

# EMPLOYING IP ACROSS AMERICA

## EXECUTIVE SUMMARY

Evidence shows that innovation and creativity are key drivers for economic growth and prosperity in both developed and developing countries. As the leading country globally, intellectual property (IP)-intensive industries drive America's jobs and economic growth in each and every state. Tasked with quantifying the value of IP and understanding its "spillover" benefits and the broad impact on other industries of local economies, ndp|analytics completed an analysis of the total contributions of IP on each of the 50 states plus the District of Columbia. These state-by-state fact sheets further underscore the economic benefits of IP-intensive industries to state economies via employment, wages, sales, and exports.

"Employing IP across America" builds upon our previous report "IP Creates Jobs for America" to analyze IP companies across all industries in the U.S. economy. In addition to estimating the direct and indirect contributions of IP along the supply chain, our report expands "indirect" benefits to include the "spillover" benefits, on the broader economy. Overall, each dollar spent in direct expenditure creates a chain reaction of indirect spending, with subsequent rounds of additional spending and "spillover" benefits to other industries in the economy. For example, a consumer products company spends money on "direct" inputs such as R&D, personnel, operational costs, as well as goods and services to manufacture their products. The company "directly" purchases equipment and materials from suppliers and pays salaries to employees. These suppliers then buy materials from other vendors and hire workers to produce equipment to sell to the IP-intensive company. The company "indirectly" creates incomes for those other vendors and workers along the supply chain. Vendors and workers use additional incomes to purchase goods and services outside of that supply chain in the local economy. The jobs and income that result from the consumer purchases are considered employment and personal income impacts. The consumer products company essentially accounts for this "spillover" spending.

In this report, we measure IP-intensive companies by tangible inputs such as research and development (R&D) performance and by tangible outputs such as patents, trademarks, and copyrights across all 50 states and the District of Columbia. We define IP-intensive companies as those who have R&D investment in manufacturing and non-manufacturing sectors, who apply registered trademarks to products such as consumer goods, and who belong to six copyright-concentrated industries (motion pictures, newspapers, performing arts, broadcasting, independent artists, and software).

Below are the findings on key indicators from our analysis:

### **Employment**

IP-intensive companies in California, Texas, and Illinois created the most direct and indirect jobs in 2013, accounting for 7.7 million, 5.0 million, and 2.9 million jobs, respectively. These IP-related jobs comprise over half of total jobs in each state with 58% in California, 52% in Texas, and 56% in Illinois. Notably, Indiana, Wisconsin, and Michigan have the largest shares of IP-related jobs at 67%, 65%, and 62%, respectively. IP-intensive companies contribute to state employment in different channels from direct employment to indirect employment along the supply chain, as well as in "spillover" benefits to other sectors in the economy. The positive benefits of IP help support a broad range of other sectors outside the supply chain in the local economy.

## **Sales and Labor Productivity**

IP-intensive companies contribute more to the economy on average than the private sector. Indiana, Michigan, and Louisiana have the highest share of direct and indirect IP sales, accounting for 85%, 78%, and 72% of total sales respectively in 2013. Altogether in Indiana, IP-intensive companies created more than \$489 billion direct and indirect sales. Furthermore, IP-intensive companies have high labor productivity, meaning that their workers produce more than non-IP-intensive companies. For instance, in Indiana, IP-intensive companies have an economic contribution of \$154,441 per worker, whereas the average in the state's private sector is \$86,834 per worker. Higher labor productivity is a common trait among IP-intensive companies.

## **Exports**

IP-intensive companies produce goods that are demanded globally. Within the manufacturing sector, IP-intensive companies in California and Texas exported more than \$240 billion and \$129 billion worth of goods, more than any other state. Moreover, these exports create jobs in the U.S. For instance, exports by IP-intensive manufacturing companies support 377,081 jobs in California and 317,128 jobs in Texas.

## **Wages**

Our study found a consistent pattern across 50 states and the District of Columbia that IP-intensive companies pay higher wages than their counterparts in the private sector. The State of Washington has the highest wage premium for IP workers. The average wage of a worker at an IP-intensive company in Washington earns 48% more than an average private sector employee. California and New Hampshire follow Washington with 44% and 39% higher wages for IP workers, respectively.

## **Conclusion**

State by state, our data consistently show that innovative and creative companies perform better and contribute more to the local economy than their counterparts. The direct and indirect economic impacts of innovation are overwhelming, accounting for increased economic growth and employment. IP-intensive companies play a critical role in driving state and regional economies. These companies serve as our engines of growth, vehicles for innovation, and drivers of economic prosperity. The long-term vitality of these industries will rely on the support from Congress and the Administration to foster and protect the creativity and ingenuity of American IP-intensive companies.

## METHODOLOGY

The research methodology of this study is built upon our previous research projects including *IP Creates Jobs across America* (2012), *Employment and Gross Output of Intellectual Property Companies in the United States* (2011), and *The Impact of Innovation and the Role of Intellectual Property Rights on U.S. Productivity, Competitiveness, Jobs, Wages, and Exports* (2010).

