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Michigan Beer: An Economic Contribution Assessment of Michigan's Value Chain

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Introduction

Michigan craft beer production is growing, but it is not the only state experiencing an explosion in the growth of local brewing. What was once a widespread hobby of home brewers has turned into a consumer-driven market for specialty beers, and this craft beer movement is moving the beer consumption experience to days past.

According to the Brewers Association, microbreweries are breweries with production less than 15,000 barrels (one barrel is 31 gallons) a year and with at least 75 percent of sales off-site.¹ Brewpubs are breweries where more than 25 percent or more of its beer is sold on site. They further define craft breweries as those producing less than 6 million barrels a year and distinguish between independent and conventional brewers based on ownership (Brewers Association 2017a). Together, microbreweries and brewpubs occupy the craft beer segment of the beer industry. The rise of this craft beer movement brings us back to the olden days of beer production and how consumers view beer. Before prohibition, the production and distribution of beer was largely a local phenomenon. Local and regional breweries supplied local homes and bars, and it was rare for beer to be shipped over long distances. This partitioning of markets spawned local flavors and local preferences for American-styles brews dominated by ales and porters. In the 19th Century, German immigrants brought with them their own style of beers called lagers. These lagers became the seed for Americas most popular style of beer and adopted by the larger national brands like Budweiser, Busch, Coors, Miller and Stroh's, to name a few.

In the 1870s, the advent of technological advances in refrigeration, transportation and pasteurization allowed brewers to realize economies of scale in production. Relative to other styles of beer, lagers are germane to mass production within large batches (Watson 2012), making them suitable for wider geographic distribution. As these mega-breweries developed, they whittled away market share of smaller and more local-leaning breweries. A series of market consolidations through acquisitions and closures concentrated production to fewer facilities that could take advantage of economies of scale in purchasing and distribution and economies afforded through larger batch sizes. That is, the remaining concentrated firms could underprice their smaller competitors, forcing them out of business. In addition, market concentration allowed the larger brewers a degree of market power in dictating what products would be available on retail shelves and generated huge marketing advantages. The result was a rapid decline in the number of breweries in the U.S. and the commoditization of beer (Scherer 1996, Ch. 10).

Because of the importance of economies of scale in production and advertising, national brands need to appeal to wide swaths of the population. As such, beer flavors tended toward carefully blended and bland flavors with the broadest consumer appeal (Miller 1982). In effect, it was a race to the middle. This developed a marketplace of largely indistinguishable beers where blind consumer taste tests showed that consumers could not accurately discern beers by taste, color or aroma (Greer 1984). Despite this, brand loyalty was fierce. Individuals identified with the brand they consumed and extravagant expenditures on national marketing campaigns helped solidify those loyalties.

In 1873, 4,131 breweries operated in the U.S. Industry consolidation reduced the number of breweries to 100 in 1978 operated by only 50 firms (Brewers Association 2017b). About this time, Jimmy Carter signed

¹ Michigan law defines microbreweries as those producing less than 60,000 barrels per year.

into legislation a bill that would make brewing beer at home legal. Up to this point, and following post-prohibition restrictions on the production of alcohol, all beer production had to be undertaken under license. Senator Alan Cranston's amendment to H.R. 1337 freed hobbyists to experiment with beer production at home, for home consumption, and spawned a new era of interest in alternatives to the bland national brands that made up the beer market landscape. States similarly liberalized restrictions on microbreweries in the 1980s, providing a market opportunity for hobbyists. Many of those hobbyists set out to commercialize their homebrews, planting the seeds of an underground movement. To be sure, about 90 percent of these pioneering craft breweries started out from homebrews (Fallows 2010).

Today, there are over 5,000 operating breweries in the U.S., but market share is still concentrated with a few national firms. That is, while there are more operating breweries in the U.S. today than during the height of the brewing industry, there are about 15.5 breweries per million residents today compared to 96.1 in 1873. Additionally, the six largest firms make up about 84.5 percent of the total market of beer sales, led by Anheuser-Busch Inbev with 40.2 percent of the market (Mintel 2016a). That is, the remaining 4,994 firms volley for their share of the remaining 15.5 percent of a market that is largely not growing.

Americans are consuming less beer overall. However, total expenditures on beer continues to rise at a modest pace, reflecting increases in prices and shifts in consumer preferences toward premium beers. One sector that is gaining share is the craft beer sector. According to Mintel, beer consumers largely fall into one of two categories: 1) general beer drinkers and 2) specialty beer drinkers. While general beer consumption is in modest decline, specialty beer consumption is growing by double digits, but still makes up a small share of overall beer sales – 14 percent, according to Mintel (Mintel 2016b). A key contributing factor to the growth in craft beer is the millennials. For them, much of the draw is the ability to experiment with flavors the marketplace offers. Hence, craft beer drinkers are much less prone to be brand loyal. This contrasts with the general population who, despite having a hard time differentiating brands by taste, tend to be loyal to their favorite brand. Another factor driving demand for craft beer is the improving economy. Household finances are improving and with that freeing consumers from value brands to more higher-value brands. In this, consumers are more willing to invest in experiences rather than fulfilling a need. However, in the realm of adult beverages, beer is competing with an ever-increasing selection of wines and flavored liquors for the consumer dollar.

