To Claim or Not To Claim? Hidden Costs of Business Page Claiming

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Local businesses with limited budgets are increasingly turning to online review platforms to monitor customer reviews posted on their business pages, many of which are created by customers. Despite the clear benefits and the low cost of claiming ownership of such business pages, a significant number of pages remain unclaimed which begs the question: what is the downside of business page claiming? This study examines the impact of an owner's business page claiming on customer reviews using a unique dataset from Yelp. By leveraging the heterogeneous timing of owner business page claiming, we estimate that the action of business page claiming — which changes a business page status on Yelp from "Unclaimed" to "Claimed" — lowers average customer rating by 10.3%, which is accompanied by an increase in negative sentiment and a decrease in positive sentiment in review text. This is mainly driven by an increased chance of receiving the lowest customer ratings and a decreased chance of receiving the highest customer ratings. Moreover, after a business page is claimed, customers who provide the lowest ratings tend to write lengthier reviews and address business owners more directly about service issues in their reviews. While business page claiming may signal trustworthiness and responsibility, this study offers a cautionary note to small businesses: claiming your business page on a review platform is not costless, even if it is free of charge. We urge business owners to have realistic expectations about and make adequate preparations for business page claiming.

Key words: Business Page Claiming, Online Reviews, Digital Platforms, Local Businesses

1. Introduction

Social media and online review platforms have revolutionized the service sector of our economy, especially the hospitality industry. Today, customers routinely check reviews and ratings on various platforms before choosing which shop to patronize, and often share their experience on those platforms after their service encounters. Adapting to such an environment, many businesses carefully monitor these platforms, especially their business pages, which are often set up by customers. As a business strategy, platforms offer functionalities designed to help business owners efficiently monitor their business pages and better interact with customers. These inexpensive and sometimes free features are particularly appealing to small local businesses with limited budgets for customer service and business intelligence (Entrepreneur 2021, Yelp 2024). To take advantage of these features, a business first needs to verify its ownership of the offline business corresponding to a business page, an action we refer to as business page claiming, which itself is typically free.

Anecdotal evidence illustrated in **Figure A1** in **Appendix A** suggests that customers might consider a business with a claimed business page as more trustworthy and expect responsible businesses to have claimed business pages. Indeed, the act of business page claiming may demonstrate that the business owner cares about her customers on the platform and is attentive to their feedback. On the flip side, leaving a business page unclaimed seems to signal the opposite and may hurt the reputation of the business. Despite such benefits of business page claiming, a significant portion of business pages is unclaimed. For example, approximately 32% of all business pages on Google were still unclaimed (Hartzer 2018). Why?

From a game-theoretical perspective, we may think of business page claiming as signaling and understand the phenomenon as a separating equilibrium using the concept of perfect Bayesian equilibrium. But given the clear benefit of business page claiming and the negligible financial or operational cost of doing so, what is the nature of the signaling cost? After all, without a meaningful signaling cost, game theory would predict a pooling equilibrium with every business claiming its page. We believe that this cost originates from two sources: customer service expectations and

customer reviews. Because business page claiming signals the owner's presence on the platform, customers naturally have higher expectations in terms of customer service support on the platform, the cost of which may differ across businesses. In terms of customer reviews, we believe that customers may change their behavior towards a business on the platform after its business page is claimed. For example, perceived service availability may encourage customers who would otherwise not share their experience to write reviews, and these reviews are likely to be negative ones. Similarly, the group of customers who would have supported a nascent business may become more critical upon business page claiming and encourage the owner to further improve service. These potential negative effects of business page claiming on customer evaluations pose a dilemma to business owners who are contemplating whether to claim their business pages. To better understand this effect, we ask the following research question: What is the impact of business page claiming on customer evaluations, both in terms of numerical rating and review text content?

Examining the impact of business page claiming on local businesses is particularly important. Local businesses, often categorized as small businesses, operate predominantly as sole proprietorships without employees, mainly due to budget constraints (Small Business Administration 2022). Limited resources and strategies often present significant challenges for local businesses in effectively managing customer feedback (Pantelidis 2010), making online reviews and social media highly relevant to local businesses. Customers often view reviews as a reflection of business reputation (Luca 2016, Li 2018), and negative online feedback can significantly influence customer decisions regarding whether to visit a business and can further impact its performance (Pee 2016).

We choose Yelp as our empirical context because Yelp is one of the most well-known platforms listing local businesses in the U.S. For identification, we focus on recently opened popular restaurants in the vicinity of the 200 most populated U.S. cities and exploit the heterogeneous timing of business page claiming. We estimate the effects using the staggered difference-in-differences (DiD) (Callaway and Sant'Anna 2021) along with matching. We find that business page claiming by owners decreases the customer rating by 10.3% at the mean value, driven by an increase in 1-star

reviews and a decrease in 5-star reviews. Importantly, this effect persists over time, remaining consistent for more than a year. We also find that business page claiming not only shifts the rating distribution towards the lower end but also leads to more critical evaluations by customers and results in an increase in the length of the lowest-rated (1-star) reviews. We further analyze review content shift by performing sentiment and topic modeling analyses. Our results show an increase in the negative sentiment and a decrease in the positive sentiment after the business page claiming. Interestingly, we find that after business page claiming, customers tend to directly address the owners about service issues in their 1-star reviews. To mitigate these negative effects of business page claiming, we believe, as some literature suggested, that business owners should carefully design a managerial response strategy.

In addition to our empirical analyses, we also design a randomized online experiment to shed light on the underlying mechanisms. Consistent with the observational study, we find that business page claiming lowers customer ratings, makes customer reviews more critical, and increases reviewers' expectations of owner involvement. Overall, experiment results reinforce our theoretical argument that business page claiming imposes hidden costs by altering how customers perceive and respond to businesses.

This study advances research by uncovering the unintended consequences of business page claiming on digital platforms, a factor that remains largely understudied in the literature. Theoretically, our findings fill the crucial gap in the literature on online presence and reputation management by disentangling the effect of business page claiming (i.e., establishing online presence of business owners) from subsequent actions by business owners, such as managerial responses or other subsequent customer management strategies. We argue that business page claiming represents a passive signal of owner's presence while managerial responses play a role of a different signal of owner's responsiveness. Our additional analyses provide further insights into the managerial response literature by showing that managerial responses serve as a potential mitigation strategy, partially alleviating the negative effects of business page claiming on customer evaluations, thus establishing a connection between our novel setting and prior research.

This study provides important practical implications. The discovered effects of business page claiming offer valuable insights to local business owners, who face the dilemma of whether or not to claim their business pages on digital platforms. In particular, business owners need to be cognizant of the negative effect of business page claiming, to time their business page claiming decision, and to prepare a mitigation strategy for reputation management after business page claiming. Our heterogeneous effects highlight additional conditions under which negative impacts may arise, which local businesses should be aware of. We show that restaurants with a higher rating are more likely to experience negative effects of claiming. Further analyses reveal that the negative effects are more pronounced for businesses with lower prices and those located in more competitive areas.

2. Literature Review

2.1. Online Presence of Firms

This study contributes to the literature on firms' online presence, including their presence on social media platforms. Previous research in this area has examined active, passive, and hybrid approaches to managing online communities. Under a passive management strategy, firms provide a space for customer interactions without direct involvement, while active management involves direct participation in customer discussions. Notably, Homburg et al. (2015) show diminishing returns to active firm management, particularly among consumers seeking product-related support, highlighting the nuanced trade-offs in management strategies.

The establishment of a social media presence by firms has received significant attention in the literature, particularly in relation to its influence on customer management, brand loyalty, and firm performance (Ren et al. 2023). Studies in this domain have examined the strategies firms employ to manage their social media presence and the resulting impacts of these efforts. For example, Sun et al. (2021) examine the role of firms' social media accounts on platforms like Twitter in addressing customer complaints. Their research highlights that although service interventions cause more complaints, this increase is driven by service awareness rather than chronic complaining. Hence, they suggest that firms should be less concerned about whether to respond and more focused on how to respond to customer complaints. Chung et al. (2020) demonstrate that the volume

and timeliness of a firm's responses to negative customer messages not only enhance customer satisfaction but also positively impact the firm's market performance.

While online review platforms like Yelp fall under the broad definition of social media (Li et al. 2023), they differ from social broadcasting platforms (Shi et al. 2014) like Twitter or Facebook, which lack rating systems and are not used to evaluate businesses. Yelp pages can be created by customers without owner involvement, separating presence from management. In contrast, business pages on Twitter or Facebook are typically owner-created, making presence and management nearly inseparable—hence, the literature often overlooks this distinction. Our study extends the literature on online and social media presence by examining the indirect signaling effects of business page claiming on online review platforms. The existing literature often conflates the terms "social media presence" and "social media management," failing to clearly distinguish between the two concepts. Unlike prior research, which has predominantly focused on the combined effects of establishing an online or social media presence alongside actions such as responding to customer complaints or managing online communities, we disentangle the effect of online (or social media) presence from that of online (or social media) management, thereby revealing the nuanced implications of business page claiming as a standalone strategy.

