



## Project Linking Multi-Agency Surveys Produces New Findings on R&D by Multinational Companies

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Newly developed information from the Research and Development Data Link Project—a joint project of the National Science Foundation (NSF), U.S. Census Bureau (Census), and Bureau of Economic Analysis (BEA)—reveals new insights on the U.S. R&D activities of multinational companies (MNCs), such as the character of R&D work performed by these companies (basic research, applied research, and development). Additional new details on the R&D performed by MNCs, such as state location and technology focus, will be available in detailed statistical tables available in the forthcoming report *International Investment and R&D Data Link: 2004–07* (see “Data Availability” for more information).

The project matched records of U.S.-located companies that performed R&D, from the NSF–Census Survey of Industrial Research and Development (SIRD), to records of U.S. affiliates of foreign MNCs, from BEA’s Foreign Direct Investment in the United States (FDIUS) survey. Separately, it matched these SIRD data to records of parent companies of U.S. MNCs from BEA’s U.S. Direct Investment Abroad (USDIA) survey for a given data year. The project covered 2004 to 2007, the

last year SIRD was conducted.<sup>2</sup> (See “Definitions” for explanation of terms and “Data Notes” for the methodology).

SIRD provided details on R&D activities by U.S.-located nonfarm, for-profit companies with five or more employees, including character of R&D work and the U.S. state location of R&D performance (NSF/NCSES 2011), but it did not collect any information on foreign ownership or overseas investments. The BEA FDIUS survey provides information on U.S. affiliates of foreign MNCs (U.S.-located foreign-owned companies); the BEA USDIA survey covers domestic activities of parent companies of U.S. MNCs and their affiliates abroad. Thus companies in the SIRD-FDIUS match are the subset of SIRD companies that are also U.S. affiliates of foreign MNCs. Companies in the SIRD-USDIA match are the subset of SIRD companies that are parent companies of U.S. MNCs. The set of matched companies is not the complete universe of all R&D-performing U.S. MNC parent companies or U.S. affiliates of foreign MNCs. However, matched companies account for over 90% of the U.S. R&D performed by these companies as measured in each of the BEA surveys.

Activities covered by the BEA surveys include total R&D performance, but they do not include information on character of R&D work or state location. By combining ownership and overseas activity information from the BEA surveys with R&D details from SIRD for a given data year, the R&D Data Link Project was able to produce information not independently available from the participating surveys.

### Selected Information on R&D Performance by MNCs Located in the United States

Matching company records showed that U.S. MNC parent companies funded 88% of their U.S. R&D from their own (and other nonfederal) sources in 2007; 12% was federally funded (table 1). U.S. affiliates of foreign MNCs funded 96% of their R&D from nonfederal sources (table 2). In terms of the character of R&D work, both U.S. MNC parent companies and U.S. affiliates of foreign MNCs devote about three-fourths of their R&D expenditures to development activities (tables 1 and 2).

By aggregating data for U.S. MNC parent companies and for U.S. affiliates of foreign MNCs, it is possible

TABLE 1. U.S. R&D performance and employment by matched U.S. MNC parent companies: 2004–07

Characteristic	All industries				Manufacturing				Nonmanufacturing			
	2004	2005	2006	2007	2004	2005	2006	2007	2004	2005	2006	2007
	US\$millions											
All R&D performance	157,935	164,487	177,905	192,410	124,965	131,604	138,145	147,054	32,970	32,883	39,759	45,356
Character of work												
Basic research	5,951	5,814	6,060	8,649	5,192	5,170	5,150	8,007	759	645	909	641
Applied research	32,591	30,665	33,279	37,422	25,813	26,108	27,979	30,122	6,779	4,557	5,300	7,301
Development	119,393	128,008	138,566	146,339	93,960	100,326	105,016	108,925	25,432	27,681	33,550	37,414
Source of funds												
Company <sup>a</sup>	139,306	144,917	157,748	168,557	107,277	112,934	121,040	126,912	32,029	31,983	36,708	41,645
Federal government	18,630	19,570	20,157	23,853	17,688	18,670	17,105	20,142	941	900	3,052	3,711
	Employees (1,000s)											
All employees	10,186	10,605	11,281	11,236	6,586	6,651	6,694	6,627	3,601	3,954	4,588	4,609
R&D (FTE) employees	698	706	704	742	521	522	505	534	177	184	198	208

BEA = Bureau of Economic Analysis; FTE = full-time equivalent; MNC = multinational company; NSF = National Science Foundation; SIRD = Survey of Industrial Research and Development; USDIA = U.S. Direct Investment Abroad.

