Incomplete Disclosure: Insights from Maricopa

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Preliminary, Comments Welcome

Abstract

According to the unraveling theory, all firms have an incentive to voluntarily disclose their product quality if disclosure is costless and truthful (via a third-party verification agency). However, voluntary disclosure is hardly complete in the real world. What can be done to foster voluntary disclosure if mandatory disclosure is not available?

To address this question we study restaurant hygiene disclosure in Maricopa, Arizona. Starting in October of 2011, Maricopa County adopted an A-B-C-D system of hygiene grade cards while also allowing each restaurant to choose whether to post its letter grade online and offline. Regardless of the disclosure choice, detailed hygiene inspection reports (with our without the associated letter grade) have been available online since 2007 and remain so. Using individual inspection records we show that only 57.6% of Maricopa inspections led to online letter grade posting after the grade card policy and this percentage declined slightly over time. While restaurant cleanliness is an important predictor of disclosure, 48% of the non-disclosing restaurants would have posted an A grade if they had chosen to disclose. Clearly, underlying quality is not the only determinant of disclosure.

We present evidence indicating that disclosure decisions depend on the extent to which a restaurant or its close neighbors have been inspected soon after the regulation. Specifically, restaurants that were inspected sooner after the policy implementation date were more likely to disclose. If we define "first batch" as the earliest 10% inspections conducted right after the regulation, not only were the first-batch restaurants more likely to disclose than non-first-batch restaurants, in addition, restaurants that are geographically near to first-batch restaurants are more likely to also disclose. These findings suggest that unraveling will not come automatically as the theory predicts, and that policy makers may boost voluntary disclosure by increasing inspection intensity shortly after a disclosure regulation is introduced.

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1. Introduction

According to the unraveling theory, all firms have incentives to voluntarily disclose their product quality if disclosure is costless and truthful via a third-party verification agency (Milgrom 1981, Grossman 1981, Jovanovic 1982). This is because the incentive to disclose is driven by consumers holding a pessimistic belief that any non-disclosing firm must have the worst quality. Assuming consumers are willing to pay for higher quality and there is no cost to disclose, this pessimistic belief alone will motivate all but the worst type of firms to disclose, in both monopoly and competitive markets.

While the unraveling prediction has found support in the lab (Forsythe, Isaac, and Palfrey 1989; Forsythe, Lundholm, and Rietz 1999), it is hardly consistent with the real world. Prior to the 1990 Nutrition Labeling and Education Act, many low-fat salad dressings had a nutrition label but most of the higher fat dressings did not provide a label, and there were large fat content variations among the non-disclosing ones (Mathios 2000). Similar incompleteness occurs in the disclosure of SUV roll over risk, financial information of public companies, hazardous substances in the workplace, toxic pollution, medical mistakes, and many other markets (Fung et al. 2010). Typically, disclosure is not complete until the government mandates, or threatens to mandate, disclosure.

Theorists attribute incomplete disclosure to assumptions underlying the classical unraveling theory – for example, disclosure may not be costless (Jovanovic 1982, consumers may not understand the disclosed information (Fishman and Hagerty 2003), firms may not know the truth (Matthews and Postlewaite 1985), and strategic concerns may hinder disclosure in an oligopoly setting (Board 2009). A more comprehensive list of these theories can be found in the review paper of Dranove and Jin (2010). These

theories, as well as empirical research, often focus on the necessity of mandatory disclosure rather than practical tools to improve the degree of voluntary disclosure. In this research we explore the potential for enhancing voluntary disclosure, as an alternative to mandatory disclosure.

Specifically, we study the voluntary disclosure policies for restaurant hygiene in Maricopa County of Arizona. Every restaurant in Maricopa is subject to unannounced routine food safety inspections twice per year. In October 2011, Maricopa adopted an ABCD grading system. Under this new system an inspector arrives for an unscheduled inspection and asks the restaurant manager whether she would like to receive a letter grade and allow the letter grade to be posted online after the inspection. If the answer is yes, the inspector will conduct the inspection, assign a letter grade according to the inspection outcome, and give the restaurant a physical report card with the letter grade. Whether, when and where to post the physical grade card is up to the restaurant, but because the restaurant has opted in, the letter grade will be posted on the county's restaurant inspection website, along with detailed violations found in that inspection.

Importantly, the detailed inspection results are available on the county website both before and after the adoption of restaurant hygiene grade cards. What is new in the regulation is that the county database displays a letter grade next to the detailed inspection results if the restaurant opts in. In short, posting grade cards online and offline is voluntary, but the public can observe all the detailed inspection results regardless of the restaurant's disclosure decision. This provides a unique opportunity to study voluntary disclosure in an environment close to what the unraveling theory has assumed.

In contrast to the unraveling theory, only 57.6% of restaurants in Maricopa chose

to disclose by March 2013, and this percentage declined slightly during the first 18 months after the grade card policy. As we expect, cleaner restaurants are more likely to disclose, especially if nearby competitors are disclosed to have grades below A. Nevertheless, 48% of non-disclosure restaurants would have obtained an A grade if they had chosen to disclose. This suggests that underlying quality is not the only determinant of disclosure.

We also show that policy makers can influence the degree of voluntary disclosure by selecting when and where to conduct inspections soon after the grade card policy. In particular, restaurants that were inspected sooner after the policy implementation date are more likely to disclose. If we define "first batch" as the earliest 10% inspections conducted right after the regulation, the first-batch restaurants were not only more likely to disclose themselves but also motivated nearby non-first-batch restaurants to disclose. Further decomposing these spillover effects, we find that the greater the number of first-batch restaurants in the neighborhood, the higher the probability of disclosure for non-first-batch restaurants (while the relative cleanliness of these first-batch restaurants does not have a significant impact). Overall, these findings suggest that unraveling will not come automatically as the theory predicts, but policy makers can foster voluntary disclosure by increasing inspection intensity right after a disclosure regulation.

The rest of the paper is organized as follows. Section 2 describes the background and data. Section 3 discusses why the timing and location of initial inspections after the grade card policy may matter for disclosure decision. Section 4 presents evidence on the determinants of disclosure decision, with emphasis on the role of first-batch inspections. Section 5 discusses the economic and policy implications of our findings.

2. Background and Data

This section describes the background of the grade card policy, the data we use, and the inspection scheme we observe in the data.

2.1 Grade card policy

Maricopa started to post detailed hygiene inspection records on the county's official website in 2007. This process does not involve any decision of individual restaurants: records of all routine and follow-up inspections are posted for all restaurants.

On top of that, a voluntary ABCD grading system was introduced on Oct 14, 2011. Before October 2011, Maricopa followed a star-grading system in which restaurants with the top 10[1] percent best hygiene condition were awarded gold stars, the next 10 percent were awarded silver stars, and the other restaurants received no star. The gold/silver star system gave out a physical card with stars if a restaurant was qualified and the restaurant owner/employee may choose to post it anywhere in the restaurant.[2]

Three changes occurred when the county switched to the ABCD system. First, the ABCD system covers all restaurants, not just the top 20 percent. Second, restaurants are given a choice of posting grade card *online and offline*. Third, the classification of violations has changed when the county upgraded its database system in July 2011. In particular, inspections before the upgrade organized violations in two categories, namely risk factors and good retail practice, following the FDA guideline of food code. This classification remains after the database upgrade, but inspections after the upgrade also

[1] We could not find any official documents on the exact percent of restaurants eligible for gold and silver stars. The reported percentages are based on our conversation with an inspector in Maricopa.
[2] It is possible that gold and silver stars were reflected in the online database before the ABCD system. However, because the Maricopa website have changed to a new database system in July 2011, we cannot observe online whether a restaurant had a gold or silver star in its historical records.

classify violations into Priority (P), Priority Foundation (PF) and Core (C), where P items refer to items that have a quantifiable measure to control hazards in cooking, reheating, cooling, and handwashing, PF items support, facilitate or enable one or more P items[3], and C items are anything not designated as P or PF.[4]

Figure 1 displays the Maricopa definition of A, B, C, and D according to the reported P, PF and C violations. Figure 2 shows several screen shots of online records after Maricopa adopted the grade card policy. If one clicks on a restaurant's name, she can see every inspection for that restaurant since July 2007. An inspection can be routine or follow-ups: routine inspections are unscheduled while follow-ups often focus on whether the restaurant has corrected the violations found in the last routine inspection. The choice of disclosure is only relevant for routine inspections. If the restaurant chooses to disclose the grade corresponding to a routine inspection, the letter grade is shown next to the inspection date and inspection purpose. If the restaurant chooses not to disclose, the record reports "non-participating" in the place of letter grade. This way non-disclosure is highlighted and therefore distinguishable from not having a choice of disclosure. Regardless of the letter grade, a click on one inspection record leads to detailed violations found in that inspection. If the inspection is conducted after the grade card policy, each violation is labeled "P", "PF", or "C" in the middle of a large block of violation description (without any highlights).

[3] PF include items that require the purposeful incorporation of specific actions, equipment or procedures by industry management to attain control of risk factors that contribute to foodborne illness or injury such as personnel training, infrastructure or necessary equipment, HACCP plans, documentation or record keeping, and labeling.

