
Chia-Wen Chen†

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Abstract

This paper empirically examines whether restricting a beer distributor’s external trading opportunities increases the market share of brands within its distribution network. I take changes in distribution status from the Anheuser Busch-InBev distribution agreement in 2007, along with a panel scanner dataset from a grocery chain in Northern California from 2006 to 2008, to implement a “difference-in-differences” empirical strategy. The results show that having a more dedicated distributor matters in the beer industry: InBev products’ market share increased by 6 percent once they were carried by Anheuser Busch’s exclusive distributors. Moreover, when a distributor surrendered InBev brands to Anheuser Busch distributors, the brands in its distribution network gained higher market share. These results are consistent with the efficiency-based theory of exclusive dealing.

Keywords: Exclusive Dealing; Beer Industry; Vertical Restraints

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†Contact information: Department of Economics, National Taipei University, 151, University Road, San Shia District, New Taipei City, 23741 Taiwan. Email: cwzchen@mail.ntpu.edu.tw
I Introduction

Exclusive dealing is a vertical contract between a manufacturer and its distributor that prohibits the distributor from carrying other manufacturers’ products. The nature and the effect of such an exclusionary contract have stimulated a long debate in both academic and policy-making arenas. On the one hand, an exclusive dealing contract between a monopoly and its distributors, if implemented successfully, leads to market foreclosure. On the other hand, exclusive dealing may promote efficiency by generating a more loyal vertical relationship. Understanding the nature and the effect of exclusive dealing contracts is thus important not only for studies on organization forms, but also for the implementation of competition policies.¹

Efficiency theories suggest that the impact of exclusive dealing hinges on the nature of investments made in vertical relationships (Marvel [1982], Bork [1978], Klein and Murphy [1988], Segal and Whinston [2000]). In particular, Segal and Whinston [2000] point out that exclusive dealing can be welfare enhancing when promotional efforts made by a distributor tailored to a specific manufacturer have substitutable effects, i.e., the efforts impose a negative externality on other manufacturers. For example, a distributor’s dedication to the store display for one brand can increase that brand’s visibility, yet such a promotional effort may come at the expense of the rest of the distributor’s brands’ profitability. In that case, the promotional effort made at the distribution level is less than the one provided by a vertical integrated firm. Limiting a distributor’s extra trading opportunities removes the negative externality, leading to higher promotional efforts by the distributor and welfare-enhancing effects.

¹Exclusive dealing practices are subject to antitrust scrutiny in many countries. In Europe, an exclusive dealing practice by Intel, one that provided rebates and cash benefits to manufacturers and retailers in exchange for purchasing most of their products from Intel, was found to be anticompetitive by the European Commission and resulted in a Euro 1.06 billion fine in 2009. Other examples include the exclusionary contracts between Visa/MasterCard and their member banks that prohibited access to American Express and Discover, and Microsoft’s exclusive dealing practices with computer manufacturers to market its Internet Explorer. See United States v. VISA U.S.A., Inc., 163 F. Supp. 2d 322 (S.D.N.Y. 2001) and United States v. Microsoft Corp., 253 F.3d 34 (D.C. Cir 2001).
In this paper I study to what extent exclusive contracts affect market outcomes and whether the efficiency argument applies to the U.S. beer industry. Anheuser Busch (AB), the dominant beer manufacturer, launched an incentive program dubbed “100 percent share of mind” in 1997, which provided discounts, truck painting allowance, and other benefits to distributors that went exclusively with Anheuser Busch. The incentive program was so successful that many microbreweries claimed that they were being driven out of the marketplace due to such a practice. Nevertheless, if a beer distributor’s promotional efforts to brewers are substitutable, then a brewer’s unilateral incentive to implement a “100 percent share of mind” program may not be purely based on anticompetitive motives. Following Segal and Whinston [2000], I argue that when a substitutable effect is present, a brand will receive more promotional efforts when its distributor’s external trading opportunities are limited, all else being equal.

I test the hypothesis by exploiting a distribution agreement that allowed European InBev brands to enter Anheuser Busch’s exclusive beer distribution network. According to the AB-InBev agreement, Anheuser Busch was to begin importing InBev brands to the United States after February 2007 (henceforth, the event). I examine two effects due to the event. First, I examine the change in InBev’s market share and average price when it entered Anheuser Busch’s distribution system. Second, I look at the effect of InBev’s market outcomes when it entered Anheuser Busch exclusive distribution system in order to study whether employing a more dedicated distributor enhances a manufacturer’s market performance. To further explore the idea that restricting/relaxing a distributor’s brand portfolio may affect its promotional decisions, I also study changes in the market shares of other brands whose distributors were subject to the event, i.e., brands (other than InBev’s) whose distributors were forced to carry/drop InBev brands due to the event.

My empirical strategy is a “difference-in-differences” approach. Although the distribution deal applied to all Anheuser Busch distributors simultaneously across the United States, the effects in local markets are not identical. The distribution agreement had no impact at the
local distribution level if InBev was already using Anheuser Busch’s distribution network. In contrast, the distribution agreement affected InBev’s distribution status most dramatically when a local Anheuser Busch distributor was exclusive to Anheuser Busch. In such an area, brands other than Anheuser Busch’s (such as InBev) had fewer distribution options and were often accommodated into a shared and crowded distribution network. It is in such an area that the promotional efforts for InBev products are expected to increase the most compared to other areas. Moreover, since there was no change in Anheuser Busch distributors’ exclusivity in the empirical setting, and all stores in the final sample already carried InBev prior to the event, I am able to isolate the foreclosure effect and focus on the substitutable effect due to changes in distribution status.

I collected data on brewer-distributor arrangements in California from 2006 to 2007 and combined them with a two-year panel scanner dataset from a large grocery retail chain in Northern California. Having data before and after the AB-InBev deal and across different types of InBev and Anheuser Busch distribution arrangements enables me to apply a “difference-in-differences” approach to control for local market fixed effects and unobserved brand level fixed effects.

The results suggest that having a more dedicated distributor matters in the beer industry: InBev products’ market share increased by 6 percent once they were carried by Anheuser Busch’s exclusive distributors. Moreover, when a distributor surrendered InBev brands to Anheuser Busch distributors, the brands in its distribution house gained a higher market share. Similarly, for Anheuser Busch distributors that acquired InBev brands, I also find a substitutable effect from incumbent brands with low market shares. These results indicate that the promotional incentives of beer distributors are affected by distributional arrangements: beer brands obtained a higher market share when their distributor’s external trading opportunities were limited. It follows that a manufacturer’s unilateral incentive to adopt exclusive dealing in the beer industry can eliminate such a negative externality at the distribution level and need not be purely foreclosure based.
The empirical literature on exclusive dealing is limited.\textsuperscript{2} Heide et al. \textsuperscript{1998} conduct a survey of managerial distribution decisions in manufacturing industries and find that the main reason for managers to consider exclusive contracts is the fear of the free riding problem. Studies that directly look at market outcomes focus on the beer industry.\textsuperscript{3} Both Sass \textsuperscript{2005} and Asker \textsuperscript{2005} do not support the anticompetitive theory of exclusive dealing.\textsuperscript{4} Rojas \textsuperscript{2010} looks at beer quantities and prices in 38 cities from 1988 to 1992 and finds that the extent of exclusive dealing is associated with a lower retail price and higher quantity, suggesting that promotional efforts of distributors increase sales while lower distribution costs offset the corresponding investment costs, which are more consistent with the existence of a welfare-enhancing effect.

This paper contributes to the empirical literature of exclusive dealing in several ways. First, Sass \textsuperscript{2005}, Asker \textsuperscript{2005}, and Rojas \textsuperscript{2010} estimate the effect of exclusive dealing in the beer industry using cross-sectional variations in data. My identification strategy is to exploit the variations in distribution status generated by the AB-InBev distribution agreement and to take advantage of the panel structure of a new dataset, intending to alleviate the concerns regarding the potential bias from omitted variables.

One disadvantage of my approach, however, is that the findings in this paper do not directly speak to the equilibrium effect of Anheuser Busch’s exclusive dealing program, which

\textsuperscript{2}Many empirical papers that study the vertical relationships between firms focus on the effect of vertical integration on market outcomes. For example, Chipty \textsuperscript{2001} and Hastings and Gilbert \textsuperscript{2005} find vertical integration leads to anticompetitive outcomes either by carrying fewer rival programs or by raising rivals’ cost. On the contrary, Hortacsu and Syverson \textsuperscript{2007} show little foreclosure effect due to vertical integration in the cement and ready-to-mix concrete industry. For a thorough review of the empirical studies on vertical integration and vertical restraints, see Lafontaine and Slade \textsuperscript{2007} and Lafontaine and Slade \textsuperscript{2008}.

\textsuperscript{3}One exception is Ater \textsuperscript{2012}, who examines hamburger revenues in shopping malls with respect to exclusive dealing. His results indicate that hamburger revenues are negatively related to the adoption of exclusive contracts in a shopping mall.

