Assessing the *New Economy* in Puerto Rico: A Domestic and International Comparison

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Executive Summary: Assessing the *New Economy* in Puerto Rico

1. **This paper is a statistical presentation of Puerto Rico's position vis-a-vis the *New Economy*.** Closely applying a methodology developed by the Progressive Policy Institute, this report benchmarks Puerto Rico's adaptation to the *New Economy* with the rest of the United States on 13 indicators measuring progress in four categories: "*knowledge jobs," globalization, transformation to a digital economy, and capacity for technological innovation*.

2. **Puerto Rico places last behind the 50 states and the District of Columbia in its adjustment to the *New Economy*.**[1] An international comparison finds Puerto Rico behind many Latin American countries, and far behind Ireland and Korea, particularly in its capacity for technological innovation. Please see summary tables I & II on pages iv and v.

3. **Innovations in information technology are driving the emergence of a *New Economy* in the United States, and worldwide.** It is characterized by rapid change, a growing global orientation and a shifting occupational and industrial order. Success in the *New Economy* increasingly depends on the application of intellectual capital - ideas, technology, and innovation - to all sectors of the economy. The *New Economy* forms the pillar for sustained economic growth in the new millennium.

Knowledge Jobs: Old Economy Occupations Persist

4. **Puerto Rico has experienced comparatively little of the *New Economy* shift to higher knowledge occupations**. The share of managerial, professional and technical workers is the second lowest in the U.S. The educational level of the workforce falls below any state, and high school dropouts comprise half the workforce, double the overall U.S. percentage.

Transformation to a Digital Economy: Falling through the Net?

5. **The digital revolution is leaving Puerto Rico households and businesses behind**. Only about 4% of Puerto Rican households have Internet access, a fifth as many as in the U.S. as a whole, 22%. The gap in computer access also persists: 15% of households have computers, less than a third as many as in the U.S. overall, 48%.

6. **Puerto Rico business appears relatively untouched by the Internet revolution.** U.S. businesses overall have twelve times as many World Wide Web sites. Individuals and organizations hold less than 1 domain name for every 1,000 people in Puerto Rico, compared to almost 12 in the U.S. overall, and 3 in Mississippi, the least developed state.

In*capacity for Innovation*?

7. **To compete in the future, Puerto Rico needs vastly increased and more efficient investment in technology and innovation.** In the emerging *New Economy* where globalization has become the dominant word, success is increasingly based on the extent to which locally generated ideas and technology permeate each sector. Puerto Rican business now generates negligible innovation. *The number of patents generated per capita is 30 times less than in the U.S. overall and industry investment in R&D runs at 1/5th of 1% of gross product, 10 times lower than in the U.S. as a whole.*

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[1] This report does not rank Puerto Rico in the Progressive Policy Institute's other category, economic dynamism, due to a lack of information on two of the three indicators. Please see the introduction and section VIII for further discussion on methodology.

Summary Table I: Assessing the New Economy in Puerto Rico: Comparisons with the 50 States and the District of Columbia

***** The table below compares Puerto Rico's competitive position in the *New Economy* with the 50 states and the District of Columbia in four categories, following closely the methodology of the Progressive Policy Institute in *The State New Economy Index*.

	Rank	Puerto Rico Score	United States Score
I. Knowledge Jobs			
Managerial and Technical Jobs (as % of total)	51	22.2	27.7
Education of Work-force (weighted number)[2]	52	30.2	39.5
II. Globalization			
Manufacturing Exports (% of total shipments)	25	8.6	8.3
Foreign Direct Investment (jobs as % of total)	49	2.1	4.8
III. The Digital Economy			
Households Online (as % of total)	52	4.3	22.2
Share of Households with Computers	52	15.0	48.4
Internet Domain Names (per 1,000 people)	52	0.8	11.3
IV. Innovation Capacity			
Jobs in High Tech Sectors (as % of total jobs)	52	0.47	4.50
Ph.D. Scientists and Engineers (as % of total jobs)	52	0.06	0.40
Engineers (as % of total jobs)	52	0.50	1.52
Number of patents (per 1,000 workers)	52	0.02	0.61
Industry Investment in R&D (as % of gross product)	44	0.17	1.94
Venture Capital Investment (as % of gross product)	16	0.11	0.18

Note. An underline signifies that Puerto Rico ranking has been estimated. *See* Section VIII: Data Sources, for information on methodology and data sources. Appendix 2 contains a full listing of the rankings and raw scores by indicator. *See* also the Progressive Policy Institute (PPI), *The State New Economy Index: Benchmarking Economic Transformation in the States,* July 1999, the American Electronics Association, *Cyberstates 3.0*, June 1999, and U.S. Department of Commerce, *The Emerging Digital Economy II*, June 1999.

[2] *See* Section VIII: Data Sources for methodology used to calculate weighted figures, and Appendix 2 for a full listing of raw scores and rankings for the 52 U.S. locations.

Summary Table II: Assessing the New Economy in Puerto Rico – Selected International Comparisons

***** The 50 states and the District of Columbia regularly benchmark their performance with nations competing for investment or markets. The table below compares the *New Economy* in Puerto Rico and the rest of the United States with selected foreign countries on seven indicators measuring the transformation to the digital economy and the capacity to innovate.

	U.S.	P.R.	Argentina	Brazil	Chile	Colombia	Ecuador	Ireland	Korea	Mexico	Singapore	Spain
I. ***The Digital Economy***												
Mobile Phones (per 1,000 people)	206	45	56	28	28	35	13	146	150	18	273	110
Computers (per 1,000 people)	407	125	39	26	54	33	13	241	150	37	400	122
Internet hosts (per 10,000 people)	976	0.3	16	10	15	3	1	122	38	9	188	62
II. ***Capacity to Innovate***												
Scientists & Engineers in R&D (per million people)	3,732	303	671	168	-	-	169	1,871	2,636	213	2,728	1,210
Patents (per million people)	231	3	-	16	13	0.1	0.6	250	1,488	4	69	68
Expenditures on R&D (% of GNP)	2.5	0.4	0.4	0.6	0.7	-	0.1	1.4	2.8	0.4	1.1	0.9
Post-secondary Education (% of students)	81	48	42	12	30	19	26	40	60	16	39	51

Note. – Indicates that no data is available. *Sources.* Please see section VIII for data sources and methodology.

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Introduction

• The New Economy

A revolution in information technology is driving the emergence of a *New Economy* characterized by globalization, a shift to services and away from production work, intensified competition and rapid change.[3] Two thirds of U.S. economic growth is now derived from technological innovation.

The drivers of success in the *New Economy* have changed; an economy's competitiveness and prospects for growth are increasingly based on the extent to which knowledge, innovation and technology are integrated throughout all its sectors. A recent study by the Progressive Policy Institute (PPI) assessed the progress of each state, but not Puerto Rico, vis-a-vis the *New Economy*.[4]

• The New Economy and Puerto Rico

The Old Economy Persists in Puerto Rico. This report finds that the *New Economy* remains relatively dormant in Puerto Rico, and that the pace of structural change lags behind the 50 states. On an overall assessment of its progress in adapting to the *New Economy*, Puerto Rico ranks last behind the 50 states and the District of Columbia.

Methodology. The report provides a snapshot of the *New Economy* in Puerto Rico, assessing and comparing Puerto Rico's progress with the 50 states and the District of Columbia[5] on 13 different indicators (please see summary table I above). This report draws on similar methodology and indicators to PPI's recent publication, *The State New Economy Index*, and uses more current data for many indicators. This report presents useful information on Puerto Rico's performance on each indicator. To add an international perspective, this report also includes a comparison of seven selected indicators of the *New Economy* in Puerto Rico with several countries worldwide.

The *Index* generated by PPI constitutes a reasonable, if imperfect, measure of the *New Economy* as it emerges at different speeds across the United States. The paucity of data also limits the precision with which the New Economy can be measured, particularly below the national level. Several PPI indicators like the volume of initial public offerings or venture capital investment are anecdotally interesting, but convey little meaning when expressed for any one year. So few deals take place each year in most states that one more or less would change

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[3] The Progressive Policy Institute (PPI) was one of the first institutions to describe the emerging New Economy. *See The State New Economy Index*, July 1999, and *The New Economy Index*, 1998.

[4] Progressive Policy Institute, *The State New Economy Index,* July 1999.

[5] The report ranks Puerto Rico out of 52 United States locations: the 50 states, the District of Columbia, and Puerto Rico.

the rankings considerably. The indicators measuring venture capital and industrial R&D over-estimate *New Economy* progress in Puerto Rico, as they calculate activity as a share of gross product, not gross domestic product, which is a more accurate reflection of total economic output. Had the indicators been expressed as a share of GDP, Puerto Rico scores on these indicators would have been reduced by a third.[6]

Table 1 below compares the indicators used here to those in the PPI report. This report draws on 12 of the 17 PPI indicators in 4 of their 5 categories. Data on several indicators in the PPI report was not available for Puerto Rico: jobs at fast growing "gazelle" firms, the extent of job churning, technology in schools, and digital government. For this reason, the economic dynamism category in the PPI report is not addressed here. In order to provide more information on the digital economy and the capacity for innovation in Puerto Rico, information on two indicators was added to this report: households with computers and all engineers as a share of the workforce.[7]

Table 1. *New Economy* Indicators

Category	**Progressive Policy Institute *New Economy* Indicators**	**Puerto Rico *New Economy* Indicators**
1) "Knowledge jobs"	• Office Jobs • Managerial and professional jobs • Educational attainment of workforce	**X** ✓ ✓
2) Globalization	• Export orientation of manufacturing • Jobs provided by foreign firms	✓ ✓
3) Economic Dynamism	• Number of jobs in fast growing firms • Rate of job churn • Value of initial public offerings (IPO's)	**X** **X** **X**
4) Transformation to a Digital Economy	• Adults online • Number of ".com" domain names • Technology in schools • Use of information technology by local and state government	✓ ✓ **X** **X** • Households with computers
5) Technological Innovation Capacity	• Number of high-tech jobs • Number of Ph.D. scientists and engineers • Number of patents issued • Industry investment in R&D • Venture capital activity	✓ ✓ ✓ ✓ ✓ • Number of all engineers

[6] Puerto Rico's GDP is approximately 50% higher than its gross product, reflecting the output and income of outside corporations.

[7] The ranking of locations by domain names is based on all domain names, not just commercial ".com" domain names, as in the PPI report.

Puerto Rico's Overall New Economy Ranking

Puerto Rico's overall ranking is calculated using a similar methodology to the PPI report. Please see section VIII for more information on the methodology and weighting used in calculating Puerto Rico's overall *New Economy* ranking. Raw scores for all 52 locations appear in a separate attachment.

Report Outline

The report is divided into two parts: comparisons of the *New Economy* with domestic locations in sections I to IV, and with selected international countries in sections V and VI. In the domestic comparisons, a summary page for each indicator lists and graphs Puerto Rico's raw score and ranking, along with the top three and bottom three ranking states. Subsequent pages furnish additional information on Puerto Rico's performance on each indicator. In the international comparisons, the indicator scores for Puerto Rico, the U.S. overall and a selected group of countries are listed and graphed (please see summary table II above).

• *Domestic Comparisons*

The Progressive Policy Institute measures the emergence of the *New Economy* across the 50 states according to indicator scores in five categories: knowledge jobs, globalization, economic dynamism, the digital economy, and capacity for technological innovation. The economic dynamism category is not addressed here for lack of data for Puerto Rico.

"Knowledge Jobs." In the *New Economy*, competitiveness is increasingly dependent on the knowledge and technical skills of the labor force. Section I reviews and compares Puerto Rico's performance on two indicators: managerial and technical jobs as a share of total employment, and the educational attainment of the workforce.

Globalization. Section II assesses and compares the extent of globalization in Puerto Rico as measured by the share of the workforce producing products for export and the share of the workforce employed by foreign companies. Exports of pharmaceutical, electronics component and other products place Puerto Rico in the middle of the states for export intensity (manufacturing exports over total shipments).

The Transformation to a Digital Economy. Section III assesses and compares Puerto Rico's progress in transforming to a digital economy with the 50 states and D.C., using several measures: share of households on-line, share of households with computers, and the number of Internet domain names per 1,000

people. Puerto Rico ranks last behind Mississippi for each indicator and the category as a whole.

Technological Innovation Capacity. Section IV assesses the capacity for technological innovation in Puerto Rico using six measures: high tech jobs as a share of all jobs, engineers and Ph.D. level scientists as a share of total employment, all engineers as a share of total employment, patents generated per 1,000 workers, industry investment in research and development (R&D), and venture capital investment as a share of gross product. Puerto Rico ranks at the bottom of this category, with the lowest scores in the first four categories, 44th in industrial R&D investment, and a relatively high ranking (16) for the venture capital measure, thanks largely to active government promotion.

- ***International Comparisons.***

Sections V and VI compare Puerto Rico's standing in the *New Economy* with selected foreign countries. Several indicators are used to measure and compare Puerto Rico's transformation to a digital economy (mobile phones, computers, and Internet hosts), and its capacity for technological innovation (scientists and engineers in R&D, patents, and spending on R&D, and enrollment in post-secondary education). Specific information available on the indicators for the *New Economy* at the state and territory level in the U.S. is not necessarily available for many foreign countries, and vice versa.

Section VII attempts to benchmark the pace of adaptation to the *New Economy* in Puerto Rico in light of the domestic and international data provided in this report.

- ***Data Sources and Methods.***

Section VIII contains the data sources used in the report and an explanation of the methodology used to generate the indicator, where necessary. A separate section lists the sources for general economic and demographic information employed throughout the report.

- ***Appendices***

Appendix 1 provides the SIC codes used by the American Electronics Association (AEA) to define high technology sectors. Appendix 2 contains the raw scores and rankings for Puerto Rico, the 50 states and the District of Columbia for most of the indicators used in the report.[8]

[8] All engineers as a share of the workforce is included for information purposes only and is not included in the appendix, or used to calculate the overall New Economy rankings.

I.1. **Managerial, Professional & Technical Jobs** Puerto Rico Ranking**: 51 / 52**

Managers, professionals, and technicians as a share of the total workforce.

Indicator Score:	Jobs as Percent of Total, 1997
	Puerto Rico: 22.2%
	U.S. Average: 27.7%

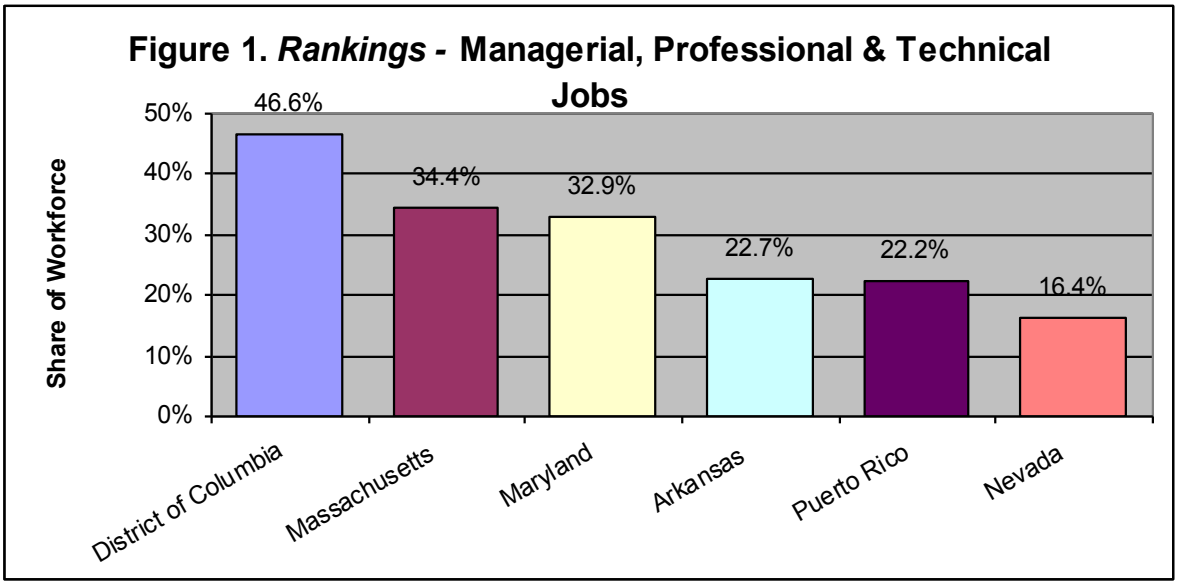
Source. Bureau of Labor Statistics.

- Managers, professionals, and technicians comprise 22.2% of the Puerto Rico workforce, in comparison to 27.7% in the U.S. as a whole.
- Of the 50 States and D.C., only Nevada has a lower share of managerial and technical jobs, 16.4%, than Puerto Rico.

Highest / Lowest Ranking States

	Share	**Rank**
District of Columbia	46.6%	1
Massachusetts	34.4%	2
Maryland	32.9%	3
Arkansas	*22.7%*	*50*
Puerto Rico	*22.2%*	*51*
Nevada	*16.4%*	*52*

Figure 1. *Rankings* - Managerial, Professional & Technical Jobs



A. BACKGROUND

- Management and professional jobs in the U.S. have increased as a share of total employment from 22% in 1979 to 28.4% in 1995.

B. *MANAGEMENT AND TECHNICAL JOBS IN PUERTO RICO*

- Managerial and professional jobs comprise 27.7% of all positions in the 50 states: 6.7% managerial and 21% professional (please see tables 2 and 3 and figure 2 below). In Puerto Rico, the equivalent share is 22.2%: 4.6% managerial and 17.6% professional (5 percentage points lower overall than in the U.S. as a whole).

Table 2. U.S. Workforce Structure, 1997

Occupation Type	Number	Percent of Total
Total	121,592,210	100
Managerial	8,192,170	6.7
Professional	25,594,320	21
Sales	14,319,050	11.8
Clerical	21,251,910	17.5
Service	19,610,730	16.1
Agricultural	1,515,370	1.2
Production	31,108,660	25.6

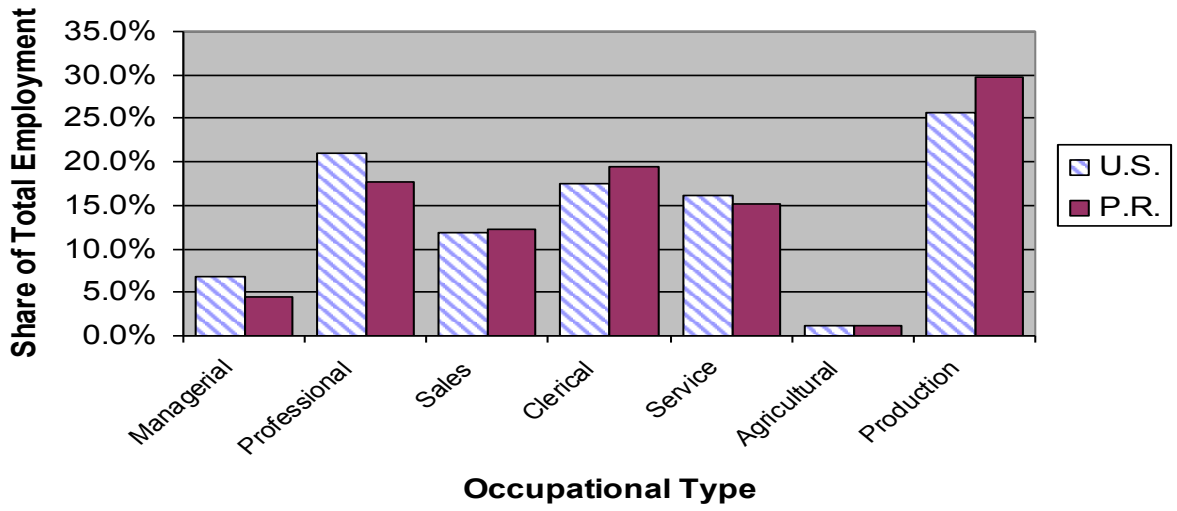
Source. Bureau of Labor Statistics.

Table 3. P.R. Workforce Structure, 1997

Occupation Type	Number	Percent of Total
Total	865,290	100
Managerial	39,490	4.6
Professional	152,490	17.6
Sales	106,340	12.3
Clerical	169,030	19.5
Service	130,960	15.1
Agricultural	9660	1.1
Production	257,320	29.7

Source. Bureau of Labor Statistics.

Figure 2: Composition of U.S. and P.R. Workforce



I.2. Workforce Education — Puerto Rico Ranking: 49 / 52

Weighted measure of educational attainment of the workforce (advanced degrees, bachelor's degrees, associates degrees, or some college work).

Indicator Score:

Measure of Workforce Education, 1990	
Puerto Rico:	30.2
U.S. Average:	39.5

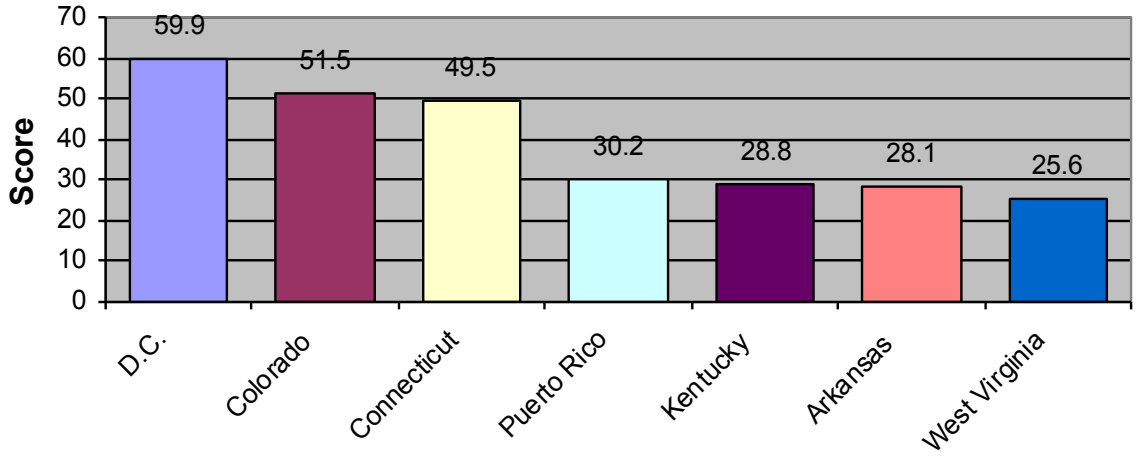
Source. U.S. Census Bureau, *Census of Housing and Population 1990*.

- Puerto Rico ranks 49th in terms of its workforce education, with a score of 30.2.
- More than half of the workforce lacks a high school degree, double the U.S. average and significantly higher than in any state.
- The share of workers with advanced degrees in Puerto Rico (3.6%) is less than half the overall U.S. percentage.

Highest / Lowest Ranking States

	Score	Rank
D.C.	59.9	1
Colorado	51.5	2
Connecticut	49.5	3
Kentucky	*28.8*	*50*
Arkansas	*28.1*	*51*
West Virginia	*25.6*	*52*

Figure 3. *Rankings* - Workforce Education



Note. See section VII for information on the calculation of the workforce education measure.

A. BACKGROUND

- **More jobs require knowledge**. Knowledge-based jobs increased from 27% of total employment in 1983 to 31% in 1993, and are expected to grow to 33% by 2006.
- **Knowledge jobs pay more**. The premium, or benefit in increased earnings, of a college degree over a high school degree has increased by 34% since 1975, and the benefits of an advanced degree relative to a high school degree have jumped by 56%.
- Those without any degree are the worst off. High school dropouts earn $24,000 less than do college graduates, and $47,000 less than do holders of advanced degrees. Wages for workers with a high school degree or less have fallen in real terms since the 1970's, and increased for those with a college degree. Please see table 4 below.

Table 4. Annual Income by Education Group in the U.S., 1998.

Education	Annual Earnings	Premium over no HS degree
No High School	$16,124	-
High School	$22,895	$6,771
Some College	$26,235	$10,111
Bachelors	$40,478	$24,354
Advanced Degree	$63,229	$47,105

Note. Mean Earnings of Workers 18 Years Old and Over. *Source*. U.S. Bureau of the Census, Current Population Survey.

B. EDUCATIONAL ATTAINMENT IN PUERTO RICO AND THE 50 STATES

- The percentage of Puerto Rican workers with no high school degree is almost double the U.S. Half of Puerto Rican workers dropped out before receiving a high school degree compared to a quarter, 24.8%, in the U.S. as a whole. In the state with the highest proportion of dropouts, Mississippi, 35% of the workers lack a high school degree. Given the increasing importance of skills and education in the labor market, a large share of Puerto Rico workers may be left further behind.

Table 5. Educational Attainment in Puerto Rico and the 50 States, 1990

	Population (1990)	No high school	High school	Some college	Associate's degree	Bachelor's degree	Advanced degree
United States	158,868	24.8%	30.0%	18.7%	6.2%	13.1%	7.2%
Puerto Rico	1,952	50.3%	21.0%	8.8%	5.6%	15.8%	3.6%

Source. U.S. Bureau of the Census, 1990 Census of Population, CPH-L-96.

- In Puerto Rico, one in seven workers holds a bachelor's degree or higher, 14.3%, compared to one in five in the United States, 20.3%. About the same share of the workers in Puerto Rico and the U.S. overall hold an associate's degree or above: 25.0% in Puerto Rico and 26.5% in the 50 States. The share holding advanced degrees in Puerto Rico, 3.6%, is half the overall U.S. average and lower than in any state.
- Test results on the SAT in Puerto Rico point to weaker basic skills, particularly in mathematics. The average score on the mathematics section in 1998 (447 out of 800) was 64 points lower than in the U.S. as a whole, and lower than in any state.[9] The SAT is administered in Puerto Rico in both English and Spanish, although far more take the test in Spanish (13,635 in 1998) than in English (1,842 in 1998).[10]
- The Puerto Rico Statewide Systemic Initiative (PR-SSI) has effected some improvement in the teaching of science and mathematics in the public schools. Endorsed by the National Science Foundation and the U.S. Department of Education, the program combines the reform of science and mathematics curricula and improved teacher training. Mathematics scores of high school graduates remain low, however.

C. RETURNS TO EDUCATION IN PUERTO RICO AND THE 50 STATES

- The labor market in Puerto Rico provides less return to education than the overall U.S. market. First, earnings for workers at each education level are significantly lower in Puerto Rico. Workers of all education levels in the 50 states earned at least twice as much as those in Puerto Rico; college graduates earned more than 2.6 times as much.

Table 6. Difference in Earnings by Education Level in Puerto Rico and the U.S. as a Whole

	No High School	High School	Some college	Bachelors and above
Puerto Rico	$ 5,854	$ 8,101	$ 9,203	$ 13,274
United States	$ 12,242	$ 17,594	$ 20,255	$ 34,936
Ratio of U.S. to P.R. Earnings	2.09	2.17	2.20	2.63

Note. Earnings data from 1989 (1990 Census for Puerto Rico, and 1989 Current Population Survey for the U.S.).

[9] The College Board, 1999. http://www.collegeboard.org/press/senior99/html/satt2.html The College Board strongly discourages the comparing and ranking of locations by average SAT score. The percentage of high school seniors who take the test varies from state to state. If only the more academically capable students take the test, a state's average score will be higher than in another state with equally talented students where a higher proportion of students take the test.

[10] The scores listed for Puerto Rico are for the Spanish language SAT.

- Second, the premium for education (the value in additional earnings) in the Puerto Rico labor market is substantially lower than in the U.S. overall. Holders of bachelor’s degrees receive a premium of 185% over those with no educational degree in the U.S. as a whole, compared to a premium of 127% in Puerto Rico. Please see table 7 below.

Table 7. Premium in Earnings for Additional Education over Earnings with No Degree in Puerto Rico and in the 50 States

	High School	Some college	Bachelors and above
Puerto Rico	38%	57%	127%
United States	44%	65%	185%

Source. Earnings data from 1989 (1990 Census for Puerto Rico, and 1989 Current Population Survey for the U.S.).

II.1. Employment in Foreign Corporations Puerto Rico Ranking: 49 / 52

The percentage of each state's workforce employed by foreign companies.

Indicator Score: Workforce Employed by Foreign Co.'s 1996
Puerto Rico: 2.1%
U.S. Average: 4.8%

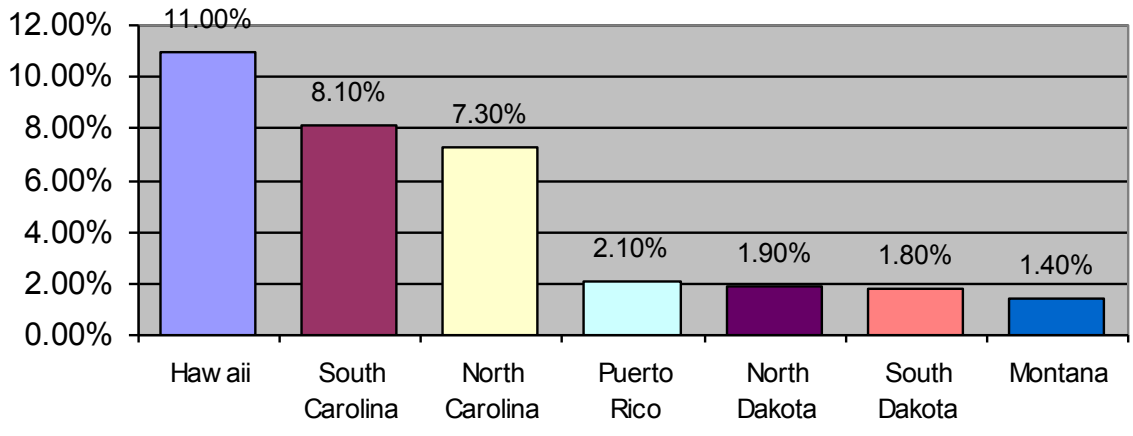
Source. U.S. Bureau of Economic Analysis.

- Foreign companies employ an estimated 19,400 workers in Puerto Rico, or about 2.1% of the total private industry labor force.
- The share of employment in foreign firms in Puerto Rico, 2.1%, is less than half the U.S. average, 4.8%.

Highest / Lowest Ranking States

	Score	Rank
Hawaii	11.0%	1
South Carolina	8.1%	2
North Carolina	7.3%	3
North Dakota	1.9%	*50*
South Dakota	1.8%	*51*
Montana	1.4%	*52*

Figure 4. *Rankings* - Workforce Employed by Foreign Companies



A. BACKGROUND

- Foreign direct investment (FDI) in the United States has increased from $134 billion in the 1970's to $312 billion in the first half of the 1990's (in 1992 dollars), and from 0.32 percent of GDP to 0.69 percent. FDI brings new management ideas, workplace practices, and technologies.[11]

B. FOREIGN DIRECT INVESTMENT IN PUERTO RICO

- Foreign companies in Puerto Rico support an estimated 19,400 jobs, or 2.1% of the workforce, ranking Puerto Rico 49 out of 52, before North Dakota, South Dakota and Montana.
- The number of jobs generated by foreign companies has increased slightly, 0.5%, since 1991, after falling from 28,900 jobs in 1993. In contrast, foreign companies have hired an additional 100,000 workers in the U.S. overall during the same period, increasing their employment by two percent.

Table 8. Workers Employed by Foreign Companies, 1991-1996 (thousands)

Year	1991	1992	1993	1994	1995	1996	1991-1995 Change (%)
Total U.S.	4,871.90	4,715.40	4,765.60	4,840.50	4,941.80	4,977.50	2.1%
Puerto Rico	19.3	19.8	28.9	28.4	27.4	19.4	0.5%

Source. Fahim-Nader and Ziele, "Foreign Direct Investment in the United States-New Investment in 1997 and Affiliate Operations in 1996," *Survey of Current Business*, Bureau of Economic Analysis (June 1998), Table 13.

[11] PPI, *State New Economy Index*, p. 19.

II.2. Export Focus of Manufacturing **Puerto Rico Ranking:** 25 / 52

The percentage of manufacturing shipments exported to foreign countries.

