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Towards an Empirical Industrial Organization Analysis (New and Old) of the Japanese Beer Industry

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Abstract

In this paper I investigate the characteristics of the Japanese beer market in the attempt to assess market structure, behavior and the degree of market power. Three tools of analysis are used: (1) stability of firm market shares over time; (2) short-run industry price responses to beer tax changes and; (3) long-run real price responses to tax rate changes. While challenges remain, the very high market concentration together with the finding of real beer price increases over the long-run suggest that the market is not near a competitive model. However, a near one-to-one matching of real tax and price increases at the wholesale level suggests otherwise.

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Keywords: New Empirical Industrial Organization, Beer, Monopoly Power, Collusion

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This is a work in progress and very preliminary. Please do not quote. Comments are most welcome.
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1. Introduction

The beer industry is often a popular topic to investigate. It is a fairly well-understood product with seemingly little change in the product over the years, unlike say, semiconductors, which are being reinvented every two years or so. It is a widely consumed product and often included in demand elasticity studies. At the same time, it is an addictive alcoholic beverage often "sin-taxed" quite heavily with several close substitutes which makes it an interesting topic in public finance. And lastly, in some countries, indeed, internationally, it is an industry which is dominated by several large firms, which makes the relatively simple industry and ideal focus of study in industrial organization.

Despite these observations, the beer industry in Japan seems to be very much understudied, at least in theoretical and careful empirical work in the academic economic literature.[1] This is even more puzzling given the fact that in many ways the Japanese beer industry represents a near-textbook example of a potentially collusive oligopoly. Approximately 99% of the domestic market is captured by four firms.[2] Imported beer is tiny, amounting to 37,922 KL in 2005 (Source: Japan Trade Statistics, *Gaikoku Boueki Gaikyou*).[3] As total consumption of beer in Japan (in 2004) was approximately 6,550,000 KL (source: Brewer's Association of Japan, http://www.brewers.or.jp/english/10-consupt.html), imports are only approximately 0.6% of the market.[4] Thus, with such a closely held market, application of either traditional or more recent methods empirical industrial organization seems warranted.

This paper aims to fill that gap. The next section will briefly describe some characteristics of the Japanese beer industry. Section 3 will discuss empirical methods for

[1] There is a great deal of business, marketing and management literature on the beer industry in the Japanese language, yet more theoretical work, in English or Japanese, appears scarce. As this paper is very much a work in progress, the knowledge of any notable works in Japanese or otherwise is greatly appreciated.

[2] The four largest firms are: Kirin, Asahi, Sapporo, and Suntory. In May 2003 the Okinawa-based Orion Beer company acquired the licensing rights to produce (at its only plant) and sell Asahi Super Dry. (Source: Orion homepage October 23rd, 2006.)

[3] Moreover when discussing major foreign brands one encounters in Japan, it is of interest to note that, for example: Kirin produces Budweiser under license in Japan and has exclusive importing rights for Heineken and Pilsner Urquell; Sapporo imports Guinness; Asahi imports Miller "Special", Bass Pale Ale, and Tsingtao and brews Lowenbrau in Japan.

[4] For those interested in such statistics, this works out to 59.57 liters per Japanese (15 and over) per year (based on October 1st, 2004 population statistics at www.stat.go.jp).

assessing market structure and power in oligopolistic settings, with emphasis on the so-called NEIO or New Empirical Industrial Organization approaches first outlined in Bresnahan (1989) in the late 1980s. Section 4 will present some tests for market power of the Japanese beer market, using two approaches in particular: 1) market share stability or lack thereof and ; 2) short-run and long-run price responses to various tax hikes on beer. Section 5 will conclude with a summary of the main findings, and discuss remaining puzzles.

2. Industry History and Characteristics

Around 1870, shortly after the Meiji Restoration, foreigners began making beer in Yokohama, Japan. The "first and largest" foreign beer brewery in Japan, Spring Valley Brewery was established at that time by a naturalized American, William Copeland, who was trained in his native Norway.[5] Later, many small domestic breweries grew and imported beer volume fell. Many of these domestic start-ups were formerly sake-producing families who decided to diversify. After much organizational and technological change in the ensuing 80 years or so, three major brewers eventually emerged in the post-war period: Asahi, Sapporo and the largest, Kirin, formerly "The Japan Brewery" whose first brewery was established on the very grounds of William Copeland's Spring Valley.

In 1964, whisky maker Suntory entered the market. The Okinawa-based Orion beer corporation was established in 1957, supplying less than 1% of the national market, the large majority of those sales occurring in the local Okinawa market. In 1994 a major legislative change was enacted which removed considerable barriers to entry in the brewing industry. Previously, brewers had to produce a minimum of 2000 kiloliters (KL). This was reduced to a relatively miniscule 60 kiloliters per year. As one might expect, Japan's own micro-brew (or in Japanese "regional brew" or *ji-biiru*) boom ensued. Having said that, after twelve years of deregulation, Japanese *ji-biiru* still only represents about 1% (or less?) of total national sales.