[4] C items are usually related to general sanitation, operational controls, sanitation, standard operating procedures, facilities or structures, equipment design, or general maintenance.

Because disclosing restaurants have the choice of whether to post the letter grade offline, we sent a research assistant to check out a random neighborhood in Maricopa. Figure 3 presents an example of physical posting in this neighborhood. Among 26 restaurants that we checked, 5 did not participate in any disclosure (and therefore labeled "non-participating" in the online database), 14 participated in online disclosure but did not post the letter grade inside the restaurant, and the other 7 disclosed both online and office. All the offline disclosing restaurants had an A grade. Six of the 14 online-only disclosing restaurants had a B or C grade, while the remaining 8 in this group had an A grade. This neighborhood is clearly not representative of the whole Maricopa County, but it highlights the facts that restaurants have discretion in both online and offline postings, and their disclosure decision clearly depends on factors beyond the underlying hygiene quality. Given the difficulty of observing offline posting status for every restaurant, our empirical analysis of disclosure focuses on the decision of online posting only.

The new grade system of Maricopa has received mixed reaction in the mass media. On the one hand, the letter grade system is more salient to consumers than the previous star system, although it is still difficult for consumers to infer the grade of non-disclosure restaurants; on the other hand, critics have expressed concerns that the county's intention to maintain a friendly relationship with the industry may encourage dirty restaurants to opt out posting and have little effect in reducing the public health risk of foodborne illnesses.[5]

[5] Lauren Gilger "Maricopa County's Restaurant Inspection Process Goes from Being Easy on Restaurants – to Being Even Easier", Phoenix New Times, October 17th, 2011, accessed at: http://blogs.phoenixnewtimes.com/bella/2011/10/maricopa_county_implements_vol.php" on December 10, 2012.

2.2. Data

Our main dataset comes from the public website of the Maricopa county government. It contains inspection results from 23,863 food installations from July 2007 to March 2013. For each inspection, we know the date of inspection, type of inspection (routine, follow-up, etc), description of each violation from the Food Code, and letter grade or a label of non-participating after the grade card policy. Because disclosure is only relevant for routine inspections, we exclude all follow-up inspections. In total, there are 215,203 inspection records in our analysis sample, of which 148,443 were before the grade card policy, 38,459 have participated in online disclosure after grade card, and the remaining 28,301 inspections chose "non-participating" in disclosure.

In Figure 2, we show one inspection record of B grade as of August 8, 2013 on the right hand side, and an earlier inspection record of the same restaurant on February 16, 2010 at the bottom of the page. Both records have violation #14 corresponding to the cleanliness of food-contact surface. However, the textual explanation of this violation is slightly different and the letter "P" is only added after grade card. We can predict the letter grade for both disclosing and non-disclosing restaurants after grade card, but it is difficult to do so for pre-grade-card records. This is because the violations reported in pre-grade-card inspections do not contain the label of "P", "PF" and "C". Moreover, each violation code may include multiple items in the county's food code and there is no guarantee that items under the same violation code are always classified in the same P, PF or C category. In theory, we can use text matching to create a correspondence between pre- and post-grade-card violation codes and then define grades before grade

card, but we believe the outcome is likely noisy as Maricopa had revised its food code when it adopted grade card.

Given this limitation, we resort to compare number of risk factor violations, number of good hygiene practice violations, and total number of violations before and after the grade card. Figure 4 shows that the total violations per inspection dropped from 1.5~2 before grade card to roughly 1 after grade card. It is unclear whether the drop is attributable to food code change, grade card policy, or both. Conditional on periods after grade card, total violations clearly vary by disclosure status. By definition, grade A has fewer violations than grade B, and grade B has fewer violations than grades C or D. More interesting is that non-disclosing inspections are on average better than any grade except for grade A. This implies that there must be some A restaurants choosing non-disclosure. In fact, as shown in Figure 5, no more than 75% of A restaurants choose to disclose, and this percentage drops below 70% over time. In comparison, the disclosure rate of B restaurants is around 50%, and the disclosure rate of C/D restaurants is never above 40% and drops gradually to below 30% at the end of our sample. These patterns are in a sharp contrast to the unraveling theory.

Table 1 provides a more detailed data summary. In addition to reporting the number of total violations per inspection before grade cards, we report A,B,C,D restaurants after grade card separately, and by the restaurant's disclosure status. Sixty-nine percent of disclosing restaurants are A, followed by 26% in B, 4% in C and 1% in D. In contrast, the grade distribution of non-disclosing restaurants has significantly fewer As (48%), and more B/C/Ds (36%, 9% and 6% respectively). On average, restaurants of worse (disclosed or imputed) grades have more violations.

This remains true if we decompose total violations into the total number of risk factor violations and the total number of good retail practice violations. As detailed above, the distinction of risk factor and good retail practice violations always exists in the database. Conditional on inspection records after the grade card policy, Table 2 correlates the count of P, PF and C violations to the count of risk factor and good retail practice violations within each inspection. Apparently, P and PF items are closely related to risk factor violations, while C items are closely related to good retail practice violations. Because P, PF and C are only available after grade card, our comparison before and after the grade card policy will focus on the count of risk factor violations, good retail practice violations and all violations.

2.3 Inspection scheme

In Maricopa, restaurants typically receive 2 routine inspections every year. Because routine inspections are unscheduled and meant to be a surprise visit to the inspected restaurants, the Maricopa county health department has the authority to determine when and where to conduct routine inspections in a particular day.

As shown in the first column of Table 3, the average time interval between two adjacent routine inspections on the same restaurant is 178 days before grade card and 182 days after grade card. Their similarity suggests that Maricopa does not change their inspection frequency permanently because of the grade card policy. That being said, conditional on the same restaurant, the average time interval from the last inspection before grade card to the first inspection after grade card is longer (289 days), probably

because the Maricopa county department had to devote some labor to database upgrade and employee training before it adopted grade card.

To further examine what factors affect inspection frequency, we take each routine inspection as an observation and regress the number of days since the last inspection on the number of violations detected in the last inspection. This regression is run separately for the inspection intervals before, during and after grade card. Across the three columns of Table 4, we add restaurant establishment types and chain status in Column 2. Before adding these controls, Column 1 shows that Maricopa tends to inspect dirtier restaurants more frequently, such targeting is more sensitive to risk factor violations than to good retail practice violations, and these patterns are similar before during and after grade card. Adding restaurant attributes improves the R-squared from 0.06 to 0.1. The calendar timing of inspection is also geographically clustered. For each of the 32 census tracts that have more than 50 restaurants with records both before and after grade card, Figure 6 plots the interquartile range of the timing of the first inspection after grade card, where timing is defined by the number of calendar months since October 14, 2011. This figure shows significant variations in the median inspection timing across census tracts. Moreover, within each census tract, more than 50% of restaurants were inspected at least 2 months apart, leaving room for some restaurants to observe the disclosure decision of other same-tract restaurants before their own turns.

3. Potential effects of initial inspections on disclosure

Assuming how Maricopa conducts routine inspections is out of the control of any individual restaurant, the natural variations in who received the initial set of routine

inspections right after the grade card regulation will help us identify the effect of initial inspections on disclosure decision.

One may argue that who received the initial round of inspections and when should have no impact on consumers and nearby restaurants, because the public can always go to the county website to check out the latest inspection results for every restaurant in Maricopa. The unraveling theory is built upon consumer's extreme pessimistic belief of non-disclosing product quality; this alone should push every restaurant to disclose regardless of when the inspectors come in after grade card. However, as documented in Section 2, the detailed inspection records are not easy to translate into letter grade because a consumer must know click into the database enough to see detailed inspection records, must know the difference of P, PF, and C violations, must identify which violation belongs to which type, must add up the number of reported P, PF and C violations in a specific inspection, and must compare them with the grade definition. All these require non-trivial knowledge of the institution and time to navigate the website.

To the extent that consumers do not fully understand the information posted on the county website and do not automatically assume non-disclosing restaurants are of the worst quality, the timing and location of initial inspections may have two effects on consumer belief: first, the disclosure decision of early-inspected restaurants may remind consumers that the disclosure regulation is now in effect and restaurants have a choice to participate in voluntary disclosure. Because the only media coverage we can find on the grade card policy was concentrated in the first few days after the policy change (October 14-18, 2011), we expect the reminder effect of the first batch disclosures is important for consumers to be aware of the grade card policy weeks and months after the policy

adoption. Second, the disclosed grades of earlier-inspected restaurants will help to define consumer belief as to what hygiene condition to expect in non-disclosing restaurants. If the earlier-inspected restaurants only disclose A grades, consumers may believe in a possibility that a non-disclosing restaurant is of B quality. If there are both A and B grades, the belief on non-disclosing restaurants may be strictly lower than B. From the consumer's point of view, an alternative explanation for the lack of grade card in a restaurant is that the restaurant has not received any inspection after the grade card policy. However, the non-disclosing restaurants are clearly identified in the online database, although consumers may not pay close attention to it. Given the geographical clustering of inspection timing, the more grade cards there are in a neighborhood, the less convincing is the excuse of "no inspection yet." This will further reduce consumer expectation of hygiene quality in a restaurant without grade card.

