Foreign Direct Investment and Intellectual Property Innovation in the United States

A Profile of Global and U.S. Innovators
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INTRODUCTION

This report explores the contributions in innovation of top foreign direct investments (FDI) in the United States. It features comparisons between top investor patent performance in the United States and the rest of the world, details on the key sectors and geographies in the United States where the top FDI investors do business, and informative investor-specific experiences.

The U.S. innovation ecosystem’s strong intellectual property protection benefits both domestic and foreign-owned companies by incentivizing research and development (R&D) activities. The outsized magnitude of research and development activity in the United States by foreign-owned firms demonstrates the desirability of the United States as a destination to create, protect, and monetize intellectual capital.

METHODOLOGY

This analysis examines characteristics of the top 1,000 global multinational companies that are also patent holders, based on data from Orbis Crossborder Investment and Orbis Intellectual Property from Bureau van Dijk— a Moody’s Analytics company. Bureau van Dijk’s Orbis Crossborder database captures both forms of equity investments (greenfield FDI projects and crossborder M&A deals), and its Intellectual Property database captures multiple dimensions of patent filings and performance. This analysis provides unique insights into the profile of top global innovators by blending FDI data elements with intellectual property data elements to build a novel profile of FDI innovation in the United States by top multinationals. Unless otherwise noted, the data presented reflects a snapshot of FDI and patent activity as of January 2013 to December 2018.

Top global FDI multinationals, defined by the companies with the greatest number of cross-border investments, were identified in the Crossborder database. The top FDI multinationals were then aggregated into a sample of top global patent holders by patent count to narrow down the sample set to 100 multinationals with the greatest number of cross-border investments and patents owned by these entities.

To dive deeper into characteristics of the largest foreign-owned innovators in the United States, only global multinationals that are also patent holders were considered for the analysis. Both public and privately held companies were included in the analysis.

Patent valuations come from a data provider called IP Business Information (IPBI). IPBI is a Dutch company focusing on Intellectual Property (IP) valuation, IP big data processing, and IP data in general. For this collaboration with Orbis Intellectual Property, IPBI has processed datasets from different official patent offices worldwide, with specific algorithms and rule sets. All live and granted patents are given a valuation, and form the extensive dataset used in the evaluation of the Innovation Strength Indicators.

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1 IPBI is a spin off company of InTraCom Group, the global leader in patent valuations and licensing advisory. InTraCom Group is often engaged for their services in IP litigation advisory, as well as being called up as expert witnesses in litigation cases.
For purposes of this analysis, innovation is characterized by the volume or value of patents held by a global multinational.

MULTINATIONAL COMPANY PATENTS IN A GLOBAL CONTEXT

Global multinational companies (referred to as “multinationals”) represent large, sophisticated business entities with investments and assets in multiple locations, including patents. By examining the 1,000 largest multinationals with the most FDI projects that are patent holders, we can learn where these large firms come from and their primary industry. These top 1,000 investors represent 28 percent of the global FDI projects globally between 2013 and 2018. They also hold 7 percent of global patents by count and 11 percent of global patents by value.²

A measure of Global Ultimate Owner (GUO) traces and attributes final ownership of a global multinational to the country of the top parent in a multinational’s ownership chain. Figure 1 below shows the top 10 source markets for these top 1,000 global multinationals.

FIGURE 1: TOP 1,000 INVESTORS WITH PATENTS BY SOURCE MARKET

The United States is the leading source of innovating multinationals, hosting 23 percent of all innovative

² The Orbis Intellectual Property database estimates global patent value by an indicator-based approach. The valuation takes into account over 25+ market, legal, and financial indicators and is refreshed every 6 months. Some of the indicators used do take into consideration proprietary datasets on company financial statements, litigation case outcomes, royalty rates, licensing agreements, and actual transaction values.
companies from the top 1,000. Over 50 percent of the top 1,000 companies originate from just five countries: The United States, Japan, Germany, France, and the United Kingdom. China follows in 6th place with 5 percent, or 50 of the top 1,000 innovative multinationals.

