



**U S - I S R A E L**  
**SCIENCE & TECHNOLOGY FOUNDATION**

## **The U.S-Israel Innovation Index**

**Data Annex**

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## Contents

<b>HOW TO READ THE DATA .....</b>	<b>3</b>
METHODOLOGY USED TO NORMALIZE AND BENCHMARK METRICS .....	3
<b>A. RAW AND NORMALIZED DATA BY INDICATOR .....</b>	<b>5</b>
GOV-1: GOVERNMENT BUDGET APPROPRIATIONS ON R&D .....	5
GOV-2: INVENTORY OF BILATERAL TREATIES, IN SCIENCE AND TECHNOLOGY .....	7
GOV-3: FOREIGN OPERATIONS ACCOUNT SPENDING, U.S. DEPARTMENT OF STATE .....	8
GOV-4: EXISTENCE OF BILATERAL SCIENCE AND TECHNOLOGY COMMISSIONS .....	10
GOV-5: TRADE & INVESTMENT FRAMEWORK AGREEMENTS IN PLACE BETWEEN THE COUNTRY AND THE UNITED STATES .....	12
HC-1: HIGHER EDUCATION EXPENDITURE ON R&D (HERD) AS PERCENT OF GDP .....	13
HC-2: ARTICLE CO-AUTHORSHIP BETWEEN U.S. AND COMPARATOR COUNTRIES IN SCIENCE AND ENGINEERING FIELDS .....	14
HC-3: U.S. DOCTORATES AWARDED TO FOREIGN STUDENTS, S&E FIELDS .....	16
HC-4: NUMBER OF H1-B ENTRIES INTO THE UNITED STATES .....	17
HC-5: PARTICIPATION IN DISTRIBUTED COMPUTING PROJECTS .....	19
PSI-1: INDUSTRY FINANCED GROSS DOMESTIC EXPENDITURE ON R&D (I-GERD) .....	21
PSI-2: U.S. EXPORTS AND IMPORTS IN KNOWLEDGE-INTENSIVE INDUSTRIES .....	22
PSI-3: ACTIVITY OF MNC AND MOFA (FOREIGN AFFILIATES) .....	24
PSI-4: NUMBER OF KNOWLEDGE-INTENSIVE INDUSTRY COMPANIES CROSS LISTED .....	26
PSI-5: BILATERAL FOREIGN DIRECT INVESTMENT (FDI) FLOWS .....	27
R&D-1: GROSS DOMESTIC EXPENDITURE ON R&D (GERD) AS A PERCENT OF GDP .....	29
R&D-2: R&D EXPENDITURE OF FOREIGN AFFILIATES .....	30
R&D-3: USPTO CO-PATENT APPLICATIONS .....	32
R&D-4: PATENT APPLICATIONS AND/OR PATENTS GRANTED BY NATIONAL PATENT OFFICE .....	34
R&D-5: 301 WATCH LISTS STATUS .....	36
<b>B. AGGREGATE BENCHMARKED SCORES (INDEX RESULTS) .....</b>	<b>37</b>
<b>C. NORMALIZATION FACTORS USED .....</b>	<b>40</b>
GDP (PPP, US\$) .....	40
TOTAL POPULATION .....	40
<b>D. INDEX OF SOURCES .....</b>	<b>42</b>
SOURCE LISTING: INDICATORS .....	42
<i>BOINC Statistics</i> .....	42
<i>Congressional Budget Justification: Foreign Operations (U.S. Department of State)</i> .....	43
<i>OECD Main Science and Technology Indicators</i> .....	43
<i>U.S. Department of Commerce, Bureau of Economic Analysis, International Economic Accounts</i> .....	43
<i>U.S. Department of Commerce, International Trade Administration. "TradeStats Express"</i> .....	43
<i>U.S. Department of Homeland Security, Yearbook of Immigration Statistics</i> .....	44
<i>U.S. Department of State: List of International Agreements Other Than Treaties</i> .....	44
<i>U.S. Department of State: Congressional Budget Justification for Foreign Operations</i> .....	44
<i>U.S. Internal Revenue Service: Publication 78, Cumulative List of Organizations described in Section 170(c) of the Internal Revenue Code of 1986</i> .....	44
<i>U.S. National Science Foundation Science and Engineering Indicators</i> .....	44
<i>U.S. National Science Foundation, Survey of Earned Doctorates</i> .....	44
<i>U.S. Patent and Trademark Office, Patent Full-Text and Image Database</i> .....	45



U.S.-ISRAEL  
SCIENCE & TECHNOLOGY FOUNDATION

*U.S. Patent and Trademark Office, Patenting by Geographic Region (State and Country), Breakout by  
Technology Class*.....45  
*World Intellectual Property Organization Statistics Database* .....45  
ADDITIONAL SOURCES CONSULTED.....45

## HOW TO READ THE DATA

### METHODOLOGY USED TO NORMALIZE AND BENCHMARK METRICS

Each metric was selected to provide insight into an individual aspect of the U.S.-Israel relationship organized into four categories: government; private sector and industry; human capital; and research and development. In each category, one of four metrics is used to baseline the countries evaluated, meaning it does not measure a relationship. The Index uses only quantitative metrics, e.g., no qualitative evaluations or forced rankings. The data may be directly related to science and technology or indirect. Indirect metrics are proxies and may measure the relationship beyond high-technology or some another aspect of U.S.-Israel interactions.

#### Raw Data:

The raw data is collected for each country, and where available in time series, and presented in a table format. In the detailed model, there is information about the metric's source, units, and notes about the collection process. In some instances, the statistics require the development of a summary table because the indicator combines multiple datasets. The following table illustrates a sample of our raw data:

#### RAW DATA FOR GOV-1: GOVERNMENT BUDGET APPROPRIATIONS ON R&D

Country	2011	2010	2009
United States	--	\$148,448.00	\$165,316.50
Brazil		\$13,700.90	\$12,346.10
Canada		\$6,422.00	\$8,268.77
Chile	--	--	--
Finland	\$2,182.24	\$2,248.23	\$2,130.10
Germany	\$29,365.73	\$28,422.38	\$25,894.19
Hong Kong		\$597.00	\$424.00
Israel	--	\$1,300.08	\$1,278.25
Japan	\$34,136.48	\$32,201.49	\$30,938.62
Russia	\$16,276.89	\$14,910.40	\$15,132.33
Singapore	--	\$2,500.00	\$2,300.00
South Africa			
South Korea	\$15,855.56	\$14,542.84	\$13,209.59
Sweden	\$3,250.54	\$3,267.34	\$3,162.00
Switzerland	--	\$3,059.27	--
Turkey		\$1,060.68	
United Arab Emirates	--	--	--

Units: million current US\$, PPP

#### Normalized Data:

In order to compare data across the peer group, the Index normalize the statistics to make realistic comparisons. Not every dataset is normalized (e.g., number of relevant treaties), and some data is normalized at its source so additional adjustment is not required. As a general rule data is often normalized by one of several factors, include: population, e.g., per capita; size of the economy using Gross Domestic Product adjusted for Purchasing Power Parity in US dollars; or percent of overall investment, e.g., percentage of government expenditure. The Index clearly indicates which metrics are

normalized and by which factor the data is normalized. The follow table highlights how the raw data in the table above is normalized by GDP:

**NORMALIZED DATA FOR GOV-1: GOVERNMENT BUDGET APPROPRIATIONS ON R&D**

Country	
Chile	NA
Finland	0.0000000091
Germany	0.0000000085
Israel	0.0000000060
Singapore	0.0000000087
South Korea	0.0000000143
Sweden	0.0000000090
Switzerland	0.0000000077
United Arab Emirates	NA

**Benchmarked Data:**

Benchmarking data allows a direct comparison to the data across the peer group. Israel is used as the baseline for the one metric in each category that does not measure relationships, while the U.S.-Israel activity is the baseline for all other metrics.

**NORMALIZED AND BENCHMARKED DATA FOR GOV-1: GOVERNMENT BUDGET APPROPRIATIONS ON R&D**

Chile	Finland	Germany	Israel	Singapore	South Korea	Sweden	Switzerland	United Arab Emirates
NA	9.47	8.84	6.25	9.05	14.94	9.38	8.06	NA

Normalized data is used as a common denominator for each country’s data across the entire dataset. Therefore, Israel always equals 1, while the comparator countries will be above or below 1 based on their relative size vis-à-vis Israel’s data. Across the Index, Israel is baselined at 100 points, meaning Israel always receives 6.25 points per metric ( $100/16=6.25$ , or 25 points per category). The relative scores of other country provide a relative comparison to Israel. The table above, this comparison shows that the Israeli government spends less than all of this peer groups on R&D, almost half of what Finland spends on a normalized basis. While individually this data provides insight in the relative position of Israel and the U.S.-Israel relationship, it is important to note that this but a single indicator which must be assessed within the larger Index framework, either at the category level or the overall Index output level.