\textsuperscript{4}The two papers have very different empirical approaches. Sass \textsuperscript{2005} studies a cross-sectional survey of beer distributors and finds that exclusive distributors on average generate higher prices and larger sales for their suppliers, which is not consistent with the anticompetitive theory. Asker \textsuperscript{2005} looks at scanner data in the Chicago market and adopts a structural approach to recover the costs incurred and the promotional efforts made by nonexclusive distributors in exclusive and less exclusive markets. He finds that the above distributors in more exclusive markets are not less efficient than distributors in less exclusive markets. His results do not support the foreclosure hypothesis.
was the main focus of previous empirical studies. All Anheuser Busch distributors remained exclusive or nonexclusive in the time periods I study. However, I do show that the average beer price is not higher in areas where Anheuser Busch had exclusive distributors compared to the ones where Anheuser Busch had employed nonexclusive distributors. Such evidence is consistent with findings in Sass [2005] and Rojas [2010].

The findings in this paper have implications about the nature of exclusive contracts beyond the U.S. beer industry. As emphasized in this paper, the welfare effect of exclusive contracts depends on the nature of investments made by the middlemen, regardless if they are beer distributors, soft drink bottlers, or car dealers. For example, if a bottler’s function is mainly logistics, then its investment may not have a substitutable effect as shown in this paper; if that is the case, then exclusive contracts in that industry are more likely to be anticompetitive and should be under carefully scrutiny.\(^5\)

The rest of the paper proceeds as follows. Section 2 discusses the theoretical literature and the testable hypotheses. Section 3 provides an overview of the beer industry. Section 4 explains the research design and the empirical strategy of the paper. Section 5 describes the data. Section 6 provides the results. Section 7 concludes the paper and offers potential future research directions.

II Theoretical Motivation and Empirical Propositions

There is an extensive theoretical literature on exclusive dealing. In general, the gains from exclusive contracts can come from a surplus of anticompetitive behavior or improvement in economic efficiency. To show that exclusive dealing is based on an anticompetitive motive, the first hustle is to establish conditions for dealers to mutually agree to such a contract. To this front, several studies have shown that a dominant incumbent can foreclose future entrants when there is a contracting externality [Rasmusen, Ramseyer and Wiley [1991], and

\(^5\)Such an approach to evaluate an exclusive contract is exactly the one suggested by Segal and Whinston (2000).
Nevertheless, the equilibrium effect of exclusive dealing is ambiguous when allowing for competition at both the upstream and the downstream levels.

Efficiency justification for exclusive dealing argues that firms use such contracts to protect investments. In particular, Segal and Whinston [2000] provide a theoretical model of exclusive dealing and derive conditions for an exclusive contract to affect investment incentives when investments are noncontractible. Segal and Whinston [2000] show that restricting a distributor’s external trading opportunities increases the level of investment when a distributor’s investment has a substitutable effect, i.e., investment devoted to one brand hurts the value of other brands in the same distribution network; or when a manufacturer’s investment has a complementary (a positive spillover) effect.

The model in Segal and Whinston [2000] integrates many properties discussed in previous efficiency arguments of exclusive dealing. For example, Marvel [1982] argues that exclusive dealing increases efficiency when a manufacturer’s investments at the distribution level are subject to the free riding problem by other manufacturers, which is the case when a manufacturer’s investments have a complementary effect. In addition, Areeda and Kaplow [1988] argue that a distributor’s loyalty is important when its promotional effort can be tailored toward one manufacturer against the others, which is the case when a distributor’s investments have a substitutable effect. The property of investments at the distribution level thus plays a critical role in supporting the efficiency arguments of exclusive dealing. In fact, Segal and Whinston [2000] show that exclusive dealing is irrelevant for investment incentives if investments in a buyer-seller relationship do not affect the buyer’s trade with other sellers (i.e., investments have no external effect).

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6 Contracting externality is present when the outcome of a bilateral contract affects the payoffs of parties that are not involved in the contracting process. For example, under the presence of economies of scale, an entrant may need to secure enough dealers to successfully enter the industry. In this case, an exclusive contract between an incumbent and a dealer imposes a negative contracting externality on all the other dealers, because it reduces the likelihood of a successful entry event.

7 Simpson and Wielgelgen [2007], Abito and Wright [2008], and Doganoglu and Wright [2010] also provide settings that allow exclusive dealing to achieve inefficient outcomes. Rey and Tirole [2007] present a general overview of market foreclosure theories (including work on vertical foreclosure, horizontal foreclosure, and exclusive dealing arrangements) and their policy implications.
In this paper I study whether investments have a substitutable effect at the distribution level as suggested in Segal and Whinston [2000]. If a distributor’s investments in a brand are important in determining a brand’s overall market performance, and such investments have substitutable effect, then one would expect changes in distribution status to affect a brand’s market share. Specifically, by limiting a distributor’s external trading opportunities, a manufacturer can enhance the distributor’s promotional effort toward the manufacturer’s brands and increase its sales. This leads to the following testable hypothesis.

**Hypothesis 1** All else equal, a brand’s market share will be higher when the brand’s distributor has fewer external trading opportunities. In the empirical setting, this is when:

1. the brand is reallocated from a shared distribution network to an exclusive distribution network.
2. the brand’s distributor loses its representation of InBev.

The substitutable effect implies, on the contrary, that a brand’s market share will decrease when its distributor carries more brands and intensifies the cannibalization between brands in the same distribution house. Therefore, I predict the following hypothesis.

**Hypothesis 2** All else equal, a brand’s market share will be lower when the brand’s distributor has more external trading opportunities. In the empirical setting, this is when the brand’s distributor gains InBev products.

Finally, if the change in InBev products’ market share was driven by a substitutable effect at the distribution level, the effect will be stronger when investments by local distributors are more crucial in deciding a brand’s success, such as when shelf space is relatively limited. Using data available in the empirical setting, I present the following testable hypothesis.

**Hypothesis 3** The substitutable effect is stronger in stores with limited shelf space, where investments in distributors are more crucial in determining a brand’s success.
III Industry Background

Beer is an alcoholic beverage that has a distinct flavor and taste as compared to wine and distilled spirits. During the sample period of the data (2006-2008), there were more than 13,000 beer labels and 1,500 breweries in the United States, with the annual total sales of beer around $100 billion. The brewing industry is highly concentrated even with such a large number of brands: Anheuser Busch, Miller and Coors collectively claimed nearly 80% of the U.S. market in 2007.

There are mainly three market segments at the brewing level: domestic macro brands, domestic specialty brands, and imported brands. Anheuser Busch, Miller, and Coors, the dominant players in the industry, enjoy economies of scale in producing macro products that are priced lower, have large package size options, and are supported by national advertising campaigns. Specialty beer producers entered the brewing industry during the 1980s and 1990s. They started out as microbreweries and produce specialty products that emphasize flavor and taste. Sierra Nevada Brewing and the Boston Beer Company are the pioneers of the microbrewery movement and are the most successful and nationally known companies in this segment. The last segment includes imported brands that are usually well-established products from foreign countries. Most imported and specialty beer brands have higher prices than domestic macro brands.

Beer is sold throughout the United States through a “three-tier” (brewer-distributor-retailer) system. The top tier brewers supply their products to state-licensed middlemen (distributors). The distributors then store and transport the products to the bottom tier retailers. Distributors are also responsible for point-of-sale promotions and are expected

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8 Statistics are obtained from the National Beer Wholesalers Association and the Brewers Association websites.
9 Source: Beer Institute. Anheuser Busch was the dominant firm in the industry with 50% market share in 2007. Mergers and acquisitions are quite common in the industry. For example, Anheuser Busch acquired microbreweries such as Widmer Brothers and Redhook in the 1990s. More recently, Miller and Coors formed a joint venture in 2008 and Anheuser Busch merged with InBev in 2009. All the sample data used in this paper were before the Miller/Coors and Anheuser Busch/InBev mergers. For a general introduction to the U.S. brewing industry, see Tremblay and Tremblay 2005.


to have sales staff visit or call accounts regularly to make sure products are available and fresh. Distributors also help brewers to execute their marketing plans locally. For example, a manager of a Manhattan distribution company once described how he helped Coors to modify its Latino 360 marketing program: “Sometimes they’ll draw up a program in Colorado that is more of a Mexican theme, and that’s not the Hispanic consumer here. So we work collectively and closely with them to make sure they stay focused on the Puerto Rican and Dominican consumers – those that are drinking our products.”10 After Prohibition, vertical integration between brewers and distributors became heavily regulated by state laws. As a result, brewers often turned to vertical restraints, such as exclusive dealing and exclusive territory, to control their distributors.11 The distribution networks of macro brewers (Anheuser Busch, Miller, and Coors) are often viewed by the beer press as a superior promotional vehicle due to economies of scale and their bargaining power on securing better shelf space.12

Intra-brand competition at the distribution level is not common: brewers tend to adopt exclusive territory systems to prevent competition between their distributors.13 In contrast, most distribution networks are shared houses full of competing brands that intensify inter-brand competition at the distribution level. Most distributors represent at least one of the domestic macro brewers. These so-called Anheuser Busch, Miller, or Coors distributors work closely with the macro brewers to maintain a stable cash flow while carrying other domestic specialty or imported brands at the same time. There are also “independent” beer distributors that do not carry brands from any of the domestic macro firms, but rather

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11 In the paper, an AB distributor merely means that a distributor had a distribution contract with Anheuser Busch, not that a distributor was owned by Anheuser Busch. In fact, no AB distributor in the data was owned by Anheuser Busch. Nevertheless, Anheuser Busch, along with other domestic macro brewers, did have great influence on their distributors’ daily operations through the terms in their distribution contract. For example, Khermouch 1997 describes some features of AB’s distribution contract: “to minimize absentee management, the new (AB) contract requires the top on-site manager to hold a 25% stake (of the distribution company)” and “the contract also mandates weekly calls on all retail accounts, requires mandatory drug testing and prohibits sales incentives on non-A-B brands not matched for A-B brands.”

