

The Advantages of Mergers for Market Entry - A Study Case for the Brewing Industry

Benjamin Winter*

Introduction

Over the last decade, the global industry for brewing has witnessed a great number of mergers involving breweries from different parts of the world. This fact can be seen in the increasing global market share of the five leading breweries. It has increased from 25.4 percent in 2000 to 46.3 percent in 2009¹. Today the market is being dominated by four major breweries. These are, listed by size, Anheuser-Busch Inbev, SABMiller, Heineken and Carlsberg.

The most common explanation for the merger-wave is the trend in beer consumption. For western industrialized nations, demand has been decreasing since the late 1990s, whereas developing countries such as Brazil, China or Russia have been experiencing strong growth rates in their beer consumption². Facing this development, beer suppliers of the West have had to search for new markets in order to maintain growth.

This essay assumes that most breweries use mergers as a tool to gain access to

* Benjamin Winter received his degree in Economics (B. Sc.) from the University of Bonn in 2013. The present article refers to his bachelor thesis under the supervision of JProf. Dr. Eugen Kováč, which was submitted in October 2012.

¹ source: Euromonitor-International (2010)

² see Colen and Swinnen (2011)

new and growing markets. The gist of this essay lies in the attempt to explain why mergers seem to be the preferred tool. This attempt is important because Greenfield-Investments as well as exports might suffice to fulfil this purpose³.

This essay will explain the advantage of mergers over the other two choices.

The basis will be given by a model introduced by Qiu and Zhou (2006). The model combines product differentiation and information asymmetry with Cournot competition (simultaneous competition in quantities). This demonstrates in which way a high degree of product differentiation creates incentives to merge and how these incentives can be increased by the presence of information asymmetry. The underlying problem of the model is the merger-paradox, which was introduced by Salant, Switzer, and Reynolds (1983).

The following chapter roughly presents the merger paradox, gives an explanation for product differentiation and the way it can overcome the merger paradox. Afterwards the relevant parts of the model will be introduced so that finally the results can be applied to the brewing industry. In the end it will be possible to give an explanation for why mergers on the brewing market are the preferred tool to acquire market entry.

The merger paradox and product differentiation

As described in the introduction, the underlying problem of the model is the merger paradox, which was introduced by Salant, Switzer, and Reynolds (1983). The authors examine mergers on a Cournot market with linear demand and homogenous firms. They come to the conclusion that mergers lead to losses for the involved firms, if the market share after the merger is below 80 percent. The reason for this is the fact, that Cournot competition results in declining reaction functions. If a merger between two or more firms takes place, the involved firms

³ for Greenfield-Investment see Raff, M., and Stähler (2009)

(in the following referred to as insiders) will decrease joint outputs to increase the market price. The output reduction leads to an increase in profits because it internalizes negative externalities, which were created through former competition. Unfortunately for the insiders, in the next step uninvolved firms (outsiders) will increase output, thereby also increasing their profits. This output increase has a negative effect on the profits of the insiders which might prevail. The merger leads to increasing profits for the outsiders, whereas the insiders might suffer from losses. This result is known as the merger paradox⁴.

The described scenario assumes that all firms involved are homogenous. This homogeneity is abolished when offered products are differentiated. Product differentiation captures how strong products differ in the eyes of the consumers. Therefore it describes the willingness of a consumer to substitute a product for that of another firm. If the consumers express a high willingness to substitute products, the firms on this market find themselves in a situation of intense competition. If, however, the consumers have strong preferences towards a certain product, competition between firms is weakened. The willingness of consumers to substitute goods and the following degree of product differentiation has a direct influence on the reaction functions of the firms. The higher the degree of product differentiation, the lesser the influence of a firm's supply on the demand of its competitors. A high degree of product differentiation therefore weakens the merger paradox. The output reduction by the insiders that follows a merger leads to a smaller output increase of the outsiders if the products are differentiated. This, however, allows the positive effects of the merger to prevail. The model by Qiu and Zhou describes when this is the case.

⁴ see Pepall, Richards, and Norman (1999).

Introducing the model

The model examines a market where n domestic firms compete á la Cournot and offer differentiated products. A foreign firm tries to enter the market and has two choices of how to acquire entry. It can either merge with one of the domestic firms or supply the market via exports. An assumption of the model is that the domestic firms are informed about local market demands but the foreign firm is not (information assymetry). If the foreign firm merges with one of the domestic firms, the domestic firm shares its information concerning the demand with the foreigner and they adjust joint outputs. They will, however, continue to offer differentiated products. If the foreign firm does not merge, it will lack information regarding the demand. In this case it will not be able to accurately optimize its profits. The degree of product differentiation within the model determines the market's equilibrium. Varying the degree of product differentiation, therefore, has a crucial influence on whether a merger takes place or not.

