The Operational Consequences of Private Equity Buyouts: Evidence from the Restaurant Industry

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ABSTRACT

How do private equity firms affect their portfolio companies? We document operational changes in restaurant chain buyouts between 2002 and 2012 using comprehensive health inspection records in Florida. Store-level operational practices improve after private equity buyout, as restaurants become cleaner, safer, and better maintained. Supporting a causal interpretation, this effect is stronger in chain-owned stores than in franchised locations -- "twin" restaurants over which private equity owners have limited control. Private equity targets also slightly reduce employee headcount, lower menu prices, and are less likely to close. These changes to store-level operations require monitoring, training, and better alignment of worker incentives, suggesting private equity firms improve management practices throughout the organization.

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The private equity asset class has grown tremendously in the last thirty years, reaching over $1.6 trillion in aggregate transaction value between the years 2005 to 2007, when half of these investments took place in the U.S. (Kaplan and Stromberg 2009). At the same time, the private equity industry generates much controversy, often at the center of public debate, as was evident during the 2012 U.S. presidential elections. Critics of the private equity industry such as labor and political leaders often argue that PE transactions are largely financial engineering schemes. Some accuse PE firms by practicing "strip and flip" strategies, while portfolio companies struggle under high leverage burden causing an excessive focus on short-term financial goals, leading to cost cutting adversely affecting customers, employees, and the firm as a whole.[1]

Jensen (1989) argues instead that leveraged buyouts are a superior governance form leading to better managed companies. Specifically, PE firms mitigate management agency problems through the disciplinary role of debt, concentrated and active ownership, and high-powered managerial incentives, which lead managers to improve operations. Consistent with this view, substantial body of work documents significant improvements in profitability and operating income of buyout targets (e.g., Kaplan 1989; Boucly, Sraer, and Thesmar 2011; Cohn and Towery 2013, among others). Moreover, Davis et al. (2013) find significant increases in productivity in a large sample of U.S. buyouts from the 1980s to early 2000s.

Nevertheless, little is known about the actions taken by private equity firms. For example, while we know that PE firms control the boards of their portfolio companies, provide strong equity incentives to management, and likely to replace the CEO (Kaplan and

[1] Discussing the Burger King acquisition by 3G Capital, for example, a New York Times article argued, "financial engineering has been part of the Burger King story for so long that it's hard to believe there is still anything worth plucking from its carcass." New York Times, June 2012.

Stromberg 2009), do these changes trickle down the organization and affect day-to-day operations? Do private equity firms engage in operational engineering bringing in industry and operating expertise? PE firms themselves claim they place heavy emphasis on adding value to their portfolio companies (Gompers, Kaplan, and Mukharlyamov 2014), however identifying such effects is challenging.[2]

Two obstacles hinder elucidation of the role played by private equity firms. First, data for PE-backed firms are scarce. Private companies are not required to disclose financial information, let alone detailed operational data, which would shed light on whether private equity firms engage in operational engineering. Second, even if such data is available, do PE firms cause operational changes or merely select companies with promising trajectories?[3]

We study the restaurant industry with its unique data and institutional setting to address both of these challenges. Focusing on a variety of micro-level operational dimensions to explore the consequences of private equity acquisitions, we find that PE firms are active investors that improve firm operations. The improvements we document require better monitoring, training, and alignment of worker incentives, suggesting PE firms improve management practices throughout the organization.

To show causality, we would ideally compare two identical firms: one with PE ownership treatment and one without. Restaurants enable a close variation of such an experiment. We exploit the dual ownership structure pervasive in the restaurant industry in which, within a chain, stores can be owned by either the parent company or a franchisee.

[2] Early papers by Baker and Wruck (1989) and Baker (1992) explored value creation in individual cases of private equity buyouts. More recently, Acharya et al. (2013) study portfolio company performance and relate that performance to PE firm and partner characteristics.

[3] The standard approach in the literature is to match PE-backed firms with control firms selected using observable characteristics. Such counterfactuals will generate unbiased estimates only under the identifying assumption that these characteristics are precisely the ones that led PE to invest in the portfolio company in the first place.

Franchisees are legally independent entities that have the same brand, menus, and appearance as stores owned directly by the chain. Beyond such contractual specifications, however, headquarters—and thus a private equity owner—has limited ability to influence the decision-making of franchisees (Kidwell, Nygaard, and Silkoset, 2007; Vroom and Gimeno, 2007). Hence, this setting allows us to compare *twin* stores that differ in their ownership structure and thus degree of PE influence.

The restaurant industry provides a wealth of operational details, even for private firms. While prior literature has focused mostly on financial statements of companies that either issued public debt or went public, Cohn et al. (2012) illustrate that such an approach leads to biased estimates.[4] Even absent such biases, financial statements shed light only on aggregate firm performance rather than detailed operational level practices. We peer into micro-level firm operations through the lens of health inspections, which provide a backstage view of restaurants' operating practices as defined by the Food and Drug Administration (FDA).

Each year roughly 48 million people get sick, 128,000 are hospitalized, and 3,000 die of foodborne diseases in the United States (Center for Disease Control and Prevention). Therefore, all restaurants in the United States, public and private, are subject to periodic surprise inspections aimed at identifying threats that may lead to foodborne illnesses. Restaurants are evaluated on operational practices such as food handling, kitchen maintenance, consumer advising, and employee training. These inspections provide a unique view of practices and routines employed by restaurant managers.[5]

[4] Exceptions are papers that focus on non-financial performance margins such as innovation (Lerner, Sorensen and Stromberg 2012), and employment (Davis et al. 2013)

[5] Few examples include serving food at an appropriate temperature, storing toxic substances properly, or sanitizing food surfaces. We provide a complete list of practices examined by inspectors in the Appendix.

We compile every restaurant inspection conducted in Florida between 2002 and 2012.[6] Private equity firms acquired 94 restaurant chains with a presence in Florida over this period, accounting for approximately 3,700 individual restaurants out of over 50,000 in operation.[7] We first employ a difference-in-difference analysis to explore the overall treatment effect of private equity firms on chain stores.

Our key result is that restaurants commit fewer health violations after being acquired by a private equity firm. The improvement is concentrated in those practices whose potential hazards are deemed by the FDA most dangerous for customers. The effect remains strong with store-level fixed effects and when we control for changes in number of employees and number of seats per store. The use of store-level data allows us to include zip code by year fixed effects in the analysis to control for varying customer demographics and local demand shocks. In addition, we show that there are no pre-existing trends in health-related violations before private equity takes over, and the treatment effect increases steadily over five years after the private equity buyout.

These operational practices matter. Jin and Leslie (2003) show that a reduction in violations, triggered by the introduction of hygiene quality grade cards, is associated with improved store revenue and reduced the number of foodborne illness hospitalizations. We find that such violations are also strongly correlated with customer reviews posted on Yelp.com. Moreover, we show that deterioration in such operational practices is correlated with future likelihood of restaurant closures, a proxy for poor store profitability.

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[6] Health inspections in the U.S. are commonly conducted at the level of the county. Each county has its own inspection standards and grading system, making cross-county health inspection comparisons difficult. The choice to conduct the study in Florida was motivated by the fact that health inspections in Florida are conducted at the state level, allowing consistent comparison of inspection outcomes across a larger sample.

[7] Sample restaurant chain buyouts include Burger King, Sbarro, California Pizza Kitchen, Chilis, Quiznos, PF Changs, Outback Steakhouse, among others.

Are these operational improvements driven by active PE involvement or mere selection? We find a differential treatment effect within a chain using the twin restaurants analysis: improvements in health-related practices are concentrated in directly owned restaurants where private equity firms have more influence. Moreover, we show that both directly owned stores and franchisees experience similar pre-existing trends prior to the PE buyout. These results indicate an active involvement of private equity firms in the operations of their portfolio companies.

We also find evidence of spillover effects, as franchisees located in the same zip code as directly owned restaurants catch up over time and improve their practices as well, in contrast to franchisees located in areas with no proximate directly owned restaurants. This suggests that competitive pressures lead franchisees to adopt the improved practices.

Next, we explore whether these changes are driven by other margins of restaurant operations. Are these improvements accompanied by the hiring of more employees or increases in menu prices? We find the opposite. PE-backed restaurants slightly reduce employee headcount at the store level. Moreover, using a panel of menu prices from nearly 2,200 restaurant chains from 2005 to 2012, we find that PE-backed restaurants lowered prices relative to those of similar menu items sold by direct competitors.

The evidence so far suggests that private equity acquisitions induce significant operational changes at the level of the individual store. It is natural to wonder whether such changes translate into increased profitability. While we do not observe store-level financial information, we ask whether the likelihood of store closure, a proxy for poor financial performance, changes following the PE buyout. We find that store closure risk declines following the PE buyout. Moreover, this decline is concentrated in directly owned stores in which PE firms have greater influence and where operational improvements are largest.

We interpret the results as evidence that private equity ownership improves existing operations by introducing better management practices and mitigating agency problems. Improving such practices in a restaurant chain requires not only appropriate capital budgeting but also better training, monitoring, and alignment of worker incentives throughout the chain. Related to our paper, Acharya et al. (2013) study portfolio company performance and find that partner background, operational or financial, relate that performance to PE firm. More broadly, this paper is related to an extensive literature that explores the consequences of private equity ownership (e.g., Kaplan 1989; Lichtenberg and Siegel 1990; Boucly, Sraer and Thesmar 2011; and John, Lang and Netter 1992 to name a few). Davis et al. (2013) provide evidence for productivity improvements, mostly through assets reallocation. In contrast we find that improvements occur within existing stores. Importantly, we also contribute to the literature with a new approach to identifying whether private equity buyouts causally affect their portfolio companies.

