Impact of COVID-19 Pandemic on the Local Economy: Small Business Resilience and Supply Chain Dynamics

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This research investigates the impact of COVID-19 on small businesses at a micro-level by focusing on firms in eight cities in California. While most studies in this field present evidence at an aggregate level, our study recognizes each local region's idiosyncrasy. By analyzing the effectiveness of government emergency financial aid for small businesses at the city level, our goal is to help public policymakers design more specific solutions to target the problems faced by small businesses effectively due to the COVID-19 pandemic. Recognizing the critical role of small businesses as essential suppliers in local marketplaces, we aim to explain their impact on broader supply chain dynamics. We strive to provide valuable insights for policymakers and practitioners seeking to enhance supply chain resilience in the face of unforeseen disruptions.

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I. INTRODUCTION

The COVID-19 pandemic has taken an enormous toll on the world's economy including that of the United States. The widespread shutdowns, loss of lives, inescapable unemployment, and massive supply chain disruptions are among the factors that led to this economic downturn. Although all organizations have suffered from the consequences of COVID-19, small businesses are hurt the most (Kawaguchi, Kodama & Tanaka, 2020). Researchers have studied the adverse effects of this pandemic on small businesses from different perspectives. Bacq, Geoghegan, Josefy, Stevenson & Williams (2020) provide ideas and offer practical guidance in the areas of health needs, education, small businesses, community, and purchasing developed in a three-day virtual idea blitz organized in response to the COVID-19 crisis. Bartik, Bertrand, Cullen, Glaeser, Luca & Stanton (2020), Bloom, Fletcher & Yeh (2021), Fairlie (2020), and Humphries, Neilson & Ulyssea (2020) use surveys, and investigate the impact of the pandemic on the U.S. small business owners, and their outcomes and

expectations. Others have studied the effects of this crisis on the U.S. labor market, unemployment, and furloughs (Cajner, Crane, Decker, Hamins-Puertolas & Kurz, 2020; Bartik, Bertrand, Cullen, Glaeser, Luca & Stanton, 2020). Manolova, Brush, Edelman & Elam (2020) take a different approach and examine the relationship between gender and entrepreneurs' responses to the opportunities created by COVID-19 pandemic.

A common characteristic of all these studies is that they observe the problem at the national, and aggregate levels. However, the extant literature is scarce of research investigating the issue at a micro, e.g., city level. Our study tries to address this issue by examining the impact of this pandemic on small businesses from different cities across California. Specifically, this research examines how small businesses' financial performance changed in response to COVID-19. Moreover, this study investigates consumers' perceptions, corresponding actions, and their effects on firm performance. Studying the impact of a negative shock, such as a global pandemic at the micro-level, is essential because small businesses are among the key players in the economic system. This micro-level analysis offers a nuanced understanding that can inform targeted strategies for policymakers and practitioners aiming to bolster the resilience of small businesses within the broader supply chain context.

II. LITERATURE REVIEW

Entrepreneurship is an essential contributor to economic development and growth as it creates new jobs, advances innovation, and increases welfare (Acs, Desai & Hessels, 2008; Acs and Szerb, 2007; Carree, van Stel, Thurik & Wennekers, 2002; van Stel, Carree & Thurik, 2005; Wennekers and Thurik, 1999; Wong, Ho & Autio, 2005). Small businesses employ almost 50% of American workers (Bartik, Bertrand, Cullen, Glaeser, Luca & Stanton, 2020). However, the survival rate of new firms past six years is only about 40% in the U.S. (Headd, 2003; Phillips and Kirchhoff, 1989).

2.1. Small Business Importance for the Economy

In the United States and across the world, small businesses are a noteworthy driver of local economic development. They account for the majority of jobs and make a substantial contribution to technological advancements and new product growth by serving as crucial suppliers to various marketplaces, emphasizing their significance within the broader supply chain (Baker et al., 2021; Obi et al., 2018, Ou, 2006, Ye et al., 2019).

As opposed to larger corporations, small businesses are extremely adaptable. They demonstrate superior resilience to technological changes and nimbly respond to demand fluctuations and emerging consumer needs. This is partly because their structure enables them to make decisions more swiftly (Perez-Gomez et al., 2018; Gherghina et al., 2020).

Due to the vital role that small businesses play in the supply chain, the literature is abundant with studies investigating survival strategies. On a broad level, researchers have found that factors, including firm, entrepreneur, industry, regional, and national economic conditions, jointly determine the success of a new venture (Cader and Leatherman, 2011). Negative exogenous shocks to the economy serve as natural experiments where researchers can study these factors' impact and offer insights into making small businesses more resilient. During such periods, one way to transform businesses is to adopt a pivoting strategy (Manolova,

Brush, Edelman & Elam, 2020; Morgan, Anokhin, Ofstein & Friske, 2020). Morgan, Anokhin, Ofstein & Friske (2020) describe pivoting as changing the product or service offerings in response to an exogenous shock to capitalize on emerging opportunities.