2.2. Online Reputation and Customer Management

Our study is related to the extensive literature on online reputation and customer management. It is recognized that active involvement of dissatisfied customers usually entails different processes in contrast to those of satisfied customers. Dissatisfied customers may share their negative experiences with other customers, complain to the business, or stop using the service or product (exit) (Hirschman 1970). Our study contributes to the literature on online reputation by revealing that the indication of potential owner presence and the likelihood of service availability on online platforms could also influence customer evaluations.

A related stream of research has focused on how firms should handle customer interactions on online platforms and social media, particularly with respect to the managerial response strategy.

Service failures do not always trigger customer dissatisfaction (del Río-Lanza et al. 2009). Instead, customer dissatisfaction is primarily caused by inadequate or absent managerial responses to service failures. For example, Gu and Ye (2014) show that managerial responses are effective for addressing dissatisfied customers. Yang et al. (2019b) investigate how average review ratings depend on new reviews and managerial responses. The study suggests that firms should adopt a selective approach when responding to customer reviews.

Recent studies have examined how managerial responses affect customer feedback on online platforms, yielding mixed results. Proserpio and Zervas (2017), using hotel reviews from two different platforms, find that managerial responses increase review volume and improve customer ratings. However, the study confirms that managerial responses lead to more customer effort in writing negative reviews. Chevalier et al. (2018) examine the similar effect of managerial responses on hotel customer reviews. Interestingly, they find a decrease in review ratings after managerial responses.

Studies have also explored the externality of managerial responses and how managerial responses affect customers who observe the responses. Wang and Chaudhry (2018) find that managerial responses to negative reviews can influence subsequent reviews if the responses are observable at the time of subsequent reviews. Chen et al. (2019) suggest that responding to positive and negative reviews may have heterogeneous effects on subsequent reviews.

Our work differs from these studies because we deliberately tease out the effects of owner features enabled after business page claiming, such as providing managerial responses, so as to focus on the effect of business page claiming itself, which is a relatively unexplored area in existing research.

3. Hypotheses Development

Customers write reviews mostly because of intrinsic motivation (Khern-am nuai et al. 2018) and often have an intended audience in mind (Qiao and Rui 2023). To understand how business page claiming may influence reviewing behavior of customers, we consider two modes of review writing: *customer-oriented* and *owner-oriented*. The former is based on the reviewer's consideration of other customers as target audience, and the latter is based on the reviewer's consideration of the owner as target audience. We next formulate our hypotheses based on these two audience considerations.

One of the main factors driving user contribution on review platforms is the desire to assist other customers (Hennig-Thurau et al. 2004). Bolton et al. (2004) argue that writing reviews without receiving monetary rewards is analogous to contributing to the public good. Many customers actively participate on review platforms to share their service experiences with fellow customers and caution them against unsatisfactory services. We refer to this scenario as the *customer-oriented* mechanism. We expect the *customer-oriented* mechanism to persist regardless of whether an owner claims a business page or not. The act of claiming the page should not influence customers' inclination to write reviews intended to assist other customers.

Unlike the *customer-oriented* mechanism, the *owner-oriented* mechanism is expected to strengthen once a business page is claimed. This proposition aligns with the argument put forth by Chevalier et al. (2018), which suggests that customers are motivated to engage with reviews not only because reviewer opinions can influence other customers but also because reviewer feedback may impact the business. Once it is claimed, a business page signals the owner's presence and even customer service availability on the platform. This visibility raises customers' expectations that their feedback will be reviewed by the owner and may even impact business operations.

We argue that strengthening of such an *owner-oriented* mechanism could have a negative impact on the online reputation (i.e., overall rating) of claimed businesses on the review platform. While we may expect some "appreciative" positive effects since business page claiming might signal a more trustworthy business, such positive effects are more likely to be salient when consumers are searching and comparing businesses before consumption. However, conditional on service consumption, the negative effects of business page claiming become more salient for the following reasons. Customers often utilize review pages as a viable outlet to report service issues (Yang et al. 2019a). According to Hirschman (1970), customers have two options: exit or voice. Customers may choose to "exit" a service when they experience dissatisfaction; this entails withdrawing support for a business by discontinuing patronage and switching to competitors. On the other hand, customers may choose to "voice" by expressing their dissatisfaction and endeavoring to bring about positive

changes or improvements within the business. This can be achieved through expressing complaints or actively participating in feedback. An owner's claiming a business page creates a new voicing outlet for customers. Before an owner claims a business page, there is a perceived absence of a voice channel (with "Unclaimed" page status), making dissatisfied customers more likely to opt for the exit option. However, once the owner claims the business page (with "Claimed" status), customers are more inclined to voice their concerns since they perceive the owner to be attentive and open to receiving feedback. As a result, customers who have experienced service issues are more likely to post their concerns on the review platform, thereby lowering the business's overall rating while at the same time giving the business an opportunity of service recovery and customer retention. Moreover, since business page claiming signals the presence of a customer service agent, such an implicit identity cue may encourage dissatisfied customers to engage more actively (Gao et al. 2023) with the business. Based on the arguments above, we propose the following hypothesis.

Hypothesis 1 (H1): *Business page claiming lowers overall customer ratings.*

While **Hypothesis 1 (H1)** captures the overall negative impact of business page claiming on customer ratings, it is important to identify which components of this decline drive the aggregate effect. Distinguishing between negative and positive experiences is crucial, as prior research has shown that customers process and react to these encounters differently (Ho-Dac et al. 2013). From a managerial perspective, knowing whether rating decreases stem mainly from dissatisfied customers or from shifts in positive ratings provides actionable guidance for developing effective response strategies (Ravichandran and Deng 2023, Deng and Ravichandran 2024).

Naturally, different customers may react differently to an owner's business page claiming. Regarding negative experiences, our reasoning suggests that extremely dissatisfied customers are most likely to be energized after the owner claims the business page and therefore post lower ratings. Moreover, perceiving the presence of business owners, these customers would at least expect actions from owners reading customer feedback. As a result, these customers may feel encouraged or compelled to provide more detailed information about service failures, anticipating that the owners

will investigate these issues. This mechanism is similar to an argument proposed in Proserpio and Zervas (2017), according to which dissatisfied consumers are less likely to leave short indefensible reviews when hotels are likely to scrutinize them. Hence, highly dissatisfied customers are more likely to exert increased effort to make their reviews more informative. Based on this reasoning, we expect that business page claiming will lead to greater involvement of highly dissatisfied customers. To test this empirically, we propose the following hypotheses.

Hypothesis 2A (H2A): *Business page claiming leads to an increase in the likelihood of 1-star reviews.*

Hypothesis 2B (H2B): *Business page claiming leads to an increase in the length of 1-star reviews.*

Customers inclined to leave positive reviews are driven by intrinsic motivation to help fellow customers and support a business (Hennig-Thurau et al. 2004), especially when the business is relatively new and less known (Chen et al. 2008). For example, Dellarocas et al. (2010) suggest that customers are more likely to generate reviews for products that are less known in the market. With a crowdsourced business page that has not yet been claimed, supportive customers may notice the absence of owner and respond by supporting a new local business with enthusiastic 5-star reviews.

However, after the business page is claimed, even for customers who would continue to support the business by leaving positive reviews, some of them may be more likely to leave lower ratings instead of high ratings because business page claiming signals the owner's presence and these customers might want to encourage the owner to further improve the service. Indeed, Proserpio and Zervas (2017) find that an owner's presence could attract reviewers who are more demanding with higher expectations. Based on the above arguments, we propose the following hypothesis.

Hypothesis 3 (H3): *Business page claiming leads to a downward shift in positive ratings distribution.*

We further elaborate on how business page claiming can be connected to signaling theory (Connelly et al. 2011, Spence 2002). This theory addresses the context of information asymmetry, where one party (signaler) takes observable actions to convey its quality or intentions to others (receivers).

For a signal to be credible, it must entail differential costs: it should be less costly (or risky) for high-quality actors to send the signal than it is for low-quality actors (Connelly et al. 2011).

Business page claiming on platforms is costless and easy, lacking an upfront financial cost. But, surprisingly, a significant portion of business pages remain unclaimed (Hartzer 2018). This puzzling gap suggests that business page claiming, while free of charge, carries implicit costs or risks that vary across businesses. In other words, business page claiming can function as a signal because it is effectively "less costly" for some businesses (those prepared to meet the customer expectations) than for others. In signaling terms, business page claiming will produce a separating equilibrium only if businesses that forgo claiming do so because the net cost of that signal (in terms of future repercussions) is higher for them. This dynamic can justify business page claiming as a new signal of a business's credibility and customer-centric orientation, despite its negligible direct cost.