<sup>a</sup> Includes company and other nonfederal sources.

NOTES: Data from SIRD (cosponsored by NSF and U.S. Census Bureau) matched to data from USDIA survey (conducted by BEA). SIRD data presented are aggregations of unweighted microdata. A total of 1,505 (2004), 1,531 (2005), 1,596 (2006), 1,586 (2007) companies in SIRD were matched to U.S. MNC parent companies from USDIA survey. Detail may not add to total because of rounding.

SOURCE: National Science Foundation/National Center for Science and Engineering Statistics, U.S. Bureau of Economic Analysis, and U.S. Census Bureau. R&D Data Link Project.

TABLE 2. U.S. R&D performance and employment by matched U.S. affiliates of foreign MNCs: 2004–07

Characteristic	All industries				Manufacturing				Nonmanufacturing			
	2004	2005	2006	2007	2004	2005	2006	2007	2004	2005	2006	2007
	US\$millions											
All R&D performance	28,854	29,963	32,924	37,323	24,276	23,300	28,115	29,167	4,578	6,662	4,809	8,156
Character of work												
Basic research	873	1,051	1,025	1,631	719	954	949	1,528	155	97	77	104
Applied research	6,121	6,048	6,707	7,409	4,644	4,209	6,136	6,028	1,478	1,839	572	1,381
Development	21,860	22,864	25,191	28,282	18,914	18,137	21,031	21,611	2,946	4,727	4,161	6,671
Source of funds												
Company <sup>a</sup>	27,606	28,579	31,291	35,699	D	D	26,505	27,556	D	D	4,786	8,143
Federal government	1,248	1,384	1,633	1,624	D	D	1,610	1,611	D	D	23	13
	Employees (1,000s)											
All employees	1,957	1,924	2,028	2,124	1,518	1,490	1,555	1,621	439	435	474	503
R&D (FTE) employees	117	119	127	137	97	91	103	109	20	28	24	28

D = suppressed to avoid disclosure of confidential information.

BEA = Bureau of Economic Analysis; FDIUS = Foreign Direct Investment in the United States; FTE = full-time equivalent; MNC = multinational company; NSF = National Science Foundation; SIRD = Survey of Industrial Research and Development.

<sup>a</sup> Includes company and other nonfederal sources.

NOTES: Data from SIRD (cosponsored by NSF and U.S. Census Bureau) matched to data from FDIUS survey (conducted by BEA). SIRD data presented are aggregations of unweighted microdata. A total of 994 (2004), 1,010 (2005), 1,041 (2006), 1,028 (2007) companies in SIRD were matched to records for U.S. affiliates from BEA FDIUS survey. Of these, 907 (2004), 962 (2005), 977 (2006), 967 (2007) had nonzero R&D expenditures. Majority-owned classification based on FDIUS survey data. Detail may not add to total because of rounding.

SOURCE: National Science Foundation/National Center for Science and Engineering Statistics, U.S. Bureau of Economic Analysis, and U.S. Census Bureau. R&D Data Link Project.

to obtain an overall measure of R&D performance for all MNCs located in the United States. However, the aggregation across all MNCs cannot be performed without taking into account that a single company may be both an affiliate of a foreign parent company and a U.S. parent company, and therefore, its data would appear in both tables 1 and table 2. Table 3 provides selected aggregated 2007 data that have been adjusted to avoid double counting of these overlapping companies. Data in table 3 show R&D and employment for all U.S. R&D performing companies, all MNCs with U.S. facilities (identified via the link), and other (non-MNC) U.S.-located companies.

