

Growth Trends and Economic Impacts of Selected Industries on the Puerto Rico Economy

Knut Ingar Westeren¹

Abstract: The main purpose of this article is to account for the difference between the GDP and GNP growth patterns in the Puerto Rico economy over the last four decades, where GDP represents the total output of the economy while GNP represents the total income remaining on Puerto Rico. We focus on growth strategies in general and on how the effects of one of the major economic policies, section 936 of the Internal Revenue Code (936 IRC), has influenced the development of the Puerto Rico economy in particular. The analysis shows that substantial parts of the income created from Puerto Rico's industrial expansion have been transferred to the U.S. by the large exports-producing companies in Puerto Rico. We also demonstrate by model calculations that growth strategies based on expansion in service and import substitution sectors would have been more favorable for increasing employment, income and related production activities.

Keywords: Puerto Rico, growth strategies, export, import substitution.

Resumo: O objetivo principal deste artigo é explicar a diferença entre o PIB e os padrões de crescimento do Produto Nacional Bruto na economia de Porto Rico nas últimas quatro décadas, onde o PIB representa a produção total da economia, enquanto o PNB representa a renda total que permanece em Puerto Rico. Nós nos concentramos em estratégias de crescimento em geral e sobre como os efeitos de uma das principais políticas econômicas, o artigo 936 do Código Tributário Nacional (936 IRC), tem influenciado no desenvolvimento da economia de Porto Rico, de forma peculiar. A análise mostra que partes substanciais da renda criada a partir da expansão industrial de Porto Rico foram transferidas para os EUA através das grandes companhias produtoras-exportadoras. Nós também demonstramos através do modelo de cálculos que as estratégias de crescimento com base na expansão do setor de serviços e a substituição de importação estaria sido mais favorável para o aumento do número de emprego, renda e atividades relacionadas à produção econômica.

Palavras-chave: Porto Rico, estratégias de crescimento, exportação, substituição de importação.

Introduction

1.1 The development in Puerto Rico in perspective

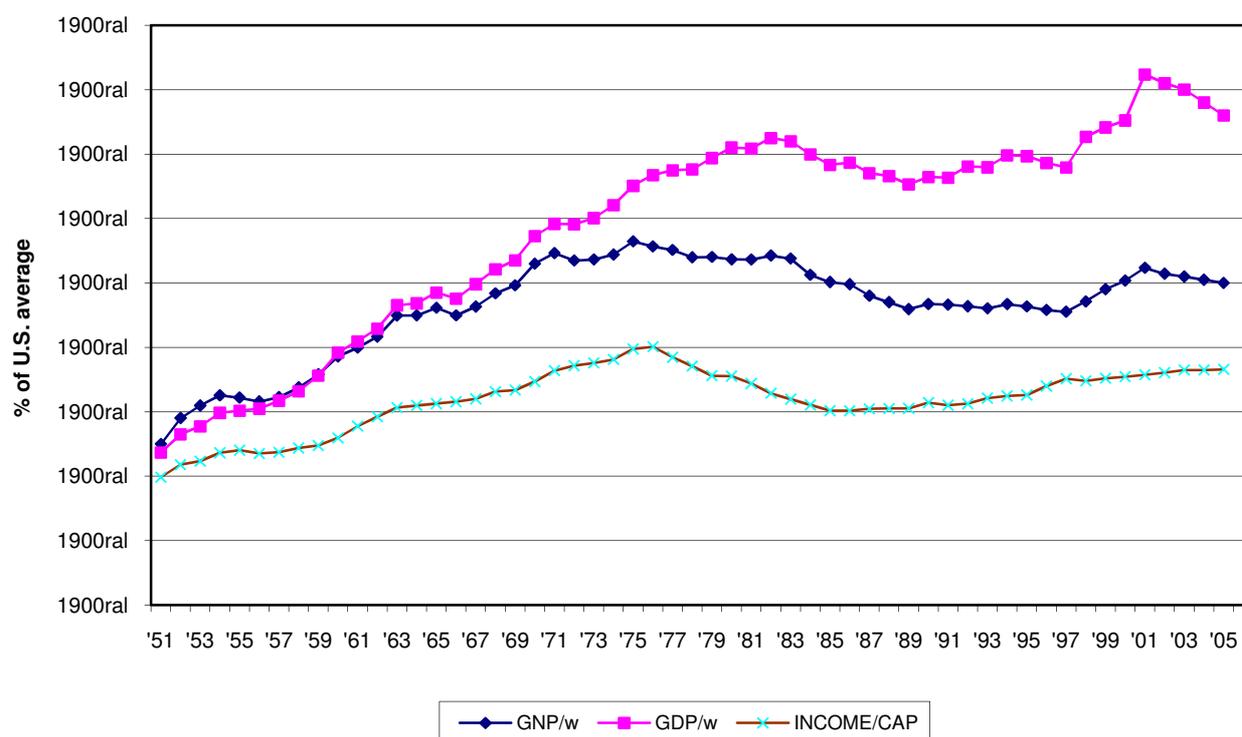
From 1950 to 1970 Puerto Rico had a more rapid economic growth than the average performance of the U.S. Around 1970 Puerto Rico saw the introduction of new export industries that gave rise to a growing discrepancy between Gross Domestic Product (GDP) and Gross National Product (GNP).

