R&D INVESTMENT IN PUERTO RICO: A Partial Briefing Document

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R&D INVESTMENT IN PUERTO RICO:

A Partial Briefing Document

Purpose Of This Document

This document is intended to provide a background for discussion on how R&D investment in Puerto Rico might be increased.

Section 1, *R&D INVESTMENT IN PUERTO RICO: A Brief Background*, provides a brief background on R&D investment in Puerto Rico.

Section 2*, R&D INVESTMENT IN PUERTO RICO: Short Term and Long Term—How?*, shows the significance of including Puerto Rico in the federal R&D tax credit. (However, from the outset it should be emphasized that tax credits are one important but actually marginal factor of deciding where R&D is done. Federal funding for R&D goes typically to the best scientists. In private sector investment R&D is also decided by where best science and best scientific infrastructure is located and only at the margin by federal tax incentives. Nevertheless, the margin is important!)

Section 3, *R&D INVESTMENT IN PUERTO RICO: Statistical Appendix*, provides a statistical appendix on R&D investment in Puerto Rico

R&D INVESTMENT IN PUERTO RICO:

A Brief Background

Executive Summary—R&D Investment in Puerto Rico

1. 21st century economic growth will more than ever require significant R&D investment.[1]

2. R&D investment in Puerto Rico is (and has been) dangerously low. At an estimated $144 million, Puerto Rico's investment in R&D is miniscule compared to the spending of California ($36 billion), Michigan ($13.3 billion), and South Carolina ($996 million). Puerto Rico invests 0.3% of GDP on R&D; the U.S. invests 2.6%, Ireland, 1.4%, Japan, 2.9%, and Korea, 2.8%. Puerto Rico's R&D investment is inconsistent with its aspirations to U.S. living standards. As a percent of GNP, Puerto Rico's R&D investment is similar to South America and Mexico.

3. R&D investment finds fertile ground (world class universities, world class scientists and engineers, and venture capitalists) and multiplies and flourishes (Silicon Valley, Research Triangle, Austin, and Route 128). The investment in, and conduct of, R&D create the conditions and the critical mass for explosions in economic growth (e.g., Silicon Alley in N.Y.C).

4. Competition for R&D investment by countries, regions, states, and institutions is intense.

5. This document dealing with R&D investment in Puerto Rico is organized into the following five sections:

I. A Background On R&D In Puerto Rico
II. How the Private Sector Decides Where To Do R&D
III. R&D (High Tech) Investment: The Potential Avenue for Puerto Rican Economic Growth
IV. Inducing 936 Firms To Make R&D Investments In Puerto Rico (Restoring Relationships, Optimizing Assets, Changing Directions, And Moving Into The Fast Lane)
V. Empowerment Zones: Another Needed Congressional Action

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[1] National Research Council, *Capitalizing on Investments in Science and Technology*, 1999. Committee for Economic Development, *America's Basic Research: Prosperity Through Discovery*, 1998. Lewis M. Branscomb and James H. Keller, eds., *Investing in Innovation*, 1998.

I. A Background On R&D In Puerto Rico

R&D investment in Puerto Rico remains woefully inadequate, at an estimated 0.3% of GDP, or $144 million annually.[2] The U.S. as a whole invests about **nine times as much as a percent of GDP** (2.61%). South Carolina, the state closest in population to Puerto Rico, expends $996 million on R&D annually, almost seven times as much.

Private sector R&D. Industry investment in R&D is particularly low in Puerto Rico. Total industry spending totals approximately $53 million.[3] Federal surveys of industry R&D spending have found that island firms spend almost nothing on R&D.[4] The most recent Puerto Rico government survey on R&D found that only 30% of manufacturing firms invested in R&D at all.[5]

The minute number of patents originating in Puerto Rico confirms the persistent under-investment in R&D. Puerto Rico accounted for only 435 of the 1.1 million patents generated in the US since 1977, or 0.04% of the total.[6] In comparison, Mississippi generated 2,404 patents during the same time, and South Carolina, a state with a similar population, created 4,345 patents. Even adjusting for population, GDP, or manufacturing GDP, Puerto Rico's patent output is a stunning **1.42%, 1.40%, or 3.36%** of what would be expected if Puerto Rico produced scientific innovation at U.S. levels, and illustrates the room for improvement.

Puerto Rico's private sector invests only about **one tenth of 1%** of GDP on R&D, and constitutes only a third of all Puerto Rico's R&D. In comparison, industrially funded R&D in the United States averages 1.70% of GDP, and composes about two thirds of all U.S. R&D. High tech firms clustered in California, Michigan, New Jersey, New York, and Massachusetts invest $34 billion, $13 billion, $11.1 billion, $9.9 billion, and $8.3 billion each year in R&D, respectively.[7]

Consider if the Commonwealth of Puerto Rico were a U.S. corporation, it would expend at least 10 times as much on R&D (the average corporation invests 3.4%

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[2] Based on most recently available 1997 figures.

[3] An estimate, given the lack of survey data. Total non-industry supported academic R&D spending ($74 million) and federal support for non-academic R&D ($17 million), subtracted from estimated total economy-wide R&D spending (0.3% of GDP, or $144 million in 1997).

[4] The bi-annual Survey of Industry Research and Development, administered by the Bureau of the Census, now includes Puerto Rico. The Survey has either elicited no responses about R&D in Puerto Rico or so few that data is not published to protect proprietary company information.

[5] Information from a survey of 172 manufacturing corporations by the Puerto Rico Economic Development Administration in 1991. R&D spending among respondents totaled only $31 million.

[6] Figure includes utility patents, design patents, plant patents, reissue patents, defensive publications, and statutory invention registrations.

[7] National Science Foundation, Industrial Research and Development, 1997 Early Release Tables, Table A-48.

of sales). Sony, a corporation with sales similar to Puerto Rico's GDP, invests $1.9 billion annually, **13 times as much**. Intel alone invests $2.7 billion in R&D each year (on $27 billion in sales). Forty-nine United States *universities* spend more on R&D than Puerto Rico; Johns Hopkins University alone spends six times as much ($830 million annually).

Government of Puerto Rico funding. Until recently, the Commonwealth of Puerto Rico's funding for R&D has been slight. R&D funding averaged $8 million annually from 1993 to 1997. Last year, the Commonwealth increased its support to $15 million[8], and enacted a 200% deduction for R&D expenses.

Federal funding. Federal funding for R&D in Puerto Rico totaled $49.5 million in 1996.[9] Although Puerto Rico has 1.4% of the U.S. population, it received only 0.08% of all federal R&D funds.[10] The Department of Health and Human Services ($22.7 million), the National Science Foundation ($12.1 million), and the Department of Agriculture ($9.3 million) together provided almost 90% of all federally funded R&D in Puerto Rico. Puerto Rico universities received two-thirds of all federal R&D funds; the University of Puerto Rico (Mayaguez, Medical Services, and Rio Piedras campuses) conducted almost 90% of the federally funded R&D in universities.