Michigan Beer Industry

German Americans largely populated the Great Lakes states from Upstate New York through the Dakotas (U.S. Census Bureau 2000) and fanned the demand for German-styled lagers. One of these German migrants founded Michigan's most famous brewery in Detroit. Bernhard Stroh established the Stroh brewery in the 1850 and quickly developed a following. Through acquisitions, the Stroh firm added other national and regional brands of beers including Schaefer, Schlitz, Lone Star and Old Milwaukee and expanded their footprint through multiple breweries. Stroh's reached its pinnacle in the early 1980s after the acquisition of Schlitz to become the third largest U.S. producer of beer. However, it took on heavy debt and was not able to compete during the devastating Miller-Anheuser Busch-Coors price wars of the 1970s and 80s (Miller 2017, Scherer 1996). In 1985, Stroh's closed the original Detroit brewery citing its age and lack of room for expansion as the primary reasons, and was eventually broken up in 2000.

Despite the closure of Stroh's Detroit brewery, the Michigan spirit of beer brewing lived on. Michigan was both early in the adoption of microbreweries and is one of the leading states in the number of operating

microbreweries. Michigan ranked fifth in the nation in terms of number of craft breweries in 2012, but more recently slipped to sixth according to the Brewers Association (Brewers Association 2017c). Regardless, the number of breweries continues to rise. What started as three microbreweries in the state in 1993 has now grown to over 240 and all expectations are that this number will continue to grow. In addition, the level of production per brewery is also growing, increasing the per-brewery rate of output by just under 2.0 percent between 2015 and 2016 (Brewers Association 2016, Brewers Association 2017c).

Michigan has vast capacity to supply breweries with barley, rye and wheat inputs, and in providing hops. Because Stroh's brewery depended heavily on Michigan-grown barley, Michigan's agricultural sector has a long history of producing barley for malting (Miller 2017). However, the institutional knowledge in barley production has largely atrophied over time, where malting quality grains generally command a premium over conventional feed and food grains. MSU Extension is working with agricultural producers to ramp up Michigan's ability to supply malting grain for brewing. In addition, Michigan hops growers have been diligently ramping up production in recent years and supplying hops for brewing regionally and nationally. Hops grown in Michigan have clear attributes that differentiate it from that grown in other hops producing states in the Northwest. As hops are the spice of beer, hops may be the key to branding Michigan produced beer as Michigan. As exemplified by Napa Valley's experience with wine, flavor alone is not sufficient for building a regional brand, but also reputation and concerted marketing effort generate public interest and perception of the region as the primary source of quality products. Those products must deliver on the real and perceived attributes that draw consumer endorsements.

This structural support for Michigan's budding beer industry is reflected in the attitudes of brewers and the growth of this sector. Michigan brewers are very interested in locally sourcing their inputs (Miller 2017) and generating a genuinely Michigan made product, and a cadre of specialty malt producers has developed to help source this demand. However, these small malting operations cannot take advantage of the economies of scale afforded by large-scale commercial malting houses. By blending malts, large-scale malt houses are also better able to meet exacting specs required for base brews that are produced year round. Relative to those commercial providers, many small-scale malting houses may be limited to supplying malt for batch runs of specialty and seasonal brews because of the higher price and product inconsistencies.

One can think of Michigan brewers as being in one of three markets: 1) local, 2) regional or 3) national. As most brewers start out small and with local footprint, they start out in a local market. Upon developing a following in their local market and depending on the span of this market, they may seek to expand regionally and possibly selling outside of the state. For example, a brewery located in Grand Rapids may be able to take advantage of the community's draw of residents from other states to build out a potential regional customer base outside of the state. Reaching the status of a national brand requires significant distribution resources that are usually reserved for the top tier national brands. However, the obstacles to reaching new markets are getting smaller through information technologies and wholesalers than can take a product to a national market without requiring the brewer to invest significant in-house distribution networks. More commonly though, a brand reaches the national audience through acquisition by a national supplier.

According to the Michigan Brewers Guild, there are about 240 breweries operating in Michigan today. Nearly all of them fall under the category of microbrewery or brew pub. That is, as defined by the Brewers Association, most all fall within the craft beer segment. This definition feels arbitrary, as all Michigan

brews distinguish themselves from leading national brands like Budweiser, Bud Light, Coors and Miller Genuine Draft with more traditional flavors and greater adherence to craft artistry. Nevertheless, once a national brand takes a 25 percent or more stake in the brewer or supersedes the six million barrel limit, the Brewers Association drops them from the list of craft beer brewers.