GDP measures the total output of the economy while GNP represents the total income remaining on the island. An important reason why the GDP and the GNP curves started to diverge around 1970 is mainly due to the development of export industries that sent substantial amounts of money back to mainland USA as proprietor income.

In 1950, Gross National Product per worker (GNP/w) in Puerto Rico was about 25% of the U.S. average and rose to about 50% in 1970. From 1970 to 2005 GNP/w has stayed around 50% of the U.S. average. On the other hand, GDP per worker (GDP/w) increased from about 50% of the US average in 1970 to around 70% from 1980 to 1996, reaching a peak about 80% of the U.S. average in 2001 and then falling back to about 76% in 2005, see Fig. 1.

¹Nord-Trøndelag University College - Steinkjer, Norway. Email: knut.i.westeren@hint.no

Fig. 1 - Puerto Rico Economic Indicators as a percentage of United States level, source Government Development Bank for Puerto Rico, 2006



The development in Puerto Rico since 1970 has given rise to many discussions about the sources of its lagging economic growth with related issues being approached from at least three angles:

- Economic strategies for development on the island.
- U.S. federal spending and fiscal policy.
- The political situation: Is Puerto Rico better off with Commonwealth status (as of today), as a new U.S. state, or as an independent country.

These issues are interrelated, but in this paper we will focus on growth strategies and how the effects of one of the major economic policies, section 936 of the Internal Revenue Code (936 IRC), has influenced the development of the Puerto Rico economy. To answer some of these questions we will use the IMPLAN model, which was developed for Puerto Rico for 1982 and 1992 to help identify the sources and impacts of economic growth, MIG (1994) and (2004). This type of model is often used for local and regional impact analyses associated with particular infrastructure investments, but in this case we use the model for structural analyses of changing growth patterns.

1.2 Theoretical background

Many theoretical points of departure can be used for the analysis of the Puerto Rico development. Particularly relevant for our approach is the work of Albert Hirschman where he focuses on unbalanced growth and how linkages can be introduced into the analysis. In this paper we show/demonstrate that unbalanced

growth has been an important development factor in Puerto Rico and our main methodology is input/output analysis where the concept of linkages is essential.

In the 1950s Hirschman analyzed the processes of industrialization in developing countries, especially in Latin America (Hirschman, 1967). The concepts of unbalanced growth and linkages was developed to counter the neoclassical assumptions used in the 1950`s (and still used by many today) that the factors of production and entrepreneurship are evenly distributed in the economy. Hirschman's main thesis was that "development depends not so much on finding optimal combinations for given resources and sectors of production as on calling forth and enlisting for development purposes resources and abilities that are hidden, scattered, or badly utilized" (Hirschman, 1958).

He used the concepts of forward and backward linkages in a dynamic setting to analyze processes of development and change. Hirschman saw the advantages of how input-output analysis sheds light on what he meant by the concepts of forward and backward linkages in the analysis of developing processes. His line of thought was that an input-output table for a country (or a region) would have many empty cells in an early phase of its industrializing process. As time passes more and more cells will be filled as the effects of forward and backward linkages spread in the economy.

