The Beer Institute Economic Contribution Study

Methodology and Documentation

Prepared for

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Executive Summary:

The Beer Industry Economic Contribution Study (The Study) has been conducted on a regular basis by the Beer Institute, a Washington, DC based trade organization. This study estimates the economic contributions made by the malt beverage industry to the U.S. economy in 2010. John Dunham and Associates, conducted the research in concert with the Beer Institute and the National Beer Wholesalers Association. This work used standard econometric models first developed by the U.S. Forest Service, and now maintained by the Minnesota IMPLAN Group. Data came from industry sources, government publications and Dun and Bradstreet, Inc.

The study defines the beer industry as those firms involved in the brewing, wholesaling, importing/ exporting and retailing of malt beverages including beer, malt liquor and flavored malt beverage products. The study measures the number of jobs in these sectors; the wages paid to employees; and the value added and total output of each.

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 malt beverage industry generates output (and jobs) in hundreds of other industries, often in 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 and by state and by Congressional District.

The study also estimates taxes paid by the industry and its employees and consumer taxes generated by the sale of malt beverage products. Federal taxes include the industry-specific excise tax, business and personal income taxes, FICA, unemployment insurance, and the Special Occupational Tax paid by brewers, wholesalers and retailers. Brewers pay federal excise taxes. State and local tax systems vary widely, with brewers, wholesalers and retailers each making substantial payments. Direct wholesale state and local taxes primarily consist of state excise taxes and gross receipt taxes, where applicable. Direct retail taxes include state and local sales taxes, license fees, and applicable gross receipt taxes. Brewers, wholesalers and retailers pay 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 beer industry pay similar taxes.

The brewing industry is a dynamic part of the U.S. economy, accounting for about $223.8 billion in output or 1.5 percent of GDP. American and international brewers, along with their wholesale and retail partners, directly or indirectly employed approximately 1.84 million Americans in 2010. These workers earned almost $71.2 billion in wages and benefits. Members of the brewing industry and their employees paid $33.5 billion in direct federal, state and local taxes. In addition, the consumption of beer throughout the country generated $5.3 billion in federal and state excise taxes, $4.9 billion in state sales taxes, and almost $682.2 million in other beer-specific local taxes. The figures presented in the analysis do not include local sales taxes.

Beyond numerical indicators of brewers' economic activity is another powerful story. The brewing industry has a presence in every U.S. Congressional district. Family names are on most beer packages sold in the United States. Brewers are responsible corporate citizens who care deeply about abuse of their products. Members of the brewing industry have worked individually and collectively on dozens of successful education and awareness programs to reduce drunk driving, underage drinking, and all other forms of alcohol abuse.

Summary Results:

The Beer Institute Economic Contribution study measures the impact of the malt beverage industry, as defined by its traditional three tiers of brewing, wholesaling, and retailing, on the entire economy of the United States. The industry contributes about $223.8 billion in output or 1.5 percent of GDP and, through its production and distribution linkages, impacts firms in all 432 sectors of the US economy.[1] The brewing process (as defined in this study) begins in one of two ways. First, agricultural products – such as barley, corn, rice and hops – are purchased from farmers and agricultural supply companies throughout the country. Alternatively, beer can enter the country as an imported finished product. The 1,875 firms that use agricultural products to produce malt beverages or directly import the product into the United States are denoted as brewers.[2] There are basically three types of brewing firms in the country. First, the major brewers – those that produce over 2 million barrels of malt beverages per year. These include the traditional names such as Anheuser-Busch, Miller Brewing Company, and Coors. There are also several dozen regional brewers in the country, each of which generally produces less than 2 million barrels of malt beverages. Finally, there are literally hundreds of brew-pubs and craft-brewers located throughout America. These firms produce beer for a limited market – sometimes only for their own retail establishment. All told, these firms employ 41,490 people in brewing or importing operations, sales, packaging, and direct distribution.