## A. RAW AND NORMALIZED DATA BY INDICATOR

### GOV-1: GOVERNMENT BUDGET APPROPRIATIONS ON R&D

*Metric is a baseline resources indicator that compares levels of government investment in R&D, indicative of policy support for science and technology.*

#### Raw Data:

Country	2012	2011	2010	2009	2008
Brazil			\$13,700.90	\$12,346.10	\$11,625.60
Canada			\$6,422.00	\$8,268.77	\$7,884.87
Chile		--	--	--	--
Finland	\$ 2,091.25	\$2,182.24	\$2,248.23	\$2,130.10	\$1,976.63
Germany		\$29,365.73	\$28,422.38	\$25,894.19	\$24,261.34
Hong Kong			\$597.00	\$424.00	
Israel		--	\$1,300.06	\$1,278.25	\$1,260.98
Japan	\$35,228.29	\$34,136.48	\$32,201.49	\$30,938.62	\$30,559.90
Russia		\$16,276.89	\$14,910.40	\$15,132.33	\$11,304.21
Singapore		--	\$2,500.00	\$2,300.00	--
South Africa					
South Korea		\$15,855.56	\$14,542.84	\$13,209.59	\$11,894.98
Sweden		\$3,250.54	\$3,267.34	\$3,162.00	\$2,907.06
Switzerland		--	\$3,059.27	--	\$2,682.99
Turkey			\$1,060.68		
United Arab Emirates		--		--	--
United States			\$148,448.00	\$165,316.50	\$144,390.80

Units: million current US\$, PPP

#### Data Normalization:

Data Normalized by GDP

Country	Raw Data	GDP (2011)	Normalized Data
Brazil	\$13,700.90 (2010)	\$2,304,646,306,421.69	0.0000000059
Canada	\$6,422.00 (2010)	\$1,394,490,333,470.96	0.0000000040
Chile	NA	\$298,946,638,195.08	NA
Finland	\$ 2,091.25 (2012)	\$205,154,012,030.01	0.0000000102
Germany	\$29,365.73 (2011)	\$3,204,596,141,780.93	0.0000000092
Hong Kong	\$597.00 (2010)	\$353,510,082,789.52	0.0000000003
Israel	\$1,300.06 (2010)	\$216,157,813,937.71	0.0000000060
Japan	\$35,228.29 (2012)	\$4,383,325,325,529.53	0.0000000080
Russia	\$16,276.89 (2011)	\$3,015,670,235,601.72	0.0000000054
Singapore	\$2,500.00 (2010)	\$316,741,482,392.94	0.0000000081

<b>South Africa</b>	NA	\$558,215,907,198.83	NA
<b>South Korea</b>	\$15,855.56 (2011)	\$1,506,004,280,696.95	0.0000000105
<b>Sweden</b>	\$3,250.54 (2011)	\$390,406,648,352.61	0.0000000083
<b>Switzerland</b>	\$3,059.27 (2010)	\$388,640,087,195.30	0.0000000079
<b>Turkey</b>	\$1,060.68 (2010)	\$1,288,637,792,412.36	0.0000000010
<b>United Arab Emirates</b>	NA	\$380,512,914,081.71	NA
<b>United States</b>	\$148,448.00 (2010)	\$15,094,000,000,000.00	0.000000009835

**Benchmarked to Israel (score used to compile overall Index):**

<b>Brazil</b>	<b>Canada</b>	<b>Chile</b>	<b>Finland</b>	<b>Germany</b>	<b>Hong Kong</b>	<b>Israel</b>	<b>Japan</b>
4.94	3.29	NA	8.47	7.62	0.28	5.00	6.68

<b>Russia</b>	<b>Singapore</b>	<b>South Africa</b>	<b>South Korea</b>	<b>Sweden</b>	<b>Switzerland</b>	<b>Turkey</b>	<b>United Arab Emirates</b>
4.49	6.70	NA	8.75	6.92	6.54	0.80	NA

## GOV-2: INVENTORY OF BILATERAL TREATIES, IN SCIENCE AND TECHNOLOGY

*Quantifies the number of international agreements in effect between the U.S. and target country in technology-related areas.*

### Raw Data:

(as of January 1, 2011)

Brazil	Canada	Chile	European Union	Finland	Germany	Hong Kong	Israel	Japan
14	26	13	1	4	23	1	14	37

Russia	Singapore	South Africa	South Korea	Sweden	Switzerland	Turkey	United Arab Emirates
41	4	8	14	12	5	7	4

### Data Normalization:

No normalization factor used. Data benchmarked using raw data.

### Benchmarked to Israel (score used to compile overall Index):

Brazil	Canada	Chile	Finland	Germany	Hong Kong	Israel	Japan
5.00	9.29	4.64	1.43	8.21	0.36	5.00	13.21

Russia	Singapore	South Africa	South Korea	Sweden	Switzerland	Turkey	United Arab Emirates
0.36	1.43	2.86	5.36	4.29	1.79	2.50	1.43

**Note:** Due to the large volume of information individual treaties are not listed by name in this document. Please contact USISTF for the list of included treaties.



## GOV-3: FOREIGN OPERATIONS ACCOUNT SPENDING, U.S. DEPARTMENT OF STATE

Measures U.S. funds flowing to target countries as tracked by the U.S State Department

### Raw Data:

Country	FY 2010 Enacted	FY 2011 Actual	FY 2012 Request	FY2013P
Brazil	\$25,099,000	\$25,099,000	\$18,250,000	
Canada	\$0	\$0	0	
Chile	\$1,950,000	\$1,950,000	\$1,300,000	
Finland	\$0	\$0	\$0	
Germany	\$0	\$0	\$0	
Hong Kong	\$0	\$0	\$0	
Israel	\$2,775,000,000	\$2,775,000,000	\$3,075,000,000	
Japan	\$0	\$0	\$0	
Russia	\$71,595,000	\$71,595,000	\$64,635,000	
Singapore	\$500,000	\$500,000	\$250,000	
South Africa	\$577,560,000	\$577,560,000	\$561,936,000	
South Korea	\$0	\$0	\$0	
Sweden	\$0	\$0	\$0	
Switzerland	\$0	\$0	\$0	
Turkey	\$7,995,000	\$7,995,000	\$5,600,000	
United Arab Emirates	\$240,000	\$240,000	\$0	
United States				

### Data Normalization:

Data Normalized by Population

Country	Raw Data	Population (2011)	Normalized Data (per capita)
Brazil	\$25,099,000	194,933,000.00	0.1287570601
Canada	\$0	34,437,000.00	0.0000000000
Chile	\$1,950,000	17,399,000	0.1120754066
Finland	\$0	5,401,000	0.0000000000
Germany	\$0	81,777,000	0.0000000000
Hong Kong	\$0	7,146,000	0.0000000000
Israel	\$2,775,000,000	7,594,000	365.4200684751
Japan	\$0	127,819,000	0.0000000000
Russia	\$71,595,000	142,411,000	0.5027350415
Singapore	\$500,000	5,274,000	0.0948047023
South Africa	\$577,560,000	50,591,000	11.4162598091
South Korea	\$0	49,006,000	0.0000000000

<b>Sweden</b>	\$0	9,450,000	0.0000000000
<b>Switzerland</b>	\$0	7,837,000	0.0000000000
<b>Turkey</b>	\$7,995,000	73,950,000	0.1081135903
<b>United Arab Emirates</b>	\$240,000	5,375,000	NA

**Benchmarked to Israel (score used to compile overall Index):**

<b>Brazil</b>	<b>Canada</b>	<b>Chile</b>	<b>Finland</b>	<b>Germany</b>	<b>Hong Kong</b>	<b>Israel</b>	<b>Japan</b>
0.0018	0.0	0.0015	0.0	0.0	0.0	5.0000	0.0

<b>Russia</b>	<b>Singapore</b>	<b>South Africa</b>	<b>South Korea</b>	<b>Sweden</b>	<b>Switzerland</b>	<b>Turkey</b>	<b>United Arab Emirates</b>
0.0069	0.0013	0.1562	0.0	0.0	0.0	0.0015	0.006

## GOV-4: EXISTENCE OF BILATERAL SCIENCE AND TECHNOLOGY COMMISSIONS

*Identifies whether a bilateral S&T Commission, or similar organization, exists between target countries*

### Raw Data:

(as of September 2011)

Organization	Country
Israel-Texas Science and Education Foundation Inc	Israel
Israel-U.S. Binational Industrial Research and Development Foundation (BIRD Foundation)	Israel
U.S.-Israel Binational Science Foundation (BSF)	Israel
United States - Israel Binational Agricultural Research and Development Fund (BARD)	Israel
United States-Israel Science and Technology Foundation Incorporated	Israel
Korea-U.S. Science Cooperation Center	South Korea
The German Center for Research and Innovation	Germany

Methodological Note 1: Primary search terms used: country AND "Technology" or "Science" or "Innovation" or "Research and Development"

Methodological Note 2: Only organizations with clear government involvement (funding or Board participation) are listed

**Data Normalization:**

No normalization factor used. Data benchmarked using raw data.

**Benchmarked to Israel (score used to compile overall Index):**

Brazil	Canada	Chile	Finland	Germany	Hong Kong	Israel	Japan
0.0	0.0	0.0	0.0	1.0	0.0	5.0	0.0

Russia	Singapore	South Africa	South Korea	Sweden	Switzerland	Turkey	United Arab Emirates
0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0

## GOV-5: TRADE & INVESTMENT FRAMEWORK AGREEMENTS IN PLACE BETWEEN THE COUNTRY AND THE UNITED STATES

*Quantifies the number of Trade & Investment Framework Agreements, with science and technology chapters, in effect between the U.S. and target country in technology-related areas.*

### Raw Data:

(as of January 1, 2011)

Canada	Chile	Israel	Singapore	South Korea	South Africa	Switzerland	Turkey	United Arab Emirates
1	1	1	1	1	1	1	1	1

### Data Normalization:

No normalization factor used. Data benchmarked using raw data.