The Spanish brewery Mahou San Miguel purchased a 30% stake in Grand Rapids-based Founders Brewing Co. in 2014. Because the stake exceeded 25 percent ownership by a large brewer, Founders' brews are no longer considered craft beer by the Brewers Association. Alternatively, a private equity firm-owned Oskar Blues Brewing Co. acquired Perrin Brewing Co. in Comstock Park, MI but retained Perrin's operational independence. According to Brewbound, the infusion of capital allowed Perrin to nearly double production the first year (Rurnari 2016). Oskar Blues Brewing further acquired Florida-based Cigar City and continues to expand its holdings to become the 10th largest craft brewer. Because a private equity firm owns Perrin, it retains its craft beer status.

Michigan brewers who have developed a following of Michigan consumers are realizing there are opportunities to expanding sales outside of Michigan. California-based Lagunitas Brewing Co recently acquired partial equity in Short's Brewing Co. However, Heineken, who had a minority stake interest in Lagunitas, went on to purchase the remaining interest in Lagunita. This follows Short's recent expansion into surrounding states. Short's, known for their slogan "Michigan only, Michigan forever," recognized that staying viable requires expanding one's reach beyond the state and have subsequently changed their slogan to reflect this broader market appeal. Heineken's Lagunitas holds a minority stake of 20 percent in Short's. Hence, Short's Brewing Co. retains its craft brewer status with the Brewers Association (Allen 2017).

Michigan brewpubs are expanding by adding new locations. Grand Rapids' Founders recently announced plans to add a taproom in Detroit's Cass Corridor, while Detroit's Atwater Brewery opened a brewpub in Grand Rapid (Walsh 2017). Others, like Arbor Brewing Co. sees opportunities building brewpubs across the state. Expanding the geographic scope of one's market may be imperative in this competitive market and allow brewers to advantage from economies of scale in brewing, marketing and distribution. The brewery industry is one that is steeped in scale economies that make it less costly to produce in larger batches. Hence, expansion is a key strategy for maintaining a competitive advantage.

There is concern that national brands that take minority stakes Michigan craft beer producers will impair Michigan's craft beer industry by pursuing profits over quality and underpricing other craft beer producers. More conventional national brands, like Anheuser Busch and MillerCoors, are not sitting idle. They are introducing and acquiring brands marketed as craft. Whether these national brewers can market large-batch beers as craft was recently challenged in court. A California challenge to MillerCoors's labeling of Blue Moon as craft was lost because there is no legally-binding definition of what constitutes craft beer. The outcome dilutes the overall value proposition of the "craft beer" label and, hence may allow national producers to encroach on the market of smaller independent producers. That is, the craft beer industry must make extra effort to distinguish itself from others to justify higher prices.

In total, the beer sector is rife with change, as consumers seek alternatives to bland tasting popular brands. Especially for millennials, there is a desire to invest in experiences rather than consume a beverage. Craft beer affords this value proposition, but keeping the customer engaged may be challenging because craft beer consumers are less likely to be captured by brand loyalty. Additionally, as the craft beer movement is relatively new, the industry has little reference to how consumers may respond to an

economic down cycle. If the wine industry is any comparison, research suggest that demand will move with the business cycle (Freeman 2000).

Economic Contribution of Michigan Brewing Industry

A recent report set out to estimate the economic contributions of Michigan's local beer sector (Miller 2017). In that, local beer was considered that which was sourced with Michigan-grown inputs and consumed in Michigan. The findings highlighted the value chains that underlie Michigan's beer producing sectors, but limited economic impact considerations to those brewers categorized as craft brewers by the Brewers Association and that which is also consumed in Michigan. It also omits impacts of beer that is produced in Michigan but draw from outside agricultural inputs, barely, wheat, rye and hops. This report complements that report by viewing economic contributions of Michigan beer production regardless of where the beer inputs are sourced and where the beer is actually consumed. In the economic estimates beer production from out-sourced materials still give rise to economic activity in the state based on the value-added contribution of brewing and related activity, but not from the outsourced inputs. Additionally, the extent to which in-state suppliers contribute to industry output is captured, along with all associated transactions that in-state suppliers make in providing these inputs. For in-state agricultural producers of barely, hops and other inputs, these secondary transactions may be made up of purchases of seed, agrochemicals, farm services, fuel and other expenses that go into producing agricultural commodities that go into beer production. The estimates also capture the value-added activities of brewers along with any associated transactions that stay within the state. This may include, to the extent that suppliers are located within the state, the purchases of labels, packaging, energy, transportation, malt, hops, and business services like marketing, accounting, and legal services, to name a few.

This study also differs from the prior economic impact study in that the primary measure is the contribution to economic outcomes, rather than an impact. By measuring contributions, we are not netting out the next best alternative uses of inputs, or inferring a counterfactual state of the Michigan economy should brewing activities not take place. Attempting to estimate a true economic impact that accounts for all alternative best uses of inputs would result in estimates that are tenuous at best. Rather, this study will account for the share of economic activity of the current economy that is associated with commercial brewing and associated production of agricultural inputs to beer production.

