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THESIS

Győrfi Zoltán

Transformation of the Hungarian beer market in the light of international tendencies

Ph.D. thesis

Supervisor:

Dr. Fertő Imre Ph.D

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Major research questions

The goal of the dissertation is a comprehensive study of the supply and demand side of after-privatisation situation of the food industry (and beer industry) after the change of the political system.
At the preparation of the dissertation I was led by two goals: besides summarising the theories available in the international literature to create the demand function of the Hungarian beer, and to present the global tendencies in the world's beer industry which heavily determine Hungarian beer market tendencies.

My goal is nothing else but to thoroughly review the beer supply, the red battle and competition of beer producer concerns to increase their market share.

Beside it I also aimed to create the demand function of the beer in Hungary and by this I will empirically demonstrate those factors which significantly affect on the beer demand.

Since in the transitional countries (like in Hungary) there has been nor study prepared on the analysis of the comprehensive beer market, neither research presenting the demand on beer in an empiric way, so my dissertation aims to cover this gap.

1. Examination of beer demand

1.1 Aims, structure of the chapter

I begin the thorough analysis of the international and Hungarian beer market with the theoretical and practical analysis of the beer demand.

In the first part of the chapter I present the theoretical-methodological background of the empirical researches of beer demand available in the international literature, then I summarise the results.

After the comparative evaluation of the international results I prepare the Hungarian beer demand function for the period of 1980-2004.

I examine the price and income elasticity characterising the local alcohol market, and I compare these results with the results of the international researches.

In the second part of the chapter I follow the analysis of the demand with the evaluation of the consumer preferences.

In its framework I examine alcohol consumer habits, and its trend. I present the structure of the alcohol consumption by the analysis of the beer, wine and liquor consumption.

In the chapter I also examine the trend of the relation between consumers' available income and money spent on the individual alcoholic drinks.

1.2 Summary of previous studies on the demand for alcoholic beverages

Several economist have studied the demand for alcoholic beverages. Table x. provides non-exhaustive but insightful list of studies ont he demand for alcoholic beverages and some of their elasticities. A glance of these results reveals that expenditure and own-price elasticities vary considerably from one study to another. Expenditure elasticities for beer, wine and spirit range from -0.83 to 1.94, -0.01 to 2.10 and 0.46 to 2.66, respectively

Table 1. Summary of previous studies – Income elasticities

Author(s)	Income elasticities		
	Beer	Wine	Spirits
Hogarty és Elzinga, 1972 (USA)	0,43	n.a.	n.a.
Johnson és Oksanen 1977 (Kanada)	0,00	0,04	0,11
Duffy, 1982 (UK)	0,49	1,50	1,65
Clements és Johnson, 1983 (Australia)	0,80	0,75	1,91
Quek, 1988 (Kanada)	0,44	1,26	0,95
Heien és Pompelli, 1989 (USA)	1,94	2,10	2,66
Tremblay és Lee, 1992 (USA) long term	0,11	n.a.	n.a.
Selvanathan, 1995 (UK)	0,48	2,02	1,83
Gallet és List, 1998 (USA) 1964-1973	-0,26	n.a.	n.a.

Source: Modeling the demand for alcoholic beverages and advertising specifications, Agricultural Economics 22. 2000

The ranges for the own-price elasticities for the same products are 0.26 to -0,89, -0,43 to -1,89, -0,37 to -1,88.

The lack of consensus across studies extends to qualitative results about the nature the relationships between alcoholic beverages (i.e. complements versus substitutes).

Table 2. Summary of previous studies – own price elasticities

Author(s)	Own price elasticities		
	Beer	Wine	Spirits
Hogarty és Elzinga, 1972 (USA)	-0,89	n.a.	n.a.
Johnson és Oksanen 1977 (Kanada)	-0,27	-0,67	-1,14
Duffy, 1982 (UK)	-0,17	-1,14	-0,84
Clements és Johnson, 1983 (Australia)	-0,36	-0,43	-0,74
Quek, 1988 (Kanada)	-0,16	-0,66	-0,66
Heien és Pompelli, 1989 (USA)	-0,84	-0,55	-0,50
Tremblay és Lee, 1992 (USA) long term	-0,72	n.a.	n.a.
Selvanathan, 1995 (UK)	-0,24	-0,55	-0,56
Gallet és List, 1998 (USA) 1964-1973	-1,72	n.a.	n.a.