### Benchmarked to Israel (score used to compile overall Index):

Brazil	Canada	Chile	Finland	Germany	Hong Kong	Israel	Japan
0.0	5.0	5.0	0.0	0.0	0.0	5.0	0.0

Russia	Singapore	South Africa	South Korea	Sweden	Switzerland	Turkey	United Arab Emirates
0.0	5.0	5.0	5.0	0.0	5.0	5.0	5.0

## HC-1: HIGHER EDUCATION EXPENDITURE ON R&D (HERD) AS PERCENT OF GDP

*Metric is a baseline resources indicator that compares education-sector expenditures in R&D.*

### Raw Data:

Country	2011	2010	2009	2008	2007
Brazil		0.02	0.02	0.02	0.03
Canada	0.65	0.69	0.72	0.68	0.67
Chile		..	..	0.15	0.13
Finland		0.79	0.75	0.64	0.65
Germany		0.51	0.50	0.45	0.41
Hong Kong		0.40	0.42	0.40	0.37
Israel		0.58	0.59	0.64	0.61
Japan		0.42	0.45	0.40	0.44
Russia		0.10	0.09	0.07	0.07
Singapore		0.60	0.61	0.54	0.50
South Africa				0.18	0.18
South Korea		0.40	0.39	0.37	0.34
Sweden		0.90	0.90	0.79	0.75
Switzerland		0.80	..	0.72	..
Turkey		0.39	0.40	0.32	0.35
United Arab Emirates					
United States			0.39	0.36	0.35

Units: percent of GDP

### Data Normalization:

Raw Data is normalized by GDP.

### Benchmarked to Israel (score used to compile overall Index):

Brazil	Canada	Chile	Finland	Germany	Hong Kong	Israel	Japan
0.17	5.60	1.29	6.81	4.40	3.45	5.00	3.62

Russia	Singapore	South Africa	South Korea	Sweden	Switzerland	Turkey	United Arab Emirates
0.86	5.17	1.55	3.45	7.76	6.90	3.36	NA

## HC-2: ARTICLE CO-AUTHORSHIP BETWEEN U.S. AND COMPARATOR COUNTRIES IN SCIENCE AND ENGINEERING FIELDS

Counts article co-authorship between U.S. and target countries in Science and Engineering fields as defined by the U.S. National Science Foundation.

### Raw Data:

Country	Total Number of Articles	Year	Country	Total Number of Articles	Year
Brazil	2,235	2010	Russia	1,840	2010
Canada	129	2010	Singapore	1,062	2010
Chile	761	2010	South Africa	35	2010
Finland	1,183	2010	South Korea	4,342	2010
Germany	10,615	2010	Sweden	2,264	2010
Hong Kong	--	2010	Switzerland	3,509	2010
Israel	2,259	2010	Turkey	901	2010
Japan	5,587	2010	United Arab Emirates	--	2010

### Data Normalization:

Data normalized by population

Country	Raw Data (2010)	Population (2011)	Normalized Data (per capita)
Brazil	2,235	194,933,000.00	0.0000114655
Canada	129	34,437,000.00	0.0000037460
Chile	761	17,399,000	0.0000437381
Finland	1,183	5,401,000	0.0002190335
Germany	10,615	81,777,000	0.0001298042
Hong Kong	--	7,146,000	NA
Israel	2,259	7,594,000	0.0002974717
Japan	5,587	127,819,000	0.0000437102
Russia	1,840	142,411,000	0.0000129204
Singapore	1,062	5,274,000	0.0002013652
South Africa	35	50,591,000	0.0000006918
South Korea	4,342	49,006,000	0.0000886014
Sweden	2,624	9,450,000	0.0002776720
Switzerland	3,509	7,837,000	0.0004477479
Turkey	901	73,950,000	0.0000121839
United Arab Emirates	--	5,375,000	NA

**Benchmarked to Israel (score used to compile overall Index):**

Brazil	Canada	Chile	Finland	Germany	Hong Kong	Israel	Japan
0.19	0.06	0.74	3.68	2.18	NA	5.00	0.73

Russia	Singapore	South Africa	South Korea	Sweden	Switzerland	Turkey	United Arab Emirates
0.22	3.38	0.01	1.49	4.67	7.53	0.20	NA



### HC-3: U.S. DOCTORATES AWARDED TO FOREIGN STUDENTS, S&E FIELDS

Counts U.S. Doctorates awarded to foreign students from target countries, in S&E fields as defined by the U.S. National Science Foundation; measures academic exchange between target countries.

#### Raw Data:

Country	2010	Country	2010	Country	2010
Brazil	131	Israel	67	South Korea	1,077
Canada	339	Japan	172	Sweden	16
Chile	44	Russia	108	Switzerland	-
Finland	7	Singapore	53	Turkey	404
Germany	156	South Africa	15	UAE	5
Hong Kong	-				

#### Data Normalization:

Data normalized by population

Country	Raw Data (2010)	Population (2011)	Normalized Data (per capita)
Brazil	131	194,933,000.00	0.0000006720
Canada	339	34,437,000.00	0.0000098441
Chile	44	17,399,000	0.0000025289
Finland	7	5,401,000	0.0000012961
Germany	156	81,777,000	0.0000019076
Hong Kong	-	7,146,000	NA
Israel	67	7,594,000	0.0000088228
Japan	172	127,819,000	0.0000013457
Russia	108	142,411,000	0.0000007584
Singapore	53	5,274,000	0.0000100493
South Africa	15	50,591,000	0.0000002965
South Korea	1,077	49,006,000	0.0000219769
Sweden	16	9,450,000	0.0000016931
Switzerland	-	7,837,000	0.0000022968
Turkey	404	73,950,000	0.0000054632
United Arab Emirates	5	5,375,000	0.0000009302

#### Benchmarked to Israel (score used to compile overall Index):

Brazil	Canada	Chile	Finland	Germany	Hong Kong	Israel	Japan
0.3808	5.5788	1.4332	0.7345	1.0811	NA	5.00	0.7600

Russia	Singapore	South Africa	South Korea	Sweden	Switzerland	Turkey	UAE
0.4300	5.6951	0.1680	12.4547	0.9595	1.3016	3.0961	0.5272

## HC-4: NUMBER OF H1-B ENTRIES INTO THE UNITED STATES

Counts number of entries to U.S. under H1-B visas by country of citizenship of visa-holder.

### Raw Data:

Country	Fiscal Year 2011	Fiscal Year 2010	Fiscal Year 2009	Fiscal Year 2008
Brazil	7,852	7,418	6407	7761
Canada	88,236	72,959	22156	23312
Chile	2,331	2,229	2206	2360
Finland	599	412	358	507
Germany	8,344	8,380	8369	10318
Hong Kong	-	-	-	-
Israel	3,599	3,671	3442	4445
Japan	11,503	12,099	9677	11788
Russia	2,490	2,271	2074	2688
Singapore	1,993	2,176	2098	2701
South Africa	1,429	1,546	1390	1680
South Korea	11,728	11,815	8719	9956
Sweden	1,795	1,789	1749	2162
Switzerland	1,470	1,376	1354	1626
Turkey	4,739	5,083	4486	4832
United Arab Emirates	7	12	9	12

### Data Normalization:

Data normalized by population

Country	Raw Data (FY2011)	Population (2011)	Normalized Data (per capita)
Brazil	7,852	194,933,000.00	0.0000402805
Canada	88,236	34,437,000.00	0.0025622441
Chile	2,331	17,399,000	0.0001339732
Finland	599	5,401,000	0.0001109054
Germany	8,344	81,777,000	0.0001020336
Hong Kong	-	7,146,000	NA
Israel	3,599	7,594,000	0.0004739268
Japan	11,503	127,819,000	0.0000899944
Russia	2,490	142,411,000	0.0000174846
Singapore	1,993	5,274,000	0.0003778915
South Africa	1,429	50,591,000	0.0000282461
South Korea	11,728	49,006,000	0.0002393176
Sweden	1,795	9,450,000	0.0001899471

<b>Switzerland</b>	1,470	7,837,000	0.0001875718
<b>Turkey</b>	4,739	73,950,000	0.0000640838
<b>United Arab Emirates</b>	7	5,375,000	0.0000013023

**Benchmarked to Israel (score used to compile overall Index):**

<b>Brazil</b>	<b>Canada</b>	<b>Chile</b>	<b>Finland</b>	<b>Germany</b>	<b>Hong Kong</b>	<b>Israel</b>	<b>Japan</b>
0.42	27.03	1.41	1.17	1.08	NA	5.00	0.95

<b>Russia</b>	<b>Singapore</b>	<b>South Africa</b>	<b>South Korea</b>	<b>Sweden</b>	<b>Switzerland</b>	<b>Turkey</b>	<b>United Arab Emirates</b>
0.18	3.99	0.30	2.52	2.00	1.98	0.68	0.01

## HC-5: PARTICIPATION IN DISTRIBUTED COMPUTING PROJECTS

The sum of (1) citizens participating in U.S. hosted distributed computing projects; and (2) U.S. citizens participating in comparator country hosted distributed computing projects

### Raw Data:

(as of September 2012)

Country	Number of citizens	Country	Number of citizens	Country	Number of citizens
Brazil	30,200	Israel	8,707	South Korea	10,647
Canada	94,363	Japan	67,271	Sweden	23,501
Chile	5,827	Russia	42,901	Switzerland	52,281
Finland	24,892	Singapore	2,967	Turkey	7,029
Germany	275,364	South Africa	6,725	United Arab Emirates	851
Hong Kong	5,574				

### Data Normalization:

Data normalized by population

Country	Raw Data	Population (2011)	Normalized Data
Brazil	30,200	194,933,000.00	0.0001549250
Canada	94,363	34,437,000.00	0.0027401632
Chile	5,827	17,399,000	0.0003349043
Finland	24,892	5,401,000	0.0046087762
Germany	275,364	81,777,000	0.0033672549
Hong Kong	5,574	7,146,000	0.0007800168
Israel	8,707	7,594,000	0.0011465631
Japan	67,271	127,819,000	0.0005262989
Russia	42,901	142,411,000	0.0003012478
Singapore	2,967	5,274,000	0.0005625711
South Africa	6,725	50,591,000	0.0001329288
South Korea	10,647	49,006,000	0.0002172591
Sweden	23,501	9,450,000	0.0024868783
Switzerland	52,281	7,837,000	0.0066710476
Turkey	7,029	73,950,000	0.0000950507
United Arab Emirates	851	5,375,000	0.0001583256

### Benchmarked to Israel (score used to compile overall Index):

Brazil	Canada	Chile	Finland	Germany	Hong Kong	Israel	Japan
0.68	11.95	1.46	20.10	14.68	3.40	5.00	2.30

Russia	Singapore	South Africa	South Korea	Sweden	Switzerland	Turkey	United Arab Emirates
1.31	2.45	0.58	0.95	10.84	29.09	0.41	0.69

## PSI-1: INDUSTRY FINANCED GROSS DOMESTIC EXPENDITURE ON R&D (I-GERD)

*Metric is a baseline resources indicator that compares industry investment in R&D, indicative of private sector activity.*

### Raw Data:

Country	2011	2010	2009	2008	2007
Brazil		0.55	0.56	0.53	0.52
Canada	0.82	0.83	0.9	0.94	0.97
Chile			..	0.17	0.13
Finland		2.56	2.70	2.62	2.37
Germany			1.87	1.80	1.72
Hong Kong		0.33	0.34	0.31	0.37
Israel			..	2.46	2.67
Japan		2.47	2.53	2.71	2.69
Russia		0.30	0.33	0.30	0.33
Singapore		1.11	1.17	1.70	1.47
South Africa					
South Korea		2.68	2.53	2.45	2.36
Sweden			2.12	..	2.12
Switzerland			..	2.04	..
Turkey		0.38	0.35	0.34	0.35
United Arab Emirates					
United States			1.78	1.82	1.76

Units: percent of GDP

### Data Normalization:

Raw Data is normalized by GDP.

