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Subsidizing Failing Firms: Evidence from Chinese Restaurants

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Abstract

Using data on nearly 20,000 restaurants in China during the COVID-19 outbreak, we find evidence that the government-sponsored rent reduction program reduced debt overhang problems. Rent reductions, which averaged 36,000 RMB per restaurant, increase the open rate of restaurants by 3.7%, revenue by 11,000 RMB, and the number of employees by 0.36. Larger restaurants with higher committed costs benefit more from the rent reduction. The stimulus has a positive spillover effect that boosts the revenue of restaurants in the immediate vicinity of subsidized restaurants. The treatment effect varies with organizational structure in a manner consistent with an information frictions hypothesis.

I. Introduction

The COVID-19 pandemic resulted in an unprecedented loss of income for many business sectors worldwide, leading to financial distress, layoffs, and bankruptcy. To mitigate the economic damage and hardship, governments across the globe have rolled out various fiscal stimulus policies. In principle, these policies should help to restore a firm's equity and alleviate the debt overhang problem outlined by Myers (1977). Debt overhang can lead existing equity holders to lay off workers and curtail maintenance investments even when these investments generate positive net present value (NPV). However, the effectiveness of fiscal stimulus policies, even in a financial crisis, has long been debated in the literature

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(Mian and Sufi (2012)). Given the large scale of policy spending, it seems crucial to evaluate the extent to which these policies do in fact sustain businesses and employment.

In this article, we conduct a comprehensive and direct assessment of the rent reduction program that was widely implemented in China during the COVID-19 pandemic. We use a unique database that contains detailed bill-level information on nearly 20,000 restaurants, which provides us with real-time insights into their operational decisions and performance. The pandemic had a severe impact on the restaurant industry in China, as the virus outbreak and subsequent nationwide lockdown occurred during the Spring Festival and other festive holidays during which dining out and tourism are typically major sources of revenue for the restaurant industry.[1] As a result, most restaurants experienced a significant drop in revenue, while their costs, such as rent and wages, continued to accumulate. Restaurants that had borrowed heavily to prepare for the Spring Festival were particularly hard hit.

To mitigate the liquidity crisis and debt-overhang problems faced by restaurants, the Chinese government coordinated a national-level rent reduction program in late Jan. 2020, which urged real estate companies to reduce rents at their rental properties. The goal of the program was to prevent unemployment, support small and medium enterprises (SMEs), and stabilize the economy. The rent reductions offered by real estate firms were primarily focused on their shopping malls, with most real estate firms offering a waiver of rent to their merchants in late Jan. and Feb. 2020. More than 2,000 shopping malls across China rolled out rent reduction programs. In our sample, the average rent reduction per restaurant was 36,000 RMB.

Since rent accounts for over 25% of total restaurant costs in our sample,[2] we hypothesize that the rent reduction program significantly alleviated debt overhang problems faced by restaurants. To test our hypothesis, we employ a standard difference-in-differences approach, which involves comparing restaurants that receive rent reductions to those that do not before and after the rent reduction program. Our identification strategy is strengthened by several features of the program. First, since the program was coordinated by the government, political connections are plausibly the primary determinant of whether a real estate firm conducts rent reductions.[3] Second, each real estate firm's rent reduction policy is implemented uniformly across all its properties. Similarly, within shopping malls subject to the rent reduction policy, the reductions are uniformly offered to all

[1]Restaurant revenue during the Spring Festival holiday is on average 12% of whole-year revenue and accounts for 0.6% of China's annual GDP (Based on our database as of 2018 and the National Bureau of Statistics).

[2]According to the annual survey of Chinese restaurants by the Association of Restaurants in China, labor costs make up an additional 22% of total restaurant operating costs, leaving about 53% to variable costs, such as food ingredients.

[3]Duchin and Hackney (2021) and Li and Strahan (2021) show that government subsidies in the U.S. during the COVID-19 pandemic were associated with political connections. In China, 92% of real estate firms that implemented rent reductions are state-connected. Specifically, these companies are either state-owned enterprises (SOEs) or have CEOs who are current or former members of the National People's Congress or the National Committee of the Political Consultative Conference.

tenants. This suggests that there is no selection based on the characteristics of restaurants. Additionally, our analysis indicates that real estate properties located in areas that are hit harder by the crisis are not more likely to receive rent reductions. Even within a city district where the exposure to the crisis is similar across real estate properties, rent reductions are available to some properties but not others. Third, we limit our sample to include only restaurants located in shopping malls owned by real estate firms, for both the treatment and control groups. This restriction is intended to ensure that restaurants in the treatment group have similar ex ante characteristics to those in the control group. Moreover, both shopping malls with rent reductions and those without are required by the government to maintain similar social distancing and hygiene standards. Therefore, the rent reductions in our study are likely to be exogenous to the characteristics and operating conditions of the shopping malls, the characteristics of the restaurants within the malls, the local economic conditions, and the COVID-19 infection rates. We show that there are parallel trends in the key characteristics of the restaurants prior to the pandemic, further mitigating concerns of endogeneity. Finally, we check and confirm that in our sample, the only treatment a landlord provides to tenants within a shopping mall is a rent reduction.

We present six main results. First, we find that rent reductions significantly increase the open rates of restaurants, the total revenue per restaurant, and the number of waiters employed at each restaurant.[4] Specifically, the rent reduction program leads to a 3.7% higher open rate, 11,000 RMB higher revenue, and an additional 0.36 waiters employed per restaurant per month on average. To put the economic magnitude of these estimates in perspective, we find that for the full sample, the open rate drops 15%, revenue drops 94,000 RMB, and employment falls by 1.6 waiters on average during the 6-month period after the COVID-19 outbreak. This implies that the open rate at restaurants with rent reduction fell by 25% less than at restaurants without rent reduction. Similarly, the revenue and number of employees at restaurants with rent reduction fell by 12% and 23% less than at restaurants without rent reduction, respectively.

Different restaurants have different levels of rental expense and capacities for labor adjustment, potentially resulting in a heterogeneous rent reduction effect. As Bartlett and Morse (2021) have shown, differences in size can lead to differences in revenue resiliency, labor flexibility, and committed costs. For example, larger restaurants may face higher committed costs such as higher rent. Therefore, we hypothesize that the rent reduction program we study is more effective for larger restaurants. To measure restaurant size, we use the number of tables as a proxy. Our second finding is that the marginal effect of the rent reduction is indeed greater for larger restaurants.

At the same time, if a restaurant can remain open by laying off workers, the treatment effect of rent reduction may be smaller. Our third finding is that after controlling for rent using the number of tables as a proxy, firms with more labor flexibility have a smaller treatment effect, where labor flexibility is measured by the number of employees. Our second and third findings together indicate that the

[4]A restaurant is considered open in a given month if it has at least one customer order in that month in our data set.

treatment effect of the rent subsidy is most notable for large firms with little labor flexibility.

Fourth, our analysis reveals that the rent reduction program generates a positive spillover effect on neighboring restaurants, resulting in increased revenue and open rates for establishments with cuisine types different from those in the subsidized shopping malls. This finding suggests that the stimulus may have driven additional consumer traffic to the area. However, we also find that the stimulus program had a negative spillover effect on nearby restaurants with cuisine types similar to those in the treated shopping malls. This shows that the direction of the spillover effect depends on the competitive relationship between restaurants in shopping malls and those outside of them. In the overall sample, our results indicate a weakly positive and significant spillover effect from the stimulus program.

The fifth finding of our study is that rent reductions induce strategic responses by restaurants. These strategic responses include offers of discounts and promotions of takeout and delivery orders during the lockdown period. Restaurants with rent reductions are 1.8% more likely than those without rent reductions to expand to the delivery service business for the first time during COVID-19 and 2.1% more likely to list their restaurants on an additional delivery platform. Moreover, the ratio of the value of discounts to total revenue increases by 6% at treated restaurants. These results suggest that rent reductions enabled restaurants to mitigate the impact of the crisis by adapting to changing consumer behavior. Furthermore, the findings demonstrate that the benefits of rent reductions were passed on to customers, allowing them to substitute traditional dining options with takeout or delivery orders and to receive more discounts.

Finally, we find that the treatment effect of rent reductions varies with the organizational structure of the restaurant chains. In particular, the impact of rent reductions is more significant for franchise-based restaurants than for company-owned ones. Specifically, the treatment effect of rent reductions for franchise-based restaurants is 2.7% higher in terms of the open rate, 5,100 RMB higher in terms of revenue, and leads to the retention of 0.25 more employees compared to treated company-owned restaurants.

We test four hypotheses regarding heterogeneity in the treatment effect based on the organizational structure of the restaurant: information frictions, internal capital markets, economies of scale, and monetary incentives. The information frictions hypothesis, which pertains to the degree of centralization in a firm's decision-making process, stands out as the most plausible channel.[5] Decentralized firms may be better able to exploit local information in responding to volatile business environments (Aghion, Bloom, Lucking, Sadun, and Van Reenen (2021)), and therefore, put the rent reduction windfall to better use. By contrast, centralized firms may experience delays in responding strategically to local developments because they must coordinate their actions with headquarters, limiting their ability to take advantage of the rent reduction. The literature on organizational structure suggests that company-owned restaurants are more likely to be centrally managed, with headquarters exerting greater influence over daily operational decisions, while franchise-based restaurants tend to be more decentralized, with each

[5]We comprehensively explain and empirically investigate all four channels in Section V.E.

franchisee having greater autonomy over such decisions (Bernstein and Sheen (2016)).[6] This literature also finds that company-owned chains with fewer stores are more decentralized than company-owned chains with more stores. Consistent with the information frictions hypothesis, we find that the rent reduction effect among company-owned restaurants is more pronounced for restaurant chains with a smaller number of stores, although there is no heterogeneity in the treatment effect based on the number of stores within a brand for franchise-based restaurants.[7]

To further test whether information frictions impede the strategic responsiveness of company-owned restaurants (Krueger (1991), Holmstrom and Milgrom (1994), and Elango and Fried (1997)), we use a restaurant's proximity to its headquarters as a proxy for how quickly and effectively the restaurant reacts to the stimulus (Bernstein, Giroud, and Townsend (2016)). Given the difficulties associated with physical travel during the pandemic, we hypothesize that the distance of a restaurant from its headquarters reduces the stimulus effect for company-owned restaurants but not for franchise-based restaurants, where decision-making is decentralized. Consistent with this hypothesis, we find that the distance between a company-owned restaurant and its headquarters reduces the impact of the rent reduction, with more distant restaurants experiencing a smaller increase in open rates and revenue. However, for franchise-based restaurants, we do not find any significant difference in the effectiveness of the rent reduction based on the distance to the headquarters.

Overall, our article makes several contributions to the literature evaluating the effect of fiscal stimulus policies on businesses. First, we provide a comprehensive assessment of the effectiveness of a national-level rent reduction program. Second, we focus on the restaurant industry, which was particularly hard hit by the pandemic, and we show how fiscal stimulus helped restaurants pivot to delivery services. Third, we analyze the impact of rent reductions on operational decisions across different organizational structures, and we find that decentralized firms were more responsive to the fiscal stimulus. These findings have important implications for the design of effective fiscal stimulus programs.