2.2. Challenges Faced by Small Businesses in the Supply Chain Context

Small businesses are essential for economic growth. However, small business owners face unique challenges that threaten the survival of their firms. Thus, a vast number of studies focus on small business survival (e.g., Headd, 2003; Phillips and Kirchhoff, 1989; Reid, 1999; Rico, Pandit and Puig, 2020; Schafer and Talavera, 2009; Van Praag, 2003). The literature shows that small business survival and prosperity depend on factors such as technological environment (e.g., Agarwal, 1998), innovation (e.g., Cooke and Wills, 1999), business environment including lower cost of entry, easy access to finance, and greater information sharing (e.g., Ayyagari, Beck and Demirguc-Kunt, 2007), business advice and external collaboration (e.g., Robson and Bennett, 2000), capital inheritance (e.g., Schafer and Talavera, 2009), regional ethnic diversity (e.g., Boudreaux, 2020), gender (e.g., Fairlie and Robb, 2009), network support (e.g., Bruderl and Preisendorfer, 1998), being a family firm (e.g., Madanoglu, Memili and De Massis, 2020), health of the owner (e.g., Torres and Thurik, 2019), and skills and ability to cope with uncertainties and complexities during downturns (e.g., Bartoloni, Arrighetti and Landini, 2020).

Marshall and Schrank (2014) and Marshall and Schrank (2020) investigate small business recovery after negative shocks such as natural disasters. Torres and Thurik (2019) especially draw researchers' attention to health capital and its spillover effects on small business owners' working lives. As a pandemic, COVID-19 brought a new level of challenge by leading to a global crisis that combines a natural disaster's momentary and devastating characteristics and the wide scope and prolonged duration of a grand obstacle (Bacq et al., 2020). This global crisis caught businesses, individuals, health systems, and legislative authorities off guard, highlighting the need for a resilient supply chain perspective to understand how small businesses navigate and overcome such unparalleled shocks (Brammer, Branicki, and Linnenluecke, 2020).

2.3. COVID-19 Impact on Small Businesses

The COVID-19 pandemic that has caused 1,610,810 deaths worldwide as of December 13, 2020 (JHU, 2020) is a major exogenous shock (Giones, Brem, Pollack, Michaelis, Klyver & Brinckman, 2020; Morgan, Anokhin, Ofstein & Friske, 2020; Nummela, Paavilainen-Mantymaki, Harikkala-Laihinen & Raitis, 2020) which left many small business owners with no other solution than to exit the business and others struggling to survive.

The pandemic has wreaked havoc on small businesses. Results of recent studies (Balla-Elliott et al., 2020; Bloom et al., 2021; Bratik et al., 2020; Fairlie, 2020) show that almost half of the small businesses are temporarily closed due to the pandemic, one-third of their full-time employees are either laid off or furloughed, and their sales have sunk by more than 40% on average. The latter is stark compared to larger businesses, which only lost about 10% of their sales. These drastic economic impacts are mainly because small businesses are severely lean regarding financial measures such as cash on hand. Drawing upon supply chain literature (Foster & Suwandi, 2020; Nordhagen et al., 2021)., this precarious financial position may amplify the ripple effects throughout the

supply chain network, highlighting the interconnectedness and interdependence of businesses within the broader economic ecosystem.

Many researchers (e.g., Baker & Judge, 2020) forecast that this will lead to a deep economic recession in the near future. Although the magnitude and length of such a recession is yet to be determined, scholars are certain that it will continue to affect small businesses' operation and profitability at a higher rate than larger businesses. This has been echoed in the small business owners' opinion about the prospect of economic recovery. In research by Humphries et al. (2020), between 40% and 50% of small business owners believed they would not recover from the recession in the next two years. This underscores the pressing need to understand and address the unique challenges small businesses face within the supply chain context as they navigate the complex aftermath of the COVID-19 pandemic.

2.4. COVID-19 Relief Acts for Small Businesses

The economic environment shaped by interdependencies between economic development and institutions affects the entrepreneurship dynamics in every country. These interdependencies determine other factors such as governance quality, access to capital and other resources, and the perceptions of entrepreneurs (Acs, Desai, and Hessels, 2008). Acs and Szerb (2007) and Fotopoulos and Storey (2019) emphasize the importance of public policies designed to assist entrepreneurs. To help small businesses, workers, families, and industries, the Coronavirus Aid, Relief, and Economic Security (CARES) Act (2020) and the Coronavirus Response and Consolidated Appropriations Act (2021) were passed by the U.S. Congress and signed into law on March 27, 2020 and December 27, 2020 respectively (https://home.treasury.gov/policy-issues/coronavirus/about-the-cares-act Accessed on May 24, 2021). Bartik et al. (2020) explain that while the majority of businesses planned to get funding through the CARES Act as such a stimulus would influence their business decisions, including layoffs and staying in business, many expected bureaucratic complexities and challenges related to establishing eligibility to create barriers to accessibility of the funding.