A second related literature is that on the impact of human resource management (HRM) on productivity, illustrating a link between management practices and firm performance.[8] Our findings illustrate that PE firms improve operations management practices, consistent with Bloom, Sadun and Van Reenen (2009) who survey over 4,000 firms in Asia, Europe, and the U.S. to assess their management methods. They show that PE-backed firms are on average the best-managed group in the sample. However, they cannot rule out the possibility that these firms were better managed before private equity takeovers. Our paper is also closely related to Matsa (2011), who explores the impact of leverage on product quality, finding that firms that undertook high leverage appear to degrade their products' quality. Our

[8] For example, Bartel, Ichniowski, and Shaw, (2007), Black and Lynch (2001), Bloom and Van Reenen (2007), Ichniowski, Shaw, and Prennushi (1997), and Lazear (2000).

contrasting finding may be explained by our focus on the recent wave of private equity buyouts, as the nature of PE buyouts and amounts of leverage taken has changed over time (Guo, Hotchkiss and Song 2011).

The remainder of the paper proceeds as follows. Section I describes the data sources and the nature of health violations. Section II provides empirical results on the impact of private equity on restaurant operations, and Section III concludes.

I. Data description

The data in this analysis is constructed from several sources combining information on PE buyouts (CapitalIQ), health inspection results and restaurant ownership in Florida (Florida Department of Business and Professional Regulation), store level employment (InfoUSA), restaurant menu prices (Datassential) and restaurant consumer reviews (Yelp.com). In this section we also illustrate key characteristics of the health inspection results and their correlation with consumer satisfaction and restaurant closures.

A. Health Inspections

The focus of this paper is on operational practices related to sanitation and food-hazard safety. Such practices are correlated with store revenue (Jin and Leslie 2003), and in section I.C we also show correlation with overall consumer satisfaction and restaurant closures. But safety and sanitation practices are important in their own right, as their violation poses a threat to public health safety. Each year in the U.S. roughly one in six people get sick (48 million people), 128,000 are hospitalized, and 3,000 die of foodborne diseases in the United States (Center for Disease Control and Prevention). Most of these outbreaks originate from commercial food facilities through food held at improper temperature, poor personal

hygiene of workers, food handling, and cross contamination (Collins 1997). Due to such concerns, all restaurants in the United States are subject to periodic health inspections conducted by trained specialists in food service evaluation certified by the Food and Drug Administration. Failed inspections can result in fines, suspensions, and closure.

We gather health inspection data from the Florida Department of Business and Professional Regulation. This data encompasses every restaurant inspection conducted in the state of Florida from 2002 through 2012. U.S. health inspections are typically organized and conducted at the county level, and each county is free to use its own criteria and scoring methodology. There is no common standard used across states and counties. The advantage of using data from Florida is that inspections here are conducted at the state level using consistent criteria, and historical records are available back to 2002. Each record gives the name of the restaurant, the address, the date of the inspection, and lists violations across 58 different operational practices.

Florida health inspections divide violations into critical and non-critical. Critical violations are those "likely to directly contribute to food contamination, illness or environmental degradation." Examples of critical violations are improper disposal of waste, improper temperatures for cooked or stored food, dirty restrooms, and contaminated food surfaces. Non-critical violations "do not directly relate to foodborne illness risk, but preventive measures are required." Examples include clean non-food contact surfaces, adequate lighting, clean clothes and hair restraints. A complete description of inspection violations is provided in Appendix A. Inspections fall primarily into three categories: routine surprise, follow-up, and initial setup. We consider only surprise inspections for this study. Follow-ups are arranged in response to violations that need to be fixed and, like startup inspections, occur on known dates, which allow restaurants to put their best foot forward.

B. Other data sources

We supplement the inspection data with restaurant ownership data, also from the Florida Department of Business and Professional Regulation. Restaurants need to renew licensing agreements with the state each year. These licenses, available from 2002 to 2012, provide the name and address of the owner at each restaurant. This allows us to separate restaurant branches into those owned directly by the parent brand, for which the owner name and address coincide with those of the parent firm, and those that have been franchised to independent owners. We incorporate data from InfoUSA, which makes phone calls to establishments to gather, among other data items, the number of full-time equivalent employees. This data is also gathered on an annual basis. Employee count is matched to the inspection database by name, address, and geocode coordinates. We collect median income at the county level from the Bureau of Economic and Business Research (BEBR) at the University of Florida.

We gather restaurant-pricing information from Datassential. This provider samples a representative menu from over 2,000 chains each year from 2005 to 2012. These menus give each item name, food category, and price. Datassential also categorizes each restaurant by price range and cuisine type. We also collect information on restaurant consumer reviews from Yelp.com.

To determine which of these restaurants were acquired by private equity firms, we download from Capital IQ all Leveraged Buyout, Management Buyout, and Secondary LBOs in the restaurant industry. We research each deal to find the names of the restaurant chains involved and record the date the deal closes. There are 103 separate deals involving 117 distinct brand names and approximately 3,500 individual restaurant locations in Florida.

Table I provides summary statistics on inspections and the restaurant sample. Panel A shows that over 20,000 eating establishments are inspected roughly twice each year.[9] The mean number of critical violations found is 4.5 with a standard deviation of 4.3. Panels B-D show that restaurants acquired by private equity firms are not observably different from restaurants in general. Chains acquired by PE firms have, on average, 175 outlets in Florida. These stores generate 3.8 critical violations per inspection, similar to violation counts in untreated chains with at least 5 stores in Florida. Treated and untreated stores appear similar on employee counts, size, and county income as well. Panel C shows that private equity is present in all types of cuisines, with a greater relative presence in hamburger chains, and panel D shows that treated and untreated chains have similar price distribution.

C. Correlation between health inspections and other restaurant outcomes

Before introducing the impact of private equity, we begin by studying the determinants of restaurant violations generally. In Table II, columns 1 and 3, we regress critical and non-critical violations on various store characteristics. Larger restaurants—those with more seats and employees—have more violations. Richer neighborhoods see fewer violations. The more units in the restaurant chain, the better the inspection outcomes. This may be evidence of professional management; a firm running multiple stores has more experience and better controls and procedures in place to monitor operational practices than a proprietor opening her first store. By cuisine type, Asian establishments fare the worst, while donut shops, ice cream parlors, and beverage stores are the cleanest. These latter categories offer simpler items and less variety, which may explain fewer violations. Columns 2 and 4 add restaurant chain

[9] We include only those stores for which we have employee and seat counts. There are fewer inspections in 2002 because the data do not cover the entire year.

fixed effects and drop chain-invariant variables. The remaining results are unchanged. Higher median county income leads to fewer violations even within the same chain.

We extract data from Yelp.com, a consumer review website, to explore whether health-related operational practices are correlated with overall customer satisfaction. People who register as users with Yelp by providing a valid email address can leave star ratings, ranging from 1-5, and comments on restaurants and other businesses. Anyone can read these reviews. In Florida, Yelp reviews are sparse before 2010 and increase significantly by 2012. We thus do not have a sufficient panel structure to examine the impact of PE on consumer satisfaction, but we exploit the cross-sectional correlation between this review-based restaurant quality measure and health violations in Table III, panel A.

For the year 2012, we average at the chain level the number of critical violations found in all inspections for all branches. We also average the number of stars given in Yelp for that chain. Column 1a shows the results of a simple univariate regression of stars on critical violations. The coefficient on critical violations is -0.023 and highly significant. A four-violation increase (one standard deviation) is thus associated with a rating lower by 1/10 of a star. This is meaningful given that 90% of ratings fall between 2 and 5 stars, and half-stars are associated with significant changes in revenue (Luca 2011). Column 2a adds restaurant price range by cuisine fixed effects (e.g., $10-$15 check size – Asian). Violations and customer satisfaction are strongly negatively related even among similar restaurants. Column 3a shows the results of a robustness check requiring at least five Yelp reviews for a restaurant or chain, and the results remain the same. Columns 4a – 6a add non-critical violations. These are also negatively related to Yelp scores but not as strongly as are critical violations.

This relationship between health-related practices and perceived quality could be a direct effect—customers downrate stores with poor hygiene levels. The correlation may also

reflect more broadly that a restaurant that sustains good practices also performs better on other quality dimensions such as service and food. Both explanations suggest that our findings may have a broader interpretation on customer satisfaction.

Panel B of Table III shows that poor practices are correlated with even more dire outcomes—restaurant closure, a proxy for store profitability.[10] For each individual restaurant, we average all inspection scores received each year. We then create the dummy variable *store closure* which equals one in the year a store closes, if it closes. Closure is defined as having no inspection record in a given year or in subsequent years. The inspection database is comprehensive, and every restaurant is inspected at least once and usually twice each year. Thus, if no inspections occur in a given year, we assume it must have closed. In column 1b, we regress store closure on the number of critical violations received in the year of closure and the year before (*lagged annual critical violations*) as well as year and store fixed effects. The coefficient on annual critical violations is 0.0007 and highly significant. A one standard deviation increase in critical violations is associated with a 0.3 percent increase in the likelihood of closure that year. This is not small considering the unconditional likelihood of closure is 7 percent per year, implying a 4 percent increase in closure likelihood. The number of violations the prior year has more than three times this impact, suggesting that an increase in one standard deviation in critical violations in prior year is associated with an almost 15 percent increase in likelihood of store closure. Non-critical violations, added in columns 2b and 3b, are again not as strong a factor.

[10] Mandatory closures that are enforced due to poor health inspections are rare. The closures discussed here are voluntary ones decided by the restaurant owners.

II. Empirical Methodology

A. Initial Specification

We examine the effect of private equity buyouts on portfolio company outcomes using essentially a differences-in-differences methodology. Our initial investigation estimates the following equation:

$$y_{ijt} = \eta_j + \lambda_{kt} + \beta \times PostPE_{it} + \gamma' X_{ijt} + \varepsilon_{ijt}, \qquad (1)$$

where i indexes restaurant chain, j indexes specific store within a chain, t indexes time, y_{ijt} is the dependent variable of interest (e.g., number of health inspection violations, employment, menu prices), η_j and λ_{kt} are store fixed effects and zip code by year fixed effects respectively, X_{ijt} are control variables (such as number of seats and employees per store) and ε_{ijt} is an error term. To allow for serial dependence of the error term, we cluster standard errors at the restaurant chain level, rather than at the specific store. The main coefficient of interest is β, the coefficient of $PostPE_{it}$, which is a dummy variable that equals one if a restaurant chain i was acquired by a private equity firm at time t.