MNCs with U.S. facilities employed 810,000 R&D employees (80% of U.S. industrial R&D employment), and they performed \$210.7 billion in R&D in 2007.<sup>3</sup> R&D performance by MNCs accounted for 82% of total industrial R&D in the United States in 2007 and 86% of industrial basic research in the same year. Non-MNC firms accounted for 18% of total U.S. industrial R&D and 14% of basic industrial research in the same year (third panel in table 3). The last panel in table 3 shows the distribution of R&D by character of work within each of the three aggregates (all companies, MNCs, and non-MNCs).

## Data Notes

### Sources and Limitations

Information from the R&D Data Link Project resulted from matching company records from the NSF/U.S. Census Bureau SIRD separately to two BEA surveys: the FDIUS survey and the USDIA survey (Census, BEA, NSF/SRS 2005). The three surveys included in the R&D Data Link Project cover for-profit companies and use comparable definitions and accounting guidance for R&D expenditures. Certain measurement differences in other

TABLE 3. U.S. employment and R&D performance, by company characteristic and character of work: 2007

Employment and R&D performance	All R&D performing companies		
	Matched MNCs	Other companies <sup>a</sup>	
	Employees (1,000s)		
All employees	16,306	12,212	4,094
R&D (FTE) employees	1,016	810	207
	US\$millions		
All R&D performance	255,806	210,747	45,058
Basic research	10,867	9,365	1,503
Applied research	51,761	40,821	10,940
Development	193,177	160,562	32,616
	Distribution of performer within R&D categories (%)		
All R&D performance	100.0	82.4	17.6
Basic research	100.0	86.2	13.8
Applied research	100.0	78.9	21.1
Development	100.0	83.1	16.9
	Distribution of R&D categories within company groups (%)		
All R&D performance	100.0	100.0	100.0
Basic research	4.2	4.4	3.3
Applied research	20.2	19.4	24.3
Development	75.5	76.2	72.4

BEA = Bureau of Economic Analysis; FDIUS = Foreign Direct Investment in the United States; FTE = full-time equivalent; MNCs = multinational companies; NSF = National Science Foundation; SIRD = Survey of Industrial Research and Development; USDIA = U.S. Direct Investment Abroad.

<sup>a</sup> Companies that are not MNCs.

NOTES: Data are unweighted. Matched data are aggregations of SIRD microdata that account for MNCs after matching to FDIUS and USDIA surveys (conducted by BEA) and adjusted for overlap for companies that may be both affiliates of foreign parent companies and U.S. parent companies. Thus in this table MNCs refer to U.S.-located companies that are either parent companies of U.S. MNCs or foreign-owned companies. Detail may not add to total because of rounding.

SOURCES: National Science Foundation/National Center for Science and Engineering Statistics, U.S. Bureau of Economic Analysis, and U.S. Census Bureau. R&D Data Link Project. National Science Foundation/National Center for Science and Engineering Statistics, Research and Development in Industry: 2006–07. Available at <http://www.nsf.gov/statistics/industry/>.

variables do not significantly impair the comparability of the data.

SIRD classified companies by industry based on industry distribution of payroll, whereas BEA classification is based on sales by industry. Tables in this InfoBrief used SIRD industry classification. Tabulations in the full set of detailed statistical tables will present information from a given survey source (SIRD or BEA surveys).

SIRD covers for-profit companies with five or more employees, publicly or privately held, that performed R&D

within the 50 United States and the District of Columbia. SIRD estimates are subject to sampling and nonsampling errors. For more information see <http://www.nsf.gov/statistics/industry/>. SIRD information includes domestic sales, employment, R&D by character of work, technology areas, state location of R&D performance, and industry and firm size detail. The BEA surveys collect financial and operating statistics, including employment, sales, trade in goods, balance sheets, income statements, and total R&D expenditures. For more information see <http://www.bea.gov/international/index.htm#omc>.

