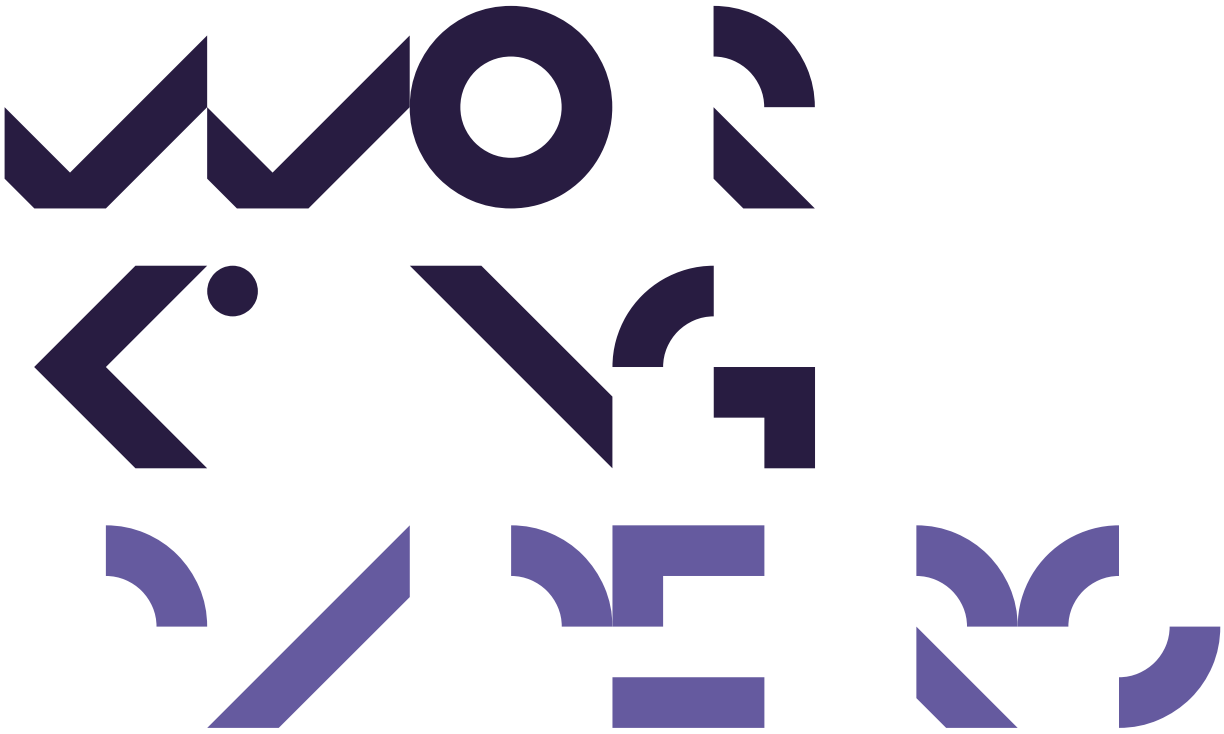

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Globalization of Brewing and Economies of Scale

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Abstract

The globalization of the brewing industry after the turn of the century through a large wave of mergers and acquisitions has changed the structure of the world beer markets. The paper tracks the development in industry concentrations from 2002 to 2012 and points to high transportation costs for beers and economies of scale in advertising and sales efforts as the main factors behind the wave of cross-country mergers and acquisitions. Using firm-level data from the largest breweries, the estimations verify significant economies of scale in marketing and distribution costs. Based on information from the Annual Reports of the eight largest breweries in the world, the estimation proved a reduction in these costs of more than ten percent when doubling the size of the brewing group. This finding verifies that the restructuring of the brewing industry creates significant scale benefits to be shared between the merging partners as marketing and distribution costs are very high in this industry.

Keywords: Marketing, mergers and acquisitions, brewing industry

JEL Classification L11, L66, M37

1. Introduction

The globalization of the brewing industry after the turn of the century through a large wave of mergers and acquisitions has been documented and analyzed; see Euromonitor (2010) and Pedersen, Madsen and Lund-Thomsen (2013). However, the main motivation of the players behind this globalization of the beer market is not clear. There seems to be no short-run payoff to the largest breweries, which in a short period doubled their share of the world market for beers and played the key role in the restructuring of the industry, see Madsen, Pedersen and Lund-Thomsen (2012). In this paper we focus on the nature of the product and discuss the methods of distribution and product branding as important aspects of why the brewing industry moves from a regional industry to a global one.

Increasing economies of scale in plant production have been listed as one of the main factors behind the restructuring of the national brewing industry before the turn of the last century; see e. g. Tremblay, Iwasaki and Tremblay (2005) and Nelson (2005). However, the distribution of beers is expensive compared to the distribution of other consumer goods and the international trade of beer is therefore quite low compared to the home production of beers except for a few small countries. Due to the high trade costs, the breweries could not extend the economies of scale in their production plants by adding more demand through international trade. Therefore, if the large number of cross-border mergers and acquisitions that make the industry more global are motivated by some synergies, one has to look at economies of scale at the multi-plant level where management skills, advertising and transfer of know-how or technology become central factors.

Marketing and sales costs have always played an important role in the brewing industry and today they account for 16 percent of the net revenue among the largest brewing groups and the industry thereby ranked among the top in advertising. The paper focuses on the role of advertising in building brand loyalty and how the advertising facilities are creating “premium brands” (which may be premium in no other way than being heavily advertised) and thereby causing an upward pressure on beer prices. From industrial economics it is well known that the structure of advertising costs translates into significant scale advantages. As observed by Tremblay and Tremblay (2005), the industry has travelled through several stages of development each with its own characteristics. Currently the brewing industry has reached a semi-global stage reflecting a mixture of global and multi-domestic features as described by Porter (1986).