Once malt beverages have been produced or imported, they enter the second tier of the brewing industry – the wholesaling tier. We estimate that there are nearly 3,300 firms involved in the wholesale supply of malt beverages throughout the country (not including wholesaling operations directly owned and operated by the major breweries).[3] Wholesalers are involved in the transportation of malt beverages from the brewers or a bonded warehouse operated by importers, and the storage of products for a limited period of time. The wholesaling tier of the industry directly employs around 98,120 individuals throughout the country.

Finally, the third tier of the industry directly sells products to the consumer. This can either be through on-premises sales (as in the case of a restaurant or tavern), or for off-premises consumption (grocery stores, package stores, etc.) The nature of malt beverage retailing varies by state. In some states, liquor stores sell malt beverages, in some grocery stores, and in others bars sell products for off-premises consumption. For this analysis, the retail tier is assumed to consist of firms in the following industries: Restaurants and taverns, retail stores, hotels, airlines, and amusement locales. While there are obviously other venues that may sell beer to the public – street vendors, cruise lines, non-profit groups, etc. they are not included in the analysis due to limited data availability and the small amount of product that they handle. We estimate that there are approximately 547,600 licensed outlets selling malt beverages in the United States, with over 904,370 employees.[4]

Other firms are related to the three tiers of the malt beverage industry as suppliers. These firms produce and sell a broad range of items including ingredients for the production process, fuel, packaging materials, sales displays or machinery. In addition, supplier firms provide a broad range of services, including personnel services, financial services, advertising services, consulting services or even transportation services. Finally, a number of people are employed in government enterprises responsible for the

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1 Based on GDP of $14.861 trillion. See: *National Income and Product Accounts Gross Domestic Product: Fourth Quarter and Annual 2010 (second estimate)*, News Release, US Department off Commerce, Bureau of Economic Analysis, February 25, 2011. Economic sectors based on IMPLAN sectors.

2 Throughout this study, the term "firms" actually refers to physical locations. One brewer, for example, may have breweries in 5 or 6 locations throughout the country. Each of these breweries is included in the count.

3 Physical locations.

4 Retailer counts are based on data from TDLinx, a division of ACNielsen (US), Inc., provided to JDA by the Beer Institute. Retail job counts are based on data from Dun & Bradstreet.

regulation of the malt beverage industry. All told, we estimate that suppliers to the malt beverage industry are directly responsible for 291,740 jobs with supplier firms generating almost $59.5 billion in economic activity.

An economic analysis of the malt beverage 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[5] the spending by employees of the industry, and those of supplier firms whose jobs are directly dependent on malt beverage sales and production, should surely be included. This spending on everything from housing, to food, to educational services and medical care makes up what is traditionally called the "induced impact" or multiplier effect of the malt beverage industry. In other words, this spending, and the jobs it creates is induced by the production, distribution and sale of malt beverages. We estimate that the induced impact of the industry is nearly $76.2 billion, and generates 500,600 jobs, for a multiplier of about 1.54.[6]

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 beer industry, this contribution comes in two forms. First, the traditional direct taxes paid by the firms and their employees provide over $33.5 billion in revenues to the federal, state and local governments. In addition, the consumption of beer generates $5.3 billion in federal and state excise taxes, $4.9 billion in state sales taxes, and just over $678 million in other beer-specific local taxes. These figures do not include local sales taxes.[7]

Table 1 below presents a summary of the total economic impact of the 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 Malt Beverage Industry

($ In Billions)	Direct	Supplier	Induced
Output	$ 88.072	$ 59.475	$ 76.208
Jobs	1,043,985	291,741	500,616
Wages	$ 32.539	$ 16.227	$ 22.405
Taxes			$ 44.36

Output Model:

John Dunham and Associates produced the Economic Contribution of the Beer Industry study for the Beer Institute. 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 Beer Institute 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.

The model has been developed with a series of basic output views, each of which will be detailed below. The output views are generated interactively by entering query criteria such as the state of interest into the

5 These firms would more appropriately be considered as part of the supplier firms' industries.

6 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 and 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.