Worth mentioning is the fact that the authors present three different scenarios. The first scenario does not take information assymetry into account, meaning that the foreigner has the same information regarding local market demands as the domestic firms. The second scenario studies a case of information assymetry, the difference being that a merger is only followed by information sharing, but not by an adjustment of joint outputs. The third scenario takes all aspects into account. The firms are faced with information assymetry and a merger is followed by information sharing as well as the adjustment of joint outputs. This third case will be presented in the following chapter.

The model

As already mentioned, n domestic firms and a foreign firm compete á la Cournot. The foreign firm's index is 0, that of the domestic firms $i \in N = \{1, \dots, n\}$. The set of all firms is therefore defined as $M = \{0\} \cup N$. As the firms offer differentiated products, each firm is confronted with the inverse demand function $p_i = a + \theta - q_i - bQ_{-i}$, $i \in M$. In this equation p_i and q_i represent both the price and the quantity of product i and $Q_{-i} = \sum_{j \in M, j \neq i} q_j$ the aggregated supply of all firms with the exception of the supply of firm i . a is presumed to be large enough so that every firm offers a positive supply. θ is a random variable with the expected value $E[\theta] = 0$ and a variance of $\sigma^2 \equiv Var[\theta] = E[\theta^2]$. θ captures the fluctuations of the demand, known only to the domestic, not, however, to the foreign firm. Finally $b \in [0, 1]$ describes the degree of product differentiation. Obviously, the products offered by the firms are homogeneous and, therefore, completely substitutable if $b = 1$. If, however, $b = 0$, the products are differentiated to a maximum, therefore allowing each firm to behave as a monopolist. The marginal costs of each firm equal zero ($c = 0$). Given the inverse demand function each firm optimizes its profits according to the following profit function:

$$\pi_i = q_i p_i = q_i (a + \theta - q_i - bQ_{-i}), i \in M$$

The game of the model takes place on two levels. At level one a native firm (F1) decides whether or not to merge with the foreigner (F0). In between the two levels the domestic firms observe the true value of θ . At level two all firms simultaneously compete in quantities. Level one includes two possible scenarios leading to different outcomes on level two. Whereas in *scenario 1* F1 decides not to merge, in *scenario 2* F0 and F1 merge. In the following the equilibrium on level two in both scenarios will be calculated.

Scenario 1: First the quantity which all firms offer is calculated, if $\theta = 0$ and all firms, including the foreign firm, are aware of this. In this case all firms maximize the following optimization problem:

$$\max_{q_i} \pi_i = q_i (a - q_i - bQ_{-i}), i \in M$$

Since all firms are faced with the same optimization problem, solving the first order condition provides the following equilibrium:

$$q^0 = \frac{a}{2 + bn}$$

q^0 is identical to the quantity which F0 will supply under asymmetric information without having merged with F1 ($q^0 = q_0^u$), where q_0^u describes this quantity. The reason for this is that F0 does not know the actual value of θ and therefore has to optimize its expected profits $E[\pi_0] \equiv \pi_0^e$ with $E[\theta] = 0$ by using the expected quantities of all domestic firms. The domestic firms anticipate this behaviour and optimize:

$$\max_{q_i} \pi_i = q_i (a + \theta - q_i - bQ_{-i} - bq_0^u), i \in N$$

As above, solving the first order conditions provides the domestic firm's supply:

$$q_i^u = \frac{(2 + bn - b)a + (2 + bn)\theta}{(2 + bn)(2 + bn - b)} = q^0 + \frac{\theta}{2 + bn - b}$$

Inserting q_0^u and q_i^u into the profit function provides the equilibrium profits:

$$\pi_0^u = (q_0^u)^2 + \frac{(2 - b)a\theta}{(2 + bn)(2 + bn - b)} \text{ and } \pi_i^u = (q_i^u)^2, i \in N \quad (1)$$

Scenario 2: In this scenario F0 and F1 merge. F1 reveals its information regard-

ing the demand and the merging parties adjust joint outputs by maximizing the joint profit function:

$$\max_{q_0, q_1} \pi_{0,1} = q_0(a + \theta - bq_0 - bQ_{-0}) + q_1(a + \theta - q_1 - bQ_{-1})$$

$$\max_{q_i} \pi_i = q_i [a + \theta - q_i - b(q_0 + q_1 + Q_{-i})], \quad i \in \{2, \dots, n\}$$