What, then, are the "costs" that give business page claiming its signaling power? We argue that the costs arise *ex post*, from heightened customer expectations once a business signals its presence. Claiming one's page publicly demonstrates that the owner is active on the platform, presumably monitoring feedback. Customers might interpret this as a sign that "the owner is attentive to customer feedback." However, this signal comes with hidden costs: once customers see that an owner is present, they naturally expect more responsiveness and service improvements. Failing to live up to these expectations can damage the business's reputation. For many small businesses, this commitment can be challenging. Owners of local restaurants often have limited capacity to monitor and manage online feedback (Small Business Administration 2022). Upon noticing a claimed page, dissatisfied customers may feel empowered to voice complaints they might otherwise have withheld, believing the owner will address their issues. In other words, the signal of claiming raises customer expectations, and any mismatch between expectations and actual service can result in harsher public critiques. The cost of signaling thus materializes as a risk to rating metrics and reputation.

It is worth noting that managerial responses to online reviews represent an active form of engagement and signaling. When owners or managers reply to customer reviews, they send a powerful

signal of responsiveness, concern, and service commitment (Li et al. 2017). Prior research has documented that such responses can positively shape customer perceptions (Proserpio and Zervas 2017). In the language of signaling theory, managerial responses are costly signals—they require time, effort, and tact—that low-commitment firms may not be willing to undertake. Thus, compared to a signal of claiming a business page, managerial responses function as a different signaling mechanism—one that reinforces the business's commitment to customer management.

It is important to distinguish the different roles these two signals play. Business page claiming is an implicit signal of owner presence, whereas managerial response is an explicit signal of responsiveness. Both are grounded in signaling theory, but their effectiveness and implications differ. Claiming alone can have a negative effect if not followed by action. Managerial responses, on the other hand, have generally been associated with positive outcomes in the literature. In short, a claimed page without active engagement sends an incoherent signal that may even backfire, whereas a claimed page with active engagement sends an explicit signal about the owner's presence and responsiveness to customers. Building on the above arguments, we propose the following hypothesis for empirical test.

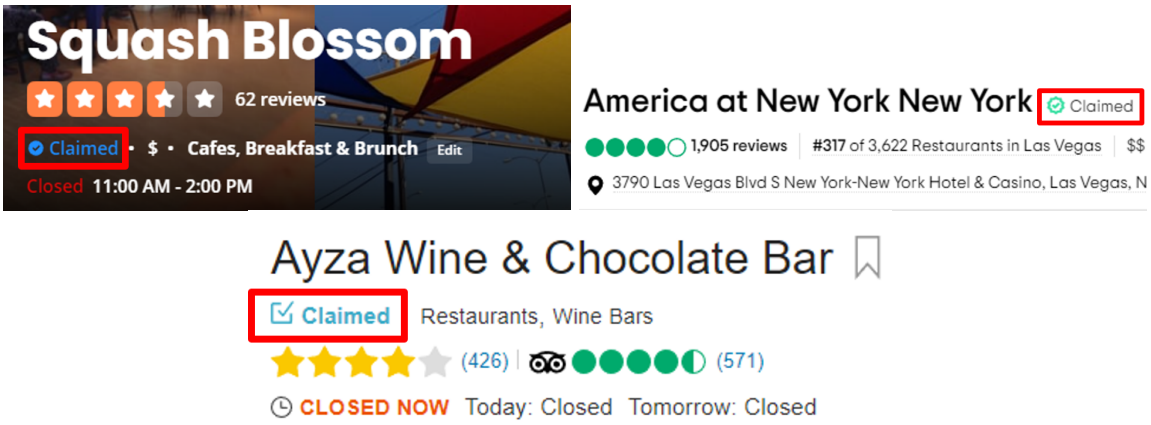
Hypothesis 4 (H4): *Managerial response after business page claiming can mitigate the negative effects of business page claiming.*

4. Research Context and Data

Business page claiming is the action of asserting ownership of a business page on a review platform. This can be accomplished by the owner or management of the business through a verification process provided by the platforms. Business page claiming is also the initial step that allows owners to access various features for customer management on online platforms at no cost. To claim a business page, owners usually begin by signing up and searching for the business name on platforms. The platforms will show the business page if it is already listed by a customer. The claim status of the business page by the owner ("Unclaimed" or "Claimed") is typically displayed at the top of the page near the business name, on major review platforms like Yelp, TripAdvisor, and Yellow

Pages. Examples of the owner's page claiming status in these review platforms are illustrated in **Figure 1**. Business page claiming is known to provide several advantages, including establishing an online presence for a business, granting owners control over the business page, and implementing customer management features such as responding to customer reviews (Yelp 2024).

Figure 1 **Business Page Claiming Status in Major Review Platforms (Yelp, TripAdvisor, and Yellow Pages)**



We collect Yelp reviews and ratings of new restaurants that have gained popularity in metropolitan regions in the vicinity of the 200 most populated U.S. cities. These cities are ranked by population as of July 1, 2022, according to estimates from US Census Bureau (2023b) (See **Table B1** in **Appendix B** for the complete list of these cities). Specifically, the restaurants in our data are located within a 25-mile (40-kilometer) radius in each city. With a unique dataset that tracks the dates when owners claim their business pages on Yelp, we have a rare opportunity to observe how business page claiming by owners influences customer reviews.

Restaurant popularity within the focal area is assessed by automated Yelp algorithms. We monitor the dates when restaurants are recognized as popular in their respective areas (henceforth referred to as the popular dates). It is important to note that the criteria for being listed as popular are not influenced by requests from the owners, business advertising, or payments for features, ensuring an unbiased selection process. By restricting our analysis to restaurants classified as popular through platform-operated automated mechanisms, we mitigate potential biases originating

from unobserved heterogeneity among restaurants. Additionally, our focus on new restaurants helps to reduce potential confounding due to diverse operational history of different restaurants.

We collect restaurant samples with claimed dates on Yelp ranging from November 2022 to September 2023. These restaurants are newly opened, operating for no more than three months as of the popular date. We distinguish two groups of new businesses: never-adopters and adopters. The former consists of restaurants that did not claim their business pages on Yelp throughout our sample period. The latter consists of restaurants that claimed their business page during our sample period. For adopters, we have documented the date of business page claiming.

We categorize the restaurants based on 11 major cuisine types: American, Mexican, Indian, Italian, Chinese, Japanese, Korean, Vietnamese, Mediterranean, French, and fast food. We also utilize demographic data as a proxy for the restaurant demand in the restaurant location. This includes variables such as the median age and income level of the neighborhood, as well as the population of the restaurant region. We obtain this demographic information from the 2021 American Community Survey estimates (US Census Bureau 2023a), using the postal codes of the restaurants.

To disentangle the claiming effect from other possible concurrent effects, we implement exclusion criteria on post-claiming features. These features include store-specific promotions (e.g., Yelp Deals), managerial responses (i.e., owners' responses to customer reviews), and private messaging. Regarding Yelp Deals, businesses rarely utilize such store-specific promotions, and we exclude these businesses from our sample. Regarding managerial responses, businesses are excluded if they engage in this activity within 90 days following the claimed date of their business page. We also remove any reviews after the date of the first managerial response for each business if it had a managerial response. Notably, the private messaging feature is automatically activated on Yelp upon business page claiming. However, owners can disable this feature at any time. Alternatively, if the owner does not use the private messaging feature for 30 consecutive days without disabling it, the feature will be automatically deactivated 30 days after claiming (Yelp 2017). Thus, we include businesses

that disabled private messaging within 30 days after claiming and exclude reviews until the deactivation date. Additionally, for businesses with private messaging automatically deactivated 30 days after claiming, we exclude reviews from the first 30 days after claiming.[1]

We use these exclusion criteria because the use of these features may also change customer reviewing behavior, thereby confounding our estimation of the business page claiming effect. Alternatively, we may consider effects caused by these auxiliary features as indirect effects of business page claiming. By focusing on businesses that did not use these features during our sample period, we disable the mediators and estimate the direct effect.

We report summary statistics of the restaurant sample in **Table 1**, and the review level characteristics of these businesses in **Table 2**. Approximately 19% of new popular businesses have claimed their pages by the end of the sample period.

Table 1 Summary Statistics: New Popular Restaurants

Variable	Description	Count	Mean	SD	min	max
claim	Whether a business i is claimed	3514	0.19	0.40	0	1
population	Population size in the zip code area of the business i	3502	36336.68	19961.66	16	129165
age	Median age of population in the zip code area of business i	3507	37.36	5.26	18.8	72.4
income	Median income of population in the zip code area of business i	3495	90245.72	34694.49	13510	250001
fast_food	Indicator of a business i provides fast food	3514	0.03	0.16	0	1
american	Indicator of a business i provides American cuisine	3514	0.06	0.24	0	1
mexican	Indicator of a business i provides Mexican cuisine	3514	0.08	0.27	0	1
indian	Indicator of a business i provides Indian cuisine	3514	0.01	0.11	0	1
italian	Indicator of a business i provides Italian cuisine	3514	0.03	0.18	0	1
chinese	Indicator of a business i provides Chinese cuisine	3514	0.03	0.17	0	1
japanese	Indicator of a business i provides Japanese cuisine	3514	0.03	0.16	0	1
korean	Indicator of a business i provides Korean cuisine	3514	0.03	0.17	0	1
vietnamese	Indicator of a business i provides Vietnamese cuisine	3514	0.02	0.15	0	1
mediterranean	Indicator of a business i provides Mediterranean cuisine	3514	0.02	0.14	0	1
french	Indicator of a business i provides French cuisine	3514	0.01	0.09	0	1
delivery	Whether a business i allows delivery	3514	0.25	0.43	0	1
pickup	Whether a business i allows pickup	3514	0.24	0.43	0	1
reservation	Whether a business i allows reservation	3514	0.01	0.08	0	1

5. Identification

Local business owners choose to claim ownership of their Yelp business pages. Such a decision is not random and is likely influenced by a business's operational characteristics and owner traits.