7 Federal excise taxes are actually paid by the brewer and included in the price of the product. In this analysis, however, they are included as part of consumption taxes (but redistributed based on the location where the beer was produced).

system. Each of the output sheets is linked to the industry model and is updated "on-the-fly" on an as-needed basis.

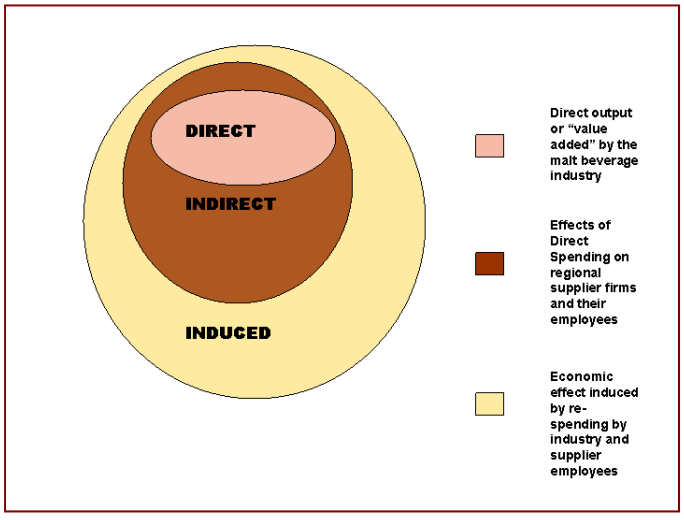
- STATE OUTPUT SHEET: is a summary sheet of all data for a single state. The sheet provides information on employment, wages, output, the number of establishments, and taxes generated and paid. The direct impact of the industry is broken out by the three tiers (brewers, wholesalers and retailers). Supplier and induced impacts are broken out by major economic sector – basically mirroring the 1 digit NAICS code (agriculture; business and personal services; construction; finance, insurance and real estate; manufacturing; retailing; transportation and communication; travel and entertainment; wholesaling; mining and government).

- NATIONAL OUTPUT SHEET: Same as the STATE OUTPUT SHEET but for the country as a whole.

- DISTRICT OUTPUT SHEET: The DISTRICT OUTPUT SHEET mirrors the STATE OUTPUT SHEET except that it includes data only for the governmental legislative district selected by the user. Data are allocated by district based either on the physical address of the facilities (in the case of brewers and wholesalers), or by the zip code of the facility (in the case of retailers and restaurants/taverns). Zip code data are allocated based on the percentage of the physical area of the zip code contained within the boundaries of the legislative district. If 100 percent of the physical area of the zip code is located within the district 100 percent of the jobs are allocated to that district. If, for example, 10 percent of the physical area of the zip code is located within the district only 10 percent of the jobs in that zip code are allocated to the district. Supplier and induced jobs are allocated based on a similar distribution using total jobs in the United State by 2 digit SIC-code across each of the thousands of area and point zips in the country.

Economic Impact Modeling – Summary:

The Economic Contribution of the Beer Industry begins with an accounting of the direct employment in the various sectors. Brewing encompasses company owned distribution operations, can production and other supply operations, and beer importers. Wholesaling includes the nationwide network of beer distributors and related warehouse and transportation operations. Retailing includes locations where beer is consumed "on-premise," such as bars, restaurants, sports and entertainment venues, and airlines. "Off-premise" retail outlets are supermarkets, convenience stores, warehouse stores, and similar locations. The data come 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 required to produce a six-pack of beer from malting barley, to packaging, to shipping generate the direct effects on the economy. Regional (or indirect) impacts occur when these activities require purchases of goods and services such as building materials from local or regional suppliers. Additional, induced impacts occur when workers involved in direct and indirect activities spend their wages in the region. The ratio between total economic and direct impact is termed the multiplier. The framework in the chart on the previous page illustrates these linkages.

This method of analysis allows the impact of local production 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 Beer Institute model, only the most conservative estimate of the Induced Impact has been used.