In sum, the US Congress passed the Coronavirus Aid, Relief, and Economic Security (CARES) Act in March 2020, in response to the devastating economic effects of the pandemic. Through multiple measures, including emergency government grants, loan payment coverage, and most importantly the $350 billion Paycheck Protection Program (PPP), the CARES Act is intended to assist small businesses (Parrott et al., 2020)

Current literature on the impact of such policies shows mixed results. Carroll et al., 2020 predicted that the CARES Act and PPP program will be enough for a quick recovery and bringing consumer expenditures to normal levels. However, they also discovered that only 20% of stimulus payments would be spent immediately. This finding has been corroborated by the data collected from household bank accounts (Kobayashi et al., 2021). This casts doubt on the effectiveness of the CARES Act and PPP, especially when a swift recovery for small businesses is concerned.

Other studies have shown that financial assistance measures were ineffective in relieving small businesses from monetary losses or enabling them to reopen (Cirera et al. 2021). For instance, Guerrieri et al. (2020) doubted the benefits of traditional fiscal stimulus and advocated for monetary policies in an economy where supply shocks

affect aggregate demand and production. Other studies (Granja et al., 2020; Chetty et al., 2020) associate this ineffectiveness with the lack of access to such loans and improper allocation of PPP credits. Latter studies also state that policies that intend to stimulate the demand and provide cash to small businesses may not work when economic activities are shut down for health and safety reasons. Exploring how relief acts have influenced the interconnected web of small businesses, their suppliers, and the broader economic ecosystem (Caiazza et al., 2021) ensures a comprehensive understanding of the challenges and opportunities presented by these relief acts within the intricate tapestry of the supply chain, thereby contributing to a nuanced analysis of their impact on small businesses in the wake of the COVID-19 pandemic. It would be essential to explore alternative strategies within the supply chain context to understand the multifaceted challenges small businesses face in their quest for survival amid the pandemic.

2.5. What is Unique about the Impact of COVID-19 on Small Businesses in California

The impact of COVID-19 on small businesses has been studied at the global and national levels (Bartik et al., 2020; Baker & Judge, 2020; Bloom et al., 2021; Fairlie, 2020; Humphries et al., 2020). However, the current literature of granular studies investigating the pandemic's effects on small businesses at the state and local levels is scarce. The spread and fatality rates of COVID-19 differed significantly across different states mainly due to the local government interventions such as social distancing and closure of businesses (White & Hébert-Dufresne, 2020). Adolph et al. (2021) posit that since the federal government allowed states to make their own decisions as to when and for how long to close down different businesses, the effect of such closures varies among states. This variation of dynamics among states, along with other factors like population distribution and other demographic parameters, calls for a micro-level study that investigates the impact of COVID-19 on small businesses at the state and city levels.

Bartik, Bertrand, Cullen, Glaeser, Luca & Stanton (2020) and Fairlie (2020) focus on small businesses in the U.S. at an aggregate level and present the big picture of the impact of the pandemic on these businesses. However, entrepreneurship's contribution to economic development can change significantly between countries and regions (Acs, Desai & Hessels, 2008; Westlund and Bolton, 2003). Thus, it is crucial for public policymakers to be acquainted with local factors and variables specific to different contexts (Acs, Desai & Hessels, 2008). Geography (Rappaport and Sachs, 2003) and population diversity (Alesina, Harnoss & Rapoport, 2016) play important roles in economic growth and prosperity. Our paper aims to contribute to the literature by presenting evidence from multiple cities in California. California is a Pacific coastal state. Rappaport and Sachs (2003) describe this region as having high economic activity, population density, and personal income level due to higher productivity or more skilled human capital. Based on the most recent data provided by the U.S. Census Bureau, the population estimate is 39,029,342 (July 1, 2022), the percentage of foreign-born persons is 26.5% (2018-2022), the percentage of persons with a bachelor's degree or higher is 35.9% (2018-2022), median household income is $91,905 (2018-2022). The number of firms is 742,139 (2017).

California's unique demographic characteristics further emphasize the need for a localized examination of the challenges and opportunities small businesses face in their

broader supply chain context, recognizing the interconnectedness of small businesses within the overarching economic framework (Fuller & Moran, 2001) and highlighting the significance of state-level dynamics in shaping their experiences during the pandemic.

