The 2024 Economic Impact Study of the Commercial Explosives Industry

Methodology

Prepared for

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Executive Summary

The Economic Impact Study of the Commercial Explosives Industry estimates the economic contributions made by the commercial explosives industry to the U.S. economy in 2024. John Dunham & Associates (JDA) conducted this research, which was funded by the Institute of Makers of Explosives (IME). This study utilized standard econometric models first developed by the U.S. Forest Service, and now maintained by the IMPLAN, Inc. Data were sourced from the IME, the Federal Government, and Data Axle.

The study defines the commercial explosives industry as companies that manufacture and distribute commercial explosive materials, as well as companies that utilize explosive materials for commercial purposes (blasting companies).[1] The study measures the number of jobs in these sectors; the wages paid to employees, and their economic output.

Industries are linked to each other when one industry buys from another to produce its own products. Each industry in turn makes purchases from a different mix of other industries, and so on. Employees in all industries extend the economic impact when they spend their earnings. Thus, economic activity started by the commercial explosives industry generates output (and jobs) in hundreds of other industries, often in sectors and states far removed from the original economic activity. The impact of supplier firms, and the "induced impact" of the re-spending by employees of industry and supplier firms, is calculated using an input/output model of the United States. The study calculates the impact on a national basis, by state, and by congressional district.

The study also estimates taxes paid by the industry and its employees. Federal taxes include industry-specific excise and sales taxes, business and personal income taxes, FICA, and unemployment insurance. State and local tax systems vary widely. Direct retail taxes include state and local sales taxes, license fees, and applicable gross receipt taxes. The commercial explosives industry pays real estate and personal property taxes, business income taxes, and other business levies that vary in each state and municipality. All entities engaged in business activity generated by the industry pay similar taxes.

The commercial explosives industry is a dynamic part of the U.S. economy, accounting for about $19.06 billion in total economic output or roughly 0.07 percent of GDP.[2] The commercial explosives industry directly or indirectly employed approximately 60,329 Americans in 2024. These workers earned over $5.05 billion in wages and benefits, and paid $2.39 billion in federal, state and local business taxes.

Summary Results

The Economic Impact Study of the Commercial Explosives Industry measures commercial explosives manufacturers, distributors, as well as blasting companies. The industry contributes about $19.06 billion in economic output, or 0.07 percent of GDP, and through its production and distribution linkages impacts firms in 525 of the 546 sectors of the US economy.[3]

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1 For the purposes of this study, companies that manufacture, distribute, or utilize explosive materials for recreational activities, military applications, or personal use are not included.

2 Based on GDP of $28,284.5 billion. See: *Gross Domestic Product, fourth quarter and year 2024 (forth estimate), GDP by Industry, and Corporate Profit.* US Department of Commerce, Bureau of Economic Analysis, May 3, 2024.

3 Economic sectors based on 2022 IMPLAN sectors.

Other firms are related to the commercial explosives industry as suppliers. These firms provide a broad range of goods and services, including equipment, personnel services, financial services, consulting services or transportation services. Finally, a number of people are employed in government enterprises responsible for the regulation of the sector. All told, JDA estimates that the commercial explosives industry is responsible for 20,689 supplier jobs. These firms generate about $6.43 billion in economic activity.

An economic analysis of the commercial explosives industry will also take additional linkages into account. While it is inappropriate to claim that suppliers to the supplier firms are part of the industry being analyzed,[4] the spending by employees of the industry, and those of supplier firms whose jobs are directly dependent on the commercial explosives industry, should surely be included. This spending on everything from housing, to food, to entertainment and medical care makes up what is traditionally called the "induced impact" or multiplier effect. In other words, this spending, and the jobs it creates, is induced by the commercial explosives industry. The induced impact of the sector is estimated to be nearly $5.09 billion, and generates 24,048 jobs, for a multiplier of 0.68.[5]

An important part of an impact analysis is the calculation of the contribution of the industry to the public finances of the community. In the case of the commercial explosives industry, the traditional business taxes paid by the firms and their employees provide $2.39 billion in revenues to the federal, state and local governments.

