Small Business Administration Lending and Economic Performance

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Abstract

This paper analyzes a panel of state-level data from 1990 to 2023 to determine whether lending by the U.S. Small Business Administration (SBA) through two specific loan programs, 504 and 7(a), significantly impacts state-level real GDP and unemployment rates. Additionally, it seeks to understand how these impacts changed during the global financial crisis (GFC) from 2007 to 2009, which originated from the U.S. subprime mortgage crisis. Using a dynamic panel data model with the Generalized Method of Moments (GMM) estimator, we find that SBA lending positively promotes state-level real GDP and reduces unemployment rates, and these effects are statistically significant and economically important. Specifically, a 1% increase in SBA 7(a) loans per job supported correlates with a decrease of over six basis points in the state unemployment rate. However, this positive effect diminished during the GFC, resulting in a 0.002% decrease in state-level real GDP and a 0.03% increase in the unemployment rate across both loan programs.

Key Words: Small Business Administration, Small Business Lending, Dynamic panel data, GMM

JEL Classifications: G38, H81, L26

I. Introduction

Small businesses are often acclaimed as the engines of both developing and developed economies. There is a widely held belief in their crucial role in economic growth, job creation, boosting foreign trade, and alleviating poverty. Consequently, policymakers frequently highlight small businesses as vital sources of employment growth. However, small business owners continue to face significant challenges in obtaining the necessary funds to execute their innovative ideas and become viable enterprises. In 2022, two out of every three business owners in the U.S. who sought credit did not receive the amount they needed.[1] These persistent gaps in access to capital stem from two issues related to information asymmetry: adverse selection and moral hazard, as identified by Stiglitz and Weiss (1981).[2] To mitigate the credit constraints faced by small businesses, the U.S. Small Business Administration (SBA) provides federal loan guarantees through its two key

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[1] SBA press release, April 12, 2023.

[2] Stiglitz and Weiss (1981) argued that adverse selection impedes the ability of markets to allocate credit using just the lending rate because it increases the proportion of high-risk borrowers in the pool of prospective borrowers. On the other hand, moral hazard reduces the ability of rates alone to clear lending markets because once the loan is extended, the actions of borrowers is not independent of the lending rate. As a result, difficulties in obtaining adequate information about the parties involved in a transaction may explain the inefficient allocation of small business loans. In such an environment, there are no market forces leading supply to equal demand, and credit is rationed. (Craig et al. 2009).

lending programs, the 7(a) and 504 Loan Programs. These programs offer loan guarantees to eligible small businesses that are unable to secure credit elsewhere. Over the years, the volume of guaranteed loans has steadily increased. In fiscal year 2023, the SBA guaranteed a record $33.94 billion in loans for small businesses, representing an 11.4% increase compared to the $30.46 billion guaranteed in fiscal year 2017.

Given the advancements in computer technology and continuous innovations in communication that have significantly improved the efficiency of credit markets—especially for small businesses—we would expect a considerable decrease in information costs stemming from problems of asymmetry in the small business lending market. Moreover, if SBA loan guarantees effectively mitigate credit market frictions, they will lead to improved capital allocation within the economy, which, in turn, should have a positive impact on overall economic performance.

Conversely, if SBA loan guarantees fail to alleviate credit rationing in lending markets, we should not observe a significantly positive correlation between the level of SBA guarantees and economic performance. Therefore, the steady growth of SBA loan guarantee programs raises the question of whether there is any observable impact of SBA activities on U.S. economic growth and employment.