The main objective of the paper is to analyze the importance of advertising for the trajectory of product branding in the global brewing industry by looking at the main large brewing groups and their strategies in brand advertising. The next section focuses on the high costs related to distribution of beers and how it created a natural barrier for international trade and paved the way for mergers and acquisitions as a strategy in the globalization of the industry. Section 3 deals with the role of advertising behavior in the brewing industry, the large price premium of premium lager beer and explores the economies of scale in marketing activities on a global scale. Section 4 presents the empirical evidence for economies of scale in marketing and distribution for the largest brewing groups on the global markets and documents significant cost savings by scale in marketing and distributions. Section 5 discusses some motives behind the globalization of the beer industry and the last section concludes the paper.

2. Distribution of beer and globalization

The distribution of beers has played and still plays an important role in the structure of the beer market and it is a major barrier for new entrants to the market and for growth of those already on the market. Beer is not a weightless good and compared to other grocery goods it takes up a large space in the retail shops. A large quantity is also consumed directly in restaurants and bars why a separate distribution system has emerged for this product and it is often run by the breweries themselves. The economies of scale in a separate distribution system are obvious and the distribution is therefore run by the large breweries. Their exclusion of other brands from their distribution is a major barrier to the market for smaller brands e. g. from microbreweries.

The economies of scale in distribution and the heavy investment in new technology in the period after the Second World War dramatically increased the minimum efficient scale of a production plant. Plant automation that increased the speed of canning and bottling lines and the fall in transportation costs increased the economics of plant size as a larger area could be served from a single production plant. This development turned the national beer markets for mass-produced beer through a dramatic restructuring with increasing concentration everywhere. In the US market the share of the four largest breweries increased from 22 to 95 percent in the period 1950-2000 reflecting a decrease in the numbers of independent breweries from above 350 to just 24. The increasing concentration in the market was driven by the growth of a few breweries, where the leading company Anheuser-Busch's market share jumped from 6 to 54 percent in the period. For a

summary of this development in the US market see Tremblay and Tremblay (2005) and Nelson (2005).

The fast innovation in communication in the period also contributed to the concentration of the industry as it reduces the demand for small local brands. This is most forcefully documented by George (2009) who looked at the penetration of television in local markets in the US from 1945 to 1960. She found that the number of local breweries was negatively correlated with the fraction of the population with access to a television signal and that the opportunity of national advertising through broadcasting accounts for 27% of the total decline in the market share for the local breweries. This national trend was intensified by the development in newspapers and magazines where the local ones also lost market shares to those covering a larger area.

The development in technology and communication in the period forced a concentration in most other national beer markets as well. However, the German market have lagged behind mainly due to politically introduced rules which have delayed the restructuring of the industry. Best known is the 'purity' rules, which forbid beers to contain preservatives and thereby increased the distribution costs. This old regulation from the guilder system was first challenged by the European Court of Justice in 1987 where Germany had to open the borders to beer produced legally in other European Union countries, see Adams (2006).

The increasing concentration in the national beer markets also reduced the number of competitors at a global scale. However, these developments do not change the cross-border competition in a significant way as the international trade in beer and the cross-border ownership holding were low at that time. While the internationalization of most consumer markets increased the foreign competition from import, the beer market remained and still is a remarkably closed home market with very limited competition from import. Table 1 illustrates this point by listing the import share for selected countries.

The average import shares for these countries are below 1% and it does not seem to increase much over time. Import duties and other trade barriers may explain the low trade in the developing countries but not in the developed countries where the shares are low too. Even for the smaller European countries, where some cross-border trade is expected to increase the share significantly, the import shares remain remarkably low. However, one have to keep in mind that these figures reflect the share of quantities and as imported beer mainly is of a premium quality with a higher

price, these shares underestimate the value shares with a wide margin. Also the export shares may vary a lot more between the countries as some of the large breweries with their famous brands have large production facilities in some of the smaller countries like the Netherlands and Belgium.

Table 1. Import share of beer in percentages.

Country	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
USA	1,15	1,19	1,20	1,30	1,48	1,51	1,45	1,32	1,39	1,42
Brazil	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00
Mexico	1,81	1,81	1,83	1,91	2,10	2,03	1,94	1,86	2,01	2,06
China	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
South Korea	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,02	0,02	0,02
South Africa	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Ghana	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Germany*	0,13	0,13	0,13	0,14	0,14	0,15	0,13	0,13	0,15	0,15
Great Britain	0,21	0,16	0,20	0,22	0,22	0,24	0,24	0,20	0,21	0,18
Netherlands	2,77	2,78	2,95	2,89	3,14	2,91	2,84	2,62	2,74	2,56
Czech Republic	0,10	0,09	0,09	0,10	0,09	0,10	0,08	0,06	0,07	0,06
Belgium	0,10	0,14	0,18	0,28	0,39	0,61	0,68	0,56	0,72	0,91
Average	0,52	0,53	0,55	0,57	0,63	0,63	0,61	0,56	0,61	0,61