The second optimization problem is that of the outsiders. Again, the equilibrium is calculated by solving the first order conditions:

$$q_0^m = q_1^m = \frac{(2-b)(a+\theta)}{2(2+bn-b^2)} \quad \text{and} \quad q_i^m = \frac{a+\theta}{2+bn-b^2}, \quad i \in \{2, \dots, n\}$$

$$\pi_0^m = \pi_1^m = (1+b)(q_0^m)^2, \quad \text{and} \quad \pi_i^m = (q_i^m)^2 \quad (2)$$

At this point comparing the quantities in the two scenarios is possible. The merger paradox roots from the fact that $q_0^m < q_0^u$ and $q_i^u < q_i^m$. The insiders reduce, the outsiders increase their output. As explained in chapter two, if products are homogenous the possibility arises that the negative effect on the insiders' profits prevails. In this case, by using the results of (1) and (2), it is possible to calculate the precise degree of product differentiation at which a merger is profitable. In order to do so, the difference $\Delta\pi \equiv (\pi_0^m + \pi_1^m) - (\pi_0^u + \pi_1^u)$ is calculated. After several steps of calculation, $\Delta\pi$ can be simplified to:

$$\Delta\pi = \frac{\theta^2 Z(n, b)}{(2+bn)^2(2+bn-b)^2} + \frac{a\theta(nb^2-2b)}{(2+bn)^2(2+bn-b)} + \frac{b^2(a+\theta)^2 Y(n, b)}{2(2+bn)^2(2+bn-b^2)^2}$$

$Y(n, b)$ is defined as $Y(n, b) \equiv n^2b^3 - (3n^2 - 4n + 4)b^2 - 4(n-1)b + 4$ and $Z(n, b)$ as $Z(n, b) \equiv (2+bn-2b)^2 - 2b^2$. Taking expectation of $\Delta\pi$ leads to the following

equation:

$$E[\Delta\pi] = \frac{1}{(2+bn)^2} \left[\frac{\sigma^2 Z(n,b)}{(2+bn-b)^2} + \frac{b^2(a^2 + \sigma^2)Y(n,b)}{2(2+bn-b^2)^2} \right]$$

This equation describes the expected differences in profits with and without merger. Therefore, a merger is advantageous if, and only if $E[\Delta\pi] > 0$ is the case. In this case the sum of the profits of the merging firms is larger than the sum of the expected profits of the same firms without merging. This crucially depends on the degree of product differentiation b . Indeed the existence of $b(n) \in (0, 1)$ can be proved⁵, fulfilling following criteria:

$$E[\Delta\pi] \begin{cases} > 0, \text{ for } b \in (0, b(n)) \\ = 0, \text{ for } b = b(n) \\ < 0, \text{ for } b \in (b(n), 1] \end{cases} \quad \text{and} \quad \frac{db(n)}{dn} < 0$$

Put in words, $b(n)$ describes the exact degree of product differentiation at which the gainings of a merger are equal to the losses. The underlying reaction chain has already been explained in chapter two. The more competitors there are, the higher the degree of product differentiation needs to be in order to maintain the gainings of a merger.

These results allow the definition of a sub game perfect Nash-Equilibrium, which the authors capture under proposition 4. For every value of n there exists exactly one $b(n) \in (0, 1)$. If $b > b(n)$ there will be no merger between F0 and F1 on level one, resulting in the equilibrium quantities of $\{q_0^u, q_1^u, \dots, q_n^u\}$ in level two. If, on the other hand, $b < b(n)$, F0 and F1 merge on level one, leading to the equilibrium quantities of $\{q_0^m, q_1^m, \dots, q_n^m\}$ in level two.

As was pointed out at the beginning, there are three scenarios to the model,

⁵ for proof see Qiu and Zhou (2006) page 23ff.

the first being defined by symmetric information (all firms, including F_0 , know the exact value of θ). As a consequence, the products need to be differentiated to a higher degree, in order to keep up the gainings of a merger. Asymmetric information, therefore, creates an additional incentive to merge.

Informative value of the model regarding the brewing industry

Having introduced the model, let us focus on the market for beer. The question is, to which degree the products on the beer market are differentiated and in how far asymmetric information plays a role. Most important, however, is the question, whether or not competition in quantities is suitable for the beer market.