Indicator Score:

Exports as % of total manufacturing, 1992	
Puerto Rico:	8.60%
U.S. Average	8.31%

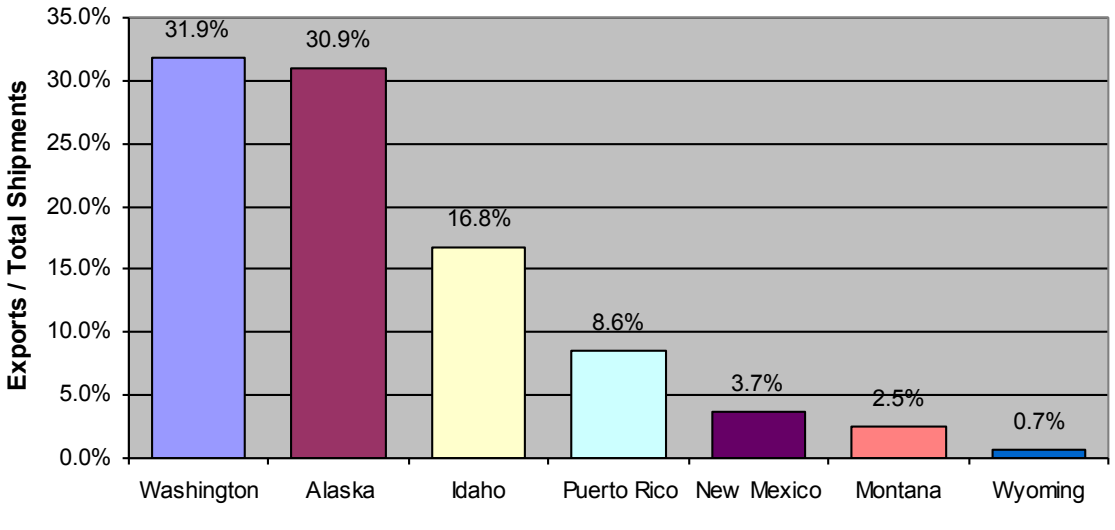
Sources. U.S. Census Bureau, *Establishments that Export: 1992* and *1992 Economic Census of the Outlying Areas*.

- Puerto Rico's export intensity (exports as a share of total shipments) of 8.60% is higher than the U.S. average, 8.31%, and ranks the island 25 of 52.
- Exports of manufacturing products from Puerto Rico totaled approximately $2.67 billion in 1997.

Highest / Lowest Ranking States

	Score	Rank
Washington	31.9%	1
Alaska	30.9%	2
Idaho	16.8%	3
New Mexico	3.7%	*50*
Montana	2.5%	*51*
Wyoming	0.7%	*52*

Figure 5. *Rankings* - Export Intensity of Manufacturing



A. BACKGROUND

- **Higher earnings.** Workers in export-oriented firms earn 10% more than workers in similar firms with few or no exports.[12]
- **U.S. trade increasing.** U.S. exports and imports as a share of GDP have climbed from 5.5% in 1950 to 25% in 1997.

B. EXPORT INTENSITY OF MANUFACTURING IN PUERTO RICO

- At 8.60%, the value of exports as a percent of total manufacturing shipments in Puerto Rico is slightly higher than in the U.S. overall, 8.31%, and ranks the island in the middle of the 50 states and the District of Columbia based the most recent 1992 data.[13] Subsidiaries of mainland corporations operating in Puerto Rico account for a large share of exports; approximately half of all exports are pharmaceutical products included in the chemicals and allied products category (please see table 10 on the following page).
- Table 9 below indicates that exports increased rapidly from 1989 to 1991, dropped with the recession of the early 1990's, and grew last year by 5%.

Table 9. Exports from Puerto Rico to Foreign Countries, 1989-1997
(millions of dollars)

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Exports	1,939	2,252	2,568	2,396	2,559	2,622	2,540	2,658	2,668	2,797
% Change	37.6%	16.1%	14.0%	-6.7%	6.8%	2.5%	-3.1%	4.7%	0.4%	4.8%

Source. Puerto Rico Planning Board, Economic Report to the Governor 1998, Statistical Appendix.

- Export intensity by sector. Puerto Rico's chemicals sector is the most export-oriented, sending more than 10% of its shipments to foreign countries. Other sectors with high export intensity include the food industry, 9.3% exported, and industrial machinery and equipment, 7.7%. Table 9 on the following page lists the total shipments by Puerto Rican manufacturing sector for 1992, in the order of export intensity.[14]

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[12] Bernard and Jensen, "Exporters, Jobs, and Wages in U.S. Manufacturing: 1976-1987," *Brookings Papers in Microeconomics,* 1995.

[13] See section VIII for more detailed information on data sources and methodology.

[14] Data from the 1997 economic census of Puerto Rico is now being tabulated.

Table 10. Puerto Rico Export Intensity by Manufacturing Category, 1992

Manufacturing Category	Manufacturing Shipments	Exports as % of Shipments
28 Chemicals and allied products	13,222,572	10.1%
20 Food and kindred products	5,089,839	9.3%
35 Industrial machinery and equipment	1,291,257	7.7%
29 Petroleum and coal products	1,684,949	7.5%
38 Instruments and related products	1,870,103	6.1%
34 Fabricated metal products	465,447	4.3%
26 Paper and allied products	315,282	3.1%
25 Furniture and fixtures	177,990	1.4%
36 Electronic and other electric equipment	2,761,223	1.4%
39 Miscellaneous manufacturing industries	263,591	1.4%
30 Rubber and miscellaneous plastics products	410,524	1.0%
27 Printing and publishing	443,006	0.1%
32 Stone, clay, and glass products	516,316	0.1%
22 Textile mill products	177,591	0.0%
23 Apparel and other textile products	1,408,988	0.0%
37 Transportation equipment	149,349	0.0%
31 Leather and leather products	385,603	0.0%
Totals for all manufacturers	31,034,804	7.2%

Source. Bureau of the Census, *Economic Census of Puerto Rico: Manufacturing*, 1992.

III.1. Online Population — **Puerto Rico Ranking:** 52 / 52

The percentage of households with Internet access.

Indicator Scores:	Households Online, Sept. 1998
Puerto Rico:	4.3%
U.S. Average:	22.2%

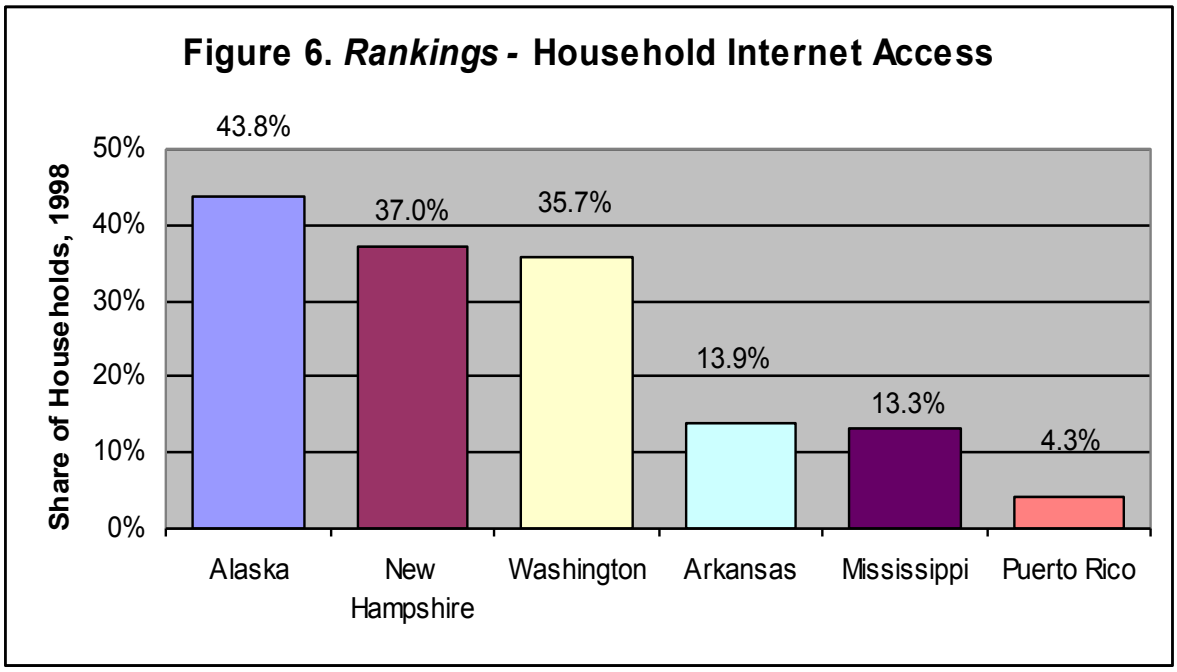
Source. U.S. Department of Commerce.

- The share of households in Puerto Rico with Internet access is estimated at 4.3%, with 6.5% of the population online from anywhere (home, work, library, community center).
- Puerto Rico ranks last among the 50 States and D.C. Its share of homes with online access is a third of Mississippi, the lowest ranked state with 13.3% of households online, and a fifth of the U.S. as a whole, 22.2%.

Highest / Lowest Ranking States

	Score	Rank
Alaska	43.8%	1
New Hampshire	37.0%	2
Washington	35.7%	3
Arkansas	13.9%	*50*
Mississippi	13.3%	*51*
Puerto Rico	4.6%	*52*

Figure 6. *Rankings* - Household Internet Access



A. BACKGROUND

- The share of U.S. households with Internet access in 1998 was estimated at 22%. An additional 11% only had access outside the home.[15] The share of households with access is projected to increase from 33% to over 50% by 2003, partly in response to the dropping cost of computers and online access.
- The number of people online worldwide is expected to reach 350 million by 2003, up from 95 million at the end of 1998.[16]

B. ONLINE ACCESS IN PUERTO RICO

- Puerto Rico Online. Little information is available about the number of Puerto Ricans online. The Census Bureau does not administer the Survey of Internet and Computer Use, the primary source of data on household technology use, in Puerto Rico. **Local sources** place the total number of Internet users in Puerto Rico at 250,000, based on estimates of 110,000 accounts with island internet service providers (ISP's).[17]
- *Population online.* According to these estimates, 6.5% of the island population is now on-line from any location: home, work, school, library, community center, etc.. In comparison, about a third of Americans, or 32.7%, are online, a five times higher share than Puerto Rico.[18]
- *Households online.* Based on findings by the firm of Research & Research that two-thirds of those online from any location had access from home, the share of households in Puerto Rico with online access is estimated at 4.3%. In comparison, a five times higher percentage of households in the U.S. overall, 22.2%, has online access.
- Profile of Puerto Rico Internet users. A recent study by Bruno Haring of Research & Research found that 56% of Puerto Rico Internet users have purchased through the Web at least once.[19] As elsewhere, popular on-line purchases in Puerto Rico include software, books, CD's, tapes, and computer accessories. Users connect frequently; 93% go online at least twice a week and 58% log on daily. Users are also overwhelmingly young; only 27% are over 35, and 61% are younger than 25. These figures indicate that older Puerto Ricans are particularly reticent to use the Internet.

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[15] U.S. Department of Commerce, NTIA, *Falling Through the Net: Defining the Digital Divide.*

[16] eMarketer, 1999.

[17] International Data Corporation (1998) and Jose Martinez, Technology Writer, *Caribbean Business*. Analysts estimate that 2.4 people have access for each account. Total number of accounts includes both business and home accounts.

[18] U.S. Department of Commerce, NTIA, *Falling Through the Net: Defining the Digital Divide*, Chart II-1. http://www.ntia.doc.gov/ntiahome/fttn99/InternetUse_II/Chart-II-1.html

[19] Gigante, Lucienne, *Caribbean Business,* July 29, 1999, cover story, data provided by Badillo Nazca.

III.2. Internet Domain Names — **Puerto Rico Ranking:** 52 / 52

The number of Internet domain names per 1,000 people.

Indicator Score:	Internet Domain Names per 1,000 people
	Puerto Rico 0.75
	U.S. average 11.28

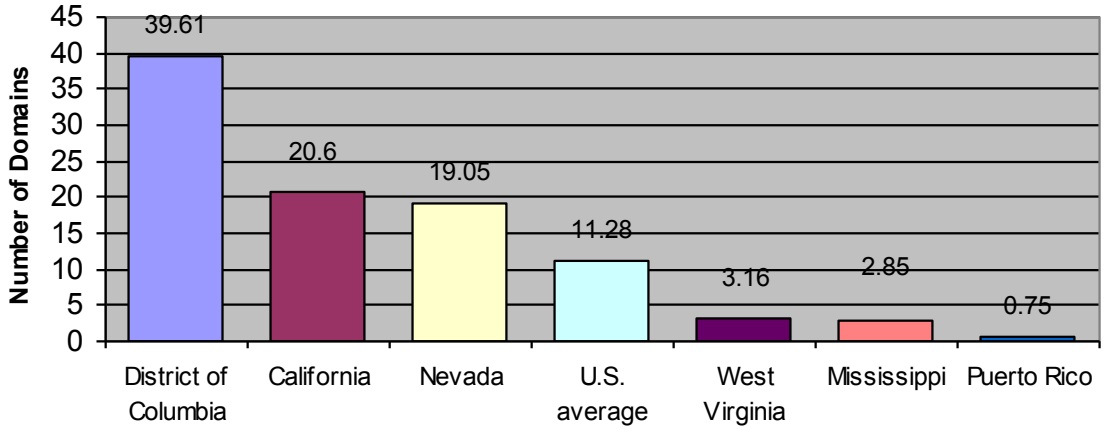
Source. Domainsondisc.com figures for April 1999.

- An estimated 2,825 domain names were registered in Puerto Rico, as of April 1999. South Carolina, a similarly populated state had 20,542, and Mississippi, the least developed state, 7,791.
- Adjusted for population, Puerto Rico has *fifteen times fewer* domain names than the U.S. as a whole, and four times fewer than Mississippi.
- Adjusting for per capita income, Puerto Rico has half as many Internet sites as Mississippi and a fifth as many as the U.S.

Highest / Lowest Ranking States

	Score	Rank
District of Columbia	39.61	1
California	20.60	2
Nevada	19.05	3
West Virginia	3.16	*50*
Mississippi	2.85	*51*
Puerto Rico	0.75	*52*

Figure 7. *Rankings* - Domains per 1,000 People



Source. Domainsondisc. As of April 1999. www.domainsondisc.com

A. BACKGROUND

- The number of World Wide Web sites worldwide has exploded from 213 in 1981, 535,000 in 1991 to 56.2 million in July 1999.[20]
- Total e-commerce conducted through the Web is expected to reach $1.2 trillion by 2003, of which U.S. e-commerce will comprise $654 billion.[21]

B. ALL DOMAIN NAMES IN PUERTO RICO

- Domainsondisc.com estimates the total number of all types of domain names in Puerto Rico at 2,825 as of April 1999.[22] Per capita, Puerto Rico has 15 times fewer domains than the U.S. as a whole (0.75 per thousand people in Puerto Rico compared to over 11 per thousand in the entire U.S.) and ranks last among the 50 states and the District of Columbia.

C. COMMERCIAL WEB SITES IN PUERTO RICO

- Selected Comparisons. In terms of commercial web sites per million people, Puerto Rico is ahead of most Latin American countries, but remains far behind the rest of the United States, *which has more than 12 times as many commercial sites per capita.* The table and graphic below offers several international comparisons on the number of commercial web sites in Latin America..
- Puerto Rico. Companies in Puerto Rico had an estimated 2,900 commercial web site addresses registered as of January 1999, representing a 65% jump from the 1,753 sites in July 1998.[23]

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[20] Internet Software Consortium http://www.isc.org

[21] eMarketer, 1999. http://www.emarketer.com/estats/083099_idc.html

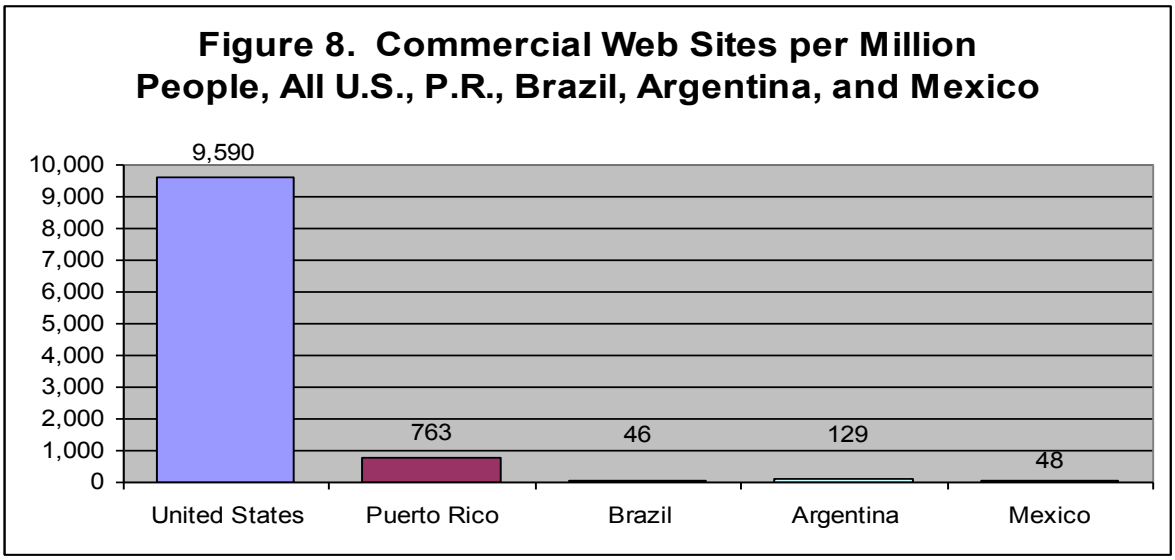
[22] Domainsondisc.com, 1999.

[23] More recent estimates have yet to be verified. Matthew Zook, Ph.D. Candidate, Department of City and Regional Planning, University of California at Berkeley. These figures suggest that the methodology to estimate the location of domains employed by Mr. Zook and Domainsondisc is different.

Table 11. Commercial Web Sites in All US, PR, and Selected Latin America Countries, 7/98 and 1/99

	7/98	1/99	% Change	Per Million People (1/99)
United States	1,440,671	2,566,275	78%	9,590
Puerto Rico	1,753	2,900	65%	763
Brazil	5,046	7,595	51%	46
Argentina	2,619	4,620	76%	129
Mexico	2,039	4,480	120%	48

Source. Matthew Zook, Ph.D. Candidate, Department of City and Regional Planning, UC-Berkeley, August 1999.



III.3. Computer Use **Puerto Rico Ranking:** 52 / 52

The share of households with a computer at home.

Indicator Score:	Computer at Home, September 1998
	Puerto Rico: 15.0%
	U.S. Average: 48.4%

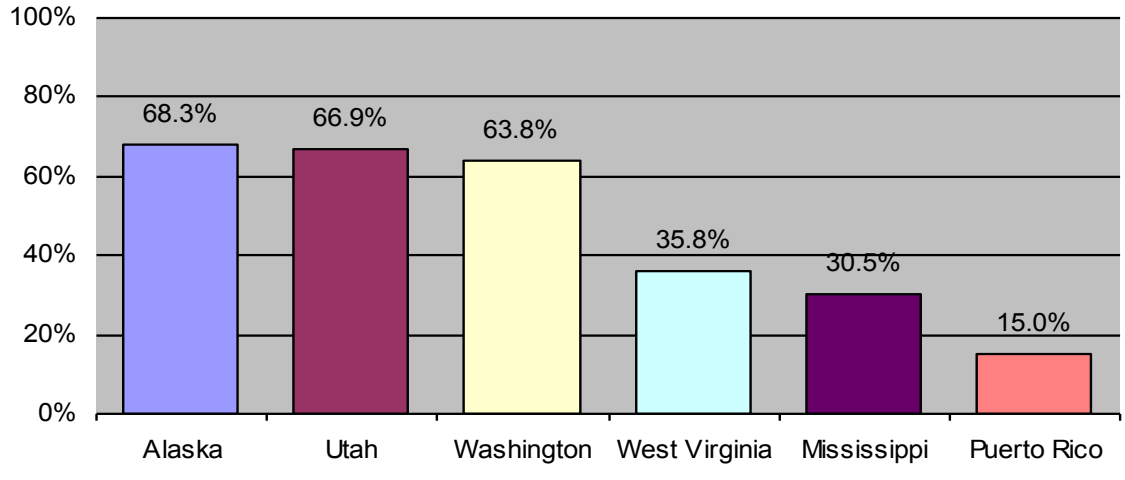
Source. U.S. Department of Commerce and International Data Corporation.

- The estimated share of households in Puerto Rico with a computer, 15%, is less than a third of the U.S. overall, 48.4%.
- Twice as many households have computers in Mississippi, the state with the lowest share, 30.5%.

Highest / Lowest Ranking States

	Score	Rank
Alaska	68.3%	1
Utah	66.9%	2
Washington	63.8%	3
West Virginia	35.8%	*50*
Mississippi	30.5%	*51*
Puerto Rico	15.0% (est.)	*52*

Figure 9. *Rankings* - Households with Computers



A. BACKGROUND

- Now at almost 50% of households, computer ownership in the United States has quadrupled in the past fourteen years.[24] Households with lower incomes, lower education levels, located in the South, and headed by a person under the age of 25 have lower ownership levels.

B. COMPUTER OWNERSHIP IN PUERTO RICO

- Industry estimates place the share of households with computers at 15% in Puerto Rico.[25] Little information is available about the penetration of computers into Puerto Rican households. The Census Bureau now collects data annually on Internet and computer use through the Current Population Survey (CPS), but the survey is not administered in Puerto Rico.
- PC Sales. Sales of PC's have increased significantly in recent years, jumping 11% last year from 90,000 units in 1997 to 100,000 in 1998. The value of PC and workstation sales totaled an estimated $181 million in 1998.[26] Dataquest estimates that Puerto Rico PC shipments will increase by 15% in 1999, comparable to the growth rate in the United States as a whole.[27] While this projection represents strong sales growth, it will not serve to close the gap in computer utilization with the 50 states.

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[24] Department of Commerce, *Falling through the Net – Defining the Digital Divide*, July 1999.

[25] International Data Corporation (1999) and sources at Compaq Computers, Puerto Rico.

[26] International Data Corporation (1999).

[27] Dataquest, "Forecast Analysis: Global PC Forecast Summary: Changes Afoot?" May 31, 1999.

IV.1. High Technology Jobs — **Puerto Rico Ranking:** 52 / 52

Jobs in high technology sectors: manufacturing, software and computer-related services, and telecommunications as a share of total employment.

Indicator Score:

High Tech Jobs, 1997	
Puerto Rico:	0.47%
U.S. Average:	4.47%

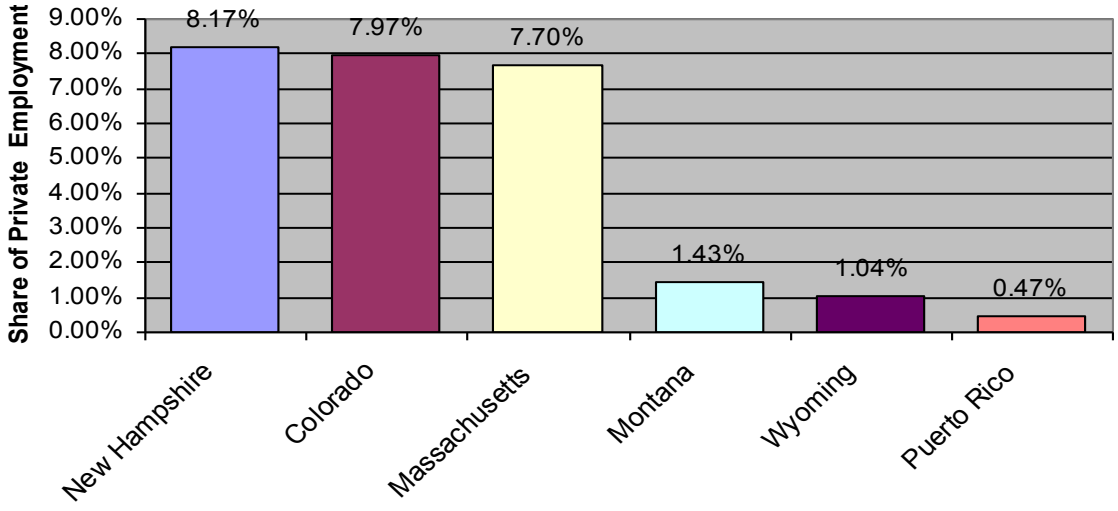
Source. U.S. Bureau of Labor Statistics & Puerto Rico Bureau of Labor Statistics.

- Puerto Rico ranks last in the number of high tech jobs as a share of total employment.
- At 0.3% of the total, high tech employment in Puerto Rico is 15 times lower than in the U.S. as a whole.

Highest Ranking States / Puerto Rico

	Score	Rank
New Hampshire	8.17%	1
Colorado	7.97%	2
Massachusetts	7.70%	3
Montana	*1.43%*	*50*
Wyoming	*1.04%*	*51*
Puerto Rico	*0.47%*	*52*

Figure 10. *Rankings* - High Tech Jobs



A. BACKGROUND

- High technology companies now contribute 24 percent of manufacturing value added, up from 18 percent in 1970. High tech output accounts for 6.2 percent of GDP, up from 5.5% in 1990.[28]
- Average wages in the U.S. high tech sector are 77 percent higher than in the rest of the economy.[29]

B. JOBS IN HIGH TECHNOLOGY SECTORS IN PUERTO RICO AND THE UNITED STATES

- In 1997, jobs in high technology sectors[30] accounted for 4,098 jobs in Puerto Rico, 4/10ths of 1% of the private sector jobs. *Jobs in high technology companies comprised 4.5% of jobs in the U.S. as a whole, a 10 times higher share*. The average wage for jobs in these sectors in Puerto Rico was $25,600, approximately half the average wages in U.S. high tech sectors.
- Of the forty-five high technology industry sectors identified by the American Electronics Association, the Puerto Rico Labor Department reports employment in seventeen.[31]
- What employment exists in high technology companies is concentrated in the following sectors: computer processing, cable and pay television services, computer storage devices, computer services, and computer programming. These sectors account for more than two thirds of all high technology employment in Puerto Rico.

Table 12. Employment in Selected Puerto Rico High Technology Sectors, 1997

	Computer Processing and Data Preparation	*Cable and Pay TV*	*Computer Storage Devices*	*Other Computer Related Services*	*Computer Programming*
SIC	7374	4841	3572	7379	7371
Employment	889	828	675	404	340
Share of high tech jobs	22%	20%	16%	10%	8%

Source. Puerto Rico Department of Labor, Bureau of Labor Statistics. Puerto Rico figures for 1997. U.S. figures for 1996.

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[28] Organization for Economic Cooperation and Development (OECD), *The Knowledge Economy,* (Paris: OECD, 1996), p. 9.

[29] American Electronics Association, *Cyberstates 3.0*, 1999.

[30] According to the definition of the American Electronics Association (1999). See appendix 1 for a full listing.

[31] These figures may underestimate the extent of employment in these sectors if employment is characterized under broader SIC categories. Without further information, estimates cannot be made.

- *Overall, Puerto Rican high tech employment is 10 times lower as a share of all jobs than in the U.S. as a whole*. Of the five high tech sectors with the highest employment levels in Puerto Rico, only one, computer storage devices, has a higher share of total employment in Puerto Rico than in the U.S. overall. Please see table 13 below.

Table 13. High Tech Sectors' Share of Employment in U.S. Overall and P.R.

	Computer Processing and Data Preparation	*Cable and Pay TV*	*Computer Storage Devices*	*Other Computer Related Services*	*Computer Programming*
Share of all jobs	0.07%	0.06%	0.05%	0.03%	0.03%
US share of all jobs	0.235%	0.077%	0.003%	0.220%	0.280%
Ratio of US to PR	3.36	1.28	0.06	7.33	9.33

Source. Puerto Rico Department of Labor, Bureau of Labor Statistics. Puerto Rico figures for 1997. U.S. figures for 1996.

- While still low, employment in high tech sectors has increased in the past four years, with the number of jobs up 24% since 1994. Employment in computer processing is up 31%, computer programming, 73%, and computer services, up 60%.[32]

[32] Most recent employment figures for the third quarter of 1998.

IV.2. Scientists and Engineers — **Puerto Rico Ranking:** 52 / 52

Doctorate holding scientists and engineers as a percentage of the workforce.

Indicator Score:

Scientists and Engineers, 1997	
Puerto Rico:	0.06%
U.S. Average:	0.40%

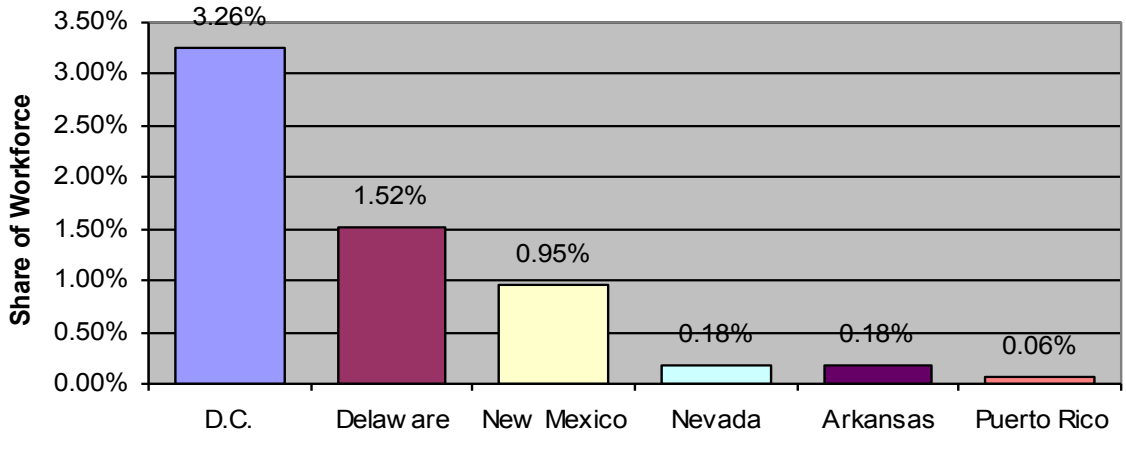
Source. National Science Foundation, 1999.

- Puerto Rico ranks last after the 50 states and D.C., with doctorate holding scientists and engineers comprising less than 1/10th of 1% of the workforce. The U.S. as a whole has a 6 times higher share.
- 1 in 67 American workers are engineers; in Puerto Rico engineers share is three times smaller: 1 in 200 workers.

Highest / Lowest Ranking States

	Score	Rank
D.C.	3.26%	1
Delaware	1.52%	2
New Mexico	0.95%	3
Nevada	*0.18%*	*50*
Arkansas	*0.18%*	*51*
Puerto Rico	*0.06%*	*52*

Figure 11. *Rankings* - PhD Scientists and Engineers



A. BACKGROUND

- Given the increasing importance of constant innovation in the *New Economy*, a well-educated workforce of scientists and engineers is critical for success

B. PH.D. SCIENTISTS AND ENGINEERS IN PUERTO RICO AND THE 50 STATES

Table 14. Employed Doctoral Scientists in Puerto Rico and the U.S. Overall

	Total	Sciences	Computer & math. Sciences	Life & Related Sciences	Physical & Related Sciences	Social & Related Sciences	Engineering
United States	518,440	429,820	32,400	141,780	105,250	150,390	88,620
Puerto Rico	670	550	10	310	80	150	120

Source. National Science Foundation/Division of Science Resources Studies, *1997 Survey of Doctorate Recipients*.

- Ph.D. scientists under-represented in Puerto Rico workforce. Ph.D. scientists are heavily under-represented in the Puerto Rican labor market, comprising less than 1/20th of 1% or 1 in 2,000 of all workers. Scientists represent a fraction of the workforce more than 6 times as small as in the U.S. overall. Please see table 15 below. Scientists with training in computer and mathematical sciences, and the physical sciences are even more under-represented, as a proportion 28 times and 11 times smaller than in the U.S. If Puerto Rico were an average state, it would have almost 300 Ph.D. level computer scientists, instead of 10.

Table 15. Scientists as Share of Workforce by Ph.D Field

	Total	Sciences	Computer & Maths Sciences	Life & Related Sciences	Physical & Related Sciences	Social & Related Sciences	Engineering
United States	0.400%	0.332%	0.025%	0.109%	0.081%	0.116%	0.068%
Puerto Rico	0.059%	0.049%	0.001%	0.027%	0.007%	0.013%	0.011%
Ratio of US to PR	6.76	6.83	28.31	4.00	11.50	8.76	6.45

Source. National Science Foundation/Division of Science Resources Studies, 1997 Survey of Doctorate Recipients.