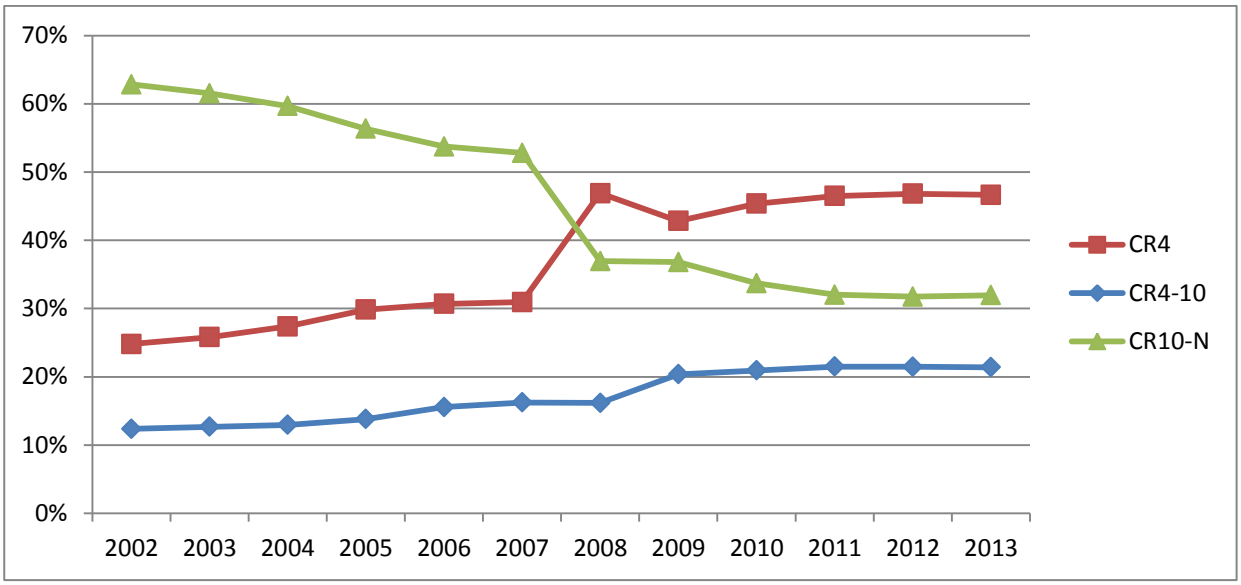
Note: The import share is calculated as the share of the local production on the basis of the volume where 1 barrel has been converted into 0.8523 hectoliter.
Source: Brewers Almanac: Beer Institute Washington, DC.

The turn of the century changed this as the cross-border mergers and acquisitions increased dramatically and made a few of the breweries real world players; see Pedersen, Madsen and Lund-Thomsen (2013) for more evidence on this. The increased concentration in the global brewing industry is highlighted in Figure 1 where the four firm concentration ratios increased by 88 percent from a market share of 25 to 47 percent so they hold close to half the world market of beer. The six next largest breweries increased their market share with 75 percent in the period and now hold about 20 percent of the market. Of cause, these dramatic increases in market shares for the large breweries happened at the expense of the smaller breweries which could see their market share reduced to just about 30 percent of the world market.

The restructuring of the industry was primarily led by a few large breweries which became real multinational companies by a strategy of cross-border mergers and acquisitions. The large jump in CR4 in 2008 is the result of InBevs' acquisition of Anheuser Busch. This was a mega-takeover

amounting to 57 billion EURO and it made the new company AB Inbev the true leader in the industry with twice the size of the next largest company SAB Miller.

Figure 1. Concentration ratios in the global brewing industry



Note: CR4 and CR4-10 measure the market share by volume of the four largest and the 6 next largest companies in the worldwide brewing industry. CR10-N pictures the market share of the rest.
Source: Market Lines' database: Market Data Analytics.

The distribution of beers has played a key role in this development of the brewing industry compared to the other consumer goods industries. The high transportation costs first of all exclude export of beer as the main road for globalization of the breweries as they have to produce the beer locally and close to the market. Next, the establishment of a distribution system in a foreign country is not an easy task as it is not just the establishment of one workplace, but many scattered over the area to be covered by distribution. This excludes green field investment as an option when the breweries move overseas and make the merger and acquisition strategy much more attractive.

However, cross-border mergers and acquisitions may be the only feasible way for their globalization, but the questions still remain why they take the road and what are the benefits, if any? As the export road to internationalization is blocked, the economies of scale in the production facilities vanished as a motivating factor for the breweries. If there are any synergies of these merger and acquisition strategies, they therefore have to be extracted at a higher level in the company from multi-plant operations or economics of scope in handling several brands. At this

level of the value chain sales and marketing management played a central role and it accounts for a large share of the central costs. We will therefore take a closer look at these costs in the next part.

3. Marketing of beer and globalization

Large price differences for beers are well known for the shoppers which often have to pay 2 or 5 times more for a special beer compared to the cheapest one on the market. Table 2 lists the average price across different types of beers and regional markets according to Market Data Analytics which collect consumption information from nearly 50 countries and cover 96% of the total world consumption of beer in 2010 as reported by FAOstat (2014).

Table 2. Beer prices for different types of beer on the global market

	World Market	European Market	American Market	Asian Market	African Market
Average price	3.14	4.61	2.94	2.44	2.22
Standard lager	2,54	3.81	2.42	2.13	2.14
Premium lager	4.83	5.84	3.84	4.58	2.61
Ales and stouts	4.30	4.75	3.11	7.03	2.20
Specialty beers	5.22	6.02	4.77	5.31	2.50
Low alcohol beers	3.46	4.17	2.75	3.15	2.27

Note: The price is USD per liter in 2013 and calculated as market value per market volume. European market includes Eastern Europe and Russia, American market includes the whole continent, Asian market includes the Pacific countries and African market includes the Middle East.
Source: Market Lines' Database: Market Data Analytics.

As expected, beer prices are much higher in the developed countries with a large margin and on average close to 90% higher in the European market compared to the Asian markets. As the beer prices are market prices, part of these differences is a result of the higher consumption taxes in the developed countries. However, as there is close to no international trade of beer, the price differences between the countries can persist over time anyway as a result of differences in the production costs between countries. But also within the region large price differences exist between

the different types of beers with the special beers as the most expensive. Table 3 shows the price premium for the premium and specialty beers compared to the price of a standard lager beer.