[1] Our initial sample consists of 218,046 reviews (96,470 reviews from claimed restaurants). We exclude 95 reviews from restaurants that participated in Yelp Deals, 29,229 reviews from businesses that engaged in managerial responses within 90 days of claiming, 33,754 reviews posted after the first managerial response, 8,345 reviews from businesses that disabled private messaging within 30 days of claiming, and 5,815 reviews from the first 30 days after claiming for businesses with automatically deactivated private messaging.

Table 2 Summary Statistics: Restaurant Reviews

Variable	Description	Count	Mean	SD	min	max
star	Star rating provided with a review r	140808	4.07	1.33	1	5
1-Star	Whether review r is provided with a 1-star rating	140808	0.09	0.29	0	1
2-Star	Whether review r is provided with a 2-star rating	140808	0.07	0.25	0	1
3-Star	Whether review r is provided with a 3-star rating	140808	0.09	0.29	0	1
4-Star	Whether review r is provided with a 4-star rating	140808	0.17	0.38	0	1
5-Star	Whether review r is provided with a 5-star rating	140808	0.58	0.49	0	1
word	Word counts of review r	140808	91.43	89.08	1	971
length	Number of typed characters of review r	140808	501.66	488.70	7	5348
elite	Whether review r is written by Elite reviewer	140808	0.24	0.43	0	1

For instance, a business may decide to claim its page when experiencing growth in customers and overall performance. The self-selection of owners' business page claiming poses an identification challenge to our estimation of the claiming effect.

To address this, we combine a staggered DiD regression framework with the matching procedure (Jäger and Heining 2022, Aneja et al. 2023, Azoulay et al. 2010). We first utilize propensity score matching (Rosenbaum and Rubin 1983) to pair each treated business with a non-treated counterpart that shows a similar likelihood of claiming its business page on Yelp. This approach ensures the treated and control groups are comparable.

Variables used in the matching process include various characteristics up to 30 days before the popular date.[2] Initially, we use the popular dates for the matching instead of claiming dates because some new businesses claimed their page later during the data collection period and lack a common history with the control group.[3] Specifically, we include the average star rating of businesses to mitigate potential biases due to the possibility that highly-rated businesses might be more likely to claim their business pages. To account for population characteristics, we include population demographics pertaining to the restaurant location, such as population size, median income level, and age of the population. In addition, we include the major ethnic cuisines of restaurants, availability of delivery, pickup, and reservation as well as the proportion of reviews from elite reviewers.

We first calculate propensity scores with logistic regression. We then employ one-to-one nearest neighbor matching without replacement, with a caliper of 0.01. The matching yields 627 pairs of

[2] We also provide matching based on a 14-day period prior to the popular date in **Appendix C.9**.

[3] To enhance the robustness of our findings, we also employ an alternative matching approach based on claiming dates, considering common history with the control group in **Section 7.2**.

adopters and non-adopters. **Figure C1** and **Table C1** in **Appendix C.1** show propensity scores and the covariate balance checks before and after matching, indicating a successful matching.

We measure customer evaluation using both the numerical star rating and the probability of each star rating. Hence, our dependent variables include the numerical star rating and the binary indicator for different star ratings. To test **Hypothesis 2B (H2B)**, we also use the length of a review as a dependent variable. For statistical inference, we estimate the econometric specification represented by Equation (1) at the individual review level:

$$y_{rijt} = \beta claim_{it} + \gamma X_j + \theta_i + \tau_t + \epsilon_{rijt}, \tag{1}$$

where r, i, j, and t index review, restaurant, reviewer, and time, respectively. The independent variable of interest, $claim_{it}$, equals 1 if Yelp business page is claimed at the date of review and 0 otherwise. θ_i and τ_t are business and time fixed effects, respectively. We also include X_j, a reviewer's Yelp Elite status as a reviewer-level control variable.

Recent literature (Goodman-Bacon 2021, Callaway and Sant'Anna 2021) highlights the identification problem of the traditional two-way fixed-effect (TWFE) estimation when there are more than two periods and more than two treatment cohorts/times. Hence, we implement a staggered DiD approach suggested by Callaway and Sant'Anna (2021) to improve the validity of causal effect estimations using the never-treated and not-yet-treated control groups.

6. Results

6.1. Effects on Numerical Rating

To test **Hypothesis 1 (H1)**, we estimate how star ratings change after business owners claim their business page. **Table 3** reports the estimation results. Specifically, Column (1) reports the results where the control group consists of late-adopters (i.e., businesses that have not yet claimed their business pages but eventually did during our sample period). In Column (2), we utilize the never-adopters (i.e., businesses that did not claim their business pages during our sample period) as the control group. Then, in Column (3), we further leverage the weighted DiD by using the weighted sample from the propensity score matching using the never-adopters as the control group. The

results in **Table 3** consistently show that business page claiming leads to a statistically significant decrease in average customer ratings. In terms of magnitude, the DiD coefficient in Column (3) suggests an average decrease of 0.42 stars, which is about a 10.3% reduction in star rating at the mean. Regarding the potential impact on revenue, building on Luca (2016)'s findings that a 1-star increase in Yelp ratings corresponds to a 5% to 9% revenue increase, our results may indicate a potential revenue decline ranging from -2.1% to -3.7%. To summarize, we find a negative effect of business page claiming on customer ratings, thereby supporting **Hypothesis 1 (H1)**.

Table 3 Impact of Business Page Claiming on Customer Rating

	(1) Star (DiD)	(2) Star (DiD)	(3) Star (PSM + DiD)
claim	-0.376***	-0.369***	-0.420***
	(0.130)	(0.130)	(0.148)
Control Group	late-adopters	never-adopters	never-adopters
Matched Sample	N	N	Y
Reviewer Control	Y	Y	Y
Business FE	Y	Y	Y
Seasonality FE	Y	Y	Y

Standard errors in parentheses are clustered by business.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

We next analyze the distributional changes that contribute to the decline in star ratings. Specifically, we estimate the impact of business page claiming on the likelihood of businesses receiving customer ratings for different star levels. **Table 4** presents the estimation results regarding the probability of receiving a one-star rating. We find a consistently positive effect of business page claiming on the likelihood of receiving one-star reviews. For example, Column (3) suggests that claiming a business page leads to a 9.57% increase in the likelihood of the business receiving a one-star rating from customers. In sum, business page claiming leads to a higher occurrence of the lowest ratings, thereby supporting **Hypothesis 2A (H2A)**. It is pertinent to note that we find no statistically significant effect of business page claiming on the likelihood of receiving either a two-star rating or a three-star rating (see **Tables C2 and C3** in **Appendix C.2**).

To test whether particularly dissatisfied customers are more motivated to provide detailed reviews on the business page after noticing that it has been claimed, we examine the change in the

Table 4 Impact of Business Page Claiming on Likelihood of 1-Star Rating

	(1) 1-Star (DiD)	(2) 1-Star (DiD)	(3) 1-Star (PSM + DiD)
claim	0.0762***	0.0770***	0.0957***
	(0.0174)	(0.0174)	(0.0204)
Control Group	late-adopters	never-adopters	never-adopters
Matched Sample	N	N	Y
Reviewer Control	Y	Y	Y
Business FE	Y	Y	Y
Seasonality FE	Y	Y	Y

Standard errors in parentheses are clustered by business.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

length of 1-star reviews after business page claiming. We measure review length by the number of words in reviews. Results reported in **Table 5** indicate a positive and statistically significant increase in the number of words in 1-star reviews after business page claiming, thereby supporting **Hypothesis 2B (H2B)**. On average, customers write 1-star reviews that are 93 words[4] longer after the business page claiming. In sum, our results show that claiming a business page significantly increases the effort customers put into writing 1-star reviews. In contrast, we find no evidence that the reviewers in general, across all star ratings, write longer reviews after business page claiming. These results are reported in **Appendix C.3**. Additional analyses using the number of characters as an alternative measure of review length show consistent results (see **Appendix C.4**).