### Benchmarked to Israel (score used to compile overall Index):

Brazil	Canada	Chile	Finland	Germany	Hong Kong	Israel	Japan
1.12	1.67	0.35	5.20	3.80	0.67	5.00	5.02

Russia	Singapore	South Africa	South Korea	Sweden	Switzerland	Turkey	United Arab Emirates
0.61	2.26	NA	5.45	4.31	4.15	0.77	NA

## PSI-2: U.S. EXPORTS AND IMPORTS IN KNOWLEDGE-INTENSIVE INDUSTRIES

Tracks import/export of Key NAICS. Limited to 4 digit NAICS

### Raw Data:

1) US IMPORTS (2011)		2) US EXPORTS (2011)		US Trade Balance
Figures in US\$		Figures in US\$		Total (2011)
US IMPORTS	TOTAL	US EXPORTS	TOTAL	
Brazil	\$1,825,743,267	Brazil	\$14,637,579,441	\$12,811,836,174
Canada	\$14,813,132,670	Canada	\$25,387,907,639	\$10,574,774,969
Chile	\$21,262,007	Chile	\$2,799,293,404	\$2,778,031,397
Finland	\$1,284,314,889	Finland	\$915,373,876	-\$368,941,013
Germany	\$27,184,292,830	Germany	\$19,688,334,731	-\$7,495,958,099
Hong Kong	\$986,215,630	Hong Kong	\$12,974,538,214	\$11,988,322,584
Israel	\$9,126,809,033	Israel	\$3,126,421,504	-\$6,000,387,529
Japan	\$30,668,405,085	Japan	\$21,680,339,004	-\$8,988,066,081
Russia	\$288,399,576	Russia	\$1,943,329,237	\$1,654,929,661
Singapore	\$10,452,163,411	Singapore	\$12,145,998,452	\$1,693,835,041
South Africa	\$135,869,968	South Africa	\$1,231,079,726	\$1,095,209,758
South Korea	\$19,544,030,898	South Korea	\$11,781,092,822	-\$7,762,938,076
Sweden	\$3,260,085,422	Sweden	\$2,440,496,566	-\$819,588,856
Switzerland	\$14,449,585,805	Switzerland	\$4,976,372,829	-\$9,473,212,976
Turkey	\$383,630,560	Turkey	\$3,931,577,423	\$3,547,946,863
United Arab Emirates	\$33,142,675	United Arab Emirates	\$6,183,573,214	\$6,150,430,539
				-
<b>WORLD</b>	<b>\$546,888,922,363</b>	<b>WORLD</b>	<b>\$401,233,275,023</b>	<b>\$145,655,647,340</b>

NAICS Codes Used: 334: COMPUTER and ELECTRONIC PRODUCTS; 3254: PHARMACEUTICALS and MEDICINES; 3353: ELECTRICAL EQUIPMENT; 3359: ELECTRICAL EQUIPMENT and COMPONENTS (NESOI); 3364: AEROSPACE PRODUCTS and PARTS; 3391: MEDICAL EQUIPMENT and SUPPLIES

### Data Normalization:

Magnitude of trade relationship (exports + imports). Data normalized by GDP

Country	Raw Data (2011)	GDP (2011)	Normalized Data
Brazil	16,463,322,708	\$2,304,646,306,421.69	0.0071435355
Canada	40,201,040,309	\$1,394,490,333,470.96	0.0288284826
Chile	2,820,555,411	\$298,946,638,195.08	0.0094349795
Finland	2,199,688,765	\$205,154,012,030.01	0.0107221338
Germany	46,872,627,561	\$3,204,596,141,780.93	0.0146266879
Hong Kong	13,960,753,844	\$353,510,082,789.52	0.0394918123



<b>Israel</b>	12,253,230,537	\$216,157,813,937.71	0.0566865029
<b>Japan</b>	52,348,744,089	\$4,383,325,325,529.53	0.0119427011
<b>Russia</b>	2,231,728,813	\$3,015,670,235,601.72	0.0007400440
<b>Singapore</b>	22,598,161,863	\$316,741,482,392.94	0.0713457602
<b>South Africa</b>	1,366,949,694	\$558,215,907,198.83	0.0024487831
<b>South Korea</b>	31,325,123,720	\$1,506,004,280,696.95	0.0208001558
<b>Sweden</b>	5,700,581,988	\$390,406,648,352.61	0.0146016519
<b>Switzerland</b>	19,425,958,634	\$388,640,087,195.30	0.0499844439
<b>Turkey</b>	4,315,207,983	\$1,288,637,792,412.36	0.0033486586
<b>United Arab Emirates</b>	6,216,715,889	\$380,512,914,081.71	0.0163377264

**Benchmarked to Israel (score used to compile overall Index):**

<b>Brazil</b>	<b>Canada</b>	<b>Chile</b>	<b>Finland</b>	<b>Germany</b>	<b>Hong Kong</b>	<b>Israel</b>	<b>Japan</b>
0.63	2.54	0.83	0.95	1.29	3.48	5.00	1.05

<b>Russia</b>	<b>Singapore</b>	<b>South Africa</b>	<b>South Korea</b>	<b>Sweden</b>	<b>Switzerland</b>	<b>Turkey</b>	<b>United Arab Emirates</b>
0.07	6.29	0.22	1.83	1.29	4.41	0.30	1.44



### PSI-3: ACTIVITY OF MNC AND MOFA (FOREIGN AFFILIATES)

Annual estimates of cross-border trade in services and of services supplied to international markets through U.S. and foreign affiliates of multinational companies. Services supplied to foreign persons by U.S. MNCs through their MOFAs and to U.S. persons by foreign MNCs through their MOUSAs, by country.

#### Raw Data:

Country	Hi-Tech Exports	Hi-Tech Imports	Total Hi-Tech Trade	U.S. Trade Balance
<b>United States</b>				
Brazil	\$463.00	\$602.00	\$1,065	\$139
Canada	\$2,790.00	\$4,463.00	\$7,253	\$1,673
Chile	\$70.00	\$79.00	\$149	\$9
Finland			-	-
Germany	\$1,689.00	\$3,330.00	\$5,019	\$1,641
Hong Kong	\$266.00	\$150.00	\$ 416	\$116
Israel	\$226.00	\$1,108.00	\$1,334	\$882
Japan	\$3,640.00	\$1,989.00	\$5,629	\$1,651
Russia			-	-
Singapore	\$1,362.00	\$455.00	\$ 1,817	\$907
South Africa	\$219.00	\$118.00	\$ 337	\$ 101
South Korea	\$667.00	\$204.00	\$871	\$463
Sweden	\$1,457.00	\$810.00	\$2,267	\$647
Switzerland	\$4,161.00	\$1,518.00	\$5,679	\$2,643
Turkey			-	-
United Arab Emirates			-	-

Units: million US\$

#### Data Normalization:

Magnitude of trade relationship (exports + imports). Data normalized by GDP

Country	Raw Data (2010)	GDP (2011)	Normalized Data
Brazil	\$1,065	\$2,304,646,306,421.69	0.0000000005
Canada	\$7,253	\$1,394,490,333,470.96	0.0000000052
Chile	\$149	\$298,946,638,195.08	0.0000000005
Finland	-	\$205,154,012,030.01	0.0000000000
Germany	\$5,019	\$3,204,596,141,780.93	0.0000000016
Hong Kong	\$ 416	\$353,510,082,789.52	0.0000000012
Israel	\$1,334	\$216,157,813,937.71	0.0000000062
Japan	\$5,629	\$4,383,325,325,529.53	0.0000000013
Russia	-	\$3,015,670,235,601.72	0.0000000000



U.S.-ISRAEL  
SCIENCE & TECHNOLOGY FOUNDATION

<b>Singapore</b>	\$ 1,817	\$316,741,482,392.94	0.0000000057
<b>South Africa</b>	\$ 337	\$558,215,907,198.83	0.0000000006
<b>South Korea</b>	\$871	\$1,506,004,280,696.95	0.0000000006
<b>Sweden</b>	\$2,267	\$390,406,648,352.61	0.0000000058
<b>Switzerland</b>	\$5,679	\$388,640,087,195.30	0.0000000146
<b>Turkey</b>	-	\$1,288,637,792,412.36	0.0000000000
<b>United Arab Emirates</b>	-	\$380,512,914,081.71	0.0000000000

**Benchmarked to Israel (score used to compile overall Index):**

<b>Brazil</b>	<b>Canada</b>	<b>Chile</b>	<b>Finland</b>	<b>Germany</b>	<b>Hong Kong</b>	<b>Israel</b>	<b>Japan</b>
0.3744	4.2139	0.4038	2.9503	1.2689	0.9534	5.00	1.0404

<b>Russia</b>	<b>Singapore</b>	<b>South Africa</b>	<b>South Korea</b>	<b>Sweden</b>	<b>Switzerland</b>	<b>Turkey</b>	<b>United Arab Emirates</b>
2.9503	4.6477	0.4891	0.4686	4.7046	11.8388	2.9503	0.0

## PSI-4: NUMBER OF KNOWLEDGE-INTENSIVE INDUSTRY COMPANIES CROSS LISTED

Measures (1) foreign knowledge-intensive companies listed on US exchanges, and (2) U.S. knowledge-intensive companies listed on foreign exchanges.