III. METHOD

3.1. Data

To investigate the determinants of small businesses' financial performance during the pandemic and the effectiveness of the government's economic relief policies, a publicly available database from Opportunity Insights (Chetty, Friedman, Hendren, Stepner, et al., 2020) was used. This database tracks economic activity at a granular level in real-time using anonymized data from private companies. The dataset reports such key indicators as customer spending, business revenue, mobility, and the like. This dynamic dataset releases each data series at the highest available frequency using an automated pipeline that ingests data from data providers. This study uses daily data from February 24, 2020, to March 28, 2021, across eight California cities: Los Angeles, San Diego, San Jose, San Francisco, Fresno, Oakland, Sacramento, and Bakersfield. The total number of observations is 3,192.

Figure 1 shows the trend of small business revenue growth across eight cities between February 24, 2020, and March 28, 2021. Reference lines in the figure identify dates when the government's economic policy was signed by the President. On March 27, 2020, President Donald Trump signed the CARES Act, including the Paycheck Protection Program and the first round of stimulus checks. On December 28, 2020, the President signed the Consolidated Appropriations Act, including the fund of another round of PPP loans and the second round of stimulus checks.

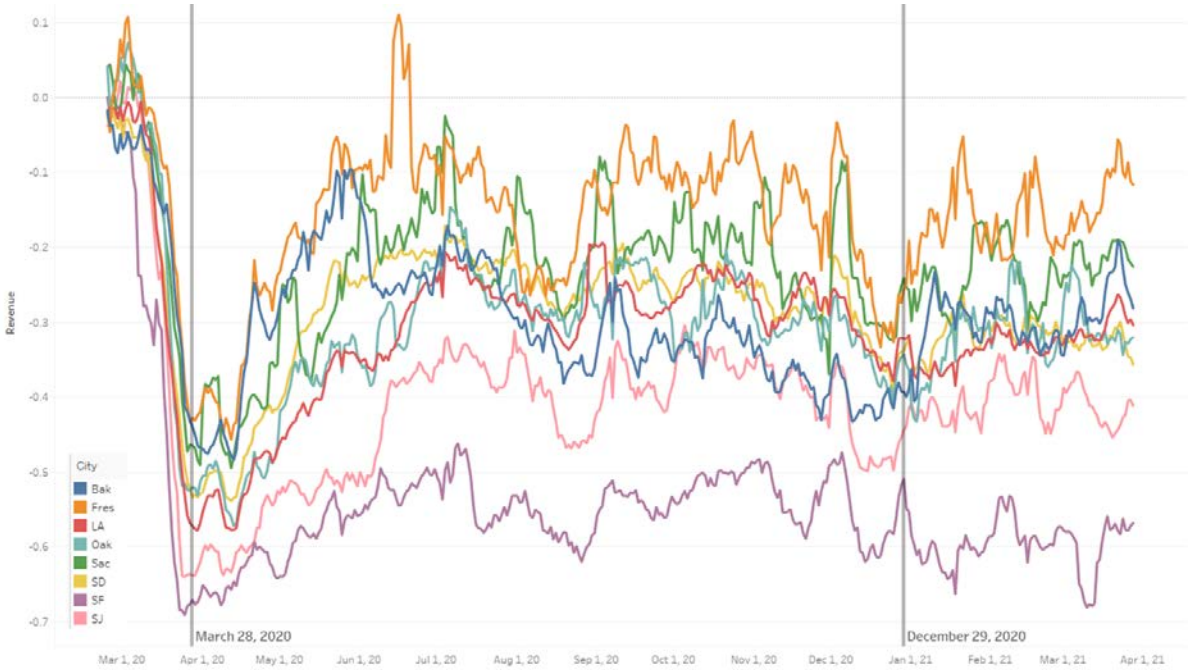

FIGURE 1. REVENUE GROWTH RATE TREND BETWEEN FEB 24, 2020 AND MARCH 28, 2021

3.2. Models and Findings

The model below proposes that customers' overall spending, case and death rates of COVID-19, and overall time spent at and outside residential locations influence small businesses' financial performance. The authors used a panel data analysis using the city as a panel variable and date as a time variable. It is strongly balanced panel data.

$$Y_{revenue\_all} = \beta_0 + \beta_1 X_{spend\_all} + \beta_2 X_{case\_rate} + \beta_3 X_{death\_rate} + \beta_4 X_{gps\_residential} + \beta_5 X_{gps\_away\_from\_home} + \varepsilon$$

$Y_{revenue\_all}$	Percent change in net revenue for small businesses, calculated as a seven-day moving average, seasonally adjusted, and indexed to January 4-31, 2020.
X_{spend_all}	Seasonally adjusted credit/debit card spending relative to January 4-31, 2020, in all merchant category codes (MCC), 7-day moving average.
X_{case_rate}	Confirmed COVID-19 cases per 100,000 people, seven-day moving average.
X_{death_rate}	Confirmed COVID-19 deaths per 100,000 people, seven-day moving average.
$X_{gps\_residential}$	Time spent at residential locations.
$X_{gps\_away\_from\_home}$	Time spent outside of residential locations.

