations in response to wage cost and other considerations. Limited technology transfer also takes place in the Caribbean.

The following tentative recommendations can be made with respect to employment issues:

- (1) Since twin plants play an important role in job creation, to maximise this contribution in the face of high rates of unemployment in the Caribbean, attempts should be made at stimulating indirect employment via backward, forward and lateral linkages.
- (2) Twin plants should be encouraged to upgrade local skills and to develop local management talent so that they can contribute more meaningfully to skill formation in the Caribbean.
- (3) Twin plants should be encouraged to transfer technological knowledge to host countries and therefore help in the diffusion of modern technology.
- (4) Consideration should be given to linking wage levels to prevailing labour productivity levels to ensure equity in terms of income levels.

- (5) Since twin plants are likely to shift geographic locations there is need to incorporate, wherever possible, local firms in production operations to ensure minimum employment disruption. This can reinforce (3).
- (6) Factory and overall working conditions, particularly as they affect female labour, should be kept under constant review with a view of improvement wherever possible.

In these approaches, individual country initiatives should be supported by wider regional initiatives involving host countries, namely CBI countries, to ensure maximum effect through common policies.

Meanwhile, obvious gaps exist in this study. The following areas of research in the field of employment, accordingly, can be identified:

- (1) In-depth analysis of working conditions in twin plants, and analysis of differences between twin plants and other firms in export industries.
- (2) Quantification of the actual contribution of twin plants to indirect employment trends.
- (3) Quantification of the role of part-time employment in twin plant employment.
- (4) In-depth study of factors accounting for the heavy concentration so far of twin plant investment in the two Caribbean countries, namely Costa Rica and the Dominican Republic, and limited employment elsewhere.
- (5) More in-depth comparative analysis of labour intensity between twin plants and other forms of foreign direct investment in the Caribbean with respect to specific sectors, i.e. electronics, textiles and apparel.

Notes

¹ Data supplied by the Economic Development Administration of Puerto Rico.

² *ibid.*

³ Twenty-two countries from Central America and the English-speaking Caribbean countries were designated CBI countries. CBI provisions came into effect in 1984. In 1989, Guyana became a CBI country. Caribbean countries or rest of the Caribbean in this study broadly refers to CBI countries unless specifically stated otherwise.

⁴ Data from Selected socio-economic statistics: Puerto Rico (San Juan, Economic Development Administration, 1987).

⁵ Data from Puerto Rico in figures (San Juan, Government Development Bank, 1987).

⁶ *ibid.*

⁷ *ibid.*

⁸ L. Birger: "Puerto Rico: A winner in promoting itself and gaining new jobs", in Miami Herald, 7 Dec. 1989.

⁹ *ibid.*

¹⁰ Selected socio-economic statistics ..., op. cit.

¹¹ ibid.

¹² F. Fröbel, J. Heinrichs and O. Kreye: The international division of labour (London, Cambridge University Press, 1980).

¹³ ibid.

¹⁴ See Selected socio-economic statistics: Puerto Rico (San Juan, Economic Development Administration, 1987).

¹⁵ ibid.

¹⁶ This partly governs the supply of investment resources available to a given country.

¹⁷ Information supplied to the author by the President of the Government Development Bank.

¹⁸ Speech at Citibank's Fourteenth Annual 936 Conference, 27 Mar. 1987.

¹⁹ Selected socio-economic statistics ..., op. cit.

²⁰ The labour force of Puerto Rico (San Juan, Economic Development Administration, 1986).

²¹ Selected socio-economic statistics ..., op. cit.

²² Puerto Rico Business Review, Vol. 12, No. 8, 1987.

²³ Quoted in Caribbean development programme (San Juan, Economic Development Administration, 1987).

²⁴ Information supplied by the Economic Development Administration of Puerto Rico. This is so even though not all CBI countries are hosts of twin plant investment.

²⁵ See Alfred Roach in Puerto Rico Business Review, Vol. 12, No. 8, 1987.

²⁶ Larry Putterman, Executive Vice-President, Milton Shoe, Inc., in Puerto Rico Business Review ..., op. cit.

²⁷ Caribbean development programme (San Juan, Economic Development Administration, 1987).

²⁸ Citibank's Fourteenth Annual 936 Conference, 27 Mar. 1987.

²⁹ This is brought out by recent official pronouncements.

³⁰ See Development under siege (New York, UN, 1987).

³¹ Puerto Rico's economic development programme (San Juan, Economic Development Administration, 1987).

³² ibid.

³³ Excluding Jamaica, other investment from Puerto Rico amounted to US\$26 million.

³⁴ Information supplied by MNEs through the Economic Development Administration.

³⁵ Source: Caribbean Basin Investment Survey (Washington, United States Department of Commerce, 1989), p. 4.

³⁶ ibid.

³⁷ ibid.

³⁸ Mainly involving United States multinational firms in manufacturing production in the CBI geared for exports to the United States. See Caribbean Basin Investment Survey (Washington, United States Department of Commerce, 1989).

³⁹ This refers to full-time employment.

⁴⁰ See Caribbean Basin Investment Survey ..., op. cit.

⁴¹ Specifically related to market access to the United States through investment in CBI countries.

⁴² ibid.

⁴³ See findings from Bobbins Consulting Group, 1988. This study covered all countries in which twin plant investment was found.

⁴⁴ Information supplied by the Economic Development Administration of Puerto Rico.

⁴⁵ See Caribbean Basin Investment Survey ..., op. cit.

⁴⁶ N. Jéquier: Measuring the indirect employment effects of multinational enterprises: Some suggestions for research framework, Working Paper No. 56 (Geneva, ILO, 1989), for some discussion.

⁴⁷ A. Halbach: Multinationale Unternehmen und Zulieferindustrien in der Dritten Welt (Frankfurt, Campus Verlag, 1985).

⁴⁸ See S. Lall: Technological change, employment generation and multinational enterprises: A case study of a foreign firm and a local multinational in India, Working Paper No. 28 (Geneva, ILO, 1983).

⁴⁹ ILO: Technology choice and employment generation by multinational enterprises in developing countries (Geneva, ILO, 1984).

⁵⁰ ILO: The economic and social effects of multinational enterprises in export processing zones (Geneva, ILO, 1988).

⁵¹ L. Lim and P. Fong: Technology choice and employment creation: A case study of three multinational enterprises in Singapore, Working Paper No. 16 (Geneva, ILO, 1981), and S. Lall: Technological change, employment generation and multinational ..., op. cit.

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