- High scientist unemployment. Reflecting the weak demand for skilled workers in Puerto Rico, *unemployment among doctorate holding scientists was 13% in April, 1997*, approximately the same as the unemployment rate for all workers (13.1% for 1997). In comparison, the unemployment rate for Ph.D. scientists in the U.S. as a whole was only 1.2%, less than a quarter of the overall U.S. rate of five percent.[33] Interestingly, no scientist with a degree in computer and math sciences or physical and related sciences was unemployed in Puerto Rico.
- Brain drain. The anemic local demand for workers with post-graduate training in science, mathematics and engineering has driven an ongoing brain drain in Puerto Rico. The National Science Foundation's *1997 Survey of Doctoral Recipients* found that only 350 of the 1,560 doctorate holders born in Puerto Rico now reside on the island.[34]

Table 16. Employment of Scientists in Puerto Rico and the U.S. Overall By Field

	Total	Sciences	Computer & math. Sciences	Life & Related Sciences	Physical & Related Sciences	Social & Related Sciences	Engineering
United States	100%	83%	6%	27%	20%	29%	17%
Puerto Rico	100%	82%	1%	46%	12%	22%	18%

Source. National Science Foundation/Division of Science Resources Studies, 1997 Survey of Doctorate Recipients.

- Computer, mathematics, and physical scientists under-represented. The table above indicates the Ph.D. field for the scientists employed in Puerto Rico. In comparison to the composition of scientists in the U.S. as a whole, Puerto Rico has a higher share of Ph.D.'s with training in the life sciences, 46% compared to 27%, and a far lower share of Ph.D.'s with training in computer, math, physical and related sciences, 13% compared to 26%.

- Salaries for Ph.D. scientists. Salaries for scientists in Puerto Rico fall significantly below the average for the United States, despite a high cost of living on the island. The average scientist in the U.S. earns $60,200, 20% more than in a scientist in Puerto Rico, $50,000.[35] The handful of states that

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[33] National Science Foundation, Division of Science Resources Studies, Data Brief: Healthy Economy Yields Even Lower Unemployment Rate for Doctoral Scientists and Engineers, April 15, 1999. http://www.nsf.gov/sbe/srs/databrf/sdb99340.htm

[34] Id.

[35] Scientists in New York and New Jersey, the most common destinations for Puerto Rican migration to the mainland earn 26% and 50% more on average. National Science Foundation, 1995 Survey of Doctorate Recipients, Table 59.

pays their scientists lower wages have significantly lower costs of living: North Dakota, South Dakota, Montana, Arkansas, and Wyoming.

Table 17. Salaries for Ph.D. Scientists and Engineers in Puerto Rico, 1995

	Total	Scientists	Engineers	Non S&E occupations
Puerto Rico	$50,000	$40,000	$45,000	$70,000
United States	$60,200	$55,000	$67,000	$73,500

Note. NSF data does not distinguish Puerto Rico from other outlying areas. It is assumed that scientists in Puerto Rico comprise the majority. *Source*. National Science Foundation, 1995 Survey of Doctorate Recipients.

C. ALL ENGINEERS IN PUERTO RICO AND THE UNITED STATES

- Approximately 4,300 engineers (including those with and without Ph.D.'s) comprise ½ of 1% of the Puerto Rican labor force.[36] In comparison, engineers constitute a three times higher proportion of the labor force in the U.S. as a whole (1.5%).

- In fact, 7 of the 14 categories of engineers tracked by the Labor Department are not represented at all in Puerto Rico. Of the remaining types, only civil, industrial, and safety engineers were employed in Puerto Rico at a similar proportion of the labor force as in the U.S. as a whole.

- Salaries for all engineers across the U.S. averaged $56,100, 36% higher than the average in Puerto Rico, $41,100. The salary differential between the U.S. as a whole and Puerto Rico is highest for civil and computer engineers (approximately 64% higher in the U.S.). Please see table 18 below.

Table 18. Engineer Salaries in the U.S. Overall and Puerto Rico
(for those occupations with engineers in Puerto Rico)

	Chemical Engineers	*Civil Engineers*	*Electrical Engineers*	*Computer Engineers*	*Industrial Engineers*	*Safety Engineers*	*Mechanical Engineers*	***Total***
U.S. Overall	$ 58,400	$ 52,750	$ 56,820	$ 56,590	$ 52,350	$ 50,760	$ 52,210	**$ 56,115**
P.R.	$ 47,970	$ 32,070	$ 43,910	$ 34,450	$ 44,860	$ 45,290	$ 39,700	**$ 41,179**
Difference	21.7%	64.5%	29.4%	64.3%	16.7%	12.1%	31.5%	**36.3%**

Source. Bureau of Labor Statistics, Occupational Employment Statistics Survey, 1997. http://stats.bls.gov/oeshome.htm.

[36] Bureau of Labor Statistics, Occupational Statistics Survey, 1997.

IV.3. Patents — Puerto Rico Ranking: 52 / 52

The number of patents issued to companies or individuals per 1,000 workers.

Indicator Score:

Patents per 1,000 workers, 1998	
Puerto Rico:	0.02
U.S. Average:	0.61

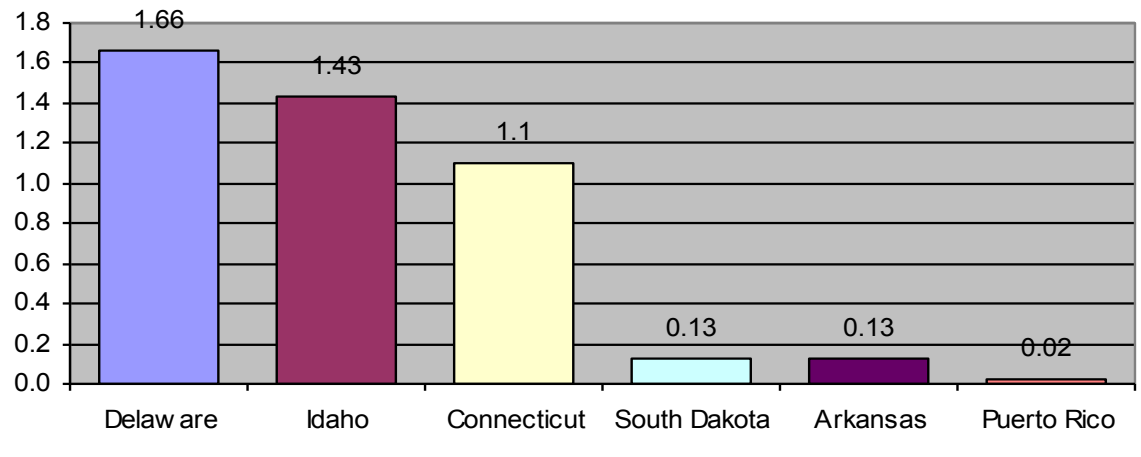
Source. U.S. Patent and Trademark Office, 1999.

- Puerto Ricans generated 20 patents in 1998 or 0.02 per thousand workers, *a rate 30 times lower than the overall U.S. average.*
- Arkansas and Mississippi, the states with the most similarly sized labor forces, created 173 and 143 patents in 1998, *7 times more than Puerto Rico*.
- While major R&D conducting corporations operate production facilities in Puerto Rico, they carry out minimal R&D in Puerto Rico.

Highest / Lowest Ranking States

	Score	Rank
Delaware	1.66	1
Idaho	1.43	2
Connecticut	1.10	3
South Dakota	0.13	*50*
Arkansas	0.13	*51*
Puerto Rico	0.02	*52*

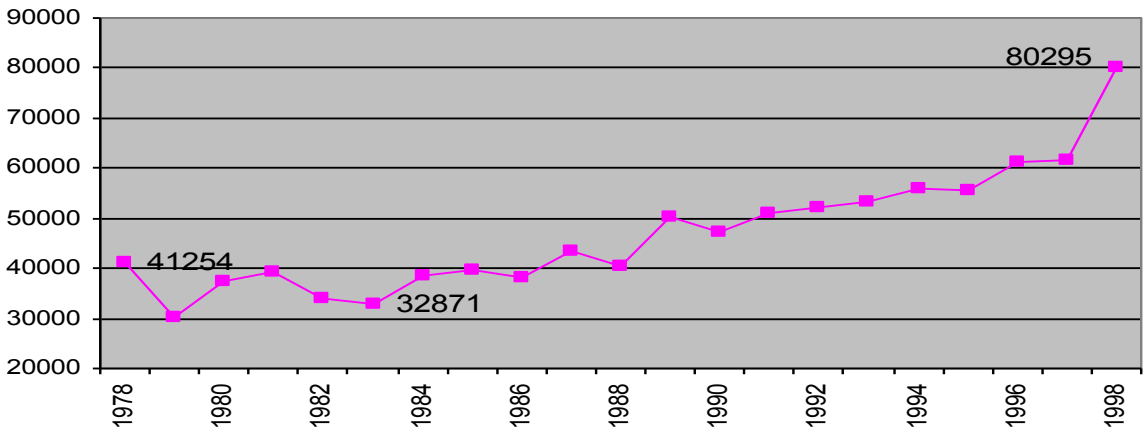
Figure 12. *Rankings* - Patents per 1,000 workers



A. BACKGROUND

- The number of patents issued annually has climbed steadily in the U.S., reflecting the escalating rate of product innovation in the economy. Innovations enable increases in productivity and improvements in wages.
- The number of patents issued has jumped from approximately 33,000 in 1983 to over 80,000 last year. Please see figure 13 below. Since 1983, the number of patents issued has increased at an annual rate of 6.1%.[37]

Figure 13. Patents Issued Annually in the US, 1978-1998



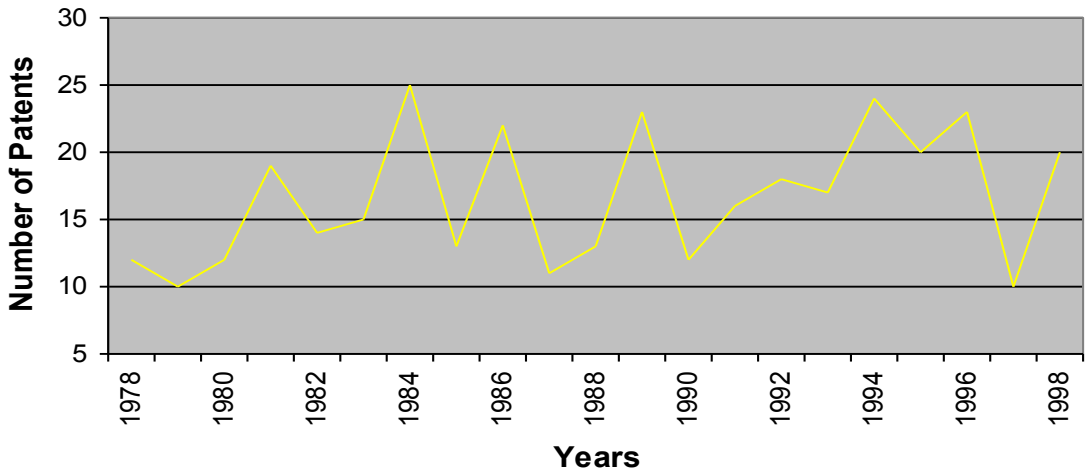
Source. U.S. Patent and Trademark Office, 1999

[37] U.S. Patent and Trademark Office, Patent Counts by Country/State and Year: Utility Patents, 1963 to 1998, March 1999.

B. PATENTS GENERATED IN PUERTO RICO

- Patents in Puerto Rico. The number of patents issued in Puerto Rico has improved little since 1978, ranging between 10 and 25 annually. Please see figure 14 below. Of the recent patents since 1994, no corporation accounted for more than five. The only organizations generating more than 5 patents were the Government of Puerto Rico (14) and the University of Puerto Rico (6).[38]

Figure 14. Patents Issued in Puerto Rico, 1978-1998



- All patents since 1977. Puerto Rico accounted for only 435 of the 1.1 million patents generated in the US since 1977 or 0.04% of the total.[39] In comparison, Mississippi generated 2,404 patents during the same time, and South Carolina, a state with a similar sized 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 created scientific innovation at overall U.S. levels.

[38] U.S. Patent and Trademark Office, Patenting by Geographic Origin (State and Country)-Breakout By Organization.

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

IV.4. Industry Investment in R&D **Puerto Rico Ranking:** 44 / 52[40]

Private sector investment in research and development as a share of gross product.

Indicator Score:

Private R&D Investment, 1997	
Puerto Rico:	0.17%
U.S. Average:	1.94%

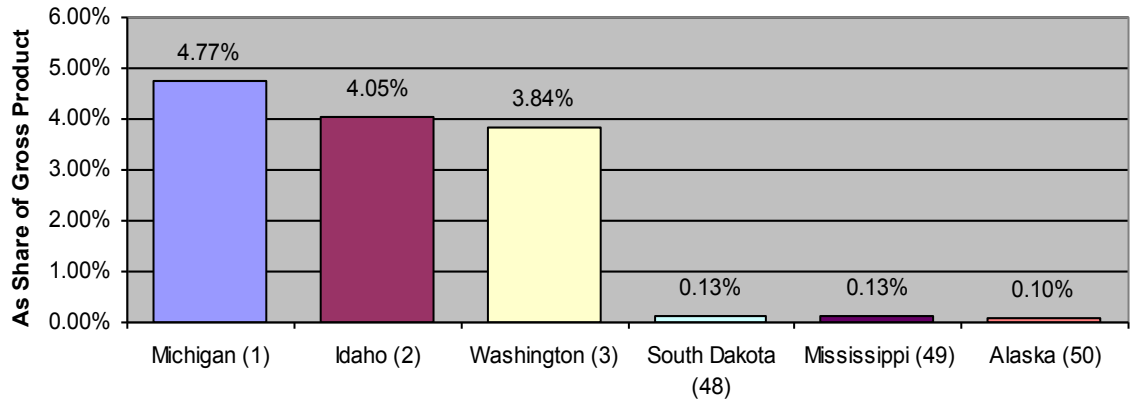
Sources. National Science Foundation, 1999.

- Private investment in R&D in Puerto Rico is an estimated $53 million annually, or 0.17% of gross product.
- Despite its many electronics and pharmaceutical firms, the private sector conducts little R&D in Puerto Rico.
- Private R&D investment in Puerto Rico as a share of the economy is *11 times* less than in the U.S. as a whole.

Highest / Lowest Ranking States

	Score	Rank
Michigan	4.77%	1
Idaho	4.05%	2
Washington	3.84%	3
South Dakota	0.13%	*48*
Mississippi	0.13%	*49*
Alaska	0.10%	*50*

Figure 15. *Rankings* - Industry Investment in R&D



[40] The National Science Foundation does not release information on the District of Columbia or West Virginia to avoid disclosing information about individual companies.

A. BACKGROUND

- Investments in research and development are *the key* driver of economic growth in the *New Economy*, boosting productivity and generating increases in living standards.

- Studies find that investments in research and development generate returns to investors of over 20 percent and benefits to society of over 50 percent.[41] Two thirds of economic growth in the U.S. is now attributable to technological innovation.

B. PRIVATE INVESTMENT IN R&D IN PUERTO RICO

- Industry sponsors approximately $53 million of R&D annually in Puerto Rico.[42] The most recent survey in 1991 found that only 30% of manufacturing companies conducted any R&D at all, and the rest spent $31 million.[43] Federal surveys find evidence of negligible R&D spending.[44]

- Despite the substantial pharmaceutical manufacturing business in Puerto Rico, the first pharmaceutical research and development center opened only last year, operated by local firm Mova Pharmaceuticals.

- In contrast, clusters of high tech firms 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.[45] In South Carolina, a state with a similar population to Puerto Rico, industry invested $783 million in1997, 15 times as much as the private sector in Puerto Rico.

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41 *See* Council of Economic Advisors (1995) for a review of studies.

42 Estimate based on federal and Puerto Rico survey results and press reports on electronics and pharmaceutical firms in Puerto Rico.

43 Information from a survey of 172 manufacturing corporations by the Puerto Rico Economic Development Administration in 1991.

44 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.

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

IV.5. Venture Capital Investment **Puerto Rico Ranking:** 16 / 52

Private sector venture capital invested as a percentage of gross product.

Indicator Score:	Venture Capital Investment, 1998
	Puerto Rico: 0.11%
	U.S. Average: 0.18%

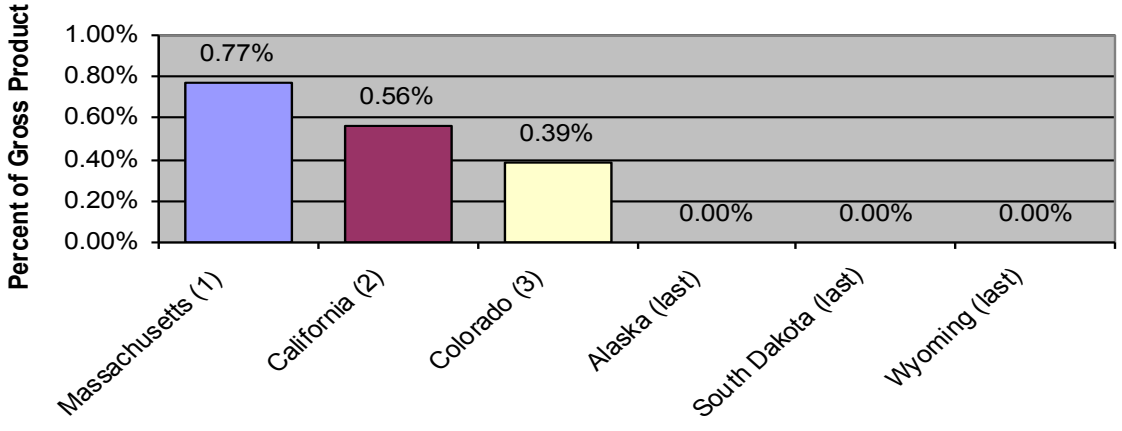
Sources. PriceWaterhouseCoopers, 1999 and Puerto Rico Industrial Development Company (PRIDCO).

- At 0.11% of gross product, private venture capital investment in Puerto Rico is about two-thirds of the overall U.S. level (0.18%).
- Venture capital investments from the private sector totaled an estimated $35 million in 1998.

Highest / Lowest Ranking States

	Score	Rank
Massachusetts	0.77%	1
California	0.56%	2
Colorado	0.39%	3
Alaska	0.00%	Last
South Dakota	0.00%	Last
Wyoming	0.00%	*Last*

Figure 16. *Rankings* - Venture Capital Activity



A. BACKGROUND

- Venture capital (VC) fuels growth of companies at the early stages of development, and wields an importance beyond its share of the overall capital markets. Venture capital investments were made in U.S. 2,485 companies in 1997, four times as many as in 1980.
- Employment in venture backed companies increased 34% annually between 1991 and 1995, at the same time as employment in Fortune 500 firms decreased 3.6%.[46]
- A majority (62%) of all VC investment was concentrated in a handful of states, California ($5.77 billion), Massachusetts ($1.7 billion), Texas ($816 million) and New York ($557 million).[47]

B. VENTURE CAPITAL IN PUERTO RICO

- In 1998, venture funds invested $50 million in Puerto Rico, of which $35.7 million is allocated to private sources based on the level of government investment in the funds.[48] The Puerto Rico government estimates that $350 million is under management for investment as venture capital in Puerto Rico, of which $100 million has been provided by the Puerto Rico government ($48 million in private equity, and $52 million in a venture fund of funds).
- VC activity in 1998 represented approximately 0.18% of gross product in the U.S. as a whole, and 0.11% in Puerto Rico, or two thirds as much, ranking Puerto Rico 16 of 52 in terms of activity compared to the economy, and 31 in terms of overall VC activity.
- Using gross product and not gross domestic product (GDP) as the baseline overestimates the extent of VC activity in Puerto Rico. If VC activity were expressed as a share of GDP instead, the indicator score would be reduced by a third to 0.12% (GDP in Puerto Rico is 50% higher than gross product).
- The volume of venture capital investment in any one year should not be construed as a powerful indicator of innovation capacity in Puerto Rico, or elsewhere. Given the small amounts of financing involved, one or two deals could radically change the rankings (as is true with the IPO indicator). Also, without information on the rate of return to VC investments, volume data for any one year has little meaning.

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[46] Robert D. Atkinson and Randolph Court, *The New Economy Index: Understanding America's Economic Transformation*, 1998.

[47] Pricewaterhousecoopers, *1998 Money Tree Report*, 1999.

[48] Puerto Rico Industrial Development Company, August 1999. Because the PriceWaterhouseCoopers only tracks private source funds, this report adjusts total venture investments by the ratio of private funds to total venture funds in Puerto Rico (71%) to allocate $35.7 million of the total $50 million in 1998 investments to private sector sources.

Puerto Rico and the *New Economy*: *International Comparisons*

Benchmarking the *New Economy* in Puerto Rico with the 50 states and the District of Columbia indicates that the island remains behind the rest of the United States overall, and behind on most measures, particularly in its capacity for innovation and transformation to a digital economy. As business becomes more global, the 50 states must compete and compare themselves with foreign countries. For a global perspective, the following sections compare Puerto Rico's competitive position in the *New Economy* with a group of twenty developing and developed nations worldwide (please see following page for a list).

- **The Digital Economy**

Puerto Rico ranks at the bottom of all the countries in terms of Internet hosts per capita, with 0.3 per 10,000 people, a minute fraction of the 979.3 in the U.S. as a whole. Computer use is higher in Puerto Rico (7 of 20) than in most selected countries, although it is a third of the level in the rest of the United States. The penetration of mobile phones in Puerto Rico (13 of 20) is comparable to developing countries in Latin America, but a fraction of the use level in the United States.

- **Capacity for Innovation**

Puerto Rico ranks in the middle of the selected countries in its capacity for innovation. Its low output of patents ranks it lower than all but Ecuador, Columbia and Malaysia, and below Brazil, Chile, Venezuela, Mexico, and Thailand. Total investment in research and development as a percent of gross product places Puerto Rico 13 of 20, and behind several developing countries including Venezuela, Brazil, and Chile.

Puerto Rico compares favorably with most developing countries on the number of scientists and engineers engaged in R&D, with the exception of Venezuela where more than twice as many work - 671 per million people compared to 303 per million in Puerto Rico. However, Puerto Rico remains far out of the range of the leading nations like Korea (2,636), Japan (6,309), the rest of the United States (3,732), Spain (1,210), and Portugal (1,185) in the number of scientists and engineers in R&D. A relatively high share of students enroll in post-secondary education in Puerto Rico (48%), indicating that the basic education foundation is comparable internationally.

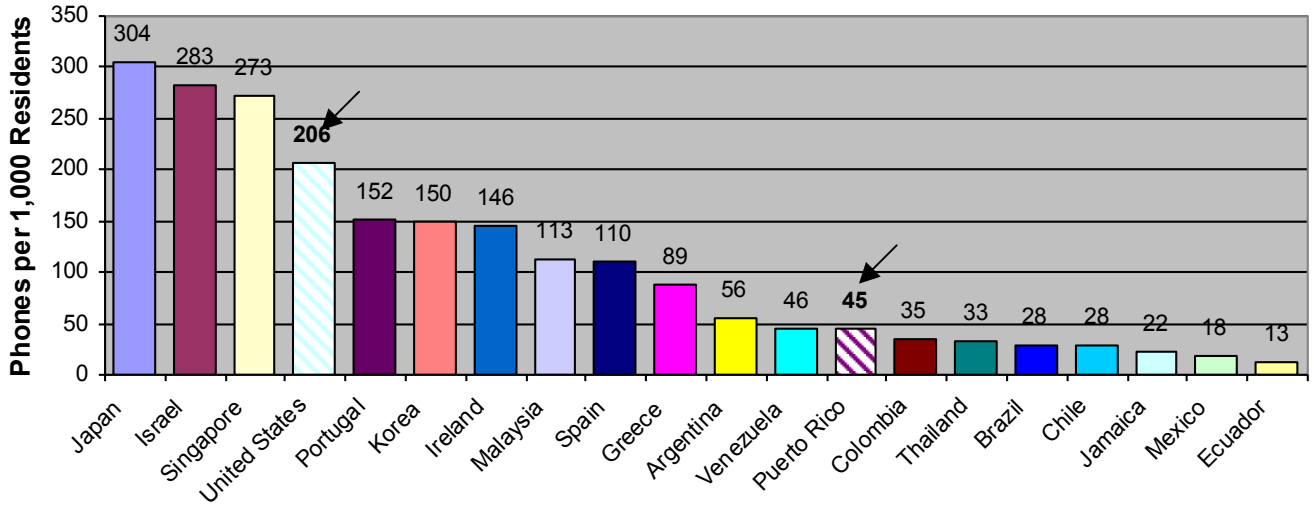
Table 19. Puerto Rico Ranked on *New Economy* Measures with Twenty Selected Countries Worldwide

The Digital Economy		**Capacity for Innovation**	
Mobile Phones	13 / 20	R&D Scientists and Eng.	10 / 20
Computers	7 / 20	Patents	13 / 20
Web Use	20 / 20	Total R&D investment	13 / 20
		Secondary Educ. Enrollment	4 / 20

V.1. *International Comparison – The Digital Economy:* Mobile Phones

- In the emerging digital economy, mobile / cellular phones are rapidly becoming ubiquitous. The Yankee Group forecasts that one billion phones will be in use by the year 2005, and that technological advances will transform the mobile phone into a major conduit for data transmission as well as voice communication.
- At 45 phones per thousand people, penetration of mobile / cellular phones into the Puerto Rican market is a fifth of the overall U.S. level, 206 per thousand, and more comparable to levels in Latin America and the Caribbean, 26 phones per thousand.
- Argentina and Venezuela both have more mobile / cellular phones per thousand people, 56 and 46 respectively, than Puerto Rico. Korea (150), Malaysia (113), and Singapore (273) each have a mobile phone penetration rate at least three times as high as Puerto Rico.

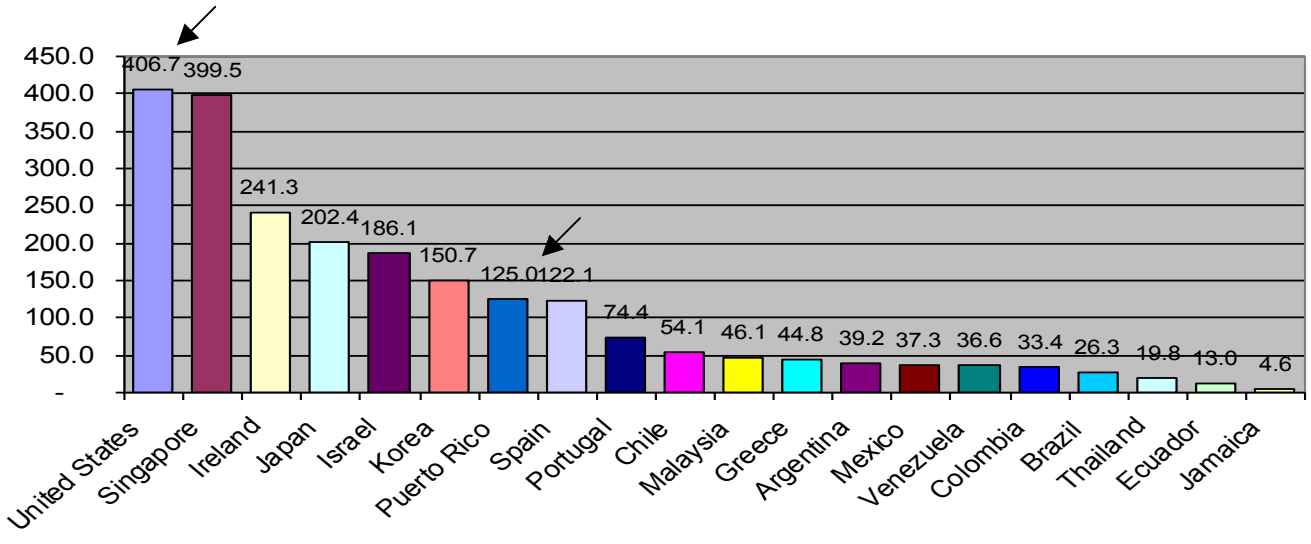
Figure 17. Mobile Phones Per 1,000 People



V.2. *International Comparison – The Digital Economy:* Computers

- The number of computers in Puerto Rico, an estimated 125 for every 1,000 people,[49] compares favorably with Spain, Portugal and Chile, but places Puerto Rico below Ireland (241), Israel (186), and Korea (150), and far out of the range of computer use in the United States (407) and Singapore (400).
- Market forecasts project strong growth in computer sales of 15% for 1999 in Puerto Rico, comparable to the rest of the United States, Singapore, and other more technologically developed countries.[50]

Figure 18. Computers per 1,000 People

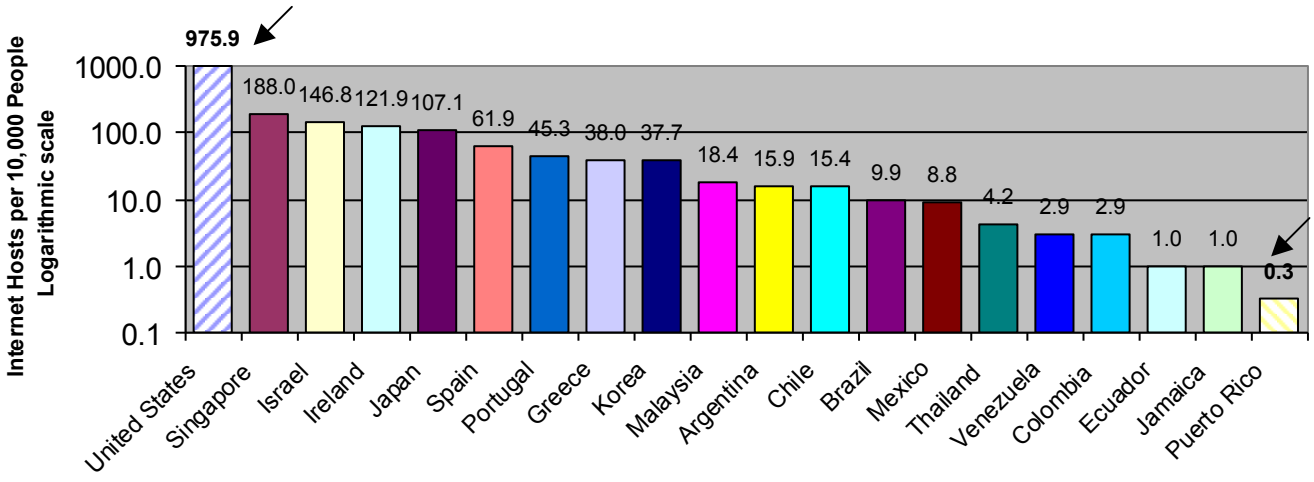


[49] Estimated on the basis of sales figures and other industry data.
[50] Dataquest, 1999.

V.3. *International Comparison – The Digital Economy:* Internet Hosts

- With 0.3 hosts per 10,000 people, Puerto Rico ranks at the bottom of the selected countries in the number of Internet hosts per 10,000 people, as indicated on the graph below.[51] The U.S. ranks far above all other countries with 976 compared to 188 in Singapore and 107 in Japan. Puerto Rico ranks far below any state in the U.S., and lower than Jamaica and Ecuador.[52]

Figure 19. Internet Hosts Per 10,000 People



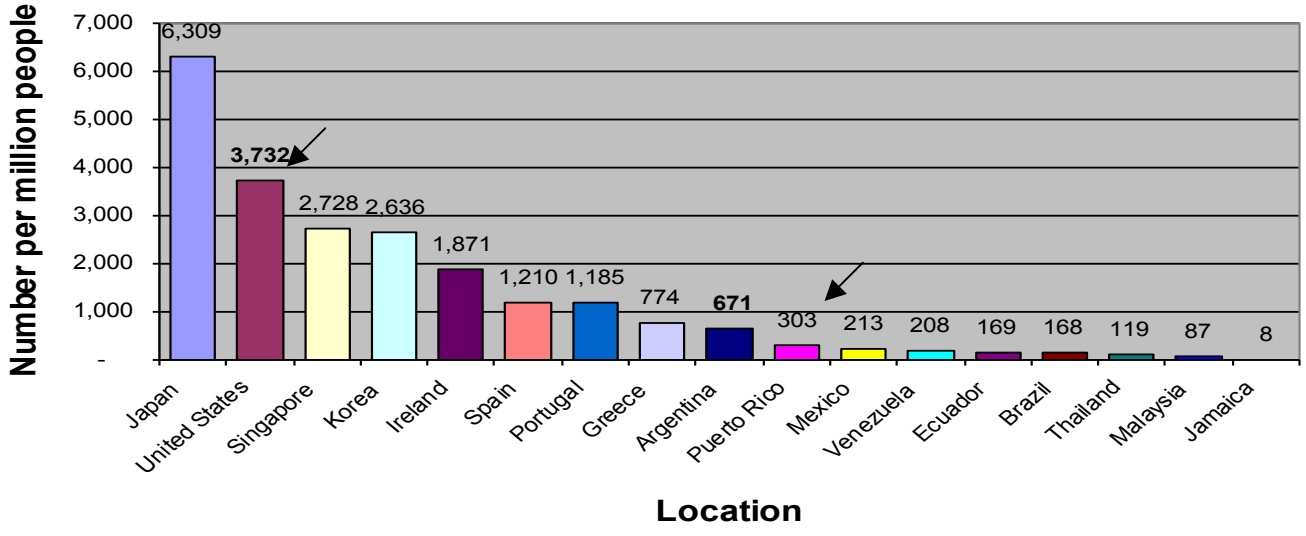
[51] In order to include values from 0.3 to 956, the information is graphed on a logarithmic scale.