Table 1 compares a fixed-effects regression and a random-effects GLS regression. According to the Hausman Test (p = *.9327*) (Hausman, 1978), the random-effects model is preferred. Thus, the unique errors are not correlated with the independent variables. According to the Breusch and Pagan Lagrangian Multiplier test for random effects (p = *.000*), variances across cities (i.e., panel effect) exist, and a random-effects regression is appropriate.

TABLE 1. FIXED-EFFECTS VS. RANDOM-EFFECTS GLS REGRESSION

	Fixed-effects	Random-effects GLS
	coefficient (t)	coefficient (z)
const	1.81 (-10.51)**	-0.04 (-2.51)*
spend_all	0.046 (2.36)*	0.047 (2.42)*
case_rate	-7.86e-06 (-6.57)**	-8.00e-06 (-6.70)**
death_rate	0.000147 (1.66)	0.0001565 (1.77)
gps_residential	0.34 (0.90)	0.3197065 (0.83)
gps_away_from_home	1.81 (5.69)**	1.79138 (5.63)**
Observations per group	399	
R-squared	Within: .74 Between: .76 Overall: .74	
Model	F: 1763.17**	Wald chi: 8838.22**
The error correlation with regressors	0.12	0
The intraclass correlation	0.54	0.39
Hausman test	0.9327	

** p value < .05 ** p value < .01*

Customers' overall credit/debit card spending positively impacts small businesses' revenue. Governments' economic relief acts have had positive influences. COVID-19 case rate has a significant negative impact, but its death rate does not significantly impact small businesses. People might pay more attention to the number of positive cases than death cases and strongly associate infection and the odds of death. Time spent outside residential locations has a significant positive impact, but time spent at residential locations does not significantly impact.

Tables 2 and 3 show the results of a series of Difference-in-difference tests, which show the effectiveness of the government's economic relief acts (i.e., the CARES Act and the Consolidated Appropriations Act) at the individual city level. To control the time-fixed effects, the Date variable is used as a covariate.

TABLE 2. DIFFERENCE-IN-DIFFERENCE TESTS: BEFORE VS. AFTER THE CARES ACT

	R-square	Before	After	DID estimator (t)
Los Angeles	.09	-0.013 (-0.47)	0.006 (0.73)	0.019 (.66)
San Diego	.10	-0.013 (-0.47)	0.042 (5.18)**	0.054 (1.94)
San Jose	.15	-0.048 (-1.84)	-0.111 (14.24)**	-0.064 (2.34)*
San Francisco	.42	-0.153 (-7.13)**	-0.271 (42.11)**	-0.118 (5.28)**
Fresno	.26	0.102 (4.22)**	0.193 (26.42)**	0.090 (3.55)**
Sacramento	.14	0.056 (2.13)*	0.105 (13.39)**	0.049 (1.81)
Oakland	.09	0.037 (1.39)	0.012 (1.50)	-0.025 (.90)
Bakersfield	.10	0.030 (1.13)	0.025 (3.12)**	-0.005 (.18)

** p value < .05 ** p value < .01*

It is important to note that the revenue growth was negative across eight cities before and after the CARES Act. Thus, the effectiveness of the CARES Act is about whether or not it attenuated the negative trend of revenue growth.

Looking at the cities in Southern California, LA shows no significant differences before and after the Act became effective compared to the average of the other cities. The revenue growth of small businesses in San Diego was more negative after the Act became effective. However, the amount of the growth dropped was a little less than that of the rest of the cities, which made the difference between San Diego and the other cities significant. However, the difference between San Diego and the other cities before and after the Act is marginally significant. Thus, the Act was not very effective. For Bakersfield, the growth drop was more negative than that of the other cities after the Act was effective. However, the difference between Bakersfield's small businesses and the other cities' small businesses in their negative revenue growth was similar before and after the Act. For San Diego, the Act might slow down the decreasing trend of the sales growth of small businesses compared to other cities. On the other hand, it was ineffective for small businesses in Bakersfield.

We also looked into five Northern California cities: San Jose, Oakland, San Francisco, Fresno, and Sacramento. For San Jose, the revenue decrease was more negative than that of the other cities after the Act. COVID more challenged San Francisco's small businesses compared to those of the other cities. They were continuously and even more negatively impacted by COVID even after the Act became effective. On the other hand, Fresno's small businesses were less negatively affected than the other cities,

and their downward revenue growth was much less than the average of small businesses in the other cities after the Act. The Act was somewhat effective for small businesses in Fresno. There was a similar pattern in Sacramento, but it is challenging to say the Act was effective. In that, the difference between average small businesses' revenue growth between Sacramento and other cities before and after the Act was insignificant. Lastly, Oakland showed no significant differences.