Table 5 Impact of Business Page Claiming on 1-Star Review Word Counts (Log-transformed)

	(1) log(1-Star Word) (DiD)	(2) log(1-Star Word) (DiD)	(3) log(1-Star Word) (PSM + DiD)
claim	2.486**	2.519**	1.265***
	(1.070)	(1.210)	(0.422)
Control Group	late-adopters	never-adopters	never-adopters
Matched Sample	N	N	Y
Reviewer Control	Y	Y	Y
Business FE	Y	Y	Y
Seasonality FE	Y	Y	Y

Standard errors in parentheses are clustered by business.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Finally, we explore how business page claiming impacts the probability of a business receiving 5-star and 4-star ratings. **Table 6** reports the estimated effect of business page claiming on the likelihood of receiving 5-star ratings. The results clearly suggest a negative effect. In contrast,

[4] This figure represents the actual increase in word counts for 1-star reviews, not accounting for the natural logarithm.

estimation results reported in **Table 7** suggest that business page claiming increases the likelihood of a business receiving 4-star ratings, thereby supporting **Hypothesis 3 (H3)**.

Table 6 Impact of Business Page Claiming on Likelihood of 5-Star Rating

	(1) 5-Star (DiD)	(2) 5-Star (DiD)	(3) 5-Star (PSM + DiD)
claim	-0.160***	-0.156***	-0.161***
	(0.0471)	(0.0471)	(0.0553)
Control Group	late-adopters	never-adopters	never-adopters
Matched Sample	N	N	Y
Reviewer Control	Y	Y	Y
Business FE	Y	Y	Y
Seasonality FE	Y	Y	Y

Standard errors in parentheses are clustered by business.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7 Impact of Business Page Claiming on Likelihood of 4-Star Rating

	(1) 4-Star (DiD)	(2) 4-Star (DiD)	(3) 4-Star (PSM + DiD)
claim	0.0764**	0.0768**	0.0853**
	(0.0302)	(0.0299)	(0.0391)
Control Group	late-adopters	never-adopters	never-adopters
Matched Sample	N	N	Y
Reviewer Control	Y	Y	Y
Business FE	Y	Y	Y
Seasonality FE	Y	Y	Y

Standard errors in parentheses are clustered by business.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

6.2. Effects on Review Content

Next, we investigate how business page claiming influences the textual content of reviews. Specifically, we examine 1) whether business page claiming leads customers to express more negative sentiment and less positive sentiment in their review text and 2) whether business page claiming encourages customers to address owners more directly about the service issues in their 1-star reviews. The latter inquiry can shed light on our proposed *owner-oriented* mechanism which should be more prominent after business page claiming.

To estimate the impact of business page claiming on review sentiment, we employ Valence Aware Dictionary and Sentiment Reasoner (Hutto and Gilbert 2014), or VADER[5], to measure sentiment scores. We use both negative and positive sentiment scores as dependent variables (from 0 to 1).

Table 8 reports the effect of business page claiming on negative sentiment expressed in review text. All three estimations consistently indicate an increase in negative sentiment after business page claiming, in full alignment with previous results based on numerical rating. Similarly, estimation results reported in **Table 9** suggest a decrease in positive sentiment expressed in review text after business page claiming. In summary, sentiment analyses based on review text further support our main hypotheses on the negative impact of business page claiming.

Table 8 Impact of Business Page Claiming on Negative Sentiment Score (Score from VADER)

	(1) Neg (DiD)	(2) Neg (DiD)	(3) Neg (PSM + DiD)
claim	0.00989***	0.00981***	0.00890**
	(0.00358)	(0.00360)	(0.00421)
Control Group	late-adopters	never-adopters	never-adopters
Matched Sample	N	N	Y
Reviewer Control	Y	Y	Y
Business FE	Y	Y	Y
Seasonality FE	Y	Y	Y

Standard errors in parentheses are clustered by business.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9 Impact of Business Page Claiming on Positive Sentiment Score (Score from VADER)

	(1) Pos (DiD)	(2) Pos (DiD)	(3) Pos (PSM + DiD)
claim	-0.0296**	-0.0307**	-0.0213
	(0.0128)	(0.0128)	(0.0142)
Control Group	late-adopters	never-adopters	never-adopters
Matched Sample	N	N	Y
Reviewer Control	Y	Y	Y
Business FE	Y	Y	Y
Seasonality FE	Y	Y	Y

Standard errors in parentheses are clustered by business.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

To answer the second inquiry, we begin by grouping review text based on their numerical ratings. We present word clouds of the top words in 1-star reviews before and after business page claiming,

[5] VADER is a popular tool for social media sentiment analysis. For results based on an alternative tool, please refer to **Appendix C.5** where we use TextBlob (Loria et al. 2018) to extract sentiment scores.

shown in **Figure C2** in **Appendix C.6**. Although not granular, we take this as a primitive yet suggestive evidence that the *owner-oriented* mechanism strengthens after business page claiming.

To examine whether customers are more likely to address the owner and management directly regarding the service issues in their reviews after business page claiming, we define three different indicator variables. The first one, denoted by "*owner*," indicates whether a review contains terms such as "owner," "server," "waiter," "manager," "management," "employee," "staff," "merchant," "employer," "businessman," "businesswoman," "host," or "supervisor."

The second and third variables capture whether customers directly call out the owners in their reviews because they expect owners to read their reviews. Specifically, we focus on pronouns directly referring to individuals, likely owners. We define a variable "*owner*2" to indicate whether a review contains words "you" and "your." We define a variable "*owner*3" to indicate whether a review contains terms such as "he," "his," "him," "she," "her," "they," "their," or "them."

It is possible that these pronouns may refer to other customers rather than owners. To address this, we introduce the fourth variable, "*owner*4," created using Generative AI (ChatGPT 4.0) and manual labeling to determine whether a 1-star review is directly addressing the owner. We hired two RAs who manually labeled 300 one-star reviews that specifically address the owners and cross-checked the labels, including references to owner terms and pronouns, achieving an accuracy of 86.4%. Using the finalized labels, we then engineered a prompt for ChatGPT in a few-shot learning approach (with accuracy of 84.7% on the human-labeled set) to label the rest of the test set. Then, we reestimated the DiD coefficients with PSM.

Estimation results reported in **Table 10** show a significant positive effect of business page claiming on customers addressing owners in their 1-star reviews. Specifically, we find that the number of owner-related terms increased in the review texts after business page claiming, and highly dissatisfied reviewers tend to directly address owners in reviews after business page claiming.

Interestingly, except for 1-star reviews, business page claiming does not have a significantly positive effect on owner-indicating measures in reviews. These results are provided in **Appendix C.7**.

Table 10 Effect of Business Page Claiming on Direct Addressing of Owners in 1-Star Reviews

	(1) owner (PSM + DiD)	(2) owner2 (PSM + DiD)	(3) owner3 (PSM + DiD)	(4) owner4 (PSM + DiD)	(5) owner_topic (PSM + DiD)
claim	0.234*	1.290***	1.142**	0.0191**	1.698***
	(0.140)	(0.368)	(0.497)	(0.00828)	(0.494)
Control Group	never-adopters	never-adopters	never-adopters	never-adopters	never-adopters
Matched	Y	Y	Y	Y	Y
Reviewer Control	Y	Y	Y	Y	Y
Business FE	Y	Y	Y	Y	Y
Seasonality FE	Y	Y	Y	Y	Y

Standard errors in parentheses are clustered by business.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Finally, to detect topical shift in reviews, particularly regarding how they express issues after business page claiming, we analyze and compare the dominant topics in reviews written before and after the business page was claimed. We use the Gensim library (Řehůřek and Sojka 2010) for topic modeling and focus on 1-star reviews since highly dissatisfied customers are the most motivated to express their service-related concerns in reviews, likely directing these concerns to the owner.

Specifically, we construct a topic model based on 1-star reviews, using them as a corpus, and then apply the model to predict the topic distribution for each review. Based on evaluation of topic coherence, we select the best model, which yields six distinct topics. Details on how we selected the best model based on topic coherence and the identified topics are provided in **Appendix C.8**.

Among the six topics, we identify Topic 4 as the one in which customers address the owner regarding the service issues. Specifically, Topic 4 has high probabilities for words like "order," "ask," "customer," "say," "tell," "manager," "service," "time," "go," and "pay." This topic mostly focuses on customer service interactions and communication with owners/managers. To capture owner-oriented reviews while filtering out noise from the topic modeling results, we concentrate on 1-star reviews where the dominant topic is Topic 4, with a topic contribution percentage greater than or equal to 90% (see examples in **Table C22** in **Appendix C.8**). In these reviews, customers address owners, expecting their service concerns to be resolved, or provide suggestions related to service issues. After creating a binary variable *owner_topic*, we conduct a staggered DiD analysis using *owner_topic* as the dependent variable. Column (5) of **Table 10** reports the estimation result, suggesting an increase in owner addressing behavior. This further supports our *owner-oriented* mechanism: customers are more likely to directly address owners in their reviews about service issues after business page claiming.