12 For example, Bump Williams, an IRS industry analyst, said “there’s nobody better than these three networks. They can get these beers on shelves overnight.” See Kesmodel 2007.

13 In some states, it is even required by law to use an exclusive territory system for beer distributors. For empirical studies of the effect of exclusive territory in the U.S. beer industry, see Culbertson and Bradford 1991, Sass and Saurman 1993, Sass and Saurman 1996, and Rojas 2010.
collect a large number of specialty and imported beer brands.\textsuperscript{14}

From a logistics perspective, a shared distribution house creates route efficiencies by using larger trucks and eliminating duplicate routes. However, a shared distribution house means brewers must compete with each other to make the distributor prioritize their brands: while each brewer would like its distributor to devote as much attention to its products and provide the level of service that the brewer finds necessary, chances are its distributor will not be in complete compliance, especially when it serves multiple brewers at the same time.

Faced with the above incentive problem, Anheuser Busch began its “100 share of mind program” in 1997. Distributors that chose to carry only Anheuser Busch products were given extended credits, extra money on beer cases and truck painting, and priority when other Anheuser Busch distributors go up for sale. Not every Anheuser Busch distributor decided to go exclusive, though. Anheuser Busch distributors that were carrying strong brands, such as Heineken or Guinness, were less likely to give up these brands to their rival distributors in order to enroll into the incentive program compared to ones that were carrying only weak brands. Furthermore, in areas where Anheuser Busch had lower market share, distributors were less enthusiastic about the program.\textsuperscript{15} In fact, as Sass \textsuperscript{2005} points out, the likelihood for a distributor to become exclusive to a brewer depends on the market characteristics of its assigned territory.

Terminating existing distribution contracts can be costly for brewers. Some states have franchise laws that prevent brewers from terminating their distribution contracts without a good cause.\textsuperscript{16} Due to the difficulties in switching distributors at will, the distribution agreement between Anheuser Busch and InBev, which happened on a national scale, provides a great opportunity to look into how distribution status affects market outcomes.

\textsuperscript{14}Some of the independent distributors also carry several brands of energy drinks, tea, and juices.
\textsuperscript{15}For example, one of the Anheuser Busch distributors said: “There’s no way we could be totally exclusive. We fly the A-B eagle on our trucks, but if we didn’t do our other things, we couldn’t stay in business.” See Butler \textsuperscript{1999}.
\textsuperscript{16}Such practices make sure a distributor’s promotional contribution to a brand does not get ripped off easily by another distributor. However, these practices may make a brewer vulnerable to termination of a bad distributorship; for example, see Day \textsuperscript{2006}.\mbox{}
IV Empirical Strategy

The Event: AB-InBev Distribution Agreement

InBev was created in 2004 by the combination of two major beer manufacturers, Belgium’s Interbrew and Brazil’s AmBev. InBev had many well-known beer products around the world such as Beck’s, Stella Artois, Skol, and Brahma. Prior to 2007, InBev maintained distribution contracts with various distributors throughout the United States.

In November 2006, Anheuser Busch announced a distribution agreement with InBev that allowed it to distribute InBev European beer products, such as Beck’s and Stella Artois, in the U.S. market after 2007: “Effective February 1, 2007, Anheuser-Busch will import these premium brands and be responsible for their sales, promotion and distribution in the United States. These InBev brands, which had sales volumes of about 1.9 million hectoliters (or about 1.5 million barrels) in 2005, will be available to Anheuser-Busch’s U.S. wholesaler network where possible.”\(^\text{17}\) It was widely believed by many industry analysts that Anheuser Busch intended to use this distribution deal to expand its product portfolio and to have more control over its distributors (Kesmodel 2008). On the other hand, InBev aimed at taking advantage of Anheuser Busch’s distribution system to boost sales.\(^\text{18}\)

The AB-InBev distribution agreement shuffled brand portfolios for many local beer distributors in the United States. After the agreement took place, Anheuser Busch distributors that were not carrying InBev products began carry InBev products while other types of distributors (non-AB) had to drop InBev products.

The distribution agreement did not include InBev’s Canadian brands, such as Labatt Blue and Labatt Blue light.

\(^{18}\)In the press release, August A. Busch IV, the Chief Executive Officer of Anheuser Busch, said: “These well-known import brands complement our company’s leading portfolio of American premium beers and enable our company to better compete”; Carlos Brito, the Chief Executive Officer of InBev, announced that “By securing access to Anheuser-Busch’s world-class sales and distribution system, this agreement will enhance opportunities for U.S. consumers to experience the unique values of our premium European import brands, and further accelerate their growth.”
I assign changes in InBev’s distribution status to a “control group” or a “treatment
group” in each local market based on the local Anheuser Busch distributor’s distribution
status prior to the event. To illustrate, Table I lists three possible scenarios. In the first
row, the local (nonexclusive) Anheuser Busch distributor already carried InBev, along with
other brands in 2006 (prior to the event). In this case, nothing would change for InBev
at the local distribution level due to the event, and so this is our “control group.” In
contrast, the second row and the third row list brand portfolios of other types of Anheuser
Busch distributors. Notice that neither type of distributor carried InBev prior to the event.
Therefore, these Anheuser Busch distributors received InBev brands after the event and
belong to our “treatment groups.”

Even though InBev is reallocated to Anheuser Busch distribution networks in both of the
treatment groups, the treatment InBev receives within those two groups is quite different.
In the second scenario, InBev moves to a nonexclusive Anheuser Busch distribution system.
Because Anheuser Busch was the only beer manufacturer to have exclusive distributors in
the dataset, InBev merely moved between two shared distribution networks in this scenario.
Therefore, the treatment effect in the second scenario is a “reallocation” (to an Anheuser
Busch distribution network) effect. In the third scenario, InBev’s distribution status changes
more dramatically, because the local Anheuser Busch distributor was an exclusive one. In
this case, InBev leaves a relatively crowded shared distribution network and enjoys a more
exclusive network after the event. Therefore, the treatment effect in the third scenario is
both “reallocation” and “exclusive” effects. If investments, such as promotional efforts at
the distribution level are substitutable, then we would expect that the promotional efforts
of InBev to increase the most in the final scenario.

Econometric Models for Market Share and Price

To examine how beer distribution affects market outcomes, I exploit the brand distribu-
tion reallocation generated from the AB-InBev deal. Given the panel structure of my data, it
is straightforward to carry out the estimation by a “difference-in-differences” approach. The advantage of this approach is that it not only controls for national shocks in each period, but it also eliminates unobserved permanent fixed effects in each local market. This is particularly important, because a distributor’s choice to become exclusive depends on the market characteristics of its assigned territory. In addition, the fact that the AB-InBev distribution agreement applied to the entire U.S. at the same time and was not tailored to meet the needs of California Anheuser Busch distributors also helped to reduce the potential omitted variable bias problem due to the interactions of local demand/cost unobservables and time variables.\footnote{I would be more worried about the research design if the distribution agreement was tailored to certain Anheuser Busch’s distributors in Northern California. For example, if InBev products’ distribution rights were given to specific Anheuser Busch’s exclusive distributors, because they out-performed other Anheuser Busch’s distributors in 2006, then I may incorrectly attribute the increase in InBev’s market share to the substitutable effect.}

The main concern of using this approach to identify the distribution effect is that the event itself is not entirely exogenous: it is very likely that Anheuser Busch chose to add InBev brands into its brand portfolio, because InBev brands were performing well at the time and were not close substitutes to its own brands. To the extent that InBev were performing well across the United States, the identification strategy of the substitutable effect is still valid. However, I will discuss how well the findings in this paper can be generalized to other settings in the final section.