TABLE 3. DIFFERENCE-IN-DIFFERENCE TESTS: BEFORE VS. AFTER THE CONSOLIDATED APPROPRIATIONS ACT

	R-square	Before	After	DID estimator (t)
Los Angeles	0.00	0.005 (0.50)	0.003 (0.19)	-0.001 (0.07)
San Diego	0.01	0.044 (4.76)**	0.015 (0.86)	-0.029 (1.50)
San Jose	0.06	-0.111 (-12.46)**	-0.087 (5.28)**	0.024 (1.28)
San Francisco	0.33	-0.249 (-33.08)**	-0.301 (21.54)**	-0.051 (3.24)**
Fresno	0.17	0.181 (21.53)**	0.199 (12.76)**	0.018 (1.00)
Sacramento	0.05	0.097 (10.82)**	0.114 (6.86)**	0.017 (0.90)
Oakland	0.01	0.013 (1.39)	0.019 (1.11)	0.006 (0.32)
Bakersfield	0.01	0.022 (2.37)*	0.039 (2.27)*	0.017 (0.88)

** p value < .05 ** p value < .01*

FIGURE 2. SMALL BUSINESSES' REVENUE GROWTH CHANGE BEFORE AND AFTER THE CARES ACT AND THE CONSOLIDATED APPROPRIATIONS ACT: SAN FRANCISCO, SAN JOSE, AND FRESNO

The average revenue growth was positive when we set the Consolidated Appropriation Act as a reference point. Thus, the question is if the Act attenuated or enhanced the positive revenue growth trend. LA did not show any significant results. Small businesses' revenue growth in San Diego had dropped by a more considerable amount compared to that of the other cities. The Act did not show any positive impact.

For small businesses located in San Jose, their overall revenue growth was lower than the average in other cities. Unlike the average revenue growth of the other cities, San Jose small businesses' revenue growth was higher after the Act became effective. However, the change amount was insignificant before and after the Act became effective. Bakersfield's small businesses showed higher and more consistent revenue growth than the other cities' small businesses, which showed dropping revenue growth. SF small businesses' revenue growth was overall significantly lower than the other cities' average growth. While the average revenue growth decreased slightly, the revenue growth of SF small businesses dropped significantly.

SF small businesses were more challenged even after the Act became effective. Small businesses in Fresno and Sacramento showed higher revenue growth than those in the other cities. While the average revenue growth of small businesses in the other cities decreased, those in Fresno and Sacramento kept their revenue growth consistent over time. However, there was no significant difference before and after the Act. Another Northern California-based city, Oakland, showed no significant results. In sum, unlike the CARES Act, it helped small businesses in Bakersfield, Fresno, and Sacramento keep their revenue growth consistent. San Francisco is the most struggling city among eight cities.

The analysis outputs suggest the necessity of deeper analysis by closely examining differences in the business landscape of each city and the demographic nature between cities. Furthermore, many small businesses were closed before the Consolidated Appropriation Act became effective. In sum, it is crucial to understand the similarities and differences between small businesses in different cities. According to this understanding, the State government must establish a more detailed financial aid strategy (i.e., fund allocation).

IV. CONCLUSION AND DISCUSSION

This study intends to investigate how COVID-19 influenced small businesses and how effective governments' economic relief acts. In general, it strongly recommends that the U.S. government establish an emergency system where policymakers can make policies that consider the market characteristics of each city for optimal distribution and maximum effectiveness of government aid.

4.1. Summary

This study explores the pivotal role of small businesses as vital suppliers within the local economy, particularly amidst the challenges posed by the COVID-19 pandemic. The analyzed model shows the positive influence of customers' overall spending on small businesses' performance. Many working individuals have been financially challenged (e.g., reduced working hours and closed businesses). The government's financial support has helped them do business with local small businesses. This support might be a temporary additional income source for some other people, and they enjoy spending it to support local small businesses. Also, the Paycheck Protection Program and Economic Injury Disaster Loan helped local small businesses to keep their employees and keep their businesses open.

A significant positive impact of the COVID-19 case rate may imply that the change in infectious case number rather than the actual death count is enough to heighten people's perceived risk of infection. As a result, they minimized their activities outside their residential areas. In a similar vein, time spent outside residential locations has a significant positive impact on small

businesses, and time spent at residential locations does not show a significant impact. While many small businesses have an online selling platform and the digital market has been booming, in-person relationships are still essential to success. In other words, customers see the actual value of the in-person relationship.

A series of difference-in-difference analyses present the limited effectiveness of governments' economic relief acts. It may be because of inherent differences across cities in an economic landscape, population characteristics, industry characteristics, and the like.

4.2. Managerial Implications

The findings of this study support that government economic policies should be implemented, managed, and evaluated at the city level, especially during the pandemic, when the nation faces significant economic challenges. It requires close collaboration among Federal, State, County, and City governments. After the total budget is allocated at the state or county level, each city government should have its discretion of budget allocation with its local SBA office.