Source: Modeling the demand for alcoholic beverages and advertising specifications, Agricultural Economics 22. 2000

Table 3. Cross price effects

	complements	substitutes
Johnson és Oksanen, 1977 (Kanada)	beer/spirits	bor/sör
Fuss and Wavermann, 1987 (Kanada)	beer/wine	beer/spirits wine/spirits
Quek, 1988 (Kanada)		beer/wine beer/spirits wine/spirits
Alley, 1989 (British-Columbia)	beer/wine beer/spirits wine/spirits	

Source: Modeling the demand for alcoholic beverages and advertising specifications, Agricultural Economics 22. 2000

1.3 Beer demand function - Hungary

The beer demand function defined as follows:

$$\ln Q_{beer} = c_0 + c_1 \ln P_{beer} + c_2 \ln P_{wine} + c_3 \ln P_{spirits} + c_4 \ln Y$$

Used data

For the preparation of the regression model I used Hungary's statistical data in a timeline analysis. The examined period is between 1980-2004 (number of observations: 25), data is from the Central Statistical Office (KSH) (Hungary's Statistical Yearbook 1980-2004). The data used for the analysis is arranged in a data table available in Attachment 2 and 3.

Consumption data

The individual alcoholic products annual consumption data were standardised following KSH methodology, that is every alcoholic drink was converted into 100%-os pure alcohol consumption data when it was put in the model.

Prices

The prices (beer, wine and spirits) and income values were deflated by consumer price index, cleaning them off from the inflationary effects.

When examining the prices I used the following categories:

- 0,5 litre, bottled standard lager beer price (source: KSH)
- 1 litre white standard wine price (source: KSH)
- 0,2 litre standard rum consumer price (source: KSH)

Income

The consumers' available income parameter was modelled and deflated by the national per capita net income (source: KSH).

After the logarithmic regression-analysis we receive the following data:

Table 4.: Beer demand function results:

	Beer consumption (Q_{beer})
Beer price – own price (P_{beer})	-0.214
p value	0.2834
Wine price (P_{wine})	0.119
p value	0.1103
Spirits price ($P_{spirits}$)	**-0.491**
p value	0.0000
Income (Y)	**0.171**
p value	0.0533
Durbin-Watson	1.705
Reset	0.0107
VIF	**4.63**
Shapiro-Wilk W test	**0.1035**
R^2	0.7257
N	25

The Durbin-Watson statistical value (1.705) refers to positive first grade autocorrelation, so I found it necessary to complete the re-estimation of the function by the Cochrane-Orcutt auto regression method, which is suitable to eliminate the residual auto correlation happening at regression procedures.

Received values are in the Table 5:

Table 5: The re-estimation of the beer demand function with Cochrane-Orcutt AR (1) method

	Beer consumption (Q_{beer})
Beer price – own price (P_{beer})	-0.290
p value	0.1436
Wine price (P_{wine})	**0.120**
p value	0.0814
Spirits price ($P_{spirits}$)	**-0.421**
p value	0.0008
Income (Y)	**0.169**
p value	0.0579
_cons	2.194
p value	0.0054
Durbin-Watson	**1.883**
R^2	0.662
N	25

As a result of the procedure the Durbin-Watson statistics value improved to acceptable level, and the wine price, as explanatory coefficient became significant. Significant values in the Table 5. are **bold**.

1.4 The Hungarian alcoholic data: summary measures

In this section we summarize the basic Hungarian alcohol consumption data for beer, wine and spirits for the years 1980-2004.

Table 6. presents the per capita consumption of beer, wine and spirits at the beginning (1980) and end (2004) of the sample period and 4 middle years 1985, 1990, 1995 and 2000 in litres per capita of each beverage (rows 1-3) as well as pure alcohol terms (rows 4-7).

Figures 1-3 show the consumption of the three beverages in litres per capita for the period 1980-2004.