I first fit InBev’s market share using the following specification for store $i$ in week $t$:

\begin{equation}
\text{Share}_{it} = \alpha_i + \beta_0 \, 1[\text{Post}]_t + \beta_1 \, 1[\text{InBev moved to AB exclusive}]_{it} \\
+ \beta_2 \, 1[\text{InBev moved to AB}]_{it} + \epsilon_{it},
\end{equation}

where $i$ indexes individual store and $t$ indexes time, $\alpha_i$ represents store fixed effects ($i=1$ to 206), and $1[\text{Post}]_t$ is an indicator variable equal to one for time periods after the AB-InBev distribution agreement. The main variables in interest are $1[\text{InBev moved to AB exclusive}]_{it}$.
and $1[\text{InBev moved to AB}]_{it}$, which are indicator variables equal to one in areas where InBev moved to an AB exclusive distribution network, and in areas where InBev moved to an AB distribution network, respectively. Specifically, in the baseline regression, the dependent variable after the event becomes:

(2)
\begin{align*}
\text{Share}_{it} &= \alpha_i + \beta_0 + \epsilon_{it} & \text{for stores in the control group,} \\
\text{Share}_{it} &= \alpha_i + \beta_0 + \beta_1 [\text{InBev moved to AB}]_{it} + \epsilon_{it} & \text{for stores in treatment group 1,} \\
\text{Share}_{it} &= \alpha_i + \beta_0 + \beta_1 [\text{InBev moved to AB exclusive}]_{it} + \beta_2 [\text{InBev moved to AB}]_{it} + \epsilon_{it} & \text{for stores in treatment group 2.}
\end{align*}

If brands receive more promotional efforts from a more exclusive (less crowded) distribution network, then $\beta_1$ is expected to be positive (Hypothesis 1). Similarly, if brands gain more promotional efforts from an Anheuser Busch distribution network, then $\beta_2$ is expected to be positive.

I also fit InBev’s market share using the following alternative specification to allow for monthly fixed effects:

(3)
\begin{align*}
\text{Share}_{it} &= \alpha_i + \alpha_m + \beta_1 [\text{InBev moved to AB exclusive}]_{it} + \beta_2 [\text{InBev moved to AB}]_{it} + \epsilon_{it},
\end{align*}

where $\alpha_m$ represents monthly fixed effects ($m=1$ to 24).

To further study the substitutable effect on rival brands when their distributors receive/drop InBev (Hypotheses 1 & 2), I regress the market shares of rival brands on indicator variables that describe changes in their distribution status due to the event:

(4)
\begin{align*}
\text{Share}_{ijt} &= \alpha_i + \alpha_j + \alpha_m + \gamma_1 [\text{InBev in}]_{ijt} + \gamma_2 [\text{InBev out}]_{ijt} + \epsilon_{ijt}.
\end{align*}
Here, \( i \) indexes individual stores, \( j \) indexes brand, and \( t \) indexes time; \( 1[\text{InBev in}]_{ijt} \) is an indicator variable for a brand’s distributor to receive InBev after the event; \( 1[\text{InBev out}]_{ijt} \) is an indicator variable for a brand’s distributor to drop InBev after the event. After controlling for store, brand, and monthly fixed effects, the coefficients \( \gamma_1 \) and \( \gamma_2 \), are changes in market share when a brand’s distributor acquires or drops InBev. Substitutable effect exists when \( \gamma_1 \) has a negative sign and \( \gamma_2 \) has a positive sign.

Given that Anheuser Busch is the most dominant player in the U.S. beer industry, it is interesting to examine how the above effects would differ with regard to Anheuser Busch’s market share within a distribution system. To do this, I fit InBev’s market share using the following specification to allow for interaction terms between changes in distribution status and the level of Anheuser Busch’s market share within a distribution network:

\[
\text{Share}_{it} = \alpha_i + \alpha_m + \beta_1 1[\text{InBev moved to AB exclusive}]_{it} + \beta_2 1[\text{InBev moved to AB}]_{it} + \beta_3 1[\text{InBev moved to AB exclusive}]_{it} \times \text{AB market share}_i + \beta_4 1[\text{InBev moved to AB}]_{it} \times \text{AB market share}_i + \epsilon_{it}.
\]

For each store, I construct interaction terms \( 1[\text{InBev moved to AB exclusive}]_{it} \times \text{AB market share}_i \) and \( 1[\text{InBev moved to AB}]_{it} \times \text{AB market share}_i \) that allow interactions between Anheuser Busch distributor’s average market share of its Anheuser Busch products prior to the event, and the variables of interest (\( 1[\text{InBev moved to AB exclusive}]_{it} \) and \( 1[\text{InBev moved to AB}]_{it} \)). The coefficients on the interaction terms (\( \beta_3 \) and \( \beta_4 \)) help us to learn more about how a brand’s brewer’s (i.e., Anheuser Busch’s) market share plays out in different distribution settings. We would be more cautious to interpret a positive “exclusive” effect as evidence of an increase in the distributor’s promotional effort if it was mainly driven by the brewer’s market share, i.e., when \( \beta_3 \) is positive. In addition, the coefficient \( \beta_4 \) measures how important a brewer’s market share is when the brand is reallocated to a new distribution network. If a distributor allocates its promotional efforts based on a brewer’s market share, we would
expect $\beta_4$ to be positive.

In addition to using InBev’s market share as the dependent variable, I also fit InBev’s average price using the above specifications to examine if changes in market shares are based on pricing or non-pricing channels. Standard errors are clustered at the store level for all regressions.

V Data

The California Beer and Beverage Distributors (CBBD) trade association publishes an annual directory containing its member distributors in California. Each directory contains information about each distributor’s brand portfolio and its operating counties.\textsuperscript{20} Almost all distributors that carried InBev also carried Anheuser Busch or Miller products. According to the 2006 CBBD directory, prior to the event, there were 39 Anheuser Busch distributors in California. Out of these 39 distributors, 11 were exclusive distributors, and of the other 28 Anheuser Busch nonexclusive distributors, 11 were already carrying InBev products. Due to the distribution agreement, in the 2007 CBBD directory, nearly all Anheuser Busch distributors were listed as having acquired InBev products.\textsuperscript{21}

Beer sales and pricing data are provided by Nielsen. The scanner dataset contains weekly, Universal Product Code (UPC) level, price and sales data of the malt beverage category for a major grocery chain in Northern California and Nevada and includes 258 stores in 150 cities. The two-year data begin April 15, 2006 and end April 5, 2008, for a total of 104 weeks. In the dataset there are six major categories: lager, stout/porter, light beer, pale ale, malt liquor, and flavored alcoholic beverage. Within each brand there are many package

\textsuperscript{20}The 2006 and 2007 trade directories are provided by local distributors.

\textsuperscript{21}All Anheuser Busch distributors in the data should start carrying InBev brands after the event, because California does not have strict beer franchise laws that forbid brewers to switch between distributors. In addition, Anheuser Busch distributors would not refuse to carry InBev products, because InBev products were very popular at that time. In the final sample, only one Anheuser Busch distributor did not include InBev in its brand portfolio in the 2007 CBBD directory. Given that this distributor had exactly the same brand portfolio in both the 2006 and 2007 CBBD directories, it is very likely that the distributor failed to update its information.
sizes, different volumes, and bottling methods. For example, Budweiser has 7 package sizes (1, 4, 6, 12, 18, 20, and 30), sold in bottles or cans. For each brand, I added up sales for all its package sizes and containers to calculate its aggregate sales. Therefore, sales data are at the brand level instead of at the UPC level.22

Table II lists the top 20 beer brands’ market share, price, and their basic characteristics (alcohol by volume, or ABV, and calories per 12 oz.) in the dataset.23 On average, domestic macro brands were the lightest in both ABV and calories and were usually priced lower than other products.24 Top domestic specialty brands were almost all rich beer with 5.0% or higher ABV and had at least 150 calories per 12 oz. bottle. There were five InBev brands in the dataset: Bass, Beck’s, Boddingtons, Beck’s Premier Light, and Stella Artois.25 Their market share, average price, and product characteristics can also be found in Table II. Because domestic macro brands have very different attributes from other brands, when studying the substitutable effect with a group of brands, I provide results both including and excluding domestic macro brands in the following empirical section.

Most brands have their own price promotion schedule that prevails across stores. However, within a product there are still pricing differences in the data, probably due to demographic differences. For example, a product can have a price range from $15 to $16.5 across different stores within a week, but show a similar promotion pattern throughout a year.

Summary Statistics

22Here a “brand” refers to products that share the same attributes and are under the same brand name. For example, “Guinness Draught Ale” may come with different package sizes, but it has its unique flavor and its own brand name. Throughout the paper, I use “brand” and “product” interchangeably, because the final sample is at the brand level. In contrast, Guinness (the brewery) owns several brands, such as “Guinness Draught Ale” and “Guinness Extra Stout.”

23Beer prices were for the average six-pack of 12 oz. containers across packages. I adjust volume and package sizes to find out how many units were sold for each brand in terms of a regular 12 oz. six-pack. I divide total sales revenue by adjusted sales to find out the adjusted average 12 oz. six-pack price for each brand. Market shares in sales are defined as total brand sales (in quantity) divided by total beer sales.

24Domestic macro brands are: Budweiser family brands, Bud Light family brands, Busch, Michelob family brands, Miller family brands, Coors family brands, Keystone family brands, Natural family brands and Pabst Blue Ribbon.