According to difference-in-difference analyses, the government's financial aid is not effectively distributed across small businesses as integral suppliers within the local marketplaces. Currently, the programs should be evaluated at the city level. Even though the effect would vary across industries, the city should monitor and evaluate programs. Policymakers can investigate how effective each program is across industries within each city. Each city can differ from other nascent cities in terms of its economic infrastructure, market structure, geographic characteristics, etc.

In connection to the supply chain dynamics, this study highlights the importance of evaluating government economic policies at the city level regarding small businesses, as they are a crucial supplier within the marketplace. Moreover, supply chain disruption has a greater and more direct impact on small businesses' economic stability than other institutions. Given the idiosyncrasies of different cities regarding their active industries and the business landscape differences within particular Supply Chain networks, it is imperative to allocate funds to the cities. Also, cities should work more closely with the Small Business Administration (SBA) office to exercise discretion in the allocation of budgets based on the unique economic dynamics of each city. Since industries respond differently to these aids, it is imperative to have a city-level evaluation of the success and effectiveness of such programs. Furthermore, since the extended supply chain of many small businesses spans other cities, it calls for inter-city collaborations to enhance the effectiveness of these incentives in solving supply chain challenges.

4.3. Limitations and Future Research Directions

There are limitations in this research, but they clearly show potential future research opportunities. First, the dataset did not look into the effectiveness of government acts at each program level (i.e., Paycheck Protection Program, Stimulus Check). It does not capture the new business opportunities some local small businesses face (e.g., a niche market). Second, only an overall market analysis was possible, but an industry-focused analysis could be carried out. Lastly, a more profound analysis of the business landscape and local demographic information could be added to provide more insights into the city government's decision-making for local economy protection and enhancement.

4.4. Follow-up data collection from small businesses in California

Additional survey research was conducted to support the proposed managerial implications and raise the urgent need for close and city-level monitoring to heighten the effectiveness of the acts. The survey questionnaire is adapted from the one developed by Atchison et al. (2020).

The developed survey questionnaire was distributed through a cloud-based data collection platform, Amazon Mechanical Turk (MTurk). Studies supported MTurk as a source to recruit participants from the general population (e.g., Buhrmester, Kwang, and Gosling 2011; Goodman, Cryder, and Cheema 2013; Paolacci, Chandler, and Ipeirotis 2010; Rand 2012). As Goodman, Cryder, and Cheema (2013) suggested, multiple screening variables were used. Two MTurk quality control factors were used, which are (1) the incentive approval ratio (i.e., >90%) and (2) the geographic location (i.e., California). There was an additional screening variable with the survey questionnaire. In exchange for respondents' participation, a monetary incentive was granted. The total sample size was 130.

Our survey results gave us an overall idea of what small businesses experience during the pandemic. 44.62% responded that they had experienced decreased sales, while 32.31% reported increased sales. Of 22 respondents in the Finance and Insurance industry, 14 responded that their sales have increased. On the other hand, among 21 business owners in the Retail Trade industry, 13 have experienced a decrease in sales.

73% have experienced cash flow disruption. 67% have experienced a drop-in customer, and 25% have not yet experienced a noticeable drop in the number. 53.08% have secured enough cash to survive 1 to 3 months. 22.31% have enough cash to survive 4 to 6 months. 11.54% reported not having enough cash secured to survive a month. Only 13% have enough cash for more than six months.

50.77% received government financial aid, and they rated the effectiveness of the aid 3.9 out of 5.0. 40% said they did not receive any financial aid from the government. Those who received government financial aid are more interested in PPP (i.e., 4.12 out of 5.0) than those who did not (i.e., 3.17 out of 5.0). Additionally, businesses with increased sales showed higher interest in PPP (i.e., 4.17 out of 5.0) than businesses with decreased sales (3.38 out of 5.0).

In terms of safety measures, 35% applied extreme safety measures. 47% had some measures, and 12% had only mandatory measures. 6.15% said they did not have any safety measures in place. 55% lost at least one employee, and 43% did not lose any employees. 34% of responded businesses hired employees, and 15% did not. 51% stopped providing one of their offerings, and 42% kept all the offerings. 56% offered new products, but 37% did not add any new products to their portfolio. Lastly, many businesses missed some payments during the pandemic (i.e., loan 45%; rent 42%; utility/payroll 50%). Lastly, the survey results show that 60% of respondents have an online sales platform (vs. 35% have no online sales platform).