Input-output analysis was developed in the 1950s and as data was developed this could be used to describe dynamic forces in the industrializing processes in both developed and undeveloped countries. Hirschman's analysis and formulation of concepts can be compared to Perroux's concept of growth pole, Perroux (1955).

Hirschman finds it important to differentiate between countries which are at the start of industrialization, and countries that are at a later stage of development. Hirschman says that developed countries usually have a more balanced interaction in the production of finished goods, investment goods and raw materials. In such countries, the growth process will to a high degree be an interaction between forward and backward linkages. In this respect it is important to differentiate between the U.S. economy and what has happened to the Puerto Rico economy. Puerto Rico has experienced negative effects from policies relying solely on backward linkages from few specialized export industries.

The level of investment plays an important role in Hirschman's theory of economic development under non equilibrium. "Investment decisions (are essential) not only because of their immediate contribution to output, but because of the larger or smaller impulse such decisions are likely to impart on further investment, that is, because of their linkages", Hirschman (1992).

As early as in the 1950`s, Hirschman was in favor of export policies that allocated money to the exporting country, especially when the economic activity was based on foreign companies utilizing local resources. In such cases Hirschman argued that the country should use money from export activities to better the conditions for regional growth poles via investments in education, transport systems and other infrastructure. In our analysis we show the consequences of not returning the gains from export to the local economies. Hirschman also argued that all policies had to take into account the actual historical and economic conditions because the stage of development is of crucial importance.

2. Section 936 of the Internal Revenue Code as a development measure

Several articles and investigations have focused on the use of Section 936 of the IRC in recent years, e.g. Hexner and Jenkins (1998), Hunter (2003), U.S. Congressional Budget Office (1990) and U.S. General Accounting Office (1996). 936 IRC has been in effect in the post war period in Puerto Rico and was initially meant to attract labor intensive manufacturing to stimulate the economic development on the island. 936 IRC exempted U.S. corporations from paying federal income tax on income earned by their Puerto Rican subsidiaries. The Puerto Rico authorities also had their own tax subsidy program that exempted corporations under the 936 IRC legislation from the Puerto Rico income tax.

The cost of this program has been substantial, as illustrated by Hexner and Jenkins (1998):

“Even for historical purposes it is worth examining how costly and ineffective section 936 proved to be. In 1989, section 936 cost U.S. Treasury \$2.37 billion or \$22 375 per 936 section employee. Because the annual wage in corporations receiving 936 credits was only \$20 540 in 1989 the U.S. Treasury was paying \$1 835 more per employee in tax losses than the employee received in salary from his or her employment. The pharmaceutical industry received even more in tax benefits for each job.”

During the 1990s U.S. Congress reduced the effects of Section 936 IRC for Puerto Rico. Starting in 1996, 936 IRC claims were eliminated for new corporations and phasing out benefits for existing recipients over the next 10 years. It was calculated that 936 IRC in 1994 cost \$3.8 billion in lost revenues and that the ten year phasing out from 1996 to 2006 will cost about \$25 billion.

Termination of 936 IRC was a main factor in the Congressional Budget Office (1990) analysis which concluded that there will be a drop in the gross domestic product by 10-15% and an increase in unemployment of 4-7 percentage points. Others have challenged these calculations as being too negative, see Hexner and Jenkins (1998).

3. Economic development in Puerto Rico in recent years

3.1 Introduction

Puerto Rico experienced the same recession as the U.S. in the early 1980s and after that total employment has grown from about 700 000 in the mid 1980s to about one million in 2000, see Table 1. After year 2000 employment growth stopped and in 2006 still remained a little above a million.

Table 1 - Employment on Puerto Rico, All Employees, Thousands

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
All Employees	693.1	679.7	641.6	645.6	684.2	692.5	728.0	763.8	817.8	837.4	846.1	837.9	858.2	871.8

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
All Employees	898.1	929.7	973.1	989.3	997.0	1011.3	1025.3	1008.6	1005.0	1021.6	1045.9	1047.7	1042.8

Source: U.S. Bureau of Labor Statistics.

Behind the total growth there has been a considerable change in the economic structure. Employment in the manufacturing industries experienced a large build in the up late 1960s and the beginning of the 1970s and reached a peak in the mid 1990s with more than 150000 persons employed, see Table 2. A downward trend started in the end of the 1990s but seemed to phase out during 2003 and later years.