The COVID-19 crisis has inspired a growing literature on the resulting fiscal stimulus policies. For instance, Granja, Makridis, Yannelis, and Zwick (2020) study the economic effects of the Paycheck Protection Program (PPP) in the U.S. Bartlett and Morse (2021) find that PPP application success increased the medium-run survival probability by 21% only for microbusinesses, and they argue for size-targeting of policies due to differences in labor flexibility, committed costs, and revenue resiliency. Duchin, Martin, Michaely, and Wang (2022) find that the PPP

[6]Franchise-based restaurants are more likely to have greater autonomy in deciding on strategic responses, such as deliveries and discounts, for the following reason. Delivery platforms in China charge fees of 15%–30% based on order revenue. After paying the royalty fee to the franchise headquarters, the individual franchise restaurant owners retain all residual profits. As a result, franchise headquarters cannot mandate that each franchise store offer delivery, as it would potentially undercut store profits. However, in the case of company-owned restaurants, all residual profits go to the headquarters, giving it the power to dictate whether its stores switch to delivery. The same applies to discount offers.

[7]In this article, the term "restaurant brand" refers to a restaurant chain or company, such as Starbucks. On the other hand, the term "restaurant" alone denotes an individual location or store within a restaurant brand, rather than the company as a whole.

program disproportionately benefited firms with better connections to participating banks. Our study reinforces the conclusion that stimulus policies should be tailored to the characteristics of targeted firms and industries.

Another literature investigates the effects of economic stimulus during times of financial crisis. For instance, Mian and Sufi (2012) analyze the impact of the cash for clunkers program in the U.S., which temporarily boosted car sales but had no long-term effect on car purchases. Nakamura and Steinsson (2014) and Ramey and Zubairy (2018) evaluate the government spending multiplier during the financial crisis. Giroud and Mueller (2017) examine financially constrained firms' vulnerability during the Great Recession, and suggest a role for employment policy that goes beyond conventional stimulus. Our article shows that conventional fiscal stimulus can mitigate unemployment by correcting misaligned incentives created by debt overhang.

The remaining sections of the article are structured as follows: Section II provides an overview of the COVID-19 crisis and the rent reduction program in China. Section III develops our hypotheses and Section IV details the data sources used in our analysis. Section V outlines our empirical methodology and presents our main findings. Finally, Section VI summarizes our conclusions.

II. COVID-19 and Rent Reductions in China

The restaurant industry in China has experienced significant growth over the past decade, as reported by the China Hospitality Association (2021). From 2011 to 2019, the industry's total revenue grew from 2 trillion RMB to 4.6 trillion RMB. However, the emergence of the COVID-19 pandemic dealt an unprecedented blow to the industry as COVID-19 cases and lockdowns spread across the country. The first 7 months of 2020 saw a significant decline in revenue to a total of only 1.8 trillion RMB, representing a 30% drop compared to the same period in 2019. At the same time, costs such as rent and wages continued to accumulate. The timing of the lockdown period, which coincided with the Spring Festival and subsequent holidays, exacerbated the liquidity shortage and debt burden for restaurants. This is because celebratory events during this period, including dining out and tourism, are typically the biggest sources of profit for the restaurant industry each year. Many restaurants had borrowed significant amounts in preparation for the Spring Festival and subsequently found themselves in financial distress.

Shortly after the implementation of the lockdowns in late January, the central and local governments in China initiated a rent reduction program to support small businesses, including restaurants, during the crisis.[8] The rent reductions offered by

[8]To encourage rent reductions, some municipalities also rebated to landlords up to 20% of the reduced rent. Other policies that the central government implemented in order to stimulate the economy include the provision of shopping coupons and deductions on value-added taxes. Furthermore, a few local governments implemented policies aimed at increasing credit availability for SMEs. They also waived fees associated with medical, social, or unemployment insurance premiums. None of these policies were designed to disproportionately benefit treated real estate firms or restaurants with rent reductions. In Section V.F, we explore the impact of policies such as shopping coupons and other measures implemented by the central and local governments, and find that they do not change the interpretation of our results with regard to the impact of rent reductions.

real estate firms were primarily focused on the shopping malls that they own, with most real estate firms offering either a full or half waiver of rent to their merchants in late Jan. and Feb. 2020. Some firms even continued the rent reductions into Mar. or Apr. 2020. The rent reduction program waived rent for treated restaurants for 21 days on average. Among the firms that responded to the rent reduction program, state-owned real estate firms and firms with connections to government officials were among the first to participate. Strong political ties were the most significant determinant of a firm's response, and participating firms often publicized their support on social media. Of the real estate firms that rolled out rent reductions, 92% were state-connected enterprises, with 65% being non-SOEs but having CEOs who were current or former members of the National People's Congress or National Committee of the Political Consultative Conference, and 27% were outright SOEs.[9] Although rent reductions reduced profits during the pandemic for state-connected landlords, these firms may have expected to be compensated with favorable policies in the future, as suggested by previous research (Calomiris, Fisman, and Wang (2010), Fisman and Wang (2015), Fisman, Shi, Wang, and Xu (2018), and Duchin, Gao, and Shu (2020)).

In Jan. and Feb. of 2020, neither the central nor the local governments clearly stated the goals of the rent reduction program. However, in 2018, the State Council of China released a guideline for economic growth that included "six principles of protection" and "six principles of stability." These principles prioritize stabilizing employment and were reiterated in State Council Policy Guidance No. 6 regarding COVID-19, which was released in Mar. 2020. Therefore, one possible goal of the central government's rent reduction program was to support employment. Another possibility was to assist SMEs, as the State Council consistently emphasizes the importance of providing favorable policies to these businesses. A third possibility is that local governments were concerned that without rent reductions, future or current-year GDP growth would be lower, which could negatively impact their political careers since GDP growth is a crucial factor for promotion (Xiong (2018)). State-connected CEOs and SOEs may have been willing to help stabilize the economy through rent reductions, even at the expense of profits, because they also serve a dual purpose of supporting employment and stabilizing the economy (Carpenter and Whitelaw (2017)).

III. Hypothesis Development

We hypothesize that the rent reduction program has a significantly positive impact on the open rates and performance of restaurants during the crisis, thereby reducing unemployment. When faced with accumulating rent, existing debt, and little foreseeable revenue, a restaurant may choose to default and close, even if the restaurant could earn a positive profit in the long run. This situation presents the classic debt-overhang problem of Myers (1977), where high existing debt leads a firm to forgo positive NPV projects, in this case leading a restaurant to close the business, because most profits would go to debt holders. Rent reduction can be viewed as a form of debt reduction. Generally, debt relief helps restore incentives

[9]We define a firm to be an SOE if its largest shareholder is the central or the local government.

for equity holders. In this case, rent reductions during COVID-19 create incentives for restaurant owners to continue operating.

Different restaurants may have different levels of rental expense and capacities for labor adjustment, potentially resulting in a heterogeneous rent reduction effect. As Bartlett and Morse (2021) have shown, differences in size can lead to differences in revenue resiliency, labor flexibility, and committed costs. Specifically, larger restaurants may face higher committed costs such as higher rent. Therefore, we hypothesize that lease or debt payment restructuring subsidies, such as those in the rent reduction program we study, are more effective for larger restaurants. At the same time, restaurants can adjust labor costs during the pandemic. Therefore, we hypothesize that at restaurants with more flexibility to lay off workers, the treatment effect of rent reduction is smaller.

Additionally, we hypothesize that rent reductions provide incentives and funding for equity investment in strategic adjustments to restaurant operations. Such decisions could include the promotion of takeout or delivery services, as well as the implementation of order discounts, which are natural strategic responses to lockdowns and decreased demand. From a restaurant owner's perspective, a voluntary decision to reduce revenue is economically equivalent to a capital contribution. So an owner who provides discounts or pays for delivery services is effectively making an equity investment. Equity investments that finance operational changes may generate positive NPV, but are often restricted by the burden of debt overhang. Rent reductions may provide relief from this burden, allowing restaurants to be proactive and innovative in their efforts to remain open and profitable.

IV. Data and Identification

Our analysis relies on a proprietary bill-level database from a SaaS (Software as a Service) company named Hualala in China, which covers about 11% of all chain restaurants in China (i.e., more than 150,000 restaurants).[10] Every day, the database records more than 12 million transactions that are worth over 1.2 billion RMB. The database has comprehensive information on revenue, the number of tables in the restaurants, the total number of orders, names and prices of the dishes on the orders, the number of takeout orders, and order discounts, which we aggregate into monthly data. The database also records waiters' nicknames, from which we estimate the number of employees. The database also has the names and exact locations of restaurants.

The database also includes a flag indicating the organizational structure of restaurants (i.e., whether a restaurant chain is franchise-based or company-owned). The owners of franchise-based restaurant subsidiaries purchase the right to use the trademarks, names, branding, and business models of the headquarters. Sometimes the headquarters also provides training for the staff and raw materials to the subsidiaries. The franchise-based subsidiary owners typically have to pay fixed annual or monthly royalty fees to headquarters, but they retain all rights to residual profit.

[10]Beijing Duolaidian Information Technology Co. Ltd, also known as Hualala, is one of the top SaaS system providers for the food and beverage services business in China. The database mostly covers chain restaurants.

The other type of restaurant chain is directly company-owned. The company-owned restaurants do not charge their subsidiaries royalty fees but instead claim all the residual profit from their subsidiaries. They also hire and send professional managers to manage the subsidiaries. Therefore, company-owned restaurants and franchise-based restaurants have different governance mechanisms, managerial incentives, and different levels of managerial discretion. For example, because franchise-based subsidiary owners claim all residual profit, they are more likely to have greater autonomy in deciding on strategic responses, such as deliveries and discounts. However, in the case of company-owned restaurants, all residual profit goes to the headquarters, giving it the power to dictate whether its stores switch to delivery or offer order discounts.

We merge the Hualala data with additional data on rent reductions from news articles, press releases of real estate firms and governments, and postings on multiple social media platforms. Our data search is comprehensive, and we cross-validate the data using different sources.[11] We collect the names and locations of all shopping malls in Chinese cities from the AutoNavi map service and flag those that carried out rent reductions. Then we match the restaurants to the shopping malls by names and locations. We restrict our sample to restaurants in the 49 largest Chinese cities (Tier 1 and Tier 2 cities) to ensure data quality. Most of the restaurants in our sample are clustered in areas where economic activity and population are most concentrated, such as in Beijing, Shanghai, and Guangdong.