### Raw Data:

Country	Number of cross listed companies	Country	Number of cross listed companies	Country	Number of cross listed companies
Brazil	22	Israel	33	South Korea	1
Canada	46	Japan	6	Sweden	2
Chile	0	Russia	0	Switzerland	1
Finland	2	Singapore	4	Turkey	0
Germany	385	South Africa	0	UAE	1
Hong Kong	2	<i>Data as of October 2012</i>			

### Data Normalization:

Data normalized by GDP

Country	Raw Data	GDP (2011)	Normalized Data
Brazil	22	\$2,304,646,306,421.69	0.00000000009546
Canada	46	\$1,394,490,333,470.96	0.00000000032987
Chile	0	\$298,946,638,195.08	0.00000000000000
Finland	2	\$205,154,012,030.01	0.00000000009749
Germany	385	\$3,204,596,141,780.93	0.00000000120140
Hong Kong	2	\$353,510,082,789.52	0.00000000005658
Israel	33	\$216,157,813,937.71	0.00000000152666
Japan	6	\$4,383,325,325,529.53	0.00000000001369
Russia	0	\$3,015,670,235,601.72	0.00000000000000
Singapore	4	\$316,741,482,392.94	0.00000000012629
South Africa	0	\$558,215,907,198.83	0.00000000000000
South Korea	1	\$1,506,004,280,696.95	0.00000000000664
Sweden	2	\$390,406,648,352.61	0.00000000005123
Switzerland	1	\$388,640,087,195.30	0.00000000002573
Turkey	0	\$1,288,637,792,412.36	0.00000000000000
UAE	1	\$380,512,914,081.71	0.00000000002628

### Benchmarked to Israel (score used to compile overall Index):

Brazil	Canada	Chile	Finland	Germany	Hong Kong	Israel	Japan
0.31	1.08	0.00	0.32	3.93	0.19	5.00	0.04

Russia	Singapore	South Africa	South Korea	Sweden	Switzerland	Turkey	UAE
0.00	0.41	0.00	0.02	0.17	0.08	0.00	0.09

## PSI-5: BILATERAL FOREIGN DIRECT INVESTMENT (FDI) FLOWS

Tracks FDI Flows in Key NAICS.

Raw Data:

1) US FDI ABROAD (2012)		2) FDI IN THE US (2012)		FDI Magnitude
Figures in Millions of US\$		Figures in Millions of US\$		Millions of US\$
	TOTAL	US EXPORTS	TOTAL	Total (2011)
Brazil	16801	Brazil	-\$167	\$16,634.00
Canada	33694	Canada	\$18,468	\$52,162.00
Chile	1540.5	Chile	\$0	\$1,540.50*
Finland	271	Finland	\$40,082	\$271.00
Germany	23512	Germany	-\$40	\$63,594.00
Hong Kong	5387.5	Hong Kong	-\$2	\$5,347.50
Israel	6340	Israel	\$67,356	\$6,338.00
Japan	14011	Japan	\$754	\$81,367.00
South Korea	6955	South Korea	\$311.57	\$818.00
Russia	818	Russia	-\$13	\$19,012.57*
Singapore	18701	Singapore	\$3,473	\$2,022.00
South Africa	2035	South Africa	\$16,997	\$7,709.00
Sweden	3387	Sweden	-\$4	\$6,860.00
Switzerland	15780	Switzerland	\$471,210	\$32,777.00
Turkey	527	Turkey	-\$167	\$527.00*
United Arab Emirates	438	United Arab Emirates	\$18,468	\$434.00
WORLD	391273	WORLD	\$0	\$862,483.00

NAICS Categories Used: Chemicals; Computers and Electronic Products; Electrical Equipment, Appliances, and Components; Transportation Equipment, Professional, Scientific, and Technical Services

\*Data was collected from only half of a data set.

### Data Normalization:

Magnitude of FDI flow. Data normalized by GDP

Country	Raw Data (2011)	GDP (2011)	Normalized Data
Brazil	\$16,634.00	\$2,304,646,306,421.69	0.0000000072
Canada	\$52,162.00	\$1,394,490,333,470.96	0.0000000374
Chile	\$1,540.50*	\$298,946,638,195.08	0.0000000052
Finland	\$271.00	\$205,154,012,030.01	0.0000000013
Germany	\$63,594.00	\$3,204,596,141,780.93	0.0000000198
Hong Kong	\$5,347.50	\$353,510,082,789.52	0.0000000151
Israel	\$6,338.00	\$216,157,813,937.71	0.0000000293

<b>Japan</b>	\$81,367.00	\$4,383,325,325,529.53	0.0000000186
<b>South Korea</b>	\$818.00	\$3,015,670,235,601.72	0.0000000003
<b>Russia</b>	\$19,012.57*	\$316,741,482,392.94	0.0000000600
<b>Singapore</b>	\$2,022.00	\$558,215,907,198.83	0.0000000036
<b>South Africa</b>	\$7,709.00	\$1,506,004,280,696.95	0.0000000051
<b>Sweden</b>	\$6,860.00	\$390,406,648,352.61	0.0000000176
<b>Switzerland</b>	\$32,777.00	\$388,640,087,195.30	0.0000000843
<b>Turkey</b>	\$527.00*	\$1,288,637,792,412.36	0.0000000004
<b>United Arab Emirates</b>	\$434.00	\$380,512,914,081.71	0.0000000011

**Benchmarked to Israel (score used to compile overall Index):**

<b>Brazil</b>	<b>Canada</b>	<b>Chile</b>	<b>Finland</b>	<b>Germany</b>	<b>Hong Kong</b>	<b>Israel</b>	<b>Japan</b>
1.23	6.38	0.88	0.23	3.38	2.58	5.00	3.17

<b>Russia</b>	<b>Singapore</b>	<b>South Africa</b>	<b>South Korea</b>	<b>Sweden</b>	<b>Switzerland</b>	<b>Turkey</b>	<b>United Arab Emirates</b>
0.05	10.24	0.62	0.87	3.00	14.38	0.07	0.19

## R&D-1: GROSS DOMESTIC EXPENDITURE ON R&D (GERD) AS A PERCENT OF GDP

*Metric is a baseline resources indicator that compares actual expenditures on R&D activities, across all sectors of activity (government, education, business).*

### Raw Data:

Country	2011	2010	2009	2008	2007
United States			2.9%	2.84%	2.7%
Brazil		1.16%	1.17%	1.11%	1.1%
Canada	1.74%	1.81%	1.92%	1.9%	1.96%
Chile		--	--	0.395%	0.327%
Finland		3.88%	3.93%	3.7%	3.47%
Germany		2.82%	2.82%	2.681%	2.528%
Hong Kong		0.76%	0.79%		
Israel		4.40%	4.46%	4.77%	4.848%
Japan		3.26%	3.36%	3.47%	3.46%
Russia		1.16%	1.25%	1.04%	1.12%
Singapore		2.09%	2.24%	2.65%	2.37%
South Africa				0.93%	0.92%
South Korea		3.74%	3.56%	3.36%	3.21%
Sweden		3.40%	3.6%	3.7%	3.4%
Switzerland			--	2.995%	--
Turkey		0.84%			
United Arab Emirates			--	--	--

Units: percent of GDP

### Data Normalization:

Raw Data is normalized by GDP.

### Benchmarked to Israel (score used to compile overall Index):

Brazil	Canada	Chile	Finland	Germany	Hong Kong	Israel	Japan
1.32	1.98	0.45	4.41	3.20	0.86	5.00	3.70

Russia	Singapore	South Africa	South Korea	Sweden	Switzerland	Turkey	United Arab Emirates
1.32	2.38	1.06	4.25	3.86	3.40	0.95	NA

## R&D-2: R&D EXPENDITURE OF FOREIGN AFFILIATES

Tabulates R&D Performed by U.S. affiliates of foreign companies in the United States by country; and vice-versa. Analyzes R&D investment by country from which bilateral R&D investment is originating.