If private equity firms merely engage in financial engineering, then private equity buyout may not affect store-level operations. However, in all other cases it might matter. If private equity firms are forced to cut down costs to maintain debt payments, then store-level operations may be adversely affected. Alternatively, private equity firms may engage in operational engineering, for example by improving management practices, changing workers contracts, and bringing new cooking techniques, etc. In these cases, we may expect to see improvements in operational practices following the private equity buyout.

The identification strategy can be illustrated with a simple example. Consider a restaurant chain that was acquired by a private equity firm. To measure the effect of this

treatment on store-level operations, one could simply compare operational practices before and after the acquisition. This difference takes out any time-invariant unobservable characteristics at the level of the store, and is essentially equivalent to the store-level fixed effects outlined in the above specification. Such time-invariant characteristics may include chain-level variables such as cuisine type, segment, brand, logo, cooking technologies, and also store-level characteristics such as location.

However, other events around the private equity acquisition may have also affected the store-level operational practices. For example, customer awareness to hygiene and cleanliness standards have changed due to increased media attention, or state-level inspection standards and enforcement have changed leading to greater emphasis on such operational practices. Therefore, we include a control group that consists of all the restaurants in Florida that have not (yet) been treated. Due to the staggered nature of the private equity buyouts, this implies that restaurants remain in the control group until they are treated (which, for most restaurants, may never be). We compare the changes in operational practices within the treated restaurants with the changes in the control group. This difference-in-difference estimates the effect of private equity buyout on restaurant's operations.

Private equity decisions to acquire a restaurant chain depend on various factors. If such factors are omitted from the specification then relationship between private equity and operational practices may be spurious. We discuss further how our identification strategy can account for such concerns.

A key ingredient to restaurant's success is its location. Suppose the restaurant's area is booming, or local demographics have changed, then the restaurant may decide to change its operational practices accordingly. This may be a concern if such changes are also important factor in the private equity decision to acquire the restaurant in the first place. Put differently,

changes in local area may be important if private equity firms are passive buyers who acquire chains located in areas likely to experience an upward trajectory for which local restaurants adjust. Fortunately, because of our detailed location information, and the availability of such data for all restaurants in Florida, we can control for such local shocks by including a full set of zip code fixed effects interacted with year fixed effects, thus separating out the effects of the private equity buyout from contemporaneous local shocks.[11]

There is an additional possibility of shocks that are specific to the restaurant. Since such shocks do not affect other restaurants in the same area, they cannot be accounted for by the inclusion of zip code by year fixed effects. Moreover, since these are time-varying shocks, they cannot be eliminated with restaurant fixed effects. To explore for such possibility, we focus on the dynamics of operational practices around the private equity buyout. If private equity firms respond to pre-existing shock, then we should find an effect already before the buyout. However, as illustrated in Figure 2, we find no changes in operational practices in the years leading to the private equity buyouts, and the treatment effect increases steadily over five years, becoming statistically significant only two years after the buyout, implying there is no effect either before or immediately after the acquisition.

While the empirical strategy so far can address several important concerns, anticipation of future chain-level shocks may still lead to spurious correlation. An ideal experiment would compare two *identical* stores, one treated with PE ownership and the other without. The prevalence of the franchising model in the restaurant industry allows us to run a close variation of such experiment.

[11] Rather than comparing chain-level outcomes of McDonalds with Burger King, such approach allows us to compare two branches located in the same neighborhood who cater to similar demographics, compete in the same market, and experience similar fluctuations in demand.

B. Comparing Franchisees and Directly Owned Stores

In a franchising arrangement, a parent franchisor sells a business format, typically including a brand name, menus, operating strategies, and design concepts, to a franchisee. In return for an "off-the-shelf" business, the franchisee supplies the capital for the restaurant and pays royalties and fixed fees to the franchisor, typically based on the sales of the franchised outlet. Figure 1 shows two stores in Tampa Florida, one direct owned and one franchised, a few miles apart. The appearance is similar and customers cannot easily detect whether a store is franchised or directly owned.

Importantly, a franchise is a legally independent business not vertically integrated with the parent company and obligations to headquarters are only through contractual agreements. Therefore, despite the similarity in appearance and operations, headquarters have limited ability to influence and force restructuring of franchisees (Kidwell, Nygaard, and Silkoset, 2007; Vroom and Gimeno, 2007), as often times, available control is insufficient to ensure compliance (Shane, 1996). For example, private equity owned Burger King faced numerous lawsuits in 2010 from the Burger King National Franchisees Association (NFA), a group representing a majority of their independent operators in the United States. The franchisees "opposed a company mandate [to] sell a double cheeseburger for $1," "challenged a mandate that they keep their restaurants open late at night," and "haven't upgraded their checkout terminals as quickly as management wanted" (Wall Street Journal, 5/17/10). Such disagreements arise because of externalities. While directly owned stores internalize the benefit of providing high-quality service for customers who may attend other stores within the chain, this is not the case with franchisees.

When acquiring a restaurant chain, PE buyers inherit an existing structure of franchisees, as well as pre-existing contractual agreements, which typically last 10 to 20 years.[12] Such contracts are often written loosely to allow adoption of franchisees to local markets (Bradach, 1997; Sorenson and Sørensen, 2001). Because the franchisees are the residual claimants of their business, they often have discretion over actions not explicitly contracted with the firm. Hence, while franchisees and directly owned stores are essentially "twin" businesses, differences in ownership imply that restructuring efforts by PE acquirers will manifest more strongly in company-owned than in franchised stores where PE acquirers have greater influence. This provides the motivation to estimate the following specification:

$$y_{ijt} = \eta_j + \lambda_{kt} + \beta \times PostPE_{it} + \gamma \times Direct_{ijt} + \delta \times PostPE_{it} \times Direct_{ijt} + \zeta' X_{ijt} + \varepsilon_{ijt}, \quad (2)$$

where i indexes restaurant chains, j indexes specific store within a chain, t indexes time, $Direct_{ijt}$ is a dummy variable equal one if a store is directly owned by headquarters and zero if it is a franchisee. All other variables are defined above. We also cluster standard errors at the level of the restaurant chain to allow error dependence between stores within the same chain. In this specification, the coefficient of interest is δ, which compares the effect of PE buyout on y in directly owned stores relative to franchisees.

Similarly to equation (1), this specification includes store fixed effects, η_j, which capture time-invariant heterogeneity, removing chain-level variation that is common to both

[12] Since franchisees are independent legal entities, their capital structure is separate and thus they do not experience any increases in debt loads following the PE buyout.

directly owned stores and franchisees.[13] Hence, the specification controls for between-chain variation allowing the interpretation of δ as a within-chain estimate. The zip code by year fixed effects, λ_{kt}, allows us to isolate δ from time-varying unobserved local shocks as discussed earlier.

This analysis allows us to compare "twin restaurants", that differ in the level of influence that headquarters and thus private equity firms obtain. While directly owned restaurants are fully treated with private equity ownership, we say that franchisees are only quasi-treated, and differential effect between the two may reveal whether private equity firms affect operational practices.

The advantage of such analysis is that it allows us to deal with the concern that anticipation of future shocks leads to the chain buyout, and therefore generating spurious results. This concern is resolved as long as anticipated future shocks similarly affect both directly owned stores and franchisees. In that case, differences within-chain may reveal the private equity effect. Given that both franchisees and directly owned restaurants share the same logo, menus, food preparation techniques, brand name, advertisements, and are basically indistinguishable by customers, any anticipated shocks are likely to similarly affect both franchisees and directly owned.

Despite the similarities between franchisees and directly owned stores, can it be that private equity buyouts occur because of a shock to only one of the groups? To explore such possibility, we focus again on the dynamics of operational practices around the private equity buyout, but this time, comparing directly owned stores and franchisees. If private equity firms respond to pre-existing shock, then we should find an effect already before the buyout.

[13] Despite the inclusion of store fixed effects $Direct_{ijt}$ dummy variable remains in the estimation as some restaurants change their ownership status over time.

However, as illustrated in Figure 3, we find no differences between franchisees and directly owned stores in the years leading to the private equity buyouts, and the gap between franchisees and directly owned (where private equity firms are more influential) increases steadily and become statistically significant only two years after the transaction.

Finally, franchisee ownership assignment is naturally not random. For this to be a concern, one needs to explain why franchisee assignment may be correlated with post buyout operational practices changes. We discuss this concern in the next section.

C. The Determinants of the Decision to Franchisee vs. Directly Own

Why are certain stores company-owned, and do these same underlying reasons drive operational practices following the private equity buyout? The franchising literature often relies on agency theoretic arguments, specifically, moral hazard models to derive predictions of whether restaurants or retailers may be directly owned or a franchisee (Lafontaine and Slade 2007). One prediction from such models is that franchising is more common when individual store effort matter more, such that compensation may capture effort more closely (see for example Norton 1988). In addition, such models predict that company ownership is more likely when store size and initial setup costs is bigger (e.g., Lafontaine 1992), and daily operations are more complex (e.g., Yeap 2006). As units of *within* a chain are nearly identical along these dimensions, most of these cross-sectional predictions cannot explain why a chain selects to franchise or own a certain store.

Within a chain, costly monitoring may generate variation in the decision of a chain of whether to own or franchise a certain location (Lafontaine and Slade 1996). Some empirical evidence illustrates that locations more distant from headquarters are more likely to be franchisees as monitoring is more difficult (Brickley and Dark 1987, Minkler 1990). If such

regions are for some reason more likely to experience, for example, economic boom, following the private equity buyout, that may be a concern. However, the inclusion of zip code by year fixed effects mitigates such concerns.