Our identification strategy is based on the premise that rent reduction offers are exogenous to characteristics of the shopping malls and restaurants such as their open rates and revenue. Importantly, for our identification strategy, these rent reduction policies are uniform across all properties of a given landlord. For example, Wanda Group exempted all merchants at its plazas from paying rent for a month between Jan. 24 and Feb. 25, 2020. Additionally, within each shopping mall that is subject to a rent reduction policy, reductions are uniform across all restaurants. We manually check each treated shopping mall and each corresponding real estate firm's website to confirm that a real estate firm's rent reduction is uniform across all its properties, and uniform across all the tenants within each property in our treated sample. We exclude all real estate firms that specifically target shopping malls in certain cities, certain shopping malls within cities, or specific tenants within malls for rent reductions. These constitute less than 7% of the sample. We also exclude treated shopping malls that provide rent reductions conditional on tenants remaining open during the subsidized period, which represent 1.4% of the sample. Our sample selection criteria ensure that our estimates reflect the overall impact of the rent reduction policy across a representative set of shopping malls and tenants.

There are several pieces of evidence that indicate that these real estate firms do in fact reduce rent uniformly, as they claim on their websites. First, on popular message boards such as Weibo, or on local government court websites, we do not find evidence that tenants complain or file lawsuits against their real estate

[11]We adopt web-crawling algorithms to search for keywords "rent" and "rent reduction" on search engines Baidu and Google, as well as on social media such as Weibo, which is similar to Twitter. We also search through 48 digital versions of national and local newspapers. We compare our search results with posts on real estate firms' websites to confirm the rent reduction policies.

properties for not fully conducting the rent reduction as described on their corporate websites. Second, based on annual reports of publicly listed real estate firms, we find no evidence that real estate firms claim that some of their shopping malls' profits are reduced by the rent reduction more than others. Third, we interview 104 restaurant owners in 13 shopping malls in our treated sample in Guangdong. All of these restaurant owners confirm that their rent reduction terms are consistent with real estate firms' public announcements without extra conditions. Therefore, there is no obvious selection of treated restaurants in our sample based on their characteristics.

Another premise of our identification strategy is that the only treatment a landlord provides to tenants within a shopping mall is a rent reduction. For example, if treated shopping malls offer better protection against COVID-19, such as free distribution of masks, free parking space, extra shopping coupons, or other benefits to consumers so that the treated shopping malls are more attractive venues during the COVID-19 crisis, then the identification assumption would be violated. To ensure that our estimation identifies a clean treatment effect from the rent reduction only, we use Dianping.com, which is similar to Yelp, to collect consumer comments regarding the shopping malls 6 months before and after the COVID-19 outbreak. Using natural language processing, we pick out comments with keywords such as "mask," "free parking," and "coupons" in our sample. While there is an increase in the keywords "mask" after the COVID-19 outbreak, most of the comments are related to the requirement to wear a mask as opposed to the free distribution of masks. We also do not find evidence in the restaurant app comment section that treated shopping malls have looser mask requirements to attract consumers who do not want to wear a mask. The frequency of "free parking" shows up similarly before and after the COVID-19 outbreak for both the treated and the control restaurants. We also manually check the keyword "coupon" in the post-COVID-19 environment and find that most coupons are distributed at the city level and are not associated with specific shopping malls.[12]

One challenge to our identification strategy is the concern that variation in the duration of the rent reduction programs across landlords is endogenous. Although the duration of rent reductions varies across different real estate firms due to the quasi-voluntary nature of the policy, our analysis provides two pieces of evidence that suggest that there is no systematic selection of the rent reduction period. First, we observe that SMEs with SOE landlords are offered a uniform period of 3 months for rent reduction. Our analysis of this subsample reveals that the rent reduction effect is qualitatively similar to that in the main sample.[13] Second, we find no significant correlation between the type of rent reduction offered to tenants of shopping malls and characteristics of the restaurants, such as revenue, revenue growth, or the rating of the restaurants on Dianping.com.[14]

[12]We also test whether SOE malls offer additional treatments to their tenants. Table A.1 in the Supplementary Material shows that the rent reduction effects in the subsample of state-owned malls and the subsample of privately owned but state-connected malls, whose CEOs are current or formers members of the National People's Congress, are similar to those in the main sample. Therefore, we find no evidence that SOE malls offer additional treatment.

[13]We present this result in Table A.1 in the Supplementary Material.

[14]We present this result in Table A.2 in the Supplementary Material.

To study the effect of the rent reduction, we adopt a difference-in-differences strategy. We define the restaurants in shopping malls that carry out rent reductions to be the treatment group and restaurants in shopping malls that do not carry out rent reductions to be the control group. We have a total of 19,814 restaurants in the sample, with 7,238 restaurants in the treatment group located in 791 shopping malls, and 12,576 restaurants in the control group located in 1,220 shopping malls. Since Feb. 2020 is the start of the rent reduction period for most shopping malls, we define the pre-treatment period to be June 2019–Jan. 2020, and the post-treatment period to be Feb.–July 2020. We compare restaurants receiving rent reductions to those that do not before and after the implementation of the rent reductions. To control for unobserved heterogeneity and time-varying exposure to the pandemic, we include city fixed effects, month fixed effects, restaurant brand-month fixed effects, and restaurant fixed effects in our regressions.

Panel A of Table 1 presents summary statistics for the key variables, including variables on restaurant performance and variables on strategic reactions. In

TABLE 1

Summary Statistics

Panel A of Table 1 presents summary statistics for restaurant variables over the period June 2019–July 2020. OPEN equals 1 if a restaurant has at least one dine-in or takeout/delivery order in a given month. REVENUE is monthly operating revenue at a restaurant in a month in thousands of RMB. ORDER_NUMBER is the total number of food orders received by a restaurant in a month. EMPLOYEE is the number of waiters employed by a restaurant in a month. DISCOUNT_RATIO is defined as the ratio of the total value of discounts offered to customers to total revenue in a month. DELIVERY_REVENUE is defined as the RMB value of total takeout and delivery revenue. Panel B presents mean values of the restaurant variables in the pre-treatment period June 2019–Jan. 2020 and differences in means across the treatment and control groups for both the full sample and the propensity-score-matched sample. Treated restaurants are those located in a shopping mall where there is a rent reduction program during the first half of 2020. Control restaurants are those in a shopping mall without a rent reduction. Panel C compares characteristics of real estate firms that treated their shopping malls with rent reductions to those of real estate firms that did not. PUBLICLY_LISTED is the percentage of publicly listed firms in the treatment and the control groups. SHOPPING_MALL is the average number of shopping malls owned by real estate firms in each group. RENT is the average rent paid per restaurant. REVENUE_RATIO is the average ratio of restaurant revenue to shopping mall revenue in 2019. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Full Sample

	No. of Obs.	Mean	Std. Dev.	5%	50%	95%
OPEN	277,396	0.88	0.34	0.00	1.00	1.00
REVENUE	277,396	161.33	290.14	0.00	82.14	532.38
ORDER_NUMBER	277,396	2,841.48	3,812.43	0.00	1,771.00	9,532.00
EMPLOYEE	277,396	5.11	8.95	1.00	3.00	17.00
DISCOUNT_RATIO	277,396	0.14	0.21	0.00	0.10	0.67
DELIVERY_REVENUE	277,396	42.42	72.14	0.00	36.14	123.29

Panel B. Characteristics Before COVID-19

	Unmatched Full Sample			Matched Sample		
	Treated	Control	Difference	Treated	Control	Difference
REVENUE	214.93	191.42	23.51***	214.93	213.57	1.36
ORDER_NUMBER	3,891	3,745	146***	3,891	3,920	−29
EMPLOYEE	5.82	5.69	0.13***	5.82	5.77	0.05
DISCOUNT_RATIO	0.13	0.14	−0.01***	0.13	0.13	−0.00
DELIVERY_REVENUE	42.67	45.13	−2.46***	42.67	43.16	−0.49
No. of obs.	57,904	100,608		57,904	57,904	

Panel C. Characteristics of the Real Estate Firms

	Treated	Control
PUBLICLY_LISTED	29.2%	27.4%
SHOPPING_MALL	5.17	6.16
RENT	53,142	54,793
REVENUE_RATIO	32.3%	30.8%
No. of obs.	153	198

our sample, restaurants have a mean revenue of 161,000 RMB per month with a standard deviation of 290,000 RMB. Restaurants on average receive 2,840 food orders per month, and delivery orders account for 25% of total revenue throughout our sample period June 2019–July 2020.

Panel B of Table 1 presents the mean characteristics of treated and control restaurants during the pre-treatment period. In the full sample, treated restaurants have higher revenue, a greater number of orders, and a greater number of employees, but lower discount percentage and delivery revenue. To control for the differences between treatment and control restaurants, we also provide results for propensity-score-matched subsamples constructed as follows: For each city, we estimate a probit model in which the dependent variable is an indicator that equals 1 if the restaurant is in the treatment group, and 0 otherwise. The independent variables comprise a set of firm characteristics including revenue, number of orders, number of employees, and delivery revenue during the pre-treatment period. Based on the probit estimates, we calculate a distance propensity score for each restaurant. Finally, to each treated restaurant, we match a control restaurant that has the closest propensity score using a caliper of 0.1%. The resulting matched control group includes 7,238 restaurants, the same number as in the treatment group.

Panel B of Table 1 also presents the mean values of restaurant variables in the pre-treatment period after propensity score matching. The differences in means between the treatment and control groups are insignificant in all paired comparisons. Figure 1 shows that the restaurants in the treatment and control groups have similar pre-trends in terms of open rates, revenues, number of employees, and delivery revenue. The similarity in the key variables in the pre-treatment period in the propensity-score-matched sample ensures that the treatment group and the control group are comparable before the treated restaurants are subsidized by real estate firms. Panel C of Table 1 presents that the characteristics of real estate firms that treated their shopping malls are also similar to the characteristics of real estate firms that did not. In particular, real estate firms that treated their shopping malls and those that did not are comparable in terms of their propensity to be publicly listed, the number of shopping malls per real estate firm, the rent they charge per restaurant, and restaurant revenue as a percentage of total shopping mall revenue. Finally, to rule out that treated malls and control malls have different exposure to COVID-19, we confirm that the declines in average revenue and number of orders during the period between the outbreak of COVID-19 and the lockdowns are similar for the treated and control restaurants.