Table 2: Employment in manufacturing industries (in 1000).

Year	1967	1972	1977	1982	1987	1992	1997	1998	1999	2000	2001	2002	2003
Manufacturing employment	121.5	149.7	146.9	143.2	150.0	154.5	154.7	147.6	144.1	142.7	129.4	118.1	116.3

Source: U.S. Bureau of Labor Statistics.

3.2 Puerto Rico 1992-2002

Table 3 shows the employment changes from 1992-2002 in specified industries. The general trend is a decline in manufacturing industries and growth in the service sectors. This compares with the results from the multiplier analysis. These results occur in part because of the large multiplier effects of rising personal incomes and the increasing preference for consumer services.

Table 3: Wage and Salary Employment in Specified Industry, Puerto Rico, 1992-2002

Year	SIC	1992 (thou.)	1997 (thou.)	2000 (thou.)	2002 (thou.)	% Chg '92-'02
Manufacturing:						
Food & Kindred	20	20	19	16	13	-35,0
Tobacco Products	21	1	1	1	1	0,0
Textile Mill Products	22	4	4	2	1	-75,0
Apparel & Other Textiles	23	29	21	16	11	-62,1
Chemicals & Allied	28	26	27	28	28	7,7
Leather & Leather Prod	31	6	7	4	2	-66,7
Stone, Clay, and Glass	32	5	5	6	4	-20,0
Industrial Machinery	35	3	3	4	3	0,0
Electronic & Other Electric	36	19	24	20	15	-21,1
Transport Equipment	37	1	1	1	0	-100,0
Instruments	38	16	15	15	13	-18,8
Misc. Manufacturing	39	2	2	2	1	-50,0
Total, Manufacturing		132	129	115	92	-30,3
Total, Retail Trade		84	107	119	106	26,2
Total, Financial		28	32	32	27	-3,6
Private services:						
Hotels	70	10	14	14	12	20,0
Personal Services	72	4	5	5	4	0,0
Business Services	73	35	55	62	54	54,3
Health Services	80	33	43	52	47	42,4
Education Services	82	28	29	30	27	-3,6
Social Services	83	6	11	12	12	100,0
Total, Private Services		115	157	175	156	35,7
Government, Education		91	87	90	86	-11,5
Total, Specified Industries		446	514	527	458	2,7
Other Employment		541	618	647	728	34,6
Total Employment		987	1,132	1,174	1,186	20,2

Source: County Business Patterns, U.S. Department of Commerce, 1994-2004.

Table 3 shows that total wage and salary employment in manufacturing fell from 132 000 to 92 000, a 30.3 percent decline in 10 years. Behind that development are two declining trends – one for the small establishments in locally-oriented manufacturing, the other for the large establishments in the subsidized capital intensive exports manufacturing industries. However, total private services employment increased more than the reductions in manufacturing. In short, Puerto Rico, like much of the U.S. is growing into a services-based economy. This growth is more than likely underestimated because of a significantly large informal economy.

It is too early to give a complete assessment of the economic situation after the termination of the 936 IRC, but the Government Development Bank for Puerto Rico (2006) has published macroeconomic indicators for the last ten years. They show that Gross national product in fixed prices grew on the average of 3,4% for 1996-2000. At that point Puerto Rico experienced a reduction in growth with a growth of 1,5% in 2001 and a negative development with a reduction of 0,3% in 2002. From 2003- 2005 Puerto Rico is back on a growth pattern of about 2,3% of GNP in fixed prices. Registered unemployment has varied from 10-14% from 1995-2005 with a

downward trend. The only conclusion so far is that the estimates from the Congressional Budget Office were too negative.

4. Analysis of expansion scenarios for the Puerto Rico economy based on the 1982 and 1992 Implan framework

4.1 Introduction

In the early 1980s Puerto Rico was facing a setback for the economy as a whole, but the export related part of manufacturing was only minimally affected. This growing diversity of the Puerto Rico economy stems, in part, from expanding trade with the U.S., Mexico and other countries. One important reason for the expansion in export oriented manufacture was 936 IRC and the income tax credit it offered Puerto Rico's manufacturing exports. Table 4 shows production in selected industries, by ownership, for 1992 and 1997. Production in firms with non Puerto Rico ownership was getting the benefits from 936 IRC, which played a very important role for the production increase in manufacture in the 1980's and 1990s.