Empirical evidence on this issue remains unclear, warranting further investigation. Some research indicates that SBA-guaranteed lending programs positively affect economic performance, such as per capita income and employment growth at the local market level (Craig et al., 2007, 2008; Cortes, 2010; Orzechowski, 2020). Conversely, other studies argue that SBA-guaranteed lending programs have minimal effects on income or employment improvements in recipient areas (De Rugy, 2007; Lee, 2018; Higgins et al., 2021; Rupasingha et al., 2019). Most of these studies typically examined annual SBA lending at the county or metropolitan statistical area (MSA) levels using data predating 2002 (Craig et al. 2007, 2008; Armstrong et al., 2014; Lee, 2018; Brown & Earle, 2017), with only a few studies investigating the relationship between SBA lending programs and state-level economic performance (Cortes, 2010; Orzechowski, 2020). A recent study by Brown and Earle (2017) explored the impact of access to SBA loans on firm-level employment growth. Based on OLS and instrumental variable regression models, their results suggested that firms receiving SBA loans increased employment by an average of 3.0 to 3.5 employees for every $1 million in SBA loans received during the first three years after the loans were granted. However, their study was limited to immediate firm-level effects and did not consider the broader impacts of SBA loans on the local economy, including GDP growth and unemployment rates.

The objective of this study is to fill a gap in the literature by providing separate estimates of the impacts of the SBA's 7(a) and 504 loan programs on state-level economic performance, which have often been analyzed together. Additionally, we expand our analysis to cover the period of the 2007-2009 global financial crisis to examine how that crisis affected SBA lending, economic growth, and employment—an area that previous studies have overlooked.

Using a panel of state-level data from 1990 to 2023, we assess whether SBA lending through the two distinct loan programs, 504 and 7(a), significantly impacts state-level GDP and unemployment rates and how this impact changed during the 2007-2009 financial crisis related to the U.S. subprime mortgage crisis. Given the consistent growth of the SBA loan guarantee programs over the years, our empirical results based on the latest data offer important policy implications: Can the ongoing expansion of these government loan guarantee programs be justified?

Based on a dynamic panel data model with a Generalized Method of Moments (GMM) estimator that accounts for potential endogeneity in SBA loan distributions (as noted by Krishnan

et al. (2015) and Brown and Earle (2017)), we find that SBA lending has a statistically significant and economically important positive impact on state-level output and unemployment reduction. Specifically, a 1% increase in SBA 7(a) loans per job supported correlates with a decrease of over six basis points in the state unemployment rate. To verify the robustness of our results, we also considered alternative measures of SBA loans, and the findings remained consistent.

The remainder of the paper is organized as follows. Section II provides an overview of SBA major lending programs. A brief review of the academic literature regarding the impact of SBA lending on the U.S. economic performance is presented in Section III. The empirical model and the econometric methodology are covered in Section IV. Section V discusses the data. Section VI reports and discusses the empirical results. The robustness tests are given in Section VII. Finally, section VIII concludes the paper.

II. The Small Business Administration Loan Programs

The SBA, an independent agency of the United States government, was created on 30 July 1953 by the enactment of Public Law 163. The mission of the SBA is "to maintain and strengthen the nation's economy by enabling the establishment and viability of small businesses and by assisting in the economic recovery of communities after disasters." The SBA's two main business lending programs are the 7(a) guaranteed loan program and the 504 loan program. The 7(a) loan program is the most basic and most significant among the SBA's business loan programs, which provides financial support to small businesses unable to secure financing under reasonable terms from traditional avenues. Loans from the 7(a) program are only available on a guaranty basis, and the program guarantees up to 85% of loans with a maximum guaranty of up to $150,000 and 75% of loans greater than $150,000 made by partnering lenders, which may include banks, credit unions, and other financial institutions. Under the guaranty concept, commercial lenders make and administer the loans, and small businesses apply to lenders for their financing. The lender decides whether it will make a loan internally or if the application has some weaknesses which, in the lender's opinion, mean the loan will require an SBA guaranty before it will be underwritten. The guaranty that the SBA provides is available only to the lender. It assures the lender that in the event of a payment default, the government will reimburse the lender for its loss, up to the percentage of SBA's guaranty. Under the 7(a) program, the borrower remains obligated for the full amount due. This federal guarantee reduces the risk to the lender, thereby encouraging them to provide loans to small businesses that might otherwise be considered too risky. The loan funds can be used for a variety of purposes, including working capital (both short and long term), refinancing debt, and purchasing furniture, fixtures, and supplies. This flexibility reflects the SBA's recognition of the diverse needs of small businesses and the barriers they face in accessing traditional credit markets. However, some businesses that are ineligible for this program, such as real estate investment firms (where property is held for investment purposes), dealers of rare coins and stamps, and lending institutions like banks.