Externalities between restaurants within a chain can be beneficial to attract customers to different stores within the same chain. Such externalities are not internalized to individual units, or franchisees. Franchisees may free ride the chain brand name and use lower quality inputs to reduce the costs of the individual franchisee, which may adversely affect the chain brand name (Klein 1995). The problem is that the cost of maintaining quality is private while benefits may accrue to all members of the chain. Such free-riding behavior may be exacerbated in situations where consumers do not impose sufficient discipline in cases of nonrepeating business. In such cases, for example near highway exits, the chain may choose to operate its own stores to mitigate such a problem. While supporting evidence is somewhat mixed (Lafontaine and Slade 2007), we may still be concerned if freeway exits may attract direct ownership, and anticipated local shocks in these regions may trigger the private equity buyout. While zip code by year fixed effects may partially mitigate this concern, we attempt to be even more accurate by controlling for freeway exit locations, as a robustness test, and find not effect on our results.

III. Results

A. Health Inspections and Restaurant Operational Practices

We turn to the relationship between private equity ownership and health violations. We create a variable, *PostPE*, which equals one if an inspection at a particular restaurant occurs after it was acquired by a private equity firm. Panel A of Table IV regresses critical violations on *PostPE*. The sample here consists of all restaurants, not just those purchased by private equity. Hence, the other restaurants in Florida serve as the counterfactual for PE treated

chains. Year fixed effects are included to pick up any changes in violations over time. Column 1a includes chain fixed effects to control for different baseline operational standards to isolate the impact of PE entry. The coefficient on *PostPE* is -0.664 and significant at the 1% level. Given that inspections average approximately 4 critical violations, this is a sizable decline of 15%. Is the effect driven by changes in restaurant workforce? Column 2a includes seats and employees as controls, motivated by Table II. The larger the restaurant, the more critical violations, but the *PostPE* coefficient maintains similar magnitude. This suggests that health-related practices improve following the PE acquisition regardless of changes in restaurant size and number of employees.

Critical health violations at the chain fall when private equity takes over. Two distinct effects could drive this. Individual restaurants could be getting cleaner, or poor performing branches could be closing. To explore within-store changes, columns 3a and 4a replace chain fixed effects with individual store fixed effects. The coefficient on *PostPE* remains the same with slightly lower significance, now at the 5% level, in this stricter test. Thus a given restaurant sees improvement in operational practices.

We introduce an even more precise counterfactual in columns 5a and 6a by replacing year fixed effects with zip code-by-year fixed effects.[14] This specification compares PE treated restaurants to competitors in the same zip code. Restaurants serve different demographics and experience different economic conditions across neighborhoods, possibly leading to different patterns in performance. Even after adjusting for location, critical violations still decline after PE entry.

[14] In practice, it is computationally difficult to estimate a regression that has so many layers of fixed effects. Fortunately, algorithms have recently been developed that can handle such high-dimensional fixed effect regressions. In our analysis, we use the iterative algorithm of Guimaraes and Portugal (2010). See Gormley and Matsa (2013).

Panel B of Table IV replaces critical with non-critical violations. In all six specifications, the effect of private equity management is essentially zero. Non-critical violations have a much smaller effect on health outcomes and, as illustrated in Table III, have a much weaker effect on customer satisfaction and store closures. It is not surprising that improvements appear to be concentrated where violated practices matter more.

Figure 2 shows the path of critical and non-critical violations around private equity takeover. The red bars plot the coefficients of a regression in which critical violations are regressed on private equity entry event year dummies[15]. Violations are flat in the three years before PE entry. Thus there does not appear to be a pre-deal trend. This helps mitigate endogeneity concerns that private equity was simply capitalizing on a trend of improved health and sanitation. The decline in critical violations then occurs steadily over the subsequent four years (becoming statistically significant in year 3 onward). This is consistent with anecdotal evidence on the speed of operational change in restaurants (Gompers, Mugford and Kim 2012). The blue bars plot the evolution of non-critical violations. There appears to be no pattern before or after the PE buyout.

To provide a better understanding of the critical violations that drive the results, Table V breaks these violations down into specific categories. Appendix A provides a list of which violations belong to which category. Improvements are concentrated in practices such as food handling, training, and consumer advising. This has implications for the channel through which PE firms operate. Changes in food handling practices cannot be achieved simply by capital reallocation within the firm. A more likely channel includes knowledge of better

[15] This regression include store fixed effects, zip code by year fixed effects, log number of seats and log number of employees. The regression results are in the Appendix, Table 1A. The average number of critical violations was added to coefficients in the graph to illustrate the relative size of the coefficients.

techniques and more effective training and monitoring of store employees, suggesting PE firms possess operational skill.

B. Operational Practices - Twin Restaurants Analysis

In this section we turn to the "twin restaurant" analysis, comparing franchisees and directly owned stores. For the sake of this test, we are interested in chains that have a mixture of both franchises and directly owned restaurants. Therefore, our sample only includes chains that franchise at least 5% of its units and no more than 95% of its units in Florida.[16] In Table VI we regress critical violations on *PostPE* but now also include the indicator variable *DirectOwn* and the interaction *PostPE * DirectOwn*. We have the licensed owner each year at each address, and thus *DirectOwn* equals one if the storeowner is the same as the ultimate parent. This specification allows extraction of a differential private equity effect on directly owned versus franchised units. We also include store and year fixed effects.

In column 1 the interaction term is negative and significant. The coefficient on *PostPE * DirectOwn* is -0.32, while the coefficient on *PostPE* alone is still negative at -0.22 but is insignificant.[17] Thus the reduction in critical violations is concentrated in directly owned stores. In column 2 we include the number of employees and seats and results are similar, suggesting that improvements at health practices at directly owned restaurants are not driven by changes to the number of employees or number of seats. These improvements in health-related practices cannot be driven by hidden variation in strength of brand, popularity of food genre, or advertising strategy because all branches are identical along these dimensions. In columns 3 and 4 we replace year fixed effects with zip code-by-year fixed effects to address

[16] Results are similar if we use a 10% top/bottom cutoff.
[17] The independent variable *DirectOwn* does not drop out of the regression with store fixed effects because some stores switch between parent and franchise ownership.

concerns regarding franchisee location choice. The results are unchanged. Overall, these results suggest that within the organization, improvements in health and sanitation practices are concentrated in stores in which PE has greater control.

Figure 3 explores the evolution of operational practices of franchisees and directly owned stores around private equity takeover. The red bars plot the coefficients from a regression in which critical violations are regressed on private equity entry event year dummies, focusing on directly owned stores only.[18] Violations are flat in the three years before PE entry, mitigating concerns that private equity was targeting a chain because of an upward trend in its directly owned stores. The decline in critical violations then occurs steadily over the subsequent four years (becoming statistically significant from year 2 onward). In contrast, the blue bars plot the evolution of critical violations of the franchisees around the PE buyout. Similarly to the directly owned stores, no trends exist in the years leading to the buyout. In addition, franchisees as a whole do not seem to improve their operational practices in the years following the buyout, as none of the event year coefficients are statistically different from zero.

As dicussed in section II.C, a restaurant chain does not franchise or directly own stores randomly. There could be a hidden factor which drives both the decision to franchise a particular store and the ease with which it can be improved. We test two stories. First, restaurants farther from headquarters might be more difficult to monitor and hence given to a franchisee who is the residual claimant. This concern is mitigated by the inclusion of zip code (by year) controls. Second, stores located near freeway exits might be more frequently directly-owned, and these locations might be associated with other factors which facilitate operational

[18] This regression is identical to the one reported in column (1) of Table 1A, but the sample is restricted to directly owned stores only. The regression includes store fixed effects, zip code by year fixed effects, log number of seats and log number of employees. The regression results are in column (3) of Table 1A, in the Appendix. The average number of critical violations was added to coefficients in the graph to illustrate the relative size of the coefficients.

change. In appendix Table 2A, we use ArcGis software to identify stores located within 0.5 (0.25) miles of a freeway exit in columns 2 and 3 (4 and 5). We interact *NearExit* with *PostPE* and find this variable insignificant in all regressions while *PostPE * DirectOwn* remains significant.

C. Operational Practices - Spillover Analysis

Are all franchisees equally reluctant to implement changes? We hypothesize that a franchisee that sees the impact of private equity or feels the competitive pressure from a better-managed store will be more likely to improve its own operations. In Table VII, we separate franchised branches into those with and without a same-brand, company owned store in the same zip code. Rather than singling out directly owned stores (as in Table VI), we focus on franchised stores in Table VII. The variable *CloseBy* equals one for a franchised store if a directly owned store of the same chain exists in the same zip code in a given year.

Column 1 shows that franchisees have significantly more critical violations after PE entry than company stores—a mirror image of the result in Table VI. The negative, though insignificant, coefficient on the triple interaction *PostPE * Franchisee * CloseBy* suggests, however, that those franchisees located in the same zip code as directly owned restaurants behave more similarly to PE controlled stores. Columns 2 and 3 only count the post-PE effect one and two years after PE firms actually enter, thus placing greater weight on later years of the deal. Operational practices in franchisees that are *CloseBy* appear to converge to their directly-owned counterparts over time, as this interaction term grows over time both in

terms of magnitude and statistical significance. This suggests that within-chain competitive pressures lead franchisees to adopt the improved practices, but with a lag.[19]

D. Employment

Private equity firms may make operational changes to restaurants along margins besides health-related practices. Their effect on employment is controversial. The popular press often chides private equity for eliminating jobs for debt service and short-term profits, while Davis, et al. (2013) find that private equity transactions result in only modest net impact on employment.

We explore the effect on this stakeholder in Table VIII. The dependent variable is the log of the number of employees at the level of the store. In column 1 we include year fixed effects and explore variation within a store by adding individual store fixed effects. The coefficient on *PostPE* is negative and significant, suggesting that PE firms do appear to operate existing restaurants with fewer employees than before. The magnitude is fairly modest. The coefficient equals -0.028, suggesting a 2.8% decline in a store's workforce. To control for the possibility that PE targets are located in areas that, perhaps due to varying economic conditions, have employment patterns different from other restaurants, we include zip code-by-year fixed effects in column 2. PE restaurants still see a decline in workers when adjusting for geographic variation and local shocks. In columns 3 and 4 of Table VIII we include the *PostPE * DirectOwn* interaction to see if the employment effect is stronger in directly controlled branches. To do so, we restrict the sample to chains that employ franchising for at least 5% of its units and no more than 95% of its units in Florida as in Section B. The interaction is

[19] One may be concerned that the main result is that franchisee restaurants are optimally operated and therefore operational improvements occur at directly owned stores only. This evidence on spillover effects illustrates that this is not the case, as franchisees adopt practices once they are subject to competitive pressures.

essentially zero, meaning both company-owned and franchised outlets see a similar decline in headcount. It is possible that relative to health-related practices, employee counts are more easily contractible and hence easier for the parent to mandate. Franchisees may also be more amenable to suggestions that lower their costs.

