Standards, international integration and economic development: A historical review of the German 'Reinheitsgebot'

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1 Introduction

The Bavarian beer law of 1516, that later morphed into the German 'Reinheitsgebot' (purity law) is often seen as the oldest known food law, and German brewers take great pride in referring to it as a guarantee of traditional quality. The law is also an example of a unilateral production standard that has become a non-tariff barrier to trade as the economic integration in Europe proceeded. Some 450 years after it was decreed the European court of justice decided in 1987 that the German standard hampered the free movement of goods in the then EC and forced a national repeal of the law. Today, German beer producers are still subject to legal production standards that have their origins in the original Reinheitsgebot, but imported beers need not adhere to the strict requirements concerning the ingredients to be used in brewing.

This paper provides a brief historical overview of the evolution and adoption of the Reinheitsgebot. It proceeds by presenting a simple analytical framework to analyze its economic effects on consumers, domestic producers and foreign suppliers. Finally, it discusses the developments on the German beer market after opening to imports, using statistical data.

2 Historical overview: From the Bavarian beer law in 1516 to the German Biersteuergesetz 1993.

The 1516 beer law simply stipulated that only barley, hops, and water may be used to make the brew. The existence of yeast had not yet been discovered. The German text (in modern German language) is provided in Annex 1.

This law has documented predecessors ranging back to the times of Emperor Barbarossa. The town law of Augsburg (also in Bavaria) "Justitia Civitatis Augustensis" of 1156 already

mentions beer: "Wenn ein Bierschenker schlechtes Bier macht oder ungerechtes Maß gibt, soll er gestraft werden..." ('If an innkeeper pours bad beer or uses unfair measure he shall be punished', own translation). The punishment was heavy and amounted to 5 guilders, on the third infringement the beer licence was nullified.

The Bavarian law of 1516 did not only regulate the ingredients for beer making. It also set maximum prices, varying between summer and winter seasons. Its main effects can be summarized as follows:

a) Consumer protection: to keep beer "pure" by feudal decree, that is, to keep cheap and often unhealthy ingredients — such as rushes, roots, mushrooms, and animals products — out of the people's drink. In medieval times, brewers often used such ingredients to raise their profits by lowering their standards.

b) Price regulation: maximum prices, depending on the season (low price between 23 April and 29 September, and double that during the rest of the year).

c) Guild protection: entry barrier into sector by setting a potentially cost increasing standard.

d) Agricultural policy: by diverting wheat into bread making, in combination with maximum prices for beer, it had direct as well as indirect market effects on grain prices.

Over the centuries, acceptance of the law spread gradually from Bavaria northwards to other German states. By the time Bismarck forged the Second German Empire in 1871, it was in force in many of the kingdoms and principalities that formed the new union. By 1906, it became the official law in the entire realm of the German Kaiser, with the addition of yeast as a basic ingredient and malted wheat as an allowable component in top-fermented beers (ales), such as Alt, Kölsch and Weissbier (Hefeweizen).

With the formation of the Weimar Republic in 1919, the old Bavarian beer ingredients law, now renamed the Reinheitsgebot (purity law), became firmly anchored in the German beer tax law, in part, because the Free State of Bavaria made its nation-wide application a condition for joining the new Republic.

European integration meant a first serious threat to this unilateral production standard. In 1987 The German Reinheitsgebot had to give way in the interest of free trade within the European Community.

Foreign competitors had long complained about the trade restrictions that were created by the German law (and an almost identical one in Greece (EEC case 176/84)). The European Court of Justice ruled in March 1987 that the German Beer Purity Law created intra-European trade barriers, in direct violation of the Rome Treaty (Article 30, banning protectionism). The Court ruled that the beer's alcohol content threatened public health more than any otherwise legal additive, and that Germany itself violated the law on occasion for public festivals without any apparent health damage. The Court forced a national repeal of the law to balance requirements within the then-EC, although it noted that domestic production requirements could remain in effect.

Since the ruling, it has been legal to import beers into Germany that are brewed with adjuncts (corn, rice, non-malted grains and sugar) and treated with chemicals for an artificial head and a longer shelf life.