Brain drain. Puerto Rico loses 80% of its Ph.D. graduates each year, primarily to the U.S. mainland. The Puerto Rican economy has been unable to create jobs for the 8,000 science and engineering students who graduate from island universities each year.[11]

Puerto Rico ranks next to last of all the 50 States, Puerto Rico, and the District of Columbia in Defense Department funding of R&D, and dead last in R&D funding from NASA.

For more information on research and development in Puerto Rico, please see the statistical appendix attached separately.

II. How the Private Sector Decides Where To Do R&D

World-class scientists and world-class scientific infrastructure are the primary determinants of where R&D is done. R&D is performed in not many locations such as Silicon Valley; Austin, Texas, the Research Triangle and Cambridge,

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8 Conversation with Puerto Rico Economic Development Administration, April 1999.

9 National Science Foundation, *Science and Engineering State Profiles: 1998 Data Update*, Puerto Rico, and United States Statistical Abstract 1998.

10 National Science Foundation, *Federal Funds for Research and Development – FY 1997, 1998, 1999*, Table C-82. Includes R&D plant

11 Average number of graduates from 1990 to 1996. National Science Foundation, WebCaspar Database System, 1999.

Massachusetts. R&D, particularly D, is also done in the facilities of the successful and aggressive new economy pharmaceutical companies.

From a different perspective, market conditions, the ability and environment for successful execution, and the bottom line determine where and how much private-sector R&D investment will take place.

On the margin R&D tax credits can have a significant short as well as long term impact on the bottom line. Thus, they can weigh heavily in determining where (and when) R&D research is performed.

Today **U.S. registered corporations have a disincentive to invest in and perform R&D in Puerto Rico. Federal R&D tax credits do not apply to Puerto Rico**. With this disadvantage, what rational executive would choose PR over North Carolina, Texas or any of the other 48 states?

If U.S. drug companies invested as much on R&D in Puerto Rico as they do in the 50 States, they would spend $1.68 billion annually. That would boost Puerto Rico's R&D more than **12 times**, and increase industry R&D on the island by **more than 30 times.** Even by investing in R&D at a quarter of normal levels in Puerto Rico, U.S. drug companies would more than triple the island's R&D.

Now, with an identical tax credit, Puerto Rico at least has a chance in this critical and competitive R&D race. The identical tax credit simply puts Puerto Rico into the U.S. R&D game. It allows Puerto Rico to be a reasonable contender, but tax credits are just one important variable in the investment decision and by no means guarantee success. See the attachment, An Illustration of Benefits, for estimates of R&D tax credit benefits to U.S. drug companies.

III. R&D (High Tech) Investment: The Potential Avenue for Puerto Rican Economic Growth

Investment is necessary for economic growth. Thus the tough question, why invest in Puerto Rico? Puerto Rico has an excellent climate, and that could encourage investment in tourism, but tourism alone cannot carry Puerto Rico's economic growth. Tourism now directly contributes only about 4% of GDP ($2.2 billion in 1998) and provides about 1 in 100 jobs (13,500). Even spectacular growth in such a small part of the economy will not generate the needed growth and jobs.

With the exception of retail and tourism, Puerto Rico today suffers as a location for investment when compared on one hand to Ireland, Mexico, Taiwan, or China or Mississippi, California, Texas, or Illinois on the other. Corporate decision-makers cut through the rhetoric, and see a high labor cost, union dominated, and

New Deal-style centralized economy with a poor physical and social infrastructure.

Yet it is a good place to reinvest and expand because an enterprise can capitalize on having conquered the learning curve of doing business in Puerto Rico. But Puerto Rico cannot achieve the growth level it needs through "plant expansions" and reinvestment in the manufacturing sector. For rapid meaningful impact, Puerto Rico's initial and pragmatic focus should fall on high return new avenues for investors already doing business in Puerto Rico.[12] For Puerto Rico having the ability to attract the investment would just be the first step in a long climb.

U.S. pharmaceuticals annually invest on the order of $11.6 billion on R&D, which represents a third of Puerto Rico's GNP. To date the R&D investment in Puerto Rico by both pharmaceutical and electronics/software firms has been negligible (the estimated total private R&D investment in Puerto Rico amounts to about $53 million, or 1/10th of 1% of GDP).

IV. INDUCING 936 FIRMS TO MAKE R&D INVESTMENTS IN PUERTO RICO (RESTORING RELATIONSHIPS, OPTIMIZING ASSETS, CHANGING DIRECTIONS, AND MOVING INTO THE FAST LANE)

The pharmaceuticals and chip/software companies (the so-called 936 investors) have made *significant manufacturing investments* in Puerto Rico. They know Puerto Rico well. The underlying rationale for much of this investment was attributed to Section 936. But even with the phase-out of 936, companies have continued to invest in manufacturing in PR. Since Congress' decision to repeal 936, Searle has announced plant expansion investments of $200 million, Hewlett-Packard, $100 million, and IPR Pharmaceuticals, $100 million.

The goal is to induce these Fortune 500 "friends of Puerto Rico" to invest in R&D. Allowing R&D tax credits in PR would put R&D investment in Puerto Rico on the CEO's decision-making screen. The infusion of R&D investment would modernize Puerto Rico's economy and its economic philosophy. Rather than relying on the "same old, same old," Puerto Rico might, in the first instance, be driven to act on its future (and the effort would not be subsidized by the U.S. taxpayer).

What counts is that Puerto Rico needs on the order of an additional $3 - $5 billion of new investment to achieve a 5 to 8% annual growth rate. $3 billion represents only 25% of the annual R&D investments of pharmaceuticals and 10% of the R&D investment for pharmaceuticals, chip, and software firms.

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[12] A survey of Puerto Rico manufacturing firms in 1991 found that fewer than 1 in 3 companies made any R&D investments, and investment totaled only $31.4 million.

As it stands, Puerto Rico's investment in R&D is inconsistent with its aspirations to US living standards. At 0.45% of GNP,[13] Puerto Rico's R&D spending approximates the average in South America, 0.48%, or R&D investments in Mexico, 0.40% of GNP.[14]

V. **Empowerment Zones: Another Needed Congressional Action**

Puerto Rico is also excluded from federal Empowerment Zone (EZ) legislation, although almost the entire island would qualify. Empowerment zone legislation would enhance considerably Puerto Rico's attractiveness to U.S. corporate R&D decision makers, and thus Congress by including PR in the legislation, or with new similar legislation, could help Puerto Rico not only play but catch up in the R&D game. (There are other persuasive arguments for Empowerment Zones in Puerto Rico, but Puerto Rico is probably unique in the feasibility of performing R&D, and taking advantage of Empowerment Zone tax credits).