The most innovative American multinationals by count of total patents are from a diverse set of sectors, including IBM, Dow Inc, General Electric Co, Johnson & Johnson, and Amazon. Leading non-U.S. multinationals in this report include Panasonic (Japan), Samsung Electronics (Republic of Korea), Siemens AG (Germany), Nestle (Switzerland), and Huawei (China).

The top ten destination countries of these top 1,000 multinational investors’ FDI projects are highlighted in Figure 2 below. The United States is the top destination of cross border FDI projects from innovative multinationals, receiving 11 percent of the total investment projects from the top 1,000 multinationals. Following closely as a preferred destination for innovation are China (8 percent), Germany (7 percent), and the U.K. (6 percent).

FIGURE 2: TOP FDI DESTINATION MARKETS BY GLOBAL INNOVATORS

Top 10 FDI Destination Markets
Count of FDI Projects from Top 1,000 Global Multinationals with Patents,
Jan 2013 - Dec 2021

Source: Orbis Crossborder Investment and Orbis Intellectual Property, from Bureau van Dijk - a Moody’s Analytics company.
Further exploration of these FDI projects divides them by sectors, as defined by North American Information Classifications System (NAICS) codes. This reveals that FDI from the top 1,000 multinationals includes multiple sectors including software and data processing, auto manufacturing and parts, banking, finance, pharmaceuticals, and chemicals. Figure 3, below, highlights the top ten sectors.

Additionally, each of these sectors contains subsectors that are uniquely driving innovation, such as: artificial intelligence within tech, electric vehicles, and self-driving technology within automotive, and fintech within banking and finance.

**FIGURE 3: TOP 1,000 INVESTORS WITH PATENTS BY SECTOR**

Source: Orbis Crossborder Investment and Orbis Intellectual Property, from Bureau van Dijk - a Moody’s Analytics company.
TOP 100 INNOVATIVE INVESTORS IN THE UNITED STATES

We identified the top 100 non-U.S. innovative investors by excluding all multinationals headquartered in the United States, then selected the top 100 with the most investment projects from 2013 to 2018.

FDI PROFILE OF TOP 100 FDI INNOVATORS

The FDI profile of these top 100 innovative firms by source, U.S. state destination, and industry are below.

**FIGURE 4: TOP 100 FDI INNOVATORS IN THE UNITED STATES BY SOURCE MARKET**

**Top 10 Source Markets**
*Count of Top 100 Innovative Investors by Global Ultimate Owner (GUO), 2013-2018*

Western Europe is the top source region of investments into the United States, home to over 50 percent of the top 100 innovative multinationals invested in the United States. Germany leads with 19 percent of the top 100 innovative multinationals, followed by France (10 percent), Switzerland (10 percent), the U.K. (8 percent), and the Netherlands (5 percent).

*Source: Orbis Crossborder Investment and Orbis Intellectual Property, from Bureau van Dijk - a Moody’s Analytics company.*
Asian innovative multinationals have also been very active on American soil, with Japan, China, Korea, and India hosting over one third of the top 100 innovative companies in the United States.

**FIGURE 5: TOP 100 FDI INNOVATORS IN THE UNITED STATES BY DESTINATION STATE**

The top 100 FDI innovators in the United States engaged in 1,055 investment projects from 2013 to 2018, accounting for 12 percent of all investment projects into the United States in that time period (from a total 8,623 FDI projects tracked from 2013 to 2018). The top U.S. state attracting cross border FDI projects was California, receiving 12 percent of the total investment projects from the top 100 innovative multinationals. Following closely as a preferred state destination for innovation were Texas (12 percent), and Michigan (6 percent).