The 504 Loan Program is a direct debentures program that provides fixed-rate loans to small businesses. This loan program is specifically designed for the long-term financing of fixed assets like real estate or heavy machinery and equipment but provides only 40% of the funding. Fifty percent of the remaining funding usually comes from banks and 10% from the small business owner depending on the SBA rules and regulations. SBA 504 financing is provided through a certified development company (CDC), a nonprofit corporation set up to contribute to the

economic development of its community. CDCs work with the SBA and private-sector lenders to provide financing to small businesses. The 504 loans cannot be used for working capital or inventory, underscoring the program's explicit focus on job creation and retention via physical capital expansion. For instance, borrowers are generally required to create or retain one job for every $65,000 guaranteed by the SBA. Understanding the 7(a) and 504 loan programs in this detailed context helps shed light on the mechanisms through which SBA loans may impact economic and employment outcomes and the potential reasons behind the variations in their effectiveness. It also underscores the significant role the SBA plays in addressing the capital access issues faced by small businesses.

III. Literature Review

Previous studies on the impact of SBA lending on economic performance primarily focused on data up to 2013. For instance, Hicks (2004) used data from the Community Reinvestment Act (CRA) to analyze the effect of CRA-reported loans on employment in 55 counties of West Virginia during the 1996-98 period. His growth model regressed county employment on CRA-reported loans of less than $100,000, human capital, public capital, county distress rankings, a trend variable, and a spatial autocorrelation adjustment. He found that loans to small businesses had a positive and statistically significant effect, but only for firms with five to nine employees. Craig et al. (2007) examined SBA loan activity in metropolitan statistical areas (MSAs) and non-MSA locations using annual data from 1991 to 2001. They identified a positive relationship between per capita personal income growth and SBA loans using a GMM regression model, noting that the effects were somewhat stronger in non-MSA locations compared to MSAs. Although statistically significant, the economic impact was minor based on the estimated coefficients. In a subsequent study (Craig et al., 2008), they analyzed the relationship between SBA loans and employment in MSA locations, again using annual data from 1991 to 2001 and applying a fixed-effects ordinary least squares (OLS) model. After controlling for the density of financial institutions, local economic structure, and the retail industrial share of the local economy, they found a statistically significant and positive impact of SBA loans on local employment, especially in lower-income MSAs compared to higher-income ones. Cortes (2010) studied the impact of SBA loans on various small business activity indicators, such as employment rates and per capita income, while controlling for other determinants of state economic growth. Using U.S. state-level data from 1986 to 2008 and estimating three different dependent variables—income growth, small firm growth, and employee growth—his regression results indicated that the impact of SBA lending on per capita income was statistically insignificant. Conversely, SBA loans had a positive and significant impact on the growth of small businesses and the number of employees within those firms. Notably, his study did not account for potential endogeneity in the model nor differentiate between the impacts of the two distinct SBA lending programs on state economic performance. Armstrong et al. (2014) analyzed the role of SBA lending in relation to employment and financial market development using a generalized least squares (GLS) fixed-effects regression model with annual data from 1991 to 2001. They found that SBA lending had a statistically significant positive effect in areas with relatively underdeveloped financial markets, concluding that the SBA guarantee helped improve credit access in these less developed regions. Brown and Earle (2017) estimated the firm-level impact of access to SBA loans on employment growth at the county level. Using OLS and instrumental variable regression models with annual data from 1991 to 2009, their results indicated that firms that received SBA loans experienced growth in employment. Lastly,

Orzechowski (2020) examined the relationship between SBA lending programs and state-level employment using a dynamic GLS panel model. His analysis used quarterly state-level data from the U.S. covering the years 1990 to 2013. The results indicated a statistically significant positive relationship between growth in SBA lending per capita and changes in state civilian employment rates. However, while these relationships were statistically significant, they were not economically meaningful. An analysis comparing states with high and low personal incomes revealed no significant differences in the relationship between SBA lending and employment across these groups. It is important to note that this study focused solely on the connection between SBA lending and state-level employment, without considering output growth.