6.3. The Role of Managerial Responses

Since the focus of this study is on the effects of business page claiming on customer evaluations, we had to select restaurants that have only claimed their businesses on Yelp without performing any other activities such as providing managerial responses to reviews. Given that we also have 456 restaurants that not only claimed their business pages but also started responding to reviews, it is interesting to use this additional sample to evaluate whether managerial response can serve as a mitigation strategy for the negative effects of business page claiming. Our results show that managerial responses after business page claiming can help mitigate the negative effects of claiming to some extent, as reported in **Appendix D**, thereby providing some support for **Hypothesis 4 (H4)**.

7. Robustness Checks

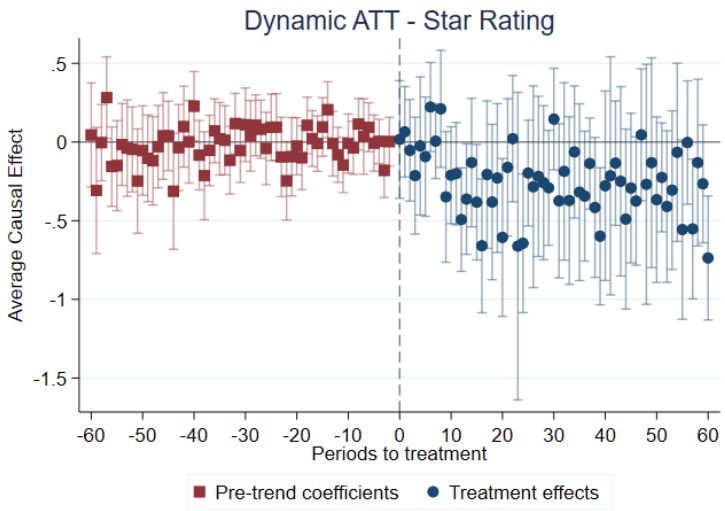
In this section, we conduct a battery of robustness checks to alleviate endogeneity concerns and also analyze effect heterogeneity.

7.1. Parallel Trend Assumption

Our staggered DiD estimate (Callaway and Sant'Anna 2021) requires support for the assumption of a parallel trend (Chiu et al. 2023). We employ diagnostic tests based on the Fixed Effects Counterfactual Estimator (FEct) proposed in Liu et al. (2024). Specifically, we utilize the F-test (goodness-of-fit test) and placebo test to thoroughly evaluate the validity of the parallel trend assumption (Chiu et al. 2023). We first check for the presence of a pre-trend using the F-test. The F-test performs evaluation for zero residual averages in the pre-treatment periods. A larger F-test's p-value indicates a better fit of the pre-trend (Chiu et al. 2023). In our analysis, the F-test's p-value is 0.168, passing the F-test at a 95% confidence interval, supporting the validity of the pre-trend assumption. We show the dynamic Average Treatment Effect on the Treated (ATT) in **Figure 2**.

Furthermore, we conduct a placebo test to provide support for the parallel trend assumption. The placebo test is performed by assuming the treatment starts a few periods earlier than its actual onset for each unit in the treatment group and applying the counterfactual estimator to

Figure 2 Pre-trend Check: ATT Pre and Post 60 days



obtain estimates of ATTs during this pseudo-treatment period. To conduct the test, we exclude observations from the last two pre-treatment periods (days) and examine whether the estimated ATTs within this range significantly deviate from zero (Chiu et al. 2023). The null hypothesis posits that the average pseudo-treatment effects within this range are equal to zero. Therefore, a larger placebo p-value suggests a better fit of the pre-trend. In our analysis, the placebo test yields a p-value of 0.453, affirming the non-violation of the parallel trend assumption (Liu et al. 2024).

7.2. Robustness Check: Stacked DiD With PSM Using Claimed Date

For this robustness check, we use a stacked DiD design (Wang et al. 2022) utilizing claimed dates. In our main analyses, we resort to matching based on popular dates as they always precede the claimed dates, ensuring common history in our data context. The stacked DiD approach offers an alternative method for gathering common history. By stacking pairs in the assigned treatment segments, we enable a robust examination of the impact while accounting for the common history between each treated group and its matched control group in the pre-claiming period. We find consistent support for our main empirical results using this alternative matching approach. More information regarding matching and results is available in **Appendix C.10**.

7.3. Robustness Check: Counterfactual Analyses Using Google Reviews of Yelp Claimed Businesses

Our reliance on observational data within Yelp lacks a counterfactual sample. Prior studies indicate that external marketing efforts, such as promotions, can influence ratings (Li 2016). Additionally, improvements in restaurant quality may also affect customer ratings (Ananthakrishnan et al. 2023). These factors could be potential confounders and pose challenges for identification.

To address these challenges and mitigate the concerns of these potential confounders, we employ an additional control group consisting of the same businesses that are claimed on Yelp and also listed on Google. Specifically, we manually link each Yelp-claimed restaurant to its business page on Google by matching names and addresses. We successfully link 664 businesses out of 672 treated businesses (98.8% of all Yelp-claimed businesses) across both platforms.

Comparing customer reviews across Yelp and Google helps alleviate concerns of unobserved, time-varying confounders for several reasons. First, a business's claiming status is not shown on its Google business page. Second, unlike Yelp, where business details, including claiming status and reviews, appear together on a single page, Google's review page is presented separately from the business page. Third, the claiming status is not displayed when the reviewer posts reviews on Google (**Figure C6** in **Appendix C.11.**)

Unlike Yelp, which requires every review to have a star rating, Google allows users to provide star ratings without reviews. Consequently, we conduct two separate analyses: (1) using all Google ratings; (2) using only Google ratings that include review text. **Table 11** reports the results from the two empirical designs assessing its effect on average star ratings. In Column (1), we observe that the average star rating decreases by approximately 0.4 when considering all Google ratings, regardless of whether they are accompanied by reviews. In column (3), focusing only on Google ratings that include written reviews, we find a similar decrease in average star ratings by 0.36.

One may be concerned that Google has a larger user base than Yelp. To alleviate this concern, we employ a manual matching process based on the median review volume of each business before the claim date on Yelp. All businesses in our sample have a claim date on Yelp, which we use

as the reference point for computing pre-treatment review volumes on Yelp and Google, rather than popular dates. Specifically, we calculate the pre-treatment median review volume for each business on both platforms and compute their ratio (MRR). Details of this calculation are provided in **Appendix C.11**. We then exclude businesses for which the ratio exceeds the overall MRR between the two platforms. Columns (2) and (4) in **Table 11** report the estimation results, which are qualitatively the same as the results without filtering.

Table 11 Yelp and Google Reviews: Effect of Business Page Claiming on Customer Rating

	First Design		Second Design	
	(1)	(2)	(3)	(4)
	Star	Star	Star	Star
	(DiD)	(DiD)	(DiD)	(DiD)
claim	-0.409***	-0.400***	-0.365***	-0.394***
	(0.147)	(0.160)	(0.121)	(0.142)
Control Group	Google	Google	Google	Google
Median Filtering	N	Y (within Median Ratio 1)	N	Y (within Median Ratio 2)
Reviewer Control	Y	Y	Y	Y
Platform FE	Y	Y	Y	Y
Business FE	Y	Y	Y	Y
Seasonality FE	Y	Y	Y	Y

Standard errors in parentheses are clustered by business.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Similarly, the estimation results presented in **Tables 12**, **13**, and **14** indicate an increase in the likelihood of receiving a 1-star or 4-star rating, along with a decrease in the likelihood of receiving a 5-star rating, respectively. These findings are consistent with our main results.

Table 12 Yelp and Google Reviews: Impact of Business Page Claiming on Likelihood of 1-Star Rating

	First Design		Second Design	
	(1)	(2)	(3)	(4)
	1-Star	1-Star	1-Star	1-Star
	(DiD)	(DiD)	(DiD)	(DiD)
claim	0.0782***	0.0782***	0.0749***	0.0837***
	(0.0195)	(0.0190)	(0.0183)	(0.0198)
Control Group	Google	Google	Google	Google
Median Filtering	N	Y (within Median Ratio 1)	N	Y (within Median Ratio 2)
Reviewer Control	Y	Y	Y	Y
Platform FE	Y	Y	Y	Y
Business FE	Y	Y	Y	Y
Seasonality FE	Y	Y	Y	Y

Standard errors in parentheses are clustered by business.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Moreover, **Table 15** presents the effect of business page claiming on the length of 1-star reviews. The results reveal a positive and statistically significant increase in the number of words in 1-star reviews following business page claiming.