### Raw Data:

Country	Total		R&D Funding Performed by U.S. Affiliates in Country		R&D Funding Performed by National Affiliates in U.S.	
	2008	2009	2008	2009	2008	2009
Brazil	\$784.5	\$941.5	\$784	\$941.0	\$0.5	\$0.5
Canada	\$4,488	\$3,589	\$3,194	\$2,532	\$1,294	\$1,057
Chile	\$3	\$21	--	\$18	\$3	\$3
Finland	\$775	\$668	\$187	\$153	\$588	\$515
Germany	\$12,559	\$12,622	\$7,039	\$7,137	\$5,520	\$5,485
Hong Kong	\$249	\$207	\$102	\$52	\$147	\$155
Israel	\$1,261	\$2,074	\$1,060	\$1,767	\$201	\$307
Japan	\$6,782	\$8,887	\$2,001	\$1,744	\$4,781	\$7,143
Russia	\$117.5	\$66	\$117	\$65	\$0.5	\$1
Singapore	\$760	\$899	\$621	\$772	\$139	\$127
South Africa	\$52	\$86	\$43	\$79	\$9	\$7
South Korea	\$1,227	\$992	\$966	\$714	\$261	\$278
Sweden	\$1,921	\$1,596	\$1,576	\$1,088	\$345	\$508
Switzerland	\$8,063	\$10,581	\$1,123	\$1,455	\$6,940	\$9,126
Turkey	\$64	\$35	\$61	\$33	\$3	\$2
United Arab Emirates	\$4	\$19	\$4	\$10	\$0	\$9
<b>ALL COUNTRIES</b>	<b>\$77,510</b>	<b>\$79,358</b>	<b>\$36,991</b>	<b>\$35,939</b>	<b>\$40,519</b>	<b>\$43,419</b>

Units: US\$, millions

### Data Normalization:

Data normalized by GDP

Country	Raw Data (2009)	GDP (2011)	Normalized Data
Brazil	\$941.5	\$2,304,646,306,421.69	0.0000000004
Canada	\$3,589	\$1,394,490,333,470.96	0.0000000026
Chile	\$21	\$298,946,638,195.08	0.0000000001
Finland	\$668	\$205,154,012,030.01	0.0000000033
Germany	\$12,622	\$3,204,596,141,780.93	0.0000000039
Hong Kong	\$207	\$353,510,082,789.52	0.0000000006
Israel	\$2,074	\$216,157,813,937.71	0.0000000096
Japan	\$8,887	\$4,383,325,325,529.53	0.0000000020



<b>Russia</b>	\$66	\$3,015,670,235,601.72	0.0000000000
<b>Singapore</b>	\$899	\$316,741,482,392.94	0.0000000028
<b>South Africa</b>	\$86	\$558,215,907,198.83	0.0000000002
<b>South Korea</b>	\$992	\$1,506,004,280,696.95	0.0000000007
<b>Sweden</b>	\$1,596	\$390,406,648,352.61	0.0000000041
<b>Switzerland</b>	\$10,581	\$388,640,087,195.30	0.0000000272
<b>Turkey</b>	\$35	\$1,288,637,792,412.36	0.0000000000
<b>United Arab Emirates</b>	\$19	\$380,512,914,081.71	0.0000000000

**Benchmarked to Israel (score used to compile overall Index):**

<b>Brazil</b>	<b>Canada</b>	<b>Chile</b>	<b>Finland</b>	<b>Germany</b>	<b>Hong Kong</b>	<b>Israel</b>	<b>Japan</b>
0.21	1.34	0.04	1.70	2.05	0.31	5.00	1.06

<b>Russia</b>	<b>Singapore</b>	<b>South Africa</b>	<b>South Korea</b>	<b>Sweden</b>	<b>Switzerland</b>	<b>Turkey</b>	<b>United Arab Emirates</b>
0.01	1.48	0.08	0.34	2.13	14.19	0.01	0.03



### R&D-3: USPTO CO-PATENT APPLICATIONS

*Measures collaborative patent applications (i.e. applications from multinational teams including target country) to the USPTO.*

#### Raw Data:

Country	2008	2009	2010	2011
Brazil			101	62
Canada			2201	1611
Chile	13	12	20	23
Finland	109	114	83	75
Germany	2018	1592	1846	1207
Hong Kong			97	85
Israel	575	595	660	430
Japan			989	611
Russia			182	147
Singapore	215	181	203	160
South Africa			38	38
South Korea	416	342	402	264
Sweden	281	220	245	176
Switzerland	571	451	560	451
Turkey			43	45
United Arab Emirates	13	15	5	16

#### Data Normalization:

Data normalized by population.

Country	Raw Data (2011)	Population (2011)	Normalized Data (per capita)
Brazil	62	194,933,000.00	0.0000000000
Canada	1611	34,437,000.00	0.0000000012
Chile	23	17,399,000	0.0000000001
Finland	75	5,401,000	0.0000000004
Germany	1207	81,777,000	0.0000000004
Hong Kong	85	7,146,000	0.0000000002
Israel	430	7,594,000	0.0000000020
Japan	611	127,819,000	0.0000000001
Russia	147	142,411,000	0.0000000000
Singapore	160	5,274,000	0.0000000005
South Africa	38	50,591,000	0.0000000001
South Korea	264	49,006,000	0.0000000002
Sweden	176	9,450,000	0.0000000005

<b>Switzerland</b>	451	7,837,000	0.0000000012
<b>Turkey</b>	45	73,950,000	0.0000000000
<b>United Arab Emirates</b>	16	5,375,000	0.0000000000

**Benchmarked to Israel (score used to compile overall Index):**

<b>Brazil</b>	<b>Canada</b>	<b>Chile</b>	<b>Finland</b>	<b>Germany</b>	<b>Hong Kong</b>	<b>Israel</b>	<b>Japan</b>
0.0281	4.1309	0.1167	1.2262	1.3033	1.0503	5.00	0.4221

<b>Russia</b>	<b>Singapore</b>	<b>South Africa</b>	<b>South Korea</b>	<b>Sweden</b>	<b>Switzerland</b>	<b>Turkey</b>	<b>United Arab Emirates</b>
0.0911	2.6789	0.0663	0.4757	1.6446	5.0816	0.0537	0.2629

## R&D-4: PATENT APPLICATIONS AND/OR PATENTS GRANTED BY NATIONAL PATENT OFFICE

Tallies patent applications (for non-U.S. countries) and/or U.S. patents granted, according to first-listed inventor. Quantifies patent activity, as proxy measure for innovation activity & output.

### Raw Data:

Applicant Country	Issuing Country								
Country	United States (1)	Brazil	Canada	Chile	Finland	Germany	Hong Kong	Israel	Japan
United States (2)		7,274	15,541	310	23	4,228	5,067	2,829	23,183
Brazil	215								
Canada	5,012								
Chile	35								
Finland	951								
Germany	11,920								
Hong Kong	419								
Israel	1,981								
Japan	46,139								

Country	Russia	Singapore	South Africa	South Korea	Sweden	Switzerland	Turkey	UAE	TOTAL
	3,735	3,902	1,939	11,516	48	191	59	0	79,845
Russia	298								
Singapore	647								
South Africa	123								
South Korea	12,262								
Sweden	1,711								
Switzerland	1,663								
Turkey	41								
United Arab Emirates	10								

1) Granted patents by USPTO, 2010, Technology Areas, Source: USPTO

2) Patent applications from US to Patent Office of country, 2009 (Chile, 2008; Sweden, 2007), Source: WIPO

### Data Normalization:

Sum of patent data. Data normalized by GDP

Country	Raw Data	GDP (2011)	Normalized Data
Brazil	7,489	\$2,304,646,306,421.69	0.0000000032
Canada	20,553	\$1,394,490,333,470.96	0.0000000147
Chile	345	\$298,946,638,195.08	0.0000000012
Finland	974	\$205,154,012,030.01	0.0000000047
Germany	16,148	\$3,204,596,141,780.93	0.0000000050
Hong Kong	5,486	\$353,510,082,789.52	0.0000000155
Israel	4,810	\$216,157,813,937.71	0.0000000223
Japan	69,322	\$4,383,325,325,529.53	0.0000000158
Russia	4,033	\$3,015,670,235,601.72	0.0000000013
Singapore	4,549	\$316,741,482,392.94	0.0000000144
South Africa	2,062	\$558,215,907,198.83	0.0000000037
South Korea	23,778	\$1,506,004,280,696.95	0.0000000158
Sweden	1,759	\$390,406,648,352.61	0.0000000045
Switzerland	1,854	\$388,640,087,195.30	0.0000000048
Turkey	100	\$1,288,637,792,412.36	0.0000000001
United Arab Emirates	10	\$380,512,914,081.71	0.0000000000

### Benchmarked to Israel (score used to compile overall Index):

Brazil	Canada	Chile	Finland	Germany	Hong Kong	Israel	Japan
0.73	3.31	0.26	1.07	1.13	3.49	5.00	3.55

Russia	Singapore	South Africa	South Korea	Sweden	Switzerland	Turkey	United Arab Emirates
0.30	3.23	0.83	3.55	1.01	1.07	0.02	0.01

## R&D-5: 301 WATCH LISTS STATUS

*Compares IP Protection regimes based on 301 List Status.*

### Raw Data:

2012 301 Watch List Status

Not on List	Watch List	Priority Watch List
Germany	Brazil	Canada
Hong Kong	Finland	Chile
Japan	Turkey	Israel
Singapore		Russia
South Africa		
South Korea		
Sweden		
Switzerland		
UAE		

### Data Normalization:

No normalization factor used. Data benchmarked using raw data.