[52] Given the discrepancy with other figures from Domainsondisc.com and Matthew Zook of the University of California, it is likely that these World Bank figures underestimate the number of domain names in Puerto Rico to some extent.

VI.1. *International Comparison – Innovation Capacity:* Scientists and Engineers in Research and Development

- Puerto Rico has 10 times fewer scientists and engineers engaged in research and development per million people, 303, than the U.S. as a whole, 3,732. Puerto Rico's workforce of scientists and engineers compares more similarly to countries in Latin America. Argentina has twice as many scientists and engineers in R&D than Puerto Rico, while other countries like Mexico (213), Venezuela (208), and Ecuador (169) have similar numbers per million people.

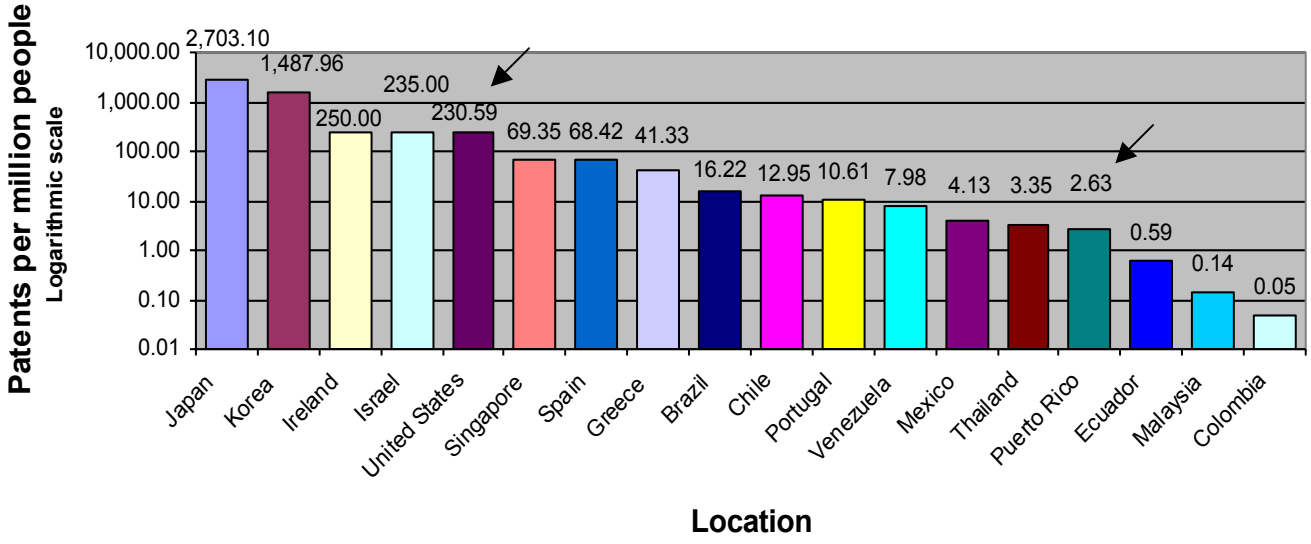
Figure 20. Scientists and Engineers in R&D



VI.2. *International Comparison – Innovation Capacity:* Patents

- An abysmally low rate of patent generation in Puerto Rico ranks the island near the bottom of the selected countries. At 2.63 patents per million people, Puerto Rico ranks far behind many developing countries in Latin America, including Brazil (16.22), Chile (12.95), Venezuela (7.98), and Mexico (4.13). Please see figure 21 below.
- Rapidly developing countries like Ireland, Singapore and Korea generate at least 30 times as many patents per capita as Puerto Rico; Korea generates more than 500 times as many.
- The low levels of intellectual capital created in Puerto Rico as reflected in these patent data point to a persistent under-investment in research and development, and in human capital.

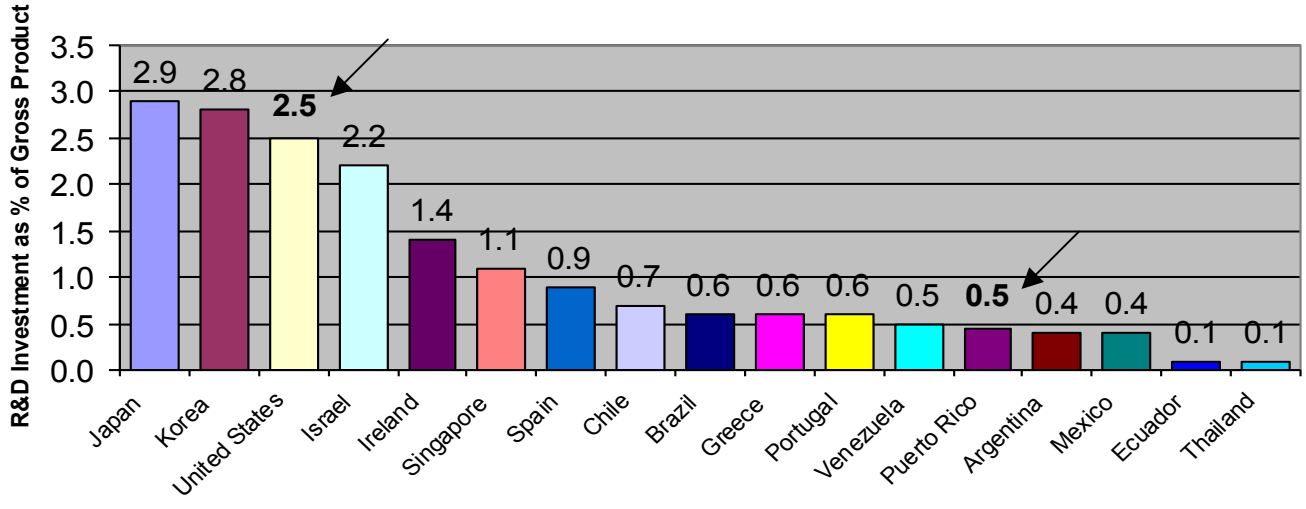
Figure 21. Patents per million people



VI.3. *International Comparison – Innovation Capacity:* Investment in Research and Development

- Puerto Rico's estimated 0.45% investment in R&D ranks the island at or below the investment level of many Latin American countries. R&D investment as a percent of gross product in Puerto Rico compares similarly to Argentina (0.4%), Mexico (0.4%), and Venezuela (0.5%), and falls behind Chile at 0.7%. R&D investment in Ireland totals 1.4% of gross product, Singapore 1.1%, and Korea, 2.8%, more than 5 times as much as Puerto Rico.[53]
- Given the increasing importance of knowledge in driving growth in the global economy, Puerto Rico's comparative under-investment in R&D bodes ill for future growth and competitiveness. Investment in knowledge and research does not reap immediate returns but is critical for long-term productivity and economic growth.

Figure 22. Total Investment in R&D

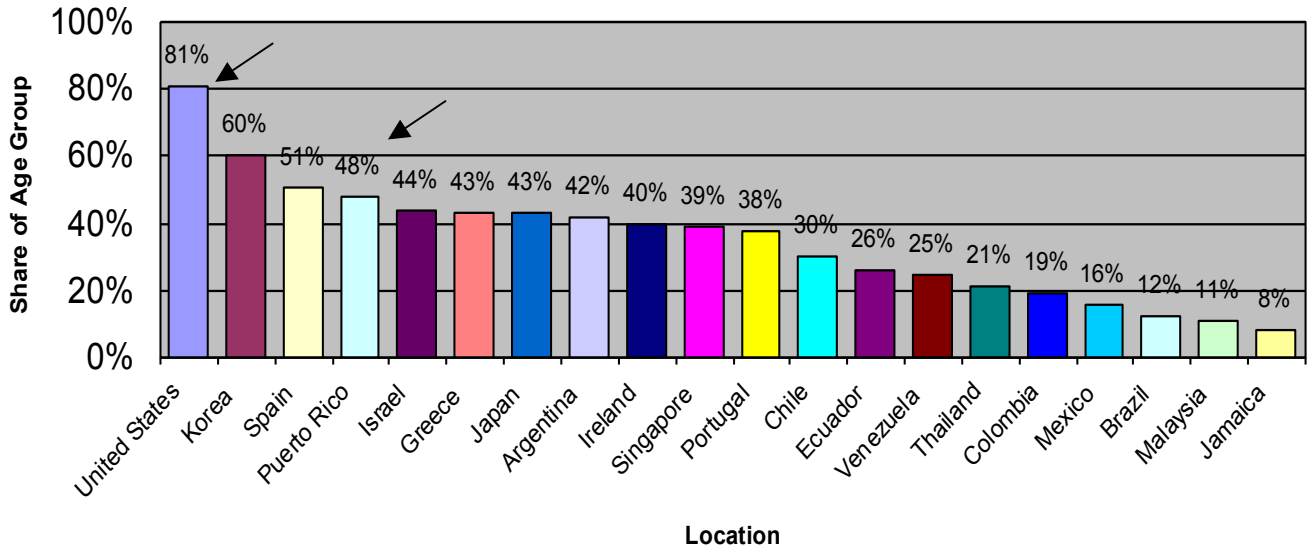


[53] Calculating Puerto Rico's investment as a percent of gross domestic product instead of gross product would reduce the percentage to approximately 0.30%.

VI.4. *International Comparison – Innovation Capacity:* Enrollment in Post-Secondary Education

- An estimated 48% of students in Puerto Rico are enrolled in post-secondary education, far lower than in the U.S. as a whole, where 81% are enrolled. Puerto Rico compares favorably with the selected countries; only Korea and Spain had a higher proportion of students enrolled. Israel (44%), Greece (44%), Japan (43%), and Argentina (42%) had similar shares of students enrolled.

Figure 23. Post-Secondary School Enrollment



VII. Coda

This report has provided a database of information with which to benchmark Puerto Rico's competitive position in the *New Economy* vis-a-vis the rest of the United States. Overall, and on almost all of the indicators, Puerto Rico finishes last. An international comparison shows Puerto Rico behind many less developed economies, particularly in indicators measuring capacity for innovation.

VIII. Data Sources and Methodology

The following section contains the data sources used in this report. Where the calculation of the indicator is not clear, a more detailed explanation of the methodology is included below. If only one source is listed, data for the 50 states and Puerto Rico are both found there. If information is available through the Internet, a hyper-link is provided to the site.

Overall *New Economy* ranking. The Progressive Policy Institute ranks each state overall on the basis of each state's indicator scores weighted by category. These rankings can be found on the Internet at http://www.neweconomyindex.org/states. For the overall ranking, the raw scores on the indicators are adjusted to be based on standard deviations from the mean, to capture the difference in the scores across the states, not just the ranking. In this report, Puerto Rico is ranked with the 50 states and the District of Columbia using a similar methodology. The four *New Economy* categories are weighted the same amount overall as those categories in the PPI report, with the indicators within categories also weighted the same. Engineers as a share of total employment is listed for information purposes only, and is not used to calculate the overall ranking.

I. Knowledge Jobs

- Managerial, Professional, and Technical Occupations

U.S. Department of Labor, Bureau of Labor Statistics, Occupational Statistics Survey, 1997.

- Workforce Educational Attainment

Methodology. The scores assigned to each state, Puerto Rico and the District are a weighted measure of the educational attainment of the workforce. The share of the population over 25 with an associate's degree or some college education receives a weight of 0.5, the share with a bachelor's degree, a weight of 1.0, and the share with an advanced degree, a weight of 2.0. *See* Progressive Policy Institute (1999). A recalculation of the same Census data did not generate the same numbers as the PPI publication, although the resulting rankings are not appreciably different.

U.S. Bureau of the Census, 1990 Census of Population, CPH-L-96.

II. Globalization

- Foreign Direct Investment

Fahim-Nader and Ziele, "Foreign Direct Investment in the United States - New Investment in 1997 and Affiliate Operations in 1996," *Survey of Current Business*, Bureau of Economic Analysis (June 1998), table 13.

- Export Orientation of Manufacturing

Methodology. Both overall U.S. and Puerto Rico data are drawn from 1992 surveys. Because the Puerto Rico data does not include the number of jobs in export firms, the measure used here is the value of shipments exported as a share of total shipments. The Puerto Rico data is adjusted to account for the 17% of shipments for which there is no destination. It is assumed

that these shipments are no different statistically from those for which there is destination information.

U.S. U.S. Bureau of the Census, *Analytical Report Series: Selected Characteristics of Manufacturing and Wholesale Establishments that Export: 1992*, June 1996.

P.R. U.S. Bureau of the Census, *1992 Economic Census of the Outlying Areas*: *Manufacturing, Puerto Rico*, 1994. Data available on the Internet at: http://www.census.gov/csd/oat/pr.htm.

III. The Digital Economy

- Online Access

U.S. Department of Commerce, National Telecommunications and Information Administration, *Falling through the Net: Defining the Digital Divide*, July 8, 1999.

Bureau of the Census, *Survey of Internet and Computer Use*, Supplement to December 1998 Current Population Survey Questionnaire. Raw data available on the Internet at: http://www.bls.census.gov/cps/computer/1998/sdata.htm. The survey collects information on internet access at home, at work and elsewhere.

P.R. Estimate from José Martinez, Technology Writer, *Caribbean Business*, August 1999.

- Computer At Home

U.S. Department of Commerce, National Telecommunications and Information Administration, *Falling through the Net: Defining the Digital Divide*, July 8, 1999.

Bureau of the Census, *Survey of Internet and Computer Use*, Supplement to December 1998 Current Population Survey Questionnaire. Data available on the Internet at: http://www.bls.census.gov/cps/computer/1998/sdata.htm

P.R. Estimate from International Data Corporation (1999) and Compaq Computer Puerto Rico. Conversation with José Martinez, Technology Writer, *Caribbean Business*, August 1999.

- Internet Domain Names

All domain names from the Internet based company, Domainsondisc (data from April 1999). Data available on the Internet at: www.domainsondisc.com.

Commercial domains from Matthew Zook, Ph.D. Candidate, Department of City and Regional Planning at UC Berkeley, August 1999.

IV. Innovation Capacity

- High Technology Jobs

Methodology. The American Electronics Association tracks the number of jobs and salaries in 45 specific (four digit Standard Industrial Code) industrial sectors. These figures accurately capture jobs in high technology sectors, but do not necessarily represent all high technology jobs. Please see appendix 1 for a complete listing of the SIC codes.

U.S. American Electronics Association, *Cyberstates 3.0*, June 1999.

P.R. Data provided by the Puerto Rico Department of Labor, Bureau of Labor Statistics, 1994-1998.

- Industry Investment in Research and Development

National Science Foundation, Division of Science Resources Studies, Survey of Industrial Research and Development, *Research and Development in Industry: 1997* [Early Release Tables], 1999. Data available on the Internet at: http://www.nsf.gov/sbe/srs/srs99411/start.htm.

- Patents

U.S. Patent and Trademark Office, Office for Patent and Trademark Information, *Patent Counts by Country/State and Year: Utility Patents, January 1963* – December 31, 1998, March 1999.

- Scientists and Engineers

Ph.D. Scientists/Engineers. National Science Foundation, Division of Science Resources Studies, Survey of Doctorate Recipients, *Characteristics of Doctoral Scientists and Engineers: 1997* [Early Release Tables], February 1999. Data available on the Internet at: http://www.nsf.gov/sbe/srs/srs99412/start.htm.

Engineers. U.S. Department of Labor, Bureau of Labor Statistics, Occupational Statistics Survey, 1997.

- Venture Capital

Methodology. Because 1998 data on gross product by state was not available at the time of publication from the Bureau of Economic Analysis, venture capital activity is expressed as a percent of 1997 gross product figures for Puerto Rico, the 50 states, and the U.S. as a whole.

U.S. PriceWaterhouseCoopers LLP, *1998 Money Tree Report*, (Boston, MA: 1999).

P.R. Information provided by Mynra Losada, Puerto Rico Industrial Development Company, August 1999.

V. International Comparisons

Most of the international data on the *New Economy* is drawn from the World Bank, *World Development Indicators 1999*, July 1999, which lists data for the most recent year available. Some data is available on the Internet at: http://www.worldbank.org/data/wdi/home.html. As above, the methodology is explained below where necessary.

- Mobile Phones, Internet Hosts

World Bank, *World Development Indicators 1999*, Table 5.11. The Information Age, pp. 310-312.

- Scientists and Engineers in R&D

Methodology. The number of scientists and engineers engaged in research and development in Puerto Rico is not available through any surveys. This figure is estimated by assuming that the ratio of non-Ph.D. to Ph.D. scientists and engineers engaged in R&D is the same in Puerto Rico as in the U.S. as a whole (0.72), and applying this ratio to the number of Ph.D. scientists and engineers working in Puerto Rico.

World Bank, *World Development Indicators 1999*, Table 5.12. Science and Technology, pp. 314-316.

National Science Foundation, Division of Science Resources Studies, Survey of Doctorate Recipients, *Characteristics of Doctoral Scientists and Engineers: 1997* [Early Release Tables], February 1999. Data available on the Internet at: http://www.nsf.gov/sbe/srs/srs99412/start.htm.

- Patents

World Bank, *World Development Indicators 1999*, Table 5.12. Science and Technology, pp. 310-312.

P.R. U.S. Patent and Trademark Office, Office for Patent and Trademark Information, *Patent Counts by Country/State and Year: Utility Patents, January 1963* – December 31, 1998, March 1999.

- Expenditures for R&D

World Bank, *World Development Indicators 1999*, Table 5.12. Science and Technology, pp. 314-316.

P.R. R&D expenditures in Puerto Rico estimated.

- Computers

World Bank, *World Development Indicators 1999*, Table 5.11. The Information Age, pp. 310-312.

- Post Secondary Education

Methodology. World Bank figures are based on all public support for education, including support for private institutions.

World Bank, *World Development Indicators 1999*, Table 2.10. Participation in Education, pp. 78-80.
P.R. Puerto Rico Planning Board, *Puerto Rico Budget 1997-1998*.

General Economic and Demographic Information

- Gross U.S. and State Product

Note. Because the Commerce Department does not currently have state gross product figures for 1998, this report uses 1997 figures for both the states and Puerto Rico.

U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Analysis Division, Washington, D.C., 1977-1997 Release June 9, 1999. Data available on the Internet at http://www.bea.doc.gov/bea/regional/gsp/gspsum_c.htm.

U.S. Department of Commerce, Bureau of Economic Analysis, "Gross Domestic Product Second Quarter 1999," July 29, 1999.

- Population

U.S. Census Bureau.

Puerto Rico Planning Board, *1998 Economic Report to the Governor*, Statistical Appendix, Table 31, February 1998.

World Bank, *World Development Indicators 1999,* Table 2.1. Population.

- Total State Employment

U.S. Department of Labor, Bureau of Labor Statistics, Data Release, "Regional and State Employment and Unemployment," June 1999, Table 4. "Civilian labor force and unemployment by state and selected areas, not seasonally adjusted," Data available on the Internet at: http://www.bls.gov/news.release/laus.t04.htm.

- Gross Product – Puerto Rico

Puerto Rico Planning Board, *1998 Economic Report to the Governor*, Statistical Appendix, Table 2, February 1998

IX. Appendices

I. American Electronics Association SIC Codes for High Technology Sectors

HIGH-TECH MANUFACTURING

Computers and Office Equipment

3571 Electronic Computers
3572 Computer Storage Devices
3575 Computer Terminals
3577 Computer Peripherals
3578 Calculating and Accounting Machines
3579 Office Machines

Consumer Electronics
3651 Household Audio and Video Equipment
3652 Phonographic Records and Prerecorded Tapes and Disks

Communications Equipment
3661 Telephone and Telegraph Apparatus
3663 Radio and TV Broadcast and Communications Equipment
3669 Other Communications Equipment

Electronic Components and Accessories
3671 Electron Tubes
3672 Printed Circuit Boards
3675 Electronic Capacitors
3676 Electronic Resistors
3677 Electronic Coils, Transformers, and Inductors
3678 Electronic Connectors
3679 Other Electronic Components

Semiconductors
3674 Semiconductors and Related Devices

Industrial Electronics
3821 Laboratory Apparatus
3822 Environmental Controls
3823 Process Control Instruments
3824 Fluid Meters and Counting Devices
3825 Instruments to Measure Electricity
3826 Laboratory Analytical Instruments
3829 Other Measuring and Controlling Devices

Photonics
3827 Optical Instruments and Lenses
3861 Photographic Equipment and Lenses

Defense Electronics
3812 Search and Navigation Systems, Instruments, and Equipment

Electromedical Equipment
3844 X-Ray Apparatus and Tubes and Related Irradiation Apparatus
3845 Electromedical and Electrotherapeutic Apparatus

COMMUNICATIONS SERVICES
4812 Radiotelephone Communications
4813 Telephone Communications
4822 Telegraph and Other Message Communications
4841 Cable and Other Pay Television Services
4899 Other Communications Services

SOFTWARE AND COMPUTER-RELATED SERVICES
Software Services
7371 Computer Programming Services
7372 Prepackaged Software
7373 Computer Integrated Systems Design

Data Processing and Information Services
7374 Computer Processing and Data Preparation
7375 Information Retrieval Services
7376 Computer Facilities Management Services

Rental, Maintenance, and Other Computer-Related Services
7377 Computer Rental and Leasing
7378 Computer Maintenance and Repair
7379 Other Computer-Related Services

Appendix 2. Raw Scores and Rankings for Puerto Rico, 50 States, and District of Columbia

	Managerial & Technical Jobs		***Education of Workforce***		***Manufacturing Exports***		***Foreign Direct Investment***		***Households Online***		***Computer Ownership***	
	Rank	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*
Alabama	40	24.9%	45	32.0	44	6.0%	30	4.0%	40	21.0%	47	39.7%
Alaska	7	29.6%	6	48.4	2	30.9%	13	5.1%	1	43.8%	1	68.3%
Arizona	24	26.5%	17	43.4	9	9.9%	39	3.4%	13	29.0%	32	47.8%
Arkansas	50	22.7%	51	28.1	47	5.5%	35	3.8%	50	13.9%	48	36.3%
California	10	28.9%	8	46.8	8	10.0%	19	4.8%	10	30.1%	26	50.0%
Colorado	9	29.2%	2	51.5	18	7.8%	25	4.2%	5	34.0%	5	61.7%
Connecticut	5	30.9%	3	49.5	5	13.4%	10	5.9%	7	31.2%	14	53.7%
Delaware	13	28.5%	22	40.8	24	6.9%	22	4.6%	26	24.7%	33	46.9%
District of Columbia	1	46.6%	1	59.9	49	5.2%	44	2.9%	36	23.2%	42	42.8%
Florida	23	26.9%	30	37.6	11	9.5%	33	3.9%	17	27.3%	37	45.1%
Georgia	37	25.3%	33	36.7	39	6.2%	7	6.1%	31	23.8%	45	40.6%
Hawaii	34	25.5%	12	44.2	25	6.9%	1	11.0%	12	29.3%	29	49.0%
Idaho	36	25.4%	28	38.9	3	16.8%	45	2.8%	18	27.0%	6	58.3%
Illinois	16	28.1%	21	41.2	28	6.8%	22	4.6%	21	25.8%	28	49.3%
Indiana	47	23.4%	44	33.0	38	6.3%	16	5.0%	23	25.5%	19	51.0%
Iowa	39	25.0%	40	34.5	33	6.5%	41	3.1%	45	20.5%	25	50.1%
Kansas	18	28.0%	19	41.8	29	6.7%	30	4.0%	22	25.5%	18	51.3%
Kentucky	43	24.6%	50	28.8	26	6.9%	10	5.9%	41	20.9%	39	43.8%
Louisiana	24	26.5%	46	32.0	41	6.1%	37	3.6%	48	17.9%	49	36.2%
Maine	15	28.2%	35	36.4	15	8.6%	4	6.6%	24	25.3%	16	52.5%
Maryland	3	32.9%	4	49.3	21	7.4%	13	5.1%	11	30.1%	12	54.7%
Massachusetts	2	34.4%	4	49.3	6	10.9%	8	6.0%	15	27.7%	15	52.5%
Michigan	27	26.4%	31	37.3	20	7.6%	28	4.1%	27	24.6%	20	50.8%
Minnesota	12	28.7%	18	42.0	43	6.0%	25	4.2%	16	27.6%	9	56.1%
Mississippi	48	22.9%	48	31.0	42	6.1%	48	2.4%	51	13.3%	51	30.5%
Missouri	31	25.6%	36	35.4	31	6.6%	36	3.7%	33	23.7%	27	49.7%

	Managerial & Technical Jobs		***Education of Workforce***		***Manufacturing Exports***		***Foreign Direct Investment***		***Households Online***		***Computer Ownership***	
	Rank	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*
Nevada	52	16.4%	34	36.5	35	6.4%	40	3.2%	20	26.1%	36	46.4%
New Hampshire	11	28.9%	11	45.3	7	10.4%	6	6.2%	2	37.0%	4	63.8%
New Jersey	21	27.6%	15	44.0	37	6.3%	4	6.6%	9	30.8%	7	56.7%
New Mexico	8	29.6%	20	41.7	50	3.7%	45	2.8%	28	24.6%	35	46.8%
New York	24	26.5%	14	44.1	13	9.2%	13	5.1%	35	23.3%	38	45.0%
North Carolina	40	24.9%	39	34.6	22	7.3%	3	7.3%	47	18.1%	46	40.5%
North Dakota	49	22.7%	29	37.8	10	9.6%	50	1.9%	46	19.9%	22	50.4%
Ohio	37	25.3%	41	34.1	17	8.2%	19	4.8%	34	23.6%	30	48.9%
Oklahoma	22	27.3%	32	37.0	48	5.4%	41	3.1%	43	20.7%	43	42.5%
Oregon	40	24.9%	16	43.6	12	9.4%	33	3.9%	8	31.1%	8	56.6%
Pennsylvania	20	27.8%	42	33.6	40	6.1%	16	5.0%	29	24.1%	34	46.9%
Puerto Rico	**51**	**22.2%**	**49**	**30.2**	**16**	**8.6%**	**49**	**2.1%**	**52**	**4.6%**	**52**	**15.0%**
Rhode Island	17	28.0%	25	39.8	27	6.8%	18	4.9%	19	26.4%	23	50.4%
South Carolina	45	24.3%	43	33.1	14	8.8%	2	8.1%	44	20.6%	44	41.1%
South Dakota	46	23.7%	37	35.2	45	5.7%	51	1.8%	37	22.8%	24	50.3%
Tennessee	44	24.4%	47	31.9	36	6.4%	8	6.0%	42	20.9%	41	43.1%
Texas	27	26.4%	23	40.1	34	6.5%	24	4.5%	32	23.7%	40	43.7%
Utah	34	25.5%	7	46.9	46	5.5%	30	4.0%	4	34.4%	2	66.9%
Vermont	14	28.4%	13	44.2	4	15.7%	28	4.1%	6	31.5%	10	56.0%
Virginia	6	30.3%	10	45.6	19	7.7%	12	5.4%	14	28.3%	13	54.1%
Washington	4	31.1%	9	46.4	1	31.9%	25	4.2%	3	35.7%	3	63.8%
West Virginia	27	26.4%	52	25.6	23	7.2%	21	4.7%	49	16.8%	50	35.8%
Wisconsin	31	25.6%	37	35.2	32	6.5%	41	3.1%	25	25.0%	21	50.5%
Wyoming	31	25.6%	24	40.1	52	0.7%	37	3.6%	30	23.9%	11	55.0%

Appendix 2. Continued.

	High Tech Jobs		*Internet Domain Names*		*Scientists & Engineers*		*Patents*		*R&D Investment*		*Venture Capital Investment*	
	Rank	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*
Alabama	29	3.24%	48	4.5	32	0.33%	47	0.18	35	0.57%	24	0.07%
Alaska	45	1.81%	21	10.8	25	0.36%	41	0.22	50	0.10%	49	0.00%
Arizona	12	5.28%	15	12.6	37	0.30%	14	0.73	22	1.53%	15	0.12%
Arkansas	41	2.05%	49	4.1	51	0.18%	51	0.13	43	0.20%	40	0.01%
California	4	6.85%	2	20.6	13	0.47%	5	1.06	6	3.29%	2	0.56%
Colorado	2	7.97%	4	17.7	8	0.52%	10	0.84	14	1.78%	3	0.39%
Connecticut	16	5.11%	9	14.6	7	0.54%	3	1.10	10	2.24%	8	0.18%
Delaware	38	2.29%	19	11.1	2	1.52%	1	1.66	7	3.19%	35	0.03%
District of Columbia	23	3.91%	1	39.6	1	3.26%	42	0.20	51	0.00%	14	0.13%
Florida	26	3.53%	8	14.8	49	0.20%	28	0.39	28	0.90%	23	0.08%
Georgia	19	4.43%	20	10.9	44	0.26%	29	0.35	37	0.55%	13	0.13%
Hawaii	47	1.64%	24	10.1	14	0.46%	48	0.15	41	0.23%	48	0.00%
Idaho	13	5.28%	30	8.1	27	0.35%	2	1.43	2	4.05%	10	0.14%
Illinois	21	4.23%	25	9.3	24	0.36%	16	0.63	20	1.59%	18	0.10%
Indiana	34	2.69%	42	6.5	46	0.26%	24	0.46	17	1.66%	39	0.02%
Iowa	32	2.92%	43	6.2	43	0.27%	27	0.42	33	0.72%	36	0.03%
Kansas	31	2.94%	29	8.2	40	0.28%	37	0.26	21	1.58%	38	0.03%
Kentucky	39	2.23%	47	4.6	48	0.23%	44	0.19	39	0.36%	33	0.04%
Louisiana	49	1.52%	46	4.8	42	0.27%	38	0.26	47	0.14%	32	0.04%
Maine	37	2.31%	26	9.1	30	0.33%	43	0.20	40	0.28%	37	0.03%
Maryland	10	5.35%	17	11.9	4	0.80%	23	0.55	27	0.93%	7	0.19%
Massachusetts	3	7.70%	5	17.1	5	0.75%	4	1.09	5	3.76%	1	0.77%
Michigan	35	2.55%	38	6.8	34	0.32%	12	0.74	1	4.77%	29	0.04%
Minnesota	7	5.92%	22	10.6	20	0.39%	8	0.97	11	2.09%	49	0.00%
Mississippi	48	1.61%	51	2.9	45	0.26%	49	0.15	49	0.13%	44	0.01%
Missouri	28	3.33%	34	7.3	29	0.34%	30	0.32	29	0.85%	21	0.09%
Montana	50	1.43%	33	7.4	23	0.36%	36	0.30	38	0.48%	9	0.15%
Nebraska	20	4.36%	41	6.6	26	0.35%	40	0.23	46	0.15%	42	0.01%

	High Tech Jobs		Internet *Domain Names*		Scientists & *Engineers*		Patents		R&D *Investment*		Venture Capital *Investment*	
	Rank	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*
Nevada	46	1.71%	3	19.1	50	0.18%	32	0.32	34	0.66%	45	0.01%
New Hampshire	1	8.17%	6	16.1	31	0.33%	7	0.98	16	1.71%	4	0.36%
New Jersey	8	5.83%	11	14.1	9	0.51%	9	0.95	4	3.76%	20	0.09%
New Mexico	22	3.99%	28	8.3	3	0.95%	25	0.45	8	2.90%	43	0.01%
New York	17	4.86%	14	13.3	11	0.48%	11	0.76	23	1.53%	22	0.09%
North Carolina	24	3.91%	35	7.2	22	0.36%	26	0.44	18	1.64%	11	0.14%
North Dakota	40	2.18%	31	7.8	16	0.46%	45	0.19	42	0.21%	46	0.00%
Ohio	33	2.89%	36	7.1	28	0.34%	18	0.60	15	1.75%	26	0.05%
Oklahoma	30	3.09%	40	6.6	36	0.30%	33	0.32	36	0.56%	31	0.04%
Oregon	9	5.44%	10	14.3	21	0.38%	13	0.73	26	1.12%	34	0.04%
Pennsylvania	27	3.48%	27	8.4	19	0.42%	20	0.59	12	1.94%	19	0.10%
Puerto Rico	**52**	**0.47%**	**52**	**0.7**	**52**	**0.06%**	**52**	**0.02**	**44**	**0.17%**	**16**	**0.11%**
Rhode Island	25	3.68%	18	11.8	6	0.54%	21	0.59	9	2.53%	27	0.05%
South Carolina	42	2.02%	45	5.4	47	0.25%	34	0.31	30	0.84%	25	0.07%
South Dakota	14	5.14%	44	5.7	41	0.27%	50	0.13	48	0.13%	49	0.00%
Tennessee	43	1.94%	39	6.7	33	0.32%	35	0.31	32	0.74%	28	0.05%
Texas	11	5.35%	23	10.3	35	0.31%	19	0.60	24	1.21%	12	0.14%
Utah	15	5.13%	12	13.6	15	0.46%	15	0.66	13	1.85%	17	0.10%
Vermont	5	6.26%	13	13.5	10	0.50%	6	1.03	19	1.62%	41	0.01%
Virginia	6	5.97%	16	11.9	17	0.46%	31	0.32	31	0.84%	6	0.20%
Washington	18	4.68%	7	15.7	12	0.47%	17	0.62	3	3.84%	5	0.23%
West Virginia	44	1.84%	50	3.2	39	0.28%	39	0.25	51	0.00%	47	0.00%
Wisconsin	36	2.44%	37	7.0	38	0.29%	22	0.55	25	1.16%	30	0.04%
Wyoming	51	1.04%	32	7.8	18	0.43%	46	0.19	45	0.16%	49	0.00%

Summary Table II: Assessing the New Economy in Puerto Rico – Selected International Comparisons

***** The 50 states and the District of Columbia regularly benchmark their performance with nations competing for investment or markets. The table below compares the *New Economy* in Puerto Rico and the rest of the United States with selected foreign countries on seven indicators measuring the transformation to the digital economy and the capacity to innovate.