Table 13 Yelp and Google Reviews: Impact of Business Page Claiming on Likelihood of 4-Star Rating

	First Design		Second Design	
	(1)	(2)	(3)	(4)
	4-Star	4-Star	4-Star	4-Star
	(DiD)	(DiD)	(DiD)	(DiD)
claim	0.0906***	0.0980***	0.0951***	0.104***
	(0.0308)	(0.0351)	(0.0249)	(0.0333)
Control Group	Google	Google	Google	Google
Median Filtering	N	Y (within Median Ratio 1)	N	Y (within Median Ratio 2)
Reviewer Control	Y	Y	Y	Y
Platform FE	Y	Y	Y	Y
Business FE	Y	Y	Y	Y
Seasonality FE	Y	Y	Y	Y

Standard errors in parentheses are clustered by business.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 14 Yelp and Google Reviews: Impact of Business Page Claiming on Likelihood of 5-Star Rating

	First Design		Second Design	
	(1)	(2)	(3)	(4)
	5-Star	5-Star	5-Star	5-Star
	(DiD)	(DiD)	(DiD)	(DiD)
claim	-0.170***	-0.163***	-0.162***	-0.160***
	(0.0497)	(0.0516)	(0.0525)	(0.0517)
Control Group	Google	Google	Google	Google
Median Filtering	N	Y (within Median Ratio 1)	N	Y (within Median Ratio 2)
Reviewer Control	Y	Y	Y	Y
Platform FE	Y	Y	Y	Y
Business FE	Y	Y	Y	Y
Seasonality FE	Y	Y	Y	Y

Standard errors in parentheses are clustered by business.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 15 Yelp and Google Reviews: Impact of Business Page Claiming on 1-Star Review Word Counts (Log-transformed)

	Second Design	
	(1)	(2)
	log(1-Star Word)	log(1-Star Word)
	(DiD)	(DiD)
claim	2.671**	2.438*
	(1.298)	(1.380)
Control Group	Google	Google
Median Filtering	N	Y (within Median Ratio 2)
Reviewer Control	Y	Y
Platform FE	Y	Y
Business FE	Y	Y
Seasonality FE	Y	Y

Standard errors in parentheses are clustered by business.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

7.4. Long-term and Heterogeneous Effects

To test our main findings over the longer term, we have expanded our sample to include up to one year of additional reviews for each treated and control group. We conduct analyses using two distinct control groups: one within Yelp, incorporating both never-claimed and not-yet-claimed Yelp restaurants, and another using Google reviews of Yelp-claimed restaurants over the extended period. From both analyses, we find consistent support for our main empirical results and show that the negative effects of business page claiming persist over a longer period (see **Appendix E**).

We also conduct subgroup analyses to examine which businesses are more affected by page claiming. Restaurants with higher ratings are more likely to claim their pages, yet they experience negative effects after claiming. Moreover, lower-priced restaurants in competitive areas are particularly vulnerable to rating declines (see **Appendix F**).

7.5. Online Experiment

To reinforce our empirical results and to gain deeper insights into the mechanism of the effects, we have conducted a randomized online experiment on Prolific. We find consistent support for our empirical findings. Specifically, in both positive and negative scenarios, the ratings are shifted toward the lower end of distributions for claimed restaurants compared to unclaimed ones. Further, we show that 67.29% of participants recognize the owners' presence in the claimed restaurants and 48.12% of subjects confirm that they can directly address the owner in their feedback. We also find that some "positive appreciative effects" are mentioned by the study participants: 16.5% of subjects indicated that claiming made them "value the owners' efforts and support the business"; 37.59% mentioned that claimed business is "trustworthy or legitimate."

Importantly, consistent with our theoretical expectations, we find that business page claiming affects reviewers' evaluations (for 58.3% of participants), makes them more critical (31.95%), and increases their expectations for service from owners (34.2%), as shown in **Appendix G**.

8. Conclusion and Implications

Information technology has fundamentally changed consumer behavior by increasing their dependence on digital platforms and raising their expectations for prompt service resolution. As a result, many local businesses with limited budgets have turned to online platforms like Yelp to monitor and even respond to customer reviews. Platforms, from their perspective, often encourage business owners to claim their business pages and utilize customer management features. Despite the touted benefits of doing so, a substantial number of business pages remain unclaimed. In this paper, we have theoretically and empirically examined the negative effect of business page claiming on customer reviews. Specifically, our empirical analysis shows that business page claiming reduces

average customer rating by 10.3%, mainly due to an increase in the lowest customer ratings and a decrease in the highest customer ratings, and that this effect is observed over the long-term period (see **Appendix E**). In accordance with this, the review text analysis shows an increase in negative sentiment and a decrease in positive sentiment after business page claiming. Moreover, after a business page is claimed, customers who provide the lowest ratings tend to write lengthier reviews and address business owners more directly about service issues. Lastly, we find that managerial responses could help partially mitigate the negative effects of business page claiming for businesses that leverage this strategy after page claiming.

Beyond reinforcing the empirical findings, the online experiment provides further insights into why claiming has these effects. Customers may interpret claiming as a signal of owner presence, which elevates their expectations for service and responsiveness. When these expectations are not met, reviewers become more critical in their evaluations and more likely to voice their concerns directly to the owner. At the same time, a smaller subset of participants views claiming as a sign of legitimacy or owner effort, highlighting the nuanced ways in which customers process this signal. Together, these experimental insights help explain the mechanisms behind the observed rating shifts and clarify the hidden costs of signaling in this context (see **Appendix G**).

Our findings offer important theoretical implications. While several studies have examined the impact of managerial responses in online reviews, there remains limited understanding of the effects of business page claiming by owners. This is noteworthy because existing studies on managerial responses tend to overlook the pivotal role of the owner's business page claiming, which serves as the first step preceding managerial responses. In particular, the effect of business page claiming might be as important as the impact of managerial responses that was reported in Proserpio and Zervas (2017) and Chevalier et al. (2018). Business owners often selectively respond to only a few reviews on review platforms, and customers might not readily recognize the online presence of the business owner through managerial responses as it requires additional effort to search for such responses amidst other customer feedback, especially if the business has a high review volume.

Thus, the signaling of business owners' attention may be only partially attributed to managerial responses. In contrast, customers can easily discern the owner's presence and potential service availability through the claim status visibly displayed on the front of business pages. To distinguish the two signals conceptually, we argue that claiming represents a passive signal of owner's presence whose (hidden) cost is poorly understood by practitioners and is missing in the literature, while managerial responses serve as a more active signal of owner's presence and responsiveness whose cost is both explicit and well-understood. We, therefore, contend that examining the effect of business page claiming contributes to the literature on online presence, reputation management, signaling and managerial responses by filling this crucial research gap.

Our findings have important practical implications, especially for local business owners considering claiming their business pages on review platforms. While business page claiming can benefit a business by signaling trustworthiness and commitment, our study issues a cautionary note by highlighting its hidden cost. Specifically, our findings suggest that business owners need to brace for a potential increase in 1-star reviews and a possible decrease in 5-star reviews after claiming their business pages. Further, analyses of heterogeneous treatment effects suggest that lower-priced restaurants in more competitive locations or restaurants with a higher rating are more likely to experience negative effects of claiming if they do not perform customer management actions after claiming. These subgroup analyses offer nuanced insights into what types of restaurants experience the negative repercussions related to business page claiming, serving as useful guidelines for local businesses in their decision to establish online presence on Yelp.

However, we believe that such a negative shock to online reputation should not discourage business owners from claiming their business pages. Business owners can mitigate or even overcome this shock if they are aware of it and are adequately prepared. As Hirschman (1970) pointed out, a customer's decision to voice her complaint towards a business is an alternative to her exit, and is a better outcome for the business if the spillover from negative voices is well-managed. As such, business owners should pay close attention to and properly handle an increase in 1-star ratings after

business page claiming. We also suggest that business owners develop strategies to retain support from enthusiastic customers who might otherwise become less engaged after noticing the business page claiming. Of course, these preparations can be challenging for local businesses, many of which are predominantly family-owned enterprises (Small Business Administration 2022). To avoid being caught off guard and placed at a disadvantage, local business owners should exercise caution when they claim their business pages and think carefully about the timing. To alleviate the negative effects, we propose and test a mitigation strategy of providing managerial responses. This strategy shows some promise in reducing the negative impact of business page claiming (**Appendix D**).

The current study has limitations that open opportunities for future research. First, we only consider two review platforms for our empirical analyses — Yelp and Google. We hope future research can further assess the robustness of our findings using business page claiming data on other platforms. Second, the impact of business page claiming is influenced by the design of the "Claimed" icon on a business page. Whether and to what extent business page claiming still affects 1-star or 5-star reviewers on platforms with different "Claimed" indicator designs remains unclear and is a potential avenue for future research. Third, our sampling strategy and Yelp's platform design only allowed us to collect the sample of popular new restaurants using the "hot and new" filter. We acknowledge that our findings might not be fully generalizable to all new restaurants, and hope that future research could investigate the impacts of business page claiming on less popular restaurants. Finally, our identification relies on the parallel trend assumption, as in a typical DiD design. Despite our effort to ensure the comparability of treated and control units, it is possible that restaurants that claimed their business pages might have experienced trends different from untreated restaurants after claiming, had they not claimed. After all, a restaurant owner, as any economic agent, should strategically choose a business decision to maximize its benefits, which means that there might exist an upward bias of the estimated effect of business page claiming due to circumstances unobservable to researchers. Because our estimated effects are negative, the potential selection bias should not qualitatively change our findings. Indeed, if restaurant owners

were intuitively wary of the potential negative impacts of business page claiming, they might have already timed their claiming decision or prepared accordingly, in which case, the true magnitude of the negative effect of business page claiming is likely larger than our estimated one.