V. Methodology and Main Results

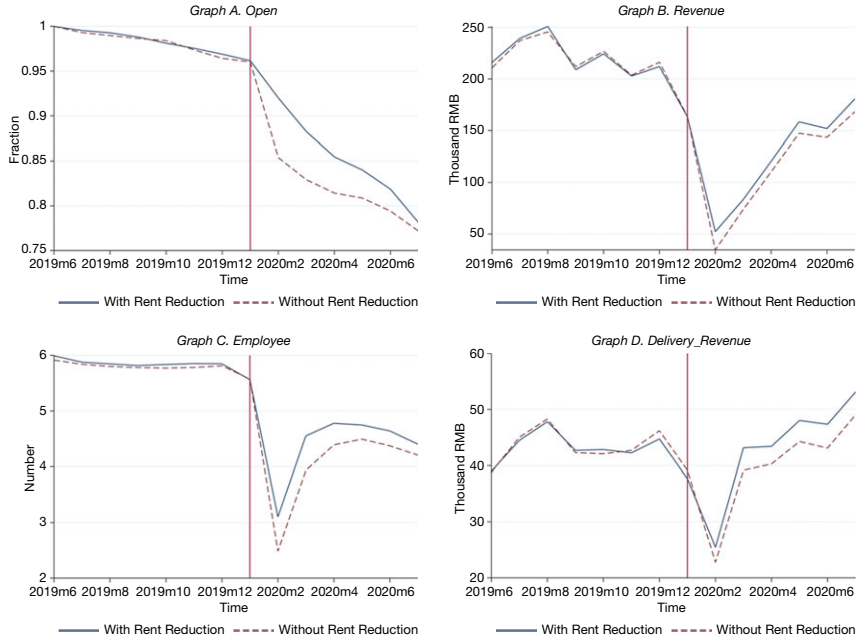
A. Rent Reductions and Operational Outcomes

We hypothesize that the rent reduction program significantly increases restaurant open rates and performance and reduces restaurant layoffs during the crisis. To test these hypotheses, we employ a standard difference-in-differences methodology. The regression specification is as follows:

FIGURE 1

The Impact of Rent Reductions on Restaurant Performance

Figure 1 displays the monthly time series of open rates, revenue, number of employees, and delivery revenue for the treatment and control groups in the propensity-score-matched sample from June 2019 to July 2020.



$$\text{PERFORMANCE}_{i,b,c,t} = \beta_1 \text{TREAT}_i \times \text{POST}_t + \beta_2 \text{TREAT}_i + \gamma \text{FE}(z_{i,b,c,t}) + \epsilon_{i,b,c,t}, \quad (1)$$

where the subscript i refers to the restaurant, b refers to the brand of the restaurant, c refers to the city of the restaurant, and t refers to the month of the observation. We define TREAT to be equal to 1 if a restaurant is located in a shopping mall with rent reductions conducted during the first half year of 2020, and 0 otherwise. POST is an indicator variable that equals 1 from Feb. 2020 to July 2020, and 0 otherwise. $\text{FE}(z_{i,b,c,t})$ includes month fixed effects, city fixed effects, restaurant fixed effects, and brand-name × month fixed effects in different specifications to absorb unobserved heterogeneity and time-varying exposure to the pandemic. The variable TREAT is omitted when restaurant fixed effects are included. Standard errors are clustered at the shopping mall level.

We use several variables as the performance outcome variable. The first one is a dummy variable indicating the open rate, which equals 1 if a restaurant under brand b in city c is operating in month t, and 0 otherwise. The second outcome variable is the aggregate monthly revenue of the restaurant. The third variable is the number of waiters employed by the restaurant in month t. The coefficient of central interest is β_1, which measures the rent reduction effect on restaurant open rates and operational performance.

Figure 1 plots the raw means of restaurant open rates in the treatment group and control group over time. As the figure shows, the pandemic and lockdown indeed weighed heavily on the restaurants. Restaurants' average revenue in Feb. 2020 dropped 80% from the peak in Aug. 2019. Around 25% of the restaurants that were open as of Dec. 2019 were permanently closed by the end of July 2020. The open rates of the treatment group and the control group have parallel trends before Feb. 2020. During the lockdown period and the subsequent economic recovery period, restaurants in the treatment group have much higher open rates. Similarly, Figure 1 shows that revenue and employment were greater at treated restaurants during the post-treatment period. As a placebo test, we define June–Sept. 2019 as the pre-treatment period and Oct. 2019–Jan. 2020 as the pseudo treatment period and we find no treatment effects.

In Table 2, we report estimates of the coefficient β_1 under different regression specifications. On average, restaurants receiving a rent reduction have a 3.7% higher open rate, 11,000 RMB higher revenue, and 0.36 more waiters employed by the end of July 2020 than a restaurant that does not receive rent reductions. To put the economic magnitude of these estimates in perspective, we find that for the full matched sample, the open rate drops 15%, revenue drops 94,000 RMB, and employment drops by 1.6 waiters on average during the 6-month period after the COVID-19 outbreak. This implies that the open rate at restaurants with rent reduction fell by 25% less than at restaurants without rent reduction. Similarly, the revenue and number of employees at restaurants with rent reduction fell by 12% and 23% less than at restaurants without rent reduction, respectively. Overall, these results are consistent with our hypothesis that rent reductions significantly helped the restaurant industry survive the worst of the pandemic.[15]

One concern with our results is that they may be driven by time-varying exposure to the crisis or by unobserved heterogeneity between restaurants that receive rent reductions and those that do not. When we include month fixed effects and restaurant fixed effects to address this concern, restaurants receiving rent reductions have a 2.8% higher open rate, 7,900 RMB higher revenue, and 0.27 more waiters employed by the end of July 2020 than restaurants that do not receive rent reductions. While the magnitude of the coefficients becomes slightly smaller, the coefficients remain statistically and economically significant. The results also remain robust when restaurant fixed effects and brand-name × month fixed effects are included.

B. Labor Adjustment and Committed Costs

Different restaurants may have different levels of committed costs and capacities for labor adjustment, potentially resulting in a heterogeneous rent reduction effect. As Bartlett and Morse (2021) have shown, differences in firm size can lead to differences in revenue resiliency, labor flexibility, and committed costs. Specifically, larger restaurants may face higher committed costs such as higher rent. Therefore, we hypothesize that lease or debt payment restructuring subsidies, such

[15]Table A.3 in the Supplementary Material presents similar baseline results using the unmatched sample instead of the propensity-score-matched sample. Table A.4 in the Supplementary Material presents that the treatment effect is more pronounced for restaurants that receive a full rent waiver than for those that receive a half waiver.

TABLE 2

Rent Reduction Effects in the Matched Sample

Table 2 presents estimates of the coefficient β_1 and t-statistics in parentheses in panel regressions of restaurant performance variables using specification (1) in the propensity-score-matched sample over the period June 2019–July 2020. OPEN equals 1 if a restaurant has at least one dine-in or takeout/delivery order in a given month. REVENUE is monthly operating revenue at a restaurant in a month in thousands of RMB. EMPLOYEE is the number of waiters employed by a restaurant in a month. TREAT equals 1 if a restaurant is located in a shopping mall where there is a rent reduction program during the first half of 2020. POST equals 1 for months after Feb. 2020. Standard errors are clustered at the shopping mall level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	1	2	3	4	5
Panel A. OPEN					
TREAT × POST	0.037***	0.035***	0.032***	0.028***	0.024**
	(3.79)	(3.52)	(3.31)	(2.88)	(2.50)
TREAT	0.001	0.001	0.001		
	(0.24)	(0.21)	(0.15)		
Month FE	Yes	Yes		Yes	
City FE		Yes			
Brand × month FE			Yes		Yes
Restaurant FE				Yes	Yes
R^2	0.182	0.238	0.327	0.413	0.539
Panel B. REVENUE					
TREAT × POST	11.326***	10.129***	9.143***	7.960***	6.838***
	(4.15)	(3.92)	(3.88)	(3.32)	(2.94)
TREAT	1.227	1.204	1.173		
	(0.21)	(0.16)	(0.11)		
Month FE	Yes	Yes		Yes	
City FE		Yes			
Brand × month FE			Yes		Yes
Restaurant FE				Yes	Yes
R^2	0.194	0.211	0.453	0.524	0.628
Panel C. EMPLOYEE					
TREAT × POST	0.358***	0.342***	0.320***	0.273**	0.269**
	(3.62)	(3.71)	(3.32)	(2.49)	(2.32)
TREAT	0.044	0.043	0.025		
	(0.28)	(0.25)	(0.14)		
Month FE	Yes	Yes		Yes	
City FE		Yes			
Brand × month FE			Yes		Yes
Restaurant FE				Yes	Yes
R^2	0.177	0.191	0.423	0.455	0.597
No. of obs.	202,664	202,664	202,664	202,664	202,664

as those in the rent reduction program we study, may be more effective for larger restaurants or enterprises. To measure restaurant size, we use the number of tables as a proxy since we do not have data on the exact rent or square footage of each restaurant.[16]

One component of costs that restaurants can adjust during the pandemic is labor. Larger restaurants with more employees can lay off workers more easily in a crisis, so they have greater labor flexibility. When we sort restaurants into terciles based on the number of employees, we find that large restaurants lay off 59% of waitstaff, and small ones lay off 31%. If a restaurant can avoid debt overhang and

[16]We acknowledge the limitation of using the number of tables to proxy for the size of restaurants, as different tables may have different numbers of seats. We partially address this concern by controlling for restaurant types.

reduce costs by laying off workers, the treatment effect of rent reduction may be smaller. We use the number of waiters as a proxy for a restaurant's labor adjustment capacity. However, there are two countervailing effects at work. On one hand, if a restaurant can avoid debt overhang and stay open by laying off labor, the treatment effect of rent reduction should be smaller. On the other hand, the size of the labor force is another proxy for the size of the restaurant, and thus could relate positively to the rent reduction effect. Therefore, we hypothesize that the treatment effect is decreasing in labor size after controlling for the number of tables.

We use a triple difference-in-differences approach to test the previous hypothesis. The regression specification is as follows:

$$\begin{aligned}\text{PERFORMANCE}_{i,b,c,t} = {} & \beta_1 \text{TREAT}_i \times \text{POST}_t \times \text{STORE\_CHARACTERISTICS}_i \\ & + \beta_2 \text{TREAT}_i \times \text{POST}_t + \beta_3 \text{POST}_t \\ & \times \text{STORE\_CHARACTERISTICS}_i \\ & + \beta_4 \text{STORE\_CHARACTERISTICS}_i + \beta_5 \text{TREAT}_i \\ & + \beta_6 \text{TREAT}_i \times \text{STORE\_CHARACTERISTICS}_i \\ & + \gamma \text{FE}(z_{i,b,c,t}) + \epsilon_{i,b,c,t},\end{aligned} \tag{2}$$

where the performance variables are revenue and the number of waiters employed, and STORE_CHARACTERISTICS represents various characteristics of restaurants that we use to study the heterogeneous effects of the rent reduction program. We measure the size of a restaurant by TABLE_PRE, which is the number of tables at the store level at the end of 2019. We measure the labor flexibility of a restaurant by EMPLOYEE_PRE, which is the average number of waiters employed at a restaurant between June 2019 and Jan. 2020. The coefficient of central interest is β_1 which measures the interaction effect of restaurant characteristics with rent reduction. Panels A–C of Table 3 present the results when the dependent variable is revenue. Specifically, Panel A of Table 3 presents that when size is proxied by the number of tables, the triple difference-in-differences term β_1 is significantly positive, suggesting that the rent reduction effect is indeed larger for restaurants with higher committed costs. Next, Panel B of Table 3 presents that when STORE_CHARACTERISTICS equals EMPLOYEE_PRE, the triple difference-in-differences term is positive, that is, the second effect of labor, as a proxy for size, dominates the first effect, as a proxy for labor flexibility. Panel C of Table 3 presents that when both EMPLOYEE_PRE and TABLE_PRE are included as triple difference-in-differences terms, the triple difference-in-differences term for labor becomes negative, while the term for the number of tables remains positive.[17] Panel D of Table 3 presents the result when the dependent variable is the number of waiters employed, and when both EMPLOYEE_PRE and TABLE_PRE are included as triple difference-in-differences terms. High-employee restaurants did in fact have a larger reduction in headcount relative to low-employee restaurants. Overall, our results show that the positive effect of rent reduction on restaurant outcomes scales with a restaurant's size, but the effect is offset by its labor

[17]When we include both EMPLOYEE_PRE and TABLE_PRE, we omit all the interaction terms of EMPLOYEE_PRE and TABLE_PRE.

