Market Structure of the Hungarian Beer Industry

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Tax shifting to consumers is a relevant problem in every country. Firms usually try to impose these taxes on the final consumer prices, although their success regarding the tax shifting depends highly on their market power. Hungarian government increased the excise tax imposed on alcoholic beverages several times in the last decade. This gives us the possibility to examine the market structure in industries where excise tax was increased by evaluating the ratio of tax shifting to the final prices.

We conduct our paper on excise tax shifting in the Hungarian beer market which is an oligopolistic market with three main producers. Using a regression model on a 12-year long data set we show that tax overshifting occurs in this market. The relevant literature explains this result by assuming vertically integrated market structure. In this approach tax overshifting can occur easily (see Seade (1985)). However, beer manufacturers seldom if ever vent their products to the final consumers. Often, retailers are inserted between manufacturers and consumers. Thus, the beer industry is much more like a vertically separated industry rather than an integrated one. Based on this we give an alternative explanation to tax overshifting.

We present a double marginalization model to explain how tax overshifting can occur because of the separated vertical structure. We compared the empirical results to the theoretical ones. These suggest that Hungarian beer producers compete in Bertrand fashion and the hypothesis of collusion between beer producers can be rejected.

1 Methodology and data

In our paper our goal was to analyze the market structure of the Hungarian beer industry. In order to examine this, we developed a regression model that

explains beer price shifts with cost and excise tax changes and with some demand control variables (temperature, import beer prices and crises proxy).

We used 12 years long monthly data sets (from 2000 to 2011) to estimate our model. According to Young and Bielińska-Kwapisz (2002) beer prices respond to tax changes within a quarter year period in the USA. Because of this effect, we used lags of cost and tax changes in our model.[1]

We chose three demand control variables. Temperature considerably biases the beer consumption. In the interval from 2000 to 2007 the correlation between yearly beer consumption in Hungary and average temperature was 0.734. From 2008 this tendency faulted due to the economic recession. That is the reason why we also included a crises proxy variable in our model. This dummy variable is 1 for every month in a quarter year when the Hungarian quarterly GDP growth rate is minus, 0 otherwise. In the Hungarian beer market, import beers have only a very small market share. However, after Hungary joined the European Union (1st May 2004) most of the import beers are duty free. The cheap import beers can cause a price reduction which can also be important in our model.

Formally, the model to be estimated for beer price at time t is:

$$\begin{aligned} \Delta p_t &= \alpha + \sum_{i=0}^{5} \beta_{1,t-i} \Delta c_{t-i} + \sum_{i=0}^{5} \beta_{2,t-i} \Delta \tau_{t-i} + \sum_{i=0}^{5} \beta_{3,t-i} \Delta p_{im,t-i} + \beta_4 \Delta T_t \\ &+ \beta_5 V_t + u_t \end{aligned} \tag{1}$$

where α is a constant, Δp_t is the domestic pre-VAT beer price change between the period t and $(t-1)$, Δc_t is the cost of production change between t and $(t-1)$, $\Delta \tau_t$ is the excise tax change between the periods, $\Delta p_{im,t}$ is the imported beer price change, ΔT_t is the monthly average temperature deviation from the 12 years average at month t, V_t is the crises proxy (dummy) variable at month t and u_t is a white noise error from a normal distribution with 0 average. The estimation method used is ordinary least squares (OLS).

Our data sets came from several sources. We used the average domestic and import beer prices and cost of production data published by the Hungarian Central Statistical Office. The VAT was filtered out from the domestic average beer price data series. Excise tax rate is defined by the Hungarian Parliament. As the nominal tax rate changes are determined by the corresponding law, we used the archive law database. All the four data sets are time series. To avoid modeling inflation, we deflated all the series using monthly consumer price indices or producer price indices (only for cost of production data set).

The monthly average temperature data came from the Hungarian Meteorological Service. From the data set we calculated a 12 years average for every month, and used the deviation between the appropriate monthly data and the 12 years average. The crises dummy variable is based on the GDP growth rate published by the Hungarian Central Statistical Office.

[1] In practice, retail firms, e.g. pubs and supermarkets, sometimes have big stocks of beer and this can cause a long-drawn-out price change.

