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Boutique Brews, Barley, and the Balance Sheet: Changes in malt barley industrial use require an updated forecasting approach

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With nearly 1,955 new craft breweries opening in the last 10 years and annual growth in beer sales of slightly more than 10 percent during the same period, it is not hard to argue that the American craft beer segment is experiencing a renaissance (Watson, 2014).¹ Today, more than 3,150 micro and craft breweries are operating in the United States and brewery counts are at the highest level in 125 years (Brewers Association, 2014; Watson, 2014).

Previous methods of estimating barley use for malting and brewing or “industrial” purposes have relied on the historical relationship between malt barley use for lager-style beer production. However, craft style beers require proportionally more malt per barrel of beer brewed. In fact, industry sources indicate that, on average, craft-style beers use between three and seven times the amount of malt per barrel as is required to brew a comparable volume of the ubiquitous, American light lager or “noncraft” beer (Brophy, 2013; Watson, 2013). Because of these significantly different malt barley needs, growth in both total and proportional volume production of craft beer necessitates an update in barley industrial use estimation methods.

¹ The Brewers Association defines a craft brewery as small, independent, and traditional: annual volume of production is less than 6 million barrels; less than 25 percent of the craft brewery is owned or controlled by an alcoholic beverage industry member that is not itself a craft brewer; and the craft brewery produces beers whose flavor is derived from traditional or innovative brewing ingredients and their fermentation.

Divergent Production, Sales Trends

Between 1993 and 2013, craft brewers' volume of production increased ninefold, and annual volume production growth averaged nearly 14 percent. In contrast, the volume of noncraft beer brewed in the United States has decreased by about 0.6 percent per year since 1993. Craft beer sales totaled \$5.7 billion in 2007 and nearly tripled to \$14.3 billion by 2013 (Brewers Association, 2014). In 2013, total beer volume sales in the United States declined 1.9 percent, while the craft segment grew by 18 percent in volume and 20 percent in sales. Despite these impressive figures, craft breweries still account for a comparatively small proportion of U.S. beer sales. In 2014, all craft breweries combined to produce 15.6 million barrels, while total U.S. beer production topped 191.6 million barrels, giving craft production a 7.8 percent share of total production.

The Malty Consequences

The overall volume of beer produced in the United States declined from 202.6 million barrels in 1993 to 191.6 million in 2013, a 5.4 percent overall drop. More striking is that over the same 20-year period, use of malt and malt extract by U.S. brewers decreased by 17.8 percent, reflecting improved production efficiencies at larger brewing houses and a proportional increase in light beer production.²

While aggregate production declines are still expected, the outlook for industrial malt use and, by association, malt barley demand is not necessarily grim. Craft beer production typically requires three to seven times the amount of malt and malt products typically used to brew noncraft beer. Therefore, growth in the craft beer sector could have a relatively greater impact on malt demand than a similar-sized decrease in noncraft volume. Given an average annual growth of nearly 14 percent in volume over the past 20 years, the craft beer renaissance has already offset some declines in noncraft demand for malt and malt products. If current trends continue, expanded craft production and the corresponding demand for malt and malt products has the potential to fully offset declining noncraft use and potentially reverse declines in industrial use for malt and, by extension, domestic malt barley.

Data, Methods, and Key Assumptions

Previous sections describe the changes that have taken place in the beer marketplace and some of the underlying characteristics of both the craft and noncraft beer segments. To determine how these translate to updated barley industrial use calculations, a number of relationships were quantified using various data sources and insights from subject area experts. Data for aggregate production and ingredient use is provided by the U.S. Department of the Treasury, Alcohol and Tobacco Tax and Trade Bureau (TTB). Data on craft production and ingredient usage patterns are provided by the Brewers Association and a variety of malting, spirits, and brewing industry experts. Trade data are sourced from the U.S. Census Bureau and downloaded from USDA's Foreign Agricultural Service Global Agricultural Trade System database.

Malt Conversions

The TTB monthly Beer Statistical Report aggregates use of malt barley and malt products into a single category, necessitating the use of expert judgment to determine the typical usage shares of malt and the various malt products (including extracts: dry, crystal, liquid). Extract use is estimated between 2 and 10 percent, with consensus nearing 5 percent of the category total; malt thus accounts for the vast majority, 95 percent, of aggregate category volume (Watson, 2014; Hansen, 2014; Germershausen, 2014).