Table 4 - Production values (in \$1000) in selected industries in 1992 and 1997, total and non-domestic ownership

	1992 Total	1992 Non- domestic 936 IRC	1992 936 in % of total	1997 Total	1997 Non- domestic 936 IRC	1997 936 in % of total
Food and kindred products	5240	3280	62,6	5308	3672	69,2
Apparel and other textile products	1412	585	41,4	1080	467	43,2
Chemicals and allied products	13253	9600	72,4	25418	21178	83,3
Petroleum and coal products	1707	1128	66,1	1219	1034	84,8
Industrial machinery and equipment	1292	770	59,6	2940	na	na
Electronic and other equipment	2779	1810	65,1	4360	1296	29,7
Instruments and related products	1874	1154	61,6	2076	1470	70,8
Total, above mentioned sectors	27557	18327	66,5	42401	29117	68,7
Mfg not mentioned above	3768	747	19,8	4474	3125	69,8
Total Mfg	31325	19074	60,9	46875	32242	68,8

Source: U.S. Bureau of Census, Statistics for Outlying Areas 1992 and 1997.

Table 4 shows that a substantial part of Puerto Rico production is originated in U.S.-based companies. U.S. based ownership increased from 1992 to 1997 in all sectors, except electronics. This development took place despite the fact that subsidies from 936 IRC were to be reduced in coming years. U.S.-based companies

thus continued their exports for several years following the termination of the subsidy program.

4.2 The 1982 analysis

An IMPLAN-based structural analysis was done for 1982 and used to make multiplier analysis in a series of four hypothetical impact assessments. In each case, industry exports expand by \$1 million from a base year 1982 represented in Table 5, the six key indicators being final demand, total industry output, employee compensation income, property income, total value added, and total employment.

Table 5 - Summary of industry outlays and product disbursements from a \$1 million change in total industry output (SAM-type multiplier effects)

Sector	Final Demand	Total Ind. Output	Employee Comp.	Property Income	Total Value Added	Employment (1000)
Drugs and pharmaceuticals	1.140	1.444	0.184	0.561	0.769	10.3
Scientific & controlling instr.	1.383	1.885	0.388	0.545	0.987	27.9
Other business services	1.664	2.142	0.994	0.383	1.471	48.4
Visitor spending	1.857	3.021	0.638	0.644	1.438	62.4

Source: Puerto Rico IMPLAN System, 1982.

These results show a larger total impact for the dominantly services type industries than manufacturing industries like drugs and pharmaceuticals and scientific & controlling instruments which received substantial IRC concessions. This indicates that much of the value of concessions, as revealed by the amount of property income change, was transferred to U.S.-based companies. The large property income component for visitor spending relates to the large share of total value added attributed to the real estate, trade, and manufacturing sectors. The services-producing sectors show the larger total effects as a result of their large labor component. Increases in labor earnings convert to corresponding increases in personal consumption expenditures that account for the large induced effect.

The share of property income of value added is much higher for drugs and pharmaceuticals than in the service sectors. The available evidence suggests that a substantial share of the property income in the Drugs and Pharmaceuticals sector went to U.S., while the property income in the service sector to a much higher degree remained local because of local ownership.

4.3 The 1992 update

Puerto Rico industries differ sharply in their contribution to the island's economic base. An area's economic base is represented by those industries that bring new dollars into its economy. The Puerto Rico 1992 input-output tables show close to 90 percent of the total production of the top six export industries was shipped out of the island, see Table 6. Notably, one visitor-related sector—Tourists Hotels—has a large export share compared to total production. Foreign visitors bring new dollars into Puerto Rico as do exports of manufactured products. Import substitutes, on the

other hand, face competition from foreign imports. Each of the three groups of industries has its own unique structure and contributes to Puerto Rico's growth and prosperity, in their own unique ways, as revealed in Tables 6 and 7.