IV. Empirical Model and Methodology

To examine whether the SBA lending has a statistically significant relationship with state-level economic growth and employment, we estimate the following equation:

$$Y_{i,t} = \beta_0 + \beta_1 Y_{i,t-1} + \beta_2 SBA_{\mathrm{t-1}} + \beta_3 (SUB * SBA)_{t-1} + \beta_4 DEP_{\mathrm{i,t-1}} + \beta_5 LQ_{\mathrm{i,t-1}} + \beta_6 HPI_{\mathrm{i,t-1}} + \varepsilon_{i.t} \quad (1)$$

Where $Y_{i,t}$ represents the real state-level gross product per capita ($RSGP$) or unemployment rate ($UNEMP$) of state i at time t. The primary variable of interest on the right side of equation (1) is, $SBA_{\mathrm{t-1}}$, which is the lagged SBA loans, measured as the loan amount per job supported. In addition, the variable SBA loans is categorized into two groups—504 loans and 7(a) loans—to determine whether the effects of SBA loans on the real state-level GDP and unemployment rate vary based on the type of SBA programs. Therefore, the first two hypotheses of this study are as follows:

H1: SBA lending will increase the real state-level gross product per capita (i.e., $\beta_2 > 0$)
H2: SBA lending will reduce the state-level unemployment rate (i.e., $\beta_2 < 0$)

Another variable of interest is $(SUB * SBA)_{t-1}$ where SUB is a dummy variable equal to one during the 2007-2009 global financial crisis (GFC) originated form the U.S. subprime mortgage crisis and zero otherwise. A statistically significant negative β_3 coefficient indicates that the contribution of SBA lending to the state-level economic growth diminished during the crisis. Therefore, the next two hypotheses of this study are as follows:

H3: The GFC has a negative effect on the contribution of SBA lending to the state-level gross product per capita (i.e., $\beta_3 < 0$)
H4: The GFC has a negative effect on the contribution of SBA lending in reducing state-level unemployment rate (i.e., $\beta_3 > 0$)

To controls for national economic conditions and local market structure, we include three additional regressors. First, $DEP_{\mathrm{i,t-1}}$ is bank deposit per capita which is a proxy for the financial development and competitiveness of banking sector in the local market (Craig et al. 2007; Corets 2010). Second, $LQ_{\mathrm{i,t-1}}$, is a variable of location quotient for manufacturers calculated as a ratio of the share of manufacturing employment in state employment to the share of overall manufacturing employment in U.S. It is intended to measure how concentrated a particular industry was in a state

compared to the national average because local industrial composition is an important determinant of local employment (Cortes, 2010; Ramsey, 2018). A ratio greater than one indicates that a state's manufacturing sector accounts for a larger share of state employment as compared to that of the nation. Third, $HPI_{\mathrm{i,t-1}}$ is the house price index which can be used to measure how the economy will likely to perform. A higher price index generally signals that more jobs will be created which stimulates consumer confidence and spending. This paves the way for greater aggregate demand, boosting GDP and overall economic growth. We take the log of all the variables defined in equation (1) in the estimation.

The dynamic nature with the lagged dependent variable included as a regressor in equation (1) suggests the possibility of an endogenous bias, as outlined by Nickell (1981). When dependent variable exhibits high persistence (i.e., the persistence coefficient β_1 is positive and statistically significant), using static models such as pooled OLS and fixed effect produce biased and inconsistent results (Blundell and Bond, 1999). To address potential endogeneity issues, Arellano and Bond (1991) and Blundell and Bond (1998) developed the generalized method of moments (GMM) model, which can be used for dynamic panel data. The GMM model provides consistent results in the presence of different sources of endogeneity, namely "unobserved heterogeneity, simultaneity and dynamic endogeneity" (Wintoki, Linck, & Netter, 2012). The GMM model removes endogeneity by internally transforming the data, and two kinds of transformation methods are available. The first method, known as first-difference transformation, where a variable's past value is deducted from its current value, could result in the loss of too many observations and an increase in the gap between observations when there are missing data (Roodman, 2009). The second method, known as second-order transformation, applies "forward orthogonal deviations" which means that instead of subtracting the previous observations of a variable from its current value, the second-order transformation subtracts the average of all future available observations of a particular variable (Roodman, 2009). Using the second-order transformation, researchers can prevent unnecessary data loss. Therefore, in the case of an unbalanced panel dataset, a GMM model with the second-order transformation provides more efficient and consistent estimates for the involved coefficients and is adopted in this study.[3]