While all disclosure theories emphasize the role of consumer belief in a firm's disclosure decision, initial inspections may affect restaurant owners or employees directly. For example, restaurant owners may take pride in having an A grade or beating nearby restaurants in the disclosed letter grade even if consumers do not care.

No matter whether disclosure is driven by consumer belief or restaurant pride, the above arguments suggest that we may observe disclosure decision to be correlated with the timing and location of initial inspections in a couple of ways.

First, if a restaurant was inspected early after grade card, it may face more intense consumer/peer scrutiny than the later inspected restaurants. The increased attention may motivate earlier-inspected restaurants to disclose, assuming more attention implies more doubt and more pessimistic belief on the hygiene quality of non-disclosing restaurants.

Conversely, the public may have started with a relative optimistic belief of non-disclosing quality but become more pessimistic over time. If so, we may observe earlier-inspected restaurants less likely to disclose at their first inspection after grade card, but as time goes by, the pessimistic belief kicks in and eliminates the disclosure difference between earlier and later-inspected restaurants.

Second, where the earlier-inspected restaurants are and whether they disclose upon initial inspections could affect the disclosure decision of later-inspected restaurants. Assuming consumers or restaurant owners tend to compare across restaurants, the spillover can be positive if the earlier disclosures remind the public to cast doubt on non-disclosing restaurants. Alternatively, the spillover can be negative if the first-batch disclosures are rarer than expected, hardly observable, concentrated on A grades, and led the public to ignore the grade card policy. Either way, the spillover effect of earlier inspections may depend on geography. For a market where the public tends to compare nearby restaurants more intensely, we would expect the spillover effect to be stronger for restaurants that compete with the earlier-inspected restaurants in the same neighborhood. If the comparison is online only and consumers are willing to travel far for a clean restaurant, geography may not matter.

In summary, given the failure of unraveling in Maricopa, we can test (1) whether earlier-inspected restaurants are more likely to disclose than later-inspected restaurants, and (2) whether the earlier-inspected restaurants have a spillover effect on later-inspected restaurants, and if the answer is yes, whether the spillover is sensitive to the distance between earlier- and later-inspected restaurants.

4. Empirical Evidence

We start this section by looking for empirical factors that can explain variations in the disclosure decision. This first look aims for statistical correlations rather than causal effects. We then relate to disclosure decision to the timing and location of initial inspections after grade card.

4.1 First look at the determinants of disclosure

For restaurant i in a geographic area k at the time of inspection t subject to a binary disclosure decision (D_{ikt}), we consider two groups of variables: the first group focuses on a restaurant's own characteristics, ranging from the number of risk factor and good retail practice violations found in that inspection (q_{it}, r_{it}), the restaurant's historical hygiene records ($q_{i,t'<t}, r_{i,t'<t}$), and the other observable attributes of a restaurant such as establishment type, chain status, location, etc (X_i). Our second group of variables emphasizes a restaurant's nearby environment, including the average household demographics in the restaurant's neighborhood, the number of nearby restaurants (N_{ik}), and the disclosure decision as well as the disclosed grades of nearby restaurants before the study restaurant makes its own disclosure decision ($D_{-ik,t'<t}, G_{-ik,t'<t}$). Some of the above variables do not vary over time and will be absorbed in zipcode, census tract or restaurant fixed effects (α_k, α_i). To summarize, the specification is:

$$D_{ikt} = \begin{Bmatrix} q_{it} \\ r_{it} \end{Bmatrix} \cdot \beta_1 + \begin{Bmatrix} q_{i,t'<t} \\ r_{i,t'<t} \end{Bmatrix} \cdot \beta_2 + D_{-ik,t'<t} \cdot \gamma_1 + G_{-ik,t'<t} \cdot \gamma_2$$

$$+\alpha_k (+\alpha_i) + X_i \cdot \theta + \varepsilon_{ikt}.$$

Table 5 reports progressive results of linear probability estimation. We use linear probability instead of discrete choice models because we want to compare results with

and without restaurant fixed effects. Column 1 includes census tract fixed effects along with a restaurant's current and past violations (in risk factor and good retail practice separately). Column 2 adds restaurant attributes and restaurant fixed effects. Because a restaurant's historical violations are closely correlated with restaurant fixed effects, we do not include them in Column 2. Results in both columns 1 and 2 confirm the expectation that restaurants with fewer violations are more likely to disclose. In one alternative version of Column 1, we include a variable that measures the variability of a restaurant's historical inspection outcomes on the right hand side. It allows for the possibility that a restaurant with variable hygiene quality may prefer not to disclose when it has high quality, in order to avoid the necessity of disclosure (or the trouble to explain non-disclosure) when it has low quality (Grubb 2011). This variable is found to be insignificant from zero. To save space, we do not report this specification in Table 5.

Column 3 controls for the competitive environment in the same census tract, including the disclosure rate of competing restaurants in the same tract and the ratio of grade B and C/D respectively in the disclosed grade distribution before the study restaurant makes its own disclosure decision.[6] Column 4 redefines competitors by restaurants within one mile from the study restaurant. Both Columns 3 and 4 suggest that, after controlling for one's own cleanliness and characteristics, the disclosure decision is dependent on what nearby restaurants have done: the more the nearby restaurants disclose, the more likely I will disclose. In comparison, the disclosed quality distribution of nearby restaurants has a mixed correlation with one's own disclosure decision when

[6] Because the ratios of grade A, B, C/D in the disclosed distribution add up to one, so the ratio of grade A is dropped due to collinearity.

we define nearby restaurants by census tract (Column 3) and the correlation becomes insignificant when nearby restaurants are defined by one-mile distance.

Of course, none of the clustering patterns can be interpreted causal. There could be unobserved and time-varying factors that affect all restaurants in a census tract, and/or strategic behavior among competing restaurants. Unlike research on peer effects, the goal of this paper is not to identify the causal effect of one restaurant's disclosure on another restaurant. Rather, we are interested in the actions that local policy makers undertake in a neighborhood and whether these actions could be a common factor that influences the clustering pattern of disclosure. This motivates us to focus on the timing and location of initial inspections.

4.2 Results on initial inspections after grade card

To examine the influence of the timing and location of initial inspections after grade card, Table 6 first repeats the first column of Table 5 and then adds two new variables: one is the timing of the first inspection that the study restaurant received after the grade card policy, measured by months since October 14, 2011. We try this variable in linear, quadratic and higher order of polynomials. We find that the quadratic order of the timing variable is not statistically significant and therefore only report the linear version in Column 2. In Column 3, we define a dummy variable of "first-batch" if a restaurant received its first inspection after grade card no later than January 11, 2012. The first-batch inspections account for the first 10% of all inspections conducted after grade card. This column confirms the first column results that receiving an earlier inspection after grade card may motivate a restaurant to disclose.

Will earlier inspections have a spillover effect on later-inspected restaurants? To answer this question, we use the disclosure status of the first batch restaurants by January 11, 2012 as the initial condition and examine its impact on nearby non-first-batch restaurants. First batch restaurants can help us define initial conditions for several reasons: first, restaurants may have changed their hygiene quality after grade card, and given the importance of historical cleanliness in inspection timing, these changes in hygiene quality may have motivated the county to alter its arrangement of inspections after the first batch. This concern is minimized in the first batch as the most recent inspections before the first batch were before grade card by definition and it is reasonable to assume that both hygiene quality and inspection timing before grade card were predetermined when Maricopa adopted the grade card. For robustness, we have also altered the definition of first batch from 10% to 7.5% and 12.5% of the earliest inspection records post grade card and found similar results. The second reason for using the first batch as an initial condition is that media coverage on grade card was concentrated in the beginning week of the grade card policy and this window is too short for us to identify any direct effect of the media coverage. By the time when a non-first-batch restaurant makes its disclosure decision, consumer belief is probably more related to the disclosure outcome of first-batch restaurants than to media coverage.

The second and third columns of Table 3 compare first-batch and non-first-batch restaurants. Roughly one-third of restaurants received their first post-grade-card inspection in the first-batch, and about 13% of restaurants belong to a chain regardless of their first-batch status. Moreover, first batch restaurants had more violations in their historical records before the grade card policy, and because of that, they were inspected

more frequently both before and after grade card. This is not surprising given the facts that Maricopa always targets dirty restaurants with more frequent inspections and we define the first batch by a fixed cutoff date (January 11, 2012). What is more interesting is that 58.3% of first-batch restaurants have chosen to disclose by March 2013 (one and half year after the policy) while only 52.8% of non-first-batch restaurants disclosed in the same time frame. Recall that in general dirtier restaurants tend to opt out of disclosure, so this 58.3% versus 52.8% difference has likely understated the role that the first-batch status plays in a restaurant's disclosure decision.