References

Ananthakrishnan U, Proserpio D, Sharma S (2023) I hear you: Does quality improve with customer voice? *Marketing Sci.* 42(6):1143–1161.

Aneja A, Luca M, Reshef O (2023) The benefits of revealing race: Evidence from minority-owned local businesses. Technical report, National Bureau of Economic Research.

Azoulay P, Graff Zivin JS, Wang J (2010) Superstar extinction. *Quart. J. Econom.* 125(2):549–589.

Bolton GE, Katok E, Ockenfels A (2004) How effective are electronic reputation mechanisms? An experimental investigation. *Management Sci.* 50(11):1587–1602.

Callaway B, Sant'Anna PH (2021) Difference-in-differences with multiple time periods. *J. Econometrics* 225(2):200–230.

Chen PY, Dhanasobhon S, Smith MD (2008) All reviews are not created equal: The disaggregate impact of reviews and reviewers at Amazon.com. `https://dx.doi.org/10.2139/ssrn.918083`.

Chen W, Gu B, Ye Q, Zhu KX (2019) Measuring and managing the externality of managerial responses to online customer reviews. *Inform. Systems Res.* 30(1):81–96.

Chevalier JA, Dover Y, Mayzlin D (2018) Channels of impact: User reviews when quality is dynamic and managers respond. *Marketing Sci.* 37(5):688–709.

Chiu A, Lan X, Liu Z, Xu Y (2023) What to do (and not to do) with causal panel analysis under parallel trends: Lessons from a large reanalysis study. `https://dx.doi.org/10.2139/ssrn.4490035`.

Chung S, Animesh A, Han K, Pinsonneault A (2020) Financial returns to firms' communication actions on firm-initiated social media: Evidence from Facebook business pages. *Inform. Systems Res.* 31(1):258–285.

Connelly BL, Certo ST, Ireland RD, Reutzel CR (2011) Signaling theory: A review and assessment. *J. Management* 37(1):39–67.

del Río-Lanza AB, Vázquez-Casielles R, Díaz-Martín AM (2009) Satisfaction with service recovery: Perceived justice and emotional responses. *J. Bus. Res.* 62(8):775–781.

Dellarocas C, Gao G, Narayan R (2010) Are consumers more likely to contribute online reviews for hit or niche products? *J. Management Inform. Systems* 27(2):127–158.

Deng C, Ravichandran T (2024) Managerial response to online positive reviews: Helpful or harmful? *Inform. Systems Res.* 35(4):1802–1823.

Entrepreneur (2021) Why all small businesses should manage their Yelp pages. `https://www.entrepreneur.com/growing-a-business/why-all-small-businesses-should-manage-their-yelp-pages/374418`, [Online; accessed 6-Oct-2025].

Gao Y, Rui H, Sun S (2023) The power of identity cues in text-based customer service: Evidence from Twitter. *MIS Quart.* 47(3).

Goodman-Bacon A (2021) Difference-in-differences with variation in treatment timing. *J. Econometrics* 225(2):254–277.

Gu B, Ye Q (2014) First step in social media: Measuring the influence of online management responses on customer satisfaction. *Production Oper. Management* 23(4):570–582.

Hartzer B (2018) Research reveals the sad state of Google My Business listings. `https://www.billhartzer.com/local-search/research-reveals-sad-state-google-business-listings/`, [Online; accessed 6-Oct-2025].

Hennig-Thurau T, Gwinner KP, Walsh G, Gremler DD (2004) Electronic word-of-mouth via consumer-opinion platforms: What motivates consumers to articulate themselves on the internet? *J. Interactive Marketing* 18(1):38–52.

Hirschman AO (1970) *Exit, voice, and loyalty: Responses to decline in firms, organizations, and states*, volume 25 (Harvard University Press).

Ho-Dac NN, Carson SJ, Moore WL (2013) The effects of positive and negative online customer reviews: Do brand strength and category maturity matter? *J. Marketing* 77(6):37–53.

Homburg C, Ehm L, Artz M (2015) Measuring and managing consumer sentiment in an online community environment. *J. Marketing Res.* 52(5):629–641.

Hutto C, Gilbert E (2014) VADER: A parsimonious rule-based model for sentiment analysis of social media text. *Proc. Internat. AAAI Conf. Web and Social Media*, volume 8, 216–225.

Jäger S, Heining J (2022) How substitutable are workers? Evidence from worker deaths. Technical report, National Bureau of Economic Research.

Khern-am nuai W, Kannan K, Ghasemkhani H (2018) Extrinsic versus intrinsic rewards for contributing reviews in an online platform. *Inform. Systems Res.* 29(4):871–892.

Li C, Cui G, Peng L (2017) The signaling effect of management response in engaging customers: A study of the hotel industry. *Tourism Management* 62:42–53.

Li X (2016) Could deal promotion improve merchants' online reputations? The moderating role of prior reviews. *J. Management Inform. Systems* 33(1):171–201.

Li X (2018) Impact of average rating on social media endorsement: The moderating role of rating dispersion and discount threshold. *Inform. Systems Res.* 29(3):739–754.

Li Y, Lu LX, Lu SF (2023) Does social media dominate government report cards in influencing nursing home demand? *Manufacturing Service Oper. Management* 25(6):2085–2105.

Liu L, Wang Y, Xu Y (2024) A practical guide to counterfactual estimators for causal inference with time-series cross-sectional data. *Amer. J. Political Sci.* 68(1):160–176.

Loria S, Keen P, Honnibal M, Yankovsky R, Karesh D, Dempsey E (2018) TextBlob: Simplified text processing. Python library.

Luca M (2016) Reviews, reputation, and revenue: The case of Yelp. com. *Working Paper, Harvard Business School, Boston* (12-016).

Pantelidis IS (2010) Electronic meal experience: A content analysis of online restaurant comments. *Cornell Hospitality Quart.* 51(4):483–491.

Pee LG (2016) Negative online consumer reviews: Can the impact be mitigated? *Internat. J. Market Res.* 58(4):545–567.

Proserpio D, Zervas G (2017) Online reputation management: Estimating the impact of management responses on consumer reviews. *Marketing Sci.* 36(5):645–665.

Qiao D, Rui H (2023) Text performance on Vine stage? The effect of incentive on product review text quality. *Inform. Systems Res.* 34(2):676–697.

Ravichandran T, Deng C (2023) Effects of managerial response to negative reviews on future review valence and complaints. *Inform. Systems Res.* 34(1):319–341.

Řehůřek R, Sojka P (2010) Software framework for topic modeling with large corpora. *Proc. LREC 2010 Workshop on New Challenges for NLP Frameworks*, 45–50.

Ren F, Tan Y, Wan F (2023) Know your firm: Managing social media engagement to improve firm sales performance. *MIS Quart.* 47(1).

Rosenbaum PR, Rubin DB (1983) The central role of the propensity score in observational studies for causal effects. *Biometrika* 70(1):41–55.

Shi Z, Rui H, Whinston AB (2014) Content sharing in a social broadcasting environment: Evidence from Twitter. *MIS Quart.* 38(1):123–142.

Small Business Administration (2022) United States small business economic profile. `https://advocacy.sba.gov/wp-content/uploads/2022/08/Small-Business-Economic-Profile-US.pdf`.

Spence M (2002) Signaling in retrospect and the informational structure of markets. *Amer. Econom. Rev.* 92(3):434–459.

Sun S, Gao Y, Rui H (2021) Does active service intervention drive more complaints on social media? The roles of service quality and awareness. *J. Management Inform. Systems* 38(3):579–611.

US Census Bureau (2023a) 2018–2022 American Community Survey 5-year estimates. `https://www.census.gov/data/developers/data-sets/acs-5year.html`.

US Census Bureau (2023b) City and town population totals: 2020–2022. `https://www.census.gov/data/tables/time-series/demo/popest/2020s-total-cities-and-towns.html`.

Wang J, Li G, Hui KL (2022) Monetary incentives and knowledge spillover: Evidence from a natural experiment. *Management Sci.* 68(5):3549–3572.

Wang Y, Chaudhry A (2018) When and how managers' responses to online reviews affect subsequent reviews. *J. Marketing Res.* 55(2):163–177.

Yang M, Ren Y, Adomavicius G (2019a) Understanding user-generated content and customer engagement on Facebook business pages. *Inform. Systems Res.* 30(3):839–855.

Yang M, Zheng Z, Mookerjee V (2019b) Prescribing response strategies to manage customer opinions: A stochastic differential equation approach. *Inform. Systems Res.*. 30(2):351–374.

Yelp (2017) How do I turn messages or quote requests for my business on or off? `https://web.archive.org/web/20170331024350/https://www.yelp-support.com/article/How-do-I-turn-messages-or-quote-requests-for-my-business-on-or-off?l=en_US`, [Online; accessed 6-Oct-2025].

Yelp (2024) Why claim your business page on Yelp. `https://business.yelp.com/products/business-page/`, [Online; accessed 16-May-2024].