### Benchmarked to Israel (score used to compile overall Index):

Brazil	Canada	Chile	Finland	Germany	Hong Kong	Israel	Japan
12.11	6.06	0.24	6.75	12..72	17.92	5.00	13.60

Russia	Singapore	South Africa	South Korea	Sweden	Switzerland	Turkey	United Arab Emirates
0.35	18.17	12.43	14.04	12.16	12.31	6.19	12.11

## B. AGGREGATE BENCHMARKED SCORES (INDEX RESULTS)

Metric Code	Metric	Brazil	Canada	Chile	Finland	Germany	Hong Kong	Israel	Japan
GOV-1	Government Budget Appropriations on R&D (GBAORD) by Socioeconomic Objective	4.94	3.29		8.47	7.62	0.28	5.00	6.68
GOV-2	Inventory of Bilateral, Treaties, Cooperative Agreements Trade Agreements	5.00	9.29	4.64	1.43	8.21	0.36	5.00	13.21
GOV-3	Foreign Operations Account Spending U.S. Department of State	0.0018	0.0000	0.0015	0.0000	0.0000	0.0000	5.0000	0.0000
GOV-4	Existence of Bilateral Science and Technology Commissions	0.00	0.00	0.00	0.00	1.00	0.00	5.00	0.00
GOV-5	Trade & Investment Framework Agreements in Place between the Country and the United States	0.00	5.00	5.00	0.00	0.00	0.00	5.00	0.00
HC-1	Higher Education Expenditure on R&D (HERD)	0.17	5.60	1.29	6.81	4.40	3.45	5.00	3.62
HC-2	Article Co-Authorship	0.19	0.06	0.74	3.68	2.18		5.00	0.73
HC-3	U.S. Doctorates Awarded to Foreign Students, S&E Fields	0.3808	5.5788	1.4332	0.7345	1.0811		5.00	0.76
HC-4	Entries Under U.S. H1-B Temporary Work Visas,	0.42	27.03	1.41	1.17	1.08		5.00	0.95
PSI-1	Industry Financed Gross Domestic Expenditure on R&D (GERD)	1.12	1.67	0.35	5.20	3.80	0.67	5.00	5.02
PSI-2	U.S. Exports and Imports in Knowledge-Intensive Industries	0.63	2.54	0.83	0.95	1.29	3.48	5.00	1.05
PSI-3	Activity of MNC and MOFA (foreign affiliates)	0.3744	4.2139	0.4038	2.9503	1.2689	0.9534	5.0000	1.0404
PSI-4	Number of Knowledge-Intensive Industry	0.31	1.08	0.00	0.32	3.93	0.19	5.00	0.04

	Companies Cross Listed								
R&D-1	Gross Domestic Expenditure on R&D	1.32	1.98	0.45	4.41	3.20	0.86	5.00	3.70
R&D-2	R&D Expenditure of Foreign Affiliates	0.21	1.34	0.04	1.70	2.05	0.31	5.00	1.06
R&D-3	USPTO Co-patent applications	0.0281	4.1309	0.1167	1.2262	1.3033	1.0503	5.00	0.4221
R&D-4	First Listed Inventor Patent Applications (World), U.S. Patents Granted	0.73	3.31	0.26	1.07	1.13	3.49	5.00	3.55
TOTAL	<b>TOTAL Index Score</b>	29.86	100.50		67.19	74.34		100.00	60.92

Metric Code	Metric	Russia	Singapore	South Africa	South Korea	Sweden	Switzerland	Turkey	United Arab Emirates
GOV-1	Government Budget Appropriations on R&D (GBAORD) by Socioeconomic Objective	4.49	6.70		8.75	6.92	6.54	0.80	
GOV-2	Inventory of Bilateral, Treaties, Cooperative Agreements Trade Agreements	0.36	1.43	2.86	5.36	4.29	1.79	2.50	1.43
GOV-3	Foreign Operations Account Spending U.S. Department of State	0.0069	0.0013	0.1562	0.0000	0.0000	0.0000	0.0015	0.0006
GOV-4	Existence of Bilateral Science and Technology Commissions	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
GOV-5	Trade & Investment Framework Agreements in Place between the Country and the United States	0.00	5.00	5.00	5.00	0.00	5.00	5.00	5.00
HC-1	Higher Education	0.86	5.17	1.55	3.45	7.76	6.90	3.36	

	Expenditure on R&D (HERD)								
HC-2	Article Co-Authorship	0.22	3.38	0.01	1.49	4.67	7.53	0.20	
HC-3	U.S. Doctorates Awarded to Foreign Students, S&E Fields	0.43	5.6951	0.1680	12.4547	0.9595	1.3016	3.0961	0.5272
HC-4	Entries Under U.S. H1-B Temporary Work Visas,	0.18	3.99	0.30	2.52	2.00	1.98	0.68	0.01
PSI-1	Industry Financed Gross Domestic Expenditure on R&D (GERD)	0.61	2.26		5.45	4.31	4.15	0.77	
PSI-2	U.S. Exports and Imports in Knowledge-Intensive Industries	0.07	6.29	0.22	1.83	1.29	4.41	0.30	1.44
PSI-3	Activity of MNC and MOFA (foreign affiliates)	2.9503	4.6477	0.4891	0.4686	4.7046	11.8388	2.9503	0.0000
PSI-4	Number of Knowledge-Intensive Industry Companies Cross Listed	0.00	0.41	0.00	0.02	0.17	0.08	0.00	0.09
R&D-1	Gross Domestic Expenditure on R&D	1.32	2.38	1.06	4.25	3.86	3.40	0.95	
R&D-2	R&D Expenditure of Foreign Affiliates	0.01	1.48	0.08	0.34	2.13	14.19	0.01	0.03
R&D-3	USPTO Co-patent applications	0.0911	2.6789	0.0663	0.4757	1.6446	5.0816	0.0537	0.2629
R&D-4	First Listed Inventor Patent Applications (World), U.S. Patents Granted	0.30	3.23	0.83	3.55	1.01	1.07	0.02	0.01
TOTAL	<b>TOTAL Index Score</b>	13.60	85.60		72.27	71.71	131.05	27.37	



## C. NORMALIZATION FACTORS USED

### GDP (PPP, US\$)

Country	2011	2010	2009
Brazil	\$2,304,646,306,421.69		
Canada	\$1,394,490,333,470.96		
Chile	\$298,946,638,195.08	\$203,442,593,943.00	\$243,195,852,909.00
Finland	\$205,154,012,030.01	\$238,801,324,503.00	\$185,347,672,267.00
Germany	\$3,204,596,141,780.93	\$3,309,668,874,172.00	\$3,031,695,217,614.00
Hong Kong	\$353,510,082,789.52		
Israel	\$216,157,813,937.71	\$217,334,169,739.00	\$206,575,505,255.00
Japan	\$4,383,325,325,529.53		
Russia	\$3,015,670,235,601.72		
Singapore	\$316,741,482,392.94	\$222,698,916,766.00	\$252,536,186,358.00
South Africa	\$558,215,907,198.83		
South Korea	\$1,506,004,280,696.95	\$1,014,483,158,314.00	\$1,324,382,558,091.00
Sweden	\$390,406,648,352.61	\$458,003,597,858.00	\$351,539,353,401.00
Switzerland	\$388,640,087,195.30	\$523,772,140,979.00	\$348,806,537,166.00
Turkey	\$1,288,637,792,412.36		
United Arab Emirates	\$380,512,914,081.71	--	\$265,540,287,367.00
United States	\$15,094,000,000,000.00	\$14,582,400,000,000.00	\$14,119,000,000,000.00

Units: Current \$, PPP

Source: World Bank, World Development Indicators (WDI) Database, of 7/28/2011

### TOTAL POPULATION

Country	2011	2010	2009	2008
Brazil	194,933,000.00			
Canada	34,437,000.00			
Chile	17,399,000	17,190,000	16,984,000	16,750,000
Finland	5,401,000	5,377,000	5,351,000	5,326,000
Germany	81,777,000	81,603,000	81,767,000	82,013,000
Hong Kong	7,146,000			
Israel	7,594,000	7,430,000	7,270,000	7,114,000
Japan	127,819,000			
Russia	142,411,000			
Singapore	5,274,000	5,165,000	5,077,000	4,988,000
South Africa	50,591,000			
South Korea	49,006,000	48,909,000	48,758,000	48,607,000
Sweden	9,450,000	9,327,000	9,299,000	9,220,000



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Switzerland	7,837,000	7,789,000	7,742,000	7,648,000
Turkey	73,950,000			
United Arab Emirates	5,375,000	5,055,000	4,908,000	4,765,000
United States	311,946,000	309,997,000	307,374,000	304,718,000

Source: IMF, World Economic Outlook Database, as of April 2011

Note: Shading indicates IMF estimate

## D. INDEX OF SOURCES

### SOURCE LISTING: INDICATORS

Exhibit 1: Listing of Indicators and Sources Used

Indicator	Source
GOV-1	<ul style="list-style-type: none"> <li>OECD Main Science and Technology Indicators</li> </ul>
GOV-2	<ul style="list-style-type: none"> <li>U.S. Department of State: <i>Treaties in Force: A List of Treaties and Other International Agreements of the United States in Force on January 1, 2011</i></li> <li>U.S. Department of State: <i>List of International Agreements Other Than Treaties</i></li> </ul>
GOV-3	<ul style="list-style-type: none"> <li>U.S State Department, Congressional Budget Justification: Foreign Operations</li> </ul>
GOV-4	<ul style="list-style-type: none"> <li>Internal Revenue Service, "Publication 78, Cumulative List of Organizations described in Section 170(c) of the Internal Revenue Code of 1986" List of 501c3 Organizations</li> </ul>
GOV-5	<ul style="list-style-type: none"> <li>Office of the United States trade Representative: <i>Trade and Investment Framework Agreements (TIFAs)</i> <a href="http://www.ustr.gov/trade-agreements/trade-investment-framework-agreements">http://www.ustr.gov/trade-agreements/trade-investment-framework-agreements</a></li> </ul>
HC-1	<ul style="list-style-type: none"> <li>OECD Main Science and Technology Indicators</li> </ul>
HC-2	<ul style="list-style-type: none"> <li>U.S. National Science Foundation Science and Engineering Indicators</li> </ul>
HC-3	<ul style="list-style-type: none"> <li>U.S. National Science Foundation, Survey of Earned Doctorates</li> </ul>
HC-4	<ul style="list-style-type: none"> <li>U.S. Department of Homeland Security, Yearbook of Immigration Statistics</li> </ul>
HC-5	<ul style="list-style-type: none"> <li><a href="http://boincstats.com/">boincstats.com/</a></li> <li><a href="http://us.allprojectstats.com/">us.allprojectstats.com/</a></li> </ul>
PSI-1	<ul style="list-style-type: none"> <li>OECD Main Science and Technology Indicators</li> </ul>
PSI-2	<ul style="list-style-type: none"> <li>U.S. International Trade Administration. "TradeStats Express"</li> </ul>
PSI-3	<ul style="list-style-type: none"> <li>U.S. Bureau of Economic Analysis, International Economic Accounts</li> </ul>
PSI-4	<ul style="list-style-type: none"> <li>Various Open Source</li> </ul>
R&D-2	<ul style="list-style-type: none"> <li>U.S. Bureau of Economic Analysis, International Economic Accounts</li> </ul>
R&D-1	<ul style="list-style-type: none"> <li>OECD Main Science and Technology Indicators</li> </ul>
R&D-2	<ul style="list-style-type: none"> <li>U.S. Bureau of Economic Analysis, International Economic Accounts</li> </ul>
R&D-3	<ul style="list-style-type: none"> <li>U.S. Patent and Trademark Office, Patent Full-Text and Image Database</li> </ul>
R&D-4	<ul style="list-style-type: none"> <li>World Intellectual Property Organization Statistics Database</li> <li>U.S. Patent and Trademark Office, Patenting by Geographic Region (State and Country), Breakout by Technology Class</li> </ul>
R&D -5	<ul style="list-style-type: none"> <li>Office of the United States trade Representative: <i>Special 301 Report</i></li> </ul>

The following material provides a description of the source material (presented in alphabetical order), used in the Index.