E. Menu prices

To continue identifying operational changes at private equity owned restaurants, we turn to pricing. Do the improved operational practices come at the expense of higher prices? Or is cost cutting passed on to the consumer? We gather annual menus from 2005-2012 for 2,178 restaurant chains from Datassential. Datassential draws a representative menu each year from each of these chains. There can be regional differences in pricing; we assume that the randomly drawn menu is representative of the entire chain. Unlike with inspections and employment, our pricing analysis will thus necessarily be at the overall chain level, as individual store pricing is not widely available. The menu data includes the restaurant name, every menu item (e.g., "Hot and sour soup"), its price, and its broad item category ("Soup—appetizer"). Each restaurant is also categorized into one of four segments (Quick service, Casual, Midscale, Fine dining) and one of 24 cuisine types (e.g., Chinese).

For each restaurant-year, we first generate *itemtype_price*, which averages the prices of all items in each broad category. Thus instead of having five soups with different prices, we collapse these into a single average "soup" price for each restaurant, each year. We also again create the variable *PostPE* which equals one for all restaurant-year menus drawn after a private equity firm has acquired the chain. The unit of observation is restaurant's *itemtype_price* each year. In Table IX, column 1, *itemtype_price* is regressed on *PostPE* and chain and year fixed effects. The coefficient is -0.29 and weakly significant. This means, relative to average prices

for all restaurants, the average menu item is 29 cents cheaper in years after PE takeover, reflecting a 4.4% decline in menu prices.

We refine this analysis by using only close competitor pricing as a counterfactual. Holding steak prices constant is actually a relative decline if other steakhouses charge more. We replace year fixed effects with "year × cuisine type × segment × item type" fixed effects. The unit of observation in these regressions is a restaurant's *itemtype_price* each year. For Applebee's "cold sandwich" price in 2005, then, the new fixed effect controls for "cold sandwich" (item type) prices sold by all other American (cuisine type), Casual (segment) restaurants in 2005[20]. The regression in column 2 with these fixed effects shows a coefficient of -31 cents on *PostPE*, still significant at 10%. Thus private equity restaurant prices fall relative to those of their closest competitors. Regressions 3-7 look at pricing changes in specific categories. Entrées, the most expensive menu item, show the largest and most significant declines. Overall, food prices go down following the PE buyout, suggesting that improvements in operational practices and food safety do not translate into higher prices for consumers.

F. Store Closures

So far, the evidence suggests that private equity induces significant operational changes to health practices, workforce, and menu prices. It is natural to wonder whether these changes translate into increased profitability. While we do not observe store-level revenue and profits,

[20] For these fixed effects to provide meaningful comparisons, we drop observations without at least 10 cuisine type × segment × item type competitors. "Italian, Fine Dining, Fried Chicken" data points, for example, would likely be dropped. For consistency, we also apply this cutoff in column 1 of Table IX.

store closures can be used as a proxy for poor financial performance. In this section, we explore how PE buyouts affects store closures.

The store closures analysis is reported in Table X. The dependent variable is a dummy variable indicating the last year in which a store operated.[21] This indicator equals zero each year for stores that remain open throughout the sample period. In column 1 we control for year and store fixed effects as well as number of employees and number of seats in the restaurant. The coefficient on *PostPE* is negative and statistically significant, suggesting that PE firms do reduce closure hazard. The magnitude of the effect is meaningful, as following the PE buyout, closure likelihood drops by almost 4%. Since closure likelihood may vary across regions and demographics, we control for zip-code by year fixed effects in column 2. PE restaurants still show a significant decline in workers when adjusting for local shocks. The magnitude is lower—1.4% reduction in closure likelihood—suggesting geography is an important determinant of closure.

In columns 3 and 4 of Table X, we explore whether both franchisees and directly owned stores experience a reduction in closure likelihood. We include *PostPE * DirectOwn,* and as in previous analysis, restrict the sample to chains that employ franchising for at least 5% of its units and no more than 95% of its units in Florida. The interaction is negative and statistically significant, implying that the decline in closure likelihood is concentrated in directly owned restaurants.

These results are consistent with the earlier finding that improvements in operational practices are concentrated in directly owned stores. Consistent with Jin and Leslie (2003), the results suggest that improvements in health-related operational practices translate into store profitability.

[21] Since our panel data ends in 2012, we cannot detect store closures in that year.

IV. Conclusion

We study the operational consequences of private equity buyouts in the restaurant industry. This industry provides a unique and detailed view of the daily operational practices of firms. We find that restaurants improve operational practices following the PE buyout and commit fewer health violations. These effects are driven by those practices that pose critical hazards for customers and public health and also most correlate with customer satisfaction and restaurant closures.

We illustrate that the effect is causal and not a mere outcome of the initial investment decision of the PE firm. Within the same chain, the effects are strongest in stores over which PE firms have complete control and bigger influence. Franchisees, which are otherwise identical, do not see the same initial improvement, suggesting that PE firms cause these changes. However, franchisees do improve subsequently if they are facing competition from directly owned stores, illustrating spillover effects. We also find that PE-backed restaurants slightly reduce employee headcount at existing stores, lower menu prices, and are less likely to close.

These findings suggest that PE firms take an active role in the firms they acquire and improve operational practices. Improving such practices requires not only capital budgeting, but also, perhaps more importantly, better training, monitoring, and alignment of worker incentives throughout the chain. We interpret this as evidence that private equity firms mitigate agency problem and improve management practices in the organization.

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Figure 1: Franchised vs. directly owned Burger King restaurants – Tampa, Florida



Directly-owned



Franchised

Figure 2: Critical and non-critical violations around private equity deal date.
This figure plots the coefficients and 95% confidence interval bands of regressions of critical and non-critical violations on event year dummy variables around the date private equity acquires a restaurant. Additional control variables are restaurant fixed effects, year fixed effects, number of employees, and number of seats. Standard errors are clustered at the level of the chain. Event year 0 is the omitted variable, corresponding to inspections that occur from 1 to 365 days after the deal close date. The average number of critical and non-critical violations was added to coefficients in the graph.

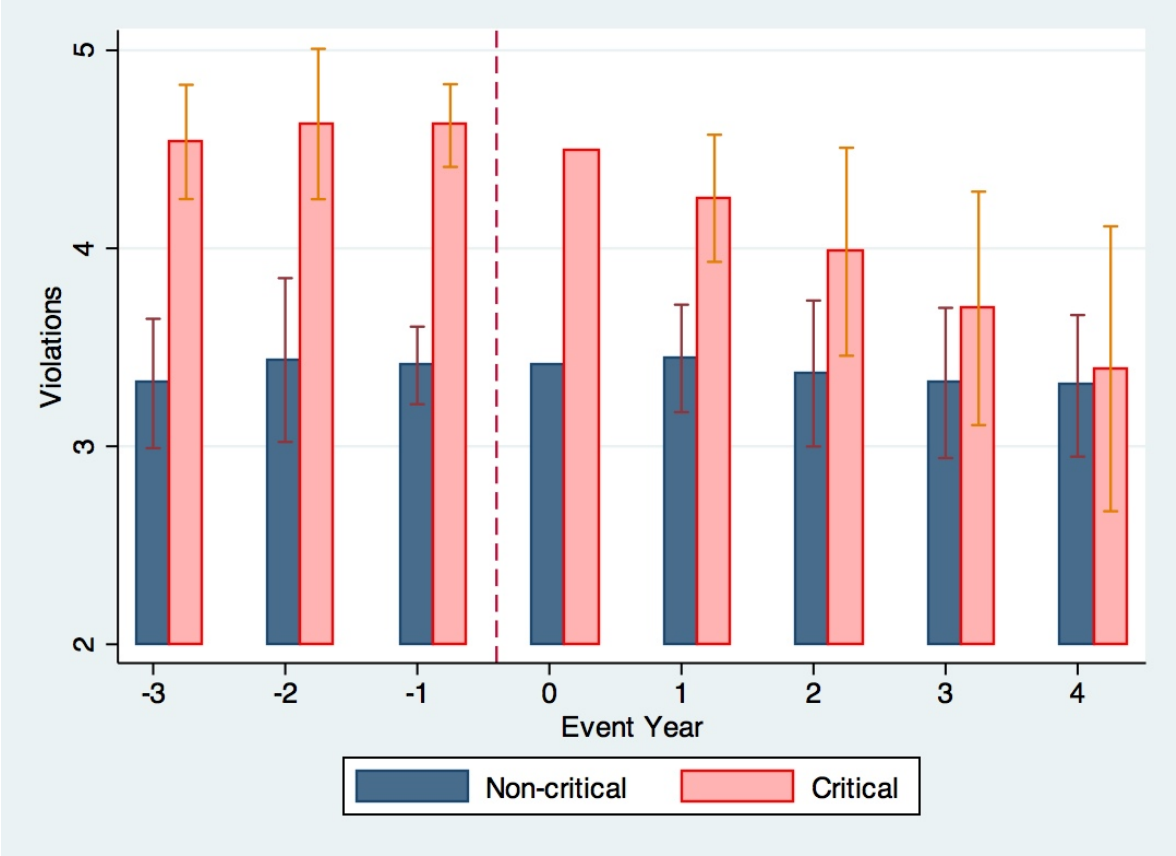


Figure 3: Franchisees and directly-owned restaurants around private equity deal date.
This figure plots the coefficients and 95% confidence interval bands of regressions of critical violations by directly-owned and franchised stores on event year dummy variables around the date private equity acquires a restaurant. Additional control variables are restaurant fixed effects, year fixed effects, number of employees and number of seats. Standard errors are clustered at the level of the chain. Event year 0 is the omitted variable, corresponding to inspections that occur from 1 to 365 days after the deal close date. The average number of critical violations was added to coefficients in the graph.