Graphically, Figure 7 plots the percent of first-batch restaurants by census tract. There are 818 census tracts in Maricopa; we color them by quintiles. A few census tracts are not colored due to either lack of restaurants or lack of precise geocodes of restaurants. Because census tracts are defined by population (roughly 3000 residents per tract), the tracts in the middle of Maricopa are much smaller in terms of geographic area than the tracts on or close to the county border. In comparison, restaurants tend to concentrate in areas with dense population and these areas are more likely to be the small tracts in the center of Maricopa. Given these statistical relationships, Figure 7 suggests that the perfect of first-batch restaurants varies widely across census tracts, even if they are close to each other in geography.

Figure 8 plots the percent of disclosing restaurants by census tract as of March 2013. A rough comparison between Figures 7 and 8 suggests a positive correlation: the tracts that have more first-batch restaurants are likely to be the tracts that have a higher disclosure rate at the end of our sample. Statistically, the correlation efficient between the percent of first-batch restaurants and the disclosure rate per tract is 0.37. This suggests a

real link of the disclosure rate of non-first-batch restaurants to the location of first-batch inspections.

To pin down the spillover effect from the first batch inspections to non-first-batch restaurants, consider every non-first-batch restaurant's disclosure status at the end of our sample (March 2013). In particular, for a non-first-batch restaurant j in census tract k, we define:

N = the total number of restaurants in tract k;

$N_{Disclose0}$= the number of restaurants in tract k that were first-batch restaurants and chose to disclose in the first-batch inspections;

N_0 = the number of restaurants in tract k that were first-batch restaurants (regardless of disclosure status);

Q_0 = the average number of risk factor violations found in all restaurants of tract k before grade card excluding the study restaurant j;

q_0 = the average number of risk factor violations found in the first-batch restaurants of track k;

R_0 = the average number of good retail practice violations found in all restaurants of tract k before grade card excluding the study restaurant j;

r_0 = the average number of good retail practice violations found in the first-batch restaurants of track k before grade card;

S_0 = the average number of total violations found in all restaurants of tract k before grade card excluding the study restaurant j;

s_0 = the average number of total violations found in the first-batch restaurants of track k before grade card.

Note that all of $\{N, N_{Disclose0}, N_0, Q_0, q_0, R_0, r_0, S_0, s_0\}$ are either exogenous or predetermined for the non-first-batch restaurant j, if we assume that individual restaurants have no control on the exact timing of routine inspections and the grade card does not cause significant entry and exit of restaurants. Before we examine the effect of these variables on j's disclosure decision as of March 2013, we would like to understand local variations in the degree of first-batch exposure ($\frac{N_0}{N}$) and the relative cleanliness of first-batch restaurants ($\frac{q_0}{Q_0}, \frac{r_0}{R_0}, \frac{s_0}{S_0}$). As shown in Table 7, regressions at the tract level find that a tract that was on average inspected earlier in the last inspection *before* grade card is likely to have a greater fraction of first-batch restaurants ($\frac{N_0}{N}$). A tract that was on average dirtier *before* grade card is also likely to have a higher $\frac{N_0}{N}$. These patterns are consistent with the general scheme of inspection frequency and targeting as documented in Section 2. The targeting practice also explains why the longer it had been from the last inspection to the policy adoption date, the cleaner the first-batch restaurants had been before grade card (relative to other restaurants in the same tract).

Denoting the end of our sample as T, we run the following specification:

$$D_{jkT} = \begin{Bmatrix} q_{jT} \\ r_{jT} \end{Bmatrix} \cdot \beta_1 + \{D_{0k}\} \cdot \gamma_1 + \alpha_{zip} + X_j \cdot \theta + Y_j \cdot \delta + \varepsilon_{jkT}$$

where $\{D_{0k}\}$ are variables related to first-batch restaurants in census tract k, which could be $\frac{N_{Disclose0}}{N}$, or a combination of $\frac{N_0}{N}, \frac{q_0}{Q_0}, \frac{r_0}{R_0}$ or $\frac{s_0}{S_0}$.

Table 8 reports the results. In the first column, we regress a restaurant's disclosure decision (as of March 2013) on $\frac{N_{Disclose0}}{N}$ of the same tract. Control variables include that restaurant's detected violations (as of March 2013), observable attribute, ZIP code fixed

effects, and the number of restaurants in that tract (N). Results suggest that, non-first-batch restaurants are more likely to disclose if they are located in a tract that has a greater fraction of restaurants in first-batch and disclosing (as of March 2013). We further replace $\frac{N_{Disclose0}}{N}$ by $\frac{N_0}{N}$, $\frac{q_0}{Q_0}$, and $\frac{r_0}{R_0}$ progressively in Columns 2 to 4. While $\frac{N_{Disclose0}}{N}$ can be influenced by both the presence of first-batch inspections and the historical cleanliness of first-batch restaurants, the former turns out to be more important in determining the disclosure status of non-first-batch restaurants. When we cluster the error by census tract in the second half of Table 8, the coefficient of $\frac{N_{Disclose0}}{N}$ remains statistically significant but the coefficients on $\frac{N_0}{N}$, $\frac{q_0}{Q_0}$, and $\frac{r_0}{R_0}$ are no longer significant. This is probably because each tract has only 20 non-first batch restaurants on average, which leaves little room to distinguish the true effect from unobserved correlations between restaurants in the same tract.[7]

To overcome the data limit at the tract level, we dig into the exact location of each restaurant and define its competitors by geographic distance. In particular, we define distances -- within 0.5 miles, 0.5 to 1 miles, 1 to 1.5 miles and 1.5 to 2 miles.

Table 9 shows the results. Each observation is a non-first batch restaurant. The outcome variable is a dummy variable indicating the disclosure status of a restaurant in March, 2013. $NDisclose_{(d1,d2)}$ is the number of first-batch restaurants that are between the distance (d_1,d_2) from the study restaurant and chose to disclose in their first-batch inspections by January 11, 2012. $N_{(d1,d2)}$ is the number of total restaurants between the distance (d_1,d_2). We also construct the before-grade card hygiene distribution by distance,

[7] All the results in Table 8 are robust to alternative definitions of first batch if first batch refers to the first 7.5% or 12.5% instead of 10% of all inspections right after the policy. They are also robust to controlling for the tract's average cleanliness in historical data (q_0 or Q_0).

namely $Q_{0(d1,d2)}$, $R_{0(d1,d2)}$ and $S_{0(d1,d2)}$. Given the close geography in Maricopa, we allow (d_1,d_2) to be (0,0.5), (0.5,1), (1,1.5) and (1.5,2).

Focusing on $\frac{NDisclose}{N}$ in various distance brackets, Column 1 and Column 2 show that the more disclosure from the first batch restaurants in close distance, the more likely a non-first batch restaurant chooses to disclose. This effect is particularly strong when the distance bracket is within 0.5 miles or between 1 and 1.5 miles. It is positive but insignificant when (d_1,d_2) is (0.5,1) and becomes negative when (d_1,d_2) is (1.5,2).

Note that a higher $\frac{NDisclose}{N}$ can be driven by having a greater fraction of first-batch restaurants nearby (a higher $\frac{N_0}{N}$) or the first-batch restaurants being relatively cleaner thus more likely to disclose (a lower $\frac{q_0}{Q}$). To decompose the two, Column 3 controls for $\frac{N_0}{N}$ in various distance brackets, Column 4 controls for $\frac{q_0}{Q}$ in various distance brackets, and Column 5 controls for both. It turns out that both of them motivate more disclosure of non-first-batch restaurants, but these effects only occur if the first-batch restaurants are within 0.5 miles from the study restaurant.

5. Conclusion

In a voluntary disclosure regime, what can be done to promote the disclosure rate? In the context of restaurant inspections, policy makers have discretion on when and where to conduct inspections, both of which turn out to be important for the effectiveness of a voluntary disclosure program in Maricopa. In particular, restaurants subject to earlier inspection after the grade card policy are more likely to disclose. Moreover, the disclosure decision of these early inspections has a positive spillover effect on nearby

restaurants. These findings suggest that unraveling will not come automatically as the theory predicts, but policy makers can boost voluntary disclosure by increasing inspection intensity right after a disclosure regulation.

A few questions deserve more future research. First, it is unclear whether the grade card policy has caused significant improvement in hygiene quality. Our previous research (Jin and Leslie 2003) shows that the hygiene grade card policy in Los Angeles County has motivated restaurants to clean up, but that policy is either mandatory or close to mandatory because consumers expect the mandate to come in a short time window. Second, we do not know why the spillover effect from first-batch restaurants to later-inspected restaurants is extremely local (within 1.5 miles), although detailed inspection outcomes are available on the county's official website and consumers can search the database anywhere. A potential explanation is that restaurant competition is local, either because consumers tend to choose restaurants within a small local area, or because restaurant owners/employees tend to compete locally for pride about hygiene quality. The local limit of the spillover effect suggests that, if the goal is to increase voluntary disclosure rate, one does not need to inspect every restaurant of a neighborhood in a short time window, but it is probably more efficient to increase inspection intensity in all neighborhoods than in a subset of sparsely distributed neighborhoods (right after a disclosure regulation).