TABLE 3

Rent Reduction Effects on Restaurants with Different Size and Labor

Table 3 presents estimates of the coefficient β_1 and t-statistics in parentheses in panel regressions using regression specification (2). In Panels A–C, the dependent variable is monthly operating revenue at a restaurant in a month in thousands of RMB. In Panel D, the dependent variable is the number of waiters employed by a restaurant in a month. TABLE_PRE is the number of tables at the restaurant in Dec. 2019. EMPLOYEE_PRE is the average number of waiters employed by the restaurant between June 2019 and Jan. 2020. Standard errors are clustered at the shopping mall level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	1	2	3	4	5
Panel A. REVENUE*: Heterogeneous Effect Based on* TABLE_PRE					
TREAT × POST × TABLE_PRE	0.121***	0.105***	0.092***	0.081**	0.076**
	(2.91)	(2.73)	(2.68)	(2.41)	(2.37)
Month FE	Yes	Yes		Yes	
City FE		Yes			
Brand × month FE			Yes		Yes
Restaurant FE				Yes	Yes
R^2	0.212	0.218	0.493	0.532	0.639
Panel B. REVENUE*: Heterogeneous Effect Based on* EMPLOYEE_PRE					
TREAT × POST × EMPLOYEE_PRE	0.113*	0.091	0.053	0.023	0.014
	(1.84)	(1.49)	(0.94)	(0.42)	(0.17)
Month FE	Yes	Yes		Yes	
City FE		Yes			
Brand × month FE			Yes		Yes
Restaurant FE				Yes	Yes
R^2	0.197	0.216	0.458	0.529	0.631
Panel C. REVENUE*: Heterogeneous Effect Based on Both*					
TREAT × POST × EMPLOYEE_PRE	−0.175**	−0.151**	−0.105*	−0.113*	−0.116*
	(−2.35)	(−2.01)	(−1.67)	(−1.70)	(−1.73)
TREAT × POST × TABLE_PRE	0.083**	0.079**	0.032	0.044	0.029
	(2.47)	(2.39)	(1.11)	(1.32)	(1.05)
Month FE	Yes	Yes		Yes	
City FE		Yes			
Brand × month FE			Yes		Yes
Restaurant FE				Yes	Yes
R^2	0.217	0.228	0.501	0.534	0.641
No. of obs.	202,664	202,664	202,664	202,664	202,664
Panel D. EMPLOYEE*: Heterogeneous Effect Based on Both*					
TREAT × POST × EMPLOYEE_PRE	−0.003***	−0.002**	−0.001*	−0.001*	−0.001*
	(−2.72)	(−2.29)	(−1.85)	(−1.69)	(−1.65)
TREAT × POST × TABLE_PRE	0.002**	0.002**	0.001*	0.001	0.001
	(2.39)	(2.04)	(1.81)	(0.93)	(0.85)
Month FE	Yes	Yes		Yes	
City FE		Yes			
Brand × month FE			Yes		Yes
Restaurant FE				Yes	Yes
R^2	0.187	0.198	0.431	0.461	0.602
No. of obs.	202,664	202,664	202,664	202,664	202,664

flexibility. This suggests that the treatment effect of the rent subsidy is most notable for large firms with little labor flexibility.

C. Spillover Effects on Nearby Restaurants

Bernstein, Colonnelli, Giroud, and Iverson (2019) show that bankruptcy has a negative spillover effect on nearby firms associated with reduced consumer foot traffic. In addition to the baseline stimulus effect in our sample, could there be a spillover effect on restaurants close to treated shopping malls? The sign of the spillover effect is not clear ex ante. On one hand, increased foot traffic stimulated by

the subsidy could spillover to restaurants nearby the shopping mall. On the other hand, restaurants that receive stimulus in a given shopping mall could take customers away from outside restaurants. To test for a spillover effect, we collect data on chain restaurants within 1 mile of the shopping malls in our sample. We include restaurants located within 1 mile of the subsidized shopping malls but without direct rent reduction in the treatment group. We include restaurants located within 1 mile of shopping malls without rent reduction and also without direct rent reduction in the control group. Table A.5 in the Supplementary Material presents that restaurants outside treated shopping malls are generally larger than the ones outside control shopping malls. To account for this size effect, we perform a propensity-score-matching for the outside-shopping-mall restaurants sample just as in the main sample. Figure 2 shows that the treatment group and the control group have similar pre-trends in open rate, revenue, number of employees, and delivery revenue.

Table 4 presents estimates of the coefficient β_1 and t-statistics in parentheses in panel regressions of performance variables for restaurants nearby subsidized and unsubsidized shopping malls using regression specification (1) in the propensity-score-matched sample. Panel A shows that on average restaurants that are close to shopping malls with rent reductions have 2,000 RMB higher revenue than restaurants that are close to unsubsidized shopping malls. Panel D shows a similar result when the dependent variable is the number of employees. Figure 2 also illustrates these positive spillover effects in open rates, revenue, number of employees, and delivery revenue in the full matched sample. Therefore, we find that in the full matched sample, rent reductions have a positive spillover effect on nearby restaurants.

Could there be heterogeneity in the spillover effect across different types of restaurants outside the shopping mall? To measure the difference in restaurant types, we use cosine similarity, which is commonly used in the textual analysis literature, to measure the similarity between restaurants in shopping malls and restaurants outside shopping malls. Cosine similarity generates a score between 0 and 1 between two vectors.[18] We sort restaurants into nine categories: hot pot, barbecue, Chinese fast food, Chinese fine dining, Western fast food, Western fine dining, bakery, morning and afternoon tea, and the rest. For each shopping mall, we construct the vector of the percentages of each restaurant type inside the shopping mall and the corresponding vector of percentages of types outside the shopping mall. Then we calculate the cosine similarity between these two vectors. We find an average cosine similarity of 0.21 across all shopping malls.

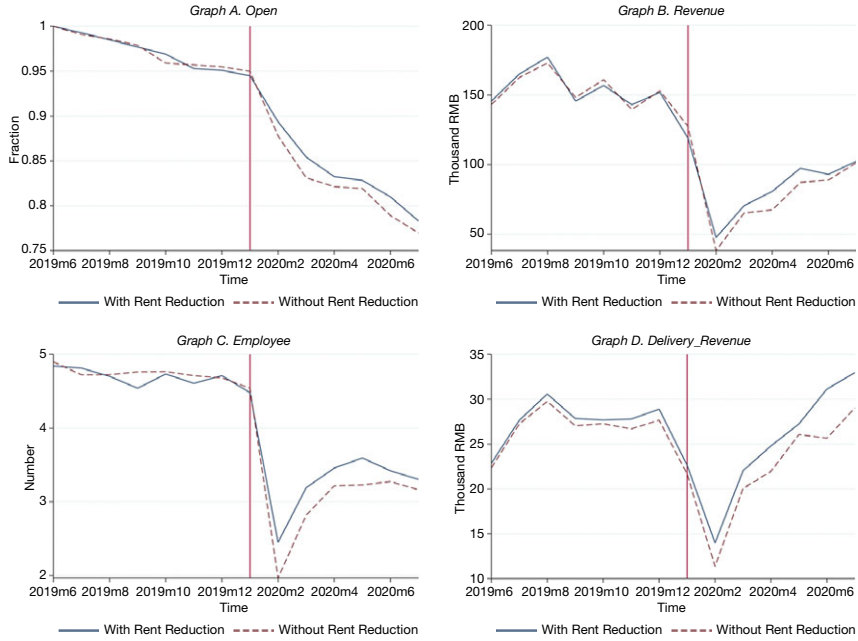
We sort the treatment and control groups of restaurants outside the shopping malls separately into terciles based on their cosine similarity with the restaurants in the shopping malls. Table 4 presents that indirectly treated restaurants with highly similar styles to restaurants inside the subsidized shopping malls (i.e., with a cosine similarity greater than 0.35) have 2,600 RMB lower revenue and 0.13 fewer employees by the end of July 2020 than outside restaurants in the control group. Indirectly treated restaurants that have the lowest similarity with restaurants inside the subsidized shopping malls (i.e., a cosine similarity less than 0.12) have 6,000

[18]See https://www.sciencedirect.com/topics/computer-science/cosine-similarity. Also see Hanley and Hoberg (2012), Lewis and Young (2019), and Girardi, Hanley, Nikolova, Pelizzon, and Sherman (2021).

FIGURE 2

Spillover Effects

Figure 2 shows the monthly time series of open rates, revenue, number of employees, and delivery revenue for restaurants near treated and control shopping malls from June 2019 to July 2020.



RMB higher revenue and 0.36 more employees by the end of July 2020 than outside restaurants in the control group. This suggests that there is a negative spillover effect on similar restaurants and a positive spillover effect on complementary restaurants outside the subsidized shopping malls.

D. Strategic Responses

We hypothesize that rent reductions induce strategic reactions by restaurants, conditional on restaurants continuing to operate, because they provide the necessary funding and incentives. One particular strategic response is to increase order discounts during the pandemic to attract more consumers. To test this hypothesis, we use regression specification (1) but we change the dependent variable to DISCOUNT_RATIO, defined as the ratio of the monthly total discount offered by a restaurant to its monthly total revenue. An increase in the discount ratio represents an active response to the pandemic by restaurants. Panel A of Table 5 presents that for the full matched sample, rent reductions lead restaurants to react strategically. Specifically, treated restaurants increase the discount ratio 6% more than control restaurants, or by 1.1% more in absolute terms. This result is consistent with the idea that restaurants without rent reductions are more likely to suffer from debt overhang that reduces their incentives to invest in order discounts.