Our previous reports found that IP supports hundreds of thousands of jobs in each state. As described in our previous reports, three common tangible IP products are patents, trademarks, and copyrights. Evidence from economic literature suggests research and development (R&D) investments are positively correlated with the number of patents and the number of trademarks in both large and small firms. Therefore, we use the R&D investment indicator to identify the IP-intensive companies that have IP products in the form of patents and trademarks. Since R&D investments are not correlated with copyright ownership, we identified IP-intensive companies as those companies in six copyright-concentrated industries (motion pictures, newspapers, performing arts, broadcasting, independent artists, and software).

Direct IP jobs are people who work in IP-intensive companies that have patents, trademarks, or copyrights. We defined IP-intensive companies as those companies who reported R&D investment in any industry. We obtained R&D investment, employment, wages, value-added and sales data from the National Science Foundation, U.S. Census Bureau, and the Bureau of Economic Analysis. For IP holdings we used data from the U.S. Patent and Trademark Office and the U.S. Copyright Office. For exports, we use data from the International Trade Administration.

Three main contributions of this report are: (1) to allocate direct IP jobs, wages, value-added and sales by industry across 50 states and the District of Columbia; (2) to estimate the indirect effects of IP on jobs, wages, and sales; and (3) to estimate IP-products and related jobs associated with U.S. exports.

First, we obtain the latest 2013 data of private sector employment, wages, and GDP by state and by industry published by government agencies. Our estimated direct IP jobs represent the number of workers employed by companies that are spending resources on R&D or operate in a copyright-concentrated industry (i.e., IP-intensive companies). Next, to demonstrate economic contribution per worker, we calculate a weighted-average of GDP per worker in IP-intensive companies in each state (i.e., total GDP of IP-intensive companies divided by the total number of workers in IP-intensive companies in all industries within a state). Similarly, we calculate a weighted-average of wage paid to a worker in IP-intensive companies in each state (i.e., total wages paid to workers in IP-intensive companies divided by the number of workers in IP-intensive companies in all industries within a state). To estimate total private sector sales and IP sales, we apply the ratio of GDP to sales by industry at the national level to total and IP GDP for each industry by state.

We use industry economic multipliers by state, produced by the U.S. Bureau Economic Analysis (BEA's RIMS II), to estimate the indirect jobs associated with the direct IP jobs, wages, and sales. Our estimated indirect IP jobs, wages, and sales represent additional jobs, sales, and wages that are created to support those direct IP jobs along the supply chain. The BEA's RIMS II multipliers estimate the direct and indirect effects of an initial economic activity on a selected region. As defined by BEA, direct effects are the dollar amount of inputs required by an industry to produce a dollar of the industry's output, while indirect effects are the dollar amount of inputs required by all other industries in the supply chain to meet the industry's initial demand for the dollar of its output.

Mary Streitwieser of the Industry Benchmark Division at the U.S. Bureau of Economic Analysis, illustrates this concept by using the example of motor vehicles to demonstrate the direct and indirect effects associated with the final outputs.<sup>1</sup> The direct effects are the input production requirements such as the paint, steel, and plastic for the motor vehicles industry to provide additional motor vehicle outputs. The indirect effects are those “trickle down” production requirements for all other industries necessary in the supply chain to support the additional demand for intermediate inputs from the motor vehicles industry, such as the additional requirement for tire cord and synthetic rubber by the plastics and rubber industry to provide the additional tires required by the motor vehicles industry. A subset of indirect effects, called the “induced effects,” are the impacts of household expenditures on goods and services from the income earned by all direct and indirect employees.

Lastly, we use export receipts by state and by industry published by the U.S. Census Bureau and the International Trade Administration. We then divide exports by our estimated sales of IP-intensive companies and sales per worker by state and by industry to estimate exports and associated employment of IP-intensive companies.

### **Selection of industries**

Our dataset covers all manufacturing and non-manufacturing industries in the private sector in the U.S. economy. Manufacturing industries and their corresponding North American Industry Classification System (NAICS) code (inside the parentheses) include food, beverage and tobacco products (311-312), textiles, apparel, and leather (313-316), wood products (321), paper and printing (322-323), petroleum and coal products (324), chemicals (325), plastics and rubber products (326), nonmetallic mineral products (327), primary metals (331), fabricated metal products (332), machinery (333), computer and electronic products (334), electrical equipment and appliances (335), transportation equipment (336), furniture (337), and miscellaneous manufacturing (339). Non-manufacturing industries and their corresponding NAICS codes (inside the parentheses) include mining (21), utilities (22), construction (23), wholesale (42), retail (44-45), transportation and warehousing (48-49), publishing (511), telecommunications (517-518), motion picture and sound recording (512), broadcasting (515), finance, insurance, and real estate (52-53), professional, scientific, and technical services (54), management of companies and enterprises (55), administrative, support and waste management services (56), education services (61), health care and social assistance (62), arts, entertainment and recreation (71), accommodation and food services (72), and other private sector services (81).

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<sup>1</sup> Streitwieser, Mary L. 2010, “Measuring the Nation’s Economy: An Industry Perspective – A Primer on BEA’s Industry Accounts,” Bureau of Economic Analysis.