6. References

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Figures and Tables

Figure 1: Grading System

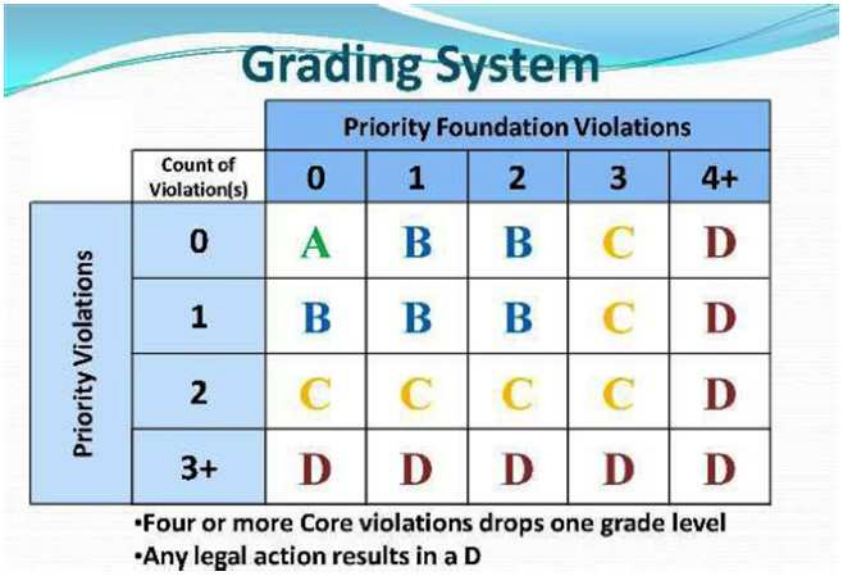
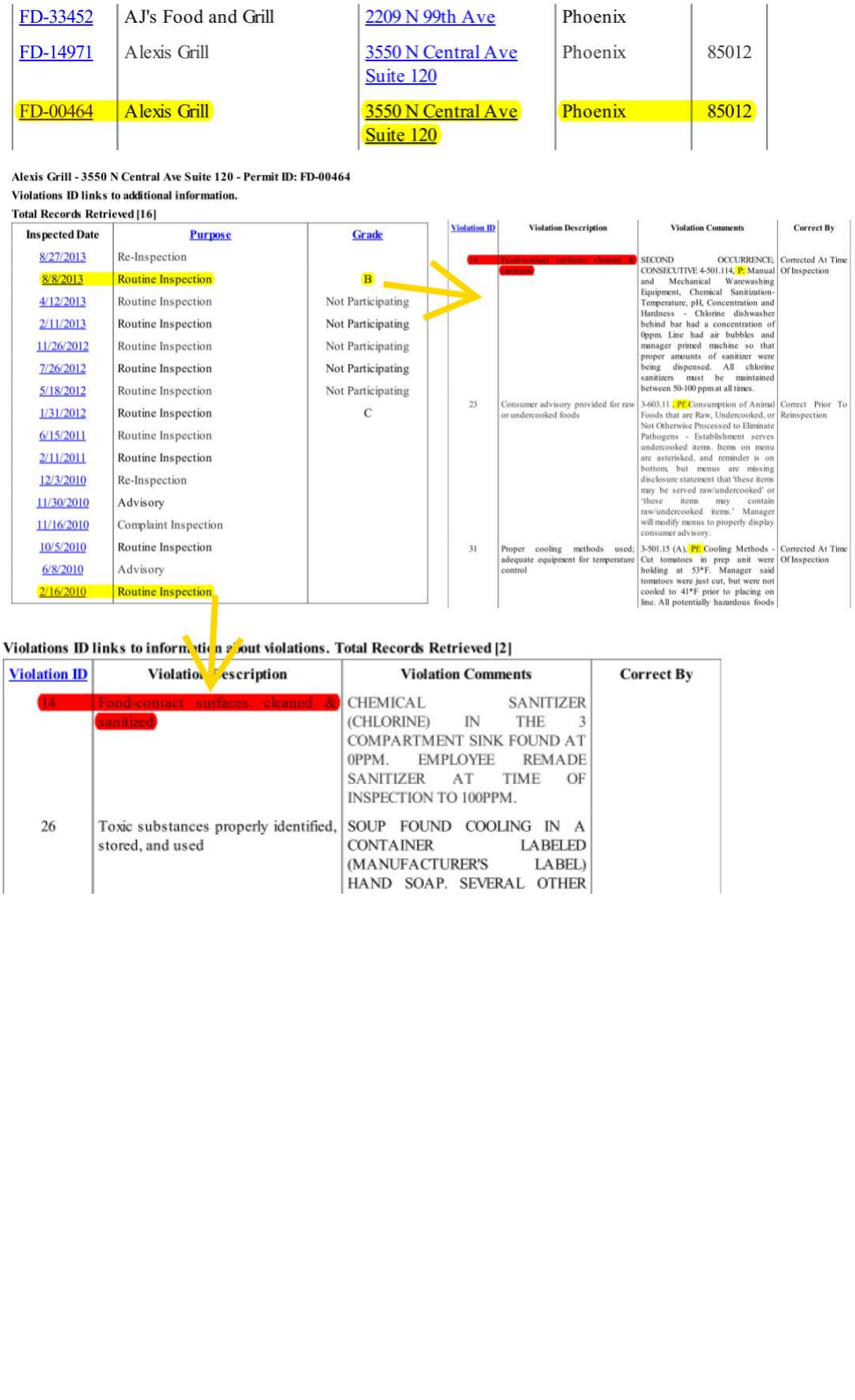


Figure 2: Example of the Online Database



FD-33452	AJ's Food and Grill	2209 N 99th Ave	Phoenix	
FD-14971	Alexis Grill	3550 N Central Ave Suite 120	Phoenix	85012
FD-00464	Alexis Grill	3550 N Central Ave Suite 120	Phoenix	85012

Alexis Grill - 3550 N Central Ave Suite 120 - Permit ID: FD-00464
Violations ID links to additional information.
Total Records Retrieved [16]

Inspected Date	Purpose	Grade
8/27/2013	Re-Inspection	
8/8/2013	Routine Inspection	B
4/12/2013	Routine Inspection	Not Participating
2/11/2013	Routine Inspection	Not Participating
11/26/2012	Routine Inspection	Not Participating
7/26/2012	Routine Inspection	Not Participating
5/18/2012	Routine Inspection	Not Participating
1/31/2012	Routine Inspection	C
6/15/2011	Routine Inspection	
2/11/2011	Routine Inspection	
12/3/2010	Re-Inspection	
11/30/2010	Advisory	
11/16/2010	Complaint Inspection	
10/5/2010	Routine Inspection	
6/8/2010	Advisory	
2/16/2010	Routine Inspection	

Violation ID	Violation Description	Violation Comments	Correct By
14	Food-contact surfaces: cleaned & sanitized	SECOND OCCURRENCE; CONSECUTIVE 4-501.114, Pf: Manual and Mechanical Warewashing Equipment, Chemical Sanitization-Temperature, pH, Concentration and Hardness - Chlorine dishwasher behind bar had a concentration of 0ppm. Line had air bubbles and manager primed machine so that proper amounts of sanitizer were being dispensed. All chlorine sanitizers must be maintained between 50-100 ppm at all times.	Corrected At Time Of Inspection
23	Consumer advisory provided for raw or undercooked foods	3-603.11 , Pf: Consumption of Animal Foods that are Raw, Undercooked, or Not Otherwise Processed to Eliminate Pathogens - Establishment serves undercooked items. Items on menu are asterisked, and reminder is on bottom, but menus are missing disclosure statement that 'these items may be served raw/undercooked' or 'these items may contain raw/undercooked items.' Manager will modify menus to properly display consumer advisory.	Correct Prior To Reinspection
31	Proper cooling methods used; adequate equipment for temperature control	3-501.15 (A), Pf: Cooling Methods - Cut tomatoes in prep unit were holding at 53*F. Manager said tomatoes were just cut, but were not cooled to 41*F prior to placing on line. All potentially hazardous foods	Corrected At Time Of Inspection

Violations ID links to information about violations. Total Records Retrieved [2]

Violation ID	Violation Description	Violation Comments	Correct By
14	Food-contact surfaces: cleaned & sanitized	CHEMICAL SANITIZER (CHLORINE) IN THE 3 COMPARTMENT SINK FOUND AT 0PPM. EMPLOYEE REMADE SANITIZER AT TIME OF INSPECTION TO 100PPM.	
26	Toxic substances properly identified, stored, and used	SOUP FOUND COOLING IN A CONTAINER LABELED (MANUFACTURER'S LABEL) HAND SOAP. SEVERAL OTHER	