[5] Most of the history in this section is from a brief, but excellent history of the Japanese beer from its Meiji beginnings to present found in Fuess (2006).

Another interesting feature of the retail Japanese beer market, which is apparent to any long-term resident after not too long, is that all four major brands are typically sold for exactly the same price right along side each other. While there will be small price differences (a few yen) across different retail outlets, and occasionally one beer will be priced on sale a few yen one week in the same store, there is virtually no price competition among these four major brewers. [6] While this by no means guarantees collusion, as the many game-theoretic based models have shown us, it is at least suspicious.[7] Thus, the lack of any significant price competition and the tremendous stability of market players (and shares to some extent) makes the Japanese beer industry an excellent case study for testing the existence of market power.[8]

Any industry study would be incomplete without describing the market share allocation, especially when only four major (and one minor) firms account for approximately 99% of the market. Table 1 shows the markets shares from 1979 to 2004.

As one can see Kirin has historically been the market leader. Asahi and Sapporo follow, with the whisky-maker Suntory, with its flagship beer "Malt's", capturing only around five or six percent in recent years.[9]

(Insert Table 1 around here)

[6] Several important caveats must be made. Like brewers around the world, Japanese brewers also produce a variety of beer products, e.g. darker beers, diet beers, seasonal beers, etc. However, even in this case, price competition across the same product, for example, a low-calorie beer by Asahi and low-calorie beer by Kirin, will often be exactly the same price, sitting side by side on the shelf. And though a variety of beers exist in Japan, by far the bulk are lager-style beers, which differ (relatively speaking) very little.

[7] It has been claimed (The McKinsey Quarterly, Number 4, 1998, p. 39) that the Ministry of Finance "sets prices." Obviously, if true, this would have a huge impact on our understanding of the competitive nature of the market. Having said that, if the government presence is more of a facilitating nature, then studying the interactions, through price and quantity behavior, particularly under tax changes is still of great interest. In any event, as I have not found any other citation which makes such claims, this paper will work under the assumption that prices are not set by the MOF.

[8] Though price competition seems largely non-existent, *non-price competition* may be considerable. Massive advertising campaigns attempting to maintain or shift brand loyalty are common. Perhaps the largest shift in the last 30 years (prior to 1994) was the introduction of Asahi's Super Dry in 1987 which did indeed shake up market shares (as seen in Table 1) capturing a large segment of (at that time) 20-something consumers who didn't want to drink their "father's beer", which was for the most part Kirin. (See Craig, 1996.) Though even there price competition did not seem to materialize (see Tables 2 and 3).

[9] It should be noted that while Suntory is historically a whisky maker, the other beer companies all make whisky and/or other alcoholic beverages as well. Perhaps, more importantly (all?) beer four major companies also are the major providers on non-alcoholic juices, canned coffee, sports drinks, etc. While we abstract from this important point in this paper and focus of the beer market, once must not forget that these firms are not only the "Budweiser, Heineken and Lowenbrau's" of Japan, but simultaneously the Coke and Pepsi corporation equivalents! These products also have very little price competition.

Market shares of the four (or five if one includes Orion) largest brewers are based on shipment data. For the earlier part of the sample even residual firms are not included in the calculations, though in later years they are. In any event, "other" firms, in addition to imports as previously noted, are tiny. Even the fifth larger brewer, Orion typically captures only one percent of the market or so. Thus, these market shares, despite the inconsistent nature of the calculations (see notes at bottom of Table 1), are a fairly decent indication of concentration, as well as of the shake-up that has occurred over the past three decades.

Several points are of note. First, historically, Kirin has been the clear market leader, accounting for over 60% of the market in 1979.[10] Second, Asahi's share rises (and Kirin falls) in the late 1980s. This is due to the much touted introduction of Asahi's Super Dry in early 1987. While other new products have been introduced before and many since, none have caused any major shift in market shares.

Lastly, the data goes to 2004, while two changes, one major and one minor are not reflected in the data. The major change is the tax-avoiding innovation of so-called *happoshu*, which is a low-malt beer-like beverage. As the definition of beer and the associated tax rates of beer and beer-like products are based on its amount of malt, by making a beer-like product with lower malt content the much lower tax rate applies. Thus, the industry has exploded with each of the major brewers (and many tiny ones) producing its own lines of various low-malt *happoshu*. So, in Table 1, we see that Kirin has clearly lost its position in the official beer category. However, in low-malt beers, which now account for 32% (not reflected in Table 1) of all beer and *happoshu* sales combined in 2004 (Source: Japan Market Share Dictionary), Kirin is the market leader. In combined beer and *happoshu* Asahi has taken the lead. Because each of these new beers has its own tax rate, and these too have changed over the late 1990s and early 2000s, any analysis will become far more complex and thus, I have, for the moment, sidestepped this period (post-1994) of the data.