According to Bureau van Dijk, a Moody’s Analytics company, the multinationals’ motives for expanding included skilled workforce availability, government support, proximity to universities, researcher availability, and technology and innovation expertise, among others. Accenture invested in the United States for “technology and innovation expertise” and its North America CEO, Ms. Julie Sweet, explained the investment as follows:

“With our network of innovation hubs across North America, we’re bringing innovation to our clients’ doorsteps to help them compete and win in the digital economy. Continuous innovation is critical to their success, and in our hubs we work side-by-side with our clients to help them bring solutions to market faster and be the disrupters, not the disrupted.”
The top recipient sector from 2013 to 2018 in the United States is the automotive (Original Equipment Manufacturer) and auto parts industry, which includes investments in electric vehicles and self-driving technologies. See sample innovative company FDI projects on page 15. The tech sector followed closely behind, including companies involved in data processing, hosting, computer systems design, and custom computer programing services. Additionally, Industry 4.0, which is the name for the current trend of automation and data exchange in manufacturing technologies, including cyber-physical systems, the Internet of things, cloud computing and cognitive computing and creating the smart factor is included in the top sectors with companies in the electrical equipment and components manufacturing.

This dataset is consistent with Bureau of Economic Analysis 2019 macroeconomic FDI activity data, the latest available data as of March 2021. The data indicates that international companies operating in the United States spend more than $71.4 billion on U.S. research and development activities, accounting for nearly 16 percent of all research and development performed by companies in the United States.
PATENT PROFILE OF TOP 100 FOREIGN INVESTORS

Analysis of the datasets for the following sections emphasizes intellectual property with a focus on patents as assets. Figures 7 through 13 explore the patent portfolio for the top 100 FDI non-U.S. headquartered companies investing into the United States from 2009 to 2018 with patents.

Analysis of patents is generally done by patent portfolio or by patent family. The patent portfolio considers patent publications. A patent publication is a region-specific published application for an invention. A patent family is a collection of patent applications. Using portfolios of patent publications enables analysis of the geographical distribution of patent values, rather than accounting for the value at a family level, which would otherwise skew the analysis.

FIGURE 7: HEATMAP OF PATENT FILINGS FROM TOP 100 NON-US COMPANIES INVESTING IN THE UNITED STATES

Figure 7 indicates the count of regional filing of patents within the regional offices from 2009 to 2018. When a company seeks to protect its intellectual property in a market where it may or may not do business, it files a patent with the resident geographic authority, indicating the primary market for the products and/or services offered by the FDI investing companies. In ten years, the top 100 FDI companies in the United States engaged in 2.9 million patent filings in 76 markets, including the United States. The volume of patent filing density in Japan may be because among the highly innovative FDI investors there are 18 Japanese firms owning nearly 40 percent of the total patents on the top 100 companies. Furthermore, the Japan office has held the top spot for patent filings for nearly four decades.

Source: Orbis Crossborder Investment and Orbis Intellectual Property, from Bureau van Dijk - a Moody’s Analytics company.
Figure 8, in contrast to the patent count volume distribution, illustrates the value of the patents over the same time period, indicating the value of the corresponding patents that are filed in the respective regional patent offices. The average U.S. value of a patent is $136,590, which is nearly 1.8 times larger than the average patent value in non-U.S. destinations. This could be due to multiple factors, such as regional advancement in specific technologies, increased awareness of the intellectual property amongst the population. Other factors include the high quality of the assets themselves, high quality patent examination standards, historical success in patent commercialization, successful track record for rights enforcement, global demand for the asset, or simply key market placement. The shift from Japanese patent filing density to the United States and Chinese filings reflects increasing commercialization activity and high transaction prices for patent families that included a U.S. patent. The shift occurred around 2014 to 2015. Since 2017, Japan has not been in the top spot for highest number of patents being filed and has been second within the FDI 100 sample set.

**FIGURE 8: HEATMAP OF PATENT VALUES FROM TOP 100 NON-US COMPANIES INVESTING IN THE UNITED STATES**

![Heatmap of Patent Values](image)

*Source: Orbis Crossborder Investment and Orbis Intellectual Property, from Bureau van Dijk - a Moody’s Analytics company.*

Breaking down the top 100 firms by patent count further by category, the top two categories are transport and electric machinery apparatus and energy technology. This is unsurprising given the concentration of FDI in automobile manufacturing in the United States. Figure 9 is based on patent filings for ten years, between 2009 and 2018. Every published patent document is classified into one or more International Patent Classification (IPC) Classes, which are then grouped to come up with a
broader technology classification such as World IP Office (WIPO) Classifications as indicated below. When the same patents (patents from 2009 to 2018) are divided by patent value, computer technology jumps to the top spot, with a technology classification valuation of over $20.1 billion. Patents in the electric machinery, apparatus, and energy technology category then hold the number two spot with a valuation of $15.7 billion.