Model Description and Data:

This Beer Institute Economic Contribution Model (Model) was developed by John Dunham and Associates based on data provided by D & B, Inc., the Beer Institute, the National Beer Wholesalers Association, and state and federal governments. The analysis utilizes the Minnesota IMPLAN Group Model in order to quantify the economic impact of the malt beverage industry on the economy of the United States. The model adopts an accounting framework through which the relationships between different inputs and outputs across industries and sectors are computed. This model can show the impact of a given economic decision – such as a factory opening or operating a sports 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 the Beer Institute Model, the malt beverage industry is defined as the three tiers of the brewing industry. This will incorporate firms in the following economic sectors:

- Brewing: Including firms that brew beer and other malt beverages, and firms that import malt beverages for consumption in the United States. The brewing sector also includes company-owned packaging and wholesaling operations. Brewers include major multi-state multi-operational brewing companies, regional and craft brewers and brewpubs.

- Wholesaling: Including firms involved in the distribution and storage of malt beverages after they leave control of the manufacturer. Exporters are included in the wholesaling sector; however, the direct effects of company-owned wholesaling operations have been shifted to the brewing sector for this analysis.

- Retailing: This includes firms involved in both the on-premises and off-premises sale of malt beverages. This sector includes restaurants, bars, hotels, retail establishments (e.g. grocery stores, package shops, convenience stores, and liquor stores), amusement places (e.g. amusement parks, beer

[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. For more information on the IMPLAN Model, see page 9.

gardens, bowling alleys) and airlines. Model limitations preclude the inclusion of ABC stores, military stores, colleges, or other government owned outlets as part of the retailing sector.

The IMPLAN Group model is designed to run based on the input of specific direct economic factors. It uses a detailed methodology (see 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 Beer Institute Economic Contribution model, direct employment in the malt beverage industry (as described above) is a base starting point for the analysis. Direct employment in each of the three components of the industry is – due to data limitations – estimated in two distinct ways. In the case of the brewing sector, establishment employment is based directly on data provided to JDA by Dun & Bradstreet, Inc. as of September 2010. Dun & Bradstreet data is recognized nationally as a premier source of micro industry data. The D&B database contains information on over 15 million businesses in the United States.[9] It is used extensively for credit reporting, and according to the vendor, encompasses about 98 percent of all business enterprises in the country. This data is gathered at the facility level; therefore, a company with a brewery, warehouse and sales office would have three facilities, each with separate employment counts. Since the D&B data are adjusted on a continual basis, JDA and staff from the Beer Institute scanned the brewery data for discrepancies. Member data from the Beer Institute was merged with the D&B data to ensure that all member companies were covered in the analysis, and JDA staff verified a large sample of the data using either company websites, or Google Earth.

Employment for large brewing operations was replaced where necessary with figures directly obtained from the companies themselves. In the case of brewpubs, industry employment is assumed to be three employees, reflecting only the brewing operations of what are essentially restaurants or taverns.[10] Employment in other brewing facilities is based on employment at specific locations reported to D & B by the companies as of September 2010, with employment at locations where no data are available estimated to be equal to the median value for similar sites.

Wholesale employment is based directly on data provided to JDA by Dun & Bradstreet, Inc. as of September 2010. This data is gathered at the facility level; therefore, a company with a brewery, warehouse and sales office would have separate employment counts. Member data from the National Beer Wholesalers Association was merged with the D&B data to ensure that all member facilities were covered in the analysis, and JDA staff verified a large sample of the data using either company websites, or Google Earth. JDA staff assigned individual wholesale facilities to either a beer, wine or spirits model based on the predominant beverage distributed by the company. Wholesalers distributing major malt beverage products (those produced by Anheuser-Busch InBev, MillerCoors, Boston Brewing or Heineken) were all assigned to beer wholesaling, while companies that distributed Diageo brands were generally assigned to spirits wholesaling. In the case where it was not obvious if a wholesaler was a beer wholesaler or a Wine/Spirits wholesaler, JDA staff used Google Maps to view the actual facility to determine what brands were featured on distribution vehicles. Employee counts for facilities with missing data or for facilities not included in the D&B lists are based on industry medians.