Table 6. Per capita consumptions

ALCOHOL TYPE	1980	1985	1990	1995	2000	2004
Consumption (l/cap)						
(1) Beer	86	93	105,1	74,6	71,6	73,2
(2) Wine	34,8	24,9	27,7	26,3	28,3	32,7
(3) Spirits	9,4	11	8,6	6,8	6,4	7,2
Pure alc. cons. (l/cap)						
(4) Beer	3,0	3,2	3,7	3,5	3,6	3,7
(5) Wine	4,0	2,9	3,1	3,0	3,2	3,7
(6) Spirits	4,7	5,5	4,3	3,4	3,2	3,6
(7) Total	11,7	11,6	11,1	9,9	10,0	11,1

As can be seen from rows 1-3 of Table 6. the per capita beer consumption initially increased from 86 litres in 1980 to its peak of 105 litres in 1990 and then declined to 73 litres in 2004.

Per capita wine consumption fluctated around 20 to 35 litres during the period 1980-2004.

The per capita spirits consumption decreased from 5,5 litres in 1985 to its minimum of 3 litres in 1999. And then the spirits consumption increased to 3,6 litres in 2004.

Let q_{it} be the per capita consumption and p_{it} be the undeflated price per litre of beverage *i* in period *t,* where *i*=1 for beer, *i*=2 for wine and *i*=3 for spirits. Then the log-change in per capita consumption is defined as

$$Dq_{it} = \log q_{it} - \log q_{it-1}$$

and log-change in undeflated price per litre is

$Dp_{it} = \log p_{it} - \log p_{it-1}$

Table 7. presents the average log-change in consumption

$$D\bar{q}i = (1/T)x\sum_t q_{it}$$

and average log-change in price

$$D\bar{p}i = (1/T)x\sum_t p_{it}$$

of beer, wine and spirits over the period 1980-2004.

Table 7.: Average per capita consumption and price growth rates for beer, wine and spirits, Hungary 1980-2004 (in percentages)

	Consumption ($D\bar{q}i$)	Price ($D\bar{p}i$)
beer	- 0.68	12
wine	- 0.249	10
spirits	-1.01	11

As can be seen from column 2, on average, beer consumption per capita fell by about 0,7% per annum. On average, wine and spirits consumptions fell by about 0,25% and 1% per annum too.

The upper half of Table 8. gives the allocation of consumers' income on each beverage

$w_{it} = p_{it}q_{it} / M_t$, i=1,2,3

where M_t is consumers' income in period t, and on alcohol as a whole

$$W_{gt} = \sum_{i=1}^{3} w_{it} \text{ ;}$$

these allocations are called 'unconditional budget shares' and 'group budget shares', respectively.

The lower half of the Table 8. gives the market share of beer, wine and spirits within the alcohol market

$w_{it}' = w_{it} / W_{gt}$ (i=1, 2, 3);

these market shares are called 'conditional budget shares'.

Table 8. Budget shares of beer, wine and spirits, Hungary 1980-2004

BEVERAGE	1980	1985	1990	1995	2000	2004
Consumers' (unconditional) budget shares (percentages)						
(1) Beer (w_{1t})	2,15	2,34	2,86	2,16	1,91	1,61
(2) Wine (w_{2t})	1,88	1,19	1,38	0,93	0,88	1,03
(3) Spirits (w_{3t})	2,77	2,61	2,23	1,82	1,52	1,53
(4) Total alcohol (W_{gt})	**6,80**	**6,15**	**6,47**	**4,90**	**4,31**	**4,18**
Alcohol (conditional) market shares (percent.)						
(5) Beer (w_{1t}')	31,6	38,0	44,2	44,1	44,3	38,5
(6) Wine (w_{2t}')	27,6	19,3	21,3	19,0	20,4	24,6
(7) Spirits (w_{3t}')	40,8	42,7	34,5	36,9	35,3	36,9

As can be seen, the proportion of income allocated by consumers to the alcoholic beverages group as a whole fell from 6.8% in 1980 to 4.18% in 2004 (see row 4).
The allocation of wine more than halved from 1.88% in 1980 to 0.88% in 2000, and for beer fell from 2.15% in 1980 to 1.61% in 2004, while the allocation for spirits fell from 2.77 in 1980 to 1.53% in 2004 (see rows 1-3).
During this period, within the alcohol market, beer share increased from 31.6% in 1980 to 38.5% in 2004. This increase was captured by the wine and spirits markets, whose shares fell from 27.6% to 24.6% for wine and from 40.8% to 36.9% for spirits (see rows 5-7).