2 Results

The key to explain our regression results is to focus on the vertically separated structure of the beer industry. Beer producers sell their products to retail shops and chains. Retail shops put their markups to the wholesale price of the beer and sell the product to the final consumers. Therefore, consumer prices exhibit two markups instead of one.

We calculated theoretical tax (or cost) shifting parameters assuming three different upstream market situations: Bertrand fashion competition, Cournot fashion competition and full collusion (i.e. monopoly, because of the constant marginal cost).

According to our calculations (using regression results and markups data) at the producers level there is almost no or only a marginal tax overshifting. If excise tax is increased by 1 real HUF, beer manufacturers will immadiately raise their wholesale prices by circa 1 real HUF. These findings suggest that the first upstream-market-model (Bertrand fashion competition) is the nearest to our empirical result. Moreover, these show that retail shops are dominant in the supply chain and hold almost all the market power. As Rojas (2008) and Slade (2004) rejected collusion between beer manufacturers, we can also exclude the possibility of cartel in the Hungarian beer market.

References

Barsky, R., Bergen, M., Dutta, S. and Levy, D. (2001), 'What Can the Price Gap between Branded and Private Label Products Tell Us about Markups?', National Bureau of Economic Research, Cambridge Working Paper

Besley, T. and Rosen, H. S. (1999), 'Sales Taxes and Prices: An Empirical Analysis', *National Tax Journal*, 157-178.

Bielinska-Kwapisz, A. and Mielecka-Kubien, Z. (2011), 'Alcohol Consumption and Its Adverse Effects in Poland in Years 1950-2005' *Economic Research International*, 1-13.

French, M. T., BrownTaylor, D. and Bluthenthal, R. N. (2006), 'Price elasticity of demand for malt liqour beer: Findings from a US pilot study', *Social Science & Medicine*, 2101-2111.

Gallet, C. A. (2007), 'The demand for alcohol: a meta-analysis of elasticities', *The Australian Journal of Agricultural and Resource Economics*, 121-135.

Gil, A. I. and Molina, J. A. (2009), 'Alcohol demand among young people in Spain: an addictive QUAIDS', *Empirical Economics*, 515-530.

Györe D., Popp J., Stauder M. and Tunyoginé Nechay V. (2009), 'Az élelmiszer-kiskereskedelem beszerzési és árképzési politikája (Supply Management and Pricing Policy of the Food Retail Trade)', Research Institute of Agricultural Economics, Budapest Working Paper

Kenkel, D. S. (2005), 'Are Alcohol Tax Hikes Fully Passed Through to Prices? Evidence from Alaska', *American Economic Review* 273-277.

Österberg, E. L. (2011), 'Alcohol tax changes and the use of alcohol in Europe', *Drug and Alcohol Review*, 124-129.

Park, M.-C. and Lee, S.-W. (2002), "Double marginalization' problems: evidence from the Korean fixed-to-mobile service market', *Telecommunications Policy*, 607-621.

Raper, K. C., Love, H. A. and Shumway, C. R. (2000), 'Determining Market Power Exertion Between Buyers and Sellers', *Journal of Applied Econometrics*, 225-252.

Rojas, C. (2008), 'Price Competition in U.S. Brewing', *The Journal of Industrial Economics*, 1-31.

Saffer, H. (1989), 'Alcohol consumption and tax differentials between beer, wine and spirits', National Bureau of Economic Research, Cambridge Working Paper

Seade, J. (1985), 'Profitable Cost Increases and the Shifting of Taxation: Equilibrium Responses of Markets in Oligopoly', The University of Warwick Working Paper

Slade, M. E. (2004), 'Market Power and Joint Dominance in U.K. Brewing', *The Journal of Industrial Economics*, 133-163.

Spoerer, M. (2008), 'The Laspeyres-Paradox: tax overshifting in nineteenth century Prussia', *Cliometrica*, 173-193.

Tian, G. and Liu, F. (2011), 'Is the Demand for Alcoholic Beverages in Developing Countries Sensitive to Price? Evidence from China', *International Journal of Environmental Research and Public Health*, 2124-2131.

West, D. S. (2000), 'Double Marginalization and Privatization in Liqour Retailing', *Review of Industrial Organisation*, 399-415.

Young, D. J. and Bielińska-Kwapisz, A. (2002), 'Alcohol taxes and beverage prices', *National Tax Journal*, 57-73.