See the attachment, An Illustration of Benefits, for estimates of empowerment zone benefits for U.S. drug companies.

VI. **Selected Sources**

United States General Accounting Office, Progress on Economic Development Activities Varies Among Empowerment Zones, November 1998.

United States Department of Treasury, Internal Revenue Service, "Tax Incentives for Empowerment Zones and Other Distressed Communities," Publication 954, Revised March 1998.

United States Congress, Joint Economic Committee, "A Guide to the Research Tax Credit: Why we have it, How it Works, and How it can be Improved," prepared by Kenneth C. Whang, December 1998.

[13] Or 0.3% of GDP. R&D spending as a percentage of GNP is higher than as a percentage of GDP, because GDP is 50% greater than GNP in Puerto Rico.

[14] UNESCO, UNESCO Statistical Yearbook 1998, Table 5.1.

R&D INVESTMENT IN PUERTO RICO:

Short Term and Long Term—How?

With the introduction of the federal tax credit in Puerto Rico, R&D is now possible. In simple terms, Puerto Rico now enjoys the 20% federal tax credit, which corporations in the other 50 states have enjoyed.

The result of this is that a pharmaceutical company seeking to boost its qualified R&D spending by $1 million would lose a $130,000 federal tax credit by locating in Puerto Rico rather than Massachusetts or North Carolina. (the effective rate of the credit is 13%). Please see table 1 below.

Table 1: **Federal Tax Effects of $1 million in additional qualified R&D**

Federal Tax Impact	**Puerto Rico**	**North Carolina**	**Mass.**
1. Value of expensing R&D	$ 390,000	$ 390,000	$ 390,000
2. Value of federal R&D tax credit (at effective rate of 13%)	$ -	$ 130,000	$ 130,000
3. Total (1+2)	**$ 390,000**	**$ 520,000**	**$ 520,000**

Local R&D Provisions Did Not Offset the Absence of the Credit in Puerto Rico

In the past Puerto Rico's generous new incentives for R&D investments were not enough to offset the benefits of investing in the 50 States that offer the federal R&D credit. For example, taking North Carolina and Massachusetts as comparisons, local provisions for R&D in Puerto Rico provide a tax benefit of $140,000, for North Carolina, $100,000, and for Massachusetts, $195,000. Please see table 2 blow. Thus, Massachusetts not only enjoys the federal tax credit but provides $55,000 more in tax benefits for R&D on a local basis. Adding federal and local tax benefits on R&D, Puerto Rico provides $90,000 fewer benefits than North Carolina, and $200,000 less than Massachusetts.

Table 2: **Local Tax Effects for $1 Million R&D Investment**

Effect of State / Puerto Rico R&D Incentives	**Puerto Rico**	**North Carolina**	**Mass.**
4. Value of expensing R&D	$ 70,000	$ 50,000	$ 95,000
5. Value of R&D credit or deduction incentive	$ 70,000	$ 50,000	$ 100,000
6. Total	**$ 140,000**	**$ 100,000**	**$ 195,000**
7. State and Federal Tax Effect (6+3)	**$ 530,000**	**$ 620,000**	**$ 715,000**

Other Local Tax Benefits Did Not Close the Gap

The R&D investment in Puerto Rico still did not make sense after taking into account other local tax incentives. In fact, a corporation spending $1 million in qualified R&D investment in Massachusetts would receive more in other local tax benefits, and continue to receive almost $200,000 more overall. See table 3 below.

Table 3: **Tax Effects of Other Local Tax Incentives**

Annualized Benefit of Other Local Tax Provisions	**Puerto Rico**	**North Carolina**	**Mass.**
8. Job training incentives	$ 3,500	$ 175	$ -
9. Investment credits		$ 9,516	$ 22,500
10. Job creation incentives		$ 2,017	
11. Investment expensing value	$ 52,500	$ 19,015	$ 36,129
12. Total	**$ 56,000**	**$ 30,723**	**$ 58,629**
13. Total Tax Effect (7+12)	**$ 586,000**	**$ 650,723**	**$ 773,629**

Notes. See footnotes for detailed assumptions for calculations.

Empowerment Zone Benefits Would Help

Extending the federal R&D credit would narrow the gap, and help Puerto Rico to compete. Empowerment zone benefits, and tax-free bonds in particular, combined with the R&D credit would further sweeten the investment, and help Puerto Rico to close the gap with states like Massachusetts and North Carolina. See table 4.

Table 4: **Empowerment Zone Benefits**

Empowerment Zone Benefits	**Puerto Rico**	**North Carolina**	**Mass.**
14. Financing savings (annualized)	$ 61,292		
15. Employment credits (Round I)	$ 21,000		
16. Employment credits (Round II)	$ 4,200		
17. Target credit (Round II)	$ 4,200		
18. Total Benefits	**$ 90,692**		
19. Total Tax Effect (13 + 18)	**$ 676,692**	**$ 650,723**	**$ 773,629**

The Federal R&D Credit - How It Works

Overview

The research and experimentation credit, or R&D credit, was designed to encourage U.S. firms to increase their investment in R&D. The credit allows a U.S. corporation to claim a non-refundable credit for its research spending by selecting one of two methods. The effective benefit of the credit to any firm depends on the type of credit selected by the corporation.[15]

1. *Regular credit.* Firms receive a credit for increased R&D intensity (spending as % of sales as compared to the absolute level of research spending), as compared to a mid-1980's base period. To the extent a firm's current research exceeds the *base amount* (mid-1980's research intensity as percent of sales multiplied by gross receipts for the past 4 years) it receives a credit of 20% on the increment.

2. *Alternative incremental credit*. Not actually an incremental credit or based on historical research intensity. Firms receive a lesser credit of between 1.65% and 2.75% on all research exceeding 1% of revenues. The alternative credit typically applies to a greater amount of research than the regular credit, but at a much lower rate.

Basic research credit. The Internal Revenue Code also provides an incentive for corporate sponsorship of basic, long-term research at universities and other educational and research institutions. Restricted to research without a specific commercial objective, the *basic research credit* is based on incremental spending over a fixed base, like the regular credit. Few firms have used this credit, however; payments to universities for basic research constitute only about 1% of all qualified research spending claimed.

Qualified research. Section 41(b) of the IRC restricts the credit to wages,[16] supplies,[17] and 65% of contract expenditures on qualified research. The credit does not apply to depreciation expenses for capitalized items like buildings, plant and equipment used for research, which are addressed under section 174. It is considered a rule of thumb that approximately 65% of research expenditures are wages and supplies, which qualify for the research credit, and 35% are

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[15] The election of the alternative credit is permanent, and it may not switch back to the regular credit without the permission of the Treasury Department.

[16] Services "consisting of engaging in qualified research or engaging in the direct supervision or direct support of research activities." Internal Revenue Code § 41(b)(2)B). Direct support does not include general administrative services. Per Treas. Reg. § 1.41)2(c).