2. Examination of beer supply

2.1Global beer production

In the last 20 years the global beer production has been constantly growing year by year, and by 2005 exceeded 1500 million hectolitres.

Table 9: Global beer production between 1998-2005 (data in million hectolitres)

YEAR	BEER PRODUCTION
2005	1530
2004	1487
2003	1471
2002	1442
2001	1411
2000	1374
1999	1345
1998	1313

Global Beer Production Up in '03 - USA Ranks 2nd, www.probewer.com

2.2 Big companies in the global beer production

Since every big beer producer is listed on the stock exchange, operating as public limited companies, for the analysis of their data their annual reports provide reliable background information.

None of the leading beer producers announces its world market share, in its annual report Anheuser-Busch, considered as market leader for a long time, dares to declare itself a market leader in the USA.

Table 10.: TOP10 beer producers in the world in 2005

RANKING	BEER PRODUCER
1.	InBev
2.	SABMiller
3.	Anheuser-Busch
4.	Heineken
5.	Carlsberg
6.	MCBC
7.	Scottish & Newcastle
8.	Modelo
9.	Kirin
10	Tsingtao

Source: Central European Banker (MKB)

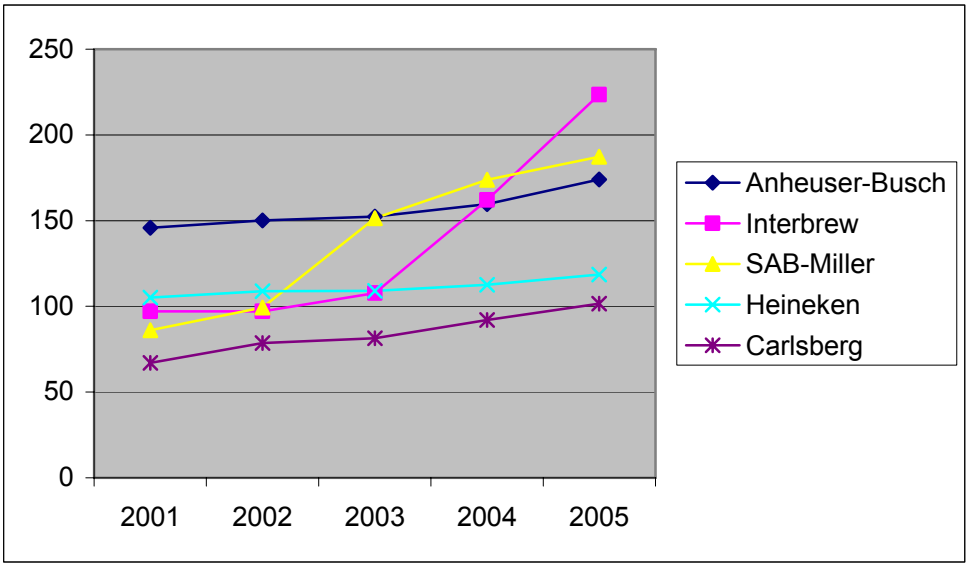
As current comprehensive market share analyses are not available in the international literature, my estimation was based on the production data published by the individual producers.

Table 11: The world's 5 leading beer-oligopolies yearly production (2001-2005) – million hectolitres

	ANHEUSER-BUSCH	**INTERBREW (INBEV)**	**SAB-MILLER**	**HEINEKEN**	**CARLSBERG**	**THE 5 COMPANIES ALTOGETHER**
2001	145,9	97,1	86	105,1	67	**501,1**
2002	150,1	97	99,4	108,9	78,6	**534**
2003	152,3	107,7	151,4	109	81,4	**601,8**
2004	159,7	162,1	173,9	112,6	92	**700,3**
2005	**174**	**223,5**	**187,2**	**118,6**	**101,6**	**804,9**

Source: the companies' publications and annual reports

Graph 1: The yearly production of the world's leading beer producers 2001-2005, data in million hectolitres



It is clear from the graph that the production of the American Anheuser-Busch long lasting market leader position was overthrown from 2004 by InBev's and SAB-Miller group's growth rate, so the American giant lost its market leader position, standing now on the third grade of the imaginary platform. The last 5 years of Heineken was of a slow growth, its growing rate stayed behind the pace set by the competitors.