V. Data

To examine the impact of SBA lending on state-level employment and economic growth, we construct a panel of U.S. data that includes observations on 51 states from 1990 to 2023. Our dependent and independent variables are constructed as annual averages over this sample period for a total of 1734 observations. We utilize the data from different sources. The first source of data on loan-specific data for all SBA-approved 7(a) and 504 loans was obtained directly from the SBA and consists of 211,943 504 loans and 1,764,630 7(a) loans for a total of 1,976,573 loans approved over the sample period. SBA loans were grouped at the state-level and across time in order to add to the SBA literature by exploring state-level economic markets that have not been fully studied by the existing SBA literature. Table 1 reports the data collected on these two SBA lending programs by calculating the total loan volume, average loan amount, and the number of

[3] The simulation results show that the GMM estimator of the model transformed by the forward orthogonal deviation tends to work better than that transformed by the first difference (K. Hayakawa,2009). Therefore, we estimate the GMM estimator of our dynamic panel data model transformed by both first difference and forward orthogonal deviation and we only select the model transformed by the first difference if the model transformed by the forward orthogonal deviation is rejected.

jobs supported per loan separately under each program for each state and Table 2 reports the annual averages of those loan data across all 51states over the 1990-2023 sample period.

Table 1: SBA 504 and 7(a) Loans by U.S. States

The table shows the total quantity of the loans approved, the average loan amount per loan, and the average numbers of job supported per loan across 51 U.S. states during 1990-2023. States are given by their U.S. postal abbreviation.

State	SBA 504 Loans			SBA 7(a) Loans			
	Qty	Gross Approved	Jobs Supported	Qty	Gross Approved	Guaranteed	Jobs Supported
AK	468	538228.7	13	4084	354821.6	270617.7	9.35
AL	2989	534709.5	15	13615	352074.4	268761.5	8.91
AR	778	635648.5	21.27	11740	338344.9	254875.8	7.18
AZ	4385	592327.8	19.82	35721	377410.7	282138	12.5
CA	41848	708816.7	20.72	233367	395028.1	298393.3	10.74
CO	6427	557208.3	17.95	41564	345726.9	260483	9.78
CT	1830	493991.7	16.79	24358	258805.6	188515.1	8.86
DC	274	753748.8	17.11	3286	279485.4	209303.7	10.55
DE	218	646794	19.75	4815	243178	180054.5	8.56
FL	14934	546931.4	12.92	88889	343153.7	258374.7	9.71
GA	5715	617115.2	15.97	46970	483097.5	366644.7	10.03
HI	1077	537834	13.25	7474	136899.4	99721.03	6.88
IA	2625	478898.3	16.47	17843	246210	186904.8	8.52
ID	3083	406352.4	13.88	16825	230202.4	174009.3	7.86
IL	9043	592481.5	17.53	58765	299453.4	223740.5	9.12
IN	4828	452671.1	18.72	31811	269194.9	199463.7	8.96
KS	1764	493470.8	17	17879	260604.7	195893.4	8.97
KY	1162	532711.9	28.27	15249	253444.9	188323.2	8.71
LA	1226	531508.3	18.56	17025	326453.6	247338.7	9.69
MA	6158	507062.9	16.69	53606	166739.1	118700.7	7.85
MD	1904	705772.6	21.07	26660	251427	186985.1	9.73
ME	1455	408980.7	12.58	11022	169688.1	123064.5	7.57
MI	5163	519857	22.21	54544	270965	198317.3	8.31
MN	8632	490933.6	19.16	47236	254291.2	189195	10.23
MO	4395	497370.9	18.15	35435	265762.9	201480.4	9.16
MS	551	840880.6	24.5	14906	287068	218820.7	6.49
MT	881	501860.6	14.74	12514	234843.4	177806	7.01
NC	3680	561628.3	12.88	30954	358666.6	269445.6	9.67
ND	1532	484627.2	15.28	7504	210573.5	151720.8	7.99
NE	1327	544299.3	19.87	12005	232926.1	174851.3	8.72
NH	3715	355598	14.87	19263	154110.9	110508.9	7.46