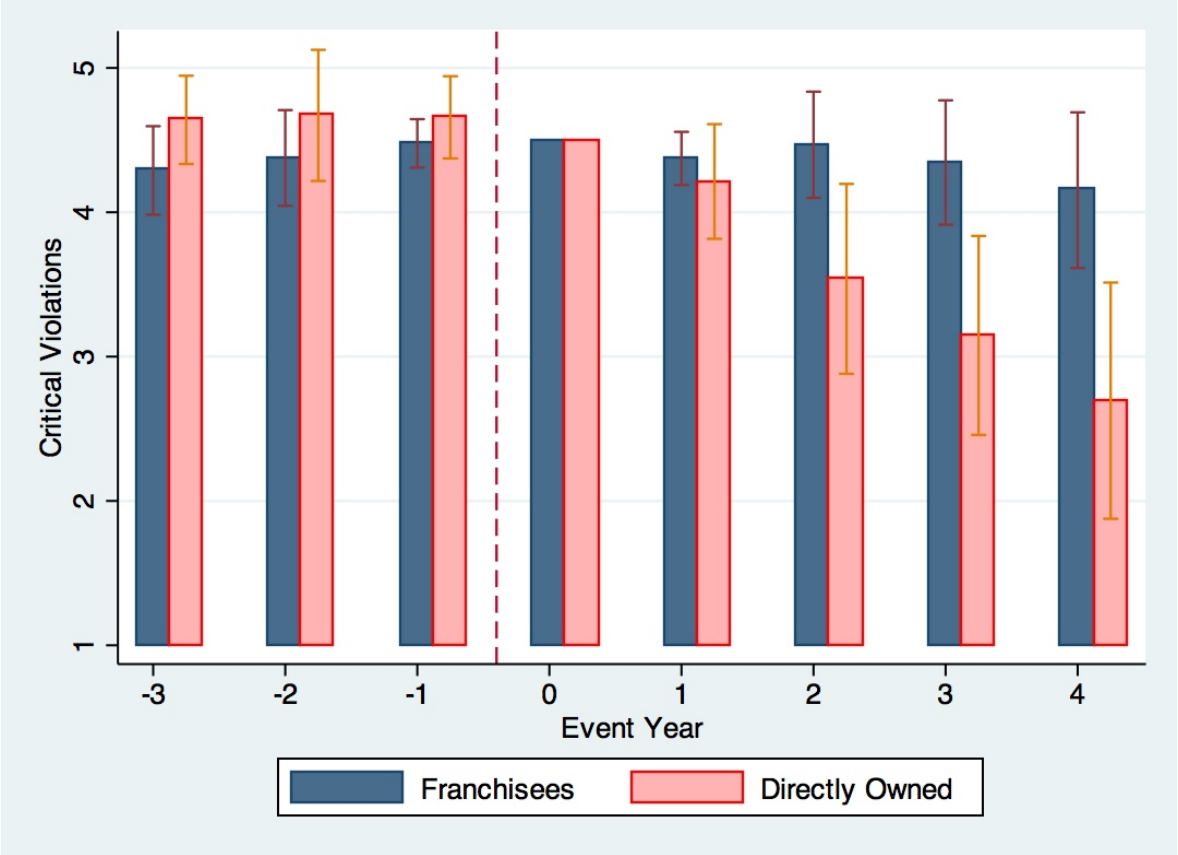


Table I

Inspection Summary Statistics

This table summarizes the Florida restaurant health inspection data. Critical violations are those "likely to directly contribute to food contamination, illness or environmental degradation." Non-critical violations "do not directly relate to foodborne illness risk, but preventive measures are required." Only routine, surprise inspections are counted.

Panel A – Distribution of Inspections Over Time

Year	Inspections Conducted	Restaurants Inspected	Inspections per restaurant	Average critical violations	Average non-critical violations
2002	20,308	15,656	1.30	1.67	2.30
2003	42,959	19,051	2.25	2.17	3.04
2004	35,087	18,901	1.86	2.31	3.60
2005	36,052	19,335	1.86	2.80	4.13
2006	40,224	20,702	1.94	4.85	4.61
2007	40,748	21,026	1.94	6.62	3.93
2008	47,350	21,771	2.17	6.19	3.88
2009	57,537	24,002	2.40	5.34	3.20
2010	63,388	27,228	2.33	5.25	3.19
2011	65,971	27,413	2.41	4.70	2.72
2012	60,329	25,783	2.34	4.56	2.69
Mean	46,359	21,897	2.12	4.49	3.35

Panel B – Restaurant Characteristics

	Ever Treated Stores		Never Treated Stores		Never Treated Stores (at least 5 stores)		All Stores	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std
Violations	7.20	5.29	8.19	6.17	6.91	5.25	8.09	6.08
Critical Violations	3.78	3.21	4.69	4.01	3.80	3.31	4.59	3.94
Non-critical Violations	3.42	2.89	3.50	3.07	3.11	2.71	3.49	3.04
Log Seats	4.16	1.28	3.77	1.51	3.56	1.69	3.81	1.49
Log Employees	3.07	0.84	2.39	1.08	2.83	1.03	2.46	1.07
Chain units (in Florida)	175.27	168.18	109.80	247.52	282.08	331.84	116.62	241.31
Log County income	10.50	0.20	10.53	0.21	10.51	0.20	10.53	0.21
Store-year observations	25,713		221,267		85,529		246,980	
Unique Stores	3,662		46,624		13,202		50,286	
Unique Chains	94		28,997		374		29,091	

Panel C – Distribution across Cuisines (%)

Cuisine	Ever Treated Stores	Never Treated Stores	Never Treated Stores (at least 5 stores)	All Stores
American	18.06	26.84	19.89	25.49
Asian	0.84	10.77	9.95	9.23
Chicken	12.06	6.54	9.01	7.39
Donut, Ice Cream, Beverage	5.12	5.01	5.61	5.02
Hamburgers	33.54	11.37	16.02	14.80
Other Ethnic	6.80	8.55	6.61	8.28
Pizza, Past, and Italian	7.56	13.47	13.51	12.56
Sandwiches, Soups, and Salads	8.79	12.96	15.82	12.31
Steak, Seafood, and Fish	7.23	4.49	3.57	4.91

Panel D – Distribution across Price Categories (%)

Average Restaurant Check	Ever Treated Stores	Never Treated Stores	Never Treated Stores (at least 5 stores)	All Stores
Under $7	51.58	32.15	43.11	35.19
$7 to $10	29.43	26.43	27.67	26.90
$10 to $15	14.92	36.00	26.24	32.70
Over $15	4.08	5.41	2.98	5.20

Table II

Drivers of Restaurant Health and Cleanliness

This table reports general determinants of restaurant health inspection outcomes. Violations are as defined in Table I. *Units in chain* counts the total number of separate stores of that particular restaurant chain in Florida each year. *Median county income* is the median income each year in the restaurant's county. *Seats* and *Employees* are measured at the store level. Standard errors are omitted for cuisine types for brevity. Standard errors are clustered by restaurant chain. *, **, *** indicate significance at 10%, 5%, 1%.

	Critical violations	Critical violations	Non-critical violations	Non-critical violations
	(1)	(2)	(3)	(4)
Log(Units in chain)	-0.238***		-0.112***	
	(0.026)		(0.020)	
Log(Seats)	0.262***	0.195***	0.223***	0.141***
	(0.024)	(0.027)	(0.022)	(0.022)
Log(Employees)	0.065**	0.079***	0.179***	0.096***
	(0.033)	(0.020)	(0.024)	(0.015)
Log(Median county income)	-0.535***	-0.334**	-0.509***	-0.345***
	(0.101)	(0.132)	(0.074)	(0.088)
Average check under $7	-0.632**		-0.232	
	(0.275)		(0.219)	
$7 - $10	-0.394**		-0.095	
	(0.164)		(0.128)	
$10 - $20	0.220*		0.207*	
	(0.132)		(0.120)	
Cuisine type				
American- omitted category				
Asian	1.628***		1.050***	
Chicken	0.032		0.543***	
Donut, ice cream, beverage	-0.542**		-0.530**	
Hamburgers	-0.240		-0.433	
Other ethnic	-0.101		-0.224	
Pizza, pasta, Italian	0.178		-0.136	
Sandwiches, soup, deli	-0.417*		-0.594***	
Steak, seafood	-0.263		-0.038	
Year fixed effects	X	X	X	X
Chain fixed effects		X		X
Observations	345,489	345,489	345,489	345,489
R2	0.20	0.32	0.10	0.21

Table III

Health Violations, Customer Satisfaction, and Store Closure

This table presents results from OLS regressions of customer satisfaction and restaurant closure on restaurant sanitation. In panel A, an observation is a restaurant chain. The dependent variable *Avg Yelp stars* is the average star rating (which can range from 1 to 5) for all reviews given to all branches in a chain in 2012 on the website Yelp.com. The independent variable *Avg critical violations* averages the critical violations for all inspections for all branches in a chain in 2012. The restriction "5 or more reviews" refers to the number of Yelp reviews for the chain in 2012. In panel B, an observation is a store-year. The dependent indicator variable equals one if the store closed in that year. *Annual critical violations* is the average number of such violations in all (typically two) surprise inspections at that store that year. Lagged violations average those the year before the closure year. Standard errors are in parentheses and clustered by restaurant chain in panel B. *, **, *** indicate significance at 10%, 5%, 1%.