	U.S.	P.R.	Argentina	Brazil	Chile	Colombia	Ecuador	Ireland	Korea	Mexico	Singapore	Spain
I. ***The Digital Economy***												
Mobile Phones (per 1,000 people)	206	45	56	28	28	35	13	146	150	18	273	110
Computers (per 1,000 people)	407	125	39	26	54	33	13	241	150	37	400	122
Internet hosts (per 10,000 people)	976	0.3	16	10	15	3	1	122	38	9	188	62
II. ***Capacity to Innovate***												
Scientists & Engineers in R&D (per million people)	3,732	303	671	168	-	-	169	1,871	2,636	213	2,728	1,210
Patents (per million people)	231	3	-	16	13	0.1	0.6	250	1,488	4	69	68
Expenditures on R&D (% of GNP)	2.5	0.4	0.4	0.6	0.7	-	0.1	1.4	2.8	0.4	1.1	0.9
Post-secondary Education (% of students)	81	48	42	12	30	19	26	40	60	16	39	51

Note. – Indicates that no data is available. *Sources.* Please see section VIII for data sources and methodology.

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Listing of Tables and Figures

- **Domestic Comparisons**

- **International Comparisons**

Introduction

• The New Economy

A revolution in information technology is driving the emergence of a *New Economy* characterized by globalization, a shift to services and away from production work, intensified competition and rapid change.[3] Two thirds of U.S. economic growth is now derived from technological innovation.

The drivers of success in the *New Economy* have changed; an economy's competitiveness and prospects for growth are increasingly based on the extent to which knowledge, innovation and technology are integrated throughout all its sectors. A recent study by the Progressive Policy Institute (PPI) assessed the progress of each state, but not Puerto Rico, vis-a-vis the *New Economy*.[4]

• The New Economy and Puerto Rico

The Old Economy Persists in Puerto Rico. This report finds that the *New Economy* remains relatively dormant in Puerto Rico, and that the pace of structural change lags behind the 50 states. On an overall assessment of its progress in adapting to the *New Economy*, Puerto Rico ranks last behind the 50 states and the District of Columbia.

Methodology. The report provides a snapshot of the *New Economy* in Puerto Rico, assessing and comparing Puerto Rico's progress with the 50 states and the District of Columbia[5] on 13 different indicators (please see summary table I above). This report draws on similar methodology and indicators to PPI's recent publication, *The State New Economy Index*, and uses more current data for many indicators. This report presents useful information on Puerto Rico's performance on each indicator. To add an international perspective, this report also includes a comparison of seven selected indicators of the *New Economy* in Puerto Rico with several countries worldwide.

The *Index* generated by PPI constitutes a reasonable, if imperfect, measure of the *New Economy* as it emerges at different speeds across the United States. The paucity of data also limits the precision with which the New Economy can be measured, particularly below the national level. Several PPI indicators like the volume of initial public offerings or venture capital investment are anecdotally interesting, but convey little meaning when expressed for any one year. So few deals take place each year in most states that one more or less would change

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[3] The Progressive Policy Institute (PPI) was one of the first institutions to describe the emerging New Economy. *See The State New Economy Index*, July 1999, and *The New Economy Index*, 1998.

[4] Progressive Policy Institute, *The State New Economy Index,* July 1999.

[5] The report ranks Puerto Rico out of 52 United States locations: the 50 states, the District of Columbia, and Puerto Rico.

the rankings considerably. The indicators measuring venture capital and industrial R&D over-estimate *New Economy* progress in Puerto Rico, as they calculate activity as a share of gross product, not gross domestic product, which is a more accurate reflection of total economic output. Had the indicators been expressed as a share of GDP, Puerto Rico scores on these indicators would have been reduced by a third.[6]

Table 1 below compares the indicators used here to those in the PPI report. This report draws on 12 of the 17 PPI indicators in 4 of their 5 categories. Data on several indicators in the PPI report was not available for Puerto Rico: jobs at fast growing "gazelle" firms, the extent of job churning, technology in schools, and digital government. For this reason, the economic dynamism category in the PPI report is not addressed here. In order to provide more information on the digital economy and the capacity for innovation in Puerto Rico, information on two indicators was added to this report: households with computers and all engineers as a share of the workforce.[7]

Table 1. *New Economy* Indicators

Category	**Progressive Policy Institute *New Economy* Indicators**	**Puerto Rico *New Economy* Indicators**
1) "Knowledge jobs"	• Office Jobs • Managerial and professional jobs • Educational attainment of workforce	**X** ✓ ✓
2) Globalization	• Export orientation of manufacturing • Jobs provided by foreign firms	✓ ✓
3) Economic Dynamism	• Number of jobs in fast growing firms • Rate of job churn • Value of initial public offerings (IPO's)	**X** **X** **X**
4) Transformation to a Digital Economy	• Adults online • Number of ".com" domain names • Technology in schools • Use of information technology by local and state government	✓ ✓ **X** **X** • Households with computers
5) Technological Innovation Capacity	• Number of high-tech jobs • Number of Ph.D. scientists and engineers • Number of patents issued • Industry investment in R&D • Venture capital activity	✓ ✓ ✓ ✓ ✓ • Number of all engineers

[6] Puerto Rico's GDP is approximately 50% higher than its gross product, reflecting the output and income of outside corporations.

[7] The ranking of locations by domain names is based on all domain names, not just commercial ".com" domain names, as in the PPI report.

Puerto Rico's Overall New Economy Ranking

Puerto Rico's overall ranking is calculated using a similar methodology to the PPI report. Please see section VIII for more information on the methodology and weighting used in calculating Puerto Rico's overall *New Economy* ranking. Raw scores for all 52 locations appear in a separate attachment.

Report Outline

The report is divided into two parts: comparisons of the *New Economy* with domestic locations in sections I to IV, and with selected international countries in sections V and VI. In the domestic comparisons, a summary page for each indicator lists and graphs Puerto Rico's raw score and ranking, along with the top three and bottom three ranking states. Subsequent pages furnish additional information on Puerto Rico's performance on each indicator. In the international comparisons, the indicator scores for Puerto Rico, the U.S. overall and a selected group of countries are listed and graphed (please see summary table II above).

• *Domestic Comparisons*

The Progressive Policy Institute measures the emergence of the *New Economy* across the 50 states according to indicator scores in five categories: knowledge jobs, globalization, economic dynamism, the digital economy, and capacity for technological innovation. The economic dynamism category is not addressed here for lack of data for Puerto Rico.

"Knowledge Jobs." In the *New Economy*, competitiveness is increasingly dependent on the knowledge and technical skills of the labor force. Section I reviews and compares Puerto Rico's performance on two indicators: managerial and technical jobs as a share of total employment, and the educational attainment of the workforce.

Globalization. Section II assesses and compares the extent of globalization in Puerto Rico as measured by the share of the workforce producing products for export and the share of the workforce employed by foreign companies. Exports of pharmaceutical, electronics component and other products place Puerto Rico in the middle of the states for export intensity (manufacturing exports over total shipments).

The Transformation to a Digital Economy. Section III assesses and compares Puerto Rico's progress in transforming to a digital economy with the 50 states and D.C., using several measures: share of households on-line, share of households with computers, and the number of Internet domain names per 1,000

people. Puerto Rico ranks last behind Mississippi for each indicator and the category as a whole.

Technological Innovation Capacity. Section IV assesses the capacity for technological innovation in Puerto Rico using six measures: high tech jobs as a share of all jobs, engineers and Ph.D. level scientists as a share of total employment, all engineers as a share of total employment, patents generated per 1,000 workers, industry investment in research and development (R&D), and venture capital investment as a share of gross product. Puerto Rico ranks at the bottom of this category, with the lowest scores in the first four categories, 44th in industrial R&D investment, and a relatively high ranking (16) for the venture capital measure, thanks largely to active government promotion.

- ***International Comparisons.***

Sections V and VI compare Puerto Rico's standing in the *New Economy* with selected foreign countries. Several indicators are used to measure and compare Puerto Rico's transformation to a digital economy (mobile phones, computers, and Internet hosts), and its capacity for technological innovation (scientists and engineers in R&D, patents, and spending on R&D, and enrollment in post-secondary education). Specific information available on the indicators for the *New Economy* at the state and territory level in the U.S. is not necessarily available for many foreign countries, and vice versa.

Section VII attempts to benchmark the pace of adaptation to the *New Economy* in Puerto Rico in light of the domestic and international data provided in this report.

- ***Data Sources and Methods.***

Section VIII contains the data sources used in the report and an explanation of the methodology used to generate the indicator, where necessary. A separate section lists the sources for general economic and demographic information employed throughout the report.

- ***Appendices***

Appendix 1 provides the SIC codes used by the American Electronics Association (AEA) to define high technology sectors. Appendix 2 contains the raw scores and rankings for Puerto Rico, the 50 states and the District of Columbia for most of the indicators used in the report.[8]

[8] All engineers as a share of the workforce is included for information purposes only and is not included in the appendix, or used to calculate the overall New Economy rankings.

I.1. **Managerial, Professional & Technical Jobs** Puerto Rico Ranking**: 51 / 52**

Managers, professionals, and technicians as a share of the total workforce.

Indicator Score:	Jobs as Percent of Total, 1997
	Puerto Rico: 22.2%
	U.S. Average: 27.7%

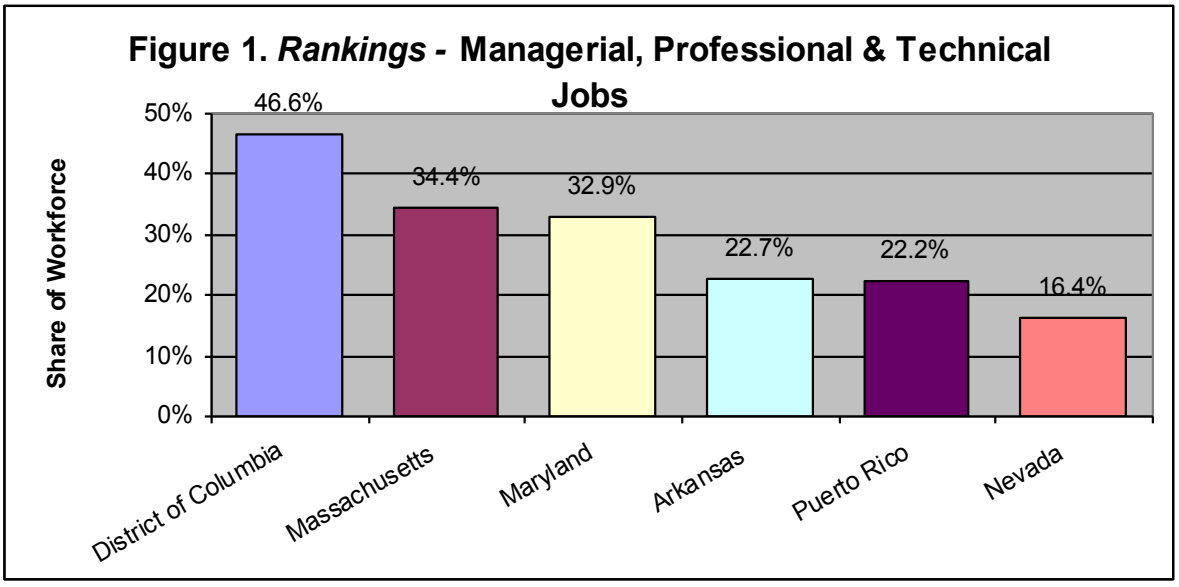
Source. Bureau of Labor Statistics.

- Managers, professionals, and technicians comprise 22.2% of the Puerto Rico workforce, in comparison to 27.7% in the U.S. as a whole.
- Of the 50 States and D.C., only Nevada has a lower share of managerial and technical jobs, 16.4%, than Puerto Rico.

Highest / Lowest Ranking States

	Share	**Rank**
District of Columbia	46.6%	1
Massachusetts	34.4%	2
Maryland	32.9%	3
Arkansas	*22.7%*	*50*
Puerto Rico	*22.2%*	*51*
Nevada	*16.4%*	*52*

Figure 1. *Rankings* - Managerial, Professional & Technical Jobs



A. BACKGROUND

- Management and professional jobs in the U.S. have increased as a share of total employment from 22% in 1979 to 28.4% in 1995.

B. *MANAGEMENT AND TECHNICAL JOBS IN PUERTO RICO*

- Managerial and professional jobs comprise 27.7% of all positions in the 50 states: 6.7% managerial and 21% professional (please see tables 2 and 3 and figure 2 below). In Puerto Rico, the equivalent share is 22.2%: 4.6% managerial and 17.6% professional (5 percentage points lower overall than in the U.S. as a whole).

Table 2. U.S. Workforce Structure, 1997

Occupation Type	Number	Percent of Total
Total	121,592,210	100
Managerial	8,192,170	6.7
Professional	25,594,320	21
Sales	14,319,050	11.8
Clerical	21,251,910	17.5
Service	19,610,730	16.1
Agricultural	1,515,370	1.2
Production	31,108,660	25.6

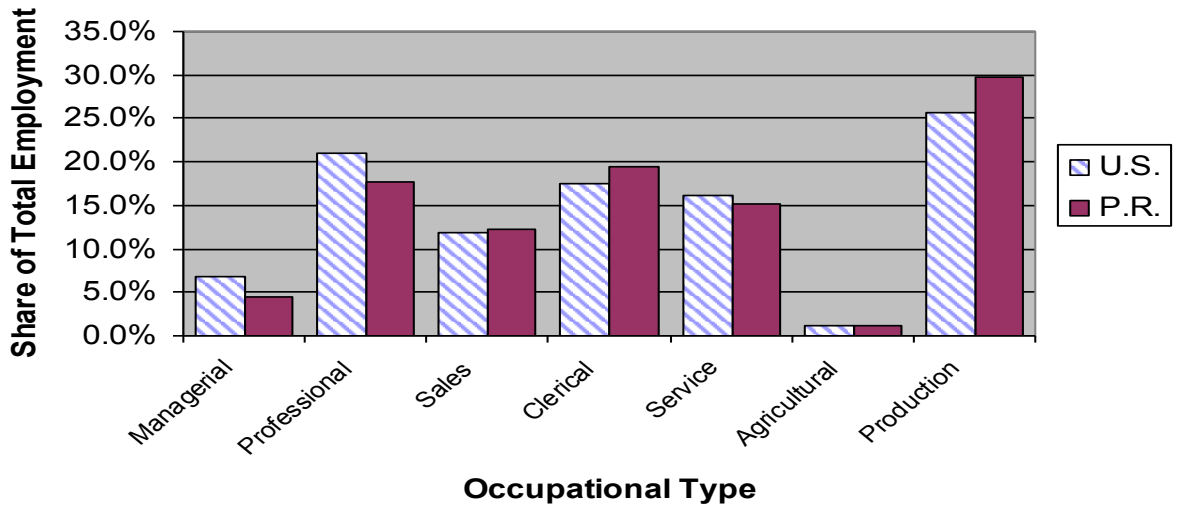
Source. Bureau of Labor Statistics.

Table 3. P.R. Workforce Structure, 1997

Occupation Type	Number	Percent of Total
Total	865,290	100
Managerial	39,490	4.6
Professional	152,490	17.6
Sales	106,340	12.3
Clerical	169,030	19.5
Service	130,960	15.1
Agricultural	9660	1.1
Production	257,320	29.7

Source. Bureau of Labor Statistics.

Figure 2: Composition of U.S. and P.R. Workforce



I.2. Workforce Education — Puerto Rico Ranking: 49 / 52

Weighted measure of educational attainment of the workforce (advanced degrees, bachelor's degrees, associates degrees, or some college work).

Indicator Score:

Measure of Workforce Education, 1990	
Puerto Rico:	30.2
U.S. Average:	39.5

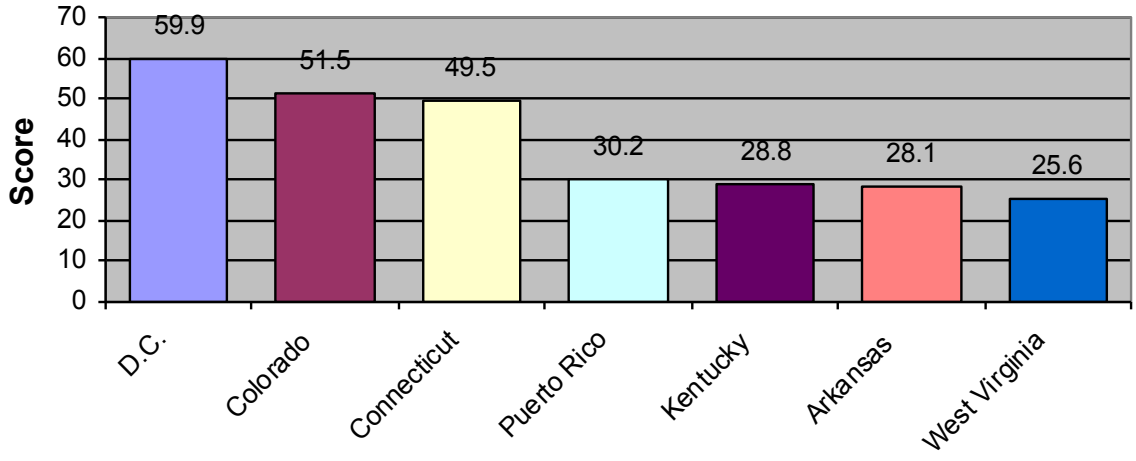
Source. U.S. Census Bureau, *Census of Housing and Population 1990*.

- Puerto Rico ranks 49th in terms of its workforce education, with a score of 30.2.
- More than half of the workforce lacks a high school degree, double the U.S. average and significantly higher than in any state.
- The share of workers with advanced degrees in Puerto Rico (3.6%) is less than half the overall U.S. percentage.

Highest / Lowest Ranking States

	Score	Rank
D.C.	59.9	1
Colorado	51.5	2
Connecticut	49.5	3
Kentucky	*28.8*	*50*
Arkansas	*28.1*	*51*
West Virginia	*25.6*	*52*

Figure 3. *Rankings* - Workforce Education



Note. See section VII for information on the calculation of the workforce education measure.

A. BACKGROUND

- **More jobs require knowledge**. Knowledge-based jobs increased from 27% of total employment in 1983 to 31% in 1993, and are expected to grow to 33% by 2006.
- **Knowledge jobs pay more**. The premium, or benefit in increased earnings, of a college degree over a high school degree has increased by 34% since 1975, and the benefits of an advanced degree relative to a high school degree have jumped by 56%.
- Those without any degree are the worst off. High school dropouts earn $24,000 less than do college graduates, and $47,000 less than do holders of advanced degrees. Wages for workers with a high school degree or less have fallen in real terms since the 1970's, and increased for those with a college degree. Please see table 4 below.

Table 4. Annual Income by Education Group in the U.S., 1998.

Education	Annual Earnings	Premium over no HS degree
No High School	$16,124	-
High School	$22,895	$6,771
Some College	$26,235	$10,111
Bachelors	$40,478	$24,354
Advanced Degree	$63,229	$47,105

Note. Mean Earnings of Workers 18 Years Old and Over. *Source*. U.S. Bureau of the Census, Current Population Survey.

B. EDUCATIONAL ATTAINMENT IN PUERTO RICO AND THE 50 STATES

- The percentage of Puerto Rican workers with no high school degree is almost double the U.S. Half of Puerto Rican workers dropped out before receiving a high school degree compared to a quarter, 24.8%, in the U.S. as a whole. In the state with the highest proportion of dropouts, Mississippi, 35% of the workers lack a high school degree. Given the increasing importance of skills and education in the labor market, a large share of Puerto Rico workers may be left further behind.

Table 5. Educational Attainment in Puerto Rico and the 50 States, 1990

	Population (1990)	No high school	High school	Some college	Associate's degree	Bachelor's degree	Advanced degree
United States	158,868	24.8%	30.0%	18.7%	6.2%	13.1%	7.2%
Puerto Rico	1,952	50.3%	21.0%	8.8%	5.6%	15.8%	3.6%

Source. U.S. Bureau of the Census, 1990 Census of Population, CPH-L-96.

- In Puerto Rico, one in seven workers holds a bachelor's degree or higher, 14.3%, compared to one in five in the United States, 20.3%. About the same share of the workers in Puerto Rico and the U.S. overall hold an associate's degree or above: 25.0% in Puerto Rico and 26.5% in the 50 States. The share holding advanced degrees in Puerto Rico, 3.6%, is half the overall U.S. average and lower than in any state.
- Test results on the SAT in Puerto Rico point to weaker basic skills, particularly in mathematics. The average score on the mathematics section in 1998 (447 out of 800) was 64 points lower than in the U.S. as a whole, and lower than in any state.[9] The SAT is administered in Puerto Rico in both English and Spanish, although far more take the test in Spanish (13,635 in 1998) than in English (1,842 in 1998).[10]
- The Puerto Rico Statewide Systemic Initiative (PR-SSI) has effected some improvement in the teaching of science and mathematics in the public schools. Endorsed by the National Science Foundation and the U.S. Department of Education, the program combines the reform of science and mathematics curricula and improved teacher training. Mathematics scores of high school graduates remain low, however.

C. RETURNS TO EDUCATION IN PUERTO RICO AND THE 50 STATES

- The labor market in Puerto Rico provides less return to education than the overall U.S. market. First, earnings for workers at each education level are significantly lower in Puerto Rico. Workers of all education levels in the 50 states earned at least twice as much as those in Puerto Rico; college graduates earned more than 2.6 times as much.

Table 6. Difference in Earnings by Education Level in Puerto Rico and the U.S. as a Whole

	No High School	High School	Some college	Bachelors and above
Puerto Rico	$ 5,854	$ 8,101	$ 9,203	$ 13,274
United States	$ 12,242	$ 17,594	$ 20,255	$ 34,936
Ratio of U.S. to P.R. Earnings	2.09	2.17	2.20	2.63

Note. Earnings data from 1989 (1990 Census for Puerto Rico, and 1989 Current Population Survey for the U.S.).

[9] The College Board, 1999. http://www.collegeboard.org/press/senior99/html/satt2.html The College Board strongly discourages the comparing and ranking of locations by average SAT score. The percentage of high school seniors who take the test varies from state to state. If only the more academically capable students take the test, a state's average score will be higher than in another state with equally talented students where a higher proportion of students take the test.

[10] The scores listed for Puerto Rico are for the Spanish language SAT.

- Second, the premium for education (the value in additional earnings) in the Puerto Rico labor market is substantially lower than in the U.S. overall. Holders of bachelor’s degrees receive a premium of 185% over those with no educational degree in the U.S. as a whole, compared to a premium of 127% in Puerto Rico. Please see table 7 below.

Table 7. Premium in Earnings for Additional Education over Earnings with No Degree in Puerto Rico and in the 50 States

	High School	Some college	Bachelors and above
Puerto Rico	38%	57%	127%
United States	44%	65%	185%

Source. Earnings data from 1989 (1990 Census for Puerto Rico, and 1989 Current Population Survey for the U.S.).

II.1. Employment in Foreign Corporations Puerto Rico Ranking: 49 / 52

The percentage of each state's workforce employed by foreign companies.

Indicator Score: Workforce Employed by Foreign Co.'s 1996
Puerto Rico: 2.1%
U.S. Average: 4.8%

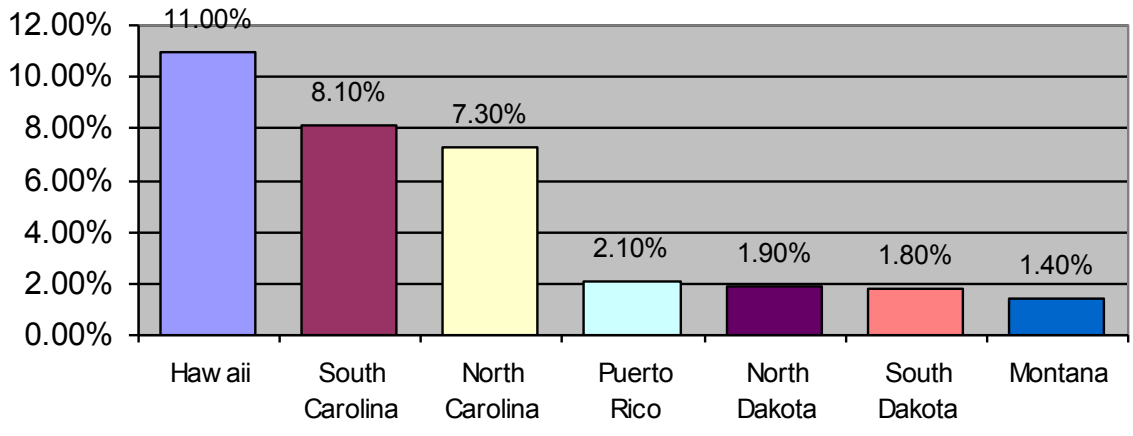
Source. U.S. Bureau of Economic Analysis.

- Foreign companies employ an estimated 19,400 workers in Puerto Rico, or about 2.1% of the total private industry labor force.
- The share of employment in foreign firms in Puerto Rico, 2.1%, is less than half the U.S. average, 4.8%.

Highest / Lowest Ranking States

	Score	Rank
Hawaii	11.0%	1
South Carolina	8.1%	2
North Carolina	7.3%	3
North Dakota	1.9%	*50*
South Dakota	1.8%	*51*
Montana	1.4%	*52*

Figure 4. *Rankings* - Workforce Employed by Foreign Companies



A. BACKGROUND

- Foreign direct investment (FDI) in the United States has increased from $134 billion in the 1970's to $312 billion in the first half of the 1990's (in 1992 dollars), and from 0.32 percent of GDP to 0.69 percent. FDI brings new management ideas, workplace practices, and technologies.[11]

B. FOREIGN DIRECT INVESTMENT IN PUERTO RICO

- Foreign companies in Puerto Rico support an estimated 19,400 jobs, or 2.1% of the workforce, ranking Puerto Rico 49 out of 52, before North Dakota, South Dakota and Montana.
- The number of jobs generated by foreign companies has increased slightly, 0.5%, since 1991, after falling from 28,900 jobs in 1993. In contrast, foreign companies have hired an additional 100,000 workers in the U.S. overall during the same period, increasing their employment by two percent.

Table 8. Workers Employed by Foreign Companies, 1991-1996 (thousands)

Year	1991	1992	1993	1994	1995	1996	1991-1995 Change (%)
Total U.S.	4,871.90	4,715.40	4,765.60	4,840.50	4,941.80	4,977.50	2.1%
Puerto Rico	19.3	19.8	28.9	28.4	27.4	19.4	0.5%

Source. Fahim-Nader and Ziele, "Foreign Direct Investment in the United States-New Investment in 1997 and Affiliate Operations in 1996," *Survey of Current Business*, Bureau of Economic Analysis (June 1998), Table 13.

[11] PPI, *State New Economy Index*, p. 19.

II.2. Export Focus of Manufacturing **Puerto Rico Ranking:** 25 / 52

The percentage of manufacturing shipments exported to foreign countries.

Indicator Score:

Exports as % of total manufacturing, 1992	
Puerto Rico:	8.60%
U.S. Average	8.31%

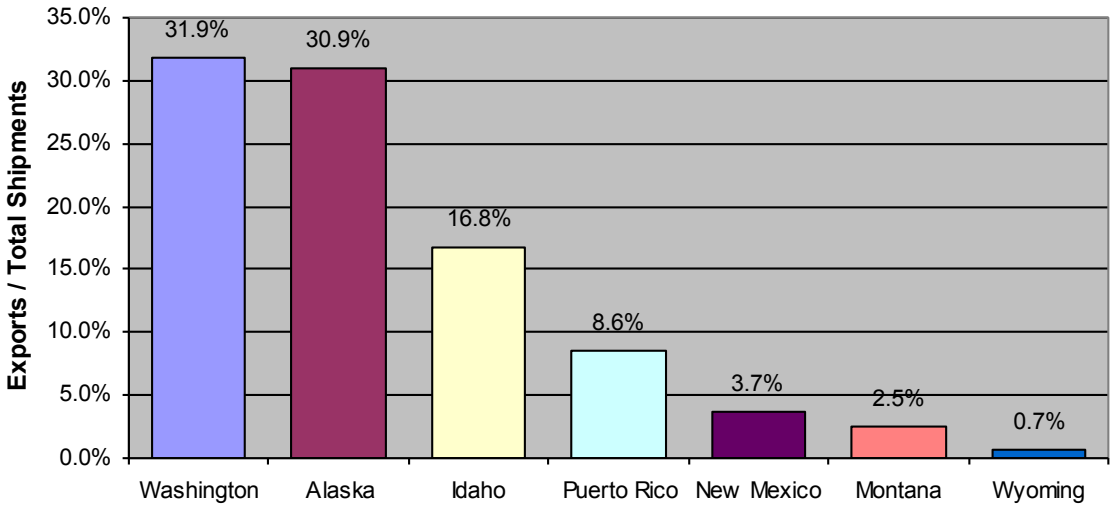
Sources. U.S. Census Bureau, *Establishments that Export: 1992* and *1992 Economic Census of the Outlying Areas*.

- Puerto Rico's export intensity (exports as a share of total shipments) of 8.60% is higher than the U.S. average, 8.31%, and ranks the island 25 of 52.
- Exports of manufacturing products from Puerto Rico totaled approximately $2.67 billion in 1997.

Highest / Lowest Ranking States

	Score	Rank
Washington	31.9%	1
Alaska	30.9%	2
Idaho	16.8%	3
New Mexico	3.7%	*50*
Montana	2.5%	*51*
Wyoming	0.7%	*52*

Figure 5. *Rankings* - Export Intensity of Manufacturing



A. BACKGROUND

- **Higher earnings.** Workers in export-oriented firms earn 10% more than workers in similar firms with few or no exports.[12]
- **U.S. trade increasing.** U.S. exports and imports as a share of GDP have climbed from 5.5% in 1950 to 25% in 1997.