Methods

A Michigan-calibrated IMPLAN economic impact assessment model was used to estimate the contributions that arise through secondary transactions. The IMPLAN data set, along with the prior report on local beer impacts developed in the local beer impact report (Miller 2017) was used to estimate direct effects and for modifying IMPLAN data to better reflect the beer production and retail activities that contribute to economic outcomes. IMPLAN is an input-output model, meaning that it traces transactions across industries, households and government units and uses these measures to estimate economy-wide changes in economic activities associated with changes in single or multiple industry activities. In this, economy-wide contributions generally exceed the initial infusion of economic activity generating what is commonly referred to as a multiplier effect. The name multiplier effect arises from the linear nature of the model that suggests an increase in one industry's output will result in a proportional increase in all of the purchases that originate from the source of the impacts.

The IMPLAN model is driven by the dollar value of transactions and therefore, the resulting contributions are measured in the value of total transactions. However, input-output models also provide estimates of employment, labor income and contributions to gross state product. These measures are derived from fixed ratios of employment, labor income and gross state product per dollar of sales (output). The fixed ratios are industry averages. While IMPLAN provides a high degree of industry granularity with 440 distinct industries, barley and hops production is included in industry aggregates grain farming and fruit farming, respectively. Additionally, brewpubs are represented in the full service restaurants industry. Only breweries are uniquely categorized. Hence, industry aggregates may not be suitably representative of the actual transactions associated with Michigan brewing, and industry purchases are modified as described in Miller (2017) to better represent the industries under this study.

The economic contribution of Michigan's brewing industry is measured up through brewing activities, including transportation costs of final output. However, in a separate measure, we include the economic contribution beyond brewing to include retail and food accommodation sales of Michigan-brewed beer as a separate measure and net out the production of the beer sales in our final estimates. In this, we recognize two channels by which economic value is generated. Beer that is brewed and distributed in Michigan generates value all the way to final sale for consumption, while that brewed in Michigan and shipped out of state stops contributing to value at the state borders. The retail and food accommodation sectors contribute value through the margins charged on beer sales. These are the markups on the final consumer price they are able to charge.

Industry statistics suggest that about 61 percent of beer sales go to kegs, while the remainder are sold in bottles or cans (Turnwall 2017). Additionally, using surveys of consumers, Mintel estimates that about 79 percent of beer is consumed away from home (Mintel 2016a). For this analysis, we assume that 100 percent of kegged beer is consumed on-site through venues such as eating and drinking places including events where beer is sold. The remainder of on-site consumption is then allocated to bottled and canned beer, where it works out to about 48 percent consumed on-site and 52 percent consumed off-site.

As IMPLAN is driven on sales values, not volume of production, we must convert volume of production into actual sales values. To do this, we break out volume into three categories: 1) on-site drafts, 2) on-site bottled/canned and 3) off-site bottled/canned. Each are assigned an average price per volume as described below.

On-site draft beer price starts with the brewers' typical selling price per ½-barrel keg. A scan of brewer revenues per ½ barrel indicates a wide range, centered on \$110. While brewers can direct sell through their own window or to food and drinking establishments, it is more common to channel kegged beer through a distributor, where the average markup is 35 percent. If selling direct, the brewer and sellers are likely to capture a share of that 35 percent, hence, the final selling price is likely not to be influenced significantly depending on the channel. Hence, the vendor price is likely to center on \$135 per ½ barrel. The general rule of thumb is that food and drink vendors' markup beer by a factor of four. Hence, the retail value of a ½ barrel of craft beer is about \$540. Considering that a half barrel contains 124 pints, this breaks down to about \$4.79 final selling price per pint, excluding taxes.

Bottled (including canned) craft beer that is sold onsite is assumed to go through a similar channel as kegged beer. However, we start with the typical consumer price of a six-pack of industry standard bottle (ISB) craft beer of 12 U.S. ounces and work backward before arriving at the food and drink vendor price. In this, a typical six-pack of craft beer sells to the consumer for about \$10.50 before tax. Assuming retailers

impose a markup of 31 percent on wholesale price, and that wholesalers charge a 25 percent markup on brewers' price, the expected brewers' price would be \$4.62 per six-pack. Wholesale markup would be \$2.63 per six-pack, while food services would markup the final selling price by a factor of four. The final consumer price would be \$28.98 per six-pack, or \$4.83 per bottled or canned craft beer for on-site consumption.

Finally, off-site bottled and canned beer generally costs \$10.50 per six-pack. Based on the retail and wholesale margins of 25 percent and retail margins of 31 percent, from above, the brewer commands \$4.62 of that sale price, while wholesalers command \$2.63 and retailers retain \$3.26. This places the final consumer price per bottle at about \$1.75, or \$10.50 per six-pack.