[10] It has been claimed (Craig, 1996) that Kirin's market share reached such a height in the 1973, that Kirin is said to have stopped all advertising from 1974 to 1978 for fear of being labeled a near monopoly and becoming the subject of Japanese anti-trust action. This comment needs to be confirmed with firm level data, and if true, certainly suggests at least tacit collusion, or fear of action by the Japanese Fair Trade Commission which would certainly be a factor in firm behavior.

If one calculates the Herfindahl-Hirshman Index (HHI) from Table 1, we find that the index values are quite high and might set off warning flags in the US Federal Trade Commission or Department of Justice, with the HHI over 4000 in 1979.[11] This, however, is by no means sufficient evidence of collusion, implicit or otherwise.

The other remarkable feature in the Japanese beer industry is price stability, across brands, but also over time. Tables 2 and 3 show the evolution of prices of domestic beer at both the retail and wholesale level. From month to month there is virtual no change in the nominal prices. As we will see, many (but not all) of these (typically upward) shifts in price are due to changes in the (beer) tax rate. This stability marked by pronounced jumps when tax changes occur offer us an almost ideal laboratory for testing market power and possible cartel-like behavior.

Table 4 shows the various tax changes on beer over the last two decades or so. The tax is a specific tax, so that for example in 1994, the beer tax was 220,000 yen per kiloliter, or 220 yen per liter. As a can of beer in Japan is typically 350 ml, this amounts to 77 yen tax per can. As a flagship beer typically costs a little over 200 yen (a little less than two American dollars), this amounts to a tax nearing 40%.[12] By comparison, the equivalent tax rates on beer (per 350 ml can) in other countries is approximately: France, 5.3 yen, Germany 3.8 yen, US (NY City) 7.6, and UK 44.5. (Source: Japan Brewers Association of Japan, www.brewers.or.jp.) These tax rate changes will be used later as part of the market structure analysis.

Despite casual empiricism which suggests perhaps at least implicitly collusive behavior, demonstrating that that is indeed the case (or not the case) can be exceedingly difficult, if not impossible. Simple Bertrand models with two-firms show us that they can be engaged in bitter marginal cost pricing. At the same time, duopoly Cournot models show us that pricing far above marginal cost can occur, even without collusion. The

[11] In the US, even at perhaps the peak of industry concentration in the early 1980s, the five-firm concentration ratio was 83% in 1983 and the HHI less than 2000 (Tremblay, 1987). This has no doubt fallen considerably with the massive micro or craft beer wave that has swept the industry since then.

[12] Since the Suntory's introduction of the first *happo-shu*, the tax structure has become somewhat more complex. *Happoshu* is a clever tax-avoidance innovation is which the "beer" made using less than a certain percentage (originally 67%) of malt content, thereby qualifying for a much lower tax rate, because it is not legally "beer". The beer companies and the legislation have gone back and forth for years on this. As it stands now there are three classes of beer and beer-like products, each with their own tax rate. This issue and the issue of dealing with yet another like product in a multi-product firm, is avoided by only looking at tax response behavior in pre-*happoshu* (and pre-micro-brew deregulation) years.

classic paper on retail gasoline stations (Slade, 1987) shows us how difficult it can be to prove collusion even with very detailed price data. The next section briefly discusses some of these papers in recent empirical IO and the describes the methods this study will employ.

3. Empirical Methods in Industrial Organization

Since the New Empirical Industrial Organization (NEIO) literature began to gain ground in the mid- to late 1980s, as summarized first in Bresnahan (1989), the previous Structure-Conduct-Performance (SCP) paradigm as an approach to measure industry behavior and market power began to lose appeal. One aspect of the SCP approach which was considered problematic was the use of accounting profits to assess price-cost differentials.[13] The NEIO approach, working on the assumptions that: marginal costs are unobservable and most probably impossible to estimate; estimating behavior from cross-section samples of industries was not promising as each industry is unique, and; that firm and industry conduct themselves were parameters to be estimated. Thus, the field has moved in a different direction. One approach was to estimate more detailed behavioral equations, supply and demand, for the industry using time series data on prices, quantities and various costs of inputs as well as various demand shifters and dummies. Porter's (1983) study of the railroad cartel is a classic in this regard. While this method may also be a promising line of research for the Japanese beer industry, the data requirements for such estimation are large, so for this first investigation we have selected less data-intensive approaches.

Another NEIO method popular for testing market power, especially in markets where the good is taxed, can be seen in the seminal work on the US cigarette industry by Sumner (1981). The basic idea is that as cigarette (per unit excise) taxes in the US vary across states, as do prices, one can construct a panel of data where both prices and tax rates are changing unevenly over time and across states. One can use fixed effect

[13] And, in general, looking at overall accounting profits as an indicator of monopoly power, and/or whether the firm is efficient has long been problematic.

dummies or conduct the estimate in first differences thus obviating the need to know the marginal cost for the industry. As the tax is a specific tax, there is (or should be) a direct link between tax and price movements.