Table 1 below presents a summary of the total economic impact of the commercial explosives industry in the United States. Summary tables for each state are included in the Output Model, which is discussed in the following section.

Table 1 – Economic Contribution of the Commercial Explosives Industry

	Direct	Supplier	Induced	Total
Jobs (FTE)	15,592	20,689	24,048	60,329
Wages	$1,711,205,300	$1,762,336,000	$1,574,702,400	$5,048,243,700
Economic Impact	$7,542,856,100	$6,427,459,300	$5,093,034,600	$19,063,350,000
Taxes				$2,391,092,300

Output Model

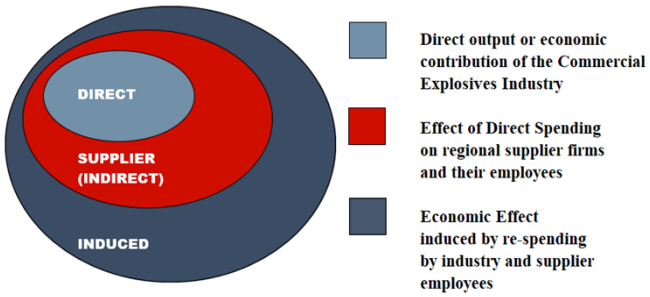
JDA produced the economic impact study for the IME. The analysis consists of a number of parts, each of which will be described in the following sections of this document. These include data, models, calculations, and outputs. These components were linked together into an interactive system that allows the IME to examine the links between the various parts of the industry and to produce detailed output documents on an as-needed basis. As such, there is no book – no thick report – outlining the impact of the industry, but rather a system of models and equations that can be continuously queried and updated.

[4] These firms would more appropriately be considered as part of the supplier firms' industries.

[5] Often economic impact studies present results with very large multipliers – as high as 4 or 5. These studies invariably include the firms supplying the supplier industries as part of the induced impact. John Dunham & Associates believes that this is not an appropriate definition of the induced impact and as such limits this calculation to only the effect of spending by direct and supplier employees.

Economic Impact Modeling – Summary

The Economic Impact Study of the Commercial Explosives Industry begins with an accounting of the direct employment in commercial explosive manufacturing, distribution, and blasting facilities. The data comes from a variety of government and private sources.



It is sometimes mistakenly thought that initial spending accounts for all of the impact of an economic activity or a product. For example, at first glance it may appear that consumer expenditures for a product are the sum total of the impact on the local economy. However, one economic activity always leads to a ripple effect whereby other sectors and industries benefit from this initial spending. This inter-industry effect of an economic activity can be assessed using multipliers from regional input-output modeling.

The economic activities of events are linked to other industries in the state and national economies. The activities the commercial explosives industry performs, such as hiring engineers, scientists, marketing, and business teams, among other jobs, account for the direct effects on the economy. Regional (or indirect) impacts occur when these activities require purchases of goods and services, such as real estate, equipment or electricity from local or regional suppliers. Additional induced impacts occur when workers involved in direct and indirect activities spend their wages. The ratio between induced economic and direct impact is termed the multiplier. The framework in the chart above illustrates these linkages.

This method of analysis allows the impact of local activities to be quantified in terms of final demand, earnings, and employment in the states and the nation as a whole.

Once the direct impact of the industry has been calculated, the input-output methodology discussed below is used to calculate the contribution of the supplier sector and of the re-spending in the economy by employees in the industry and its suppliers. This induced impact is the most controversial part of economic impact studies and is often quite inflated. In the case of the commercial explosives industry model, only the most conservative estimate of the induced impact has been used.

Model Description and Data

This analysis is based on data provided by the Institute of Makers of Explosives (IME), Data Axle,[6] and the Federal Government. The analysis utilizes the IMPLAN Model in order to quantify the economic impact of the commercial explosives industry on the economy of the United States.[7] The model adopts an accounting framework through which the relationships between different inputs and outputs across

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6 Data Axle data as of January 10, 2024. Data Axle is the leading provider of business and consumer data for the top search engines and leading in-car navigation systems in North America. Data Axle gathers data from a variety of sources, by sourcing, refining, matching, appending, filtering, and delivering the best quality data. Data Axle verifies its data at the rate of almost 100,000 phone calls per day to ensure absolute accuracy.