Variations in barley type (two-row vs. six-row), quality, and malting methods affect the rate of conversion between comparable units of barley malt. Noting this, on average, 1.3 pounds of malt barley are required to produce 1 pound of malted barley. Malt extracts are concentrated and require relatively more malt barley per unit. Using Smith's

²Calories are reduced in light beers, in part by cutting back on the amount of malt used in the brewing process.

(2008) conversions, it is estimated that 1.76 pounds of malt barley are required per pound of liquid extract; 2.22 pounds are required per pound of dry extract. Used in equivalent proportions, approximately 2 pounds of malt barley are required to produce an average pound of extract. Taking proportions and conversion factors together, each pound of malt and malt products described in the TTB reports accounts for approximately 1.33 pounds of malt barley (Heisel, 2014).

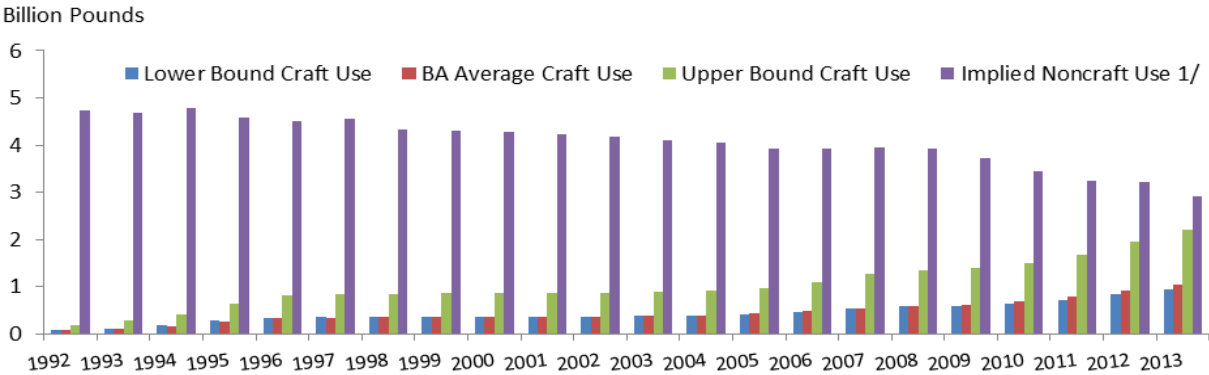
Prior to converting the category to commercial brewers’ use of malt barley, wheat-based malt use must be taken into account and deducted from the aggregate category. Bob Hansen of Briess Malt and Ingredient Company notes that some of the bestselling craft-style beers contain a significant amount of wheat; Amy Germershausen of MaltEurop estimates that between 5 and 10 percent of the malt and malt products noted in the TTB reports are in fact wheat based and not barley based. For the purpose of this report, a conservative 5 percent of malt and malt products ingredients are deducted from the total to account for wheat-based malt use.

Per Barrel Use

Noncraft and craft beer recipes tend to differ considerably in ingredient needs. Most noncraft production is pale, lightly hopped, lager-style pale beer. In contrast, Briggs et al. (2004) note that “many new small (craft) breweries have been set up and these make a wide variety of beers based on styles from around the world.” Most relevant to this discussion is the tendency for significantly higher use of malt and malt products in craft-style beer recipes. A 2012 Brewers Association survey found that brewpubs and craft brewers used, on average, 68.7 pounds of base malt and specialty malt per barrel.³ Recipe variations, as well as production inefficiencies, likely contribute to the comparably high level of malt use in craft production.

Applying the Brewers Association Benchmarking Survey estimate of per barrel malt and malt product needs to craft production implies total craft demand of 1.051 billion pounds of malt and malt products in 2013. Subtracting this figure from total reported malt and malt products and dividing by numbers of noncraft barrels produced implies noncraft use for 2013 of 16.47 pounds per barrel, or rather, craft needs are approximately 4.17 times noncraft usage. Assuming stable per barrel craft demand for malt and malt product allows the calculation of historic total craft malt and malt product usage based on volume production. Craft and noncraft malt use over time can be compared as a function of lower and upper bound estimates of craft use and an average of 68.7 pounds per craft barrel to arrive at an estimate of noncraft use.

**Figure 1: Malt and Malt Product Use Comparison:
Craft vs. Non-Craft**



1/Implied Craft use is determined as the residual of total malt and malt products usage less craft use based on Brewers Association average per barrel usage estimates.