FIGURE 9: TECHNOLOGY CLASSES OF PATENTS FROM TOP 100 NON-US COMPANIES INVESTING IN THE UNITED STATES

Source: Orbis Crossborder Investment and Orbis Intellectual Property, from Bureau van Dijk - a Moody’s Analytics company.
TOP FDI INVESTORS IN THE UNITED STATES

Figures 10 and 11 list the top 10 FDI innovators from 2009 to 2018 by number of patents and patent value. These companies have long histories of investment and growth in the United States.

The values of the patents made in the United States are relatively high compared to the number of patents filed. For example, while only 19 percent of Samsung’s global patent filings were in the United States, those patents accounted for 88 percent of its global patent value. This indicates that the U.S. intellectual property system and economy deliver and reinforce consistent patent value to foreign investors.

**FIGURE 10: TOP 10 FDI INVESTORS IN THE UNITED STATES BY PATENT COUNT AND BY PATENT VALUE**

<table>
<thead>
<tr>
<th>Company name</th>
<th># of Patents</th>
<th>Share of Patents in U.S.</th>
<th>Share of Non-U.S. Patents</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAMSUNG ELECTRONICS CO., LTD.</td>
<td>982,794</td>
<td>19%</td>
<td>81%</td>
</tr>
<tr>
<td>HITACHI LTD</td>
<td>936,446</td>
<td>15%</td>
<td>85%</td>
</tr>
<tr>
<td>CANON INCORPORATED</td>
<td>765,815</td>
<td>8%</td>
<td>92%</td>
</tr>
<tr>
<td>SIEMENS AG</td>
<td>621,317</td>
<td>11%</td>
<td>89%</td>
</tr>
<tr>
<td>TOYOTA MOTOR CORPORATION</td>
<td>544,024</td>
<td>10%</td>
<td>90%</td>
</tr>
<tr>
<td>ROBERT BOSCH INDUSTRIETREUHAND KOMMANDITGESELLSCHAFT</td>
<td>504,580</td>
<td>49%</td>
<td>51%</td>
</tr>
<tr>
<td>BAYER AG</td>
<td>416,601</td>
<td>12%</td>
<td>88%</td>
</tr>
<tr>
<td>ROBERT BOSCH GESELLSCHAFT MIT BESCHRAENKTER HAFTUNG</td>
<td>391,717</td>
<td>11%</td>
<td>89%</td>
</tr>
<tr>
<td>BASF SE</td>
<td>363,685</td>
<td>7%</td>
<td>93%</td>
</tr>
<tr>
<td>SUMITOMO ELECTRIC INDUSTRIES LTD</td>
<td>297,642</td>
<td>10%</td>
<td>90%</td>
</tr>
</tbody>
</table>

*Source: Orbis Crossborder Investment and Orbis Intellectual Property, from Bureau van Dijk - a Moody’s Analytics company.*
Significant global macroeconomic changes occurred between 2009 and 2018— the global financial crisis had just rattled the global economy and then saw a record long recovery. The timeframe reveals how companies’ actions evolved over the course of the recovery. To dig deeper, we split the timeframe into two five-year splits: the first period in 2009 to 2013 and the second in 2014 to 2018.

There are some clearly defined trends. In the earlier 2009 to 2013 period, patent filing volumes indicate that Japan was the leading geography of focus for most of the investing firms with 377,023 filings. The United States followed Japan with a little over 50 percent of the patents filed in Japan (199,393 filings). China claimed third place (162,609) and the European Patent Office claimed fourth (162,609) in the largest patent filing destination rankings.

The 2014 to 2018 five-year period shows a definitive increase in patent filings to the United States as the top destination. The United States captured 308,283 patent filings from the top 100 companies, grabbing the top patent filing destination spot from Japan who captured 306,468 filings, followed by China (190,045 filings), and the European Patent Office (138,816 filings).