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APPENDIX A. SURVEY QUESTIONNAIRE

Screening question:	Are you a business owner or self-employed?
Information reliability	In your opinion, how reliable are the information you receive on COVID-19? (1 = highly unreliable to 5 = highly reliable)
Challenges experienced	Are you experiencing any business challenges due to the COVID-19 pandemic? (1 = Yes; 2 = No; 3 = do not know; 4 = prefer not to say)
Safety measures taken	To what extent have you taken measures to protect your customers and employees from COVID-19? (1 = no measures; 2 = only mandatory measures; 3 = some measures; 4 = extreme measures)
Perceived effectiveness of the mandatory safety measures	In your opinion, how effective are the mandatory measures for businesses in preventing the spread of COVID-19? (1 = not effective at all to 5 = extremely effective)
Perceived problems of the mandatory safety measures	In your opinion, how problematic are the mandatory measures for businesses in preventing the spread of COVID-19? (1 = not challenging at all to 5 extremely challenging)
Drop in the number of customers	Have you seen a drop in the number of customers/clients visiting your business weekly? (1 = Yes; 2 = No; 3 = do not know; 4 = prefer not to say)
Received governmental assistance	Have you received any business incentives or assistance from the local, state, or federal government? (1 = Yes; 2 = No; 3 = do not know; 4 = prefer not to say)
Perceived effectiveness of governmental assistance	In your opinion how effective were the business incentives or assistance that you received from the local, state, or federal government? (1 = not effective at all to 5 = extremely effective)
Sales impacted	How has your company's sales been affected since March 31, 2020? (1 = increased; 2 = decreased; 3 = not affected; 4 = do not know; 5 = prefer not to say)
Cash flow disruption	Have you experienced a disruption in cash flow as a result of the COVID-19 crisis? (1 = Yes; 2 = No; 3 = do not know; 4 = prefer not to say)
Secured cash amount	Approximately, how many months of cash do you have available right now? (1 = less than 1 month; 2 = 1-3 months; 3 = 4-6 months; 4 = more than 6 months)
Perceived likelihood to go back to normal	In your opinion, what is the likelihood of being back to normal business on July 4, 2021? (1 = extremely unlikely to 5 = extremely likely)
Perceived interest in government economic relief program	How interested are you in CARES Act PPP loans (or similar)? (1 = not interested at all to 5 = highly interested)

Experienced delays from domestic suppliers	Have you experienced any delays from your domestic suppliers due to COVID-19? (1 = Yes; 2 = No; 3 = do not know; 4 = prefer not to say)
Experienced delays from foreign suppliers	Have you experienced any delays from your foreign suppliers due to COVID-19? (1 = Yes; 2 = No; 3 = do not know; 4 = prefer not to say)
Perceived difficulty with locating alternate domestic suppliers	Have you experienced any difficulty locating alternate domestic suppliers? (1 = Yes; 2 = No; 3 = do not know; 4 = prefer not to say)
Perceived difficulty with locating alternate foreign suppliers	Have you experienced any difficulty locating alternate foreign suppliers? (1 = Yes; 2 = No; 3 = do not know; 4 = prefer not to say)
Missed loan payments	Have you missed any loan payments due to COVID-19? (1 = Yes; 2 = No; 3 = do not know; 4 = prefer not to say)
Business space	Do you rent or own your business space? (1 = rent; 2 = own; 3 = do not know; 4 = prefer not to say)
Missed rent payments	Have you missed any rent payments for your business space due to COVID-19? (1 = Yes; 2 = No; 3 = do not know; 4 = prefer not to say)
Missed other payments	Have you missed any other scheduled payments (utilities, payroll, etc.) due to COVID-19? (1 = Yes; 2 = No; 3 = do not know; 4 = prefer not to say)
Online sales	Does your company have online sales? (1 = Yes; 2 = No; 3 = do not know; 4 = prefer not to say)
Offering stopped	Have you stopped offering any existing products or services since March 31, 2020? (1 = Yes; 2 = No; 3 = do not know; 4 = prefer not to say)
New offering	Have you started offering any new products or services since March 31, 2020? (1 = Yes; 2 = No; 3 = do not know; 4 = prefer not to say)
Expected length of the pandemic	How long do you expect the current COVID-19 pandemic to last? (1 = 3 months or less; 2 = 6 months; 3 = 9 months; 4 = 12 months; 5 = more than 12 months; 6 = do not know; 7 = prefer not to say)
Business experience	How long has your company been in business?
Industry	Which industry does your company operate in? 1. Agriculture, Forestry, Fishing & Hunting 2. Mining 3. Utilities 4. Construction 5. Manufacturing 6. Transportation and Warehousing 7. Wholesale Trade 8. Retail Trade 9. Media and Information

	10. Finance and Insurance 11. Real Estate and Rental and Leasing 12. Health Care and Social Assistance 13. Professional, Scientific and Technical Services 14. Arts, Entertainment and Recreation 15. Accommodation and Food Services 16. Management of Companies and Enterprises 17. Administrative and Support and Waste Management 18. Educational Services 19. Other
The number of employees	How many employees does your company have?
Lost employees	Have you lost any employees since March 31, 2020? (1 = Yes; 2 = No; 3 = do not know; 4 = prefer not to say)
Hired employees	Have you hired any new employees (i.e. delivery personnel) since March 31, 2020? (1 = Yes; 2 = No; 3 = do not know; 4 = prefer not to say)