Data on the retail sectors are all based on sales of malt beverages in each of the 50 states and the District of Columbia. These amounts are multiplied by either the malt beverage multipliers and output per employee ratios included in the IMPLAN model for the retail components of the industry in order to estimate total employment in each sector, or a calculation based on beer sales as a percentage of total

[9] The D&B information database updates over 1 million times a day, over 350 million payment experiences are processed annually, and over 110 million phone calls are made to businesses. In addition, D&B uses a patented matching technology and over 2,000 information computer validations to ensure a high standard of data quality.

[10] Based on Industry Revealed, Institute for Brewing Studies, 1997

alcohol sales.[11] These results were cross-checked against a wide variety of establishment data by state and were found to present a reasonable estimate of the employment in each sector generated solely by malt beverage sales. Retail data are adjusted to take into account dry counties, and state regulations pertaining to beer sales in grocery and food stores.

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 in each of the three sectors: brewing, wholesaling and retailing. 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 employees, and certain government employees. Data are then adjusted to account for counties where non-disclosure rules apply. Wage data include 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.

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 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, and 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.

Indirect Taxes paid due to the consumption of malt beverages in each state are also included in the analysis (see Data Sources section for a detailed analysis of how these data were constructed). These figures – while mostly separate from the reported taxes paid – contain very small double counts. This is because individuals employed by the beer industry or its suppliers purchase malt beverages, and the sales taxes on beer as well as state and federal beer excise taxes paid by these people are already included in the direct taxes section. In addition, estimates of certain small beer-specific taxes – such as the Tennessee Gross Receipts Tax or the California Bottle Tax – are included.

Finally, all data on the number of establishments for the brewing and wholesale sectors come from the D & B data, augmented by data from the Beer Institute, and the National Beer Wholesalers Association. Establishment estimates for retail come from TDLinx, a division of ACNielsen (US), Inc., provided to John Dunham and Associates by the Beer Institute.

While IMPLAN is used to calculate the state level impacts, Dun and Bradstreet data provide the basis for congressional district level estimates. Publicly available data at the county and congressional district level is limited by disclosure restrictions, especially for smaller sectors of the economy like brewing and beer wholesaling. Our model therefore uses actual physical location data provided by Dun and Bradstreet in order to allocate jobs – and the resulting economic activity – by county. For counties entirely contained in a single congressional district, jobs are allocated based on the percentage of total sector jobs in each county. For counties that are broken by congressional districts, allocations are based on the percentage of total brewing and beer wholesaling jobs physically located in each segment of the county. Physical

[11] For restaurants, bars and food stores. See: *Table 2.4.5U. Personal Consumption Expenditures by Type of Product,* US Department of Commerce, Bureau of Economic Analysis, Revised October 31, 2010.

locations are based on either 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 counties. Again, these percentages are based on Dun and Bradstreet data.

While brewing, wholesaling and retail jobs are generally allocated in this manner, retailing jobs are restricted to only those counties that allow the retail sale of malt beverages. There are hundreds of counties in the United States that are either wholly dry or partly dry.[12] The congressional district breakdowns exclude retailing jobs from these counties. In addition, grocery store/convenience store jobs are included in those states that allow for such sales.

Data Sources:

The Beer Institute Economic Contribution model is based on a wide range of data from industry and government sources. The basis for the model is establishment and employment data purchased from Dun and Bradstreet in September 2010. This data provides the initial counts of facilities and employment levels for breweries and wholesalers, and is used extensively to allocate supplier and induced impacts across congressional districts.

The employment data was adjusted by the Beer Institute to take into account known brewery closures and known changes to employment. Sources for the update include trade publications and interviews with major brewery contacts. Wholesaler data is also adjusted based on data provided by the National Beer Wholesalers Association.