2.3 Global beer market

Possessing the data an interesting analysis can be prepared with the comparison of the figures of the global beer industry and the production of the leading producers.

Table 12: Global beer production and the five big oligopolies' beer production 2001-2005 (million hectolitres)

	WORLD BEER PRODUCTION	GROWTH 2001=100%	TOP5 OLIGOPOLIES' BEER PRODUCTION	GROWTH 2001=100%	TOP5 OLIGOPOLIES' SHARE OF THE WORLD BEER
2001	**1411**	**100%**	**501,1**	**100%**	**35,5%**
2002	**1442**	**102,2%**	**534**	**106,6%**	**37,0%**
2003	**1471**	**104,3%**	**601,8**	**120,1%**	**40,9%**
2004	**1487**	**105,4%**	**700,3**	**139,7%**	**47,1%**
2005	**1530**	**108,4%**	**804,9**	**160,6%**	**52,6%**

Source: Modern Brewery Age, www.breweryage.com

Although the global beer production has been growing year by year from 2001, the speed of the growth is slow, in the examined period (2001-2005) the production only grew by 8,4%. The growth of the total production of the TOP5 oligopolies was eight times higher than the world market growth tendency. The majority of the analysts' forecast, that the leading 5 oligopolies global market share would exceed the magic 50% around 2010, already happened in 2005.

According to my calculations the market leader 5 oligopolies stepped over the 50% dream limit in 2005, and by their dynamic growth, expansion, company buy-outs and partner contracts they reached 52,6% market share.

2.4 The structure of the local beer industry

The last ten years of the Hungarian beer industry – after the collapse of communism – like in other sectors of the food industry went by with the privatisation although in a bit of a delay. The privatisation of the local beer industry was one of the first ones in the food industry. At the change of the political system the multinational beer concerns of the world were vividly interested in the companies of an industry with an internal market of more than 10 million hectolitres. The privatisation of the breweries was finished by 1994, which resulted that the foreign capital gained a substantial share in the industry.

2.5 After privatisation

The local oligopolistic beer market is ruled by three big companies, beside them there is a mid-size company and some smaller breweries. The biggest part of Hungary's beer supply is currently provided by the following 4 companies:

Big companies:	Dreher Sörgyárak Rt.
	Brau Union Hungária Sörgyárak Rt.
	Borsodi Sörgyár Rt.
Mid-size companies:	Pécsi Beerfőzde Rt.

All four local producers are in majority foreign ownership and their share is over 75% in each cases.

Table 13: Hungary's leading beer producers and their ownership structure

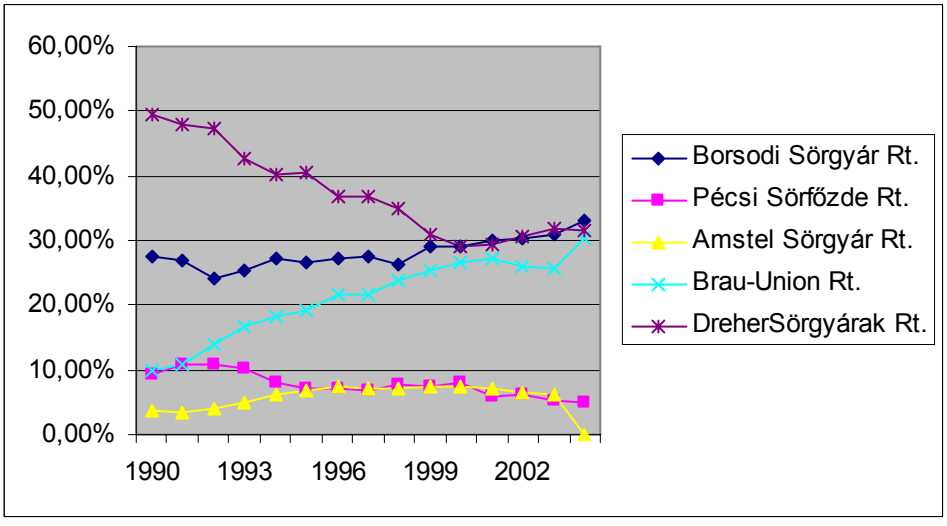
COMPANY	BEER PRODUCER	MAIN SHAREHOLDER	SHARE
Borsodi Sörgyár Rt.	Bőcs	InBev (Interbrew)	100%
Dreher Sörgyárak Rt.	Kőbánya	SABMiller	100%
Brau Union Rt.	Martfű, Komárom, Sopron	Heineken	NA – stock exchange bid and termination
Pécsi Beerfőzde Rt.	Pécs	Getränkeindustrie Holding AG. (Ottakringer)	78%