Figure 3: Offline Posting

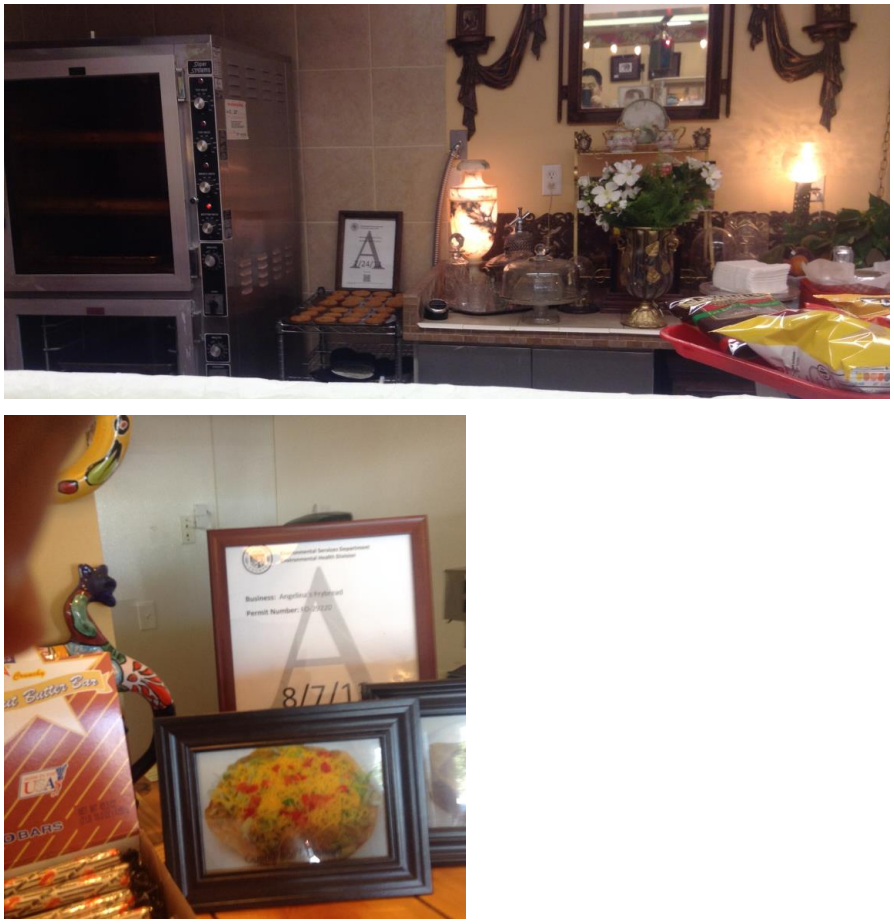
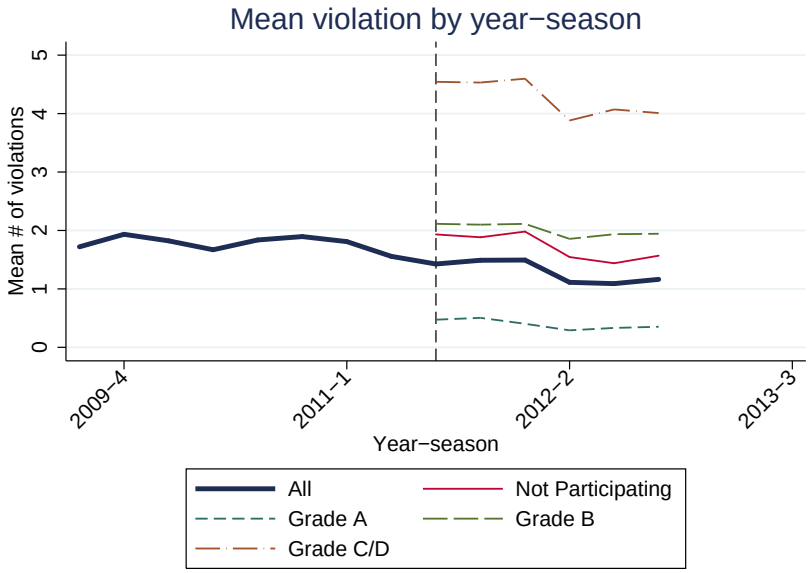
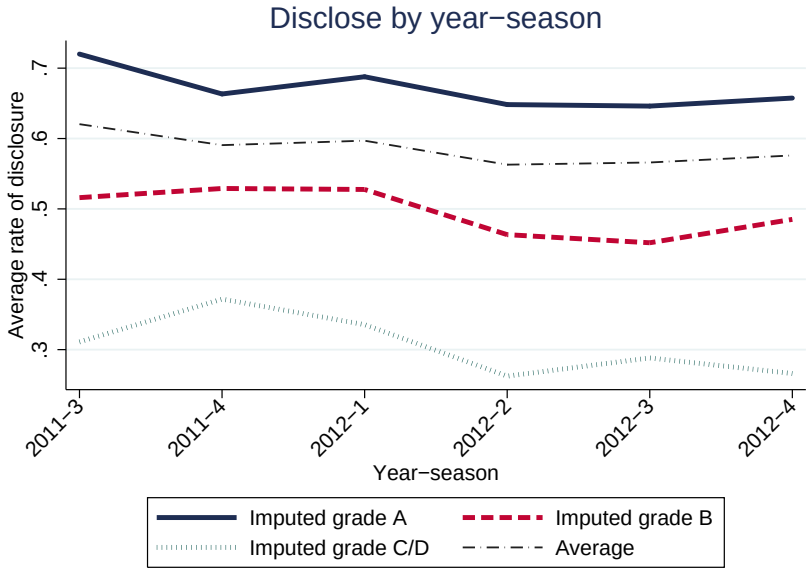


Figure 4: Mean Number of Violations by Year-Season



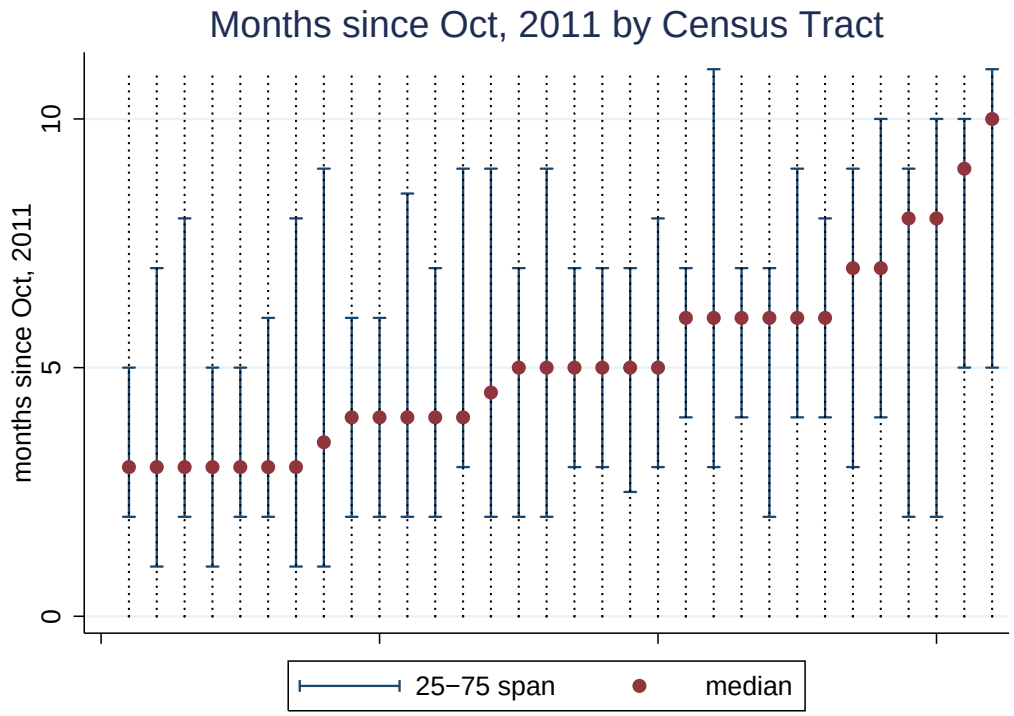
Note: Each line represents the mean number of violation for inspections that take place in the specific year-season for particular types of restaurants as indicated.

Figure 5: Average Disclosure Status by Year-Season and Imputed Grade Status



Note: Each line represents the average disclosure status for inspections that have the particular imputed grade as indicated..

Figure 6: Timing of First Post-Disclosure Inspections by Census Tract



Note: Months since October, 2011 for the first inspection after the policy change. Include 32 census tracts with more than 50 restaurnats.