For a given survey year, SIRD companies were matched (1) to majority-owned U.S. affiliates of foreign MNCs from the FDIUS survey and (2) to parent companies of U.S. MNCs from the USDIA survey. Overseas activities by majority-owned foreign affiliates of matched U.S. MNCs parent companies in selected host countries are not covered in this InfoBrief, but data on that topic will be available in the detailed statistical tables in the forthcoming report *International Investment and R&D Data Link: 2004–07*. Matched SIRD estimates presented here and in forthcoming Detailed Statistical Tables are based on the subset of companies in SIRD that are part of an MNC and are thus not equivalent to estimates presented in SIRD.

The link between the SIRD and each of the two BEA surveys was performed in two basic steps. The first step was a computer match of company identification codes from BEA files to the corresponding companies in the U.S. Census Bureau's Business Register, a database covering all U.S. businesses with paid employees. The second step was to link BEA identification codes that matched the Business Register to the SIRD using U.S. Census Bureau identification codes. Additional steps were required to verify company matches and related cross-survey data.

In tables that present data for multiple years, year-to-year changes in the measures of activity for matched U.S. MNC parent companies or matched U.S. affiliates of foreign MNCs may reflect a combination of factors: changes in the multinational status of companies (e.g., acquisition or divestiture by a foreign parent company), changes in R&D-active status (e.g., a company may be an R&D performer in one year but not the next), or changes in the matched set of companies from year to year (e.g., a company out of scope in one year because of size thresholds

or other reasons [hence not matched] but within scope in both surveys and matched the next year).

For the survey years included in the R&D Data Link Project (2004–07), SIRD-reported R&D performed by matched parent companies (table 1) accounted for 93% to 97% of the total R&D by parent companies of U.S. MNCs published by the USDIA survey. SIRD-reported R&D performed by matched U.S. affiliates (table 2) accounted for 91% to 96% of the total R&D performance by U.S. affiliates published by the FDIUS survey. A time series of MNCs R&D expenditures gathered from BEA surveys is available in *Science and Engineering Indicators 2012* (NSB 2012).

## Definitions

*Affiliate:* A business unit located in one country but owned or controlled by a company in another country.

*Full-time-equivalent (FTE) employees:* Employees who were assigned full time to R&D, plus a prorated number of employees who worked on R&D only part of the time.

*Majority-owned affiliate:* Company owned or controlled to the extent of more than 50% of the voting securities (or equivalent) by its parent company.

*Multinational company (MNC):* A parent company and its foreign affiliates.

*Parent company:* A company that has a 10% or higher ownership share in a business located outside its home country.

*U.S. affiliate:* Company located in the United States but owned by a foreign parent company.

## Data Availability

For each link year in the R&D Data Link Project, a set of detailed statistical

tables will provide data for matched parent companies of U.S. MNCs and separate set of tables will provide data for matched U.S. affiliates of foreign MNCs. Information from the R&D Data Link Project includes total employment; R&D employment; total R&D performed, by state location and technology focus; industry-specific sales; and industry-specific R&D, by character of work and funding source. Selected information is available by investing country for U.S. affiliates and by host country for foreign affiliates of matched U.S. MNC parent companies. The full set of detailed tables from this survey and technical notes will be available in the report *International Investment and R&D Data Link: 2004–07* at <http://www.nsf.gov/statistics/industry/>. Individual detailed tables may be available in advance of the full report. For further information, contact the author.

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## Notes

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2. The Business R&D and Innovation Survey (BRDIS) is the successor to SIRI and will provide additional data on the international focus of these activities. The BRDIS launch collected

2008 data. For statistics and other information see <http://www.nsf.gov/statistics/industry/>.

3. To derive a total for MNCs located in the United States, an adjustment must be made to remove the double counting that arises from U.S. parent companies that are also U.S. affiliates. For example, for R&D performance based on matched 2007 SIRI information, \$19.0 billion of U.S. R&D was performed by companies that were both U.S. MNC parent companies

and majority-owned U.S. affiliates of foreign MNCs. To avoid double counting, this amount was subtracted from the sum of \$192.4 billion (table 1) and \$37.3 billion (table 2) to obtain total U.S. R&D performed by U.S.-located units of MNCs (\$210.7 billion in table 3). Similar adjustments were made for other rows under the MNC column. The category “other companies” is the residual. Shares in the last two panels of table 3 are based on adjusted levels.

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