25Beck’s Oktoberfest is another InBev product in the dataset. However, it was a seasonal product that had only 11 observations with positive sales (carried by just 4 stores). Therefore, I excluded Beck’s Oktoberfest when I calculated InBev’s market share.
I match the brewer-distributor relationship data to the scanner dataset. As discussed before, the distribution territory data from the CBBD directory are only available at the county level, and yet the exact Anheuser Busch distribution territory is not necessarily delineated at the same level. Still, most of the counties in the data can only be mapped to one Anheuser Busch distributor, which is not surprising, because macro brewers typically use exclusive territories with their distributors. To gain more information on Anheuser Busch distributors’ exact sales territory, I contacted each exclusive Anheuser Busch distributor and each Anheuser Busch distributor of stores in the control group. I dropped a store out of the sample if it was not in California, if it did not operate during the entire time span, or if I did not have enough information to identify its Anheuser Busch distributor. The final sample size is 207 stores, having started with 256 stores.\(^{26}\) Figure I illustrates changes in distribution status of InBev brands due to the AB-InBev distribution agreement in the final sample. As shown in the figure, Anheuser Busch had exclusive distributors in Butte, Lake, Marin, Mendocino, Shasta, Sonoma, and San Joaquin counties, and prior to the event, nonexclusive Anheuser Busch distributors also carried InBev in Lassen, San Francisco, San Mateo and Stanislaus counties.\(^{27}\)

Table III gives summary statistics of store and distributor attributes for the three assigned groups during the entire two-year time span of the data. Store characteristics differ across the three groups. In general, stores with Anheuser Busch exclusive distributors had the highest store sales (in volume), the lowest average price, and carried the most brands. As discussed earlier, due to data limitation, I was unable to pin down all the brewer-distributor relationships for each store in the dataset. However, for all the brewer-distributor-store combinations that I am able to verify using the CBBD data, I also list distributor characteristics

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\(^{26}\)Stores excluded in the final sample due to a lack of information about distribution status were bigger (in terms of physical selling area) compared to the other stores in California in the original sample. Nevertheless, the average price of beer, the average price of InBev products, and the quantity sold of InBev products between stores in the final sample and the original sample were quite similar.

\(^{27}\)The counties that belonged to neither a control group nor a treatment group are counties in which the grocery chain studied in this paper did not operate, or counties in which changes in InBev’s distribution status could not be determined.
in the table. In areas where AB distributors were exclusive, these AB distributors carried on average 22 brands, while other distributors carried on average 51 brands. If representing a large number of brands led to incentive conflicts within a distribution network, then I expect to see that InBev received more investments from their new distributors in treatment group 2 areas after the AB-InBev distribution agreement took place.

Comparing Anheuser Busch nonexclusive (AB nonexclusive) and non-Anheuser Busch (non-AB) distributors, AB non-exclusive distributors had higher market shares than non-AB ones in both control stores (41.89% versus 36.94%) and treatment 1 stores (42.09% versus 24.50%). Note that non-AB distributors obtained a higher market share (44%) in AB exclusive markets. If economies of scale are important in distribution, running an exclusive network seems to be a disadvantage for Anheuser Busch. Another point to note from Table III is that the mean total market shares for AB nonexclusive distributors in the control group and in treatment group 1 are similar (41.89% versus 42.09%), suggesting that the prior ownership of InBev brands may not be correlated with the overall abilities of Anheuser Busch distributors.

Because exclusivity is associated with higher store sales and lower prices, these results seem to confirm the findings in Sass [2005] and Rojas [2010] and go against the anticompetitive theory of exclusive dealing. However, the differences may also come from permanent unobserved covariates associated with exclusivity, such as demographics differences. Because a simple cross-section comparison may suffer from the omitted variable bias problem, I focus on how changes in distribution status affect brand performance using variations generated by the AB-InBev deal.

I also construct a dataset that includes distribution status for major brewers in order to study the substitutable effect on rival brands under a shared distribution house.\textsuperscript{28} This re-

\textsuperscript{28}I am only able to map the distribution status to brands for a small number of brands due to the limitation of the CBBD data. For example, distributors 1 and 2, both serving counties A and B, may both appear to have a Heineken distributorship in the CBBD directory. It may be that Heineken has two distributors that compete with each other in both counties. However, one stylized fact in the beer industry is that major brewers tend to adopt exclusive territories. Therefore, it is more likely that distributor 1 has Heineken in
stricted sample includes eight product families in 170 stores. Table IV shows the variations I use to identify the substitutable effect with brands other than InBev.

Other than Anheuser Busch, I could identify 7 product families that were affected by the event. In Table IV, In (Out) represents whether a product’s local distributor added or dropped InBev from its brand portfolio in a given geographic area. Taking Sacramento County for example, Anheuser Busch, Miller, and Coors all had their own distributors here, and none of them was exclusive. Prior to the event, InBev was carried by the Miller distributor, which also carried Heineken along with other brands. The Coors distributor also carried Crown Imports, and the AB distributor also carried Guinness and Sierra Nevada. Therefore, after the event, Heineken received an ”InBev out” treatment; Guinness and Sierra Nevada received an ”InBev in” treatment, while Crown Imports received no treatment at the distribution level in Sacramento County.

Table IV shows no specific pattern regarding a firm’s tendency to seek or evade InBev brands at the distribution level (except for Crown Imports, which tended to be in different distribution houses from InBev prior to the event). This observation provides more confidence in the research design.

Graphical Analysis

Before turning to the parametric models, I present graphs that plot InBev’s market share during the time periods studied in the paper. Figure 2 and Figure 3 show average monthly InBev market shares for different groups of stores. In general, it seems that most of the

county A and distributor 2 has Heineken in county B, or vice versa. Nevertheless, without collecting more detailed information, I cannot assign distribution status for Heineken in this case. Unfortunately, not every distributor answered my phone calls, and so I could only trace out the distributorship of major brands in certain areas. Given that this is a restricted sample, I only use the data for the analysis of the substitutable effect for brands other than InBev.

Stores in the restricted sample tend to be smaller than the ones in the final sample. This can be a concern, because a distributor’s effort to locate better shelf space may play a more important role in a product’s sales when shelf space is limited. Therefore, if the substitutable effect was more likely to be present in stores with smaller physical display area, then the results in the restricted sample would overestimate the results for stores with an average store size.

InBev market share is defined as total InBev sales divided by total store sales in the beer category (both are in terms of 12 oz. six-packs).
variation in InBev market shares came from monthly shocks, which affected all groups. From the graphs, it also appears that InBev market shares followed similar trends in all groups. From Figure 2, I find that after the event, the vertical gap between treatment 1 and treatment 2 lines became smaller, suggesting that joining a more exclusive distribution network helped increase InBev’s market share. Figure 3 tracks changes in InBev market share for the control group and treatment groups (stores where InBev products were moved to Anheuser Busch distributors). Because of permanent differences in InBev market shares, it is very difficult to gauge the “reallocation effect” simply by looking at Figure 3. I then proceed with a “difference-in-differences” approach to formally estimate the effect of the distribution network on market outcomes.

VI Empirical Results

The Effect of Distribution Reallocation on InBev’s Market Share and Price

Table V displays the estimated changes in market share for InBev by different distribution status. Column (1) gives the baseline regression estimates, column (2) provides the results with monthly fixed effects, and column (3) provides the results with additional interaction terms.

Using results from column (1), I find that InBev market share decreased by 0.32 percentage points after the event. There was no significant impact on InBev’s market share when it moved to Anheuser Busch distribution networks. However, InBev’s market share increased by an extra 0.16 percentage points after joining Anheuser Busch “exclusive” networks, closing the gap of the decrease in market share after the event by one half. In this regard, the benefit from joining an exclusive distribution network on InBev’s market share is not trivial. Given that the overall average InBev market share prior to the event was 2.69%, moving into an exclusive distribution network was associated with a 6% increase in InBev’s market share. Column (2) provides similar results when monthly fixed effects are included.
Column (3) shows the results of InBev market share when I include interaction terms of changes in distribution status and Anheuser Busch’s market share prior to the event. The point estimate on “InBev moved to AB exclusive” remains positive and significant (0.593), but the point estimate on “InBev moved to AB” becomes negative (-0.62) and significant, suggesting that the reallocation of InBev brands into Anheuser Busch’s distribution networks had a negative impact on InBev brands’ overall performance. In addition, the point estimate of “InBev moved to AB × AB market share” is positive and significant (0.021). Therefore, while the reallocation into another distribution system hurt InBev’s market share, moving into an AB distribution network where Anheuser Busch had a higher market share offset some of the negative impact. In contrast, the point estimate of “InBev moved to AB exclusive × AB market share” is negative and significant (-0.071), suggesting that when a distributor is already exclusive to a brewer, there were no additional benefits received for brands when its brewer (in this case, its importer) gained more market share.