However, in Germany produced beer has to follow production standards akin to the Reinheitsgebot. Today, the purity law is part of the German tax code (Biersteuergesetz 1993). It states that, in bottom-fermented beers, **lagers,** brewers may use only barley malt, hops, yeast and water. Specifically, this rule forbids the brewing in Germany of lagers containing spices (as do many Belgian beers), corn or rice (as do virtually all mass-produced industrial beers in the rest of the world), sugar (to be found in many Belgian and British beers), un-malted grains (required for many Belgian and British beer styles), as well as chemical additives and stabilizers.

For top-fermented beers, **ales**, which hold about 10% of the German market, the Reinheitsgebot is somewhat more generous in terms of allowable ingredients, in part to accommodate an ancient and varied, mostly barley-based ale-brewing tradition in northern Germany, in part to accommodate the entirely wheat-based Weissbier (wheat beer) brewing tradition in Bavaria. German ales may contain — next to barley malt, hops, yeast, and water — "other" malted grains

(including, of course, malted wheat for Weissbier), as well as various forms of sugar (cane or beet) and sugar-derived colouring agents — but still no chemicals or other processed compounds.

The German production standard for beer, has created new frictions in the context of the German re-unification after the fall of the Berlin Wall in 1989. A brewery in east-German Brandenburg that has a brewing tradition dating back to 1410 was not allowed to sell its traditional bottom-fermented black beer under the name 'beer' since sugar syrup is added to give it a dark colouring and distinct taste. The Klosterbrauerei Neuzelle had to call its brew 'Schwarzer Abt' instead of beer. It took a lengthy legal battle, up to the German administration court, to allow the production and distribution of the product under the name 'beer'. In February 2005 the court ruled that adding sugar syrup in this case is not a substitute for barley malt since it is added after brewing and filtration. (BVerwG 3 C 5.04 – Ruling 24 February 2005).

3 Analysis: an economist's view on the German production standard

The Reinheitsgebot erected a non-tariff barrier to trade, as prior to the 1987 decision of the European court of justice all produce had to adhere to this unilateral production standard. The effects of the domestic production standard can be analyzed in a simple partial equilibrium setting of supply and demand for beer in Germany. With the Reinheitsgebot in place, there were (virtually) no imports, and hence the standard acted as an import ban. Figure 1 illustrates this situation, where domestic supply S_0 intersects domestic demand D at the autarchy equilibrium price p^A and a quantity Q^A is sold and consumed. The demand intercept at the vertical axis *a* and the parameter *b* on the horizontal axis stem from the parameters of a quasi-linear utility function, as explained in Annex 2.