	Panel A: Dependent variable = Avg Yelp stars					
	(1a)	(2a)	(3a)	(4a)	(5a)	(6a)
Avg critical violations	-0.0230***	-0.0220***	-0.0219***	-0.0158***	-0.0171***	-0.0160***
	(0.0037)	(0.0039)	(0.0039)	(0.0046)	(0.0048)	(0.0048)
Avg non-critical violations				-0.0180**	-0.0127*	-0.0156**
				(0.0075)	(0.0073)	(0.0075)
Price × Cuisine fixed effects		X	X		X	X
5 or more reviews			X			X
Observations	3,775	3,775	1,908	3,775	3,775	1,908
R2	0.010	0.060	0.119	0.011	0.061	0.121

	Panel B: Dependent variable = Store closure		
	(1b)	(2b)	(3b)
Annual critical violations	0.00068**		0.00088***
	(0.00026)		(0.00029)
Lagged annual critical violations	0.0023***		0.00204***
	(0.00025)		(0.00027)
Annual non-critical violations		-0.00030	-0.00066**
		(0.00029)	(0.00031)
Lagged non-annual critical violations		0.0018***	0.00073**
		(0.00028)	(0.00030)
Log(Seats)	0.0076*	0.0082*	0.0076*
	(0.0042)	(0.0042)	(0.0038)
Log(Employees)	0.0098***	0.0098***	0.0098***
	(0.0014)	(0.0014)	(0.0014)
Year fixed effects	X	X	X
Store fixed effects	X	X	X
Observations	203,006	203,006	203,006
R2	0.54	0.54	0.54

Table IV

Violations under Private Equity Ownership

This table presents results from OLS regressions of restaurant inspection results on private equity ownership and store characteristics. An observation is an inspection on a specific date at a specific store. The dependent variables are defined in Table I. *PostPE* is a dummy variable which equals one if the inspection occurs after the restaurant has been acquired by a private equity firm. *Log(Seats)* and *Log(Employees)* count the number of seats and full-time equivalent employees at the restaurant in the year of the inspection. Zip × Year fixed effects use the zip code of each restaurant. Standard errors are in parentheses and clustered by restaurant chain. *, **, *** indicate significance at 10%, 5%, 1%.

	Panel A: Dependent variable = Critical violations					
	(1a)	(2a)	(3a)	(4a)	(5a)	(6a)
PostPE	-0.664***	-0.648***	-0.630**	-0.626**	-0.614**	-0.612**
	(0.240)	(0.240)	(0.251)	(0.251)	(0.254)	(0.253)
Log(Seats)		0.212***		0.239***		0.178***
		(0.0258)		(0.0503)		(0.0536)
Log(Employees)		0.0674***		-0.0289		-0.0278
		(0.0169)		(0.0188)		(0.0196)
Chain fixed effects	X	X				
Store fixed effects			X	X	X	X
Year fixed effects	X	X	X	X		
Zip × Year fixed effects					X	X
Observations	541,147	541,147	541,147	541,147	541,147	541,147
R2	0.129	0.130	0.135	0.135	0.535	0.535

	Panel B: Dependent variable = Non-Critical violations					
	(1b)	(2b)	(3b)	(4b)	(5b)	(6b)
PostPE	0.0566	0.0696	0.085	0.084	0.0228	0.0233
	(0.140)	(0.141)	(0.157)	(0.156)	(0.150)	(0.150)
Log(Seats)		0.155***		0.0061		0.0374
		(0.0208)		(0.0415)		(0.0366)
Log(Employees)		0.0840***		-0.0073		-0.0028
		(0.0134)		(0.0121)		(0.0119)
Chain fixed effects	X	X				
Store fixed effects			X	X	X	X
Year fixed effects	X	X	X	X		
Zip × Year fixed effects					X	X
Observations	541,147	541,147	541,147	541,147	541,147	541,147
R2	0.034	0.036	0.034	0.034	0.470	0.470

Table V

Restaurant Health Violations by Category

This table presents results from OLS regressions of critical violations in disaggregated categories of restaurant maintenance and sanitation on private equity ownership and store characteristics. An observation is an inspection on a specific date at a specific restaurant address. Appendix A lists the specific critical violations in each category. The independent variables are as defined in Table IV. Standard errors are in parentheses and clustered by restaurant chain. *, **, *** indicate significance at 10%, 5%, 1%.

	Food Handling	Maintenance (Kitchen)	Maintenance (Non-Kitchen)	Training/ Consumer Advisory
	(1)	(2)	(3)	(4)
PostPE	-0.341***	-0.0379*	-0.0660	-0.0101**
	(0.134)	(0.0201)	(0.0607)	(0.0483)
Log(Seats)	0.103***	0.0158	0.0329**	0.0287**
	(0.0332)	(0.0127)	(0.0154)	(0.0129)
Log(Employees)	-0.0087	-0.0014	-0.0102	-0.0113***
	(0.0114)	(0.0046)	(0.0071)	(0.00375)
Store fixed effects	X	X	X	X
Zip × Year fixed effects	X	X	X	X
Observations	541,147	541,147	541,147	541,147

Table VI

Inspection Results in Directly Owned versus Franchised Stores

This table presents results from OLS regressions of critical violations on private equity ownership and store characteristics. An observation is an inspection on a specific date at a specific restaurant address. The independent variable *DirectOwn* is a dummy variable which equals one if the restaurant is owned and operated by its brand's parent company in a given year. *DirectOwn* equals zero if the restaurant is run by an independent franchisee. The remaining variables are as defined in Table IV. Standard errors are in parentheses and clustered by restaurant chain. *, **, *** indicate significance at 10%, 5%, 1%.

	Critical Violations	Critical Violations	Critical Violations	Critical Violations
	(1)	(2)	(3)	(4)
PostPE	-0.222	-0.221	-0.160	-0.159
	(0.306)	(0.306)	(0.266)	(0.266)
PostPE * DirectOwn	-0.315**	-0.316**	-0.317**	-0.319**
	(0.150)	(0.150)	(0.141)	(0.141)
DirectOwn	0.104	0.105	0.110	0.111
	(0.134)	(0.134)	(0.122)	(0.122)
Log(Seats)		0.234***		0.150*
		(0.071)		(0.086)
Log(Employees)		-0.034		-0.023
		(0.025)		(0.025)
Store fixed effects	X	X	X	X
Year fixed effects	X	X		
Zip × Year fixed effects			X	X
Observations	179,286	179, 286	179, 286	179, 286
R2	0.132	0.132	0.519	0.519

Table VII

Spillovers from Directly-Owned Stores to Franchisees

This table presents results from OLS regressions of critical violations on private equity ownership and store characteristics. An observation is an inspection on a specific date at a specific restaurant address. PE entry year of "1 year lag" treats PE entry dates as if they occurred one year later. The independent variable *Franchisee* is a dummy variable which equals one if the restaurant is owned and operated by an independent franchisee in a given year. *Franchisee* equals zero if the restaurant is run by the brand's parent company. *Closeby* is a dummy variable equal to one if a store is franchisee-owned and there exists a company-owned branch of the same chain in the same zip code. All cross-terms are included but not reported for brevity. The remaining variables are as defined in Table IV. Standard errors are in parentheses and clustered by restaurant chain. *, **, *** indicate significance at 10%, 5%, 1%.

	Critical violations	Critical violations	Critical violations
PE entry year	Actual entry	1 year lag	2 year lag
	(1)	(2)	(3)
PostPE	-0.479	-0.701*	-0.924***
	(0.299)	(0.364)	(0.278)
PostPE * Franchisee	0.332**	0.378***	0.484***
	(0.149)	(0.132)	(0.138)
PostPE * Franchisee * CloseBy	-0.250	-0.362*	-0.590***
	(0.232)	(0.197)	(0.212)
Franchisee	-0.119	-0.120	-0.126
	(0.124)	(0.127)	(0.125)
CloseBy	0.247***	0.259***	0.275***
	(0.111)	(0.101)	(0.0927)
Log(Seats)	0.150*	0.154*	0.158**
	(0.0862)	(0.0825)	(0.0790)
Log(Employees)	-0.0226	-0.0219	-0.0165
	(0.0249)	(0.0248)	(0.0247)
Store fixed effects	X	X	X
Zip × Year fixed effects	X	X	X
Observations	179,286	179, 286	179, 286

Table VIII

Restaurant Employment Under Private Equity Ownership

This table presents results from OLS regressions of restaurant employment on private equity ownership. An observation is a store-year. The dependent variable *Employees* is the log of the average number of full-time equivalent employees at a store in a given year. The remaining variables are as defined in Table VI. Standard errors are in parentheses and clustered by restaurant chain. *, **, *** indicate significance at 10%, 5%, 1%.

	Employees	Employees	Employees	Employees
	(1)	(2)	(3)	(4)
PostPE	-0.028**	-0.024**	-0.024**	-0.018*
	(0.013)	(0.012)	(0.012)	(0.011)
PostPE * DirectOwn			0.005	-0.005
			(0.011)	(0.009)
DirectOwn			0.008	0.018*
			(0.010)	(0.011)
Log(Seats)	0.026***	0.033***	0.014*	0.021**
	(0.008)	(0.008)	(0.008)	(0.008)
Store fixed effects	X	X	X	X
Year fixed effects	X		X	
Zip × Year fixed effects		X		X
Observations	246,387	246,387	74,345	74,345

Table IX

Restaurant Prices under Private Equity Ownership

This table presents results from OLS regressions of restaurant menu prices on private equity ownership. An observation is a menu item type at a particular restaurant in a given year. The dependent variable *Item type price* is the average price of all menu items in a food category (e.g., "cold sandwiches") sold by a particular restaurant in a given year. An example of a Year × Cuisine × Segment × Item type fixed effect is "2005, Chinese, Fine dining, dessert." The data comprise menus from 2,178 restaurant chains sampled annually from 2005-2012. Standard errors are in parentheses and clustered by restaurant chain. *, **, *** indicate significance at 10%, 5%, 1%.