Finally, while we recognize the impacts of all in-state brewing activities, we limit upstream impacts of wholesale and retail contributions to that share that remains within the state. Because Michigan-brewed craft beer sales are only taxed at the producer level, and not at the wholesale or retail level, we cannot discern the share that stays in state based on tax receipts. An alternative measure that provides indication of the share that is exported is a location quotient (LQ). Michigan's beer brewing LQs is the share of employment in beer brewing in Michigan divided by that of the nation and measures the relative intensity of beer production in Michigan. If this ratio is greater than one, it indicates that Michigan's beer production per worker is higher than that of the nation, so Michigan must be a net exporter of beer. The Bureau of Labor Statistics annual measures of Quarterly Census of Employment were used to calculate Michigan's beer production LQ of 1.42. Hence, Michigan is a net exporter of beer, but this measure has flaws in that it does not reveal what percent of production is actually exported, and it has some theoretical shortcomings that is covered in the academic research journals (Lahr 1993). IMPLAN also provides an estimate of the share of locally produced beer called a regional share coefficient. This is measured as the ratio of production minus exports divided by production minus exports plus imports, all measured in dollars. This indicates that 47.3 (1-.52711) percent of Michigan produced beer is exported out of the state. This measure suffers in that the actual share is indirectly measured, and that it does not discriminate for craft beer production over other commercial beer producing facilities. Because Michigan's beer brewing industry is largely made up of craft or microbreweries, this latter issue may not be a problem.

These consumer prices, along with wholesale and retail shares are then allocated to volumes based on the share of production that go into kegs (61%) and the share that are bottled or canned (39%). Bottled and canned beer is then distributed to that share that goes to on-site consumption (48%) and that for off-site consumption (52%). Total volume of sales comes from the Brewers Association estimate for 2016. However, since the Brewers Association definition excludes consideration of Founders Brewery production in their estimates, we add in the output of Founders. Under this measure of output, we are not limiting estimates to what remains in Michigan, but also recognize the value created along the value chain for beer produced in Michigan but shipped out of state. The share that remains in-state (52.7%) generates wholesale and retail impacts.

Sales for on- and off-site consumption only entails margins earned at the point of sales and wholesale level to avoid double counting. However, brewing activity must be subtracted from the final estimates when aggregating industry totals. When modeling retail sales and sales at food and drinking places, wholesale trade is zeroed out because wholesale trade is modeled separately. That is, we terminate the built-in model estimates of wholesale trade impacts to model them separately.

IMPLAN provides estimates of direct employment, labor income and gross state product (GSP),² while direct sales (output) are provided by the estimates described above. These direct effects are measures of the activity directly associated with the transactions measured. IMPLAN also provides estimates of secondary transactions broken out into Indirect and Induced effects. Indirect effects are those transactions and associated effects that occur because businesses buy from other businesses. Induced effects arise from changes in household incomes. This captures expenditures from labor income and proprietor’s incomes. Finally, all of the effects are additive, such that the total contributions are measured as the sum of the direct, indirect and induced effects.

Estimates of the Economic Contributions of Michigan Beer Industry

Using the assumptions described above, we estimate the economic contribution of Michigan’s craft beer industry, including Founders in three parts: 1) beer brewing, 2) retail for off-site consumption, and 3) sales for on-site through food and beverage establishments. The IMPLAN model is adjusted to account for the budding local value chain as described in Miller (2017). The findings for each contribution area are presented below. This is followed by the aggregate gross contribution estimates across the value chain.

Estimated Contributions of Brewing Activity

Estimates of the contributions of brewing activities entails all the upstream transactions associated with brewing, including purchases of inputs and services in commercial brewers. Estimates include those contributions from in-state consumption as well as for export out of the state. The estimates also aggregate brewing activities for both on-site and off-site. Accordingly, we estimate the value of Michigan craft beer production, including Founders, to be \$197.5 million in 2016. This and associated transactions is expected to give rise to \$314.6 million in economy-wide transactions, as shown in Table 1. These transactions are expected to give rise to some 877 jobs, where 218 are directly employed in brewing activities. These jobs support some \$44.3 million in labor income in the state and contribute about \$106.9 million in gross state product.

Impact Type	Employment	Labor Income	GSP	Output
Direct Effect	218	\$9,931,000	\$50,298,000	\$197,532,000
Indirect Effect	438	\$24,893,000	\$39,468,000	\$87,128,000
Induced Effect	221	\$9,510,000	\$17,094,000	\$29,958,000
Total Effect	877	\$44,334,000	\$106,861,000	\$314,618,000

Table 1: Economic Contribution of Brewing Activities

Estimated Contributions of Off-site Consumption Sales

Impacts of sales for off-site consumption include only those sales that remain in Michigan. The estimates include both retail and wholesale sales. Only margins (markup earned by retailers and wholesalers) are used as a basis of impacts. Because of the nature of the model, the purchases of beer from brewers and wholesalers cannot be easily subtracted out of the estimates. Hence, the estimated secondary effects include expected purchases of beer through conventional channels and may not represent the true expected extent to which final transactions take place. A correction is provided in the aggregate contribution estimates below.