Table 6 - Foreign trade measures for selected sectors, Puerto Rico, 1992

Sector Title	IMPLAN Sector No.	Output (mil.\$)	Exports		Imports		
			Total (mil.\$)	Share (pct.)	Total (mil.\$)	Industry (mil.\$)	Institution (mil.\$)
<i>Large current exports:</i>							
Apparel and Accessories	19	1,149	801	70	213	31	181
Drugs and Pharmaceuticals	24	10,474	9,387	90	1,831	1,408	423
Machinery, Except Electrical	33	1,388	1,339	96	1,295	579	717
Electrical and Electronic Machines	34	3,415	2,968	87	1,640	1,090	550
Prof. and Scientific Instruments	36	2,051	1,978	96	666	571	95
Misc. Manufacturing Industries	37	245	218	89	596	346	250
Total		18,722	16,691	89	6,241	4,025	2,216
<i>Visitor-related:</i>							
Wholesale and Retail Trade	50	9,080	108	1	0	0	0
Real Estate	62	4,528	215	5	0	0	0
Tourists Hotels	63	489	348	71	0	0	0
Total		14,097	672	77	0	0	0
<i>Import substitutes:</i>							
Meat and Meat Products	7	266	21	8	373	60	312
Other Business Services	71	1,403	0	0	108	108	0
Total		1,669	21	1	1,077	169	312
Other industries		34,783	5,421	16	10,440	6,611	4,425
Totals		72,085	23,886	33	19,343	12,600	6,742

Source: Minnesota IMPLAN Group, Inc., Puerto Rico IMPLAN-SAM Model, 2004.

A sector's net exports is the difference between its total exports and total imports. Even on a two-digit sector level, commodity exports are underestimated insofar as the high level of aggregation obscures the actual differences between exports and import that exists on a detailed commodity basis. Both industry output and value added measures overstate the actual performance with outflows of a large part of value added to foreign owners of production facilities.

Table 7 provides 1992 data for comparison with the 1982 base year data. Employee compensation share of total value added remained relatively low in 1992 as

it was in 1982. Most revealing is the high level of proprietor income payments compared with employee compensation - a difference anticipated in the discussion relating to the divergence in the calculated values between GNP per worker and GDP per worker. The input-output model calculates the value added the equivalent of gross domestic product. The model calculations do not reveal the outsourcing of all factor inputs, given lack of specific reference to their ownership. It does, however, show the distribution of factor payments, i.e., value added, by type of factor input.

Table 7 - Industry activity measures for selected sectors, Puerto Rico, 1992.

Sector	Industry	Employee Comp		Proprietor	Property	Value	Employ-
	Output (mil.\$)	Total (mil. .\$)	Share of VA (pct.)	Income (mil.\$)	Income (mil.\$)	Added (mil.\$)	ment (thou.)
<i>Large current exports:</i>							
Apparel and Accessories	1,149	344	64	64	101	536	13
Drugs & Pharmaceuticals	10,474	682	11	2,228	3,526	6,460	19
Machinery, Except Electrical	1,388	143	28	136	216	503	1
Electrical & Electronic Mach.	3,415	372	29	342	541	1,289	17
Prof. & Scientific Instruments	2,051	299	32	247	391	947	9
Misc. Manufacturing	245	45	48	18	28	93	1
Total	18,722	1,885	20	3,035	4,803	9,828	59
<i>Visitor-related:</i>							
Wholesale and Retail Trade	9,080	2,104	38	879	1,391	5,546	153
Real Estate	4,528	203	8	933	1,476	2,663	6
Tourists Hotels	489	203	68	23	37	299	11
Total	14,097	2,510	30	1,835	2,904	8,507	170
<i>Import substitutes:</i>							
Meat and Meat Products	266	27	73	3	5	37	3
Other Business Services	1,403	417	38	257	407	1,086	37
Total	1,669	444	40	260	412	1,123	40
Other industries	34,783	10,071	55	2,394	3,790	18,318	573
Totals	72,085	14,927	40	7,983	12,636	37,702	844

Source: Minnesota IMPLAN Group, Inc., Puerto Rico IMPLAN-SAM Model, 2004.