Menu items	All	All	Appetizer	Beverage	Dessert	Entrée	Side
	Dependent variable = Item type price						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
PostPE	-0.285*	-0.309*	-0.151	-0.180*	-0.329	-0.457**	-0.0874
	(0.170)	(0.180)	(0.373)	(0.0975)	(0.523)	(0.208)	(0.115)
Chain fixed effects	X	X	X	X	X	X	X
Year fixed effects	X						
Year × Cuisine × Segment × Item type fixed effects		X	X	X	X	X	X
Observations	374,891	374,891	65,281	67,757	32,635	116,190	77,076
R2	0.185	0.497	0.51	0.426	0.523	0.479	0.427

Table X

Store Closure Under Private Equity Ownership

This table presents results from OLS regressions of restaurant closure likelihood on private equity ownership. An observation is a store-year. The dependent variable *Close* is an indicator variable equal to one for store-years which occur in the last year in which a store operates. The remaining variables are as defined in Table VI. Standard errors are in parentheses and clustered by restaurant chain. *, **, *** indicate significance at 10%, 5%, 1%.

	Close	Close	Close	Close
	(1)	(2)	(3)	(4)
PostPE	-0.037***	-0.014	-0.003	0.004
	(0.014)	(0.012)	(0.008)	(0.007)
PostPE * DirectOwn			-0.009*	-0.010**
			(0.005)	(0.005)
DirectOwn			0.008	0.007
			(0.005)	(0.006)
Log(Seats)	0.006*	0.009**	0.007	0.004
	(0.004)	(0.004)	(0.006)	(0.006)
Log(Employees)	0.015***	0.013***	-0.016***	-0.015***
	(0.005)	(0.005)	(0.005)	(0.005)
Store fixed effects	X	X	X	X
Year fixed effects	X		X	
Zip × Year fixed effects		X		X
Observations	246,387	246,387	74,345	74,345
R2	0.044	0.434	0.022	0.407

Appendix

Table 1A

Year-by-year Impact of Private Equity on Violations

This table replaces the variable *PostPE* replaced with event year dummies for the year relative to PE entry. Event year 0, corresponding to inspections that occur from 1 to 365 days after the deal close date, is omitted. The dependent variable in columns (1), (3) and (4) is critical violations, and non-critical violations in column (2). In columns (1) and (2), the sample includes restaurants. In columns (3) and (4) samples consist of directly-owned or franchised restaurants respectively. The coefficients in columns (1) and (2) are plotted in Figure 1, and columns (3) and (4) are plotted in Figure 2. Standard errors are clustered by restaurant chain. *, **, *** indicate significance at 10%, 5%, 1%.

	(1)	(2)	(3)	(4)
Dependent Variable	Critical Violations	Non-critical Violations	Critical Violations	Critical Violations
Sample	All	All	Directly Owned	Franchisees
Year -3	0.0481	-0.093	0.150	-0.198
	(0.175)	(0.199)	(0.186)	(0.186)
Year -2	0.139	0.026	0.181	-0.110
	(0.231)	(0.252)	(0.276)	(0.202)
Year -1	0.131	-0.003	0.168	-0.011
	(0.127)	(0.119)	(0.173)	(0.102)
Year 1	-0.235	0.033	-0.277	-0.113
	(0.195)	(0.165)	(0.241)	(0.112)
Year 2	-0.508	-0.041	-0.951**	-0.023
	(0.319)	(0.224)	(0.400)	(0.224)
Year 3	-0.792**	-0.089	-1.343***	-0.142
	(0.359)	(0.231)	(0.419)	(0.262)
Year 4	-1.100**	-0.103	-1.796***	-0.338
	(0.437)	(0.218)	(0.497)	(0.328)
Log (Seats)	0.162***	0.030	0.149**	0.099
	(0.051)	(0.039)	(0.059)	(0.082)
Log (Employees)	-0.020	0.001	-0.039*	-0.020
	(0.020)	(0.013)	(0.023)	(0.031)
Store fixed effects	X	X	X	X
Zip × Year fixed effects	X	X	X	X
Observations	510,471	510,471	347,386	163,085
R2	0.538	0.475	0.549	0.524

Table 2A

Health Violations at Stores Near Highway Exits

This table presents results from OLS regressions of critical violations on private equity ownership and store characteristics. An observation is an inspection on a specific date at a specific restaurant address. The independent variable *NearExit* is a dummy variable which equals one if the restaurant is within either 0.5 or 0.25 mile of a highway exit. The remaining variables are as defined in Table VI. Standard errors are in parentheses and clustered by restaurant chain. *, **, *** indicate significance at 10%, 5%, 1%.

	(1)	(2)	(3)	(4)	(5)
		"Near" distance			
		0.5 mile	0.5 mile	0.25 mile	0.25 mile
PostPE	-0.171	-0.173	-0.128	-0.172	-0.128
	(0.283)	(0.284)	(0.233)	(0.283)	(0.233)
PostPE * DirectOwn	-0.315**	-0.320**	-0.295**	-0.317**	-0.296**
	(0.132)	(0.133)	(0.129)	(0.132)	(0.128)
DirectOwn	0.0986	0.100	0.089	0.099	0.090
	(0.136)	(0.136)	(0.135)	(0.136)	(0.135)
PostPE * NearExit		0.393	-0.012	0.786	0.167
		(0.313)	(0.279)	(0.630)	(0.616)
NearExit		-0.418	0.178	1.239	1.172
		(1.335)	(0.540)	(3.577)	(2.473)
Log(Seats)	0.278***	0.277***	0.174**	0.278***	0.173**
	(0.081)	(0.081)	(0.085)	(0.081)	(0.085)
Log(Employees)	-0.040*	-0.041*	-0.025	-0.040*	-0.025
	(0.024)	(0.024)	(0.025)	(0.024)	(0.025)
Store fixed effects	X	X	X	X	X
Year fixed effects	X	X		X	
Zip × Year fixed effects			X		X
Observations	164,088	164,088	164,088	164,088	164,088
R2	0.122	0.122	0.526	0.122	0.526

Inspection Violation Descriptions

Critical violations recorded by the Florida Department of Business and Professional Regulation:

- Food obtained from approved source
- Original container: properly labeled, date marking, consumer advisory
- Food out of temperature
- Facilities to maintain product temperature
- Thermometers provided and conspicuously placed
- Potentially hazardous food properly thawed
- Unwrapped or potentially hazardous food not re-served
- Food protection, cross-contamination
- Foods handled with minimum contact
- Personnel with infections restricted
- Hands washed and clean, good hygienic practices, eating/drinking/smoking
- Dishwashing facilities designed, constructed, operated
- Thermometers, gauges, test kits provided
- Sanitizing concentration or temperature
- Food contact surfaces of equipment and utensils clean
- Water source safe, hot and cold under pressure
- Sewage and waste water disposed properly
- Cross-connection, back siphonage, backflow
- Toilet and hand-washing facilities, number, convenient, designed, installed
- Restrooms with self-closing doors, fixtures operate properly, facility clean, supplied with hand-soap, disposable towels or hand drying devices, tissue, covered waste receptacles
- Presence of insects/rodents. Animals prohibited. Outer openings protected from insects, rodent proof
- Toxic items properly stored, labeled and used properly
- Fire extinguishers – proper and sufficient
- Exiting system – adequate, good repair
- Electrical wiring – adequate, good repair
- Gas appliances – properly installed, maintained
- Flammable/combustible materials – properly stored
- Current license properly displayed
- Food management certification valid/Employee training verification

Non-Critical violations recorded by the Florida Department of Business and Professional Regulation:

- In use food dispensing utensils properly stored
- Clean clothes, hair restraints
- Food contact surfaces designed, constructed, maintained, installed, located

- Non-food contact surfaces designed, constructed, maintained, installed, located
- Pre-flushed, scraped, soaked
- Wash, rinse water clean, proper temperature
- Wiping cloths clean, used properly, stored
- Non-food contact surfaces clean
- Storage/handling of clean equipment, utensils
- Single service items properly stored, handled, dispensed
- Single service articles not re-used
- Plumbing installed and maintained
- Containers covered, adequate number, insect and rodent proof, emptied at proper intervals, clean
- Outside storage area clean, enclosure properly constructed
- Floors properly constructed, clean, drained, covered
- Walls, ceilings, and attached equipment, constructed, clean
- Lighting provided as required. Fixtures shielded
- Rooms and equipment - vented as required
- Employee lockers provided and used, clean
- Premises maintained, free of litter, unnecessary articles. Cleaning and maintenance equipment properly stored. Kitchen restricted to authorized personnel
- Complete separation from living/sleeping area, laundry
- Clean and soiled linen segregated and properly stored
- Other conditions sanitary and safe operation
- False/misleading statements published or advertised relating to food/beverage
- Florida Clean Indoor Air Act
- Automatic gratuity notice
- Copy of chapter 509, Florida statutes, available
- Hospitality education program information provided
- Smoke free

We subdivide critical violations into categories for use in Table V:

Food Handling

- Approved source
- Food Out of Temperature
- Potentially hazardous food properly thawed
- Unwrapped or potentially hazardous food not re-served
- Food protection, cross-contamination
- Foods handled with minimum contact
- Personnel with infections restricted
- Hands washed and clean, good hygienic practices, eating/drinking/smoking
- Sanitizing concentration or temperature
- Food contact surfaces of equipment and utensils clean
- Toxic items properly stored, labeled and used properly

Kitchen Equipment Maintenance

- Facilities to maintain product temperature
- Thermometers provided and conspicuously placed
- Dishwashing facilities designed, constructed, operated
- Thermometers, gauges, test kits provided
- Fire extinguishers – proper and sufficient
- Gas appliances – properly installed, maintained

Restaurant Maintenance (non-kitchen)

- Sewage and wastewater disposed properly
- Toilet and hand-washing facilities, number, convenient, designed, installed
- Presence of insects/rodents. Animals prohibited. Outer openings protected from insects, rodent proof
- Restrooms with self-closing doors, fixtures operate properly, facility clean, supplied with hand-soap, disposable towels or hand drying devices, tissue, covered waste receptacles
- Cross-connection, back siphonage, backflow
- Water source safe, hot and cold under pressure
- Exiting system – adequate, good repair
- Electrical wiring – adequate, good repair
- Flammable/combustible materials – properly stored

Training/Certification/Consumer Advisory

- Current license properly displayed
- Original container: properly labeled, date marking, consumer advisory
- Food management certification valid / Employee training verification