² Gross state product can be thought of as total state income to labor, proprietors and to government, through taxation.

Retail sales generate fewer dollars per unit in final consumption, thus generates a more moderate level of contribution to the Michigan economy than sales through food and drinking establishments. Nonetheless, about \$29.3 million in wholesale and retail margins are generated by Michigan-produced beer, giving rise to some \$53.1 million in transactions throughout the economy. This facilitates about 458 Michigan jobs, where about 294 are directly related to the retail and wholesale efforts of beer distribution. These jobs are expected to bring in about \$19.5 million in annual labor income and contribute about \$33.6 million to gross state product.

Impact Type	Employment	Labor Income	GSP	Output
Direct Effect	294	\$11,829,000	\$19,896,000	\$29,265,000
Indirect Effect	67	\$3,470,000	\$6,188,000	\$10,704,000
Induced Effect	97	\$4,177,000	\$7,508,000	\$13,158,000
Total Effect	458	\$19,476,000	\$33,591,000	\$53,127,000

Table 2: Economic Contribution of Retail and Associated Wholesale Activities

The retail sales estimates highlight the importance of distinguishing between an economic impact and an economic contribution estimates. The estimates in Table 2 show how much net income Michigan beer vendors for off-site consumption generate in selling Michigan-brewed beer. It does not suggest these effects would disappear if Michigan brewers suddenly stopped producing beer. The inference that such sales would disappear is referred to as an impact estimate. However, since consumers would largely switch to existing national and import brands in the absence of local craft beer options suggest that retail sales would likely not decrease by the estimates shown in Table 2. At most, we may infer that national and import brands may command lower prices, and that lower price, with the same volume of purchases, may lead to a verifiable impact. It is not the effort of this study to determine how consumers would respond to a market change that excludes Michigan craft beer.

Estimated Contributions of On-site Consumption Sales

The final contribution estimates are for sales for on-site consumption and associated wholesale activities. The value of wholesaling activities differs from that of the prior section only with regards to volume. That is, we do not differentiate wholesale per-unit values between selling to retail and selling to food and drink establishments. However the per-unit values of selling through food and drink establishments is much higher with the typical 400 percent price markup charged for on-site consumption, and food and drinking establishments are much more labor intensive than retail establishments. To be sure, the high markups that such establishments are able to charge is attributed to the mix of services and attributes the establishment provides, whether it be the mix of food, big-screen TVs or sporting facilities. Hence, the values earned are not necessarily driven by the value of the beer consumed, but rather by the mix of products and ambiance afforded by the venue.

Accordingly, we estimate that the contribution of Michigan-brewed beer to food and drink establishment margins and associated wholesaling is \$342.4 million. This drives additional transactions up to \$625.7 million annually. Being more labor intensive, direct employment (including venue and wholesaling) is expected to top out just short of 6,511 jobs. Through the multiplier effect, about 8,403 jobs are supported with expected total labor income of \$229.9 million and contributing about \$329.1 million to annual gross state product.

Impact Type	Employment	Labor Income	GSP	Output
Direct Effect	6,511	\$140,820,000	\$170,031,000	\$342,370,000
Indirect Effect	749	\$39,719,000	\$70,389,000	\$128,032,000
Induced Effect	1,144	\$49,312,000	\$88,638,000	\$155,345,000
Total Effect	8,403	\$229,851,000	\$329,058,000	\$625,747,000

Table 3: Economic Contribution of On-site Consumption Sales and Associated Wholesale Activities

The same caveat applies to on-site consumption purchases as for retail. This is a measure of the contribution to the state economy, but should not be taken as an economic impact. We would largely expect such sales to exist through competing sources of local beer is not an option. Also, note that while contribution to margins are limited to Michigan-sourced beer, secondary effects may include purchases of other food and drinking establishment inputs such as raw stakes and other food products. This both reflects that beer consumption is part of the attraction of on-site consumption and that once the venue receives payment, the actual floated dollars are not limited to paying for beer input.

Estimated Gross Contributions of Michigan Beer Industry

The final task is to combine the contribution estimates into a single set of contribution estimates that accounts for double counting brewing activities in the retail and food and drinking establishment contribution estimates. This is accomplished by subtracting out the in-state beer production contributions that remain in state from the sum of the three sets of estimated contributions. Here the 52.7 percent Michigan beer production contributions are subtracted from the gross contributions of retail and food and drinking establishment contribution estimates. However, the contribution of the 52.7 percent is estimated using an unmodified model to account for the model's reliance on conventional beer supply chains with greater reliance on imports in estimating final sales contributions.