Allison and Uhl (1964) come to the conclusion that product differentiation plays a major role for the beer market. The authors analyze how subjects evaluate several brands of beer (e.g. the taste). They pay attention to the fact that the subjects evaluate, among others, their favourite brand. In the first of two treatments, the subjects are not aware of the brand they are evaluating. The results show that the subjects' evaluation of their favourite brand in this treatment is much more moderate than in the second treatment (when they are aware of the brand). This proves that the subjects have clear preferences towards their favourite brand, which, as mentioned in chapter two, is a strong criterion for product differentiation.

In order to show the existence of asymmetric information, it is necessary to prove that the demand is subject to fluctuations. Having a look at festive seasons and bank holidays of different nations will of course help. One can safely assume that the demand for alcohol in the USA on Independence Day is higher than on other days. The same can be said of the carnival season in Germany and Brazil. In fact every nation has its special occasions leading to a higher demand in alcohol,

including beer. Domestic breweries are naturally better acquainted with these fluctuations in demand than foreign breweries.

In the next step, the role of competition in quantities for the brewing market needs to be estimated. A look at the 27 EU-countries (see graph 1 in the appendix) interestingly shows that, for example, Belgium registers an increase in beer production despite the fact that demand is decreasing⁶. This increased production might be used as exports. However, as Madsen, Pedersen, and Lund-Thompson (2010) observe, the transportation of beer comes at very high costs, making local brewing more efficient. Therefore, one can assume that the increase of production serves the purpose of quantity adjustment in order to optimize profits.

With these three results in mind (high degree of product differentiation, presence of asymmetric information, competition in quantities), it is possible to explain the merger wave on the beer market according to the model. The product differentiation of beer allows the breweries to maintain profits through merging, because the output decrease of the insiders is followed by a smaller output increase of the outsiders. Due to the presence of asymmetric information, the products do not need to be differentiated to a particularly high degree. Therefore, even though Greenfield-Investments or exports might suffice as serving the purpose of a market entrance (as mentioned in the introduction), the advantage of a merger lies exactly in the additional profits maintained by the high degree of product differentiation.

In conclusion, the prognosis of the model is consistent with the recent developments on the beer market. A high degree of product differentiation combined with asymmetric information will stimulate merger movements on a market.

As we have seen, this is also the case for the beer market.

⁶ again, see Colen and Swinnen (2011)

References

- ALLISON, R., AND K. P. UHL (1964): "Influences of Beer Brand Identification on Taste Perception," *Journal of Marketing Research*, 2 (August), 36–9.
- BEER STATISTICS 2010 EDITION, THE BREWERS OF EUROPE (2013): "<http://www.brauer-bund.de/download/Archiv/PDF/statistiken/\101126%20The%20Brewers%20of%20Europe%20-%20Beer%20Statistics%202010.pdf>," *Date of request: 14.04.2013*.
- COLEN, L., AND J. SWINNEN (2011): "Beer Drinking Nations The Determinants of Global Beer Consumption," *American Association of Wine Economists*, (79), 1–39.
- MADSEN, E. S., K. PEDERSEN, AND L. LUND-THOMPSON (2010): "M&A as a Driver of Global Competition in the Brewing Industry," *Working paper No. 11-10, ISBN 9788778825438 (print) ISBN 9788778825452 (online)*.
- PEPALL, L., D. RICHARDS, AND G. NORMAN (1999): "Industrial Organization: Contemporary Theory and Practice," *Mason: South-Western*.
- QIU, L. D., AND W. ZHOU (2006): "International Mergers: Incentives and Welfare," *Journal of International Economics*, 68, 38–58.
- RAFF, H., R. M., AND F. STÄHLER (2009): "The Choice of Market Entry Mode: Greenfield Investment, M and A and Joint Venture," *International Review of Economics and Finance*, 18, 3–10.
- SALANT, S. W., S. SWITZER, AND R. J. REYNOLDS (1983): "Losses from Horizontal Merger: The Effects of an Exogenous Change in Industry Structure on Cournot-Nash Equilibrium," *Quarterly Journal of Economics*, 98, 185–199.