If the firm or industry is acting monopolistically, a state with a higher tax rate should have cigarette prices more than exceed the tax differential. So, if one state's tax rate is 5% higher, that state's cigarettes should be sold at a price more than 5% higher, if the firm is a monopolist. One shortcoming with this very ingenious approach is one that plagues analysis of monopoly behavior in general. The above prediction is true if we assume the monopolist faces a demand function with constant elasticity. If, instead, the monopolist faces a linear demand, as presented in standard undergraduate microeconomic textbooks, the prediction is the opposite. With linear demand, a 10% tax hike will result in only a 5% price hike. Conversely, a 10% tax hike is not fully passed on to the consumer under a monopoly facing linear demand.

Other work has improved some of the weakness of this panel approach strategy (Ashenfelter and Sullivan, 1987) for example, and more recently, Delipalla and O'Donnell (2001), where the authors not only use a cross-section of prices and tax rates which vary over the sample and time, but also exploit the fact that cigarettes have a specific and ad valorem tax applied to them, both of which may vary across countries.

Unfortunately, the Japanese beer market does not have the luxury of such rich data. While beer prices in Japan do actually vary slightly across prefectures presumably for a combination of income, distribution, and even perhaps consumer preference reasons, the tax rate does not vary across those regions. Nor is there an additional ad valorem tax on beer (aside from the 5% consumption tax, which is included in the price survey data). Thus, we are severely restricted as to the methods we can employ here. As such, the results presented here depend crucially upon several assumptions, the functional form of the demand assumed in particular. Therefore, this paper will adopt an eclectic approach based on standard industrial organization, and microeconomic theory, and inspired by new approaches in I.O. which do not rely on knowledge of marginal cost. In essence, three empirical approaches will be employed: 1) the stability of each firm's market share over time will be examined; 2) short-run price response to various tax changes will be discussed and; 3) the long-run relationship between real (as opposed to nominal) changes

in the beer tax rate and the beer price will be examined. Each of these will be discussed in turn below, and section 5 will conclude with some tentative impressions as to the competitive nature of the market.

4. Measuring Market Power and Market Behavior

4.1 A time series test of potential collusion

While typically tests of market power and conduct use microeconomic fundamentals, price, costs, and quantity, at least one study, uses time series econometric methods, examining only market shares of firms, to infer potential collusion. Gallet and List (2001) apply unit root tests to the market shares of the often-studied American cigarette industry. If the individual series show signs of a unit-root this implies that their market shares are not mean-reverting. If the unit root hypothesis is rejected this means that following shocks to the firm or industry that the firm's market share is mean-reverting and the authors infer that this may imply collusive behavior. While the series here are fraught with inconsistencies, as part of the eclectic nature of this paper, unit root tests were conducted on all four of the major firms' market shares. Standard Augmented Dickey Fuller Tests were performed with intercepts and trend (results not shown here). In the full sample, Kirin rejected the null of a unit root at a 5% level (suggesting mean-reversion), while the other three could not reject the null, though some with borderline p-values.[14] This suggests that the market is not terribly stable. Certainly the large shift due to Asahi Super Dry in the late 1980s, and the effect *happoshu* has had on beer and beer-like shares for Kirin would certainly support this (albeit weak) support for a competitive environment.

However, even successful cartels are often not stable for very long (see Porter's 1983 study of railroads, for example), and so studying long-run behavior may not always be appropriate. As new products are introduced, a once stable cartel may temporarily be shaken up, and indeed may find a new market share equilibrium quite different than before. This would not discount possible collusive behavior, but should be viewed as a

[14] In such small samples, the power of unit root tests is notoriously small. Thus, the likelihood that these tests have failed to reject the null (of a unit root, i.e. not mean-reverting) when in fact the series are stationary (mean-reverting) is higher than would otherwise be the case.

series of successful collusive eras interrupted by periodic collapses. Thus, individual tax events and the price response of the industry over shorter periods of time will be investigated in the next section.

4.2 Short run price response to tax hikes and cuts

Ideally, we would have a panel of data with tax rates which varied across time and prefecture and would conduct a Sumner (1981) style econometric estimation. Unfortunately, we only have the former, and thus the analysis will be a relative crude investigation of the movements of price in response to each tax change. As there are only a few tax changes, the data does not lend itself to econometric analysis it will instead be discussed on a case-by-case basis.

Table 4 list the unit tax rates for beer over the past three decades or so, up until the *happoshu* and *ji-biiru* phenomena in 1994. The beer tax changed nine times since 1960. As the entry of Suntory into the market in 1964 may have significantly altered the nature of the oligopoly and because of the turbulent price movements in general in the 1970s, we will consider four tax increases that occurred in the 1980s and early 1990s.