B. EXPORT INTENSITY OF MANUFACTURING IN PUERTO RICO

- At 8.60%, the value of exports as a percent of total manufacturing shipments in Puerto Rico is slightly higher than in the U.S. overall, 8.31%, and ranks the island in the middle of the 50 states and the District of Columbia based the most recent 1992 data.[13] Subsidiaries of mainland corporations operating in Puerto Rico account for a large share of exports; approximately half of all exports are pharmaceutical products included in the chemicals and allied products category (please see table 10 on the following page).
- Table 9 below indicates that exports increased rapidly from 1989 to 1991, dropped with the recession of the early 1990's, and grew last year by 5%.

Table 9. Exports from Puerto Rico to Foreign Countries, 1989-1997
(millions of dollars)

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Exports	1,939	2,252	2,568	2,396	2,559	2,622	2,540	2,658	2,668	2,797
% Change	37.6%	16.1%	14.0%	-6.7%	6.8%	2.5%	-3.1%	4.7%	0.4%	4.8%

Source. Puerto Rico Planning Board, Economic Report to the Governor 1998, Statistical Appendix.

- Export intensity by sector. Puerto Rico's chemicals sector is the most export-oriented, sending more than 10% of its shipments to foreign countries. Other sectors with high export intensity include the food industry, 9.3% exported, and industrial machinery and equipment, 7.7%. Table 9 on the following page lists the total shipments by Puerto Rican manufacturing sector for 1992, in the order of export intensity.[14]

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[12] Bernard and Jensen, "Exporters, Jobs, and Wages in U.S. Manufacturing: 1976-1987," *Brookings Papers in Microeconomics,* 1995.

[13] See section VIII for more detailed information on data sources and methodology.

[14] Data from the 1997 economic census of Puerto Rico is now being tabulated.

Table 10. Puerto Rico Export Intensity by Manufacturing Category, 1992

Manufacturing Category	Manufacturing Shipments	Exports as % of Shipments
28 Chemicals and allied products	13,222,572	10.1%
20 Food and kindred products	5,089,839	9.3%
35 Industrial machinery and equipment	1,291,257	7.7%
29 Petroleum and coal products	1,684,949	7.5%
38 Instruments and related products	1,870,103	6.1%
34 Fabricated metal products	465,447	4.3%
26 Paper and allied products	315,282	3.1%
25 Furniture and fixtures	177,990	1.4%
36 Electronic and other electric equipment	2,761,223	1.4%
39 Miscellaneous manufacturing industries	263,591	1.4%
30 Rubber and miscellaneous plastics products	410,524	1.0%
27 Printing and publishing	443,006	0.1%
32 Stone, clay, and glass products	516,316	0.1%
22 Textile mill products	177,591	0.0%
23 Apparel and other textile products	1,408,988	0.0%
37 Transportation equipment	149,349	0.0%
31 Leather and leather products	385,603	0.0%
Totals for all manufacturers	31,034,804	7.2%

Source. Bureau of the Census, *Economic Census of Puerto Rico: Manufacturing*, 1992.

III.1. Online Population — **Puerto Rico Ranking:** 52 / 52

The percentage of households with Internet access.

Indicator Scores:	Households Online, Sept. 1998
Puerto Rico:	4.3%
U.S. Average:	22.2%

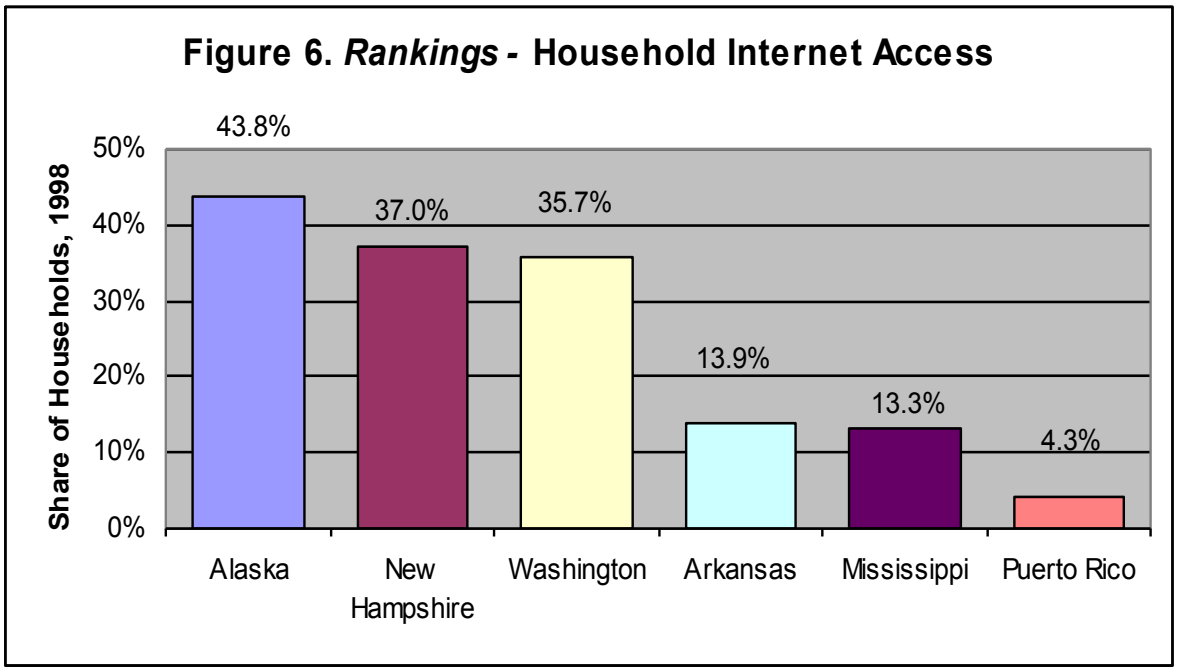
Source. U.S. Department of Commerce.

- The share of households in Puerto Rico with Internet access is estimated at 4.3%, with 6.5% of the population online from anywhere (home, work, library, community center).
- Puerto Rico ranks last among the 50 States and D.C. Its share of homes with online access is a third of Mississippi, the lowest ranked state with 13.3% of households online, and a fifth of the U.S. as a whole, 22.2%.

Highest / Lowest Ranking States

	Score	Rank
Alaska	43.8%	1
New Hampshire	37.0%	2
Washington	35.7%	3
Arkansas	13.9%	*50*
Mississippi	13.3%	*51*
Puerto Rico	4.6%	*52*

Figure 6. *Rankings* - Household Internet Access



A. BACKGROUND

- The share of U.S. households with Internet access in 1998 was estimated at 22%. An additional 11% only had access outside the home.[15] The share of households with access is projected to increase from 33% to over 50% by 2003, partly in response to the dropping cost of computers and online access.
- The number of people online worldwide is expected to reach 350 million by 2003, up from 95 million at the end of 1998.[16]

B. ONLINE ACCESS IN PUERTO RICO

- Puerto Rico Online. Little information is available about the number of Puerto Ricans online. The Census Bureau does not administer the Survey of Internet and Computer Use, the primary source of data on household technology use, in Puerto Rico. **Local sources** place the total number of Internet users in Puerto Rico at 250,000, based on estimates of 110,000 accounts with island internet service providers (ISP's).[17]
- *Population online.* According to these estimates, 6.5% of the island population is now on-line from any location: home, work, school, library, community center, etc.. In comparison, about a third of Americans, or 32.7%, are online, a five times higher share than Puerto Rico.[18]
- *Households online.* Based on findings by the firm of Research & Research that two-thirds of those online from any location had access from home, the share of households in Puerto Rico with online access is estimated at 4.3%. In comparison, a five times higher percentage of households in the U.S. overall, 22.2%, has online access.
- Profile of Puerto Rico Internet users. A recent study by Bruno Haring of Research & Research found that 56% of Puerto Rico Internet users have purchased through the Web at least once.[19] As elsewhere, popular on-line purchases in Puerto Rico include software, books, CD's, tapes, and computer accessories. Users connect frequently; 93% go online at least twice a week and 58% log on daily. Users are also overwhelmingly young; only 27% are over 35, and 61% are younger than 25. These figures indicate that older Puerto Ricans are particularly reticent to use the Internet.

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[15] U.S. Department of Commerce, NTIA, *Falling Through the Net: Defining the Digital Divide.*

[16] eMarketer, 1999.

[17] International Data Corporation (1998) and Jose Martinez, Technology Writer, *Caribbean Business*. Analysts estimate that 2.4 people have access for each account. Total number of accounts includes both business and home accounts.

[18] U.S. Department of Commerce, NTIA, *Falling Through the Net: Defining the Digital Divide*, Chart II-1. http://www.ntia.doc.gov/ntiahome/fttn99/InternetUse_II/Chart-II-1.html

[19] Gigante, Lucienne, *Caribbean Business,* July 29, 1999, cover story, data provided by Badillo Nazca.

III.2. Internet Domain Names — **Puerto Rico Ranking:** 52 / 52

The number of Internet domain names per 1,000 people.

Indicator Score:	Internet Domain Names per 1,000 people
	Puerto Rico 0.75
	U.S. average 11.28

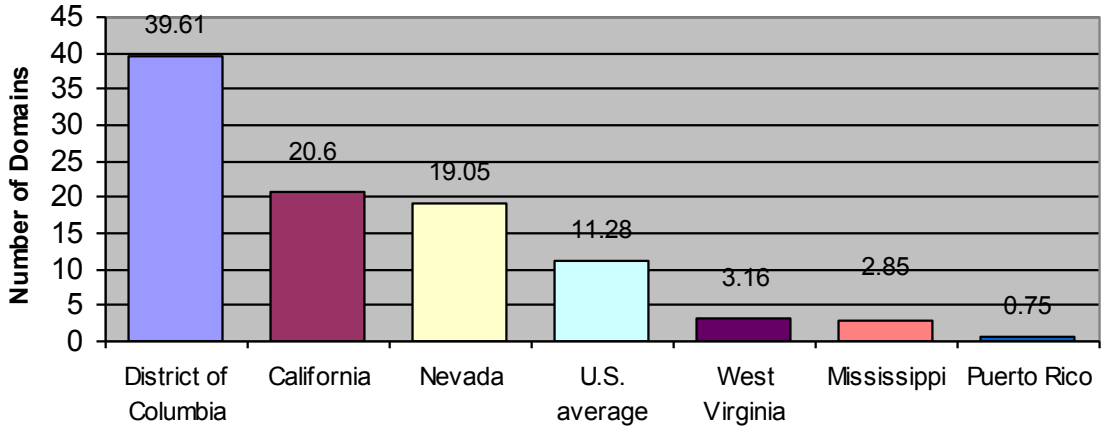
Source. Domainsondisc.com figures for April 1999.

- An estimated 2,825 domain names were registered in Puerto Rico, as of April 1999. South Carolina, a similarly populated state had 20,542, and Mississippi, the least developed state, 7,791.
- Adjusted for population, Puerto Rico has *fifteen times fewer* domain names than the U.S. as a whole, and four times fewer than Mississippi.
- Adjusting for per capita income, Puerto Rico has half as many Internet sites as Mississippi and a fifth as many as the U.S.

Highest / Lowest Ranking States

	Score	Rank
District of Columbia	39.61	1
California	20.60	2
Nevada	19.05	3
West Virginia	3.16	*50*
Mississippi	2.85	*51*
Puerto Rico	0.75	*52*

Figure 7. *Rankings* - Domains per 1,000 People



Source. Domainsondisc. As of April 1999. www.domainsondisc.com

A. BACKGROUND

- The number of World Wide Web sites worldwide has exploded from 213 in 1981, 535,000 in 1991 to 56.2 million in July 1999.[20]
- Total e-commerce conducted through the Web is expected to reach $1.2 trillion by 2003, of which U.S. e-commerce will comprise $654 billion.[21]

B. ALL DOMAIN NAMES IN PUERTO RICO

- Domainsondisc.com estimates the total number of all types of domain names in Puerto Rico at 2,825 as of April 1999.[22] Per capita, Puerto Rico has 15 times fewer domains than the U.S. as a whole (0.75 per thousand people in Puerto Rico compared to over 11 per thousand in the entire U.S.) and ranks last among the 50 states and the District of Columbia.

C. COMMERCIAL WEB SITES IN PUERTO RICO

- Selected Comparisons. In terms of commercial web sites per million people, Puerto Rico is ahead of most Latin American countries, but remains far behind the rest of the United States, *which has more than 12 times as many commercial sites per capita.* The table and graphic below offers several international comparisons on the number of commercial web sites in Latin America..
- Puerto Rico. Companies in Puerto Rico had an estimated 2,900 commercial web site addresses registered as of January 1999, representing a 65% jump from the 1,753 sites in July 1998.[23]

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[20] Internet Software Consortium http://www.isc.org

[21] eMarketer, 1999. http://www.emarketer.com/estats/083099_idc.html

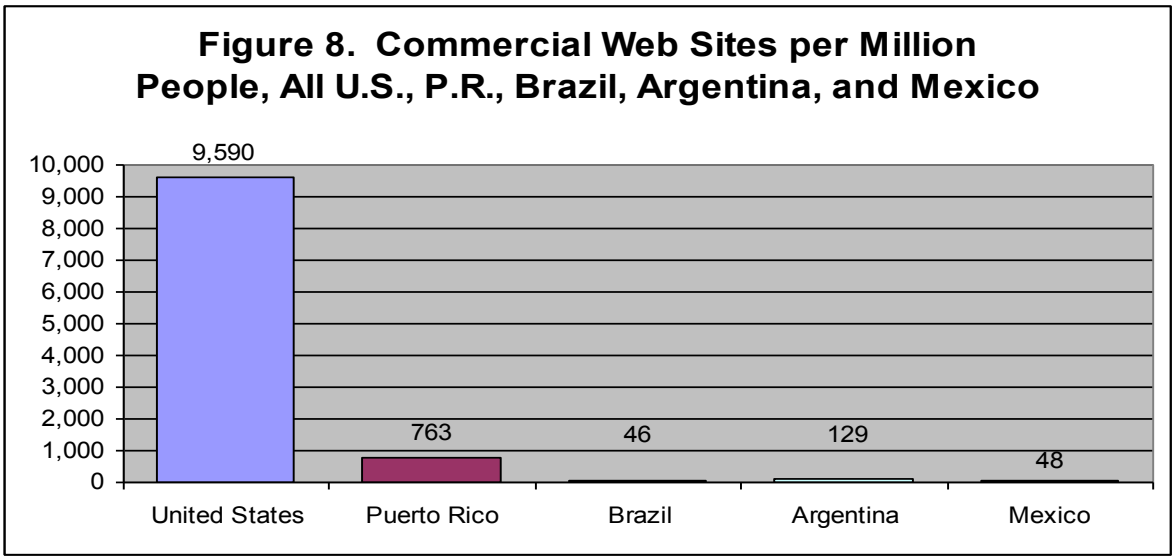
[22] Domainsondisc.com, 1999.

[23] More recent estimates have yet to be verified. Matthew Zook, Ph.D. Candidate, Department of City and Regional Planning, University of California at Berkeley. These figures suggest that the methodology to estimate the location of domains employed by Mr. Zook and Domainsondisc is different.

Table 11. Commercial Web Sites in All US, PR, and Selected Latin America Countries, 7/98 and 1/99

	7/98	1/99	% Change	Per Million People (1/99)
United States	1,440,671	2,566,275	78%	9,590
Puerto Rico	1,753	2,900	65%	763
Brazil	5,046	7,595	51%	46
Argentina	2,619	4,620	76%	129
Mexico	2,039	4,480	120%	48

Source. Matthew Zook, Ph.D. Candidate, Department of City and Regional Planning, UC-Berkeley, August 1999.



III.3. Computer Use **Puerto Rico Ranking:** 52 / 52

The share of households with a computer at home.

Indicator Score:	Computer at Home, September 1998
	Puerto Rico: 15.0%
	U.S. Average: 48.4%

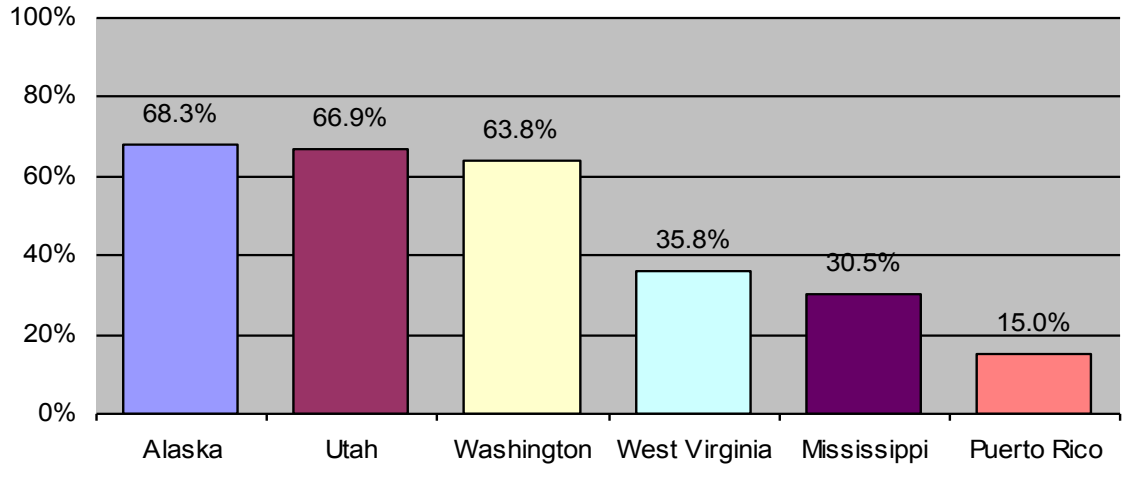
Source. U.S. Department of Commerce and International Data Corporation.

- The estimated share of households in Puerto Rico with a computer, 15%, is less than a third of the U.S. overall, 48.4%.
- Twice as many households have computers in Mississippi, the state with the lowest share, 30.5%.

Highest / Lowest Ranking States

	Score	Rank
Alaska	68.3%	1
Utah	66.9%	2
Washington	63.8%	3
West Virginia	35.8%	*50*
Mississippi	30.5%	*51*
Puerto Rico	15.0% (est.)	*52*

Figure 9. *Rankings* - Households with Computers



A. BACKGROUND

- Now at almost 50% of households, computer ownership in the United States has quadrupled in the past fourteen years.[24] Households with lower incomes, lower education levels, located in the South, and headed by a person under the age of 25 have lower ownership levels.

B. COMPUTER OWNERSHIP IN PUERTO RICO

- Industry estimates place the share of households with computers at 15% in Puerto Rico.[25] Little information is available about the penetration of computers into Puerto Rican households. The Census Bureau now collects data annually on Internet and computer use through the Current Population Survey (CPS), but the survey is not administered in Puerto Rico.
- PC Sales. Sales of PC's have increased significantly in recent years, jumping 11% last year from 90,000 units in 1997 to 100,000 in 1998. The value of PC and workstation sales totaled an estimated $181 million in 1998.[26] Dataquest estimates that Puerto Rico PC shipments will increase by 15% in 1999, comparable to the growth rate in the United States as a whole.[27] While this projection represents strong sales growth, it will not serve to close the gap in computer utilization with the 50 states.

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[24] Department of Commerce, *Falling through the Net – Defining the Digital Divide*, July 1999.

[25] International Data Corporation (1999) and sources at Compaq Computers, Puerto Rico.

[26] International Data Corporation (1999).

[27] Dataquest, "Forecast Analysis: Global PC Forecast Summary: Changes Afoot?" May 31, 1999.

IV.1. High Technology Jobs — **Puerto Rico Ranking:** 52 / 52

Jobs in high technology sectors: manufacturing, software and computer-related services, and telecommunications as a share of total employment.

Indicator Score:

High Tech Jobs, 1997	
Puerto Rico:	0.47%
U.S. Average:	4.47%

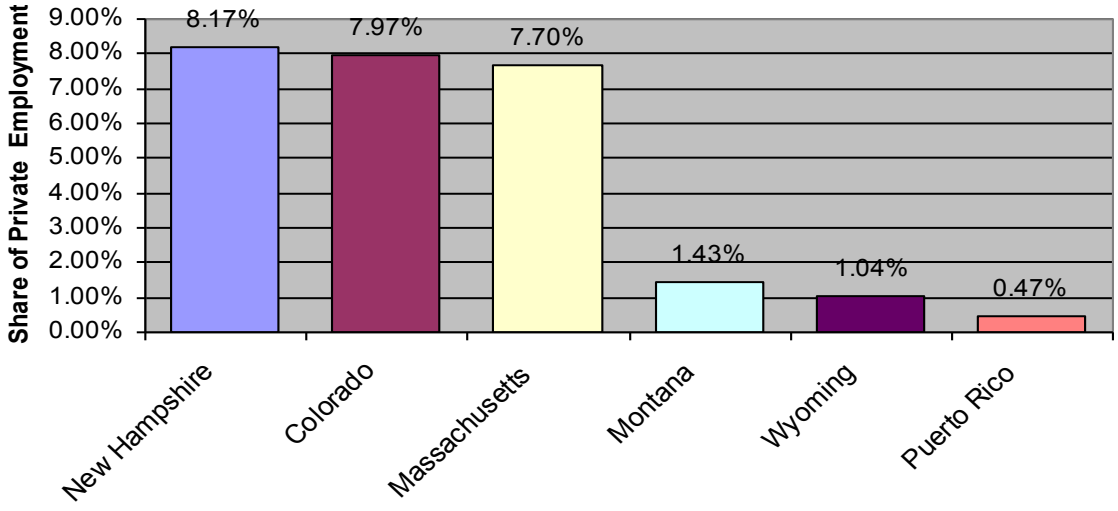
Source. U.S. Bureau of Labor Statistics & Puerto Rico Bureau of Labor Statistics.

- Puerto Rico ranks last in the number of high tech jobs as a share of total employment.
- At 0.3% of the total, high tech employment in Puerto Rico is 15 times lower than in the U.S. as a whole.

Highest Ranking States / Puerto Rico

	Score	Rank
New Hampshire	8.17%	1
Colorado	7.97%	2
Massachusetts	7.70%	3
Montana	*1.43%*	*50*
Wyoming	*1.04%*	*51*
Puerto Rico	*0.47%*	*52*

Figure 10. *Rankings* - High Tech Jobs



A. BACKGROUND

- High technology companies now contribute 24 percent of manufacturing value added, up from 18 percent in 1970. High tech output accounts for 6.2 percent of GDP, up from 5.5% in 1990.[28]
- Average wages in the U.S. high tech sector are 77 percent higher than in the rest of the economy.[29]

B. JOBS IN HIGH TECHNOLOGY SECTORS IN PUERTO RICO AND THE UNITED STATES

- In 1997, jobs in high technology sectors[30] accounted for 4,098 jobs in Puerto Rico, 4/10ths of 1% of the private sector jobs. *Jobs in high technology companies comprised 4.5% of jobs in the U.S. as a whole, a 10 times higher share*. The average wage for jobs in these sectors in Puerto Rico was $25,600, approximately half the average wages in U.S. high tech sectors.
- Of the forty-five high technology industry sectors identified by the American Electronics Association, the Puerto Rico Labor Department reports employment in seventeen.[31]
- What employment exists in high technology companies is concentrated in the following sectors: computer processing, cable and pay television services, computer storage devices, computer services, and computer programming. These sectors account for more than two thirds of all high technology employment in Puerto Rico.

Table 12. Employment in Selected Puerto Rico High Technology Sectors, 1997

	Computer Processing and Data Preparation	*Cable and Pay TV*	*Computer Storage Devices*	*Other Computer Related Services*	*Computer Programming*
SIC	7374	4841	3572	7379	7371
Employment	889	828	675	404	340
Share of high tech jobs	22%	20%	16%	10%	8%

Source. Puerto Rico Department of Labor, Bureau of Labor Statistics. Puerto Rico figures for 1997. U.S. figures for 1996.

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[28] Organization for Economic Cooperation and Development (OECD), *The Knowledge Economy,* (Paris: OECD, 1996), p. 9.

[29] American Electronics Association, *Cyberstates 3.0*, 1999.

[30] According to the definition of the American Electronics Association (1999). See appendix 1 for a full listing.

[31] These figures may underestimate the extent of employment in these sectors if employment is characterized under broader SIC categories. Without further information, estimates cannot be made.

- *Overall, Puerto Rican high tech employment is 10 times lower as a share of all jobs than in the U.S. as a whole*. Of the five high tech sectors with the highest employment levels in Puerto Rico, only one, computer storage devices, has a higher share of total employment in Puerto Rico than in the U.S. overall. Please see table 13 below.

Table 13. High Tech Sectors' Share of Employment in U.S. Overall and P.R.

	Computer Processing and Data Preparation	*Cable and Pay TV*	*Computer Storage Devices*	*Other Computer Related Services*	*Computer Programming*
Share of all jobs	0.07%	0.06%	0.05%	0.03%	0.03%
US share of all jobs	0.235%	0.077%	0.003%	0.220%	0.280%
Ratio of US to PR	3.36	1.28	0.06	7.33	9.33

Source. Puerto Rico Department of Labor, Bureau of Labor Statistics. Puerto Rico figures for 1997. U.S. figures for 1996.

- While still low, employment in high tech sectors has increased in the past four years, with the number of jobs up 24% since 1994. Employment in computer processing is up 31%, computer programming, 73%, and computer services, up 60%.[32]

[32] Most recent employment figures for the third quarter of 1998.

IV.2. Scientists and Engineers — **Puerto Rico Ranking:** 52 / 52

Doctorate holding scientists and engineers as a percentage of the workforce.

Indicator Score:

Scientists and Engineers, 1997	
Puerto Rico:	0.06%
U.S. Average:	0.40%

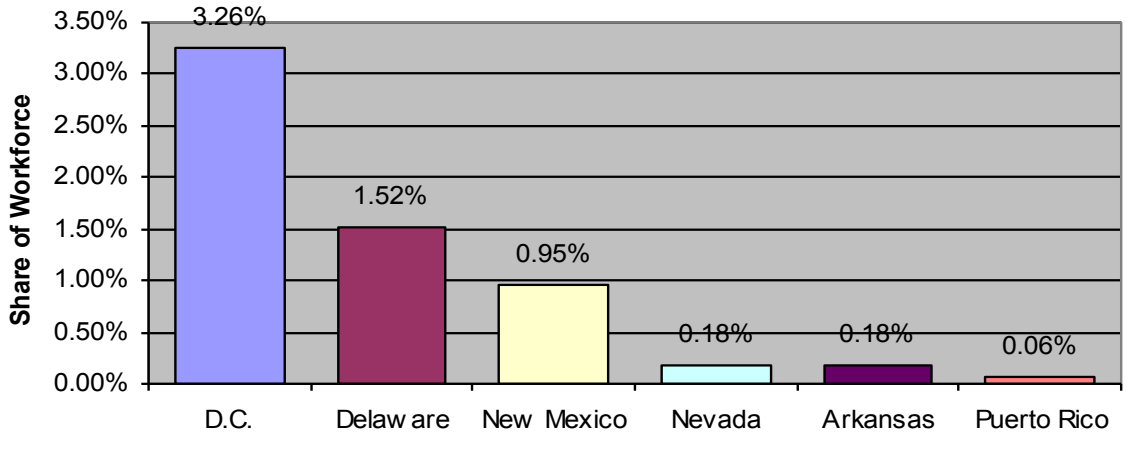
Source. National Science Foundation, 1999.

- Puerto Rico ranks last after the 50 states and D.C., with doctorate holding scientists and engineers comprising less than 1/10th of 1% of the workforce. The U.S. as a whole has a 6 times higher share.
- 1 in 67 American workers are engineers; in Puerto Rico engineers share is three times smaller: 1 in 200 workers.

Highest / Lowest Ranking States

	Score	Rank
D.C.	3.26%	1
Delaware	1.52%	2
New Mexico	0.95%	3
Nevada	*0.18%*	*50*
Arkansas	*0.18%*	*51*
Puerto Rico	*0.06%*	*52*

Figure 11. *Rankings* - PhD Scientists and Engineers



A. BACKGROUND

- Given the increasing importance of constant innovation in the *New Economy*, a well-educated workforce of scientists and engineers is critical for success

B. PH.D. SCIENTISTS AND ENGINEERS IN PUERTO RICO AND THE 50 STATES

Table 14. Employed Doctoral Scientists in Puerto Rico and the U.S. Overall

	Total	Sciences	Computer & math. Sciences	Life & Related Sciences	Physical & Related Sciences	Social & Related Sciences	Engineering
United States	518,440	429,820	32,400	141,780	105,250	150,390	88,620
Puerto Rico	670	550	10	310	80	150	120

Source. National Science Foundation/Division of Science Resources Studies, *1997 Survey of Doctorate Recipients*.

- Ph.D. scientists under-represented in Puerto Rico workforce. Ph.D. scientists are heavily under-represented in the Puerto Rican labor market, comprising less than 1/20th of 1% or 1 in 2,000 of all workers. Scientists represent a fraction of the workforce more than 6 times as small as in the U.S. overall. Please see table 15 below. Scientists with training in computer and mathematical sciences, and the physical sciences are even more under-represented, as a proportion 28 times and 11 times smaller than in the U.S. If Puerto Rico were an average state, it would have almost 300 Ph.D. level computer scientists, instead of 10.

Table 15. Scientists as Share of Workforce by Ph.D Field

	Total	Sciences	Computer & Maths Sciences	Life & Related Sciences	Physical & Related Sciences	Social & Related Sciences	Engineering
United States	0.400%	0.332%	0.025%	0.109%	0.081%	0.116%	0.068%
Puerto Rico	0.059%	0.049%	0.001%	0.027%	0.007%	0.013%	0.011%
Ratio of US to PR	6.76	6.83	28.31	4.00	11.50	8.76	6.45

Source. National Science Foundation/Division of Science Resources Studies, 1997 Survey of Doctorate Recipients.

- High scientist unemployment. Reflecting the weak demand for skilled workers in Puerto Rico, *unemployment among doctorate holding scientists was 13% in April, 1997*, approximately the same as the unemployment rate for all workers (13.1% for 1997). In comparison, the unemployment rate for Ph.D. scientists in the U.S. as a whole was only 1.2%, less than a quarter of the overall U.S. rate of five percent.[33] Interestingly, no scientist with a degree in computer and math sciences or physical and related sciences was unemployed in Puerto Rico.
- Brain drain. The anemic local demand for workers with post-graduate training in science, mathematics and engineering has driven an ongoing brain drain in Puerto Rico. The National Science Foundation's *1997 Survey of Doctoral Recipients* found that only 350 of the 1,560 doctorate holders born in Puerto Rico now reside on the island.[34]

Table 16. Employment of Scientists in Puerto Rico and the U.S. Overall By Field

	Total	Sciences	Computer & math. Sciences	Life & Related Sciences	Physical & Related Sciences	Social & Related Sciences	Engineering
United States	100%	83%	6%	27%	20%	29%	17%
Puerto Rico	100%	82%	1%	46%	12%	22%	18%

Source. National Science Foundation/Division of Science Resources Studies, 1997 Survey of Doctorate Recipients.

- Computer, mathematics, and physical scientists under-represented. The table above indicates the Ph.D. field for the scientists employed in Puerto Rico. In comparison to the composition of scientists in the U.S. as a whole, Puerto Rico has a higher share of Ph.D.'s with training in the life sciences, 46% compared to 27%, and a far lower share of Ph.D.'s with training in computer, math, physical and related sciences, 13% compared to 26%.

- Salaries for Ph.D. scientists. Salaries for scientists in Puerto Rico fall significantly below the average for the United States, despite a high cost of living on the island. The average scientist in the U.S. earns $60,200, 20% more than in a scientist in Puerto Rico, $50,000.[35] The handful of states that

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[33] National Science Foundation, Division of Science Resources Studies, Data Brief: Healthy Economy Yields Even Lower Unemployment Rate for Doctoral Scientists and Engineers, April 15, 1999. http://www.nsf.gov/sbe/srs/databrf/sdb99340.htm

[34] Id.

[35] Scientists in New York and New Jersey, the most common destinations for Puerto Rican migration to the mainland earn 26% and 50% more on average. National Science Foundation, 1995 Survey of Doctorate Recipients, Table 59.

pays their scientists lower wages have significantly lower costs of living: North Dakota, South Dakota, Montana, Arkansas, and Wyoming.