[17] Depreciable expenses for capitalized items are not included.

depreciation expenses for investments in plant and equipment that do not qualify.[18]

Effective rate - 13%. The effective rate of the regular credit is reduced from 20% to 13% for most firms because the credit is taxed again through a recapture provision (section 280C);[19] the expensing of research costs elsewhere in the code[20] must be reduced by the amount of the research credit taken.

Other restrictions. The base for the regular credit is capped at 16% of revenues, and floored at 50% of current research expenditures. The R&D credit may not be used to reduce taxes below a minimum amount.[21] Credits may be carried forward, however, for up to 20 years. A separate credit is available for support of basic research at universities and qualified not-for-profit organizations. The credit also does not apply to any research conducted outside the United States, which for the purposes of the Revenue Code excludes research conducted in Puerto Rico from the credit.

Provisions for start-ups. Under the provision for new firms without base-period sales or research expenditures, such start-ups can use 3% of sales for their "fixed base."[22] Other exceptions apply to spin-offs and mergers.

Which Firms Benefit?

In 1995, U.S. firms claimed a total of $1.42 billion in R&D credits, of which manufacturing companies claimed a majority, $1.04 billion.[23] Pharmaceutical, motor vehicle, aircraft, electronics, and computer companies claim most the credits among manufacturers.

Approximately twelve thousand firms use the credit each year. Large firms with $250 million or more in assets account for three-quarters of the dollar value of credit claims. However, three-quarters of credit claimants have assets of $25 million or less.[24]

Firms with existing tax liability will receive the most immediate benefit from the credit. However, even firms without revenues can benefit from the credit, by accessing financing based on research credit carry-forwards.

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18 Conversation with Dr. Kenneth Whang, National Science Foundation, June 1999.

19 Contained in § 41 of the Internal Revenue Code, the credit is one of twelve current year business credits available for corporations against their federal income tax liability.

20 Internal Revenue Code § 174.

21 Internal Revenue Code, Title 26, § 55, the Alternative Minimum Tax.

22 The 3% fixed base applies for the first five years, after which specific rules apply. *See* Internal Revenue Code, Title 26, § 41.

23 Internal Revenue Service, Statistics of Income, Corporation Income Tax Returns - 1995, Table 21.

24 Kenneth C. Whang, *A Guide to the Research Tax Credit,* Working Paper Series for the Joint Economic Committee, United States Congress, December 1998.

Pharmaceutical firms operating in Puerto Rico. Most pharmaceutical companies have increased their research intensities (R&D as a percent of sales) since the mid-1980's base period, in response to market pressures. As a result, most firms receive tax benefits from the regular credit at an effective rate of 13%, not at the 2.75% and lower rates applicable to additional R&D under the incremental credit. (See table below:)

Table: Pharmaceutical Company Estimated Research Credits and Intensities

	Likely Credit [25]	1996 R&D Intensity	1996 R&D Spending	Estimated Base Period Intensity	Difference (1996 – Base)
Abbot Laboratories	Regular	10.90%	1,204.80	8.4%	2.5%
American Home Products	Regular	10.10%	1,429.10	4.8%	5.3%
Bristol-Meyers Squibb	Regular	8.50%	1,276.00	7.2%	1.3%
Eli Lilly	Regular	16.20%	1,189.50	12.3%	3.9%
Johnson & Johnson	Regular	8.80%	1905.0	7.3%	1.5%
Merck	**Alternative**	**7.50%**	**1,487.30**	**11.2%**	**-3.7%**
Pfizer	Regular	14.90%	1,684.00	7.9%	7.0%
Procter & Gamble	**Alternative**	**3.50%**	**1,221.00**	**3.2%**	**0.3%**
Schering-Plough	Regular	12.80%	722.8	9.5%	3.3%
Searle-Monsanto	Regular	7.90%	728	6.5%	1.4%
Warner-Lambert	Regular	7.70%	554.8	6.4%	1.3%

Source. Credit based on comparison of calculation of which credit would provide higher tax benefit. Corporations in Puerto Rico from Puerto Rico Industrial Development Company, 1999. Base period research intensity from National Science Foundation, *Science and Engineering Indicators, 1998*, drawn from *Technical Insights*, *Inside R&D*, weekly newsletter (Englewood, NJ: John Wiley & Sons, Inc.) and *Inside R&D*, 1989 and 1985.

[25] The credit used by the corporation is not public information.

Notes to Tables:

General

1. It is assumed that the corporation is considering an increase in R&D operating expenditures of $1 million. For purposes of comparing investment incentives, it is assumed that the corporation will make a $7.5 million investment in plant and equipment to enable the increased R&D budget. A general rule of thumb for R&D is that the wages and supplies that qualify for the R&D credit typically constitute about 65% of a total R&D budget, of which the remainder is depreciation charges on plant and equipment which do not qualify. Using the assumption of an average useful life of 15 years, this additional wage and supply budget would require plant and investment of $7.5 million ($500,000 * 15 years).

2. Pharmaceutical firms contribute a large percentage of Puerto Rican GDP, and 41% of all U.S. firms operating on the island. Because most pharmaceutical firms have significantly increased their research intensities (R&D as a percentage of sales) since the mid-1980's base period, they will likely have selected the regular R&D credit and receive an effective 13% tax benefit on additional research. For example, Pfizer, a major manufacturer in Puerto Rico, now invests 14.9% of sales on R&D, up from approximately 7% during the mid-1980's base period.

3. It is assumed that the corporation has sufficient net income at the local and federal level to take advantage of benefits for full expensing, double deductions for R&D expenditures, investment and other tax incentives.

Federal Tax Impact

4. It is assumed that the corporation currently invests in R&D at a level above its historical base level, such that additional qualified R&D expenditures generate benefits through the federal R&D tax credit. The federal credit provides benefits for qualified research expenses, which include salaries, supplies, and other expenses directly related to the R&D, and does not include investments in plant, machinery and equipment. For this reason, the tax implications of the investment necessary to create or renovate facilities for R&D are included in these calculations in the "other state / Puerto Rico incentives" section.

5. The value of expensing R&D expenditures is calculated assuming the corporation has income against which expenses can be applied, and assuming an effective federal corporate income tax rate of 39% on taxable income.

State / Puerto Rico Tax Impact

6. Tax benefits of R&D expenses are calculated on the basis of current state / Puerto Rico corporate income taxes: Puerto Rico – 7%; Massachusetts – 9.5%; and North Carolina – 5%. Tax benefits are estimated on the assumption that the corporation has income against which it can apply these expenses.

7. R&D incentives are calculated on the basis of existing incentives for R&D: Puerto Rico has a double deduction for R&D expenses. Massachusetts provides a research credit on 10% of the state's apportioned share of qualified R&D expenditures. The amount of the credit over $25,000 is limited to 75%, but can be carried over indefinitely. North Carolina provides a credit of 5% of the state's apportioned share of R&D expenditures.