Tax Hike of 1982

In 1982 the tax rate increased from 161,600 to 200,100 yen per KL, an increase of 38,500 per KL. For a 633 ml bottle of beer, the size used in the retail price survey, this implies an increase in 24.4 yen per bottle. While ideally we might see the retail price jump in the survey data immediately in response to a tax hike, beer firms, like all firms must plan over a long time horizon, and must certainly give a great deal of consideration to the timing and amount of any price change, especially for a product in which prices change so little, and are so widely known. As such, we will be somewhat generous in the window in which we searching for any price hike (or cut) response. We see that the price was a constant 265 since May 1981, and then jumps to 284 yen and then 285 in October and November of 1983. This price hike is quite a bit later than the tax hike, and perhaps reflects the fact that they has just raised prices less than a year before in May 1981 (perhaps a delayed response to higher inflation in late 1970s and early 1980s?). In any event, this represents a price hike of 20 yen. Under simple constant marginal cost supply

functions and with our specific per unit cost, this would imply a cost increase of the same amount, 24.4 yen. But the industry raised the price slightly less than the tax hike. This first tax hike case appears to support “less than full tax hike” pass-through, more consistent with a linear demand monopolist, than with a monopolist facing a constant elasticity of demand. Of course, the nearly one-to-one correspondence of the tax hike to price hike matches even better with a perfectively competitive market where marginal cost and price should be equal.

If we look at the Bank of Japan (BOJ) WPI data (an index) over the same period we find that the price index rose approximately 5%, from 90.7 in September 1983 to 95.4 in October. This precedes the retail price by one month and thus is consistent with the nature of a distribution chain. As we do not have figures on actual wholesale prices of beer, we will use the retail price at that time 265 yen to infer that a tax hike of 24.4 yen per bottle implies a 9.2% increase in the tax burden beer. As the wholesale price only rose by about half that amount, this case appears consistent with a linear demand monopolist.

Tax Hike of 1984

In 1984 the tax rate increased from 200,100 to 239,100 yen per KL, an increase of 39,000 per KL or 24.7 yen per 633 ml bottle. The retail price jumped from 285 yen to 310, an increase of 25 yen. Again, under the above cost assumption, with almost a one-to-one correspondence to the tax hike, this suggests a very competitive market response.

If we look at the BOJ data we see the index rose from 95.4 in April to 101.2 in May, an increase of less than 6%. The tax burden rose by 8.7% (24.7/285), so in this case the “pass-through” of the tax-increase was about two-thirds. This result does not support either a competitive market or a constant elasticity monopolist.

Tax Cut of 1989

In 1989 the tax rate increased from 239,100 to 208,400 yen per KL, a decrease of 30,700 yen per KL, or 19.4 yen per bottle. The retail price fell by 10 yen from March to April, the same month of the tax cut. This is only half the amount of the tax cut, which is consistent with a monopolist facing linear demand. Perhaps more surprising is the price

hike less than a year later, to 320 yen per bottle, more than the pre-tax cut price. As no other tax hike followed for the next 5 years or so, this price jump cannot immediately be explained. Perhaps there were some supply shocks during this time (wages? Water prices?), but more likely it may reflect the re-adjustment the industry was going through in general, and the brand-loyalty (new and old) wars the industry was experience in the wake of Asahi Super Dry's emerging dominance. Why this perceived increase in competition should raise prices rather than lower them is mysterious, and one can only speculate that it may have to do with increases market segmentation and market power by the two leaders, Kirin and Asahi.

The BOJ data shows a decrease from 100.9 in March to 96.8 in April of 1989, a decrease of about 4%. The percentage fall in the tax burden was 6.5% (19.4/310), which implies approximately a two-thirds tax cut pass-through at the wholesale level.

Tax Hike of 1994

In 1994 the tax rate increased from 208,400 to 222,000 yen per KL, an increase of 13,600 yen per KL and 6.6 yen per bottle. The retail price increased 10 yen from April to May. In this instance the price hike exceeded the tax hike which is consistent with a constant elasticity demand monopoly and inconsistent with perfect competition or linear demand monopoly.

The BOJ data finds that the wholesale price of beer rose about 4% (100.7 to 104.6 from April to May 1994). As the tax burden only increase 2%, it appears as though we have constant elasticity monopolist behavior. This last case is difficult, however, as Suntory had just introduced the new lower-malt *happoshu*, and (because of this) a new beer-product tax for *happoshu* was introduced. This may have affected the firms' pricing behavior, though at this time this new market was tiny and indeed, the market leaders at first refused to introduce *happoshu* products of their own.