The resulting gross contribution estimates are shown in Table 4. In this, the expected contribution of Michigan's craft beer value chain, including Founders, totals \$841.0 million, where the direct value chain makes up about \$473.4 million of that value. In total, just over 9,300 jobs can be linked back to Michigan-produced beer, where about 6,917 are directly tied to brewing, moving, selling and serving beer. The largest bulk of this is in the food and drink service industry. Total labor income is expected to be about \$272.2 million, making up average annual job earnings of around \$29,000. Finally, estimates suggest that Michigan's craft beer sector contributes some \$417.7 million to annual gross state product.

Impact Type	Employment	Labor Income	GSP	Output
Direct Effect	6,917	\$157,765,000	\$215,838,000	\$473,395,000
Indirect Effect	1,042	\$56,013,000	\$96,910,000	\$183,621,000
Induced Effect	1,354	\$58,388,000	\$104,952,000	\$183,937,000
Total Effect	9,313	\$272,166,000	\$417,700,000	\$840,952,000

Table 4: Aggregate Economic Contribution of Michigan's Brewery Value Chain

Estimates of the Economic Contributions of Michigan's Malt Production

In a comprehensive study on Michigan's budding malting industry, Miller (2017) outlines Michigan commercial malting inputs and associated economic contributions through barley production based on interviews with malt house operators. Michigan has seen frenzied growth in craft maltsters opening commercial operations around the state. This interest is driven by the demand to supply local producers with locally sourced ingredients, fulfilling consumer interests in buying locally sourced foods. As part of the local food movement, the consumer draw of beer's locational attributes is largely not tested in the

market. As such, Michigan’s commercial maltsters are targeting non-price point attributes within the marketing plans that entail craft or artisan attributes, customer service, and unique flavor and aroma attributes. While hops is considered the spice of beer, malt’s contribution to product flavor, texture, color and contribution to locational branding remains questionable. If locational attributes of malt can be realized, then craft malt may have long-term viability within a specialty market segment of the Michigan brewing industry that is increasingly finding production outside the state. However, smaller maltsters will have a hard time reaching the level of product consistency afforded by larger commercial malting houses like Cargil, Briess, Rahr and others. Consistency of malt input is a key component of national brands of beer, where consistency is a key quality attribute. Furthermore, as small maltsters do not benefit from the economies of scale of large malting houses and because of issues with batch consistency, craft malt houses may be limited to supplying for special short-run or seasonal brews.

Economic contributions of malting operations arise from economic activities of malt houses including direct expenditures to suppliers of barley and other grains used in the malting process. All grain inputs are assumed to be from local suppliers, as indicated in interviews with commercial maltsters. Additionally, as no Michigan craft maltster indicated targeting sales outside of Michigan, we assume no export market currently exists. This could change if Michigan craft malting gets a sufficient foothold in the craft beer industry. Because malting grain for brewing is largely a new industry in Michigan, an expenditure profile had to be developed in the IMPLAN model to estimate the secondary effects of malting operations. We apply the same profile in Miller (2017) that is applied in the overall industry impacts above for tracing brewers expenditures for malt and for expenditures of malting operations.

Table 7 shows the estimated contributions of malt production, and reproduces that found in Miller (2017). These impacts are derived from 630 acres of barley production, and 3.7 million pounds of malt for brewing. The selling price of barley is set at \$8.50 per bushel, while that for malt is set at 65 cents per pound, giving rise to \$2.4 million in malt sales. The impacts suggest that Michigan malting operations currently generates about 38 Michigan jobs and contributes about \$2.0 million in annual gross state product. In this, it is instructive to note that Michigan brewers largely receive malt from outside the state. Also, because no maltster indicated selling out of state, the estimated contributions in Table 5 are fully accounted for in the industry contribution estimates found in Table 4.

Effect	Employment	Labor Income	GSP	Output
Direct Effect	20	\$748,953	\$910,844	\$2,406,583
Indirect Effect	11	\$363,000	\$558,202	\$1,857,354
Induced Effect	7	\$303,527	\$545,605	\$955,021
Total Effect	38	\$1,415,479	\$2,014,651	\$5,218,958

Table 5: Economic Contribution of Michigan’s Malt Suppliers

Estimates of the Economic Contributions of Michigan’s Hop Production

Hops production is a relatively new industry in Michigan. It started about 10 years ago with the first plantings of hops and has expanded ever since. Today Michigan hops are sold to nearly all states in the U.S. Hops is said to be the spice of beer in that hops provides the bitterness that offsets the sugars generated in fermentation. It also provides the aroma that is distinct in beer (Miller 2017).

Hops grow on vines and require substantial upfront investment in trellising and harvesting equipment and storage. A recent MSU Extension report estimates that the per-acre fixed costs of installing a hops yard is about \$13,668 (Sirrione et al 2014). This cost assumes a planting density of 1,000 plants per acre and

average annual yields of 1,500 pounds per acre at maturity (Tennis 2017). Actual costs and yields may differ, but for the purpose of this report, this will be the basis of fixed costs that are spread throughout the expected 20-year life of the hops yard. Hops growers will often use a third party to dry and store hops, like Black Creek Hops, in Scottville, MI. For the purpose of this report, we assume all planted hop yards are at maturity and that the costs and returns to drying and pelletizing hops are accrued at the farm.