Other Local Incentives

8. Other local incentives for training, job creation, and investment will apply to R&D investments. The tables include the tax benefits associated with these tax provisions in Puerto Rico, Massachusetts, and North Carolina. In order to make the benefits comparable to the increased R&D budget, these benefits are provided as an annual benefit.[26]

9. ***Training incentives***. Puerto Rico provides a 200% deduction for worker training, above the excess over the three-year average annual training costs from 1995 to 1997. It is assumed that the corporation's R&D expenditures would entail expenditures of 5% on training, $50,000 for each $1 million, and that these expenditures would represent additional training over the 3 year base period average in Puerto Rico.

10. ***Investment Incentives***. Puerto Rico does not have a specific incentive targeted to investment besides the provision for full expensing of investments. The benefit of full expensing for Puerto Rico taxes is compared to the tax benefits of depreciating those assets in North Carolina and Massachusetts over 15 years.

- North Carolina has an investment credit of 7% of the value of machinery and equipment placed in service in North Carolina by certain firms (manufacturing included). Only the amount above the threshold determined by the poverty of the area in which the firm operates is available ($0 for the poorest areas, and $1,000,000 for the wealthiest areas) and the credit must be taken in equal amounts over 7 years after the machinery and equipment is placed into service. It is assumed that the corporation located in a tier 2 area of high poverty, for which investments above $100,000 are eligible, and that the

[26] The present value of the benefits multiplied by the discount rate.

corporation's investment in machinery and equipment represents 30% of the $7.5 million total on building construction and renovation, machinery, and equipment. As before, the value of the credit over 7 years is annualized after calculating the present value.

- Massachusetts has a 3% investment credit for new buildings and equipment placed in operation in the state. Tax liability cannot be reduced beyond a minimum level, and the credit can be carried over for five years, and subsequently turned into an unlimited carry-over.

11. ***Job creation***. Puerto Rico does not have a tax incentive based on job creation. North Carolina provides corporations with at least five employees with a tax credit for each job created, to be taken in four equal installments in the next tax years. It is assumed that a $1 million R&D budget generates 7 new jobs, which in a tier 2 area would create a $4,000 credit per job, available as $1,000 in each of the four years subsequent to the job creation for $28,000 in total benefits. The annualized tax benefit of these job creation credits is $2,017. Massachusetts does not have a job creation based tax incentive.

12. ***Other incentives***. States and territories have a myriad of other incentives for property tax, excise tax, licensing taxes, etc. For the sake of simplicity, this analysis is restricted to the corporate income tax.

Empowerment Zone Benefits

13. Empowerment zone legislation provides a variety of tax, financial and other benefits to firms locating in empowerment zones. Two rounds of zones have already been designated, with different benefits applicable in each round; a third round has not been initiated and its benefits are unknown. The calculations provided are based on employment credit benefits from Round I and bond financing benefits from Round II.

14. *Employment credits.* It is assumed that each $1 million in qualified R&D expenditures would include approximately $400,000 in labor costs, or 40% of the R&D budget, and 7 employees, of whom 2 would be hired from targeted groups for the welfare opportunity credit of $2,400, and all 7 of whom would qualify the corporation for the employment tax credit for residents of the empowerment zone of $3,000.

15. *Bond financing.* Under Round II legislation for empowerment zones (EZ's), firms locating in EZ's will have access to up to $230 million in million in tax-exempt bonds.[27] These zone bonds are not subject to any limit on issue size,

[27] In empowerment zones with populations of 100,000 or more. Zones with populations of less than 100,000 are eligible to issue $130 million in tax-exempt bonds.

and do not affect the state cap on private activity bonds.[28] The designation of a single empowerment zone with a population over 100,000 in Puerto Rico would more than double the amount of tax-exempt private activity bonds Puerto Rico could issue from $190 million to $420 million, making it easier and cheaper for firms to establish and expand operations.

16. It is assumed that firm needs to make $7.5 million in plant and equipment upgrades that are financed through tax-exempt bonds, and that these bonds would not have otherwise been available. Tax exempt bonds would enable a corporation with a triple A credit rating to finance at a rate approximately 133 basis points, or 1.33 percent below its normal bond financing cost. The bonds are 10 years in duration. In order to compare financing benefits over 10 years with 1 year tax benefits, the financing savings are annualized after taking the present value of the savings, using a discount rate of 10% to approximate the firm's overall cost of capital.

17. Other substantial empowerment zone benefits are not calculated, including priority for area residents for many federal programs and social service block grants (SSBG's) for the government which can be used for economic development purposes like redeveloping industrial and office space and funding loan funds.

[28] States are normally limited to issuing tax-exempt private activity bonds in an amount equal to $50 per resident, and individual issues are normally restricted to $10 million.

More Background: Tax Benefits to Locating R&D in Puerto Rico

Taxable income sufficient to be wiped out by large investment, not the case in other states.

Controlled Foreign Corporation

Because Puerto Rico is considered a foreign country under the Internal Revenue Code, U.S. firms on the island can operate as controlled foreign corporations (CFC's), either as Puerto Rico corporations or as a branch of a foreign corporation. This arrangement has several key tax-saving benefits:

- *Federal tax deferment*. As CFC's, profits are not taxed by the U.S. government until they are returned to the parent corporation. A pharmaceutical or electronics component firm could use its profits to fund R&D in Puerto Rico, or in Europe, if the funds are not immediately needed in the U.S. Profits would eventually have to be returned to the U.S. The U.S. corporation would get the significant benefits of tax deferment.

- *Local tax reduction.* Any R&D conducted in Puerto Rico could be used to offset the high existing taxable income levels of U.S. firms on the island. These corporations could reduce their Puerto Rico taxable income with a 200% double-deduction for R&D recently enacted in 1998.

- In effect, each additional $1 million of R&D in Puerto Rico would reduce local tax liability by $140,000, in comparison to $120,000 in North Carolina and $195,000 in Massachusetts.