As discussed earlier, there are clear differences when measuring patent filing by destination (volume) and patent value. As volumes slightly ticked downward from the first to the second timeframe, it highlights the role of strategy in investment filings. The valuations of the patents filed in the second period increased by 60 percent compared to the first period, indicating the strength of the patents. The
increase could be attributed to increased awareness of IP and its influence, strategic filing of IP in key regions, high quality IP based on invention regions, or focus on quality versus quantity of patents being filed or owned by the investors. While the scope of this analysis does not explore the dominant effects which contributed to that uptick in patent filing value, there are a few simultaneous, correlated observations. Of the top 100 non-U.S. global multinationals with patents in the United States, overall patent filings shifted to prioritize the United States from 2014 to 2019 and in the same period, total portfolio valuations of those global patents increased significantly.

**FIGURE 12: PATENT TREND ANALYSIS OVER 10-YEAR PERIOD BY VOLUME AND VALUE**

![Diagram showing patent filings and portfolio values over a 10-year period](image)

Source: Orbis Crossborder Investment and Orbis Intellectual Property, from Bureau van Dijk - a Moody’s Analytics company.

Beyond patent volume and value, we can also track other dimensions of patent performance quality such as IP relevance, IP quality, market attractiveness, and technical quality. Figure 13 below shows, in 2014 through 2018, overall increases across all these dimensions happening at the same time as an uptick in patent filing volume in the United States. The analysis of these dimensions for the first and second investment period is provided below.
The datasets for valuations are rated on a scale of 1 to 100, 1 being low quality, 100 being superior quality. The four dimensions chosen for this analysis are:

- **Total IP Quality**: Indicates a collective score on the quality indicators providing an overview of the overall quality of the assets based on over 25+ legal, financial, and technological indicators.
- **IP Relevance**: Indicates how relevant are the associated patents owned by the specific firm. This is a ratio of the market value of assets vs the turnover of the firm. Technology driven and IP centric firms have more high IP Relevance scores.
- **Technical Quality**: Provides an indication of the invention itself covered by the subject patent but collectively at the portfolio level to indicate the collective quality of the patents within the given technology area.
- **Market Attractiveness**: Indicates the attractiveness of the patent based on the current trends for the technology covered within the patent considering patent acquisitions, values paid for similar IP, litigations and associated damages or royalties.

When the top 100 innovative non-U.S. HQ FDI investors prioritized patent filings in the United States, increases in overall patent valuation and quality patent dimensions all increased at the same time. Other countries did not see similar consistent improvement on these indicators in that timeframe.
SAMPLE FDI INNOVATIVE COMPANIES INVESTING IN THE UNITED STATES

Drawn from the Orbis Crossborder Investment and Orbis Intellectual Property databases, the following vignettes illustrate FDI projects from the top 100 non-U.S. headquartered companies in three destination sectors: AI in the automotive industry, health research and development activities in the electric and electronic industry, and manufacturing in the pharmaceutical industry. While diverse by industry and FDI activity, public quotes made by each investor all emphasize that the United States is a business destination that offers mutual benefits for the investor and the community.

In June 2020, Audi of America, a subsidiary of German Porsche Automobil Holding SE, announced that they had opened a new artificial intelligence R&D center in San Jose, CA to serve the North American regional market. The investment was motivated by domestic market potential and skilled workforce availability.

Mr. Frank Grosshauser, Senior Director of the Advance Driver Assistance Systems unit of Audi of Americas, said: “Given the rapid advancement of driver assistance technologies in North America, it’s important to be part of the latest breakthroughs, work with leading edge technology start-ups and attract the top talent. We’re looking to bring on as many as 60 engineers to develop new functionalities, catered specifically to North American Audi customer needs.”