It appears that if we only look at the wholesale price, we get a fairly consistent story. About half or two-thirds of any tax hike or cut is passed on to the next level of distribution. This is consistent with a monopolist facing linear demand. If we look at the retail prices, however, the picture is mixed, and no clear consensus is gained. Naturally, as the chain from production to distribution to final retail sales is a long an complex one,

there is no reason to expect simple cost and demand function to capture or predict the price response well. However, as the main objective is to describe firm behavior, the findings with WPI data seem more appropriate.

The objective of this section was to give close scrutiny to the detailed price movement and timing of those movements in response to tax changes. Often when taxes change (such as cigarette taxes), the prices change soon after, so it's important to look at the month-to-month changes. However, these are huge firms, occasionally making large new investments, thus the short-run response may not accurately capture the long-run behavior of these industries regardless of whether they are acting collusively or not. Also, for an industry that values price constancy (for whatever reasons, menu costs, retail price maintenance, collusion) and seldom raises price despite overall price inflation and, no doubt, rising costs in at least some inputs over time, a look at the long run real price response to tax changes is warranted.

4.3 Long run (real) price response to tax changes: tax increases or tax decreases?

From 1979 to 1994 the statutory tax rate on beer rose from 161,600 to 222,000 yen per KL, an increase of 37%. Over the same period the retail price of a 633 ml bottle of beer had risen from 215 yen in January 1979 to 330 yen in December 1994, an increase of 53.5%. During the same period, the CPI rose 45.6% (www.stat.go.jp). So, in real (2005=100) yen the retail price of beer was 310.2 yen in 1979 and 327.1 yen in December 1994, a real increase of only 5.4%.[15] In real terms the per unit tax actually decreased! In 2005-based real yen equivalents, the specific taxes are 233,189 and 218,038 yen in 1979 and 1994, respectively. Thus, it seems that in the long run, in real terms, the question may be not how much of the tax increases are being passed on to the consumer, but how much the industry's mark-up has increased over the 1980s (and if so, why). Simply put, the real burden of the tax went down, and the real price of beer went up, at least in the long run.

However, if we look at wholesale prices of beer from the BOJ data we get a very different picture. We find that the wholesale price of beer rose 39.8% over the 1979-1994

[15] The consumption tax increases are included in both the overall CPI and the retail beer price survey data.

period. Over that same period, the WPI for all commodities rose only 11% (an index of 90 in 1979 to 100.4 in December 1994.) Thus, if we deflate beer with respect to all other commodities, the real wholesale price increase was 25%. If we deflate the tax burden by the WPI instead, we see the real tax burden increased by 23%. (While this is not quite correct, as the tax is a specific tax and we are applying it to an index, it still gives us a rough measure.) This is remarkable result, if the rough calculations are to be trusted. This implies that the entire tax burden, if viewed at the wholesale level, has been passed on to the next stage of distribution. This is more suggestive of competitive market, rather than one operating like a monopolistic cartel.

This large difference between wholesale and retail has obvious and important implications and needs to be studied in more detail, if such data is available. It could simply be that the brewers are behaving competitively, and the response at the (more complex) distribution and retail level is not be adequately explained by the simple assumptions made here and the lack of knowledge about changes in each part of those sectors. It could be that the breweries are competitive, and rents are being gained downstream (regardless of, or despite tax changes) because of reorganization occurring there. However, it is also dangerous to think of production, distribution, and retail sales as independent of each other. Resale price maintenance is always a potential strategy, especially for beer firms (not just in Japan), and in general productions, sales, and advertising are all well-integrated. By no means does Kirin sell a beer at the factory gate, and then forget about it. Thus, clearly a closer look is needed and these aggregate price measures may simply not be explaining entirely what is going on.

Moreover, if there is a real mark-up increases, perhaps at the retail level alone, it's not clear whether it's from a sort of collusion (or guidance by the Ministry of Finance; see footnote 7) or better price discrimination across differentiated brands, stronger brand loyalty or some other reason altogether. This lack of pass-through of real tax declines is even more surprising if we believe there was any increase in technology over this period. Though gains from economies of scale in such a stable market are unlikely at the factory level, and little cost-reducing innovation may have occurred (or conversely, maybe there was, which makes the story more surprising), there does not seem to be any abrupt positive cost-shocks which would mitigate the expected real decline in beer prices. And it

seems odd that there would be no cost-reducing innovations in distribution occurring in Japan throughout the 1980s either.[16]

A last observation related to this section pertains to the degree of market concentration. If one calculates the HHI in 1979 and 1994, one finds that the index declines, from a value of 4492.3 in 1979 to 3447.1 in 1994. This may be no surprise given the shake-up caused by Asahi's new product Super Dry. If we are to believe the story the retail price data suggests, that real prices rose despite a fall in the real tax burden, this fall may surprise us. If we are to believe that concentration and market power (and mark-ups) are positively correlated, this finding would be somewhat non-intuitive. Or perhaps, it simply suggests that there was collusion when the HHI was at 4000, and there still is at 3000. If, however, we believe the wholesale price story, this suggests the industry may have competitive before, and is competitive now, despite level of high concentration.