R&D INVESTMENT IN PUERTO RICO:
Statistical Appendix

Table 1: Science and Engineering Profile of Puerto Rico

	STATE	U.S.	Rank [1]
Doctoral scientists,1995	867	453,928	51
Doctoral engineers,1995	150	86,738	48
S&E doctorates awarded, 1996	33	27,230	50
of which, in psychology	76%	13%	
In environmental sciences	9%	3%	
In physical sciences	9%	14%	
S&E post-doctorates, 1996 In doctorate-granting institutions	33	37,019	48
S&E graduate students, 1996 In doctorate-granting institutions	3,022	430,631	36
Federal R&D obligations,1997 (millions) [2]	$59	$70,392	47
Total R&D performance, 1995 (millions)	Na	$177,210	Na
Industry R&D, 1995 (millions)	Na	$130,332	Na
Academic R&D, 1996 (millions)	$73	$22,481	42
of which, in life sciences	79%	56%	
In environmental sciences	6%	6%	
In engineering	6%	16%	
Higher education current-fund expenditures, 1995 (millions)	$947	$182,602	39
Number of SBIR awards, 1990-1997	2	31,155	52
Patents issued to state residents, 1997	10	61,699	52

Source: National Science Foundation, *Science and Engineering State Profiles – 1998 Data Update*, Puerto Rico. 1997. *Notes* [1] Of 50 States, District of Columbia, and Puerto Rico. [2] National Science Foundation, *Federal Funds for Research and Development – FY 1997, 1998, 1999*, Table C-82. Includes R&D plant.
SBIR = small business innovation research

Table 2: Federal Obligations for R&D in Puerto Rico, FY 1996 (by performer and federal agency) (thousands of dollars)

	Total	Federal Intramural	All FFRDCs	Industrial firms	Universities & Colleges	Other Nonprofits	State & local govt	State rank
Total, all agencies	*49,450*	*8,076*	*8,271*	*45*	*32,347*	*251*	*460*	*48*
Department of Agriculture	9,251	5,120	0	0	4,130	1	0	38
Department of Commerce	379	0	0	0	329	0	50	44
Department of Defense	1,621	0	0	45	1,576	0	0	51
Department of Energy	999	0	0	0	999	0	0	47
Dept. of Health & Human Services	22,671	877	0	0	21,400	250	144	41
Department of Interior	2,099	2,079	0	0	20	0	0	45
Department of Transportation	293	0	0	0	27	0	266	51
Environmental Protection Agency	70	0	0	0	70	0	0	46
Nat'l Aeronautics & Space Admin.	0	0	0	0	0	0	0	52
National Science Foundation	12,067	0	8,271	0	3,796	0	0	34
State rank	48	48	18	52	43	52	47	

Source: National Science Foundation, *Science and Engineering State Profiles: 1998 Data Update*, Puerto Rico. Note. This table does not include federal funding for science and engineering, included in table 9.

Table 3: R&D Spending by U.S. State as Percent of State Product, 1995
(millions of dollars)

Rank in total R&D	State	Total R&D	GSP	Percent R&D/GSP	Rank in R&D/GSP	Percent of U.S. R&D
	TOTAL, U.S	183,045	7,228,287	2.53		
1	California	36,133	913,474	3.96	7	19.74
2	Michigan	13,275	251,794	5.27	3	7.25
3	New York	10,954	587,714	1.86	24	5.98
4	Massachusetts	9,969	195,874	5.09	4	5.45
5	New Jersey	9,128	266,134	3.43	11	4.99
6	Texas	8,385	514,206	1.63	30	4.58
7	Illinois	7,487	352,932	2.12	19	4.09
8	Pennsylvania.	6,919	313,293	2.21	17	3.78
9	Maryland	6,519	137,353	4.75	5	3.56
10	Ohio	5,314	292,103	1.82	25	2.90
11	Washington	5,241	150,001	3.49	10	2.86
12	Florida	5,223	339,033	1.54	31	2.85
13	Connecticut	4,311	118,595	3.63	8	2.35
14	Virginia	3,897	186,986	2.08	20	2.13
15	New Mexico	3,295	40,759	8.09	1	1.80
16	North Carolina	3,191	192,219	1.66	29	1.74
17	Indiana	3,163	148,801	2.13	18	1.73
18	District of Columbia	3,128	49,686	6.30	2	1.71
19	Minnesota.	3,087	131,358	2.35	15	1.69
20	Colorado	2,603	107,903	2.41	14	1.42
21	Missouri	2,499	137,483	1.82	26	1.36
22	Wisconsin	2,226	132,704	1.68	28	1.22
23	Georgia	2,113	200,751	1.05	38	1.15
24	Arizona	1,995	103,951	1.92	22	1.09
25	Alabama	1,681	94,988	1.77	27	0.92
26	Tennessee	1,402	134,873	1.04	39	0.77
27	Iowa	1,391	71,362	1.95	21	0.76
28	Delaware	1,149	26,947	4.26	6	0.63
29	Utah	1,144	45,554	2.51	13	0.63
30	Oregon	1,089	80,805	1.35	33	0.59
31	South Carolina	996	85,270	1.17	37	0.54
32	Idaho	914	26,885	3.40	12	0.50
33	Rhode Island	896	25,046	3.58	9	0.49
34	Kansas	764	64,146	1.19	36	0.42
35	New Hampshire	598	31,802	1.88	23	0.33
36	Kentucky	594	90,617	0.66	46	0.32
37	Oklahoma	529	68,611	0.77	41	0.29
38	Hawaii	509	36,034	1.41	32	0.28

39	West Virginia	475	36,039	1.32	34	0.26
40	Nevada	445	48,670	0.91	40	0.24
Rank in total R&D	**State**	**Total R&D**	**GSP**	**R&D/GSP (as %)**	**Rank in R&D/GSP**	**Percent of U.S. R&D**
41	Louisiana	423	112,944	0.37	50	0.23
42	Maine	345	27,748	1.24	35	0.19
43	Nebraska	336	43,673	0.77	42	0.18
44	Arkansas	330	53,358	0.62	47	0.18
45	Mississippi	315	53,647	0.59	48	0.17
46	Vermont	308	13,867	2.22	16	0.17
47	Alaska	163	23,674	0.69	43	0.09
48	Montana	119	17,722	0.67	45	0.07
49	North Dakota	98	14,477	0.67	44	0.05
50	Wyoming	87	15,761	0.55	49	0.05
51	South Dakota	55	18,662	0.29	51	0.03
	Other/unknown	5,836		2.16		3.19

Sources. National Science Foundation/Division of Science Resources Studies. Data were derived from NSF/SRS, *Research and Development in Industry 1995-96; NSF/SRS, Academic Research and Development Expenditures, Fiscal Year 1996*; and NSF/SRS, *Federal Funds for Research and Development: Fiscal Years 1996, 1997, and 1998*; and Department of Commerce, Bureau of Economic Analysis.