Both Type 1 and SAM-type multipliers are higher for import substitutes than for large current exports, see Table 8. The 1992 output multipliers compare closely with those for 1982, except for Tourist Hotels and Meat and Meat Products. Employment multipliers for 1992 show a much greater difference (except for Real Estate, which has a large strictly financial component) between the two types of sectors. The Meat and Meat Products Sector is the most labor intensive, that is, it has the highest output multiplier. It also has one of the highest SAM-type output multiplier because of a high level of employee compensation that is spent locally.

Table 8 - Output and employment multipliers for selected industries, Puerto Rico, 1982 and 1992

	IMPLAN Sector No.	Output multipliers				Employment mult. (*)	
		Type 1		SAM-type		Type 1	SAM-type
		1982	1992	1982	1992	1992	1992
<i>Large current exports:</i>							
Apparel and Accessories	19	1.2	1.2	2.6	1.8	14	24
Drugs and Pharmaceutical Preparations	24	1.2	1.3	1.4	1.9	4	14
Electrical and Electronic Machinery	34	1.4	1.4	1.9	2.0	10	19
Professional and Scientific Instruments	36	1.3	1.4	1.9	2.0	8	18
Miscellaneous Manufacturing Industries	37	1.4	1.5	2.0	2.0	10	19
<i>Visitor-related:</i>							
Wholesale and Retail Trade	50	1.4	1.4	3.0	2.4	22	41
Real Estate	62	1.6	1.6	1.9	2.3	8	20
Tourists Hotels	63	2.0	1.5	3.9	2.4	28	46
<i>Import substitutes:</i>							
Meat and Meat Products	7	2.7	1.9	4.1	2.6	26	37
Other Business Services	71	1.1	1.3	2.1	2.1	31	44

(*)The employment multipliers are defined as number of employment created per million dollars of output in the industry
Source: Minnesota IMPLAN Group, Inc., Puerto Rico IMPLAN-SAM Model, 2004.

The Tourists Hotels Sector has the highest employment multipliers—even higher than the Meat and Meat Products and Other Business Services sectors. This sector is highly labor intensive and, hence, its overall economic impact is large, although diminished somewhat by its relatively low level of employment. On the other hand the Retail Trade part of the Wholesale and Retail Trade Sector has a higher level of employment than Tourists Hotels (cf IMPLAN documentation) though it is slightly less labor intensive.

5. Using IMPLAN to analyze development possibilities

5.1 Export expansion scenarios

Policy questions arising from an examination of findings in the Puerto Rico IMPLAN study start with the “export expansion” umbrella. This policy issue is not simply a recognition of the role of exports in economic growth, but represents a real effort to understand how export expansion influences the Puerto Rico economy. The structural analysis also includes government in its production of public goods and assessment of imports as well as opportunities for import substitution.

The Puerto Rico IMPLAN model and database provides the policy analyst with two types of results:

- data from the multiplier analysis
- data from the structural analysis.

The multiplier analysis shows the industry-specific, as well as economy-wide, effects of changes in any export-producing activity or activity cluster. The structural analysis can show not only the multiplier effects, but also the entire set of inter-

industry and inter-sectoral relationships that help identify important limitations as well as possibilities for Puerto Rico's economic growth and development in the years ahead.

5.2 Identifying development scenarios

In this article, we concentrate on selected (?)activities, listed in Tables 7 and 8, to highlight important development scenarios facing the Puerto Rico economy:

- Drugs and Pharmaceuticals
- Professional and Scientific Instruments
- Other Business Services
- Visitor Related sectors.

Each of the industries or activities is marked by above-average growth in its industry group in the 1980 to 1990, but mixed rates of development over the later part of the 1990s and up to 2005.

Drugs and Pharmaceuticals has been a major exporting sector since the build up of manufacturing in the early 1970s. According to Hexner and Jenkins (1998), this sector has benefitted most from the IRS 936, , estimated at \$2 to 3 billion of tax rebates yearly through the early 1990s. The sector had an industry output of \$10.5 billion in 1992 of which \$9.4 was exported (Table 5). This is about 40% of the total export from Puerto Rico that year. In 2002 this sector exported about \$21 billion which is a little more than 40% of Puerto Rico export for that year, Development Bank for Puerto Rico (2004).