Figure 7: Map of First Batch Restaurants (subject of the first 10% inspections)

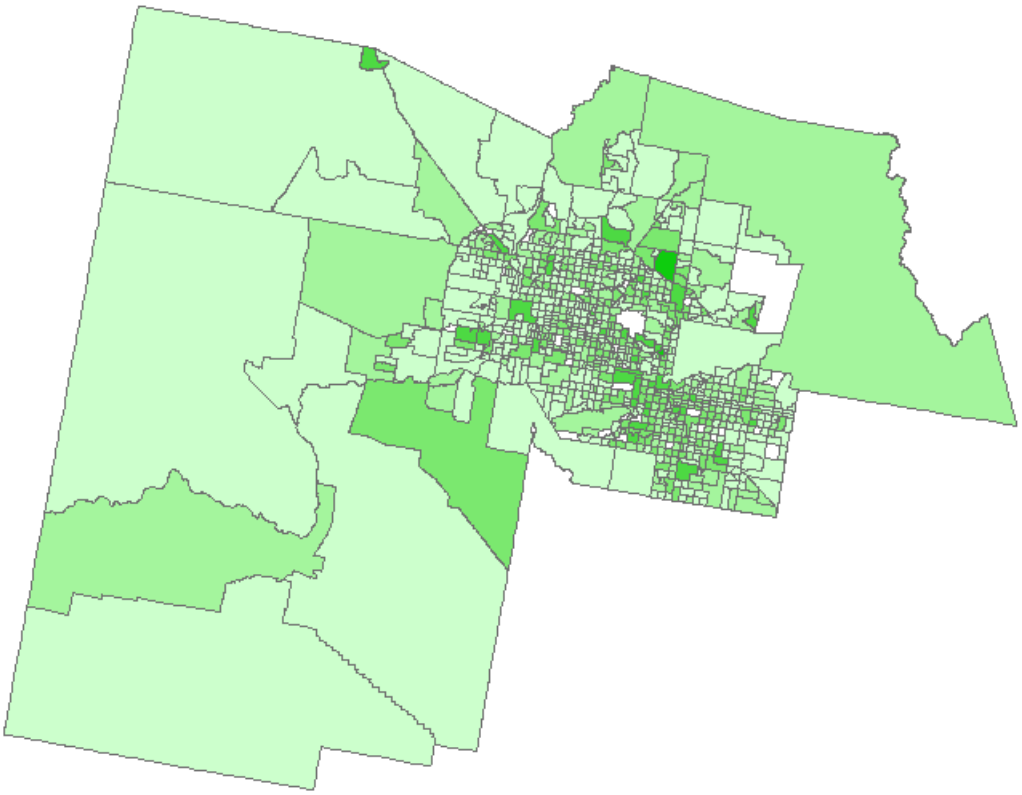


Figure 8: Map of Disclosure Status in March, 2013

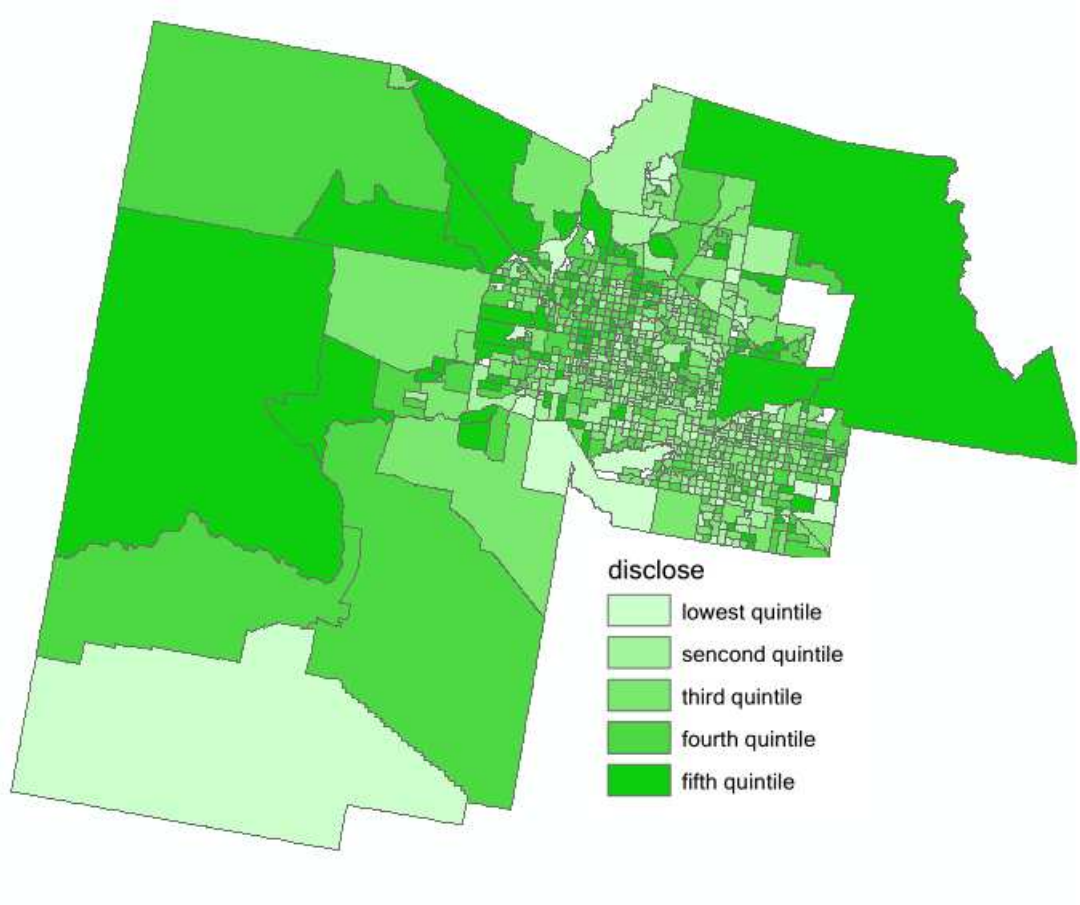


Table 1: Summary Statistics

	N	%	vios	vio p	vio pf	vio core	vio risk	vio retail
Before Disclosure	148443	-	1.79	-	-	-	0.832	0.962
Disclosed	38459	58%	0.99	0.258	0.240	0.468	0.483	0.510
A	26679	69%	0.37	0.004	0.005	0.344	0.055	0.312
B	9828	26%	2.01	0.629	0.683	0.649	1.188	0.820
C	1428	4%	3.84	1.621	1.046	1.102	2.406	1.437
D	524	1%	6.10	2.494	1.744	1.6923	3.836	2.260
Non-participating	28301	42%	1.72	0.542	0.483	0.608	0.969	0.752
A	13655	48%	0.49	0	0	0.312	0.118	0.368
B	10312	36%	2.08	0.619	0.781	0.674	1.245	0.837
C	2670	9%	3.79	1.799	1.142	0.841	2.563	1.228
D	1664	6%	6.32	2.4967	1.545	2.263	3.694	2.622

Note: For inspections done prior to the start of the voluntary disclosure program, average number of total violations, risk factor violations, and retail practice violations are reported. For inspections done after the start of the voluntary disclosure program, if the grade is posted, the actual number of average violations are reported. If the grade is not posted, then grades are imputed, and the average number of violations are reported.

Table 2: Correlation of Violation Types

	risk	good practice
priority	0.6085	0.2383
priority foundation	0.7328	0.0748
core	0.0836	0.8366

Note: each observation is an inspection.

Table 3: Summary of Inspection Frequncy by First Batch Status

	All	First Batch	Non First Batch	
	(1)	(2)	(3)	(2)-(3)
# inspections	201194	71011	130183	
# restaurants	22952	6075	16877	
% chains	13.445	13.416	13.456	
q_0	0.749	0.858	0.705	0.152
	(0.751)	(0.749)	(0.748)	(0.012)
r_0	0.886	0.951	0.859	0.092
	(0.818)	(0.814)	(0.818)	(0.013)
s_0	1.635	1.809	1.564	0.244
	(1.393)	(1.389)	(1.389)	(0.022)
avg # of days since last inspection				
prior to policy change	178	156	188	-32
	(65.567)	(52.542)	(68.361)	(1.061)
first inspection after policy change	289	230	321	-91
	(161.368)	(181.133)	(139.836)	(2.653)
other inspections after policy change	182	164	190	-26
	(99.561)	(95.788)	(100.197)	(1.548)
disclosure by March, 2013	0.544	0.583	0.528	0.055
	(0.498)	(0.493)	(0.499)	(0.008)

Table 4: Results of Regression on Inspection Intervals

	(1)	(2)	(3)	(4)	(5)	(6)
	prior to policy change		first after policy change		after policy change	
# of risk factor violations	-21.408***	-20.726***	-12.799***	-15.050***	-19.158***	-19.960***
	(0.950)	(0.915)	(1.309)	(1.314)	(0.893)	(0.890)
# of good practice violations	-2.119**	-2.119**	-12.200***	-13.919***	-4.296***	-5.524***
	(0.912)	(0.912)	(1.238)	(1.237)	(1.050)	(1.045)
restaurant characteristics		X		X		X
mean dependent variable	178	178	284	284	170	170
N	17940	17940	17940	17940	18192	18192

Note: Each observation is a restaurant. The dependent variable is the average number of days since the last inspection. Inspections included in the sample are those before the policy change, the first inspection after policy change, and those after the policy change. Restaurant characteristics includes restaurant type, whether a chain restaurant, and chain name dummies. Robust standard errors are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5: First Look of Disclosure Determinants