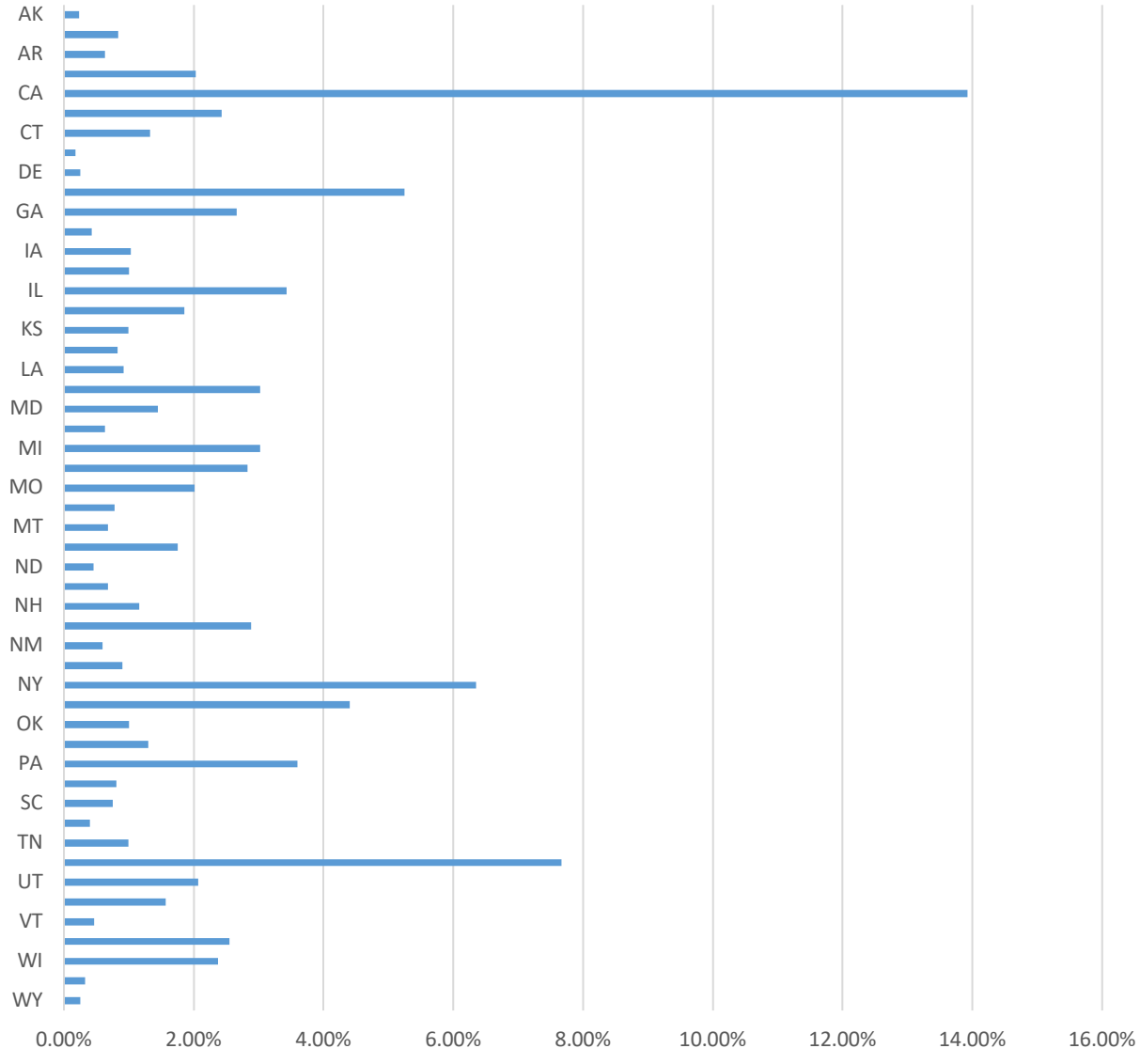
NJ	2206	822131.1	18.46	54818	323786.8	242261.1	9.07
NM	1367	495620.6	16.21	10380	303685.6	229597.3	9.6
NV	3489	574510.4	18.98	14293	306473.8	230786.8	10.6
NY	8032	636874.8	20.91	117496	220229.7	160884.8	7.78
OH	7045	448173.6	15.46	80055	208911.5	152208.4	7.63
OK	1659	523953.6	21.75	18111	307723	230030.1	8.98
OR	2308	636676.8	15.23	23368	295982.1	222540.1	8.53
PA	3218	631187.6	18.72	67992	252110.9	187080.9	8.79
RI	1213	459831.1	18.59	14709	194493.6	143797.5	8.82
SC	1398	650226.3	19.34	13432	392575.9	297700.6	9.58
SD	1591	468148.8	15.78	6385	232280.7	177357.5	6.85
TN	1393	696263.4	19.59	18257	368323.8	278818.4	9.5
TX	9904	717173.2	23.49	141577	379268.1	285432.4	9.94
UT	7449	505872.9	16.21	33368	260251.4	194157.8	10.84
VA	4348	534566.3	12.42	26658	312308.3	234331.7	9.92
VT	578	454887.6	18.42	8610	162442	117428.7	7.37
WA	4516	650817.1	13.31	45942	335412.9	252067	8.62
WI	5397	605105.6	16.25	41518	284794.7	212837.3	9.16
WV	211	562352.5	19.11	6294	218715.7	160676.4	7.02
WY	554	561592.1	16.37	4438	274743.6	207784.6	8.42