To test Hypothesis 3, I provide the regression results using only observations from smaller stores (stores with their selling area less than the mean store selling area). The results are reported in columns (4) to (6). The point estimates of the “InBev moved to AB exclusive” effect are larger than before, which seem to provide evidence supporting Hypothesis 3; however, the difference is not statistically significant at the 10% significance level.\textsuperscript{31}

Table VII further provides the effect of distribution status on InBev’s average product price. Results in columns (1) and (2) suggest that moving into Anheuser Busch’s distribution network lowered InBev’s average product price by 3.8 cents, while moving into an exclusive network provided an additional decrease in average product price by 5.4 cents. However, compared to the magnitude of the price increase after the event (79 cents), the effect from exclusive dealing on InBev’s product price was relatively small. Moreover, in column (3), once I include interaction terms, the effect of the distribution status on prices turns positive

\textsuperscript{31}Using the specification in columns (1) and (4), the difference of the point estimates of the “InBev moved to AB exclusive” effect using smaller stores and larger stores is 0.102, which has a p-value less than 0.12 using a one-sided test.
(though not significant), and all point estimates for the interaction terms could not be precisely estimated. Columns (4)-(6) provide the results by excluding larger stores. Again, once interaction terms are included, the effect of the distribution status on prices could not be precisely estimated.

The results from Tables indicate that the reallocation into an Anheuser Busch distribution network may not improve a product’s competitive advantage per se. It is the brewer’s market share that matters. More importantly, moving into an Anheuser Busch exclusive network helped InBev to obtain higher market share, and such an effect may not result from the market power of exclusive distributors. Indeed, within all Anheuser Busch exclusive networks, the gain in InBev’s market share is negatively correlated with Anheuser Busch’s market share. Moreover, the effect on product prices is not significant compared to the effect on market shares. My interpretation is that an exclusive distribution network enhances promotional efforts made to InBev brands through non-price channels, which is consistent with the efficiency argument for exclusive dealing.

The Effect of Distribution Reallocation of InBev on Rival Brands

To further examine the effect of distribution status on brand market share, I study how the inclusion/exclusion of InBev brands affects rival brands’ market shares. I interpret investments to have a “substitutable effect” if rival brands gain market shares from the exclusion of InBev brands in their distribution network or if they lose market shares from sharing their distribution network with InBev brands. Recall that as Segal and Whinston point out, the promotional services invested by distributors can have complementary or substitutable effects. If investments made by a distributor have a complementary effect on rival brands, then exclusive dealing would lower a distributor’s incentive to invest and would harm social welfare. On the contrary, if the above investments have a substitutable effect, then exclusive contracts help alleviate the incentive problem within a distribution network and would lead to efficiency gains.
Table VII presents the regression results and separates the results by product market shares. Column (1) gives the effects for all products, column (2) gives the results when domestic macro products are excluded, and the rest of the columns focus on non-macro brands, but are stratified according to each brand’s overall rank in market share. I focus on non-macro brands, because these products, compared to macro brands, are less likely to run advertising campaigns at the national level and rely more on local promotion efforts from distributors.

The estimates in column (1) show that when a distribution channel was less crowded (InBev out), brands within the distribution channel benefited from the change. The effect remains positive and significant when macro brands were excluded from the sample. Non-macro brands increased their market share by 0.11 percentage points when their distributors carried fewer brands. However, as shown in column (3), most of the benefits were driven by high market share brands. Conversely, when a distribution channel was more crowded (InBev in), there was no significant substitutable effect overall. However, when restricting the sample to non-macro brands, I find that low market share brands were crowded out significantly. On average, low market share brands decreased their market share by 0.02 percentage points.

The above results are consistent with the hypothesis that promotional efforts at the distribution level are substitutable and provide evidence of incentive conflicts at the distribution level. Interestingly, the substitutable effect is asymmetric: when distributors lost InBev brands, the incumbent high market share brands gained; when distributors received InBev brands, the incumbent low market share brands suffered. It seems that distributors reallocated their promotional services according to each brand’s popularity, holding everything else constant. One explanation is a “share of mind” story: high market share brands generate large sales volumes and cash flows for a distributor and are in better positions

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\[32\] I ranked each brand by its overall market share in the dataset. If a brand’s market share is above the 50th percentile, then it is a “high market share” brand. Similarly, if a brand’s market share is below the 50th percentile, then it is a “low market share” brand.

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to secure the distributor’s promotional efforts. Another possible explanation is that high market share brands are usually well-established brands and are much easier for distributors to promote. This may explain why low market share brands mostly likely suffered when their distributors acquired popular InBev brands and were the least likely to gain when their distributors carried fewer brands.

To test Hypothesis 3 using changes in rivals’ distribution status, I provide the regression results using only observations from non-macro brands in smaller stores in columns (5). The point estimate of “InBev out” is smaller than the one in column (2), but the difference of the point estimates of the “InBev out” effect using smaller stores and larger stores is not statistically significant.

Difference-in-Differences Matching Estimators

One of the concerns of using a simple difference-in-differences regression strategy is that the outcome variable may be a function of store attributes, and such heterogeneity between stores can lead to bias [Heckman et al., 1997]. For example, the changes in InBev’s market share may be a function of the average income of the neighborhood area. A matching estimator reduces the above bias by pairing stores with similar observed attributes so that comparisons are made based on stores that have observed attributes over a common support. Rosenbaum and Rubin [1983] show that when matching on the observables is valid, matching on the probability of program participation (the propensity score) is also valid, which greatly reduces the dimensionality of the matching procedure. One disadvantage of the above matching estimator, however, is that it requires program participation based solely on observed attributes, which may be too strong an assumption for many empirical settings. In contrast, a difference-in-differences matching estimator, as proposed by Heckman et al. [1998], allows for time-invariant unobservables and is not subject to the above “selection-on-observables” restriction.

For robustness checks, I estimate a difference-in-differences matching model as proposed
by [Heckman et al. 1998] for the effect of InBev joining Anheuser Busch’s exclusive distribution network on InBev’s market share. Following the language from the program participation literature, the treatment group in this case refers to stores with Anheuser Busch exclusive distributors, and the control group in this case refers to stores that InBev products were subject to reallocation at the distribution level, but the local Anheuser Busch distributors were not exclusive.

I first estimate a Logit model for a distributor’s choice of joining Anheuser Busch’s exclusive dealing program based on observed store attributes. Second, I obtain the predicted program participation probability based on the Logit model. To satisfy the common support assumption, I exclude stores from the treatment group that have propensity scores higher than the 99th percentile of the propensity scores from the control group. Similarly, I exclude stores from the control group with their propensity scores lower than the 1 percentile of the propensity scores from the treatment group. By removing store fixed effects, I then estimate a difference-in-differences matching model using various weighting schemes, including radius matching, nearest neighbor matching, and kernel matching.

Table (VIII) provides results from the difference-in-differences matching estimators. The estimated impact from joining an Anheuser Busch exclusive network by radius matching and nearest neighbor matching is both positive (0.18 and 0.13, respectively) and statistically significant. The matching estimate by kernel matching is also positive (0.13), but cannot be precisely estimated. The actual magnitude of the matching estimates seems to depend on how observations are weighted, however. Compared to the previous difference-in-differences regression estimate (0.16) from the baseline model, the magnitude of matching estimates is similar to the one from the regression framework and provides further support for our previous findings.

33 The observed store attributes include: the size of a store, population, income level, the percentage of population that is male, and the percentage of population that is white. Demographics data are drawn from Census 2000 at the zip code area level.
34 Standard errors for the difference-in-differences kernel matching estimator are obtained by bootstrapping.
VII Discussion and Conclusion

This paper provides empirical evidence to show that exclusive dealing matters in the U.S. beer industry: when a brand is carried by a distributor with fewer (more) external trading opportunities, its market share increases (decreases). The “exclusive” effect on InBev’s price is not significant compared to the effect on InBev’s market share. Moreover, such an effect on InBev’s market share seems to be more prominent in smaller stores where a distributor’s promotional effort is more crucial to a product’s success (though the difference is not statistically significant at the 10% level). The interpretation is that products carried by a more exclusive distributors receive more promotional efforts through non-price channels. In a grocery store, such services include maintaining product availability, securing a better shelf location, or building an effective store display. Following Segal and Whinston [2000], the findings support the efficiency argument for exclusive dealing: if investments made by distributors have a substitutable effect, then incentive conflicts within a distribution network make firms prefer exclusive distributors, and exclusive dealing can be welfare enhancing due to higher investment levels.

The results also show that InBev market share decreased after reallocation into Anheuser Busch’s distribution network. One possible explanation for this effect is switching costs in the short run. In addition, the magnitude of such a reduction decreases in Anheuser Busch’s market share prior to the event, suggesting that the market power of a product’s brewer may also affect the product’s market performance.