7 IMPLAN® model, 2022 Data, using inputs provided by the user and IMPLAN Group LLC, IMPLAN System (2024), 16905 Northcross Dr., Suite 120, Huntersville, NC 28078, www.IMPLAN.com. Dollar figures are converted to 2024 nominal dollars.

industries and sectors are computed. This model can show the impact of a given economic decision – such as a factory opening or operating a distribution facility – on a pre-defined, geographic region. It is based on the national income accounts generated by the US Department of Commerce, Bureau of Economic Analysis (BEA).[8]

Every economic impact analysis begins with a description of the industry being examined. In the case of this model, the commercial explosives industry is defined as companies that manufacture and distribute commercial explosive materials, as well as companies that utilize explosive materials for commercial purposes. Companies that manufacture, distribute, or utilize explosive materials for recreational activities, military applications, or personal use are not included.

The IMPLAN model is designed to run based on the input of specific direct economic factors. It uses a detailed methodology (see IMPLAN Methodology section) to generate estimates of the other direct impacts, tax impacts and supplier and induced impacts based on these entries. In the case of the Commercial Explosives Industry Economic Impact Model, direct employment in the commercial explosives industry is the base starting point for the analysis. Facility data for commercial explosives facilities were compiled from the IME member lists and Data Axle. Direct employment for these facilities is based on data provided to John Dunham & Associates by IME and Data Axle as of January 2024.

Data are gathered at the facility level; therefore, a company with manufacturing, distribution, and blasting facilities would have three separate facilities, each with its own count of employment. Since the Data Axle data is adjusted on a continual basis, JDA staff verified the data. Multiple stages of cleaning were then performed on these data, including removing duplicates records, removing defunct facilities and companies, and correcting inaccurate data where possible. The data from Data Axle was then merged with member data provided by IME. The database was checked against company websites, and addresses were confirmed to ensure companies were legitimate, operated within the definition, and were still in business. Employment estimates were generally taken directly from the Data Axle data and IME. Where no data was available, employment at each location was estimated to be equal to the median value for similar sites in the same state.

Once the initial direct employment figures have been established, they are entered into a model linked to the IMPLAN database. The IMPLAN data are used to generate estimates of direct wages and output. Wages are derived from data from the U.S. Department of Labor's ES-202 reports that are used by IMPLAN to provide annual average wage and salary establishment counts, employment counts and payrolls at the county level. Since this data only covers payroll employees, it is modified to add information on independent workers, agricultural employees, construction workers, and certain government employees. Data are then adjusted to account for counties where non-disclosure rules apply. Wage data includes not only cash wages, but health and life insurance payments, retirement payments and other non-cash compensation. It includes all income paid to workers by employers. Distribution income and exercised stock options received by proprietors including sole proprietors, and distributions to partners of LLCs are also included in wage figures.

Total output is the value of production by industry in a given state. It is estimated by IMPLAN from sources similar to those used by the BEA in its RIMS II series. Where no Census or government surveys

[8] RIMS II is a product developed by the U.S. Department of Commerce, Bureau of Economic Analysis as a policy and economic decision analysis tool. IMPLAN was originally developed by the US Forest Service, the Federal Emergency Management Agency and the Bureau of Land Management. It was converted to a user-friendly model by the Minnesota IMPLAN Group in 1993.

are available, IMPLAN uses models such as the Bureau of Labor Statistics Growth model to estimate the missing output.

The model also includes information on income received by the federal, state, and local governments, and produces estimates for the following taxes at the federal level: corporate income; payroll, personal income, estate and gift, excise taxes, customs duties; and fines, fees, etc. State and local tax revenues include estimates of corporate profits, property, sales, severance, estate and gift and personal income taxes; licenses and fees and certain payroll taxes.