Table 17. Salaries for Ph.D. Scientists and Engineers in Puerto Rico, 1995

	Total	Scientists	Engineers	Non S&E occupations
Puerto Rico	$50,000	$40,000	$45,000	$70,000
United States	$60,200	$55,000	$67,000	$73,500

Note. NSF data does not distinguish Puerto Rico from other outlying areas. It is assumed that scientists in Puerto Rico comprise the majority. *Source*. National Science Foundation, 1995 Survey of Doctorate Recipients.

C. ALL ENGINEERS IN PUERTO RICO AND THE UNITED STATES

- Approximately 4,300 engineers (including those with and without Ph.D.'s) comprise ½ of 1% of the Puerto Rican labor force.[36] In comparison, engineers constitute a three times higher proportion of the labor force in the U.S. as a whole (1.5%).

- In fact, 7 of the 14 categories of engineers tracked by the Labor Department are not represented at all in Puerto Rico. Of the remaining types, only civil, industrial, and safety engineers were employed in Puerto Rico at a similar proportion of the labor force as in the U.S. as a whole.

- Salaries for all engineers across the U.S. averaged $56,100, 36% higher than the average in Puerto Rico, $41,100. The salary differential between the U.S. as a whole and Puerto Rico is highest for civil and computer engineers (approximately 64% higher in the U.S.). Please see table 18 below.

Table 18. Engineer Salaries in the U.S. Overall and Puerto Rico
(for those occupations with engineers in Puerto Rico)

	Chemical Engineers	*Civil Engineers*	*Electrical Engineers*	*Computer Engineers*	*Industrial Engineers*	*Safety Engineers*	*Mechanical Engineers*	***Total***
U.S. Overall	$ 58,400	$ 52,750	$ 56,820	$ 56,590	$ 52,350	$ 50,760	$ 52,210	**$ 56,115**
P.R.	$ 47,970	$ 32,070	$ 43,910	$ 34,450	$ 44,860	$ 45,290	$ 39,700	**$ 41,179**
Difference	21.7%	64.5%	29.4%	64.3%	16.7%	12.1%	31.5%	**36.3%**

Source. Bureau of Labor Statistics, Occupational Employment Statistics Survey, 1997. http://stats.bls.gov/oeshome.htm.

[36] Bureau of Labor Statistics, Occupational Statistics Survey, 1997.

IV.3. Patents — Puerto Rico Ranking: 52 / 52

The number of patents issued to companies or individuals per 1,000 workers.

Indicator Score:

Patents per 1,000 workers, 1998	
Puerto Rico:	0.02
U.S. Average:	0.61

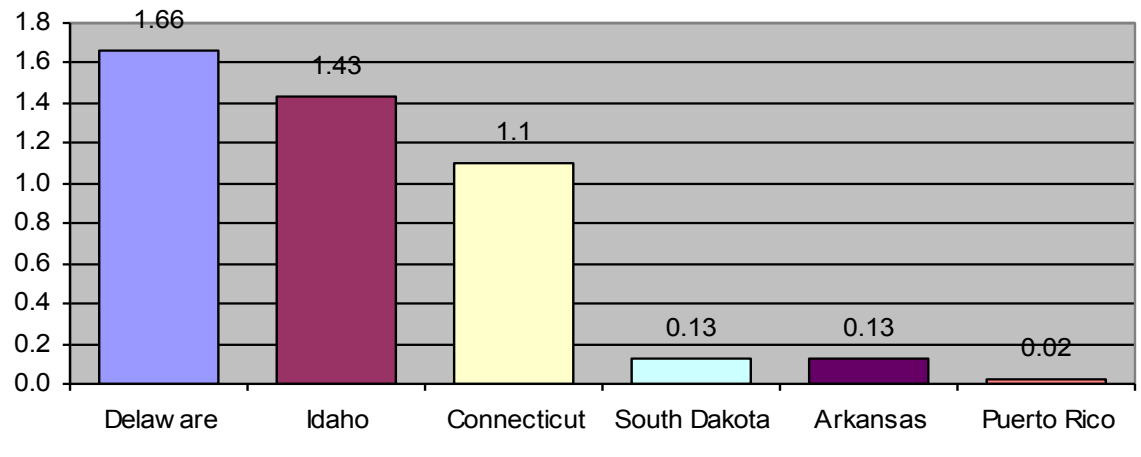
Source. U.S. Patent and Trademark Office, 1999.

- Puerto Ricans generated 20 patents in 1998 or 0.02 per thousand workers, *a rate 30 times lower than the overall U.S. average.*
- Arkansas and Mississippi, the states with the most similarly sized labor forces, created 173 and 143 patents in 1998, *7 times more than Puerto Rico*.
- While major R&D conducting corporations operate production facilities in Puerto Rico, they carry out minimal R&D in Puerto Rico.

Highest / Lowest Ranking States

	Score	Rank
Delaware	1.66	1
Idaho	1.43	2
Connecticut	1.10	3
South Dakota	0.13	*50*
Arkansas	0.13	*51*
Puerto Rico	0.02	*52*

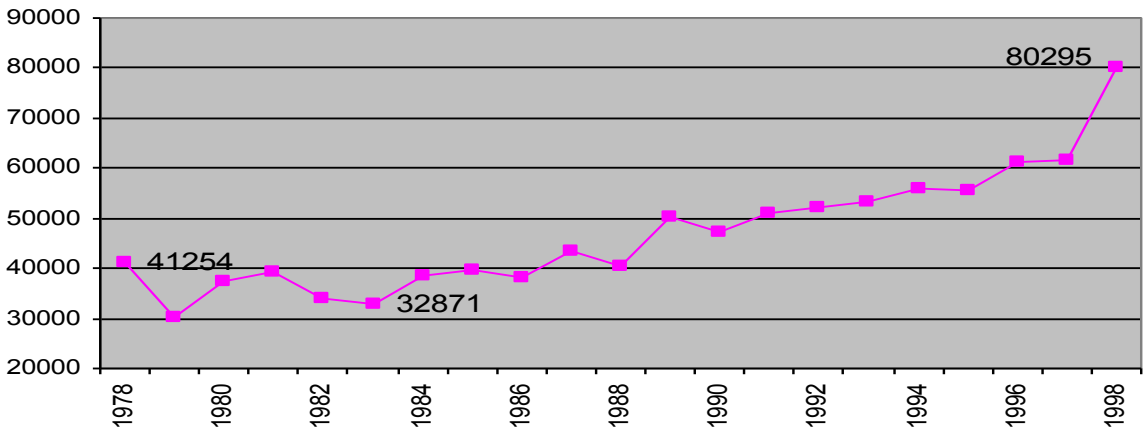
Figure 12. *Rankings* - Patents per 1,000 workers



A. BACKGROUND

- The number of patents issued annually has climbed steadily in the U.S., reflecting the escalating rate of product innovation in the economy. Innovations enable increases in productivity and improvements in wages.
- The number of patents issued has jumped from approximately 33,000 in 1983 to over 80,000 last year. Please see figure 13 below. Since 1983, the number of patents issued has increased at an annual rate of 6.1%.[37]

Figure 13. Patents Issued Annually in the US, 1978-1998



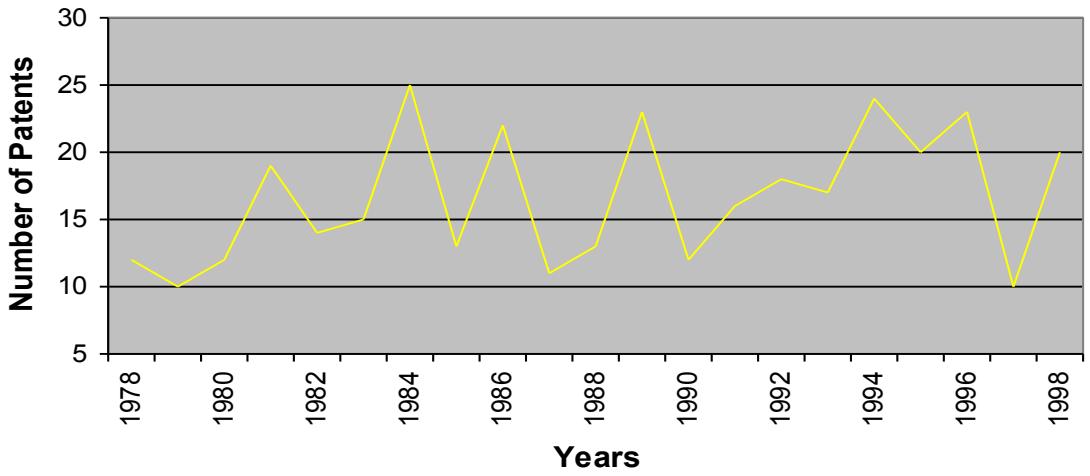
Source. U.S. Patent and Trademark Office, 1999

[37] U.S. Patent and Trademark Office, Patent Counts by Country/State and Year: Utility Patents, 1963 to 1998, March 1999.

B. PATENTS GENERATED IN PUERTO RICO

- Patents in Puerto Rico. The number of patents issued in Puerto Rico has improved little since 1978, ranging between 10 and 25 annually. Please see figure 14 below. Of the recent patents since 1994, no corporation accounted for more than five. The only organizations generating more than 5 patents were the Government of Puerto Rico (14) and the University of Puerto Rico (6).[38]

Figure 14. Patents Issued in Puerto Rico, 1978-1998



- All patents since 1977. Puerto Rico accounted for only 435 of the 1.1 million patents generated in the US since 1977 or 0.04% of the total.[39] In comparison, Mississippi generated 2,404 patents during the same time, and South Carolina, a state with a similar sized 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 created scientific innovation at overall U.S. levels.

[38] U.S. Patent and Trademark Office, Patenting by Geographic Origin (State and Country)-Breakout By Organization.

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

IV.4. Industry Investment in R&D **Puerto Rico Ranking:** 44 / 52[40]

Private sector investment in research and development as a share of gross product.

Indicator Score:

Private R&D Investment, 1997	
Puerto Rico:	0.17%
U.S. Average:	1.94%

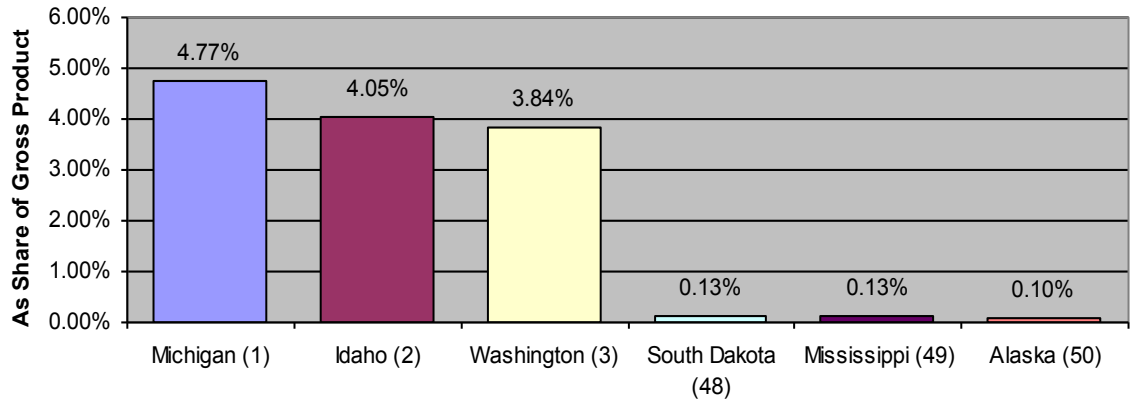
Sources. National Science Foundation, 1999.

- Private investment in R&D in Puerto Rico is an estimated $53 million annually, or 0.17% of gross product.
- Despite its many electronics and pharmaceutical firms, the private sector conducts little R&D in Puerto Rico.
- Private R&D investment in Puerto Rico as a share of the economy is *11 times* less than in the U.S. as a whole.

Highest / Lowest Ranking States

	Score	Rank
Michigan	4.77%	1
Idaho	4.05%	2
Washington	3.84%	3
South Dakota	0.13%	*48*
Mississippi	0.13%	*49*
Alaska	0.10%	*50*

Figure 15. *Rankings* - Industry Investment in R&D



[40] The National Science Foundation does not release information on the District of Columbia or West Virginia to avoid disclosing information about individual companies.

A. BACKGROUND

- Investments in research and development are *the key* driver of economic growth in the *New Economy*, boosting productivity and generating increases in living standards.

- Studies find that investments in research and development generate returns to investors of over 20 percent and benefits to society of over 50 percent.[41] Two thirds of economic growth in the U.S. is now attributable to technological innovation.

B. PRIVATE INVESTMENT IN R&D IN PUERTO RICO

- Industry sponsors approximately $53 million of R&D annually in Puerto Rico.[42] The most recent survey in 1991 found that only 30% of manufacturing companies conducted any R&D at all, and the rest spent $31 million.[43] Federal surveys find evidence of negligible R&D spending.[44]

- Despite the substantial pharmaceutical manufacturing business in Puerto Rico, the first pharmaceutical research and development center opened only last year, operated by local firm Mova Pharmaceuticals.

- In contrast, clusters of high tech firms 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.[45] In South Carolina, a state with a similar population to Puerto Rico, industry invested $783 million in1997, 15 times as much as the private sector in Puerto Rico.

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41 *See* Council of Economic Advisors (1995) for a review of studies.

42 Estimate based on federal and Puerto Rico survey results and press reports on electronics and pharmaceutical firms in Puerto Rico.

43 Information from a survey of 172 manufacturing corporations by the Puerto Rico Economic Development Administration in 1991.

44 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.

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

IV.5. Venture Capital Investment **Puerto Rico Ranking:** 16 / 52

Private sector venture capital invested as a percentage of gross product.

Indicator Score:	Venture Capital Investment, 1998
	Puerto Rico: 0.11%
	U.S. Average: 0.18%

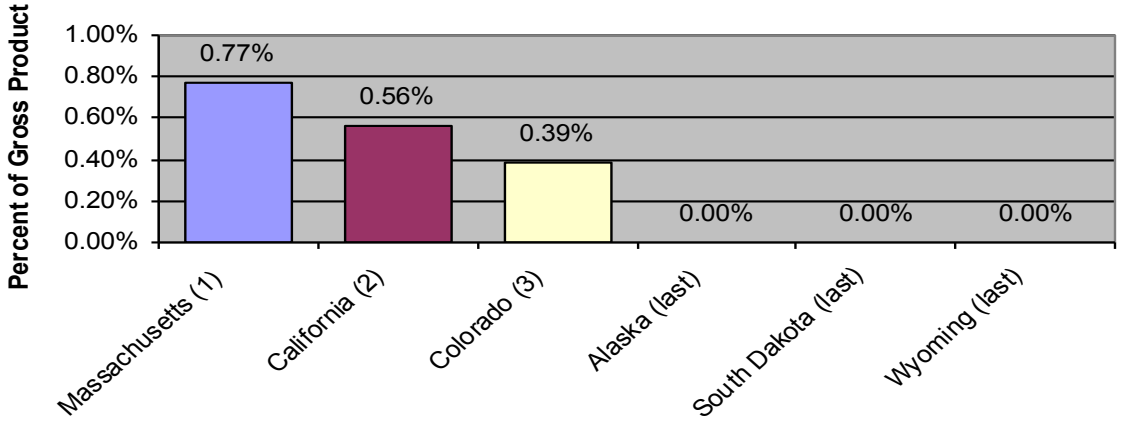
Sources. PriceWaterhouseCoopers, 1999 and Puerto Rico Industrial Development Company (PRIDCO).

- At 0.11% of gross product, private venture capital investment in Puerto Rico is about two-thirds of the overall U.S. level (0.18%).
- Venture capital investments from the private sector totaled an estimated $35 million in 1998.

Highest / Lowest Ranking States

	Score	Rank
Massachusetts	0.77%	1
California	0.56%	2
Colorado	0.39%	3
Alaska	0.00%	Last
South Dakota	0.00%	Last
Wyoming	0.00%	*Last*

Figure 16. *Rankings* - Venture Capital Activity



A. BACKGROUND

- Venture capital (VC) fuels growth of companies at the early stages of development, and wields an importance beyond its share of the overall capital markets. Venture capital investments were made in U.S. 2,485 companies in 1997, four times as many as in 1980.
- Employment in venture backed companies increased 34% annually between 1991 and 1995, at the same time as employment in Fortune 500 firms decreased 3.6%.[46]
- A majority (62%) of all VC investment was concentrated in a handful of states, California ($5.77 billion), Massachusetts ($1.7 billion), Texas ($816 million) and New York ($557 million).[47]

B. VENTURE CAPITAL IN PUERTO RICO

- In 1998, venture funds invested $50 million in Puerto Rico, of which $35.7 million is allocated to private sources based on the level of government investment in the funds.[48] The Puerto Rico government estimates that $350 million is under management for investment as venture capital in Puerto Rico, of which $100 million has been provided by the Puerto Rico government ($48 million in private equity, and $52 million in a venture fund of funds).
- VC activity in 1998 represented approximately 0.18% of gross product in the U.S. as a whole, and 0.11% in Puerto Rico, or two thirds as much, ranking Puerto Rico 16 of 52 in terms of activity compared to the economy, and 31 in terms of overall VC activity.
- Using gross product and not gross domestic product (GDP) as the baseline overestimates the extent of VC activity in Puerto Rico. If VC activity were expressed as a share of GDP instead, the indicator score would be reduced by a third to 0.12% (GDP in Puerto Rico is 50% higher than gross product).
- The volume of venture capital investment in any one year should not be construed as a powerful indicator of innovation capacity in Puerto Rico, or elsewhere. Given the small amounts of financing involved, one or two deals could radically change the rankings (as is true with the IPO indicator). Also, without information on the rate of return to VC investments, volume data for any one year has little meaning.

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[46] Robert D. Atkinson and Randolph Court, *The New Economy Index: Understanding America's Economic Transformation*, 1998.

[47] Pricewaterhousecoopers, *1998 Money Tree Report*, 1999.

[48] Puerto Rico Industrial Development Company, August 1999. Because the PriceWaterhouseCoopers only tracks private source funds, this report adjusts total venture investments by the ratio of private funds to total venture funds in Puerto Rico (71%) to allocate $35.7 million of the total $50 million in 1998 investments to private sector sources.

Puerto Rico and the *New Economy*: *International Comparisons*

Benchmarking the *New Economy* in Puerto Rico with the 50 states and the District of Columbia indicates that the island remains behind the rest of the United States overall, and behind on most measures, particularly in its capacity for innovation and transformation to a digital economy. As business becomes more global, the 50 states must compete and compare themselves with foreign countries. For a global perspective, the following sections compare Puerto Rico's competitive position in the *New Economy* with a group of twenty developing and developed nations worldwide (please see following page for a list).

- **The Digital Economy**

Puerto Rico ranks at the bottom of all the countries in terms of Internet hosts per capita, with 0.3 per 10,000 people, a minute fraction of the 979.3 in the U.S. as a whole. Computer use is higher in Puerto Rico (7 of 20) than in most selected countries, although it is a third of the level in the rest of the United States. The penetration of mobile phones in Puerto Rico (13 of 20) is comparable to developing countries in Latin America, but a fraction of the use level in the United States.

- **Capacity for Innovation**

Puerto Rico ranks in the middle of the selected countries in its capacity for innovation. Its low output of patents ranks it lower than all but Ecuador, Columbia and Malaysia, and below Brazil, Chile, Venezuela, Mexico, and Thailand. Total investment in research and development as a percent of gross product places Puerto Rico 13 of 20, and behind several developing countries including Venezuela, Brazil, and Chile.

Puerto Rico compares favorably with most developing countries on the number of scientists and engineers engaged in R&D, with the exception of Venezuela where more than twice as many work - 671 per million people compared to 303 per million in Puerto Rico. However, Puerto Rico remains far out of the range of the leading nations like Korea (2,636), Japan (6,309), the rest of the United States (3,732), Spain (1,210), and Portugal (1,185) in the number of scientists and engineers in R&D. A relatively high share of students enroll in post-secondary education in Puerto Rico (48%), indicating that the basic education foundation is comparable internationally.

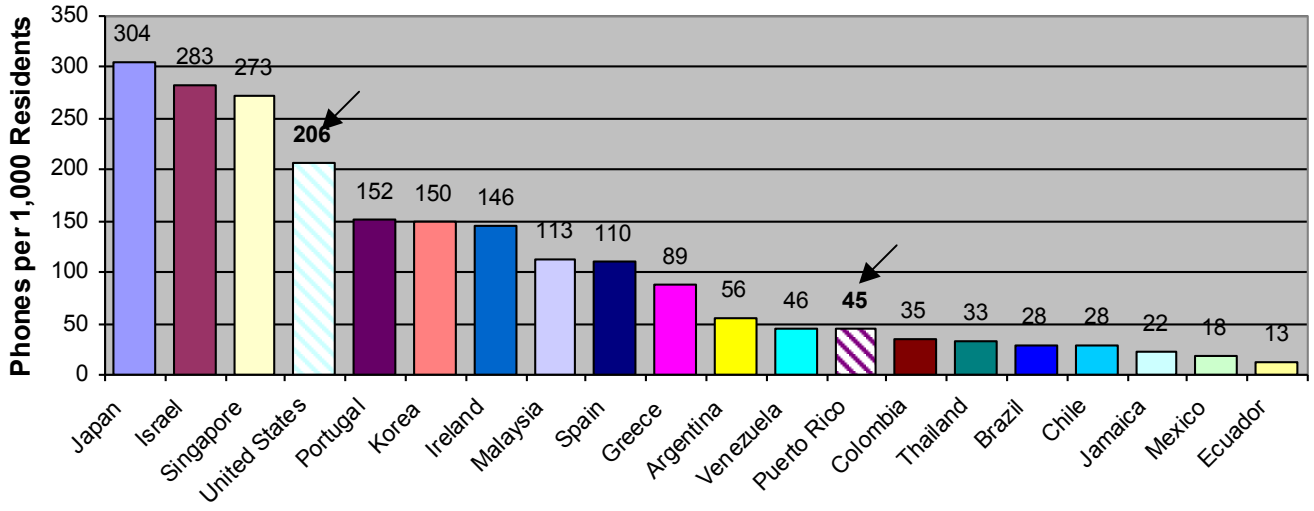
Table 19. Puerto Rico Ranked on *New Economy* Measures with Twenty Selected Countries Worldwide

The Digital Economy		**Capacity for Innovation**	
Mobile Phones	13 / 20	R&D Scientists and Eng.	10 / 20
Computers	7 / 20	Patents	13 / 20
Web Use	20 / 20	Total R&D investment	13 / 20
		Secondary Educ. Enrollment	4 / 20

V.1. *International Comparison – The Digital Economy:* Mobile Phones

- In the emerging digital economy, mobile / cellular phones are rapidly becoming ubiquitous. The Yankee Group forecasts that one billion phones will be in use by the year 2005, and that technological advances will transform the mobile phone into a major conduit for data transmission as well as voice communication.
- At 45 phones per thousand people, penetration of mobile / cellular phones into the Puerto Rican market is a fifth of the overall U.S. level, 206 per thousand, and more comparable to levels in Latin America and the Caribbean, 26 phones per thousand.
- Argentina and Venezuela both have more mobile / cellular phones per thousand people, 56 and 46 respectively, than Puerto Rico. Korea (150), Malaysia (113), and Singapore (273) each have a mobile phone penetration rate at least three times as high as Puerto Rico.

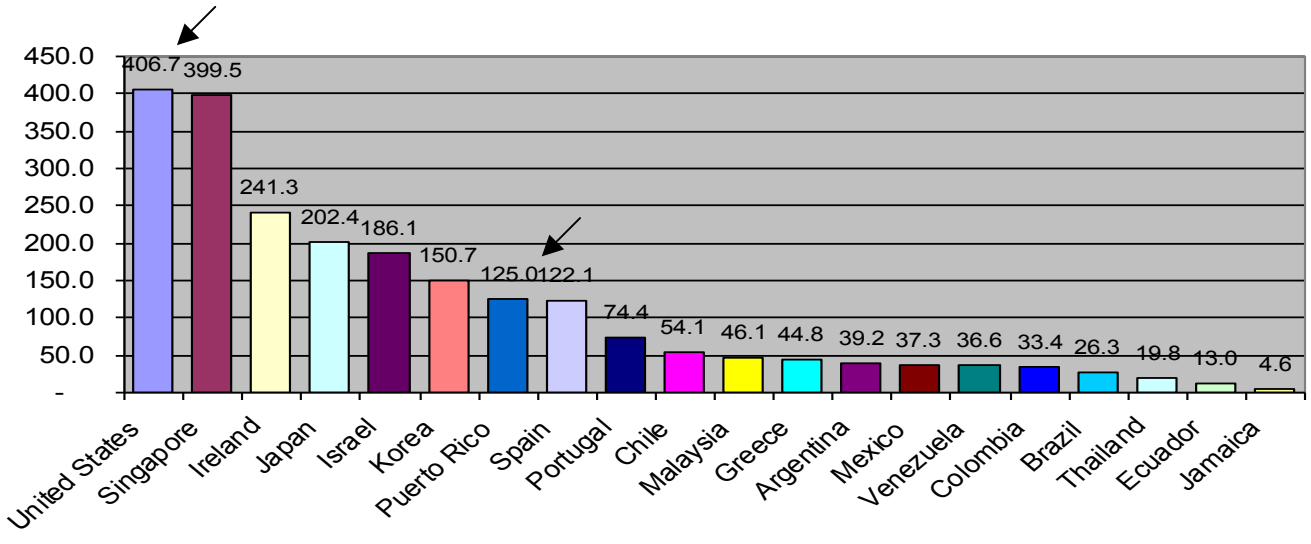
Figure 17. Mobile Phones Per 1,000 People



V.2. *International Comparison – The Digital Economy:* Computers

- The number of computers in Puerto Rico, an estimated 125 for every 1,000 people,[49] compares favorably with Spain, Portugal and Chile, but places Puerto Rico below Ireland (241), Israel (186), and Korea (150), and far out of the range of computer use in the United States (407) and Singapore (400).
- Market forecasts project strong growth in computer sales of 15% for 1999 in Puerto Rico, comparable to the rest of the United States, Singapore, and other more technologically developed countries.[50]

Figure 18. Computers per 1,000 People

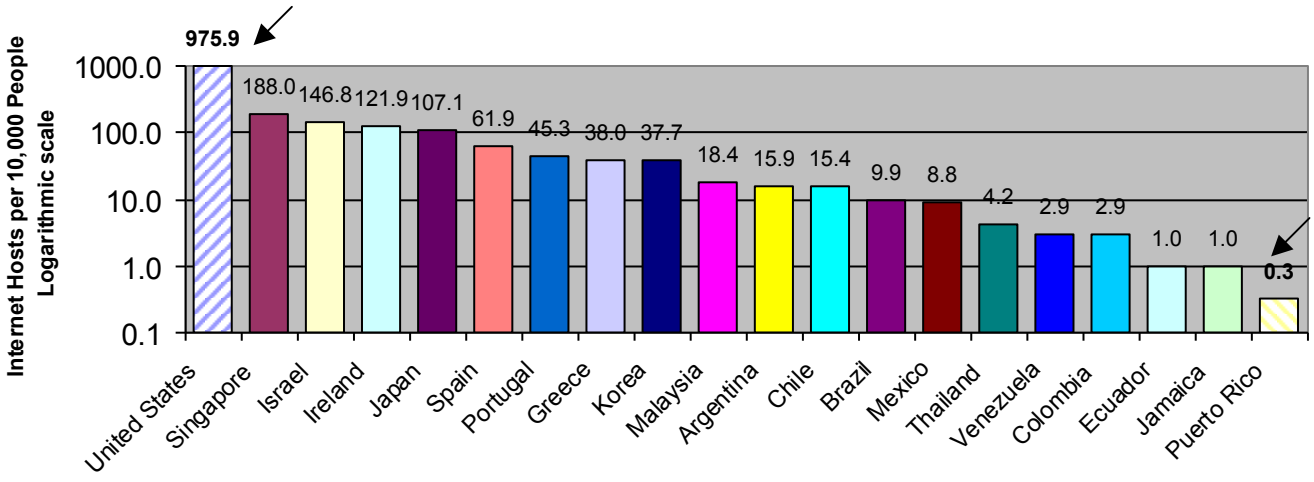


[49] Estimated on the basis of sales figures and other industry data.
[50] Dataquest, 1999.

V.3. *International Comparison – The Digital Economy:* Internet Hosts

- With 0.3 hosts per 10,000 people, Puerto Rico ranks at the bottom of the selected countries in the number of Internet hosts per 10,000 people, as indicated on the graph below.[51] The U.S. ranks far above all other countries with 976 compared to 188 in Singapore and 107 in Japan. Puerto Rico ranks far below any state in the U.S., and lower than Jamaica and Ecuador.[52]

Figure 19. Internet Hosts Per 10,000 People



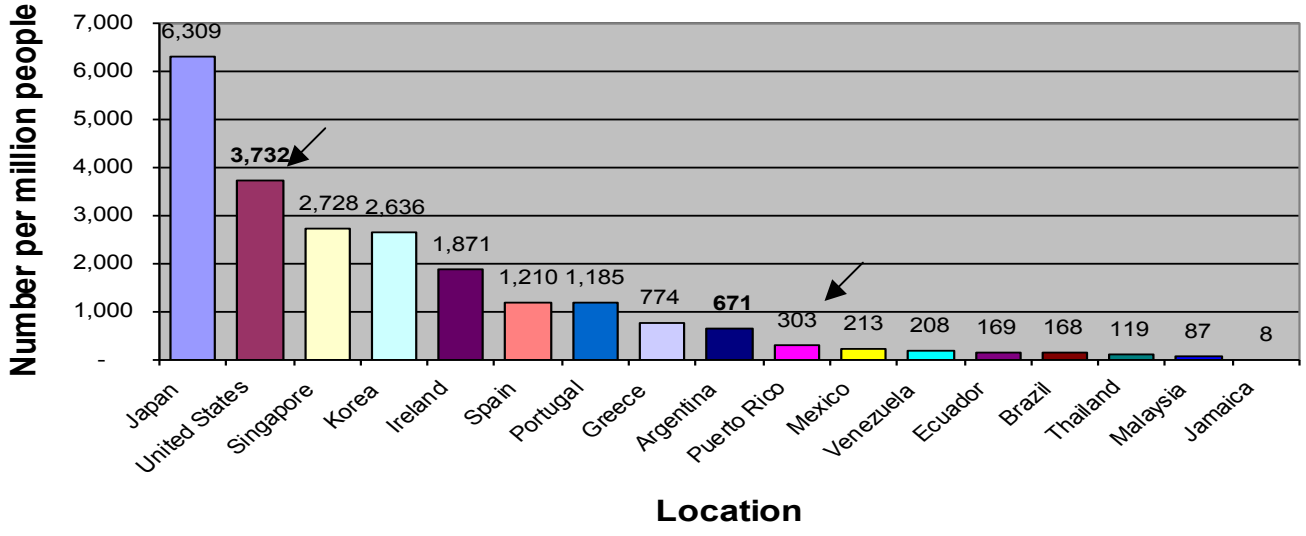
[51] In order to include values from 0.3 to 956, the information is graphed on a logarithmic scale.

[52] Given the discrepancy with other figures from Domainsondisc.com and Matthew Zook of the University of California, it is likely that these World Bank figures underestimate the number of domain names in Puerto Rico to some extent.

VI.1. *International Comparison – Innovation Capacity:* Scientists and Engineers in Research and Development

- Puerto Rico has 10 times fewer scientists and engineers engaged in research and development per million people, 303, than the U.S. as a whole, 3,732. Puerto Rico's workforce of scientists and engineers compares more similarly to countries in Latin America. Argentina has twice as many scientists and engineers in R&D than Puerto Rico, while other countries like Mexico (213), Venezuela (208), and Ecuador (169) have similar numbers per million people.