Table 4: R&D Spending by Selected Country as Percent of GNP

Country	R&D as % of GNP	Year	Country	R&D as % of GNP	Year
Africa			***South America***		
Benin	0.7%	1989	Argentina	0.4%	1995
Egypt	0.5%	1991	Brazil	0.6%	1995
Nigeria	0.1%	1987	Chile	0.7%	1995
South Africa	0.7%	1993	Ecuador	0.1%	1990
			Peru	0.6%	1995
			Venezuela	0.5%	1992
North America			***Asia***		
Canada	1.6%	1995	China	0.5%	1995
Costa Rica	0.2%	1996	India	0.8%	1994
Guatemala	0.2%	1989	Japan	2.9%	1994
Mexico	0.4%	1995	Korea	2.8%	1994
United States	2.6%	1997	Pakistan	0.9%	1987
			Thailand	0.1%	1995
			Vietnam	0.4%	1985
Europe					
Austria	1.5%	1995			
Belgium	1.7%	1991			
Denmark	1.9%	1993			
France	2.4%	1994			
Germany	2.4%	1993			
Greece	0.6%	1994			
Italy	1.1%	1994			
Netherlands	2.1%	1994			
Portugal	0.6%	1995			
Spain	0.9%	1994			
Sweden	3.4%	1993			
Switzerland	2.8%	1990			

Source. UNESCO, Statistical Yearbook, 1998, Table 5.1.

Table 5: Academic Spending on R&D by State, 1997 (thousands of dollars)

State/Region	Total R&D Spending	Federally Financed	State and Local Government	Industry	Institutional	Other R&D Spending
California	2,982,373	2,029,550	129,764	161,625	440,018	221,416
New York	1,837,519	1,184,329	85,885	101,304	251,537	214,464
Texas	1,613,800	870,729	172,631	133,563	271,562	165,315
Massachusetts	1,283,718	923,592	29,806	103,506	126,382	100,432
Maryland	1,279,076	943,359	82,040	41,067	132,626	79,984
Pennsylvania	1,245,278	810,386	41,870	139,505	183,109	70,408
Illinois	945,130	539,455	56,501	50,522	222,201	76,451
Michigan	843,550	453,818	51,026	57,285	206,227	75,194
North Carolina	808,847	458,736	116,410	96,527	107,183	29,991
Georgia	777,040	353,408	69,222	73,569	256,427	24,414
Ohio	766,731	419,830	70,520	82,879	143,938	49,564
Florida	682,114	334,300	89,003	48,304	176,276	34,231
Washington	507,771	365,901	14,845	40,882	69,458	16,685
Wisconsin	504,046	286,703	41,766	19,408	99,029	57,140
Missouri	468,487	263,475	24,108	36,717	112,121	32,066
New Jersey	462,875	224,834	37,274	26,238	139,561	34,968
Virginia	461,231	275,425	47,332	40,218	73,990	24,315
Colorado	428,766	290,453	26,941	23,826	50,467	37,079
Alabama	403,394	262,537	5,251	29,685	84,780	21,141
Indiana	400,842	209,427	23,826	33,321	114,146	20,122
Connecticut	393,240	242,659	13,858	25,401	76,511	34,811
Arizona	376,818	198,097	10,266	18,584	137,165	12,706
Minnesota	363,097	200,149	50,540	24,197	53,731	34,480
Louisiana	343,214	138,610	75,100	32,424	80,152	16,928
Iowa	341,914	162,182	52,733	24,226	83,880	18,893
Tennessee	332,078	200,937	37,911	17,436	53,022	22,772
Unknown State	299,155	152,824	23,579	16,705	80,448	25,553
Oregon	290,909	195,157	32,380	9,672	35,933	17,767
Utah	234,151	158,237	17,876	14,452	35,822	7,764
South Carolina	224,408	106,994	20,720	8,682	66,448	21,564
New Mexico	221,735	146,998	15,063	9,915	42,442	7,317
District of Columbia	217,263	155,602	1,913	18,381	24,550	16,817
Kansas	197,947	75,185	45,187	12,014	56,752	8,809
Nebraska	175,592	60,388	47,089	13,686	49,290	5,139
Oklahoma	164,699	73,249	18,944	14,036	45,309	13,161
Kentucky	161,867	78,210	7,640	20,074	53,886	2,057
Mississippi	130,347	67,207	29,324	9,169	14,509	10,138
Hawaii	120,107	72,421	28,440	5,944	13,297	5
Rhode Island	111,977	79,417	1,161	1,995	26,545	2,859
New Hampshire	107,505	67,282	7,990	4,880	15,058	12,295
Arkansas	106,251	37,932	29,227	7,572	25,119	6,401
Nevada	88,331	43,934	4,411	5,464	30,749	3,773
Puerto Rico	76,447	43,048	21,763	2,625	7,170	1,841

State/Region	Total R&D Spending	Federally Financed	State and Local Government	Industry	Institutional	Other R&D Spending
Alaska	70,943	28,127	3,964	12,769	26,082	1
Montana	70,591	31,261	14,368	8,470	15,684	808
Idaho	67,489	20,035	22,078	9,432	15,474	470
Delaware	67,042	33,864	3,066	3,371	20,140	6,601
West Virginia	63,898	29,823	2,423	3,719	23,190	4,743
Vermont	59,526	34,042	2,683	5,399	11,465	5,937
North Dakota	56,096	24,207	1,070	3,439	25,554	1,826
Wyoming	47,753	15,003	5,990	2,226	23,743	791
Maine	33,971	15,509	1,551	5,867	10,652	392
South Dakota	24,558	10,879	8,341	811	3,043	1,484
Virgin Islands	4,828	2,428	2,250	150	0	0

Source: NSF WebCASPAR Database System, figures for 1997.
Note: All dollars in thousands.

Table 6: Ranking of Academic Spending on R&D by State, 1997

State/Region	Total R&D Rank	Federally Financed Rank	S&L Govt R&D Rank	Industry R&D Rank	Institutional R&D Rank	Other R&D Rank
California	1	1	2	1	1	1
New York	2	2	5	5	4	2
Texas	3	5	1	3	2	3
Massachusetts	4	4	22	4	13	4
Maryland	5	3	6	12	12	5
Pennsylvania	6	6	17	2	7	8
Illinois	7	7	10	10	5	6
Michigan	8	9	12	9	6	7
North Carolina	9	8	3	6	16	17
Georgia	10	12	9	8	3	18
Ohio	11	10	8	7	9	10
Florida	12	13	4	11	8	15
Washington	13	11	35	13	23	28
Wisconsin	14	15	18	25	17	9
Missouri	15	17	27	15	15	16
New Jersey	16	20	20	19	10	12
Virginia	17	16	14	14	22	19
Colorado	18	14	26	23	29	11
Alabama	19	18	43	18	18	22
Indiana	20	21	28	16	14	23
Connecticut	21	19	37	20	21	13
Arizona	22	24	38	26	11	30
Minnesota	23	23	13	22	27	14
Louisiana	24	30	7	17	20	26
Iowa	25	26	11	21	19	24
Tennessee	26	22	19	28	28	20
Oregon	27	25	21	35	33	25
Utah	28	27	33	29	34	34
South Carolina	29	31	31	38	24	21
New Mexico	30	29	34	34	32	35
District of Columbia	31	28	49	27	40	27
Kansas	32	34	16	33	25	33
Nebraska	33	39	15	31	30	39
Oklahoma	34	35	32	30	31	29
Kentucky	35	33	41	24	26	43
Mississippi	36	38	23	37	47	32
Hawaii	37	36	25	41	48	51
Rhode Island	38	32	51	51	36	42
New Hampshire	39	37	40	45	46	31
Arkansas	40	42	24	40	39	37
Nevada	41	40	44	43	35	41