While IMPLAN is used to calculate the state level impacts, physical location data compiled from Data Axle and Census data provide the basis for congressional district level estimates. The model uses actual physical location data in order to allocate jobs – and the resulting economic activity – by physical address, or when that is not available, zip code. For zip codes entirely contained in a single legislative district, jobs are allocated based on the percentage of total sector jobs in each zip code. For zip codes that are broken by legislative districts, allocations are based on the percentage of total jobs physically located in each segment of the zip code, weighted by the density of the road network. Physical locations are based on either the actual address of the facility, or the zip code of the facility, with facilities placed randomly throughout the zip code area. All supplier and indirect jobs are allocated based on the percentage of a state's employment in that sector in each of the districts. These percentages are based on Data Axle data.

IMPLAN Methodology[9]

Francoise Quesnay, one of the fathers of modern economics, first developed the analytical concept of inter-industry relationships in 1758. The concept was actualized into input-output analysis by Wassily Leontief during the Second World War, an accomplishment for which he received the 1973 Nobel Prize in Economics.

Input-Output analysis is an econometric technique used to examine the relationships within an economy. It captures all monetary market transactions for consumption in a given period and for a specific geography. The IMPLAN model uses data from many different sources – as published government data series, unpublished data, sets of relationships, ratios, or as estimates. The IMPLAN Group LLC gathers this data, converts it into a consistent format, and estimates the missing components.

There are three different levels of data generally available in the United States: federal, state and county. Most of the detailed data is available at the county level, and as such there are many issues with disclosure, especially in the case of smaller industries. IMPLAN overcomes these disclosure problems by combining a large number of datasets and by estimating those variables that are not found in any of them. The data is then converted into national input-output matrices (Use, Make, By-products, Absorption and Market Shares) as well as national tables for deflators, regional purchase coefficients and margins.

The IMPLAN Make matrix represents the production of commodities by industry. The Bureau of Economic Analysis (BEA) Benchmark I/O Study of the US Make Table forms the bases of the IMPLAN model. The Benchmark Make Table is updated to current year prices and rearranged into the IMPLAN sector format. The IMPLAN Use matrix is based on estimates of final demand, value-added by sector and total industry and commodity output data as provided by government statistics or estimated by IMPLAN. The BEA Benchmark Use Table is then bridged to the IMPLAN sectors. Once the re-sectoring is

[9] This section is paraphrased from IMPLAN Professional: Users Guide, Analysis Guide, Data Guide, Version 2.0, MIG, Inc., June 2000.

complete, the Use Tables can be updated based on the other data and model calculations of interstate and international trade.

In the IMPLAN model, as with any input-output framework, all expenditures are in terms of producer prices. This allocates all expenditures to the industries that produce goods and services. As a result, all data not received in producer prices is converted using margins which are derived from the BEA Input-Output model. Margins represent the difference between producer and consumer prices. As such, the margins for any good add to one. If, for example, 10 percent of the consumer price of commercial explosives distribution is from the purchase of trucking services, then the trucking margin would be 0.1.

Deflators, which account for relative price changes during different time periods, are derived from the Bureau of Labor Statistics (BLS) Growth Model. The 224 sector BLS model is mapped to the 546 sectors of the IMPLAN model. Where data is missing, deflators from BEA's Survey of Current Businesses are used.

Finally, one of the most important parts of the IMPLAN model, the Regional Purchase Coefficients (RPCs) must be derived. IMPLAN is derived from a national model, which represents the "average" condition for a particular industry. Since national production functions do not necessarily represent particular regional differences, adjustments need to be made. Regional trade flows are estimated based on the Multi-Regional Input-Output Accounts, a cross-sectional database with consistent cross interstate trade flows first developed in 1977. These data are updated and bridged to the 546 sector IMPLAN model.

Once the databases and matrices are created, they go through an extensive validation process. IMPLAN builds separate state and county models and evaluates them, checking to ensure that no ratios are outside of recognized bounds. The final datasets and matrices are not released before extensive testing takes place.