TABLE 4

Spillover Effects of Rent Reduction on Revenue and Employment at Nearby Restaurants

Panel A of Table 4 presents estimates of the coefficient β_1 and t-statistics in parentheses in panel regressions of restaurant performance variables using regression specification (1) with the dependent variable equal to monthly operating revenue at a restaurant in a month in thousands of RMB. Treat equals 1 for restaurants located within 1 mile of a subsidized shopping mall that do not themselves receive rent reduction. Treat equals 0 for restaurants located within 1 mile of an unsubsidized shopping mall that also do not receive rent reduction. Panels B and C present separate estimates of the coefficients β_1 and their t-statistics for the top and bottom terciles of restaurants, sorted by their cosine similarity with the restaurants in their nearby shopping malls. Panels D–F present similar results with the dependent variable equal to the number of waiters employed by a restaurant in a month. Standard errors are clustered at the shopping mall level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	1	2	3	4	5
Panel A. REVENUE*: Overall Sample*					
TREAT × POST	2.021**	1.818**	1.638*	0.435	0.389
	(2.25)	(2.01)	(1.90)	(1.47)	(1.39)
Month FE	Yes	Yes		Yes	
City FE		Yes			
Brand × month FE			Yes		Yes
Restaurant FE				Yes	Yes
No. of obs.	133,896	133,896	133,896	133,896	133,896
R^2	0.137	0.147	0.314	0.361	0.528
Panel B. REVENUE*: High Similarity*					
TREAT × POST	−2.648**	−2.165**	−1.587*	−1.006	−1.023
	(−2.41)	(−2.35)	(−1.85)	(−1.08)	(−1.01)
Month FE	Yes	Yes		Yes	
City FE		Yes			
Brand × month FE			Yes		Yes
Restaurant FE				Yes	Yes
No. of obs.	44,632	44,632	44,632	44,632	44,632
R^2	0.131	0.144	0.321	0.355	0.509
Panel C. REVENUE*: Low Similarity*					
TREAT × POST	6.035***	5.028***	4.129**	3.724*	3.520*
	(2.83)	(2.59)	(2.02)	(1.90)	(1.78)
Month FE	Yes	Yes		Yes	
City FE		Yes			
Brand × month FE			Yes		Yes
Restaurant FE				Yes	Yes
No. of obs.	44,632	44,632	44,632	44,632	44,632
R^2	0.162	0.178	0.381	0.414	0.523
Panel D. EMPLOYEE*: Overall Sample*					
TREAT × POST	0.142**	0.132**	0.121**	0.065	0.051
	(2.38)	(2.21)	(2.10)	(1.28)	(1.13)
Month FE	Yes	Yes		Yes	
City FE		Yes			
Brand × month FE			Yes		Yes
Restaurant FE				Yes	Yes
No. of obs.	133,896	133,896	133,896	133,896	133,896
R^2	0.153	0.161	0.353	0.421	0.536
Panel E. EMPLOYEE*: High Similarity*					
TREAT × POST	−0.129*	−0.104*	−0.008	−0.005	−0.005
	(−1.83)	(−1.72)	(−1.50)	(−1.41)	(−1.22)
Month FE	Yes	Yes		Yes	
City FE		Yes			
Brand × month FE			Yes		Yes
Restaurant FE				Yes	Yes
No. of obs.	44,632	44,632	44,632	44,632	44,632
R^2	0.161	0.184	0.341	0.426	0.605
Panel F. EMPLOYEE*: Low Similarity*					
TREAT × POST	0.361***	0.327***	0.279**	0.262**	0.251**
	(2.73)	(2.61)	(2.15)	(2.07)	(2.03)
Month FE	Yes	Yes		Yes	
City FE		Yes			

(continued on next page)

TABLE 4 (continued)

Spillover Effects of Rent Reduction on Revenue and Employment at Nearby Restaurants

Panel F. EMPLOYEE*: Low Similarity (continued)*					
Brand × month FE			Yes		Yes
Restaurant FE				Yes	Yes
No. of obs.	44,632	44,632	44,632	44,632	44,632
R^2	0.182	0.194	0.376	0.438	0.577

During the pandemic, the ability to offer delivery service became key to survival. Indeed, the share of restaurant revenue coming from delivery service in our full sample increased in the post-treatment period. We hypothesize that restaurants that receive rent reductions are more likely to add a delivery option for customers for the first time, or to expand to an additional delivery platform. To test this hypothesis, we estimate regression specification (1) with the dependent variable equal to an indicator that equals 1 if a restaurant has a delivery option in a month. Before the pandemic, 75% of restaurants in the treatment group and 73% of those in the control group have a delivery option.[19] Panels B and C of Table 5 present that restaurants that receive rent reductions are 1.8% more likely to expand to delivery service for the first time during the pandemic and 2.1% more likely to list on an additional delivery platform. Panel D of Table 5 presents that treated restaurants also have 4,200 RMB higher delivery revenue.

We also estimate the non-delivery and the non-discount revenue in order to calculate the relative revenue increase due to delivery, discount, or both. Panel E of Table 5 presents that non-delivery and non-discount revenue increases by 2,800 RMB. Since the rent reduction increases total revenue by 11,000 RMB for treated restaurants, this suggests that delivery and discount revenue accounts for at most 75% of the revenue increase after the COVID-19 outbreak.

Taken together, these results suggest that rent reductions enabled restaurants to mitigate the impact of the crisis by adapting to changing consumer behavior. Furthermore, the findings demonstrate that the benefits of rent reductions were passed on to customers, allowing them to substitute traditional dining options with takeout or delivery orders and to receive more discounts.

E. Stimulus Effects on Different Organizational Structures

Debt overhang may interact with organizational frictions (Krueger (1991), Bernstein and Sheen (2016), and Aghion et al. (2021)). We test four hypotheses regarding heterogeneity in the treatment effect based on the organizational structure of the restaurant: information frictions, internal capital markets, economies of scale, and monetary incentives. The information frictions hypothesis pertains to the degree of centralization in firms' decision-making processes. Decentralized firms are more adaptable and can better use local information to respond to volatile business environments. Therefore, they may be able to use a rent reduction more

[19]Only 21% of all restaurants list on multiple delivery platforms. Most restaurants list on either Meituan or Elema, a subsidiary of Alibaba. These two delivery platforms have 96% of the market share of delivery business in China.

TABLE 5

Strategic Responses to the COVID-19 Outbreak and Lockdowns

Table 5 presents estimates of the coefficient β_1 and t-statistics in parentheses in panel regressions of restaurant strategic response variables using regression specification (1). The coefficients in Panels A–C are based on the sample of restaurants that survive through the end of July 2020. Those in Panels D and E are based on the full matched sample. The dependent variable in Panel A is the ratio of the total value of discounts offered to customers to total revenue in a month. The dependent variable in Panel B is an indicator that equals 1 if a restaurant has at least one delivery option in a month. The dependent variable in Panel C is an indicator that equals 1 if a restaurant lists on multiple delivery platforms in a month. The dependent variable in Panel D is the value of total delivery revenue at a restaurant in a month. The dependent variable in Panel E is the value of total non-discount and non-delivery revenue at a restaurant in a month. Standard errors are clustered at the shopping mall level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	1	2	3	4	5
Panel A. DISCOUNT_RATIO					
TREAT × POST	0.011**	0.011**	0.013***	0.007*	0.003
	(2.14)	(2.25)	(3.36)	(1.85)	(0.47)
TREAT	−0.002	−0.002	−0.003		
	(−0.68)	(−0.54)	(−1.12)		
OPEN	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes		Yes	
City FE		Yes			
Brand × month FE			Yes		Yes
Restaurant FE				Yes	Yes
R^2	0.109	0.189	0.543	0.831	0.887
No. of obs.	156,058	156,058	156,058	156,058	156,058
Panel B. DELIVERY					
TREAT × POST	0.018***	0.018***	0.014**	0.010*	0.009*
	(2.66)	(2.64)	(2.47)	(1.95)	(1.79)
TREAT	0.009	0.009	0.006		
	(0.21)	(0.33)	(0.39)		
OPEN	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes		Yes	
City FE		Yes			
Brand × month FE			Yes		Yes
Restaurant FE				Yes	Yes
R^2	0.115	0.141	0.253	0.484	0.638
No. of obs.	156,058	156,058	156,058	156,058	156,058
Panel C. MULTIPLE_DELIVERY					
TREAT × POST	0.021**	0.018**	0.021**	0.015**	0.015*
	(2.42)	(2.31)	(2.40)	(1.99)	(1.79)
TREAT	0.003	0.005	0.004		
	(0.53)	(0.76)	(0.96)		
OPEN	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes		Yes	
City FE		Yes			
Brand × month FE			Yes		Yes
Restaurant FE				Yes	Yes
R^2	0.112	0.140	0.583	0.752	0.821
No. of obs.	156,058	156,058	156,058	156,058	156,058
Panel D. DELIVERY_REVENUE					
TREAT × POST	4.241***	3.529**	3.195**	2.763**	2.527*
	(2.73)	(2.57)	(2.31)	(1.99)	(1.86)
TREAT	−0.043	−0.031	−0.030		
	(−1.03)	(−0.98)	(−0.80)		
Month FE	Yes	Yes		Yes	
City FE		Yes			
Brand × month FE			Yes		Yes
Restaurant FE				Yes	Yes
R^2	0.152	0.180	0.395	0.345	0.633
No. of obs.	202,664	202,664	202,664	202,664	202,664

(continued on next page)

TABLE 5 (continued)
Strategic Responses to the COVID-19 Outbreak and Lockdowns

Panel E. NON_DELIVERY_OR_DISCOUNT_REVENUE					
TREAT × POST	2.837**	2.594**	2.105**	1.942*	1.804*
	(2.42)	(2.31)	(2.26)	(1.74)	(1.69)
TREAT	0.141	0.125	0.241		
	(0.57)	(0.53)	(0.95)		
Month FE	Yes	Yes		Yes	
City FE		Yes			
Brand × month FE			Yes		Yes
Restaurant FE				Yes	Yes
R^2	0.102	0.120	0.316	0.367	0.572
No. of obs.	202,664	202,664	202,664	202,664	202,664

efficiently. By contrast, centralized firms may experience delays in responding to local developments because decisions must be coordinated with headquarters, potentially blunting the effectiveness of a rent reduction.

The literature on organizational structure suggests that company-owned restaurants are more likely to be centrally managed, with headquarters exerting greater influence over daily operational decisions, while franchise-based restaurants tend to be more decentralized, with each franchisee having greater autonomy over such decisions (Bernstein and Sheen (2016)). This literature also finds that company-owned restaurants with fewer stores are more decentralized than company-owned restaurants with more stores. We hypothesize that decentralized firms can better exploit the financial stimulus, given their better use of local information in decision making.

There are 8,972 franchise-based restaurants and 10,842 company-owned restaurants in our full sample. One concern with the analysis regarding organizational structure is that franchise-based stores and company-owned stores may be different in terms of their characteristics. Therefore, we perform the following propensity-score-matching procedure to ensure comparability between the franchise-based sample and the company-owned sample, as well as between treatment groups and control groups. First, as described in Section IV for the main sample, we perform a propensity-score-matching between franchise-based treated restaurants and franchise-based control restaurants. This results in a sample of 6,658 restaurants in the franchise-based subsample, half of which are treated and half of which are control restaurants. Second, we perform a propensity-score-matching between restaurants in the franchise-based subsample and restaurants in the company-owned subsample. This results in a sample of 6,658 restaurants in the company-owned subsample, also with an equal number of restaurants in the treatment and control groups.