5. Conclusion

In this paper, I have assembled market, price and tax change data in an attempt to determine the nature of competition in the Japanese beer market. As with any industry study, the challenges are large, and with the Japanese national market as well as fiscal system largely unified, panel-data to shed light on this issue does not exist.

However, from this preliminary study, some important observations and tentative conclusions emerge. First, obviously market concentration is very high. With the four largest firms accounting for 99% (or perhaps 97-98% when imports and *ji-biiru* are included), it is no surprise that the HHI is easily over 3000, if not 4000. This is not evidence of collusion, but certainly gives us good cause to give the industry a closer look.

Also, the overall stability of prices over time and across brands (though only anecdotal evidence of this was not provided here) also suggests collusion, at least implicit, may be occurring.

[16] Tremblay (1987) found that the massive consolidation of the US brewing industry from 369 firms to 33 from 1950 to 1983 brought about significant cost gains from scale economies. He argues that most of these cost reductions occurred in the 1950s, however, when significant increases in technology were also occurring. If any economies of scale (or technological) gains occurred in Japan, it also seems very likely that they occurred much earlier than the sample studied here.

At the same time, market shares have changed radically, with Asahi taking the lead in official beer, and overall beer and beer-like products in recent years. It seems apparent some type of competition, if not price competition, is taking place. The crude unit root test also seems to confirm that firm market shares are not stable, lending further tentative support for a lack of collusion. Whether this non-price competition is beneficial to the consumer (see Gifford, 1987) is another question, however, which is not answered here.

When looking at the retail price and wholesale response to tax changes, the evidence is decidedly mixed. In the short run, retail prices respond to hikes and cuts, though cases can be found of "tax pass-through" of greater than unity, less than unity, or just about unity. Each of these different reactions is consistently with different assumptions of competitive and monopoly behavior and no strong conclusion can be drawn from this. The wholesale prices, however, show more consistent reaction, with about one-half, to two-thirds of the tax change being passed onto the next stage. This is consistent with a monopolistic cartel facing linear demand.

However, the long run price movements and tax changes, while the least sophisticated, may give us the strongest evidence one way or the other. But again, the retail and wholesale price stories are different. For retail prices, while mostly nominal tax hikes have occurred, in real terms, these collectively amount to a real tax cut. Yet, over these same years, where save for the important Super Dry shake-up, the firms and the products changed very little, the real price of beer went up. This does not offer strong support for a competitive market view. Conversely, when we looked at wholesale price movements in real terms, there almost a one-to-one correspondence between the long-run tax increase (23%) and the long-run price increase (25%). This is strong evidence of a competitive market. This major discrepancy points to the need for a better understanding of the beer distribution network in Japan.

Thus, the challenges to understand the Japanese beer market remain, and indeed have become more challenging (and interesting) with the introduction of competition across *happoshu* products. More detailed industrial data may allow us to conduct more precise empirical investigations, in the spirit of NEIO. Even still, the challenges are great,

as often such analyses can only rule out certain possibilities, but leave much of the interpretation dependant upon the assumptions maintained (Hyde and Perloff, 1995.)

Nonetheless, such challenges should not deter us for expanding efforts on this or other industry studies. Market structure and firm behavior are at the very core of microeconomics, we can all benefit from more empirical studies of them.

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Table 1. Market Shares of Major Brewers in Japan (1979-2004)
Beer only (happoshu, introduced in 1994, is not included here)

	Kirin	Asahi	Sapporo	Suntory	Others, mainly Orion	Others, not Orion
1979	**62.9**	**11**	**19.2**	**6.8**	n/a	n/a
1980	**62.2**	**11**	**19.7**	**7.1**	n/a	n/a
1981	**62.9**	**10.2**	**20**	**6.9**	n/a	n/a
1982	**62.3**	**10.1**	**19.9**	**7.7**	n/a	n/a
1983	**61.3**	**10.2**	**20.2**	**8.6**	n/a	n/a
1984	**60.3**	**9.9**	**20**	**9.8**	n/a	n/a
1985	**61.2**	**9.6**	**19.7**	**9.5**	n/a	n/a
1986	61.4	9.6	20.4	8.6	n/a	n/a
1987	59	11.5	20.6	8.9	n/a	n/a
1988	49.4	23.1	19.1	8.4	n/a	n/a
1989	45.7	28.8	17.5	8	n/a	n/a
1990	49.2	24.7	18	8.1	n/a	n/a
1991	51.8	23.3	17.5	7.4	n/a	n/a
1992	49.6	23.8	18.6	7.1	0.9	n/a
1993	49.2	24	18.5	7.3	1.0	n/a
1994	49	26.1	18.2	5.8	0.9	n/a
1995	45.8	26.2	17.8	6.3	3.8	n/a
1996	42.8	28.7	17.5	5.9	5.1	n/a
1997	*41.5*	*34.6*	*14.3*	*5.1*	*0.9*	*3.6*
1998	40.3	36.9	16.4	5.5	0.9	n/a
1999	38.5	37.6	15.1	8	0.8	n/a
2000	33.7	45.7	14.4	5.4	0.7	n/a
2001	33.5	46.6	13.8	5.3	0.8	n/a
2002	*32.7*	*47.6*	*13.6*	*5.3*	*0.8*	n/a
2003	*31.9*	*49.5*	*12.6*	*5.1*	*0.9*	n/a
2004	30.7	49.3	13.4	5.8	0.8	n/a