According to Robert Serrine (Serrine 2017), Michigan produced malt generally commands about \$10.76 based on self-reporting volumes sold and total revenues of Michigan produced and sold hops. The Brewers Association estimate that Michigan has 800 acres in hops production (George 2016), though with recent plantings, that number is likely to be closer to 1,000 acres (Serrine 2016). The produced hops is sold within the state and exceedingly exported to other states – mostly directed at microbreweries (Tennis 2017). To complement the total estimated economic contributions of Michigan-produced beer, this section breaks out that contribution arising from Michigan hops production. Of this, that share of hops production that stays in state has already been captured in the above estimates. However, the value of hops exported outside of the state is not recognized in the above estimates.

Because growing hops is a specialized industry, it is not well represented in the IMPLAN economic modeling software. Hence, we adopt specialty crop sector modifications used in the industry-wide impacts above and described in Miller (2017), reflecting an MSU Extension study of the expected enterprise budgets of Michigan hops growers (Serrine et al 2014). In this, we project that total value of hops output is based on average yield of 1,500 lbs. per acre at selling price of \$10.76 per lb. for 850 acres, totaling \$13,719,000 per year.

The resulting contribution estimates are represented in Table 6, where accounting for all secondary effects, Michigan hops production for in- and out of state use supports some 283 jobs with annual labor income of \$10.7 million and contributes about \$16.7 million to annual gross state product. As mentioned before, much of this impact is captured in the above estimates. Based on industry statistics, about one-third of the hops impacts are associated with export activity and is not captured in the above value chain contribution estimates.

Impact Type	Employment	Labor Income	GSP	Output
Direct Effect	208	\$7,601,418	\$11,407,849	\$13,719,000
Indirect Effect	21	\$815,583	\$1,176,549	\$2,158,569
Induced Effect	53	\$2,293,011	\$4,121,520	\$7,230,426
Total Effect	283	\$10,710,013	\$16,705,918	\$23,107,995

Table 6: Economic Contribution of Michigan’s Hops Production

Conclusions

Michigan based breweries are expanding. Every year new breweries are starting up, existing breweries are expanding, and Michigan’s larger breweries are increasingly shipping to or operating breweries in other states. Michigan has a long history of being a top beer brewing state but faded from the national landscape with the closure of Stroh’s Brewery in Detroit. However, the national landscape is increasingly giving way to a regional perspective. Beer consumers are increasingly interested in breaking out of the old traditional brands formulated to appeal to the masses. Rather consumers are experimenting with flavors and seeking unique attributes. Craft beer and the craft beer industry provide consumers a fresh twist on regional beer and exotic blends long forgotten since prohibition. We expect craft beer to continue to take

market share of a shrinking category of consumer products. However, we caution that craft beer may remain a niche sector. This makes predicting a turning point for the industry difficult. Therefore, while we can expect further growth, we do not know if recent pullbacks on the rate of growth are temporary or a signal that the sector is reaching maturity.

Table 7 combines Table 4 with the export portion of Table 6 recognizing the hops that is produced in Michigan but exported is also a component of the Michigan beer sector value chain. In this, hops produced in Michigan but exported to brewers outside of Michigan ceases to contribute to the Michigan value chain once exported, and is not captured in the value chain estimates at the brewery level to retail. This hops component is a small share of the overall value chain, but is one with potential growth as the hops production sector continues to see cautious but robust growth. In total, we attribute some 9,398 Michigan jobs to the Michigan beer industry, commanding some \$275.4 million in annual labor income and contributing about \$422.7 million to annual gross domestic product.

Impact Type	Employment	Labor Income	GSP	Output
Direct Effect	6,980	\$160,046,000	\$219,261,000	\$477,511,000
Indirect Effect	1,048	\$56,258,000	\$97,263,000	\$184,268,000
Induced Effect	1,370	\$59,076,000	\$106,188,000	\$186,106,000
Total Effect	9,398	\$275,379,000	\$422,712,000	\$847,885,000

Table 7: Aggregate Economic Contribution of Michigan’s Beer Value Chain

The findings of this study highlight the ubiquitous nature of Michigan’s brewing industry from that which is produced for consumption in the state and that which is produced for export to other markets. While largely comprised of small producers, in the aggregate, it comprises a measurably large component of the Michigan economy. Interest in consuming locally-sourced beer and craft beers is increasing and we believe the industry continues to grow relative to the 2016 numbers used in this estimate. There are a surprisingly large number of jobs that can be tied to Michigan-sourced beer, but most of these jobs are tied to the food and drink service sector industries.

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