To test the information frictions hypothesis, we compare franchise-based restaurants to company-owned restaurants using regression specification (2) with STORE_CHARACTERISTICS equal to an indicator that equals 1 if a restaurant is franchise-based and 0 if it is company-owned. Columns 1–4 of Table 6 present that estimates of the coefficient β_1 are positive and statistically significant for a range of performance variables. This suggests that the treatment effect for franchise-based restaurants is greater than that for company-owned restaurants.[20]

[20]The coefficients of TREAT × POST are insignificant in almost all of the specifications because the rent reduction effect is isolated to company-owned restaurants in brands with fewer stores as later shown

What causes decentralized restaurants to have greater revenue and employ more workers than centralized restaurants during the COVID-19 lockdown and work resumption periods between Feb. and July of 2020? One possibility is that decentralized restaurants are better able to respond strategically to the challenges of the pandemic. As discussed in Section V.D, the ability to offer delivery service became key to survival during the pandemic. Therefore, we hypothesize that treated franchise-based stores are more likely than treated company-owned stores to add a delivery option for customers for the first time or to expand to an additional delivery platform during the pandemic. Columns 5–8 of Table 6 present results that are consistent with this hypothesis.

We also hypothesize that the treatment effect for company-owned restaurants in brands with fewer stores is more pronounced than for company-owned restaurants in brands with more stores. We use regression specification (2) to test this hypothesis with STORE_CHARACTERISTICS equal to N_STORES, the number of restaurants in the same brand as a given restaurant. Consistent with our hypothesis, Table 7 shows that the estimates of the coefficient β_1 are significantly negative for almost all performance and strategic response variables in the company-owned subsample, but insignificant in the franchise-based subsample. Moreover, Figure 3 plots the coefficient estimates and their standard errors for the variable OPEN in the matched company-owned subsample, sorted into three groups based on number of stores within a brand. The treatment effect of rent reduction is concentrated in company-owned stores in brands with fewer than 15 stores. These findings provide additional support for the information frictions hypothesis.

To further test whether information frictions slow the decision-making process of company-owned restaurants (Krueger (1991), Holmstrom and Milgrom (1994), and Elango and Fried (1997)), we use a restaurant's proximity to its headquarters as a proxy for how quickly the restaurant reacts to the stimulus (Bernstein et al. (2016)). Given the difficulties associated with physical travel during the pandemic, we hypothesize that the distance of a restaurant from its headquarters reduces the stimulus effect for company-owned restaurants but not for franchise-based restaurants, where decision-making is decentralized. To test this hypothesis, we use regression specification (2) with STORE_CHARACTERISTICS equal to DISTANCE, a restaurant's distance to its headquarters in thousands of miles.[21] Table 8 presents that the treatment effect on performance variables decreases as the distance between a company-owned store and its headquarters increases, while no such differential treatment effect is observed for franchise-based restaurants. These findings suggest that organizational structure plays an important role in the pass-through of fiscal policies.

Given these results, a natural follow-on hypothesis is that a greater distance from headquarters decreases treated company-owned restaurants' likelihood of increasing discounts and offering delivery service, while the distance to

in Figure 3 and Table 7. Moreover, the propensity-score matching based on restaurant size eliminated 15% of the company-owned restaurants. This omitted subsample of company-owned restaurants happens to include the ones with greater treatment effects.

[21]Headquarters are the global headquarters of a given restaurant brand. The result is similar if we restrict our sample to brands with headquarters in China.

TABLE 6

Heterogeneity in Rent Reduction Effects Based on Organizational Structure

Table 6 presents estimates of the coefficient β_1 and t-statistics in parentheses in panel regressions using regression specification (2). The dependent variables are performance variables and strategic response variables. OPEN equals 1 if a restaurant has at least one dine-in or takeout/delivery order in a given month. REVENUE is monthly operating revenue at a restaurant in a month in thousands of RMB. EMPLOYEE is the number of waiters employed by a restaurant in a month. ORDER_NUMBER is the total number of food orders received by a restaurant in a month. DELIVERY_REVENUE is defined as the RMB value of total takeout and delivery revenue. DISCOUNT_RATIO is defined as the ratio of the total value of discounts offered to customers to total revenue in a month. DELIVERY is an indicator that equals 1 if a restaurant has at least one delivery option in a month. MULTIPLE_DELIVERY is an indicator that equals 1 if a restaurant lists on multiple delivery platforms in a month. FRANCHISE equals 1 if a restaurant is a franchise-based restaurant and 0 if it is a company-owned restaurant. Columns 1–5 use the full matched sample. Columns 6–8 use the sample of restaurants that survive through July 2020. Standard errors are clustered at the shopping mall level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	OPEN	REVENUE	EMPLOYEE	ORDER NUMBER	DELIVERY REVENUE	DISCOUNT RATIO	DELIVERY	MULTIPLE DELIVERY
	1	2	3	4	5	6	7	8
TREAT × POST × FRANCHISE	0.027***	5.121***	0.257***	214.273***	2.462***	0.006**	0.014**	0.017**
	(3.80)	(3.37)	(3.17)	(4.21)	(2.68)	(2.39)	(2.17)	(2.35)
TREAT × POST	0.019	7.142*	0.172	198.191	2.374	0.008*	0.006	0.005
	(1.41)	(1.92)	(1.18)	(1.48)	(1.39)	(1.75)	(0.86)	(0.51)
TREAT × FRANCHISE	0.005	−0.145	0.035	−51.120	0.472	0.001	0.004	−0.002
	(0.42)	(−0.25)	(0.29)	(−0.57)	(1.05)	(0.71)	(0.49)	(−0.33)
POST × FRANCHISE	−0.001	1.302	−0.020	42.919	−0.189	0.001	0.002	0.002
	(−0.16)	(1.35)	(−0.43)	(0.87)	(−0.68)	(0.30)	(0.34)	(0.61)
TREAT	−0.001	−0.034	−0.048	64.312	0.082	0.001	0.005	0.003
	(−0.16)	(−0.12)	(−0.93)	(0.81)	(0.49)	(0.35)	(0.30)	(0.51)
FRANCHISE	−0.001	0.371	−0.027	71.251	0.021	−0.001	−0.004	0.001
	(−0.08)	(0.45)	(−0.12)	(0.69)	(0.17)	(−0.47)	(−0.34)	(0.20)
City FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.251	0.227	0.281	0.231	0.212	0.242	0.209	0.250
No. of obs.	186,424	186,424	186,424	186,424	186,424	143,528	143,528	143,528

TABLE 7

Heterogeneity in Rent Reduction Effects Based on Brand Size

Table 7 presents estimates of the coefficient β_1 and t-statistics in parentheses in panel regressions using regression specification (2). The dependent variables are performance variables and strategic response variables. OPEN equals 1 if a restaurant has at least one dine-in or takeout/delivery order in a given month. REVENUE is monthly operating revenue at a restaurant in a month in thousands of RMB. EMPLOYEE is the number of waiters employed by a restaurant in a month. ORDER_NUMBER is the total number of food orders received by a restaurant in a month. DELIVERY_REVENUE is defined as the RMB value of total takeout and delivery revenue. DISCOUNT_RATIO is defined as the ratio of the total value of discounts offered to customers to total revenue in a month. DELIVERY is an indicator that equals 1 if a restaurant has at least one delivery option in a month. MULTIPLE_DELIVERY is an indicator that equals 1 if a restaurant lists on multiple delivery platforms in a month. N_STORES is the number of stores in a restaurant brand. Panel A presents the results for the company-owned subsample, and Panel B presents the results for the franchise-based subsample. Columns 1–5 use the full matched company-owned and franchise-based subsamples. Columns 6–8 use the subsamples of restaurants that survive through July 2020. Standard errors are clustered at the shopping mall level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

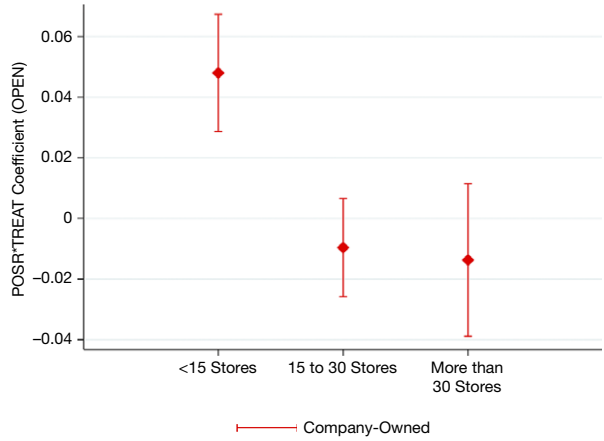
	OPEN	REVENUE	EMPLOYEE	ORDER NUMBER	DELIVERY REVENUE	DISCOUNT RATIO	DELIVERY	MULTIPLE DELIVERY
	1	2	3	4	5	6	7	8
Panel A. Company-Owned								
TREAT × POST × N_STORES	−0.001** (−2.09)	−0.253** (−2.15)	−0.005** (−2.20)	−4.484*** (−2.70)	−0.035** (−2.06)	−0.000 (−1.42)	−0.001** (−2.05)	−0.001** (−1.99)
TREAT × POST	0.033** (2.15)	9.425*** (3.18)	0.259*** (3.45)	249.371*** (3.12)	2.937** (2.41)	0.009** (2.31)	0.016*** (3.42)	0.015*** (2.89)
TREAT × N_STORES	0.000 (0.17)	−0.028 (−0.27)	−0.002 (−0.19)	2.952 (0.31)	−0.015 (−0.47)	0.000 (0.19)	0.000 (0.47)	0.000 (0.31)
POST × N_STORES	−0.000 (−0.32)	−0.051 (−0.35)	−0.001 (−0.13)	−1.013 (−0.42)	−0.002 (−0.27)	0.001 (0.11)	−0.001 (−0.17)	0.001 (0.48)
TREAT	−0.004 (−0.62)	0.514 (0.44)	0.011 (0.58)	16.981 (0.05)	0.183 (0.47)	0.001 (0.39)	0.002 (0.41)	0.001 (0.29)
N_STORES	0.000 (0.08)	0.091 (0.24)	0.001 (0.31)	2.559 (0.37)	0.036 (0.12)	−0.000 (−0.50)	−0.001 (−0.19)	0.001 (0.24)
City FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.276	0.252	0.213	0.261	0.247	0.270	0.231	0.273
No. of obs.	93,212	93,212	93,212	93,212	93,212	71,764	71,764	71,764
Panel B. Franchise-Based								
TREAT × POST × N_STORES	0.000 (0.17)	0.053 (0.42)	0.003 (0.75)	−2.183 (−0.29)	0.041 (0.37)	0.000 (0.25)	0.000 (0.42)	0.000 (0.17)
TREAT × POST	0.046*** (3.85)	11.382*** (3.72)	0.420*** (3.45)	431.920*** (3.31)	5.193*** (2.98)	0.013*** (4.01)	0.020*** (3.03)	0.022*** (2.89)
TREAT × N_STORES	−0.000 (−0.21)	−0.042 (−0.34)	−0.002 (−0.73)	−1.528 (−0.37)	−0.017 (−0.50)	0.000 (0.58)	0.000 (0.29)	−0.000 (−0.13)
POST × N_STORES	−0.000 (−0.37)	−0.063 (−0.41)	−0.001 (−0.29)	−2.836 (−0.50)	−0.012 (−0.43)	−0.000 (−0.33)	0.000 (0.25)	−0.000 (−0.53)
TREAT	0.007 (0.73)	0.947 (0.99)	0.068 (0.36)	53.092 (0.63)	0.315 (0.81)	0.000 (0.94)	−0.002 (−0.27)	0.001 (0.32)
N_STORES	0.000 (0.65)	0.081 (0.75)	0.001 (0.29)	1.931 (0.71)	0.025 (0.43)	0.000 (0.11)	0.000 (0.07)	0.000 (0.09)
City FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.263	0.235	0.268	0.248	0.226	0.268	0.197	0.214
No. of obs.	93,212	93,212	93,212	93,212	93,212	71,764	71,764	71,764

headquarters does not affect the strategic responses of treated franchise-based restaurants. Table A.6 in the Supplementary Material presents that this is indeed the case. A greater distance between a treated company-owned restaurant and its headquarter decreases its probability of increasing discounts and offering delivery service due to rent reductions. However, distance to headquarters has no effect on the strategic response of franchise-based stores.