Figure 1: without trade, only one demand function for beer
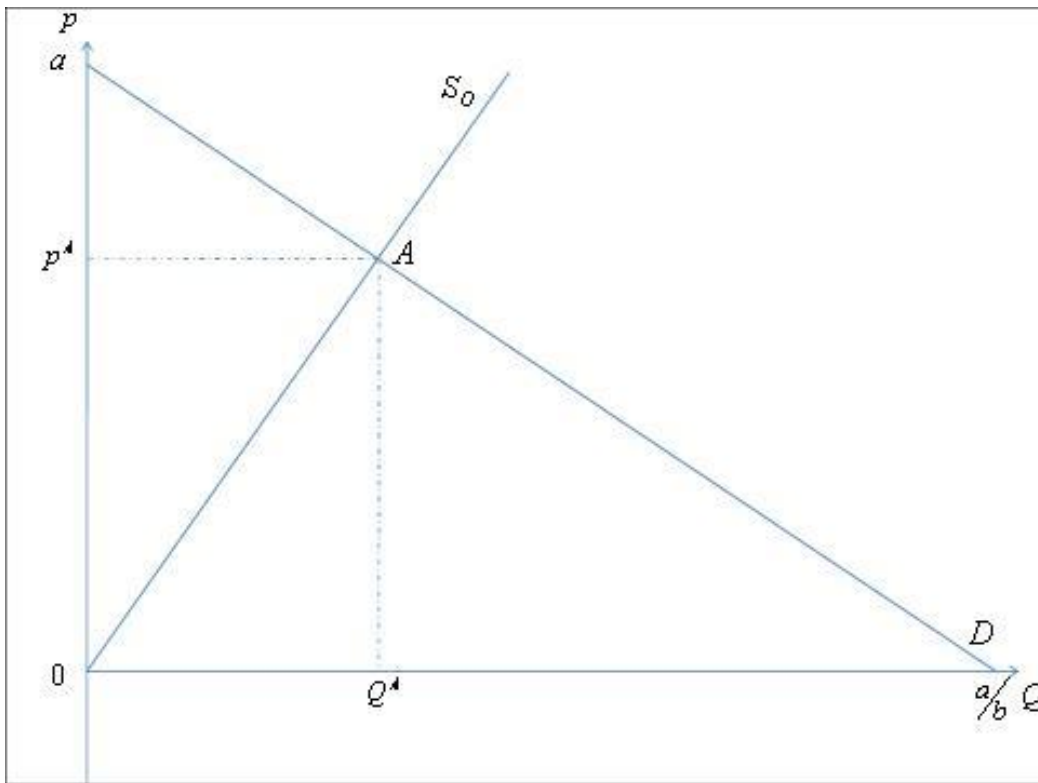
Assume now that two types of beer consumers can be distinguished. Those who care about drinking only beer produced according the Reinheitsgebot, and those who venture into consuming imported varieties that may contain additives not allowed under the German standard. The 'traditionalists' demand of the fraction $(1-\beta)$ of consumers is denoted D_2 in Figure 2, while the 'experimentalists' demand of the remaining portion β of consumers is denoted D_1. With imports allowed, there are now two supply functions: S_0 denotes the domestic German supply as before, but to there is also the foreign supply S_F. Note that Figure 2 assumes that German brewers face higher costs than foreign producers due to the production standard that prohibits using cheaper substitute ingredients. Consumers are able to distinguish perfectly between beers made according to the Reinheitsgebot and imported varieties, so that they chose to either buy domestic or foreign. As a result two equilibrium prices are observed: p_2^L where the 'traditionalists' demand clears the market for domestic beers, and p_1^L where the 'experimentalists' demand intersects with foreign supply. The outcomes on this segregated

market can be compared to the equilibrium under autarchy. In particular, this simple model suggests that:

- The price for German brews will decline, due to competition from abroad ($p_2^L < p^A$)
- Total consumption increases: $Q^1 + Q^2 > Q^A$
- Consumer welfare increases due to greater variety and lower prices: 'traditionalist' consumers are still able to buy the Reinheitsgebot beer, and 'experimentalists' can enjoy alternative varieties, and prices are lower for all varieties.
- Producer surplus for German brewers declines due to lower prices and some substitution towards imported products, while producer surplus of foreign suppliers increases.

Evidently, the strengths of these effects depends critically on consumer preferences, as reflected in the shape of the demand functions and the size of the two consumer groups distinguished, as well as on cost factors, encapsulated in the supply functions.

Figure 2: Segmented market for beer
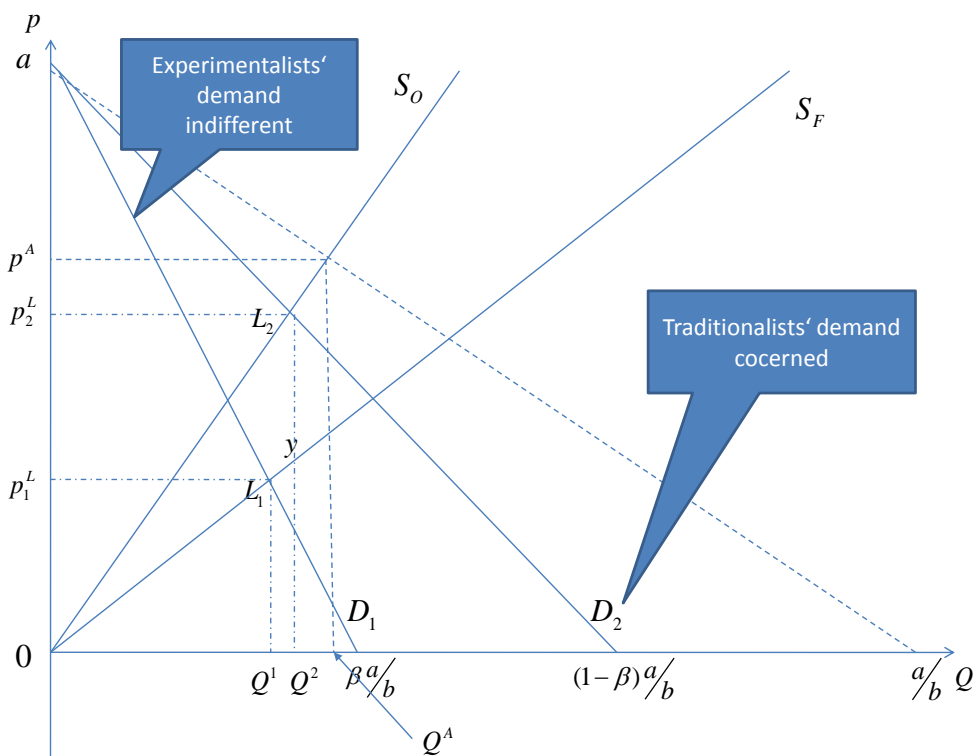
4 The facts: what has happened to the German beer market after 1987?