Source: companies' publications and websites

2.6 Competition on the oligopolistic Hungarian beer market

After the change of the political system 5 big significant beer producer competed yet on the local beer market which was on its peak at that time (the volume of the Hungarian beer production exceeded 10 million hectolitres only in 1990). In this era the dominant company on the market was the Dreher Sörgyárak Rt.) with almost 50% market share. The privatisation and the appearance of the foreign global oligopoly-owners significantly reshaped the market shares.

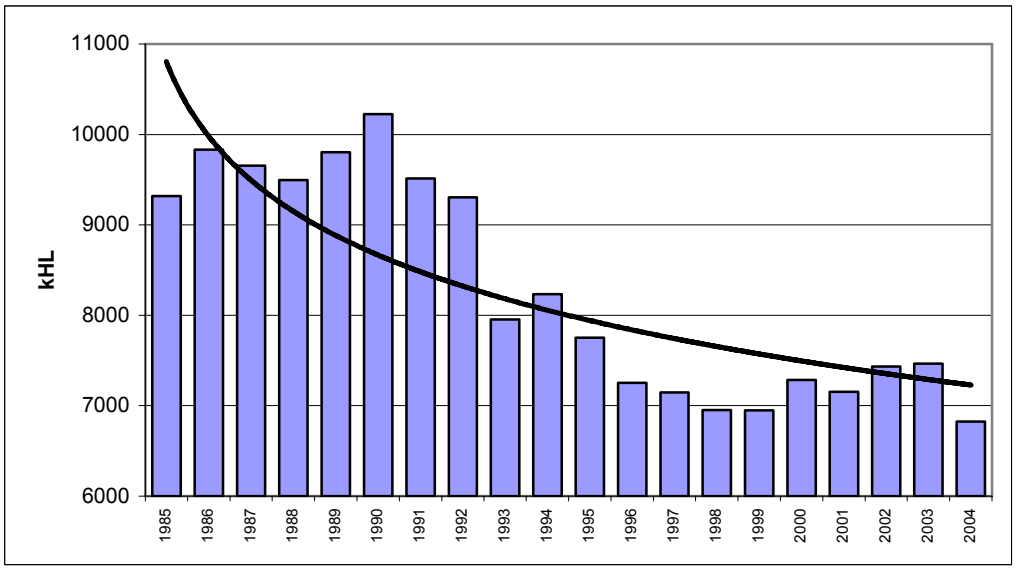
Graph 2: Market shares between 1990-2004



2.7 The beer sale in Hungary

After the privatisation the foreign owners of the beer companies developed the beer industry to a competitive level, with significant investments in the development of the technology, in the modernisation of the production and in environment protection. More than 200 million dollars invested in the modernisation of the technology improved the quality and the external appearance of the beer. Beyond the development of the technology, the internal structure of the breweries was also made more efficient; and the less developed distribution system, the sales and marketing activity was also raised on a European level. In spite of all these investments and developments the inland sale of the beer significantly dropped compared to the 1990 level, by 28%. This declining tendency stopped in 1999. In 40 years after 1950 the beer production and consumption was growing constantly and by 1990 beer practically became the most popular drink. The consumption per capita reached its record in 1990 (together with the import) with 106 litre/person/year. After 1990 on the market of "thirst" drinks the share of the beer dropped from 58% to 34,5%, due to the rise of the competitor drinks (firstly falsified wine, secondly soft drinks not paying consumer tax). To stop this unfavourable process the beer industry did everything in the last years. The production technology was modernised, the quality of the beer improved, the appearance became more attractive. In line with it the big companies of the industry were continuously fighting against the significant yearly increase of beer tax, which had real result only by 1997.