Sources: U.S. Department of the Treasury, Alcohol and Tobacco Tax and Trade Bureau; US

³ The Brewers Association includes more than 2,362 U.S. brewery members representing the vast majority of craft beer volume produced in the United States (as of 9/30/2014).

Figure 1 illustrates the divergent trends in malt and malt product use over time. Generally speaking, noncraft use declined between 1992 and 2013. In contrast, as craft volume has grown, so, too, has the absolute and relative use of malt and malt products by the craft industry. In 1992, craft use accounted for just 1.7 percent of total malt and malt product usage by U.S. brewers. By 2013, craft brewers utilized 26.6 percent of total malt and malt products, assuming the average per-barrel estimate reported by the Brewers Association (Watson, 2014). Once total malt and malt product usage by category is determined, all production uses can be converted to barley bushel terms.

Spirits Sector

The use of malt barley and barley in the production of spirits augments beer-focused estimates of barley industrial use. Malt and malt barley is primarily used in the production of malt whiskey, though other malt liquors also require varying amounts of malted barley. TTB reports do not provide disaggregated estimates of liquor-specific ingredients use. In 2013, U.S. production was estimated at 211.3 million gallons of all types of whiskey, accounting for 0.086 percent of total U.S. non-beer or wine alcohol production. Spirits industry professionals provided a confidential estimate of malt barley use for spirits production. This figure was compared to a MaltEurop-sourced estimate of 75,000 metric tons of malted barley sales to distillers. From these data points, demand for malt barley for use in spirits production is estimated at 3.95 million bushels in 2012, 4.21 million in 2013, and 4.48 million in 2014.

Homebrewers

In November 2013, the American Homebrewers Association (AHA) released the results of its nationwide survey of homebrewers. The AHA survey found that there are an estimated 1.2 million homebrewers in the United States who collectively produced more than 2 million barrels of beer (Brewers Association, 2013). This is a small, though nontrivial, proportion of all beer brewed in the United States (approximately 1 percent). Notably, estimates of homebrewer production and ingredient use are not captured by the TTB monthly brewing statistics. Furthermore, the typical homebrewer is thought to be less efficient and more likely to use malt extract and a greater proportion of imported ingredients than the typical craft brewer. Estimates of homebrewer domestic malt use range from 1 to 3 percent of total commercial brewer use (as reported by TTB), depending on assumptions of relative efficiency and use of malt to malt extracts. The more conservative 1 percent augmentation to total ingredients use is applied here and serves to increase total malt and malt products use by 40.5 million pounds or the equivalent of 1.13 million bushels of malt barley in 2014.

Malted Barley Exports

Demand for exported U.S. malt barley has generally grown in recent years and is largely concurrent with the expansion of the craft beer segment. While these markets operate largely independently of each other, changes in both markets affect estimates of barley industrial use. In 2013, aggregate U.S. malt exports totaled 351,492 metric tons, up from just 75,892 metric tons in 2003. Since peaking in 2008, malt exports have declined some while still remaining well above pre-2003 levels. Post-2003, exports to Mexico surged and have supported observed increases in exports of primarily unroasted malt. Exports of roasted malt posted significant gains starting in 2005 but have fluctuated significantly in the years since and account for a relatively small proportion of total volume exports (4.42 percent in 2013). Malt extracts represent just 0.80 percent of U.S. volume exports in 2013. When converted to a barley bushel equivalent, U.S. exports of malt and malt products require the use of 21.32 million bushels of malt barley in 2013 and are forecast to use 22.03 million bushels in 2014.

Updated Food Seed and Industrial Figures

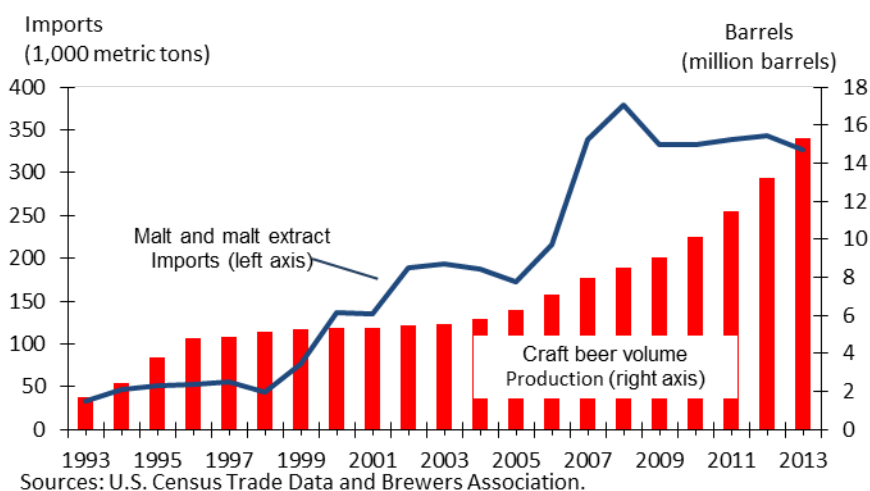
Revised industrial use estimates are paired with food and seed use projections to create the aggregate food, seed, and industrial (FSI) use estimates that are reported in USDA's monthly World Supply and Demand Estimates report and the Feed Grains Outlook. The three main components of FSI, including the revised industrial use figures, are displayed in table 1 and compared with previous FSI estimates. Barley seed and food estimates are unchanged.