Per capita beer consumption in Germany had reached its top in the late 1970s and early 1980s with more than 148 liters beer consumed per inhabitant. Since then a steady decline in beer consumption has set in, reaching 112 liters per capita in 2007. Population growth has not outweighed the declining consumption per capita, so that aggregate beer consumption is also declining slowly, but still representing a sizable 9.2 billion liters, see Figure 3.[1] The number of breweries in Germany is quite stable and lies around 1300 since the year 1995.

Figure 3: German beer consumption
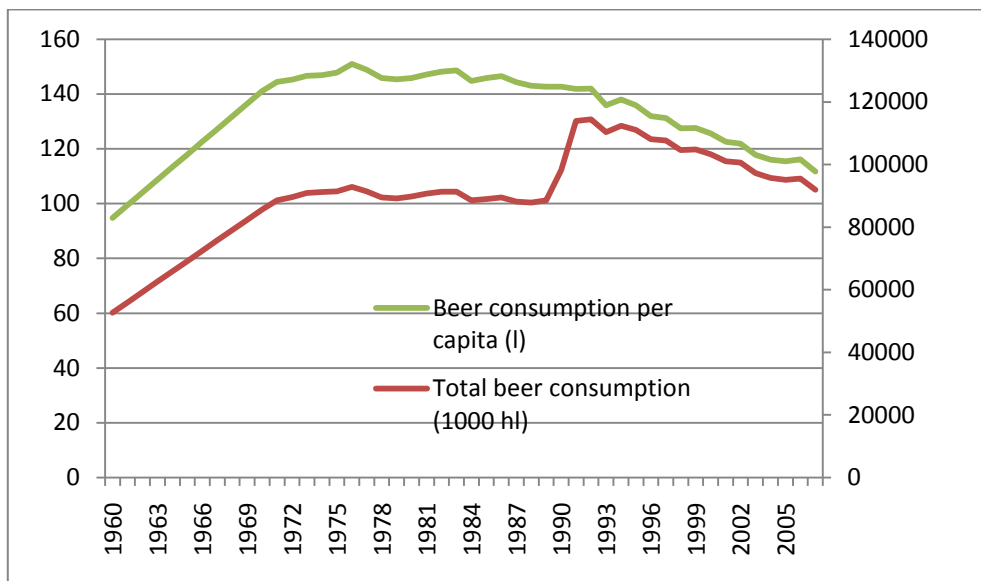
Source: Deutscher Brauerbund, Die Deutsche Bierwirtschaft in Zahlen 2007.

This decline in consumption is not captured in the analysis above and is most likely unrelated to the repeal of the Reinheitsgebot in 1987. In terms of figures 1 and 2, the overall demand for beer has shifted inward. But what has happened to imports and domestic prices?

Recall that the simple model predicts and increase in imports (as would any common sense reasoning). Indeed, as figure 4 shows, imports have increased steadily since mid 1990's (unfortunately no earlier data have been available). This increased openness of the German beer

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[1] Note that the steep increase in total beer consumption starting in 1990 is explained by the German re-unification and consequent broadening of the population base over which beer consumption is counted.

market is surely related to the decision of the European Court of Justice in 1987. But still imports represent only about 6% of German beer consumption. This is a relatively low import share compared to a share of agri-food imports in total German agri-food expenditures of more than 28 percent in the years 2007/08 (source BMELV http://www.bmelv-statistik.de/). Consumer preferences are essential to understanding this phenomenon. The reference on German beer bottles to the Reinheitsgebot of 1516 signals a certain quality that German beer drinkers seem to value highly. The German beer market is also quite particular regarding the dominance of local beers. The presence of many (1300), often small, producers serving a regional or local market is testimony to the tastes of many German beer consumers for their preferred local varieties.