The distribution of value added for the Drugs and Pharmaceuticals sector tilted heavily towards ownership. From a total value added of \$6.46 billion in 1992, employee compensation was \$682 million, while proprietor income was \$2.2 billion and property income was \$3.5 billion. Drugs and Pharmaceuticals is a capital intensive sector with high profits, but in this case, the profits do not stay in Puerto Rico.

The structure of the industry is reflected in its multiplier values. The output multipliers for Drugs and Pharmaceuticals are among the lowest for the selected industries, which is what we would expect because of the high levels of proprietor and property income not spent locally. The SAM-type multiplier is also low because employee compensation, even though spent locally, is low.

It is when we come to the employment multipliers that the differences become substantial (see Table 8). Here the Drugs and Pharmaceuticals employment multiplier is exceptionally low, only half the average for that of the other capital intensive export oriented industries. The biggest contrast is represented by Tourist Hotels, with an employment multiplier more than six times as large as Drugs and Pharmaceuticals.

Professional and Scientific Instruments is marked by relative stability in total employment much like the Chemicals and Allied Products industry, of which Drugs and Pharmaceuticals is a part. It shared with Electrical and Electronic Machines the highest percentage of output that was exported in 1992, 96 percent. It had the

highest level of imports relative to exports among the four industry groups and, therefore, low output and IMPLAN type multipliers. Compared to the visitor related sectors, Professional and Scientific Instruments sector had very low multipliers, and, hence, exports from this sector had little impact on job creation.

Visitor Spending is an aggregate of Wholesale and Retail Trade, Real Estate, and Tourist Hotels and reported the highest employment among the four sectors in 1982. Comparable figures are not available for 1992. The visitor-related industry group is marked by low exports, except for tourist hotels, essentially no imports and above-average output and employment multipliers.

Other Business Services accounts for no exports but some imports. Employee compensation for this sector was more than two-thirds of total value added in 1982 - the highest among all sectors. This is a sector likely to grow as the Puerto Rico economy grows in terms of personal income and local business activity.

What best serves the population in Puerto Rico is a related and important issue. A one million expansion in export creates a change in total industry output from the present situation with Drugs and Pharmaceuticals of \$1.444 million while the corresponding effect from Visitor Spending is \$3.021 million. The employee compensation per worker is higher in Drugs and Pharmaceuticals but the difference is relatively small - a consequence of dependence of much of the manufacturing sector on low labor costs and high levels of foreign investment coupled with large outflows of GDP to owners residing outside Puerto Rico.

6. Summary and Conclusions

In this article we have focused on growth strategies and how the effects of one of the major economic policies, section 936 of the Internal Revenue Code, has influenced Puerto Rico's economic growth. In 1982 Puerto Rico was facing a setback for the economy as a whole, but the export-related part of manufacturing was only minimally affected. This growing strength of the Puerto Rico economy in the 1980s stems, in part, from expanding trade with the U.S., Mexico, and other countries. One important reason for the expansion in export-oriented manufacture was the effects of the 936 IRC. During the 1980s and into the 1990s this development continued. Production taking place in firms with ownership outside Puerto Rico were getting the benefits from 936 IRC, which played a very important role for the production increases in manufacture into the 1990s.

This study shows a larger total impact on employment and production for the predominantly services type industries and import substitution industries than the two industries (Drugs and Pharmaceuticals and Scientific & Controlling instruments) which received substantial IRC concession. This indicated that much of the value of concessions, as revealed by the amount of property income, was transferred to U.S.-based companies. The services-producing sectors show the larger total effects on growth as a result of their large labor component. Increases in labor earnings that convert to corresponding increases in personal consumption expenditures that account for the large induced effect.

The share of property income of value added is much higher for drugs and pharmaceuticals than in the service sectors. We do not have accurate statistics of how much of the property income that stays on Puerto Rico, but the available evidence suggests that a substantial share of the property income in the Drugs and Pharmaceuticals sector went to the U.S., while the property income in the service

sector to a much higher degree remained local because of ownership structure of the businesses.

The employee compensation share of total value added remained relatively low in 1992, as it was in 1982. Most revealing is the high level of proprietor and property income payments compared with employee compensation, a difference anticipated in the discussion relating to the divergence in the calculated values between GNP per worker and GDP per worker. These results are not surprising when the lessons we learned from the analysis of development projects from the 1950 and later are taken into account.

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