Table 1: Barley FSI components and comparison					
Crop year	Seed	Food	Revised industrial	Revised FSI	Previous FSI
-----Million Bushels-----					
2012/13	5.79	6.89	134.14	146.81	155.00
2013/14	6.30	6.93	141.40	154.63	155.00
2014/15	6.00	6.98	138.87	151.85	154.00
Source: USDA, Economic Research Service and USDA, World Agricultural Outlook Board, <i>World Supply and Demand Estimates</i> .					

The revised estimates are quite close to the previous FSI calculations; the average difference is just 2.3 percent, or 3.5 million bushels. While the revised figures are very comparable with the previous estimates, the component parts of industrial use are now estimated with greater precision and will better reflect changes in the contributing markets, including exports, imports, spirits, homebrewing, and the craft sector.

Forward-looking estimates of barley industrial use will be enhanced through the disaggregation of the category into craft and noncraft, spirits, home brew, and export use. Each market has unique characteristics and requires regular monitoring to update key assumptions and use projections. How these estimates of domestic industrial use will ultimately translate to changes in domestic production remains to be answered. One area of particular interest is the interplay between craft beer growth and the use of imported malt and malt products. U.S. imports of malt have grown significantly over the last 20 years and in concert with the growth of the craft beer segment. In 1992, just 9,850 metric tons of malt and malt extract were imported into the United States; in 2012, more than 342,000 metric tons were imported.

Figure 2: Domestic craft beer volume production and malt imports



When compared with total U.S. malt and malt product needs, imports appear to account for a proportionally small volume of total domestic supply. However, the Brewers Association estimates that craft brewers use between 50 and 75 percent of the volume of malt and malt product imports. Because the craft beer segment is itself relatively small, a significant proportion of craft malt needs are being met by imported malt products. The significant use of imported malt reduces the expected impact of continued craft volume growth on domestic barley production.

References

- Brewers Association. 2014. Accessible at: <http://www.brewersassociation.org/>
- Brewers Association. 2013. “Who is the American Home Brewer”? Accessible at: http://www.brewersassociation.org/wp-content/uploads/2014/06/aha-infographic_HR.jpg
- Briggs, D.E., C.A. Boulton, P.A. Brookes, and R. Stevens. 2014. *Brewing Science and Practice*. Woodhead Publishing Limited.
- Brophy, Michael. 2013. Beer Institute. Personal Communication.
- Germershausen, Amy. 2014. MaltEurop. Personal Communication.
- Hansen, Bob. 2014. Briess Malt & Ingredients Co. Personal Communication.
- Heissel, Scott. 2014. American Malting Barley Association Inc. Personal Communication.
- Smith, B. 2008. “Converting All Grain Recipes to Malt Extract.” Beersmith Home Brewing Blog. Accessible at: <http://beersmith.com/blog/2008/06/03/converting-all-grain-recipes-to-malt-extract/>
- United States Brewers Association, *1979 Brewers Almanac*, Washington, DC: 12-13. Accessible at: <http://www.beerinstitute.org/mobile/page/brewers-almanac/br#/mobile/page/brewers-almanac/br>
- U.S. Department of Agriculture, Economic Research Service. *Feed Outlook*. 2014. Accessible at: <http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1273>
- U.S. Department of Agriculture, World Agricultural Outlook Board. *World Agricultural Supply and Demand Estimates*. 2014. Accessible at: <http://www.usda.gov/oce/commodity/wasde/index.htm>
- Watson, Bart. 2013 and 2014. Brewers Association. Personal Communications.