Table 3. Price premiums for branded beer in percentage compared to standard lager

	World Market	European Market	American Market	Asian Market	African Market
Premium lager	90	53	58	115	22
Ales and stouts	69	25	29	230	3
Specialty beers	105	58	97	149	17
Low-alcohol beers	36	9	13	48	6

Note: The premiums are calculated from the prices in USD per liter in 2013 and based on the market value per market volume. European market includes Eastern Europe and Russia, American market includes the whole continent, Asian market includes the Pacific countries and African market includes the Middle East.
Source: Market Lines' Database: Market Data Analytics.

The price premiums are significantly larger in the Asian markets compared to the European and American markets. The price premiums for imported ales and stouts are probably a result of high import duties on beer in many of the Asian countries, whereas the high price premiums for premium lager cannot be a result of taxes as they mainly are produced locally. The large price premiums across the different types of beers raise the question, whether they reflect differences in beer quality?

The real differences in products are probably less than usually realized by the consumer. If we take a look at the product quality or vertical product differentiation, it does not vary a lot between the different types of beer or brands as the production processes for beer are quite old and have not developed much over time. The technology is therefore well known and brewing only includes a few raw materials like water, barley, hops and yeast. Most breweries brew the different types of beer like pilsner and lager and the production costs do not vary significantly between these types. Even for ales and stouts the ingredients are mainly the same, but of course the market segment is smaller and has less economies of scale. While the breweries have their own prescription for brewing the different types of beer, they normally do not manage and develop the technology for the brewing process which is outsourced to special companies which deliver turnkey projects for a

brewing plant. Therefore the technology in the industry is available for all players and do not work as an entrant barrier.

There is some horizontal product differentiation due to different sorts of barley and hops and the mix of the materials in the brewing process. However, within the same categories of beer the difference in tastes is very moderate and the recognition of brands is therefore often not significant in blind tests, see Alison and Uhl (1964) for one of the first test studies of beer and Almenberg and Goldstein (2014) for a recent survey of this topic. Valenzi and Eldridge (1973) also confirmed the results of Alison and Uhl (1964), where the beer drinkers show a significant preference for their own preferred brand, but when the beers are unlabeled, the participants showed no preferences for certain beers over others.

Almenberg and Goldstein (2014) in their own study used a triangle test where three blind samples are presented for the drinkers, two are identical and one contains a different beer. After testing all three samples the drinkers are asked to single out the different, which should happened in more than 33% of the cases if taste differences exixt. They use the method to verify where the beer drinkers can differentiate different brands of beer within the same category of beer. The experiment use three well known European lager beers: Czechvar from Czech Republic, Heineken from the Netherlands and Stella Artios from Belgium. Their main conclusion is that beer drinkers are unable to distinguish between different European lager brands.

While the real product differences are quite small, the differences in product quality revealed by the beer drinkers are on the other hand very large. This perception of difference in quality is probably copied from other consumer goods where the consumer learns that he gets what he pays for. This is particularly true for the car market where there is a huge difference in quality and the prices as well, but also for furniture and consumer electronics there are large differences in quality, just to mention a few other areas.

This price-quality perception of the consumer concerning beers is most forcefully illustrated by McConnell (1968a,b) who made a controlled experiment of the branding effects in the American beer market. He made 24 home deliveries of six-packs of beer over two months to a large sample of beer drinkers. All the beer was identical, so there were no quality differences at all, but the beer drinkers did not know this as the regular labels were removed and new labels were added with three different prices corresponding to the average price of a popular, premium and super-premium beer

at that time. When assessing the quality of the beers, the panel ranked the high-priced beer higher in quality with a large margin compared to the low-priced beer. One drinker even said about the brand he thought was cheap, “It would poison me – make me ill. I couldn’t finish the bottle”.

The implication for the breweries is obvious when consumers perceived the quality of the beers by price signals. By segmenting the beer market into a premium and a standard lager by means of labeling the beers and setting a price premium for the high quality branded beer, the breweries can get more money for value, and they then turn to marketing management in their business strategy. Over time the breweries learned to optimize this price premium by branding their products by large expenses for advertising and brand promotion. Today the beer industry is among the industries with the highest expenses on marketing and sales promotion ahead of the fast food industry and sportswear industry to mention a few.

Along with the increasing brand promotion the market shares of the premium brands and special beers increased and now account for 40 percent in Europe and 30 percent in the American market, see Table 4 for the market shares of the different types of beers in 2013 in the regional beer market. Premium lager is the big cash cow in mass-produced beer with a high market share in both Europe and America and a price premium twice the premium for ales and stouts, see Table 3. The largest price premium on premium lager is earned in the European market with a price premium of USD 2.03 per liter beer; the total premium amounting to USD 24.6 billion. The price premium earned on the Asian market is now larger than on the American market with USD 16.2 billion against USD 13.3 billion. While the share of premium lager beer is relatively high on the African market, the price premium is on the other hand quite low so the total premium is only USD 0.31 billion.

The specialty beers from the so-called microbreweries which emerged in the 1990s now account for about 5 percent of the world market. This segment of the beer market seems to have matured in the US already at the end of the 1990s where their numbers peaked and they now have about 10 percent of the American market. However, the microbreweries or very small specialty brewers which only brew craft-styled beer on a small scale for local consumers, e.g. the customers of a restaurant, and their entry into the industry do not change the competition and concentration measures for the mass-produced beer in any significant way. Also, the high-price premium especially in the American markets is to a large extent reflected in higher producing costs due to small-scaled plants. They therefore only earn a modest profit as the entry barriers to the local unbranded market are quite low.