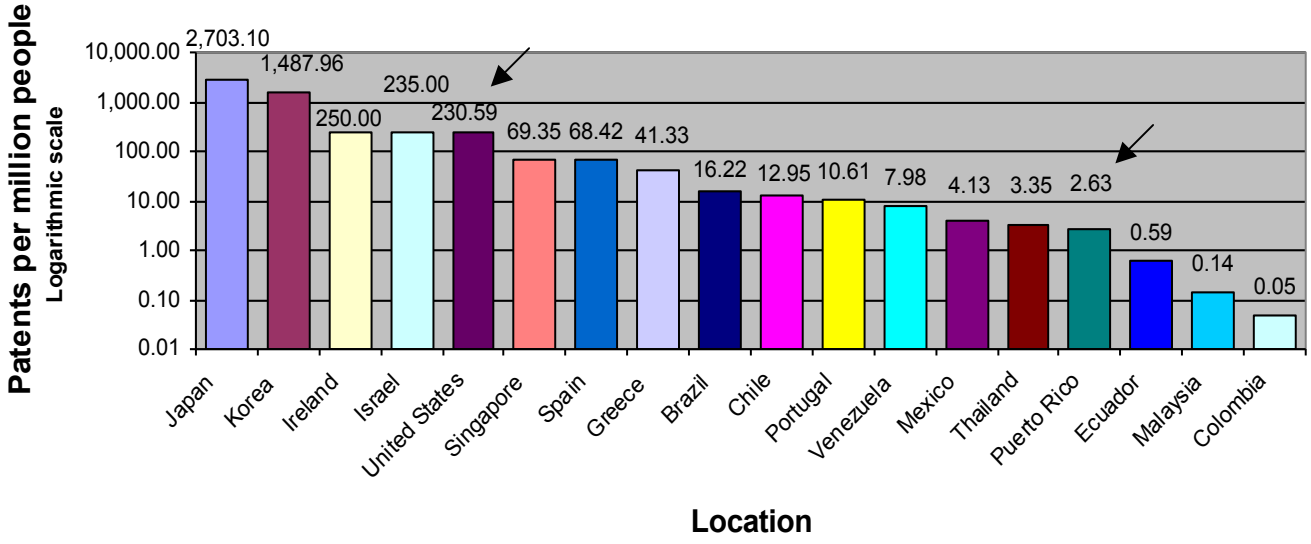
Figure 20. Scientists and Engineers in R&D



VI.2. *International Comparison – Innovation Capacity:* Patents

- An abysmally low rate of patent generation in Puerto Rico ranks the island near the bottom of the selected countries. At 2.63 patents per million people, Puerto Rico ranks far behind many developing countries in Latin America, including Brazil (16.22), Chile (12.95), Venezuela (7.98), and Mexico (4.13). Please see figure 21 below.
- Rapidly developing countries like Ireland, Singapore and Korea generate at least 30 times as many patents per capita as Puerto Rico; Korea generates more than 500 times as many.
- The low levels of intellectual capital created in Puerto Rico as reflected in these patent data point to a persistent under-investment in research and development, and in human capital.

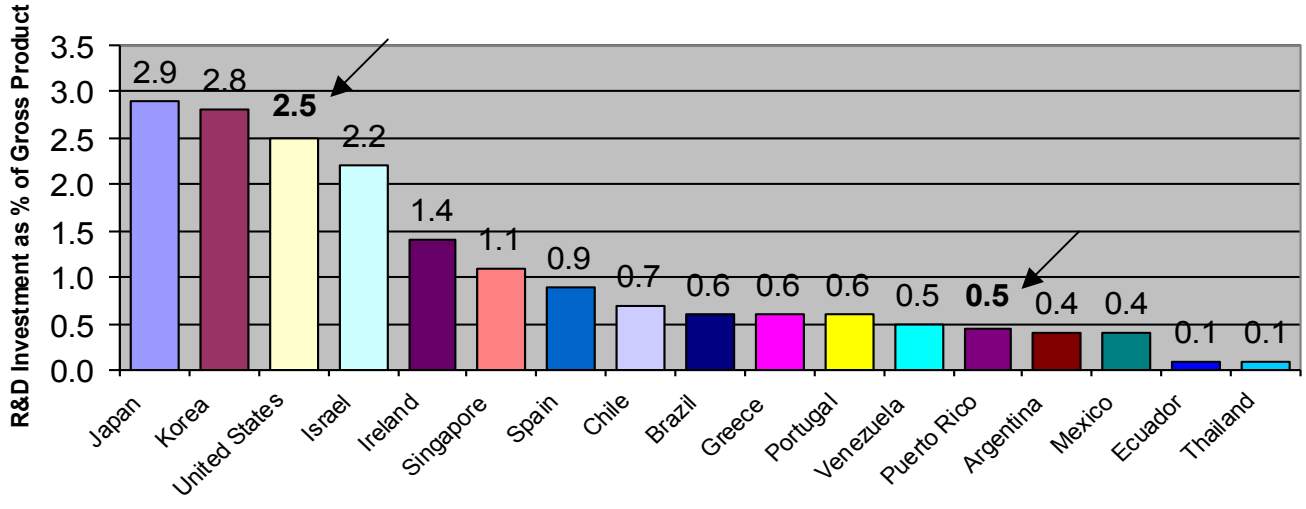
Figure 21. Patents per million people



VI.3. *International Comparison – Innovation Capacity:* Investment in Research and Development

- Puerto Rico's estimated 0.45% investment in R&D ranks the island at or below the investment level of many Latin American countries. R&D investment as a percent of gross product in Puerto Rico compares similarly to Argentina (0.4%), Mexico (0.4%), and Venezuela (0.5%), and falls behind Chile at 0.7%. R&D investment in Ireland totals 1.4% of gross product, Singapore 1.1%, and Korea, 2.8%, more than 5 times as much as Puerto Rico.[53]
- Given the increasing importance of knowledge in driving growth in the global economy, Puerto Rico's comparative under-investment in R&D bodes ill for future growth and competitiveness. Investment in knowledge and research does not reap immediate returns but is critical for long-term productivity and economic growth.

Figure 22. Total Investment in R&D

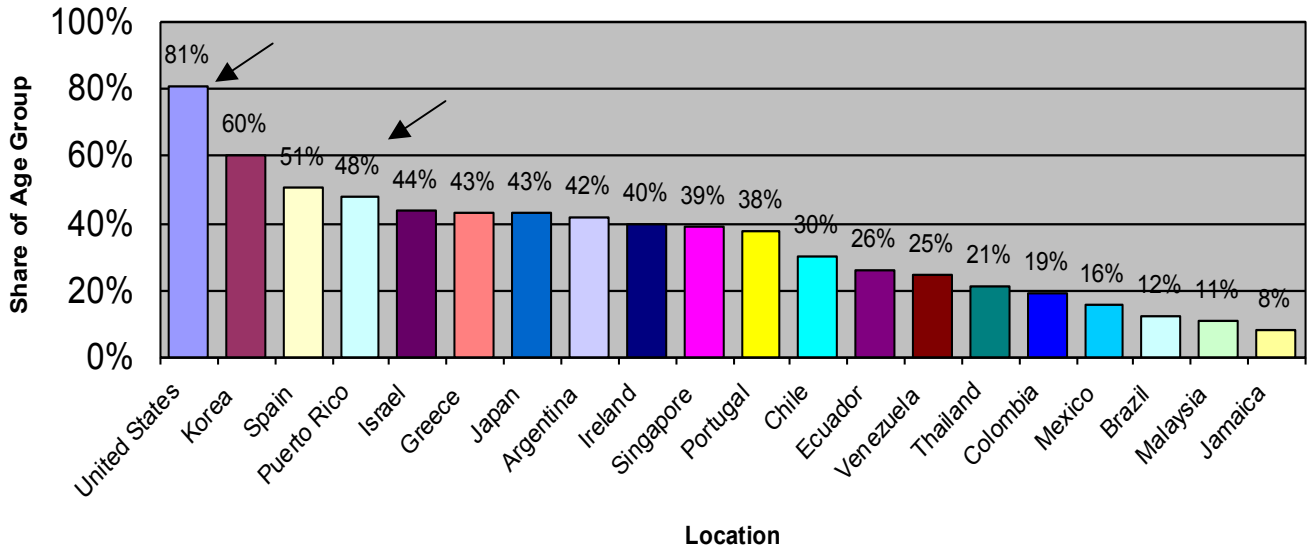


[53] Calculating Puerto Rico's investment as a percent of gross domestic product instead of gross product would reduce the percentage to approximately 0.30%.

VI.4. *International Comparison – Innovation Capacity:* Enrollment in Post-Secondary Education

- An estimated 48% of students in Puerto Rico are enrolled in post-secondary education, far lower than in the U.S. as a whole, where 81% are enrolled. Puerto Rico compares favorably with the selected countries; only Korea and Spain had a higher proportion of students enrolled. Israel (44%), Greece (44%), Japan (43%), and Argentina (42%) had similar shares of students enrolled.

Figure 23. Post-Secondary School Enrollment



VII. Coda

This report has provided a database of information with which to benchmark Puerto Rico's competitive position in the *New Economy* vis-a-vis the rest of the United States. Overall, and on almost all of the indicators, Puerto Rico finishes last. An international comparison shows Puerto Rico behind many less developed economies, particularly in indicators measuring capacity for innovation.

VIII. Data Sources and Methodology

The following section contains the data sources used in this report. Where the calculation of the indicator is not clear, a more detailed explanation of the methodology is included below. If only one source is listed, data for the 50 states and Puerto Rico are both found there. If information is available through the Internet, a hyper-link is provided to the site.

Overall *New Economy* ranking. The Progressive Policy Institute ranks each state overall on the basis of each state's indicator scores weighted by category. These rankings can be found on the Internet at http://www.neweconomyindex.org/states. For the overall ranking, the raw scores on the indicators are adjusted to be based on standard deviations from the mean, to capture the difference in the scores across the states, not just the ranking. In this report, Puerto Rico is ranked with the 50 states and the District of Columbia using a similar methodology. The four *New Economy* categories are weighted the same amount overall as those categories in the PPI report, with the indicators within categories also weighted the same. Engineers as a share of total employment is listed for information purposes only, and is not used to calculate the overall ranking.

I. Knowledge Jobs

- Managerial, Professional, and Technical Occupations

U.S. Department of Labor, Bureau of Labor Statistics, Occupational Statistics Survey, 1997.

- Workforce Educational Attainment

Methodology. The scores assigned to each state, Puerto Rico and the District are a weighted measure of the educational attainment of the workforce. The share of the population over 25 with an associate's degree or some college education receives a weight of 0.5, the share with a bachelor's degree, a weight of 1.0, and the share with an advanced degree, a weight of 2.0. *See* Progressive Policy Institute (1999). A recalculation of the same Census data did not generate the same numbers as the PPI publication, although the resulting rankings are not appreciably different.

U.S. Bureau of the Census, 1990 Census of Population, CPH-L-96.

II. Globalization

- Foreign Direct Investment

Fahim-Nader and Ziele, "Foreign Direct Investment in the United States - New Investment in 1997 and Affiliate Operations in 1996," *Survey of Current Business*, Bureau of Economic Analysis (June 1998), table 13.

- Export Orientation of Manufacturing

Methodology. Both overall U.S. and Puerto Rico data are drawn from 1992 surveys. Because the Puerto Rico data does not include the number of jobs in export firms, the measure used here is the value of shipments exported as a share of total shipments. The Puerto Rico data is adjusted to account for the 17% of shipments for which there is no destination. It is assumed

that these shipments are no different statistically from those for which there is destination information.

U.S. U.S. Bureau of the Census, *Analytical Report Series: Selected Characteristics of Manufacturing and Wholesale Establishments that Export: 1992*, June 1996.

P.R. U.S. Bureau of the Census, *1992 Economic Census of the Outlying Areas*: *Manufacturing, Puerto Rico*, 1994. Data available on the Internet at: http://www.census.gov/csd/oat/pr.htm.

III. The Digital Economy

- Online Access

U.S. Department of Commerce, National Telecommunications and Information Administration, *Falling through the Net: Defining the Digital Divide*, July 8, 1999.

Bureau of the Census, *Survey of Internet and Computer Use*, Supplement to December 1998 Current Population Survey Questionnaire. Raw data available on the Internet at: http://www.bls.census.gov/cps/computer/1998/sdata.htm. The survey collects information on internet access at home, at work and elsewhere.

P.R. Estimate from José Martinez, Technology Writer, *Caribbean Business*, August 1999.

- Computer At Home

U.S. Department of Commerce, National Telecommunications and Information Administration, *Falling through the Net: Defining the Digital Divide*, July 8, 1999.

Bureau of the Census, *Survey of Internet and Computer Use*, Supplement to December 1998 Current Population Survey Questionnaire. Data available on the Internet at: http://www.bls.census.gov/cps/computer/1998/sdata.htm

P.R. Estimate from International Data Corporation (1999) and Compaq Computer Puerto Rico. Conversation with José Martinez, Technology Writer, *Caribbean Business*, August 1999.

- Internet Domain Names

All domain names from the Internet based company, Domainsondisc (data from April 1999). Data available on the Internet at: www.domainsondisc.com.

Commercial domains from Matthew Zook, Ph.D. Candidate, Department of City and Regional Planning at UC Berkeley, August 1999.

IV. Innovation Capacity

- High Technology Jobs

Methodology. The American Electronics Association tracks the number of jobs and salaries in 45 specific (four digit Standard Industrial Code) industrial sectors. These figures accurately capture jobs in high technology sectors, but do not necessarily represent all high technology jobs. Please see appendix 1 for a complete listing of the SIC codes.

U.S. American Electronics Association, *Cyberstates 3.0*, June 1999.

P.R. Data provided by the Puerto Rico Department of Labor, Bureau of Labor Statistics, 1994-1998.

- Industry Investment in Research and Development

National Science Foundation, Division of Science Resources Studies, Survey of Industrial Research and Development, *Research and Development in Industry: 1997* [Early Release Tables], 1999. Data available on the Internet at: http://www.nsf.gov/sbe/srs/srs99411/start.htm.

- Patents

U.S. Patent and Trademark Office, Office for Patent and Trademark Information, *Patent Counts by Country/State and Year: Utility Patents, January 1963* – December 31, 1998, March 1999.

- Scientists and Engineers

Ph.D. Scientists/Engineers. National Science Foundation, Division of Science Resources Studies, Survey of Doctorate Recipients, *Characteristics of Doctoral Scientists and Engineers: 1997* [Early Release Tables], February 1999. Data available on the Internet at: http://www.nsf.gov/sbe/srs/srs99412/start.htm.

Engineers. U.S. Department of Labor, Bureau of Labor Statistics, Occupational Statistics Survey, 1997.

- Venture Capital

Methodology. Because 1998 data on gross product by state was not available at the time of publication from the Bureau of Economic Analysis, venture capital activity is expressed as a percent of 1997 gross product figures for Puerto Rico, the 50 states, and the U.S. as a whole.

U.S. PriceWaterhouseCoopers LLP, *1998 Money Tree Report*, (Boston, MA: 1999).

P.R. Information provided by Mynra Losada, Puerto Rico Industrial Development Company, August 1999.

V. International Comparisons

Most of the international data on the *New Economy* is drawn from the World Bank, *World Development Indicators 1999*, July 1999, which lists data for the most recent year available. Some data is available on the Internet at: http://www.worldbank.org/data/wdi/home.html. As above, the methodology is explained below where necessary.

- Mobile Phones, Internet Hosts

World Bank, *World Development Indicators 1999*, Table 5.11. The Information Age, pp. 310-312.

- Scientists and Engineers in R&D

Methodology. The number of scientists and engineers engaged in research and development in Puerto Rico is not available through any surveys. This figure is estimated by assuming that the ratio of non-Ph.D. to Ph.D. scientists and engineers engaged in R&D is the same in Puerto Rico as in the U.S. as a whole (0.72), and applying this ratio to the number of Ph.D. scientists and engineers working in Puerto Rico.

World Bank, *World Development Indicators 1999*, Table 5.12. Science and Technology, pp. 314-316.

National Science Foundation, Division of Science Resources Studies, Survey of Doctorate Recipients, *Characteristics of Doctoral Scientists and Engineers: 1997* [Early Release Tables], February 1999. Data available on the Internet at: http://www.nsf.gov/sbe/srs/srs99412/start.htm.

- Patents

World Bank, *World Development Indicators 1999*, Table 5.12. Science and Technology, pp. 310-312.

P.R. U.S. Patent and Trademark Office, Office for Patent and Trademark Information, *Patent Counts by Country/State and Year: Utility Patents, January 1963* – December 31, 1998, March 1999.

- Expenditures for R&D

World Bank, *World Development Indicators 1999*, Table 5.12. Science and Technology, pp. 314-316.

P.R. R&D expenditures in Puerto Rico estimated.

- Computers

World Bank, *World Development Indicators 1999*, Table 5.11. The Information Age, pp. 310-312.

- Post Secondary Education

Methodology. World Bank figures are based on all public support for education, including support for private institutions.

World Bank, *World Development Indicators 1999*, Table 2.10. Participation in Education, pp. 78-80.
P.R. Puerto Rico Planning Board, *Puerto Rico Budget 1997-1998*.

General Economic and Demographic Information

- Gross U.S. and State Product

Note. Because the Commerce Department does not currently have state gross product figures for 1998, this report uses 1997 figures for both the states and Puerto Rico.

U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Analysis Division, Washington, D.C., 1977-1997 Release June 9, 1999. Data available on the Internet at http://www.bea.doc.gov/bea/regional/gsp/gspsum_c.htm.

U.S. Department of Commerce, Bureau of Economic Analysis, "Gross Domestic Product Second Quarter 1999," July 29, 1999.

- Population

U.S. Census Bureau.

Puerto Rico Planning Board, *1998 Economic Report to the Governor*, Statistical Appendix, Table 31, February 1998.

World Bank, *World Development Indicators 1999,* Table 2.1. Population.

- Total State Employment

U.S. Department of Labor, Bureau of Labor Statistics, Data Release, "Regional and State Employment and Unemployment," June 1999, Table 4. "Civilian labor force and unemployment by state and selected areas, not seasonally adjusted," Data available on the Internet at: http://www.bls.gov/news.release/laus.t04.htm.

- Gross Product – Puerto Rico

Puerto Rico Planning Board, *1998 Economic Report to the Governor*, Statistical Appendix, Table 2, February 1998

IX. Appendices

I. American Electronics Association SIC Codes for High Technology Sectors

HIGH-TECH MANUFACTURING

Computers and Office Equipment

3571 Electronic Computers
3572 Computer Storage Devices
3575 Computer Terminals
3577 Computer Peripherals
3578 Calculating and Accounting Machines
3579 Office Machines

Consumer Electronics
3651 Household Audio and Video Equipment
3652 Phonographic Records and Prerecorded Tapes and Disks

Communications Equipment
3661 Telephone and Telegraph Apparatus
3663 Radio and TV Broadcast and Communications Equipment
3669 Other Communications Equipment

Electronic Components and Accessories
3671 Electron Tubes
3672 Printed Circuit Boards
3675 Electronic Capacitors
3676 Electronic Resistors
3677 Electronic Coils, Transformers, and Inductors
3678 Electronic Connectors
3679 Other Electronic Components

Semiconductors
3674 Semiconductors and Related Devices

Industrial Electronics
3821 Laboratory Apparatus
3822 Environmental Controls
3823 Process Control Instruments
3824 Fluid Meters and Counting Devices
3825 Instruments to Measure Electricity
3826 Laboratory Analytical Instruments
3829 Other Measuring and Controlling Devices

Photonics
3827 Optical Instruments and Lenses
3861 Photographic Equipment and Lenses

Defense Electronics
3812 Search and Navigation Systems, Instruments, and Equipment

Electromedical Equipment
3844 X-Ray Apparatus and Tubes and Related Irradiation Apparatus
3845 Electromedical and Electrotherapeutic Apparatus

COMMUNICATIONS SERVICES
4812 Radiotelephone Communications
4813 Telephone Communications
4822 Telegraph and Other Message Communications
4841 Cable and Other Pay Television Services
4899 Other Communications Services

SOFTWARE AND COMPUTER-RELATED SERVICES
Software Services
7371 Computer Programming Services
7372 Prepackaged Software
7373 Computer Integrated Systems Design

Data Processing and Information Services
7374 Computer Processing and Data Preparation
7375 Information Retrieval Services
7376 Computer Facilities Management Services

Rental, Maintenance, and Other Computer-Related Services
7377 Computer Rental and Leasing
7378 Computer Maintenance and Repair
7379 Other Computer-Related Services

Appendix 2. Raw Scores and Rankings for Puerto Rico, 50 States, and District of Columbia

	Managerial & Technical Jobs		***Education of Workforce***		***Manufacturing Exports***		***Foreign Direct Investment***		***Households Online***		***Computer Ownership***	
	Rank	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*
Alabama	40	24.9%	45	32.0	44	6.0%	30	4.0%	40	21.0%	47	39.7%
Alaska	7	29.6%	6	48.4	2	30.9%	13	5.1%	1	43.8%	1	68.3%
Arizona	24	26.5%	17	43.4	9	9.9%	39	3.4%	13	29.0%	32	47.8%
Arkansas	50	22.7%	51	28.1	47	5.5%	35	3.8%	50	13.9%	48	36.3%
California	10	28.9%	8	46.8	8	10.0%	19	4.8%	10	30.1%	26	50.0%
Colorado	9	29.2%	2	51.5	18	7.8%	25	4.2%	5	34.0%	5	61.7%
Connecticut	5	30.9%	3	49.5	5	13.4%	10	5.9%	7	31.2%	14	53.7%
Delaware	13	28.5%	22	40.8	24	6.9%	22	4.6%	26	24.7%	33	46.9%
District of Columbia	1	46.6%	1	59.9	49	5.2%	44	2.9%	36	23.2%	42	42.8%
Florida	23	26.9%	30	37.6	11	9.5%	33	3.9%	17	27.3%	37	45.1%
Georgia	37	25.3%	33	36.7	39	6.2%	7	6.1%	31	23.8%	45	40.6%
Hawaii	34	25.5%	12	44.2	25	6.9%	1	11.0%	12	29.3%	29	49.0%
Idaho	36	25.4%	28	38.9	3	16.8%	45	2.8%	18	27.0%	6	58.3%
Illinois	16	28.1%	21	41.2	28	6.8%	22	4.6%	21	25.8%	28	49.3%
Indiana	47	23.4%	44	33.0	38	6.3%	16	5.0%	23	25.5%	19	51.0%
Iowa	39	25.0%	40	34.5	33	6.5%	41	3.1%	45	20.5%	25	50.1%
Kansas	18	28.0%	19	41.8	29	6.7%	30	4.0%	22	25.5%	18	51.3%
Kentucky	43	24.6%	50	28.8	26	6.9%	10	5.9%	41	20.9%	39	43.8%
Louisiana	24	26.5%	46	32.0	41	6.1%	37	3.6%	48	17.9%	49	36.2%
Maine	15	28.2%	35	36.4	15	8.6%	4	6.6%	24	25.3%	16	52.5%
Maryland	3	32.9%	4	49.3	21	7.4%	13	5.1%	11	30.1%	12	54.7%
Massachusetts	2	34.4%	4	49.3	6	10.9%	8	6.0%	15	27.7%	15	52.5%
Michigan	27	26.4%	31	37.3	20	7.6%	28	4.1%	27	24.6%	20	50.8%
Minnesota	12	28.7%	18	42.0	43	6.0%	25	4.2%	16	27.6%	9	56.1%
Mississippi	48	22.9%	48	31.0	42	6.1%	48	2.4%	51	13.3%	51	30.5%
Missouri	31	25.6%	36	35.4	31	6.6%	36	3.7%	33	23.7%	27	49.7%

	Managerial & Technical Jobs		***Education of Workforce***		***Manufacturing Exports***		***Foreign Direct Investment***		***Households Online***		***Computer Ownership***	
	Rank	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*
Nevada	52	16.4%	34	36.5	35	6.4%	40	3.2%	20	26.1%	36	46.4%
New Hampshire	11	28.9%	11	45.3	7	10.4%	6	6.2%	2	37.0%	4	63.8%
New Jersey	21	27.6%	15	44.0	37	6.3%	4	6.6%	9	30.8%	7	56.7%
New Mexico	8	29.6%	20	41.7	50	3.7%	45	2.8%	28	24.6%	35	46.8%
New York	24	26.5%	14	44.1	13	9.2%	13	5.1%	35	23.3%	38	45.0%
North Carolina	40	24.9%	39	34.6	22	7.3%	3	7.3%	47	18.1%	46	40.5%
North Dakota	49	22.7%	29	37.8	10	9.6%	50	1.9%	46	19.9%	22	50.4%
Ohio	37	25.3%	41	34.1	17	8.2%	19	4.8%	34	23.6%	30	48.9%
Oklahoma	22	27.3%	32	37.0	48	5.4%	41	3.1%	43	20.7%	43	42.5%
Oregon	40	24.9%	16	43.6	12	9.4%	33	3.9%	8	31.1%	8	56.6%
Pennsylvania	20	27.8%	42	33.6	40	6.1%	16	5.0%	29	24.1%	34	46.9%
Puerto Rico	**51**	**22.2%**	**49**	**30.2**	**16**	**8.6%**	**49**	**2.1%**	**52**	**4.6%**	**52**	**15.0%**
Rhode Island	17	28.0%	25	39.8	27	6.8%	18	4.9%	19	26.4%	23	50.4%
South Carolina	45	24.3%	43	33.1	14	8.8%	2	8.1%	44	20.6%	44	41.1%
South Dakota	46	23.7%	37	35.2	45	5.7%	51	1.8%	37	22.8%	24	50.3%
Tennessee	44	24.4%	47	31.9	36	6.4%	8	6.0%	42	20.9%	41	43.1%
Texas	27	26.4%	23	40.1	34	6.5%	24	4.5%	32	23.7%	40	43.7%
Utah	34	25.5%	7	46.9	46	5.5%	30	4.0%	4	34.4%	2	66.9%
Vermont	14	28.4%	13	44.2	4	15.7%	28	4.1%	6	31.5%	10	56.0%
Virginia	6	30.3%	10	45.6	19	7.7%	12	5.4%	14	28.3%	13	54.1%
Washington	4	31.1%	9	46.4	1	31.9%	25	4.2%	3	35.7%	3	63.8%
West Virginia	27	26.4%	52	25.6	23	7.2%	21	4.7%	49	16.8%	50	35.8%
Wisconsin	31	25.6%	37	35.2	32	6.5%	41	3.1%	25	25.0%	21	50.5%
Wyoming	31	25.6%	24	40.1	52	0.7%	37	3.6%	30	23.9%	11	55.0%

Appendix 2. Continued.

	High Tech Jobs		*Internet Domain Names*		*Scientists & Engineers*		*Patents*		*R&D Investment*		*Venture Capital Investment*	
	Rank	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*
Alabama	29	3.24%	48	4.5	32	0.33%	47	0.18	35	0.57%	24	0.07%
Alaska	45	1.81%	21	10.8	25	0.36%	41	0.22	50	0.10%	49	0.00%
Arizona	12	5.28%	15	12.6	37	0.30%	14	0.73	22	1.53%	15	0.12%
Arkansas	41	2.05%	49	4.1	51	0.18%	51	0.13	43	0.20%	40	0.01%
California	4	6.85%	2	20.6	13	0.47%	5	1.06	6	3.29%	2	0.56%
Colorado	2	7.97%	4	17.7	8	0.52%	10	0.84	14	1.78%	3	0.39%
Connecticut	16	5.11%	9	14.6	7	0.54%	3	1.10	10	2.24%	8	0.18%
Delaware	38	2.29%	19	11.1	2	1.52%	1	1.66	7	3.19%	35	0.03%
District of Columbia	23	3.91%	1	39.6	1	3.26%	42	0.20	51	0.00%	14	0.13%
Florida	26	3.53%	8	14.8	49	0.20%	28	0.39	28	0.90%	23	0.08%
Georgia	19	4.43%	20	10.9	44	0.26%	29	0.35	37	0.55%	13	0.13%
Hawaii	47	1.64%	24	10.1	14	0.46%	48	0.15	41	0.23%	48	0.00%
Idaho	13	5.28%	30	8.1	27	0.35%	2	1.43	2	4.05%	10	0.14%
Illinois	21	4.23%	25	9.3	24	0.36%	16	0.63	20	1.59%	18	0.10%
Indiana	34	2.69%	42	6.5	46	0.26%	24	0.46	17	1.66%	39	0.02%
Iowa	32	2.92%	43	6.2	43	0.27%	27	0.42	33	0.72%	36	0.03%
Kansas	31	2.94%	29	8.2	40	0.28%	37	0.26	21	1.58%	38	0.03%
Kentucky	39	2.23%	47	4.6	48	0.23%	44	0.19	39	0.36%	33	0.04%
Louisiana	49	1.52%	46	4.8	42	0.27%	38	0.26	47	0.14%	32	0.04%
Maine	37	2.31%	26	9.1	30	0.33%	43	0.20	40	0.28%	37	0.03%
Maryland	10	5.35%	17	11.9	4	0.80%	23	0.55	27	0.93%	7	0.19%
Massachusetts	3	7.70%	5	17.1	5	0.75%	4	1.09	5	3.76%	1	0.77%
Michigan	35	2.55%	38	6.8	34	0.32%	12	0.74	1	4.77%	29	0.04%
Minnesota	7	5.92%	22	10.6	20	0.39%	8	0.97	11	2.09%	49	0.00%
Mississippi	48	1.61%	51	2.9	45	0.26%	49	0.15	49	0.13%	44	0.01%
Missouri	28	3.33%	34	7.3	29	0.34%	30	0.32	29	0.85%	21	0.09%
Montana	50	1.43%	33	7.4	23	0.36%	36	0.30	38	0.48%	9	0.15%
Nebraska	20	4.36%	41	6.6	26	0.35%	40	0.23	46	0.15%	42	0.01%

	High Tech Jobs		Internet *Domain Names*		Scientists & *Engineers*		Patents		R&D *Investment*		Venture Capital *Investment*	
	Rank	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*	*Rank*	*Raw Score*
Nevada	46	1.71%	3	19.1	50	0.18%	32	0.32	34	0.66%	45	0.01%
New Hampshire	1	8.17%	6	16.1	31	0.33%	7	0.98	16	1.71%	4	0.36%
New Jersey	8	5.83%	11	14.1	9	0.51%	9	0.95	4	3.76%	20	0.09%
New Mexico	22	3.99%	28	8.3	3	0.95%	25	0.45	8	2.90%	43	0.01%
New York	17	4.86%	14	13.3	11	0.48%	11	0.76	23	1.53%	22	0.09%
North Carolina	24	3.91%	35	7.2	22	0.36%	26	0.44	18	1.64%	11	0.14%
North Dakota	40	2.18%	31	7.8	16	0.46%	45	0.19	42	0.21%	46	0.00%
Ohio	33	2.89%	36	7.1	28	0.34%	18	0.60	15	1.75%	26	0.05%
Oklahoma	30	3.09%	40	6.6	36	0.30%	33	0.32	36	0.56%	31	0.04%
Oregon	9	5.44%	10	14.3	21	0.38%	13	0.73	26	1.12%	34	0.04%
Pennsylvania	27	3.48%	27	8.4	19	0.42%	20	0.59	12	1.94%	19	0.10%
Puerto Rico	**52**	**0.47%**	**52**	**0.7**	**52**	**0.06%**	**52**	**0.02**	**44**	**0.17%**	**16**	**0.11%**
Rhode Island	25	3.68%	18	11.8	6	0.54%	21	0.59	9	2.53%	27	0.05%
South Carolina	42	2.02%	45	5.4	47	0.25%	34	0.31	30	0.84%	25	0.07%
South Dakota	14	5.14%	44	5.7	41	0.27%	50	0.13	48	0.13%	49	0.00%
Tennessee	43	1.94%	39	6.7	33	0.32%	35	0.31	32	0.74%	28	0.05%
Texas	11	5.35%	23	10.3	35	0.31%	19	0.60	24	1.21%	12	0.14%
Utah	15	5.13%	12	13.6	15	0.46%	15	0.66	13	1.85%	17	0.10%
Vermont	5	6.26%	13	13.5	10	0.50%	6	1.03	19	1.62%	41	0.01%
Virginia	6	5.97%	16	11.9	17	0.46%	31	0.32	31	0.84%	6	0.20%
Washington	18	4.68%	7	15.7	12	0.47%	17	0.62	3	3.84%	5	0.23%
West Virginia	44	1.84%	50	3.2	39	0.28%	39	0.25	51	0.00%	47	0.00%
Wisconsin	36	2.44%	37	7.0	38	0.29%	22	0.55	25	1.16%	30	0.04%
Wyoming	51	1.04%	32	7.8	18	0.43%	46	0.19	45	0.16%	49	0.00%