FIGURE 3

Heterogeneous Treatment Effect for Company-Owned Stores by Brand Size

Figure 3 displays the coefficient estimates and their standard errors in the matched company-owned subsample for groups of brands with different numbers of stores.



We also examine three alternative hypotheses. The monetary incentives hypothesis provides an additional explanation for why franchise-based restaurants may be more responsive to rent reductions. As the residual revenue goes to the local franchisee owners, they have a greater incentive to respond positively to the stimulus. This hypothesis is consistent with our results that the rent reduction effect is more pronounced for franchise-based restaurants than for company-owned restaurants with regard to both performance and strategic response.

The internal capital markets hypothesis posits that the stimulus effect should be smaller at conglomerates that can better coordinate profit and capital sharing across enterprises. To test this hypothesis, we examine whether the stimulus effect on company-owned restaurants is less pronounced at older chains where coordination mechanisms are more likely to be in place. Rauh (2006) and Fee, Hadlock and Pierce (2009) also use age as a proxy for financial constraint, with older firms being less constrained. In untabulated results, we find that older company-owned restaurants do not exhibit a smaller treatment effect. This may be because there was little profit to be shared across stores during the pandemic. Furthermore, our finding that the stimulus effect is more pronounced for stores that are closer to headquarters is the opposite of what the internal capital market hypothesis predicts, if proximity to headquarters serves as a proxy for divisional managers' social connections to CEOs (Duchin and Sosyura (2013)). Therefore, we conclude that the internal capital markets channel is unlikely to explain our results.

Finally, we consider the economies of scale hypothesis, according to which restaurants with more stores benefit from economies of scale, which enables them to adjust costs by securing raw ingredients at lower prices and to generate higher profits, thereby reducing their financial constraints (Grunhagen and Mittelstaedt

TABLE 8

Heterogeneity in Rent Reduction Effects Based on Distance to Headquarters

Table 8 presents estimates of the coefficient β_1 and *t*-statistics in parentheses in panel regressions using regression specification (2). OPEN equals 1 if a restaurant has at least one dine-in or takeout/delivery order in a given month. REVENUE is monthly operating revenue at a restaurant in a month in thousands of RMB. EMPLOYEE is the number of waiters employed by a restaurant in a month. DISTANCE is measured by thousands of miles. Panels A–C present results for the company-owned subsample. Panels D–F present results for the franchise-based subsample. Standard errors are clustered at the shopping mall level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	1	2	3	4	5
Panel A. Company-Owned: OPEN					
TREAT × POST × DISTANCE	−0.014***	−0.013***	−0.011**	−0.009*	−0.009*
	(−3.24)	(−2.79)	(−2.40)	(−1.83)	(−1.76)
Month FE	Yes	Yes		Yes	
City FE		Yes			
Brand × month FE			Yes		Yes
Restaurant FE				Yes	Yes
R^2	0.231	0.285	0.372	0.441	0.520
Panel B. Company-Owned: REVENUE					
TREAT × POST × DISTANCE	−3.329***	−2.920***	−2.529**	−2.182**	−1.738*
	(−3.15)	(−2.88)	(−2.35)	(−2.27)	(−1.82)
Month FE	Yes	Yes		Yes	
City FE		Yes			
Brand × month FE			Yes		Yes
Restaurant FE				Yes	Yes
R^2	0.245	0.259	0.352	0.424	0.573
Panel C. Company-Owned: EMPLOYEE					
TREAT × POST × DISTANCE	−0.112***	−0.093***	−0.087***	−0.073***	−0.069***
	(−4.25)	(−3.52)	(−3.01)	(−2.89)	(−2.68)
Month FE	Yes	Yes		Yes	
City FE		Yes			
Brand × month FE			Yes		Yes
Restaurant FE				Yes	Yes
R^2	0.193	0.217	0.290	0.447	0.581
Panel D. Franchise-Based: OPEN					
TREAT × POST × DISTANCE	0.019	0.007	0.005	−0.009	−0.006
	(1.23)	(0.75)	(0.42)	(−0.85)	(−0.58)
Month FE	Yes	Yes		Yes	
City FE		Yes			
Brand × month FE			Yes		Yes
Restaurant FE				Yes	Yes
R^2	0.203	0.261	0.382	0.431	0.554
Panel E. Franchise-Based: REVENUE					
TREAT × POST × DISTANCE	0.849	0.964	0.719	0.362	0.165
	(1.20)	(1.34)	(0.72)	(0.57)	(0.05)
Month FE	Yes	Yes		Yes	
City FE		Yes			
Brand × month FE			Yes		Yes
Restaurant FE				Yes	Yes
R^2	0.239	0.235	0.361	0.434	0.584
Panel F. Franchise-Based: EMPLOYEE					
TREAT × POST × DISTANCE	0.021	0.019	0.018	0.011	0.018
	(1.02)	(0.94)	(0.82)	(0.54)	(0.79)
Month FE	Yes	Yes		Yes	
City FE		Yes			
Brand × month FE			Yes		Yes
Restaurant FE				Yes	Yes
R^2	0.191	0.268	0.304	0.389	0.577
No. of obs.	93,212	93,212	93,212	93,212	93,212

(2002)). Thus the economies of scale channel predicts a smaller treatment effect for restaurant chains with more stores, which is consistent with our findings.

Overall, our findings support the view that decentralized firms are able to use the stimulus more efficiently because they are more adaptable than centralized firms. While our results may have several possible interpretations, the information frictions hypothesis stands out as the most plausible. The variation in the effectiveness of rent reduction policies depending on the organizational structure of the restaurant chain highlights the need for tailored policy solutions.

F. Robustness Checks

To bolster confidence in our results, this section describes three robustness checks. First, we verify that our results hold up even when we exclude Wuhan from the full sample. This confirms that our results are not driven by restaurants in the epicenter of the COVID-19 pandemic, where the lockdown measures were most severe and extended. The results are presented in Table A.7 in the Supplementary Material, which indicates that all the baseline results remain valid.

Second, we address concerns about omitted variables. While the rent reduction program was conducted, several local governments also distributed coupons and cash rebates which may distort our estimation. Among the 49 cities in our sample, between 7 and 600 million RMB worth of coupons were distributed in each city. In our data set, we observe whether a given restaurant order was paid with coupons. The revenue from coupons is less than 0.4% of the total restaurant revenue in our sample. We do not find evidence that treated shopping malls disproportionately benefit from coupons. There is also no evidence that any tax relief policy favored the treated restaurants more than the control restaurants during our sample period. Therefore, while we acknowledge the possibility of omitted variables, we believe that the potential impact of such variables on our estimates is likely to be limited.[22]

Finally, another potential concern with our findings is that we do not control for the entry of new restaurants in our shopping malls, which could undermine our interpretation of our results on open rates. We find that the entry rate of new restaurants during our sample period is relatively low, with 0.16 new entries per 10 restaurants in the treatment shopping malls and 0.13 new entries per 10 restaurants in the control shopping malls during the first half of 2020. In particular, we do not find any evidence indicating that the entry rate of new restaurants is higher in the control group.

[22]We adopt web-scrawling algorithms to search for keywords "shopping coupons" and "tax deduction" on search engines Baidu and Google, as well as on social media such as Weibo. We also search through 48 digital versions of national and local newspapers. Finally, we cross-check these results with data from the websites of local governments and shopping malls. Our search reveals two tax deduction policies that were implemented during our sample period as per Executive Order No. 8 of the Ministry of Finance. The first policy was the exemption of value-added taxes for the entertainment, medical, and restaurant industries. This policy was applied uniformly to all restaurants, and there is no evidence to suggest that treated restaurants benefited disproportionately from this tax exemption. The second policy involved extending loss carry forward from 5 to 8 years. However, we did not find any evidence to suggest that treated restaurants had more losses between 5 and 8 years before the rent reduction period as compared to the control restaurants. Overall, our search for relevant keywords and policies suggests that the potential impact of omitted variables on our estimates is likely to be minimal.

VI. Conclusion

In this article, we show that rent reductions increase the open rates, revenue, and employment at restaurants during the COVID-19 crisis. We use a comprehensive data set that covers more than 10% of chain restaurants in China, and exploits features of the rent reduction program to quantify its effects. We find that a rent reduction of 36,000 RMB increases the open rate of restaurants by 3.7%, the revenue by 11,000 RMB, and the number of employees by 0.36.

We also find that the effect of the rent reduction is larger for restaurants with higher committed costs and smaller for restaurants with greater labor flexibility. These results imply that relieving committed costs such as rent is more crucial for the survival of large restaurants. By contrast, for small restaurants that operate with only essential staff, there is little room for labor layoff, so subsidies may be more effective (Bartlett and Morse (2021)).

We also find that the stimulus has a positive spillover effect that boosts the revenue and employment of restaurants in the immediate neighborhood of subsidized restaurants if these restaurants have different cuisine types, consistent with an increase in consumer traffic from the stimulus. The stimulus has a negative spillover effect on restaurants in the immediate neighborhood of subsidized restaurants if these restaurants have similar cuisine types. This is consistent with the redistribution effect from government stimulus programs discussed in Duchin and Harford (2021).

A large literature going back to Myers (1977) shows that debt overhang distorts firms' investment and operational decisions. Consistent with this literature, we find that restaurants with rent reductions are more likely to invest in discount offers and expand to the delivery business. This suggests that rent reductions enabled restaurants to mitigate the impact of the crisis by adapting to changing consumer behavior. Furthermore, the benefits of rent reductions were passed on to customers, allowing them to substitute traditional dining options with takeout or delivery orders and to receive more discounts.

The rent reduction effect on open rates, revenue, and employment is stronger for franchise-based restaurants than for company-owned restaurants. Thus, the pass-through of fiscal stimulus programs varies with organizational structure. Decentralized firms (i.e., franchise-based restaurants in our sample) react more strategically to rent reductions by switching to takeout or delivery services. This is one explanation for our result that franchise-based restaurants perform better than company-owned restaurants.

We uncover a great degree of heterogeneity in the effects of rent reductions associated with restaurant characteristics such as size, organizational structure, and distance to headquarters. This variation in the effectiveness of rent reduction policies depending on the characteristics of restaurants highlights the need for tailored policy solutions.

Supplementary Material

To view supplementary material for this article, please visit http://doi.org/10.1017/S0022109023001047.

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