#### BOINC STATISTICS

**Description:** Two websites maintaining ongoing tracking of participants using the BOINC platform for distributed computing.

**Used For Indicator:** HC-5

**Access:** 1) [www.boincstats.com/](http://www.boincstats.com/) 2) [www.us.allprojectstats.com/](http://www.us.allprojectstats.com/)

## CONGRESSIONAL BUDGET JUSTIFICATION: FOREIGN OPERATIONS (U.S. DEPARTMENT OF STATE)

**Description:** An annual report published by the U.S. Department of State summarizing the foreign operations budget of the U.S. government.

**Used For Indicator:** GOV-3,

**Access:** <http://www.state.gov/documents/organization/123415.pdf>

## OECD MAIN SCIENCE AND TECHNOLOGY INDICATORS

**Description:** The Organization for Economic Cooperation and Development (OECD) publishes on a bi-annual basis the Main Science and Technology Indicators (MSTI). MSTI provides a standardized, comparable set of internationally recognized statistics on research and development resources and outputs for all OECD-member countries and selected non-member countries. Data is maintained in time-series wherever possible.

**Used For Indicators:** GOV-1, HC-1, PSI-1, R&D-1, R&D-2,

**Access:** <http://www.oecd.org/sti/msti.htm>

## OFFICE OF THE UNITED STATES TRADE REPRESENTATIVE: TRADE AND INVESTMENT FRAMEWORK AGREEMENTS (TIFAs)

**Description:** Listing of TIFAs in-force.

**Used For Indicator:** GOV-5

**Access:** <http://www.ustr.gov/trade-agreements/trade-investment-framework-agreements>

## OFFICE OF THE UNITED STATES TRADE REPRESENTATIVE: SPECIAL 301 REPORT

**Description:** Annual publication of the 301 Watch List.

**Used For Indicator:** R&D-5

**Access:** [www.ustr.gov/sites/default/files/2012%20Special%20301%20Report.pdf](http://www.ustr.gov/sites/default/files/2012%20Special%20301%20Report.pdf)

## U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS, INTERNATIONAL ECONOMIC ACCOUNTS

**Description:** The Bureau of Economic Analysis's (BEA) U.S. International Services Statistics include data on cross-border trade in services as well as data on services supplied to international markets through activities of the affiliates of multinational companies. Data is also maintained on R&D expenditure of foreign affiliates and foreign direct investment levels..

**Used For Indicator:** R&D-2, PSI-5

**Access:** [http://www.bea.gov/international/international\\_services.htm#detailedstatisticsfor](http://www.bea.gov/international/international_services.htm#detailedstatisticsfor)

## U.S. DEPARTMENT OF COMMERCE, INTERNATIONAL TRADE ADMINISTRATION. "TRADESTATS EXPRESS"

**Description:** The U.S. Department of Commerce's TradeStats Express system is an online database that includes the latest annual U.S. merchandise trade statistics. The system includes both imports and exports, is searchable by individual relationships, and includes historical (time-series) data. TradeStats also allows results to be filtered according to industry classification by the North American Industry Classification System (NAICS).

**Used For Indicator:** PSI-2

**Access:** <http://tse.export.gov/TSE/>

## U.S. DEPARTMENT OF HOMELAND SECURITY, YEARBOOK OF IMMIGRATION STATISTICS

**Description:** The annual Yearbook of Immigration Statistics is a compendium of statistics on immigration into the U.S. as tracked by the Department of Homeland Security.

**Used For Indicator:** HC-4

**Access:** <http://www.dhs.gov/files/statistics/publications/yearbook.shtm>

## U.S. DEPARTMENT OF STATE: TREATIES IN FORCE

**Description:** This annual publication lists all treaties in force to which the U.S. is a signatory

**Used For Indicator:** GOV-2

**Access:** <http://www.state.gov/s/l/treaty/tif/index.htm>

## U.S. DEPARTMENT OF STATE: LIST OF INTERNATIONAL AGREEMENTS OTHER THAN TREATIES

**Description:** The U.S. Department of State maintains a listing of international agreements other than treaties (in-force) S&T Agreements between the U.S. and other countries.

**Used For Indicator:** GOV-2

**Access:** <http://www.state.gov/s/l/treaty/caseact/c49619.htm>

## U.S. DEPARTMENT OF STATE: CONGRESSIONAL BUDGET JUSTIFICATION FOR FOREIGN OPERATIONS

**Description:** Budget document identifying foreign aid spending.

**Used For Indicator:** GOV-3

**Access:** <http://www.state.gov/s/d/rm/rls/cbj/>

## U.S. INTERNAL REVENUE SERVICE: PUBLICATION 78, CUMULATIVE LIST OF ORGANIZATIONS DESCRIBED IN SECTION 170(C) OF THE INTERNAL REVENUE CODE OF 1986

**Description:** The online version of Internal Revenue Service (IRS) Publication 78 provides a searchable listing of organizations registered in the U.S. as 501(c)(3) non-profit organizations. Provides a standardized source to identify science and technology commissions.

**Used For Indicator:** GOV-4

**Access:** <http://www.irs.gov/Charities-&-Non-Profits/Exempt-Organizations-Select-Check>

## U.S. NATIONAL SCIENCE FOUNDATION SCIENCE AND ENGINEERING INDICATORS

**Description:** The Science and Engineering Indicators (SEI) publication is produced every other year by the U.S. National Science Foundation (NSF). The “NSF Indicators” provide a broad range of quantitative statistics on the U.S. scientific and technical enterprise, including international comparisons.

**Used For Indicator:** HC-2

**Access:** [www.nsf.gov/statistics/seind12](http://www.nsf.gov/statistics/seind12)

## U.S. NATIONAL SCIENCE FOUNDATION, SURVEY OF EARNED DOCTORATES

**Description:** The annual Survey of Earned Doctorates is conducted jointly by six U.S. federal agencies: the National Science Foundation (NSF), the National Institutes of Health (NIH), the Department of Education, the Department of Agriculture, the National Endowment for the Humanities, and the National

Aeronautics and Space Administration (NASA). Information from this survey, published or provided on a custom-request basis by the NSF's Science Resources Statistics Division, includes statistics on U.S. doctorate level education and degrees awarded.

**Used For Indicator:** HC-3

**Access:** <http://www.nsf.gov/statistics/srvydoctorates/>

### **U.S. PATENT AND TRADEMARK OFFICE, PATENT FULL-TEXT AND IMAGE DATABASE**

**Description:** The U.S. Patent and Trademark Office's (USPTO) Patent Full-Text and Image Database provides a searchable database of full-text patents and patent applications dating back to 1976.

**Used For Indicator:** R&D-3

**Access:** <http://patft.uspto.gov/>

### **U.S. PATENT AND TRADEMARK OFFICE, PATENTING BY GEOGRAPHIC REGION (STATE AND COUNTRY), BREAKOUT BY TECHNOLOGY CLASS**

**Description:** The USPTO provides annual reports, by country of first-listed inventor, totaling the number of utility patents (i.e., patents for inventions) in technology classes granted in a given year.

**Used For Indicator:** R&D-4

**Access:** <http://www.uspto.gov/web/offices/ac/ido/oeip/taf/reports.htm>

### **WORLD INTELLECTUAL PROPERTY ORGANIZATION STATISTICS DATABASE**

**Description:** The World Intellectual Property Organization (WIPO) provides global patenting statistics including a count of patent applications by patent office and country of origin, by first-listed inventor.

**Used For Indicator:** R&D-4

**Access:** <http://www.wipo.int/ipstats/en/statistics/patents/>

### **ADDITIONAL SOURCES CONSULTED**

Central Intelligence Agency (CIA). "The World Factbook." <https://www.cia.gov/library/publications/the-world-factbook/>

Department of Statistics, Singapore. "Statistics: Research and Development (Themes)." <http://www.singstat.gov.sg/>

International Monetary Fund (IMF). "World Economic Outlook Database." [www.imf.org/external/pubs/ft/weo/2013/01/weodata/index.aspx](http://www.imf.org/external/pubs/ft/weo/2013/01/weodata/index.aspx)

International Telecommunications Union (ITU). "World Telecommunication/ICT Indicators Database." <http://www.itu.int/ITU-D/ict/statistics/>

National Science Foundation. "Foreign Science and Engineering Students in the United States." <http://www.nsf.gov/statistics/infbrief/nsf10324/>

U.S.-Israel Science and Technology Foundation. "Israel 2020: Vision and Strategy for Economy and Society in a Global World."

World Bank. "World Development Indicators, World dataBank." <http://databank.worldbank.org/ddp/home.do?Step=12&id=4&CNO=2>