Appendix

| Country | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|----------------|----------|----------|----------|----------|----------|----------|----------|
| Austria | 8891.0 | 8670.0 | 8785.0 | 8818.0 | 9044.0 | 8937.0 | 8728.0 |
| Belgium | 15650.0 | 17270.0 | 17274.0 | 18311.0 | 18480.0 | 18044.0 | 18008.8 |
| Bulgaria | 4388.0 | 4312.0 | 4323.0 | 4841.0 | 5298.0 | 5358.0 | 4824.0 |
| Croatia | 3680.0 | 3593.0 | 3460.0 | 3586.0 | 3696.0 | 3887.0 | 3673.0 |
| Cyprus | 376.0 | 378.0 | 381.0 | 368.0 | 386.0 | 399.0 | 355.0 |
| Czech Republic | 18548.0 | 18753.0 | 19069.0 | 19787.0 | 19897.0 | 19806.0 | 18187.0 |
| Denmark | 8352.0 | 8550.0 | 8560.0 | 8105.0 | 7604.0 | 6474.0 | 6046.0 |
| Estonia | 1037.0 | 1097.0 | 1352.0 | 1418.0 | 1413.0 | 1275.0 | 1234.0 |
| Finland | 4564.0 | 4617.0 | 4587.0 | 4548.0 | 4547.0 | 4470.0 | 4491.0 |
| France | 18132.0 | 16801.0 | 16394.0 | 16029.0 | 15094.0 | 14777.0 | 14731.0 |
| Germany | 105990.0 | 108366.0 | 107678.0 | 104315.0 | 100628.0 | 99910.0 | 98078.0 |
| Greece | 4133.0 | 3952.0 | 3978.0 | 4028.0 | 4340.0 | 4374.0 | 4177.0 |
| Hungary | 7475.5 | 6611.2 | 6842.6 | 7482.7 | 7584.0 | 7102.1 | 6347.7 |
| Ireland | 8023.0 | 8142.0 | 8969.0 | 9337.0 | 9270.0 | 8846.0 | 8041.5 |
| Italy | 13673.0 | 13170.0 | 12798.0 | 12818.0 | 13462.0 | 13343.0 | 12776.0 |
| Latvia | 1363.8 | 1314.9 | 1290.2 | 1414.0 | 1410.1 | 1306.8 | 1357.4 |
| Lithuania | 2520.0 | 2782.4 | 2915.8 | 2966.0 | 3225.0 | 3074.0 | 2794.0 |
| Luxembourg | 391.0 | 377.0 | 374.0 | 338.2 | 322.0 | 312.0 | 324.6 |
| Malta | 78.0 | 80.0 | 76.7 | 105.0 | 110.0 | 112.0 | 103.7 |
| Netherlands | 25123.7 | 23828.4 | 24560.3 | 26478.9 | 27258.8 | 27180.9 | 25376.3 |
| Norway | 2250.0 | 2399.0 | 2398.0 | 2496.0 | 2553.0 | 2560.0 | 2516.0 |
| Poland | 28622.0 | 30108.0 | 31572.0 | 33953.0 | 36895.0 | 37108.0 | 35992.0 |
| Portugal | 7349.8 | 7436.3 | 7442.6 | 8358.6 | 8191.2 | 8208.4 | 7833.0 |
| Romania | 13086.9 | 14535.0 | 15172.0 | 17656.0 | 19554.0 | 20640.0 | 17600.0 |
| Slovakia | 4670.0 | 4218.0 | 3963.0 | 3794.0 | 3683.0 | 3558.0 | 3264.0 |
| Slovenia | 2272.0 | 1929.0 | 1867.0 | 1892.0 | 1545.5 | 1553.2 | 1443.2 |
| Spain | 30670.8 | 31335.8 | 32231.7 | 33590.6 | 34343.0 | 33402.3 | 33825.1 |
| Sweden | 4192.0 | 4495.0 | 3955.7 | 4377.4 | 4427.7 | 4287.6 | 4455.4 |
| Switzerland | 3666.0 | 3561.0 | 3417.0 | 3494.0 | 3532.0 | 3625.0 | 3555.0 |
| Turkey | 8360.0 | 8120.0 | 8188.0 | 8020.0 | 8430.0 | 9244.0 | 9231.0 |
| United Kingdom | 58014.0 | 57449.0 | 56255.0 | 53763.0 | 51341.0 | 49469.0 | 45141.0 |
| Total | 389493.7 | 391192.7 | 394684.8 | 395095.3 | 403971.4 | 398950.2 | 382650.8 |
| Total EU 27 | 371537.7 | 373519.7 | 377221.8 | 377499.3 | 385760.4 | 379634.2 | 363675.8 |

see BEER STATISTICS 2010 EDITION, The Brewers of Europe

Table 1: Beer production (1000 HL)