The exporting countries most present on the German beer market are Belgium, Denmark and the Czech Republic, see figure 5.


The rise in imports has coincided with a fall in real consumer prices for beer (beer consumer price relative to CPI). Figure 6 shows a fall of 6 percent during the period 1996 to 2007.[2] While this is consistent with the conclusions from the simple model, it is unclear which portion of the price fall can be attributed to import competition, as other factors such as efficiency gains and falling input prices might also play a role. However, available statistics indicate that nominal German producer prices rose faster than nominal consumer prices, which lends support to the conclusion that import competition has played a role in lowering average price for beer on the German market, although the import share is relatively low.

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[2] Note however that nominal consumer beer prices rose in the same period by about 12%.
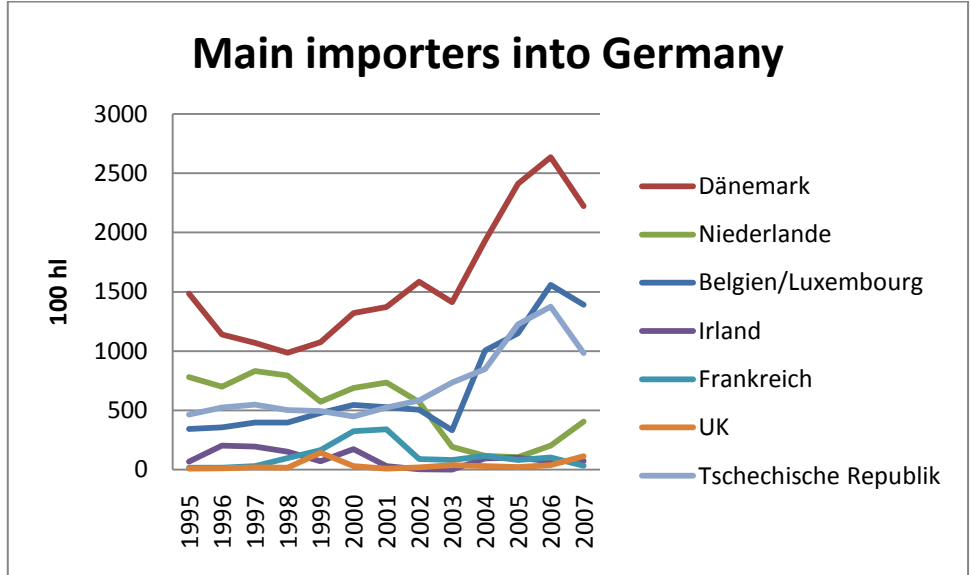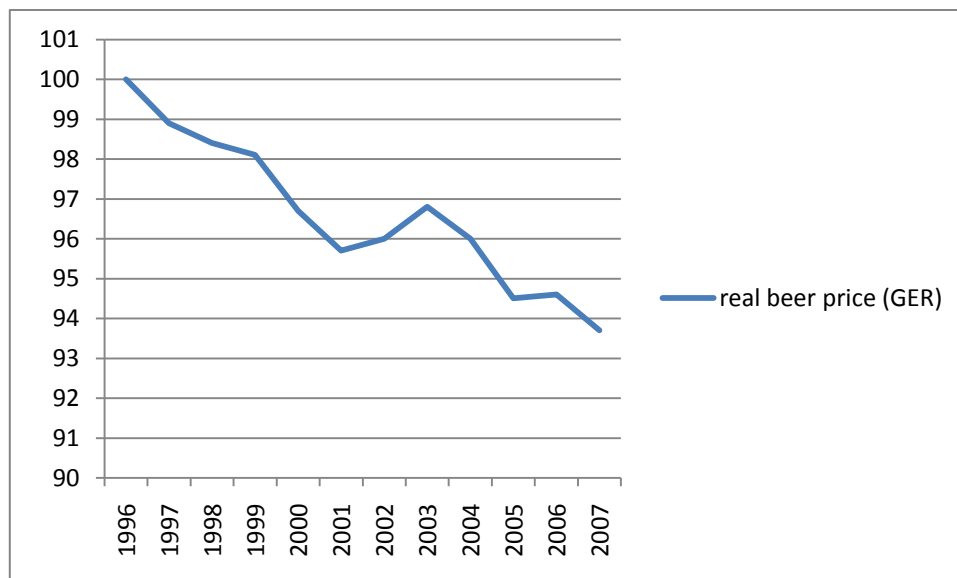
Figure 4: German beer imports
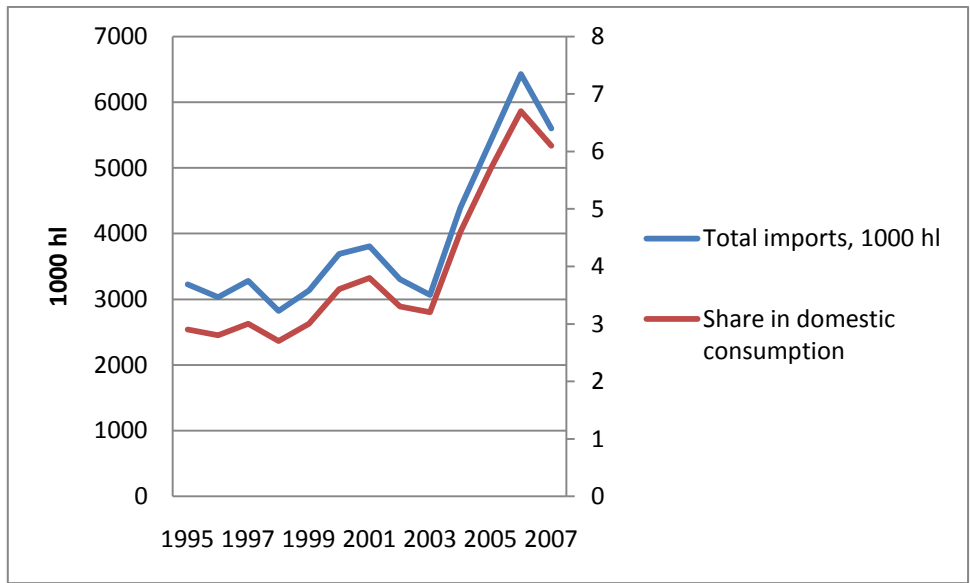
Source: Deutscher Brauerbund, Die Deutsche Bierwirtschaft in Zahlen 2007.