Table 4. Global consumption of different types of beer, 2013

	World Market	European Market	American Market	Asian Market	African Market
Consumption of beer (million hl.)	1,728	442	519	718	53
Market shares in %					
Standard lager	72.2	54.3	67.8	86.4	72.4
Premium lager	16.7	27.5	18.1	9.2	12.3
Ales and stouts	3.1	6.9	2.5	0.7	11.4
Specialty beers	5.2	7.2	10.4	0.5	1.3
Low-alcohol beers	2.8	4.1	1.2	3.1	2.5

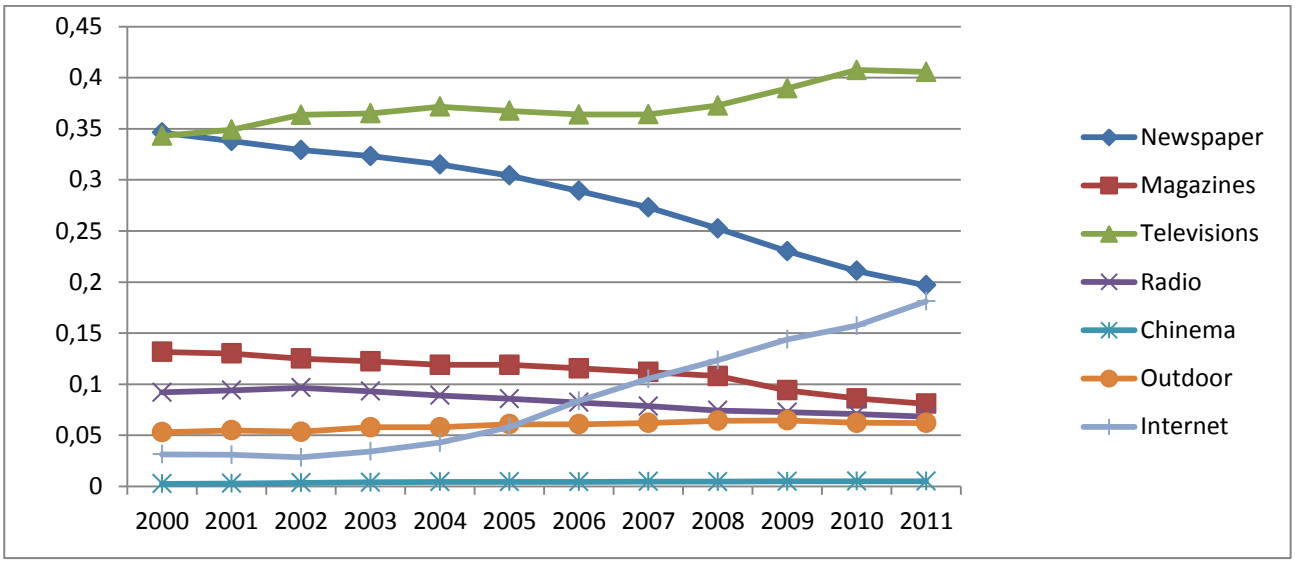
Note: European market includes Eastern Europe and Russia, American market includes the whole continent, Asian market includes the Pacific countries and African market includes the Middle East.
Source: Market Lines' Database: Market Data Analytics.

The increasing focus on advertising and branding has also been enhanced by the fast innovation in communication which has reduced the costs of advertising due to economies of scale. Especially the emergences of electronic media as radio and television which cover a larger audience and therefore result in lower contact costs than advertising in newspapers. Even if the price per viewer is the same for small and large firms, the larger firms then have advantages as they are present in more markets and therefore do not waste advertising on viewers who have no option to buy their product. This is the case for local breweries or smaller national brands which are only present in local shops or bars. As the bulk of advertising moved from the newspapers and other printed media to the electronic media which normally cover larger areas, the disadvantages grew for locally based brands.

This development has been taken to the global scene by the innovation of the internet. The internet has set up the infrastructure for fast individual communication and the new mobile gadgets for communication have make it easy to extract information and communicate all around the clock and at all places. This development has moved the consumers' awareness from newspapers and televisions to the internet and the advertising and brand promotion has followed suit. This development is highlighted in Figure 2 which lists the different media shares of the global expenses on advertising. There has been a dramatic increase in internet advertising after 2002 and it now amounts to USD 88 billion or 20 percent of the global advertising in 2011, and this increase has

been at the expense of advertising in the printed media such as newspapers and magazines which share has been reduced to half from about 50% to 25%.

Figure 2. Different medias' share of the global expenses on advertising



Note: Shares of total global spending on advertising.
Source: Warcs' database, Warc.com, US.

The internet now facilitates streaming of movies and televisions on demand and this development has turned the consumers' awareness in a global direction and has changed the foundation for branding of products and made a switch to global branding. These developments enlarge the potential audience exposed for advertising in television and on the internet and thereby intensify the advantages for the global breweries which can serve their brand all over.

As young males are the most heavy beer drinkers and also engaged in sports activities, a large part of beer advertising is related to sports and a brewery is often the main sponsor of big sports events like the World Cup in Brazil where The Federation of International Football Associations (FIFA) signed 20 major sponsorships amounting to USD 1.4 billion. Other examples are football clubs like Manchester United, Real Madrid etc. where breweries are the main sponsors.

The globalization of beer brands could tap the economies of scale in the global marketing. This globalization of the brands is the reason why the breweries introduce their global brands in the national market along with the national or regional brands which they often keeps when acquiring a national breweries.

4. Economies of scale in global brewing

The dramatic increases in marketing and sales promotion in the brewing industry and the economies of scale in advertising raise the question, whether these scale advantages in advertising also cross the national borders as a result of the globalization in the electronic media. If this is the case, the scale advantages could be tapped by multinational breweries and the large wave of mergers and acquisitions within the brewing industry the last fifteen years could be a response to these cost advantages besides other motives. To answer this question we will look at the eight largest breweries in the world in 2013, and Table 5 shows some descriptive statistics for the period 2002 to 2013 on their market shares and cost shares.