Note 1: Based on major 5 producers, if share is from Japan Market Share Dictionary (JMSD).
Note 2: 1985 data is taken from *Nikkei Sangyo Shinbun's* "Book of Shares" as data for that year was missing in JMSD
Note 3: Italics reflect preliminary estimates from JMSD, not confirmed.
Note 4: Data in bold, prior to 1986 is based on kiloliters; post-1985 data is in yen value. Both are of shipments of beer.
Note 5: Shares do not always add up to precisely 100% due to apparent rounding or reporting errors
Note 6: n/a means that data on other brewers was not mentioned in the data that year.

Table 2. Retail Price of 633 ml bottle of beer (not eating out)

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
1979	215	215	215	215	215	215	215	215	215	215	215	215
1980	215	215	215	225	240	240	240	240	240	240	240	240
1981	240	240	240	240	265	265	265	265	265	265	265	265
1982	265	265	265	265	265	265	265	265	265	265	265	265
1983	265	265	265	265	265	265	265	265	265	284	285	285
1984	285	285	285	285	310	310	310	310	310	310	310	310
1985	310	310	310	310	310	310	310	310	310	310	310	310
1986	310	310	310	310	310	310	310	310	310	310	310	310
1987	310	310	310	310	310	310	310	310	310	310	310	310
1988	310	310	310	310	310	310	310	310	310	310	310	310
1989	310	310	310	300	300	300	300	300	300	300	300	300
1990	300	300	320	320	320	320	320	320	320	320	320	320
1991	320	320	320	320	320	320	320	320	320	320	320	320
1992	320	320	missing	missing	missing	missing	missing	missing	missing	missing	missing	missing
1993	320	320	320	320	320	320	320	320	320	320	320	320
1994	320	320	320	320	330	330	330	330	330	330	330	330

Souce: Kouri Bukka Toukei Chousa Nenpou, various years

Table 3. Wholesale Price Index of Beer (Bank of Japan, 1990=100)

	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec
1979	74.8	74.8	74.8	74.8	74.8	74.8	74.8	74.8	74.8	74.8	74.8	74.8
1980	74.8	74.8	75.8	79.1	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0
1981	81.0	81.0	81.0	81.0	90.7	90.7	90.7	90.7	90.7	90.7	90.7	90.7
1982	90.7	90.7	90.7	90.7	90.7	90.7	90.7	90.7	90.7	90.7	90.7	90.7
1983	90.7	90.7	90.7	90.7	90.7	90.7	90.7	90.7	90.7	95.4	95.4	95.4
1984	95.4	95.4	95.4	95.4	101.2	101.2	101.2	101.2	101.2	101.2	101.2	101.2
1985	101.2	101.2	101.2	101.2	101.2	101.2	101.2	101.2	101.2	101.2	101.2	101.2
1986	101.2	101.2	101.2	101.2	101.2	101.2	101.2	101.2	101.2	101.2	101.2	101.2
1987	101.2	101.2	101.2	101.2	101.2	101.2	101.2	101.2	101.2	101.2	101.2	101.2
1988	101.2	101.2	101.2	101.2	101.2	101.2	101.2	101.2	101.2	101.2	101.2	101.2
1989	100.9	100.9	100.9	96.8	96.8	96.8	96.8	96.8	96.8	96.8	96.8	96.8
1990	96.8	96.8	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7
1991	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7
1992	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7
1993	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7
1994	100.7	100.7	100.7	100.7	104.6	104.6	104.6	104.6	104.6	104.6	104.6	104.6

Source: Bank of Japan, Wholesale Price Indexes (Bukka Shisuu)

Table 4. Unit Tax Rates of Beer (over 67% malt content)

Year	yen per KL	Yen per 350 ml can
1960 and before	110,800	38.78
1962	95,000	33.25
1968	106,000	37.10
1976	129,600	45.36
1978	161,600	56.56
1982	200,100	70.04
1984	239,100	83.69
1989	208,400	72.94
1994	222,000	77.70
May 1st, 2006	220,000	77.00

Note: source is Beer Producer's Association.
Must confirm dates and rates with official government sources