Braun Corporation to open innovation, research, and development center in Carmel, Indiana

In September 2020, The Braun Corporation, a subsidiary of Swedish Investor AB, announced they planned to open an innovation, research, and development center in Carmel, Indiana, expected to open in April 2021. Ms. Staci Kroon, CEO, said: “The BraunAbility Global Innovation Lab will accelerate our pursuit of life-changing innovation for those living with mobility challenges and those who care for them. We appreciate the support of the City of Carmel, a community that is actively working to advance disability inclusion throughout the city.”
US FEDERAL RESOURCES AND TOOLS TO FACILITATE FDI INNOVATION

In addition to hosting leading technology start-ups and a robust intellectual property environment, the United States also offers programs at the federal and state level designed to attract innovative FDI. The SelectUSA program in the U.S. Department of Commerce offers a geographically neutral single point of contact to access resources across over 20 U.S. government (USG) agencies. Some no-cost online tools to help investors navigate U.S. potential programs and databases include The Federal Programs and Incentives Database and the portal to publicly listed U.S. State business incentives. There are more non-public incentives available at the state and sub-state level relating to potential innovative investments that may be accessed through direct conversations with U.S. State Economic Development Organizations (EDOs). The SelectUSA program conducts one-on-one client counseling, provides data and research products, and organizes investment promotion events overseas, domestically, and virtually to demonstrate the United States’ competitiveness and value proposition for high-impact international business investment as well as offer resources for potential investors to understand the U.S. market and its EDO architecture. To access these resources, investors are invited to contact SelectUSA by emailing selectusa@trade.gov and visiting the SelectUSA website.

CONCLUSION

Innovative FDI in the United States benefits both the investing company and overall U.S. competitiveness. When investors can safeguard their intellectual property in a robust patent ecosystem combined with the world’s largest consumer market, the value of in-market innovation activity like research and development work is demonstrably high. The result is that FDI investors have an outsized impact on the U.S. innovation economy. According to the latest available BEA data, while FDI accounts for 6 percent of total private sector employment and 7 percent of private U.S. business sector value added, it also accounts for nearly 16 percent of U.S. business research and development. Looking at both the top 1,000 global multinational investors from 2013 to 2019 and top 100 non-U.S. headquartered multinational patent holders with U.S. patents from 2009 to 2018, the story is clear that the United States is a top destination for global firms who hold large amounts of intellectual property.

This analysis shows the United States is both a top source and destination for innovative FDI projects. A deeper dive into the last ten years of patents for top 10 non-U.S. headquartered FDI investors illustrates how the largest investors in the United States increased their overall patent valuations and other patent quality indicators while they prioritized the United States as a patent filing destination. Recently announced innovative FDI projects demonstrate the strength of United States’ federal programs, and the robust intellectual property system will continue to benefit innovative companies and the overall U.S. economy in the future.
ABOUT SELECTUSA

SelectUSA is a U.S. government-wide program housed in the International Trade Administration at the United States Department of Commerce. Our mission is to facilitate job-creating business investment into the United States and raise awareness of the critical role that economic development plays in the U.S. economy.

FOR MORE INFORMATION, PLEASE CONTACT:
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ABOUT BUREAU VAN DJIK

With information on over 425 million companies, Bureau van Dijk is the resource for company data. We capture and treat private company information for better decision making and increased efficiency. A key benefit of our information is how simple we make it to compare companies internationally. We provide you with access to precise, standardized information on private companies and corporate structures, so that you can confidently and quickly make the most informed decisions possible.

Orbis Intellectual Property provides a unique view on global patents through 143 million patents from 157 countries linked to information on over 2 million companies enabling innovation, technology, and industry trend analysis. It provides linked M&A and ownership timelines for all transacted patents, and information on all transactions for a given patent. Patent valuations and global litigations enable analysis of trends, and assessments of the commercial appeal of new technologies through proxies, circumventing the delay of up to 18 months in patent publications. This unique combination of capabilities enables new perspectives on innovation and IP insights.

Orbis Crossborder Investment looks at globalization via projects and deals, delivers information on the companies behind these investments – both listed and private. It tracks information daily, and monitors announced, completed and cancelled/withdrawn projects and deals, as well as rumors and intentions. Orbis Crossborder Investment allows users to analyze FDI trends by geography and/or sector, generate leads for investment promotion/attraction.
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