Table 5. Descriptive statistics

	Mean	Standard deviation	Observations
World market share	0.0638	0.0464	92
Production cost share	0.5485	0.0718	68
Distribution cost share	0.0725	0.0394	55
Marketing cost share	0.1740	0.0603	68
EBIT share	0.2150	0.0851	56

Note: Share of marketing and sales costs in net revenue. EBIT is calculated as net revenue minus cost of production, distribution and marketing. No information of marketing expenses in the annual rapport from SAB Miller and first from 2006 for Kirin.
Source: Cost share from companies' Annual Reports and world market share from Market Data Analytics Database.

The world market shares are collected from Market Data Analytics Database and the cost shares are collected from the breweries' Annual Reports and reported as share of net revenue. The costs of marketing also include sales expenses as the different types of sales and marketing costs are collapsed in their annual report. However, a lot of the sales expenses in the beer industry have the character of advertising as it is expenses for sales agents and equipment for shops and bars such as drinking glasses, bar desks and refrigerators. Distribution costs are expenses of distribution and the production costs are costs of goods sold. The different breweries use the same terms for the cost categories in their annual reports, but of course, the methods of calculating could vary between the breweries. To take care of this heterogeneity in cost accounting, the estimation below used a method with fixed effects for companies which accounts for such a heterogeneity. The EBIT is calculated as the differences between the net revenue and the 3 cost components: production,

distribution and marketing. EBIT thereby includes some administrative costs not allocated to the three cost components mentioned.

The large breweries have many different brands and advertising campaigns are often target to a specific brand. Wilcox (2001) studied beer brand advertising and market shares in the US from 1977 to 1998. Of the 11 brands studied he only found a significant relation between advertising and market share for 8 brands. However, even if the costs of advertising can be split up on the different brands, the individual brand effects may correlate with other brands of the same brewery, e.g. an advertising campaign for Bud Light may also affect the sales of Budweiser. Therefore the total costs of sales and marketing activities for the brewery is a more precise measure to validate the amount and effects of these activities when estimating the performance of the breweries.

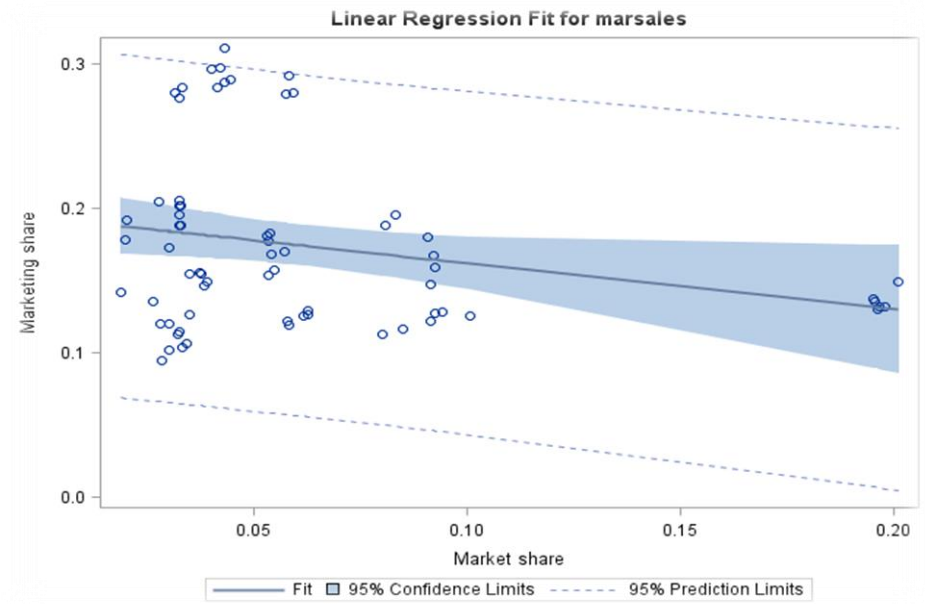
In the period from 2002 to 2013 the concentration in the global market of mass-produced beer more than doubled as listed above, and this restructuring of the industry was mainly driven by high growth among the largest breweries which more than doubled their size. To study the size effects equation (1) has been estimated where (A/R) is the share of marketing in net revenue and WS is the world market share.

$$(A/R) = \alpha + \beta\,(WS) \qquad (1)$$

Figure 3 pictures a simple OLS regression of equation (1) for the period from 2002 to 2013. Overall there is a negative correlation with lower marketing shares for breweries with a high share of the world market for beers. The estimated regression coefficient is -0.3174 and significantly negative at a level of 4 percent.

However, the regression plot also shows a large variation in marketing expenses at the same level of market share, so obviously other factors affect the share of marketing expenses. The variation is to a large extent a result of different strategies in the breweries concerning marketing and branding, as highlighted in Table 6, listing the cost shares and world market shares for the 8 largest breweries in 2013. On average, the 7 breweries who report their marketing expenses use 16 percent of their net revenue on marketing and sales, but with a high variation between the breweries, as e.g. Molson Coors spends close to three times more than Yanjing. The high level of marketing and branding costs in 2013 shows how much the leading breweries of mass-produced beers focus on branding their products.

Figure 3. Regression plot of marketing share to world market share for 7 large breweries



Note: Share of marketing and sales costs in net turnover. No information of marketing expenses in the annual rapport from SAB Miller and first from 2006 for Kirin.
Source: Cost share from companies' Annual Reports.

Table 6 also reveals a lot of variation of production and distribution costs across the different breweries. Of course, these differences in cost efficiency among the breweries are also reflected in their EBIT share of net revenue and it seems that AB InBev, the brewery with the most aggressive merger and acquisition strategy, also has the best performance in cost saving and EBIT earnings.