Figure 5: Main beer importers into Germany

Source: Deutscher Brauerbund, Die Deutsche Bierwirtschaft in Zahlen 2007.

Figure 6: Real beer consumer price index in Germany (1996 =100)

Note: calculated using data from Deutscher Brauerbund, Die Deutsche Bierwirtschaft in Zahlen 2007.

5 Conclusions

The German Reinheitsgebot that dates back to a Bavarian law of 1516 is frequently cited as being the oldest known food law. While this is probably an exaggerated claim, it is perhaps true that it is the oldest food law that is still in existence in more or less unchanged form. Almost 500 years of influence is a considerable performance for any regulation or law, anywhere in the world.

Five hundred years ago, beer was not very much traded across the European continent. But with greater economic integration, the unilateral German production standard became a non-tariff barrier to trade that was challenged in the context of European single market. Today imported beer can use a wider set of methods and ingredients than that allowed for beer produced in Germany. In some sense this could be seen as discrimination against domestic producers.

The opening of the German beer market means that consumers have a wider choice of varieties, with as such improves their welfare. However, import penetration remains relatively low and German beer drinkers prefer domestic and often local varieties that are still produced according to comparatively strict requirements that originate from the original Bavarian law of 1516. Deregulation has meant a wider choice for consumers, but one cannot deregulate against consumer preferences.