Malt beverage sales and consumption data is calculated by John Dunham and Associates and are based on on-premise and off-premise volume splits provided by the Beer Institute, Personal Consumption Expenditures from the U.S. Department of Commerce Bureau of Economic Analysis, wholesale margins from the National Beer Wholesalers Association and micro-level data provided by Dun and Bradstreet. Personal consumption expenditures allow us to measure the amount households in the country spend on goods and services such as beer and dining out. These data, along with estimated retail employment levels are used to allocate the national malt beverage sales across each state. Sales and excise tax rates are accurate as of June 2011. The federal excise tax rate used in this model is $18 per barrel.[13] Ex-dock brewers' prices without any taxes are estimated to be about $175.87 per barrel. Standard retail and wholesale margins are applied along with the taxes and fees in order to estimate total sales by product category, state and location.[14]

All of the estimates of wages, output and tax rates other than beer excise taxes, beer sales taxes and other specific beer based consumption taxes are derived from the Minnesota IMPLAN Group Input-output models.

IMPLAN Methodology:[15]

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12 Sales banned either on- or off-premise.

13 A small brewer tax break of $7 per barrel on the first 60,000 barrels exists for brewers with production of less than 2 million barrels. Federal Excise Tax rates for each state are adjusted to take this into account based on state specific tax collection data from the Beer Institute.

14 Wholesale and Retail margins are from the Bureau of Economic Analysis, *U.S. Benchmark Input-Output Accounts, 2002*, October 2007. On-premise retail margins are calculated by John Dunham and Associates and are set to ensure that total sales in each state equal estimated sales volumes.

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

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 Minnesota IMPLAN group 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, such as brewing. IMPLAN overcomes these disclosure problems by combining a large number of datasets and by estimating those variables that are not found from 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 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 beer is from the purchase of hops, then the hops 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 509 sectors of the IMPLAN model. Where data are 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 developed in 1977. These data are updated and bridged to the 509 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.

Comparison to Earlier Studies

John Dunham and Associates has conducted the Economic Contribution Study for the Beer Institute since 2003 (the 2002 Impact study). Over the 5 study periods, there have been major changes to both the industry and to the economy. In addition, learnings from prior years carry forward, and each year new components and data are added to the study.

The IMPLAN models used in the study also change from year to year, reflecting adjustments to the production structure of the economy. In 2008, IMPLAN also changed its methodology completely and eliminated or combined many of the economic sectors.

A comparison of the initial economic impact results with those from earlier years, revealed large differences in the brewing sector. Output levels per employee had grown to outlandish proportions. This was due to the fact that the IMPLAN tables used in this analysis were based on 2008 National Income and Products Accounts (NIPA) data that were subsequently revised after their release. Correcting this error involved a revision in the underlying IMPLAN structure to account for the much lower actual brewing output. While this did address much of the problem, it is not possible to correct for all of the underlying linkages in the IMPLAN tables that were based on the erroneous NIPA data. This means that the supplier and induced impact in the 2010 study are likely overstated.

In addition to these corrections, the 2010 report contains substantially more information on the wholesaling sector. Prior to this year, JDA's access to detailed wholesale company data from the NBWA was limited. This year, a substantial amount of NBWA data were included in the analysis, and the estimates of wholesale tier employment have been enhanced. At the same time, since JDA was simultaneously working on a beer, a wine and a spirits impact model, double counting of wholesaling and retailing jobs between these three sectors has been greatly reduced. This may have lowered the estimates, particularly in the retail tier.

Finally, in 2010 less data on both brewer production pricing and on retail tier pricing was available to JDA. In prior years, these data were available through other client relationships. In 2010, therefore, JDA had to model base ex-dock (no tax added) brewer pricing. The estimates proved to be somewhat higher and slightly more variable (they had a higher standard deviation) than those received in prior years. Some of this variability was reduced in the modeling process but the overall pricing was still somewhat higher than may have been expected. This price information is used to develop estimates of consumer based taxes and therefore, sales tax figures may be slightly inflated in the 2010 model relative to the 2008 estimates.

This said, any errors as to the model structure are our own and JDA will continue to revise and update the Beer Industry Economic Contribution model as additional information are made available.