The size effects can also be estimated directly by regressing the cost components on net revenue and equation (2) shows the estimated model with a log transformation of the variable. C_j is the cost component j, R is the net revenue, β_j is the estimated scale elasticity of the cost type j with respect to net revenue, and δ_i is a fixed effect for company i pick up differences in costs efficiency and accounting practices for the individual brewery.

$$\text{Log}(C_j) = \alpha + \beta_j \text{Log}(R) + \delta_i \qquad (2)$$

Table 6. World market shares and costs shares for the breweries in 2013

Company	World market share	Production costs sales share	Distribution costs sales share	Marketing costs sales share	EBIT Sales share
AB Inbev	0.195	0.407	0.094	0.134	0.361
SAB Miller	0.117	-	-	-	-
Heineken	0.101	-	0.054	0.126	-
Carlsberg	0.054	0.505	0.113	0.168	0.214
Molson Coors	0.041	0.605	-	0.284	0.111
Kirin	0.032	0.583	0.031	0.114	0.272
Tsing Tao	0.038	0.599	0.047	0.155	0.199
Yanjing	0.034	0.606	0.021	0.106	0.266
Average	0.076	0.551	0.060	0.159	0.237
Observations	8	6	6	7	6

Note: Share of marketing and sales costs in net turnover. No information of marketing expenses in the annual rapport from SAB Miller and first from 2006 for Kirin.
Source: Cost share from companies' Annual Reports and world market share from Market Data Analytics Database.

Table 7 presents the results of the estimations and the size effect is highly significant in this formulation as the variables are integrated due to the inflation and the general growth of the breweries. What is of importance, however, is the size of the coefficient, particularly if it is below 1. If so, costs rise less than proportional with sales whatever the reason behind the growth in size.

All cost models have estimated coefficients of a size less than 1. However, the estimated size elasticity for the production costs is not significantly different from one and the production costs therefore rise proportional with the increase in net sales. This verifies that the economies of scale in the production have been exhausted and further economies of scale in this period have to be harvested by multi-plant operations. The economies of scale in marketing and distribution on the other hand are quite large as the size elasticity is significantly below one for both cost types. The largest economies of scale are earned in marketing, where the elasticity indicates, that marketing costs only increase with 78% for a revenue increase of 100%, whereas the distribution costs increase with 90%. As the marketing and sales costs have high cost shares, they also return a large gain in costs savings by company growth. If all the costs saving from the size-effects are turned

forward to the consumer through a reduction of the beer prices, the EBIT margin would not be affected at all. However, this has not been the case as the size effect for the EBIT is quite large with an increase of 134 percent when the breweries double their size.

Table 7. Fixed effects estimation of the size effects in marketing and distribution costs

Dependent variable	Production costs	Distribution costs	Marketing costs	EBIT
Net sales (log)	0.987 (0.016)	0.904** (0.054)	0.782** (0.028)	1.335** (0.071)
R-square	0.999	0.993	0.998	0.993
Observations	68	55	68	56

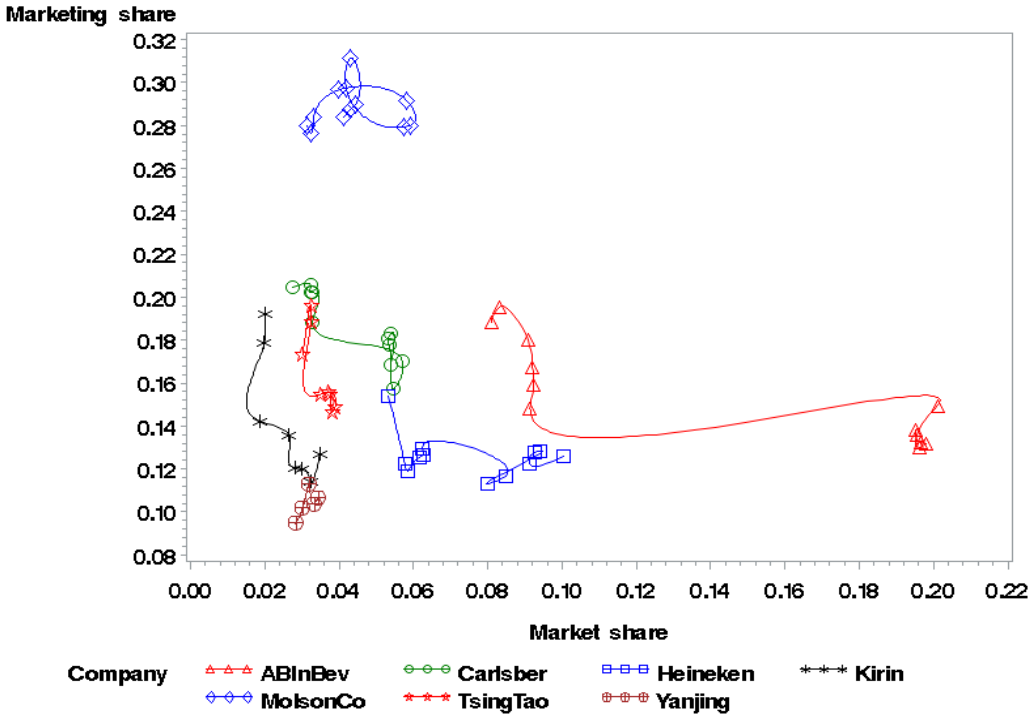
Note: One and two stars indicate where the coefficients are different from one at a significant level of 5 and 1 percent, respectively.
Source: Net sales and costs from the companies' Annual Reports.