Puerto Rico	42	41	30	49	51	44
State/Region	**Total R&D Rank**	**Federally Financed Rank**	**S&L Govt R&D Rank**	**Industry R&D Rank**	**Institutional R&D Rank**	**Other R&D Rank**
Montana	44	45	36	39	44	47
Idaho	45	49	29	36	45	49
Delaware	46	44	46	48	43	36
West Virginia	47	46	48	46	42	40
Vermont	48	43	47	44	49	38
North Dakota	49	48	52	47	38	45
Wyoming	50	51	42	50	41	48
Maine	51	50	50	42	50	50
South Dakota	52	52	39	52	52	46

Source: NSF WebCASPAR Database System, figures for 1997.

Table 7: Top Four R&D Performing Universities in Puerto Rico, 1997

Rank	Academic Institution	Total R&D Spending	Federally Funded R&D	Federal Funding as Percent of Total R&D
144	UPR Mayaguez Campus	48,857	21,052	43.1%
172	UPR Medical Sciences Campus	15,575	12,978	83.3%
240	UPR Rio Piedras Campus	6,671	4,275	64.1%
454	Catholic U of PR	86	64	74.4%
	Total	71,189	38,369	53.9%

Source. National Science Foundation, NSF WebCASPAR Database System.

Table 8: Top 25 University Recipients of Federal R&D Funds, 1997

Rank	Academic Institution	Total R&D Spending	Federally Financed R&D
1	Johns Hopkins University Applied Physics Lab	408,094	393,216
2	Stanford University	395,310	332,272
3	Johns Hopkins University	421,147	331,310
4	University of Washington – Seattle	409,959	320,784
5	Massachusetts Institute of Technology	410,930	311,396
6	University of Michigan, All Campuses	483,485	296,028
7	University of California-San Diego	378,061	274,860
8	University of California-Los Angeles	374,629	238,919
9	University of Wisconsin-Madison	419,810	233,760
10	University of California-San Francisco	334,206	229,323
11	Harvard University	299,961	222,612
12	University of Pennsylvania	296,141	217,125
13	Columbia University in the City of New York	244,337	212,180
14	Cornell University, All Campuses	351,030	205,521
15	University of Minnesota, All Campuses	363,095	200,149
16	University of Colorado, All Campuses	269,816	192,201
17	University of Southern California	259,246	191,809
18	Yale University	245,536	189,124
19	Washington University	262,426	186,993
20	University of California-Berkeley	356,813	186,349
21	Pennsylvania State U, All Campuses	339,955	185,206
22	California Institute of Technology	177,888	164,225
23	University of Pittsburgh, All Campuses	202,533	160,833
24	University of Illinois at Urbana-Champaign	286,470	156,366
25	Duke University	251,536	155,894

Notes: [1] Indicates awards for research and development (R&D) in science and engineering (S&E), including direct and reimbursed indirect costs, by all agencies of the federal government. [2] This variable indicates Federal obligations for research and development in science and engineering.
Source: NSF WebCASPAR Database System 1997.

Table 9: Federal Obligations for Research and Development **&** Science and Engineering to Puerto Rico Universities, FY 1996

Academic Institution	Total	HHS	NIH	USDA	NSF	DOD	NASA	DOE	ED	Others
United States, Total	**26,573,470**	**14,131,406**	**13,829,707**	**1,278,752**	**3,943,875**	**3,379,949**	**1,430,936**	**1,288,558**	**243,847**	**937,683**
Puerto Rico share of total	0.33%	0.28%	0.29%	1.29%	0.34%	0.21%	0.41%	0.16%	0.58%	0.19%
Puerto Rico, Total	87,957	40,198	39,641	16,486	13,503	7,244	5,842	1,998	1,417	1,826
Caribbean University	41	0	0	0	0	0	0	0	41	0
Inter American U of PR Central Office	936	0	0	0	196	0	0	0	440	300
Ponce School of Medicine	4,889	4,889	4,889	0	0	0	0	0	0	0
The Pontificial Catholic Univ. of PR	688	456	412	0	0	0	0	0	232	44
Universidad Central Del Caribe	4,554	4,554	4,554	0	0	0	0	0	0	0
Universidad del Turabo	446	0	0	0	0	40	202	0	204	0
Universidad Metropolitana	2,181	0	0	0	2,125	0	0	0	56	0
Universidad Politecnica de PR	56	0	0	0	0	0	0	0	56	0
UPR Humacao University College	1,217	158	158	0	79	722	80	0	178	0
UPR Mayaguez Campus	27,827	1,057	1,057	16,486	2,603	2,754	3,810	148	0	969
UPR Medical Sciences Campus	23,168	22,158	21,645	0	50	810	150	0	0	513
U PR Rio Piedras Campus	10,403	6,926	6,926	0	460	1,274	1,600	0	143	0
U PR System	11,499	0	0	0	7,938	1,644	0	1,850	67	0
University of Sacred Heart	52	0	0	0	52	0	0	0	0	0

Source. National Science Foundation, Federal Obligations for Science and Engineering, FY 1971-96, data generated by WebCaspar system.

Table 10: Number of Patents from Puerto Rico and the United States

State/Territory	United States	Puerto Rico	Puerto Rico / U.S. Comparison
Number of Patents in 1998	90,705	21	0.02% of total
Number of Patents from 1977 to 1998	1,145,947	435	0.04% of total
Patents / Million People (1997)	261.29	3.71	1.42% of U.S. ratio
Patents / $1 billion manuf. GDP (1997)	50.71	0.71	1.40% of U.S. ratio
Patents / $1 billion GDP (1997)	8.62	0.29	3.36% of U.S. ratio

Source. United States Patent and Trademarks Office Web site. Data through December 31, 1998.

Table 11: Puerto Rico Science and Engineering Graduates, as Percent of Total U.S. Hispanic Graduates, 1996

Hispanic Graduates	All	Science and Engineering	Engineering	Physical Sciences	Mathematics and Statistics	Computer Science	Agricultural Sciences	Biology	Medical Sciences
U.S.	152,495	54,582	4,708	1,181	793	3,272	891	4,071	16,292
Puerto Rico	23,561	9,142	1,008	362	45	822	121	1,038	3,483
Share of U.S. total	**15%**	**17%**	**21%**	**31%**	**6%**	**25%**	**14%**	**25%**	**21%**

Note. Graduates of all degree levels, certificate through doctorate.
Source. National Science Foundation, *Earned Degrees by Race and Ethnicity*, 1996.