Given that I only have data from the supermarket channel and that the results are based on a single event, it is important to discuss how well the results can be generalized to other retail formats and to other settings. First, InBev products were carried in all of the stores in the final sample. However, they may not have such a strong presence in other retail formats, because a typical convenience store, restaurant, pub, or music venue tends to carry fewer products than a typical supermarket store. Therefore, InBev products’ overall availability
may further increase when its distributors provide more promotional services. Given that the results herein seem to be stronger in stores with limited shelf space, the results in this paper may provide a lower bound of the overall increase in InBev market share due to the “exclusive dealing” effect.\(^{35}\)

Second, it is true that the AB-InBev event was not entirely an exogenous event: Anheuser Busch may have chosen to include InBev brands into its distribution network, because of their high price-cost margins and product complementarity. The main concern therefore lies in whether one can observe similar effects if one randomly assigns brands into different types of Anheuser Busch’s distribution network. Because in areas where Anheuser Busch’s distributors were exclusive, all the other (non-macro) brands, just like InBev prior to the event, were distributed in a crowded, shared distribution network, the substitutable effect should be qualitatively similar for other (non-macro) brands. Moreover, I also assess the effect of changes in rival brands’ distribution status on their market shares due to the event, and the results are also consistent with the presence of a substitutable effect.

Third and finally, during the time periods studied in this paper, less than one-third of Anheuser Busch distributors in California were exclusive (11 out of 39 in the 2006 CBBD directory), which is lower than the average exclusive distributor ratio (around 50 %) for Anheuser Busch in the United States. Therefore, California seems to have different market conditions than other areas. Nevertheless, previous studies (Sass [2005], Rojas [2010]) that directly estimate the competitive effects of exclusive dealing with data from other areas do not find much anticompetitive effects due to such contracts. My findings thus provide additional evidence to support an efficiency argument for exclusive dealing.

After the time periods studied in this paper, the U.S. beer industry has become much

\(^{35}\)According to Impact Databank (2007), U.S. annual beer consumption is 6,283 million gallons in 2006, and annual beer sales in supermarkets are 992 million gallons in 2006. Therefore, the volume of beer sold through the supermarket channel is around 16%. The U.S. average price of Bud Light in the supermarket channel was \$16.68 per case in 2006, and the average price of Bud Light in the dataset in 2006 was \$15.72 per case. Therefore, overall, the data used in this paper are comparable to data from other supermarket channels in the United States.
more concentrated due to the Miller/Coors and the AB/InBev mergers in 2008-2009. When Miller and Coors integrated their distribution system after the merger, some of their distributors lost representation of these macro brands. If economies of scale are important at the distribution level, this may result in fewer distributors and aggravate the incentive conflict problem at the distribution level. Future research on the dynamics of the vertical structure of the industry will be highly valuable. Finally, due to data limitation, the results in this paper are based solely on brewer-distributor matching. More data on contracting details (terms for distributor margins and how contracts can be terminated) between brewers and distributors will be extremely useful in studying the vertical relationships between firms.
References


Figure 1: Changes in InBev’s Distribution Status Due to the AB-InBev Distribution Agreement

Figure 2: The Effect of Reallocation to the Anheuser Busch Exclusive Distribution Network on InBev Market Share
Figure 3: The Effect of Reallocation to the Anheuser Busch Distribution Network on InBev Market Share

Table I: Identifying Changes in Distribution Status of Anheuser Busch Distributors

<table>
<thead>
<tr>
<th>Store types</th>
<th>AB distributor's 2006 brand portfolio</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stores with AB non-exclusive</td>
<td>Anheuser-Busch, Boston Beer, Gordon Biersch,</td>
<td>Control group</td>
</tr>
<tr>
<td>distributors</td>
<td>Heineken USA, <strong>InBev USA</strong>, Sierra Nevada</td>
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<tr>
<td>Stores with AB non-exclusive</td>
<td>Anheuser Busch, Barton Beers, Boston Beer,</td>
<td>Treatment group 1</td>
</tr>
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<td>distributors</td>
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<td></td>
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<tr>
<td>Store with AB exclusive</td>
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<td>Treatment group 2</td>
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<td>distributors</td>
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<td></td>
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<tr>
<td>Rank</td>
<td>Brand</td>
<td>Market share (%)</td>
</tr>
<tr>
<td>------</td>
<td>------------------------</td>
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</tr>
<tr>
<td></td>
<td><strong>Domestic Macro</strong></td>
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<td>Miller Genuine Draft</td>
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<td>Miller Lite</td>
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<td>Coors Banquet</td>
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</tr>
<tr>
<td>8</td>
<td>Keystone Light</td>
<td>1.33</td>
</tr>
<tr>
<td>9</td>
<td>Miller High Life</td>
<td>1.18</td>
</tr>
<tr>
<td></td>
<td><strong>Domestic Specialty</strong></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Sierra Nevada Pale Ale</td>
<td>3.26</td>
</tr>
<tr>
<td>19</td>
<td>Fat Tire Amber Ale</td>
<td>0.96</td>
</tr>
<tr>
<td></td>
<td><strong>Imports</strong></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Corona Extra</td>
<td>6.21</td>
</tr>
<tr>
<td>6</td>
<td>Heineken</td>
<td>4.15</td>
</tr>
<tr>
<td>10</td>
<td>Tecate</td>
<td>2.38</td>
</tr>
<tr>
<td>11</td>
<td>Corona Light</td>
<td>1.65</td>
</tr>
<tr>
<td>13</td>
<td>Pacifico</td>
<td>1.45</td>
</tr>
<tr>
<td>14</td>
<td>Smirnoff Ice</td>
<td>1.39</td>
</tr>
<tr>
<td>16</td>
<td>Newcastle Brown Ale</td>
<td>1.22</td>
</tr>
<tr>
<td>18</td>
<td>Guinness Draught Ale</td>
<td>1.01</td>
</tr>
<tr>
<td>20</td>
<td>Stella Artois (InBev)</td>
<td>0.88</td>
</tr>
<tr>
<td>26</td>
<td>Beck’s (InBev)</td>
<td>0.81</td>
</tr>
<tr>
<td>40</td>
<td>Bass Pale Ale (InBev)</td>
<td>0.45</td>
</tr>
<tr>
<td>70</td>
<td>Boddingtons (InBev)</td>
<td>0.19</td>
</tr>
<tr>
<td>105</td>
<td>Beck’s Premier Light (InBev)</td>
<td>0.08</td>
</tr>
</tbody>
</table>

This table reports product attributes of the top 20 brands along with 5 InBev brands in the data. ABV (alcohol by volume) measures the percentage of alcohol as a fraction of the total volume. Domestic macro brands are: Budweiser family brands, Bud Light family brands, Busch, Michelob family brands, Miller family brands, Coors family brands, Keystone family brands, Natural family brands and Pabst Blue Ribbon.
Table III: Summary Statistics

<table>
<thead>
<tr>
<th></th>
<th>Control group: AB nonexclusive (carried InBev prior to the event)</th>
<th>Treatment group 1: AB nonexclusive</th>
<th>Treatment group 2: AB exclusive</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Store characteristics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of stores</td>
<td>35</td>
<td>135</td>
<td>37</td>
</tr>
<tr>
<td>Weekly store sales (quantity)</td>
<td>2048 (711.15)</td>
<td>1837 (634.66)</td>
<td>2351 (634.18)</td>
</tr>
<tr>
<td>Average store price (beer per six-pack)</td>
<td>5.59 (0.28)</td>
<td>5.44 (0.26)</td>
<td>5.33 (0.35)</td>
</tr>
<tr>
<td>Number of brands</td>
<td>121.66 (19.56)</td>
<td>127.51 (14.69)</td>
<td>134.76 (9.88)</td>
</tr>
<tr>
<td><strong>Distributor characteristics (AB)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of distributors</td>
<td>5</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Market share</td>
<td>41.89 (3.13)</td>
<td>42.09 (9.47)</td>
<td>24.58 (5.03)</td>
</tr>
<tr>
<td>Number of brands carried</td>
<td>37.17 (5.31)</td>
<td>37.48 (8.66)</td>
<td>22.01 (2.31)</td>
</tr>
<tr>
<td><strong>Distributor characteristics (Non-AB)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of distributors</td>
<td>6</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>Market share</td>
<td>36.94 (15.07)</td>
<td>24.50 (18.97)</td>
<td>43.89 (19.28)</td>
</tr>
<tr>
<td>Number of brands</td>
<td>36.98 (14.47)</td>
<td>27.33 (19.40)</td>
<td>51.39 (21.27)</td>
</tr>
</tbody>
</table>

All entries reported are means with standard deviations shown in parentheses. “Weekly store sales” are sales in terms of the number of six-packs. “Average store price” is the average price per six-pack.
Table IV: Distribution Status Affected by the AB-InBev Distribution Agreement