Graph 3: Tendency of Hungarian beer production between 1985-2004



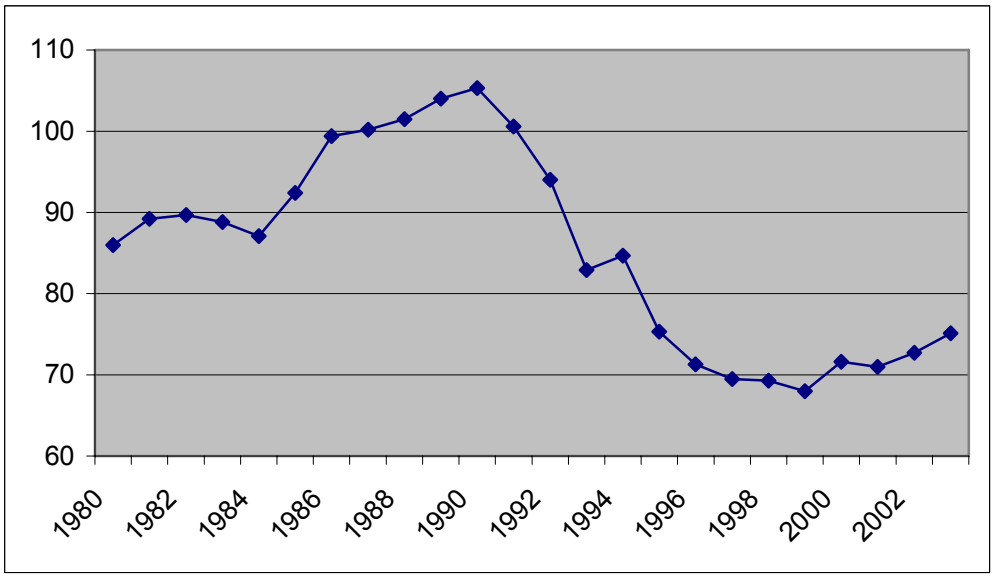
Source: Union of Hungarian Beer Producers

Between 2000 and 2003 signs of minor upswing were shown in the local beer production, the total volume was again close to 7,5 million hectolitres. The upswing was short unfortunately, and was followed by a significant drop in 2004, when Hungary joined to the EU, the production decreased with almost six-hundred thousand hectolitres. The reason of the decline is mostly explained with the significant rise of the excise tax on the beer, and with the dumping like appearance of cheap (and low quality) canned beers pouring from abroad.

2.8 The decline of beer consumption in Hungary

The local beer industry and market is characterised by a special duality: according to international experts we have one of the most saturated markets in Europe, at the same time beer consumption was continuously decreasing during ten years between 1990 and 2000.

Graph 4: Beer consumption in Hungary (litre/person/year)



Source: KSH – Hungary Statistical Yearbook 1980-2004

2.9 Possible reasons for the decline in beer consumption

Experts see the large-scale taxation on beer as the most important reason for the decline in beer consumption, which is much higher than the tax on the competitor vine, spirits and soft drinks.

The beer producers had to include the continuous rise of the consumer tax on the beer in the consumer prices, which added up to the inflationary rise of the other cost elements (e.g. raw materials, energy, amortisation, wages etc.). These factors altogether increased the price of the beer much more than the prices of the competitor drinks, which had no (soft drinks, mineral waters) or just a minimal consumer tax (wine, on the legal market). Low direct cost canned wines took the most away from the beer consumption, and the often falsified „fake wine", due to its low initial cost means a serious, unfair competition to beer.

The slowing consumption decrease in 1997 is caused by on one hand on the favourable legal changes (Media-Act passed in 1996, and on the Commercial Advertisement-Act passed in mid-1997), on the other hand the termination of the price war amongst soft drink producers, resulting higher soft drink prices. The relative market position of beer improved.

In 1997 authorities lunched their aligned and powerful actions against wine falsifiers. It effected against the beer consumption decrease, which was caused by the unchanged 15% consumer tax growth and the forced beer price increase originated from it.

Lower tax rise on beer reached by lobbyists from January 1, 1998 unfortunately could not stop the market losing tendency of beer, because due to the previous constant tax increases the beer price reached such a level that it is not competitive against falsified wine price anymore. By 1999 market loss had slowed again thanks to the successful marketing activity of the local beer producers.

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