	(1)	(3)	(4)	(5)
# of risk factor vios	-0.083***	-0.068***	-0.066***	-0.067***
	(0.004)	(0.004)	(0.004)	(0.004)
# of good practice vios	-0.019***	-0.013***	-0.008***	-0.011***
	(0.003)	(0.003)	(0.003)	(0.003)
In the previous inspection				
# of risk factor vios	-0.009***			
	(0.002)			
# of good practice vios	-0.028***			
	(0.002)			
Avg in tract				
disclosure rate			0.606***	
			(0.030)	
ratio of Grade A in disclose			-	
			-	
ratio of Grade B in disclose			0.088***	
			(0.019)	
ratio of Grade C/D in disclose			-0.081***	
			(0.028)	
Avg among nghs within 1 mile				
disclosure rate				0.225***
				(0.0367
ratio of Grade A in disclose				-
				-
ratio of Grade B in disclose				-0.017
				(0.033)
ratio of Grade C/D in disclose				-0.043
				(0.044)
Constant	0.902***	1.082***	0.424***	1.061***
	(0.014)	(0.012)	(0.048)	(0.012)
Year FE	X	X	X	X
Tract FE	X			
Restaurant type FE	X	X	X	X
Restaurant FE		X	X	X
N	57488	60690	60690	60334
R^2	0.174	0.640	0.661	0.642

Note: Each observation is an inspection after the volunteer online disclosure program started in Oct, 2011. Linear probability model is used in all specifications. Standard errors are in parentheses, clustered at the ZIP code level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: More on Disclosure Determinants

	(1)	(2)	(3)
# of risk factor vios	-0.083***	-0.085***	-0.083***
	(0.004)	(0.004)	(0.004)
# of good practice vios	-0.019***	-0.020***	-0.019***
	(0.003)	(0.003)	(0.003)
In the previous inspection			
# of risk factor vios	-0.009***	-0.009***	-0.009***
	(0.002)	(0.002)	(0.002)
# of good practice vios	-0.028***	-0.029***	-0.028***
	(0.002)	(0.002)	(0.002)
Restaurants in the 10% first inspections			0.039***
			(0.008)
Months since Oct, 2011 of the first		-0.010***	
inspection after policy change		(0.001)	
Constant	0.902***	0.917***	0.863***
	(0.014)	(0.014)	(0.015)
Year FE	X	X	X
Tract FE	X	X	X
Restaurant characteristics	X	X	X
N	57488	57488	57488
R^2	0.174	0.177	0.175

Note: Each observation is an inspection after the volunteer online disclosure program started in Oct, 2011. Linear probability model is used in all specifications. Standard errors are in parentheses, clustered at the ZIP code level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 7: Randomness of the first batch within census tract

	(1) N_0/N	(2) q_0/Q_0	(3) r_0/R_0	(4) s_0/S_0
Q_0	0.0684***	-0.0818	-0.0002	-0.0203
	(0.0233)	(0.0834)	(0.0783)	(0.0691)
Average # of days since last inspection at policy change	0.0011***	-0.0013***	-0.0008**	-0.0011***
	(0.0001)	(0.0003)	(0.0003)	(0.0003)
constant	0.0957***	1.3777***	1.1582***	1.2566***
	(0.0257)	(0.0929)	(0.0893)	(0.0802)
N	769	729	729	729

Note: Each observation is a census tract with more than 5 restaurants. N_0 is the number of restaurants in the first batch inspected in Maricopa county. N is the total number of restaurants in the census tract. q_0 is the average number of risk factor violations in inspections prior to the policy change for the first batch restaurants in the census tract. Q_0 is the average number of risk factor violations in inspections prior to the policy change for all restaurants in the census tract. Average days elaspsed since policy change (Oct, 2011) for restaurants in the census tract is also controlled. Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Initial Condition in Tract

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
# of good practice violations	-0.033***	-0.033***	-0.033***	-0.037***	-0.037***	-0.037***	-0.037***	-0.037***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
# of risk factor violations	-0.071***	-0.071***	-0.071***	-0.074***	-0.074***	-0.074***	-0.073***	-0.073***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
$NDisclose_0/N$	0.206***			0.163***	0.163***			
	(0.035)			(0.048)	(0.048)			
lnN	-0.026***	-0.028***	-0.027***	-0.023***	0.002	0.001	0.003	0.003
	(0.004)	(0.004)	(0.004)	(0.004)	(0.008)	(0.008)	(0.009)	(0.009)
N_0/N		0.114***	0.098***	0.084***		0.062	0.069	0.065
		(0.031)	(0.035)	(0.035)		(0.043)	(0.048)	(0.049)
q_0/Q_0			-0.025*	-0.020*			-0.007	-0.007
			(0.013)	(0.013)			(0.020)	(0.020)
r_0/R_0			0.004	-0.002			-0.016	-0.016
			(0.013)	(0.013)			(0.017)	(0.017)
Q_0				0.085***				0.032
				(0.026)				(0.037)
R_0				-0.021				-0.023
				(0.024)				(0.036)
constant	0.835***	0.845***	0.874***	0.874***	0.821***	0.789***	0.806***	0.803***
	(0.021)	(0.021)	(0.027)	(0.027)	(0.030)	(0.031)	(0.041)	(0.047)
restaurant type FE	X	X	X	X	X	X	X	X
ZIP code FE	X	X	X	X	X	X	X	X
Standard errors clustered	N	N	N	N	tract	tract	tract	tract
N	16874	16874	16281	16281	15273	15273	14680	14680
R^2	0.164	0.163	0.163	0.164	0.124	0.123	0.122	0.122

Note: Each observation is a restaurant. The dependent variable is a dummy indicating whether the restaurnat chose to disclose by the end of March, 2013. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 9: Neighborhood Initial Conditions - Initial Disclosure

	(1)	(2)	(3)	(4)	(5)
# of good practice vios	-0.037***	-0.037***	-0.035***	-0.038***	-0.035***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
# of risk factor vios	-0.071***	-0.071***	-0.071***	-0.071***	-0.071***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
$NDisclose_{(0,0.5)}/N_{(0,0.5)}$	0.137***	0.138***			
	(0.034)	(0.034)			
$NDisclose_{(0.5,1)}/N_{(0.5,1)}$	0.047	0.049			
	(0.038)	(0.039)			
$NDisclose_{(1,1.5)}/N_{(1,1.5)}$	0.174***	0.178***			
	(0.054)	(0.054)			
$NDisclose_{(1.5,2)}/N_{(1.5,2)}$	-0.049*	-0.049*			
	(0.025)	(0.025)			
$N_0/N_{(0,0.5)}$			0.064**		0.125***
			(0.030)		(0.037)
$N_0/N_{(0.5,1)}$			-0.010		-0.014
			(0.008)		(0.012)
$N_0/N_{(1,1.5)}$			-0.009		-0.027**
			(0.009)		(0.014)
$N_0/N_{(1.5,2)}$			-0.004		0.010
			(0.007)		(0.017)
$q_0/Q_{0,(0,0.5)}$				-0.019*	-0.016
				(0.010)	(0.010)
$q_0/Q_{0,(0.5,1)}$				-0.021	-0.018
				(0.013)	(0.013)
$q_0/Q_{0,(1,1.5)}$				-0.018	-0.021
				(0.020)	(0.020)
$q_0/Q_{0,(1.5,2)}$				0.062***	0.067***
				(0.020)	(0.021)
$\ln N_{(0,0.5)}$	0.004	0.004	0.010	0.005	0.015**
	(0.005)	(0.005)	(0.006)	(0.006)	(0.008)
$\ln N_{(0.5,1)}$	0.003	0.002	-0.003	-0.001	-0.005
	(0.006)	(0.007)	(0.008)	(0.008)	(0.009)
$\ln N_{(1,1.5)}$	0.000	0.001	-0.013	-0.001	-0.009
	(0.009)	(0.009)	(0.009)	(0.009)	(0.010)
$\ln N_{(1.5,2)}$	-0.013	-0.011	-0.004	-0.006	-0.005
	(0.010)	(0.010)	(0.009)	(0.009)	(0.011)
Mean # of risk vios in March, 2013 in each distance bin		X	X	X	X
ZIP FE	X	X	X	X	X
Restaurant type FE	X	X	X	X	X
N	14811	14811	13510	14811	13510
R^2	0.121	0.122	0.116	0.120	0.117

Note: Depedent variable is the whether the restaurant disclosed as of March, 2013. Restaurants that were among the first 10% inspected in Maricopa county are excluded from the regression. $N_{(d_1,d_2)}$ is the number of restaurants within distance (d_1, d_2) from the restaurant. $NDisclose_{(d_1,d_2)}$ is the number of restaurants that belong to the first 10% inspected batch and chose to disclose. . $q_0/Q_{0,(d_1,d_2)}$ is the ratio of average initial risk factor violations of the first 10% batch and the average intial risk factor violations of all restaurants within (d_1, d_2) to the restaurant. $NFirstBatch/N_{(1,1.5)}$ is the ratio of number of restaurants below to the first 10% batch to the number of total all restaurants within (d_1, d_2) to the restaurant. $N_{(d_1,d_2)}$ is the number of restaurants within distance (d_1, d_2) from the restaurant. $NDisclose_{(d_1,d_2)}$ is the number of restaurants that belong to the first 10% inspected batch and chose to disclose. Linear probability model used in all specifications. Robusttandard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.