<table>
<thead>
<tr>
<th>County/Product Families</th>
<th>AB</th>
<th>Anchor</th>
<th>Crown</th>
<th>Guinness</th>
<th>Heineken</th>
<th>Newcastle</th>
<th>Pyramid</th>
<th>Sierra Nevada</th>
</tr>
</thead>
<tbody>
<tr>
<td>Del Norte, Humboldt</td>
<td>In</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>In</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>San Jose (city)</td>
<td>In</td>
<td>Out</td>
<td>In</td>
<td>In</td>
<td>Out</td>
<td>Out</td>
<td>Out</td>
<td>In</td>
</tr>
<tr>
<td>Alameda</td>
<td>In</td>
<td>*</td>
<td>In</td>
<td>Out</td>
<td>Out</td>
<td>–</td>
<td>Out</td>
<td>In</td>
</tr>
<tr>
<td>Monterey, San Benito, Santa Cruz</td>
<td>In</td>
<td>In</td>
<td>In</td>
<td>In</td>
<td>In</td>
<td>*</td>
<td>Out</td>
<td></td>
</tr>
<tr>
<td>Sacramento</td>
<td>In</td>
<td>Out</td>
<td>–</td>
<td>In</td>
<td>Out</td>
<td>Out</td>
<td>Out</td>
<td>In</td>
</tr>
<tr>
<td>Yolo</td>
<td>In</td>
<td>Out</td>
<td>–</td>
<td>In</td>
<td>Out</td>
<td>Out</td>
<td>Out</td>
<td>In</td>
</tr>
<tr>
<td>Solano</td>
<td>In</td>
<td>*</td>
<td>In</td>
<td>Out</td>
<td>Out</td>
<td>Out</td>
<td>Out</td>
<td>In</td>
</tr>
<tr>
<td>Lassen</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>*</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>San Francisco</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Stanislaus</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

This table reports changes in distribution status for several product families across different geographic areas. Product families included here are brands carried by at least one AB distributor. “–” indicates that the brand’s distribution status was not affected by the AB-InBev distribution agreement. “In” indicates that the brand’s distributor started carrying InBev after the event. “Out” indicates that the brand’s distributor stopped carrying InBev after the event. “*” indicates that the brand’s distributor in the area cannot be identified.
Table V: The Effect of the AB-InBev Distribution Agreement on InBev Market Share

<table>
<thead>
<tr>
<th></th>
<th>Full sample</th>
<th></th>
<th>Using observations from smaller stores</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>InBev moved to AB exclusive</td>
<td>0.159**</td>
<td>0.159**</td>
<td>0.593*</td>
<td>0.199**</td>
</tr>
<tr>
<td></td>
<td>(0.045)</td>
<td>(0.045)</td>
<td>(0.239)</td>
<td>(0.070)</td>
</tr>
<tr>
<td>InBev moved to AB</td>
<td>-0.071</td>
<td>-0.071</td>
<td>-0.617**</td>
<td>-0.195*</td>
</tr>
<tr>
<td></td>
<td>(0.067)</td>
<td>(0.067)</td>
<td>(0.191)</td>
<td>(0.089)</td>
</tr>
<tr>
<td>post</td>
<td>-0.315**</td>
<td></td>
<td></td>
<td>-0.259**</td>
</tr>
<tr>
<td></td>
<td>(0.059)</td>
<td></td>
<td></td>
<td>(0.074)</td>
</tr>
<tr>
<td>InBev moved to AB exclusive</td>
<td>0.017*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>× AB market share</td>
<td>(0.008)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>InBev moved to AB</td>
<td>0.021**</td>
<td></td>
<td></td>
<td>0.019*</td>
</tr>
<tr>
<td>× AB market share</td>
<td>(0.006)</td>
<td></td>
<td></td>
<td>(0.008)</td>
</tr>
<tr>
<td>Constant</td>
<td>2.687**</td>
<td>2.429**</td>
<td>2.429**</td>
<td>3.060**</td>
</tr>
<tr>
<td></td>
<td>(0.014)</td>
<td>(0.031)</td>
<td>(0.031)</td>
<td>(0.022)</td>
</tr>
<tr>
<td>Monthly fixed effects</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Observations</td>
<td>21528</td>
<td>21528</td>
<td>21528</td>
<td>11960</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.043</td>
<td>0.252</td>
<td>0.254</td>
<td>0.043</td>
</tr>
</tbody>
</table>

The dependent variable is InBev’s market share, which equals the total sales of InBev products divided by store total sales in the beer category (both are in terms of six-packs). “AB market share” is the average market share of all Anheuser Busch products prior to the event. All regressions control for store fixed effects. Columns (1)-(3) report the results using the full sample. Columns (4)-(6) report the results using observations that have a store selling area less than the mean store selling area in the full sample. Standard errors, clustered at the store level, are shown in parentheses. * significant at 5%, ** significant at 1%.
Table VI: The Effect of the AB-InBev Distribution Agreement on InBev Products’ Average Price

<table>
<thead>
<tr>
<th></th>
<th>Full sample</th>
<th></th>
<th>Using observations from smaller stores</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>(1) (2) (3)</td>
<td>(4) (5) (6)</td>
</tr>
<tr>
<td>InBev moved to AB exclusive</td>
<td>-0.054**</td>
<td>-0.054**</td>
<td>0.042</td>
<td>-0.058*</td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td>(0.016)</td>
<td>(0.068)</td>
<td>(0.029)</td>
</tr>
<tr>
<td>InBev moved to AB</td>
<td>-0.038*</td>
<td>-0.038*</td>
<td>0.027</td>
<td>-0.036</td>
</tr>
<tr>
<td></td>
<td>(0.017)</td>
<td>(0.017)</td>
<td>(0.053)</td>
<td>(0.025)</td>
</tr>
<tr>
<td>Post</td>
<td>0.788**</td>
<td></td>
<td></td>
<td>0.791**</td>
</tr>
<tr>
<td></td>
<td>(0.013)</td>
<td></td>
<td></td>
<td>(0.017)</td>
</tr>
<tr>
<td>InBev moved to AB exclusive × AB market share</td>
<td>-0.004</td>
<td></td>
<td></td>
<td>-0.008*</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td></td>
<td></td>
<td>(0.003)</td>
</tr>
<tr>
<td>InBev moved to AB × AB market share</td>
<td>-0.003</td>
<td></td>
<td></td>
<td>-0.003</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td></td>
<td></td>
<td>(0.002)</td>
</tr>
<tr>
<td>Constant</td>
<td>6.896**</td>
<td>7.033**</td>
<td>7.033**</td>
<td>6.904**</td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
<td>(0.008)</td>
<td>(0.008)</td>
<td>(0.007)</td>
</tr>
<tr>
<td>Monthly fixed effects</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Observations</td>
<td>21528</td>
<td>21528</td>
<td>21528</td>
<td>11960</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.431</td>
<td>0.649</td>
<td>0.650</td>
<td>0.428</td>
</tr>
</tbody>
</table>

The dependent variable is InBev’s average price (total revenue divided by the number of six-packs sold). “AB market share” is the average market share of all Anheuser Busch products prior to the event. All regressions control for store fixed effects. Columns (1)-(3) report the results using the full sample. Columns (4)-(6) report the results using observations that have a store selling area less than the mean store selling area in the full sample. Standard errors, clustered at the store level, are shown in parentheses.

* significant at 5%, ** significant at 1%.
Table VII: Substitutable Effects on Rival Brands’ Market Share When Their Distributors Receive/Drop InBev

<table>
<thead>
<tr>
<th></th>
<th>All Exclude domestic Brands with Brands with Use observations from macro brands high shares low shares smaller stores</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>InBev in InBev in</strong></td>
<td>0.006 (0.016) 0.015 (0.019) 0.018 (0.022) -0.015** (0.005) 0.021 (0.026)</td>
</tr>
<tr>
<td><strong>InBev out</strong></td>
<td>0.118** (0.015) 0.109** (0.017) 0.128** (0.019) -0.004 (0.005) 0.092** (0.024)</td>
</tr>
<tr>
<td><strong>Constant</strong></td>
<td>1.640** (0.006) 1.023** (0.006) 1.240** (0.008) 0.182** (0.003) 1.100** (0.009)</td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td>440048 307545 243631 63914 160713</td>
</tr>
<tr>
<td><strong>Adjusted R²</strong></td>
<td>0.002 0.010 0.012 0.020 0.009</td>
</tr>
</tbody>
</table>

The dependent variable is brand level market share. Product families used in the regressions are: Anheuser Busch, Anchor, Crown imports, Guinness, Heineken, Newcastle, Pyramid, and Sierra Nevada. Brands with market shares below the mean are categorized as low market share brands. “InBev out”: an indicator for brands whose distributor stopped carrying InBev after the event. “InBev in”: an indicator for brands whose distributor started carrying InBev after the event. All regressions control for store, brand and monthly fixed effects. Standard errors, clustered at the store level, are shown in parentheses. * significant at 5%, ** significant at 1%.

Table VIII: The Impact of Joining Anheuser Busch Exclusive Distribution Networks on InBev Market Share: Difference-in-Differences Matching Estimates

<table>
<thead>
<tr>
<th></th>
<th>(1) Radius Matching</th>
<th>(2) Nearest Neighbor Matching</th>
<th>(3) Kernel Matching</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>InBev moved to AB exclusive</strong></td>
<td>0.181** (0.02)</td>
<td>0.13** (0.03)</td>
<td>0.13 (0.093)</td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td>6324</td>
<td>2914</td>
<td>6324</td>
</tr>
</tbody>
</table>

The dependent variable is InBev’s market share. Standard errors are shown in parentheses. Standard errors for the kernel matching estimate are bootstrapped standard errors using 1000 replications. * significant at 5%, ** significant at 1%.