The fixed effect estimation corrects for firm heterogeneity and the coefficient is based on the within brewery effects of market size. Figure 4 pictures the size relationship for the 7 large breweries. For most of the breweries there has been a fall in the share of marketing costs over the period and it is also correlated with an increase in their world market share. However, Molson Coors and Yanjing seems' to be outliers in this respect with no within size effect on their marketing share. Further, the regression equations only include the market share as explanatory variable and therefore do not correct for other correlates with the marketing share in the period. One possibility is that the breweries in their mergers and acquisitions move to countries with a lower level of marketing and advertising expenses. However, as Table 6 reveals there does not seem to be a significant regional differences in the level of marketing costs among the companies and Figure ¤ also shows that the large acquisition of Anheuser Busch by InBev seems to be followed by a significant reduction in the marketing costs in the following years.

These estimations only pick up the size of the correlation and tell us nothing about the causality between the market share and the share of marketing costs. Even as the mergers and acquisitions have been the main drivers behind the increase in market share for this group of breweries, it is likely that the marketing and branding have affected their revenues as well. If this is the case and a positive relationship exist the estimated parameter is not a central predictor of the causal

relationship from market share to marketing share, as it may be upward biased. However, we are not interested in the causal relationship, but whether there exist some economies of scale for these cost components whatever the reason behind the growth of the breweries may be.

Figure 4. The within breweries correlation between the share of marketing and sales costs and the world market share for 7 large breweries



5. Motivation for globalization

One of the main motives for a merger and acquisition often mentioned in the announcement of the management right after it happened is the cost synergies earned by running a joint business. The large economies of scale in marketing and distribution for the large multinational breweries in the period verified that this has also been the case and therefore could explain the wave in mergers and acquisitions in the period. With an average share of marketing costs at 0.159 and a size elasticity for cost savings of 0.218 (1 - 0.782), the total cost saving as share of net revenue is 0.035 (0.159 x 0.218) with a doubling of net revenue. Calculated in the same way the saving in distribution as share of net revenue is 0.006 and the total cost saving in distribution and marketing is then 4.04 percent point of the net revenue with a doubling of the size. This amounts to significant cost

advantages by the larger breweries and the market conditions have not forced them to hand it over to the consumers through a price reduction mentioned above as also the EBIT has increased.

Another motive behind a merger and acquisition strategy is the market power hypothesis which states that the merger will reduce the competition on the market and benefit the remaining companies as there may be a higher market share to the remaining breweries and thereby less price pressures. However, the market power effect will benefit all the breweries in the industry, and this has to some extent also been the case in the latest wave of mergers and acquisitions in the brewing industry, see Madsen, Pedersen and Lund-Thomsen (2012). They find small positive effects on the EBIT-margin for the smaller breweries in the industry in the period of the merger and acquisition wave.

However, even if the price competition only have changed modestly as a result of the merger and acquisition wave, the multinational breweries could still have some advantages by introducing their premium brands in the local markets along with the regional brands. This is probably what happened, when the EBIT margin increased with 7.93 (0.335 x 0.237) percent point of the net revenue and therefore the earnings increase a lot more than the cost savings in marketing and distribution can explain. These investments in branding by the multinational breweries also represent a sunk cost that creates an entry barrier as discussed above and thereby a first-mover advantage in the world market for beers. The rather abrupt opening up of the global beer market started a competitive race between the large breweries during the 1990s to take advantages of the first-mover opportunities and that may have been a leading motivation behind the merger and acquisition wave.

While these first-mover advantages may have led to an increasing EBIT-margin, it has not materialized in a superior return to the shareholders of the largest breweries compared with the 100 next largest breweries, see Madsen, Pedersen and Lund-Thomsen (2012). The reason for this is still unclear, but one possible explanation is, that they in the restructuring process of the industry have to pay a premium for the acquired breweries so most of the synergies earned from the scale benefit go to the owner of the acquired brewery and leave the acquirer with a larger capital cost. There is some evidence for this, as the large breweries finance their acquisition strategy by new debts and increase their leveraging substantially.

However, in a longer perspective the first-mover strategy in this period can still payoff and materialize on the bottom line of the multinational breweries in the future. First, the cost of a merger has to be paid immediately why the benefit can take some time to show up. Second and more important, the cultivation of the premium segment of the beer market in Eastern Europe, East Asia and Africa has just begun. If the economic growth in these areas follows the trend from the last ten years, the first movers can look forward to a large market for their premium beers and with a high price premium to cash in on in the future.

So far we have looked at the performance of the breweries and therefore of their owners. However, it is well known from the corporate governance literature, that the interest of the managers can be different from the interest of the shareholders of publicly owned companies. This is especially true if the managers are compensated according to the growth of the company which probably is the case for the large breweries, and that opens other motives for the merger and acquisition wave. Also the managers of the acquired breweries can have self-interest in a merger, and often in addition they will get a special remuneration packet including, top position in the new joint company. There is no systematic evidence of the managers' self-interest in the different mergers within the brewing industry.

6. Conclusion

After the turn of the century the globalization of the brewing industry has changed the structure of the beer industry through a large wave of mergers and acquisitions. This paper discusses the nature of the beer product and points to its heavy weight and no real quality differences, but a strong consumer perception of brand differences. This leads to high transportation costs for beers and a high return from branding of beers and the possibility of economies of scale in advertising and sales efforts as a factor behind the wave of cross-country mergers and acquisitions.

Using firm-level data from the largest breweries, the estimations verify significant economies of scale in marketing and distribution costs. Based on information from the Annual Reports of the eight largest breweries in the world, the estimation proved a reduction in these costs of more than ten percent when doubling the size of the brewing groups. This finding verifies that the restructuring of the brewing industry creates significant scale benefits to be shared between the merging partners as marketing and distribution costs are very high in this industry.

These scale advantages in the brewery industry created a playing field on the world market for the breweries after the opening of the new markets in the East and South East where the first movers earn competitive advantages. As the entry barriers for mass-produced premium beers are high in the world market and the threads of new innovation are low due to the nature of the product, these new dominating brewing groups probably can look forward to a long life, as the threads of takeovers also are reduced due to their large market share.

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