Annex 1: The text of the Bavarian beer law 1516

The law had been decreed by the Bavarian ruler Herzog Wilhelm IV. in April 1516 in Ingolstadt:

Wie das Bier im Sommer und Winter auf dem Land ausgeschenkt und gebraut werden soll

Wir verordnen, setzen und wollen mit dem Rat unserer Landschaft, daß forthin überall im fürstentum Bayern sowohl auf dem lande wie auch in unseren Städten und Märkten, die kein besondere Ordnung dafür haben, von Michaeli bis Georgi ein Maß (bayerische = 1,069 Liter) oder ein Kopf (halbkugelförmiges Geschirr für Flüssigkeiten = nicht ganz eine Maß) Bier für nicht mehr als einen Pfennig Münchener Währung und von Georgi (23 April) bis Michaeli (29 September) die Maß für nicht mehr als zwei Pfennig derselben Währung, der Kopf für nicht mehr als drei Heller (Heller = gewöhnlich ein halber Pfennig) bei Androhung unten angeführter Strafe gegeben und ausgeschenkt werden soll. Wo aber einer nicht Märzen-, sondern anderes Bier brauen oder sonstwie haben würde, soll er es keineswegs höher als um einen Pfennig die Maß ausschenken und verkaufen. Ganz besonders wollen wir, daß forthin allenthalben in unseren Städten, Märkten und auf dem Lande zu keinem Bier mehr Stücke als allein Gersten, Hopfen und Wasser verwendet und gebraucht werden sollen. Wer diese unsere Anordnung wissentlich übertritt und nicht einhält, dem soll von seiner Gerichtsobrigkeit zur Strafe dieses Faß Bier, so oft es vorkommt, unnachsichtlich weggenommen werden. Wo jedoch ein Gauwirt von einem Bierbräu in unseren Städten, Märkten oder auf dem Lande einen, zwei oder drei Eimer (= enthält 60 Maß) Bier kauft und wieder ausschenkt an das gemeine Bauernvolk, soll ihm allein und sonst niemandem erlaubt und unverboten sein, die Maß oder den Kopf Bier um einen Heller teurer als oben vorgeschrieben ist, zu geben und auszuschenken.

Annex 2: mathematical model underlying Figure 2

The graphical analysis in figure 2 is a representation of an analytical model of a segregated markets with externalities, largely following Polinsky and Rogerson (1983). Demand of each consumer i={1,…,N} is derived from a quasi- linear utility function that consists of the quadratic preference for the market good of interest and an additive numeraire

$$U_i(q_i, w_i) = aq_i - \bar{b}q_i^2/2 - Ir_i\, q_i + w_i$$

where the term $aq_i - \bar{b}q_i^2/2$ is the immediate satisfaction of consumer i from consuming a quantity q_i of the good and w_i is the numeraire good consumed by *i*. For simplicity $a, \bar{b}$ are the same for the *N* consumers. Foreign products carry certain characteristics that some consumers may want to avoid. This is captured by the term $-Ir_i\, q_i$. The parameter *I* represents the knowledge context regarding the specific characteristic brought by the foreign product. If consumers are not aware of the specific characteristic then *I*=0.Conversely, *I*=1 means that consumers are aware of the specific characteristic. The perceived damage associated with the consumption of the good with the specific characteristic is denoted $-r_i\, q_i$.

The maximization of the utility function under a budget constraint yields a demand function for each consumer, and aggregate demand for the good is obtained by summing individual demand functions over all N consumers. However, total demand can be partitioned into two groups: those who are indifferent, the 'experimentalist' beer drinkers, and those who are concerned about the Reinheitsgebot, the 'traditonalist' beer drinker. Let the proportion $\beta=N_1/N$ of consumers be completely indifferent to the specific characteristic, with $r_i = 0$ for every *i*=1,.., N_1. In other words, they attach no damage value to consuming the good. The remaining proportion *(1-β)= 1-N₁/N* of concerned consumers is reluctant to consume the specific characteristic and associates a damage per unit consumed equal to $r_i = r_2$ for every *i*= N_1+1,.., *N* With $b = \bar{b}/N$, the (inverse) demand functions for the two subgroups become:

$$\begin{cases} p_1^D(Q) = a - (b/\beta)Q & \text{experimentalist (indifferent) consumers} \\ p_2^D(Q, I) = a - Ir_2 - [b/(1-\beta)]Q & \text{traditionalist (concerned) consumers} \end{cases}$$

Figure 2 assumes that 'traditionalist' beer drinkers can perfectly identify the foreign product, and hence turn to domestic demand only, so that their demand function is the same as under autarchy: $p_2^D(Q,0)$.