As can be seen from Figure 1, most of the SBA lending is concentrated in California, which has 13.92% of the total SBA volume. Texas (7.66%), New York (6.35%), and Florida (5.25%) follow California with relatively large shares when compared to the remaining states. Figure 2 plots the time series of SBA lending over the sample period and as can be seen, the volume of 7(a) loans is always higher than that of 504 loans and the total TBA lending reached the highest point just right before the start of 2007-2009 US sub-prime mortgage crisis in 2006. Figure 3 depicts the average loan amount approved for each program, and it shows that although the number of loan approved is always higher for 7(a) loan program, but the average loan amount approved for each program is always higher for 504 loan program which is not surprising given the nature of 504 loan which focuses more on physical capital investments instead of inventory purchases under 7(a) loan program. Figure 4 exhibits the average number of jobs supported per loan approved under each loan program over time, and this average is always higher for the 504 loan program but it was gradually decreasing up to 2009 and afterword the average number of jobs supported is very close for both loan programs.

The data to measure economic conditions including the real gross state product per capita is directly obtained from the Bureau of Economic Analysis (BEA). The unemployment rate and employment data used to calculate the location quotient for manufacturing are from the Bureau of Labor Statistics (BLS). The house price index, one of many economic indicators that investors use to keep a pulse on broader economic trends, is downloaded from Federal Housing Finance Agency (FHFA) website. The data used to measure the financial development in each state, bank deposit per capita, is obtained from the Federal Deposit Insurance Corporation's (FDIC) annual summary of deposit data files. The definitions and the descriptive statistics of the variables used in the estimation is in Table 3, and Table 4 shows the correlations among the log values of independent variables used in the estimation. Most of the correlations are very low except the

correlation between the (log) SBA 504 gross loan per job supported and the (log) house price index at 0.6198. We also calculate the Variance Inflation Factor (VIF) for each independent variable and the VIFs are all less than 5 and range from 1.10 for (log) bank deposit per capita to 3.04 for the (log) house price index, suggesting no presence of multicollinearity among our dependent variables.[4]

Figure 1: Combined SBA Loan Volume (%) by States



[4] The results of multicollinearity tests not reported here but are available upon request.

Figure 2: Loan Volume Approved by Years

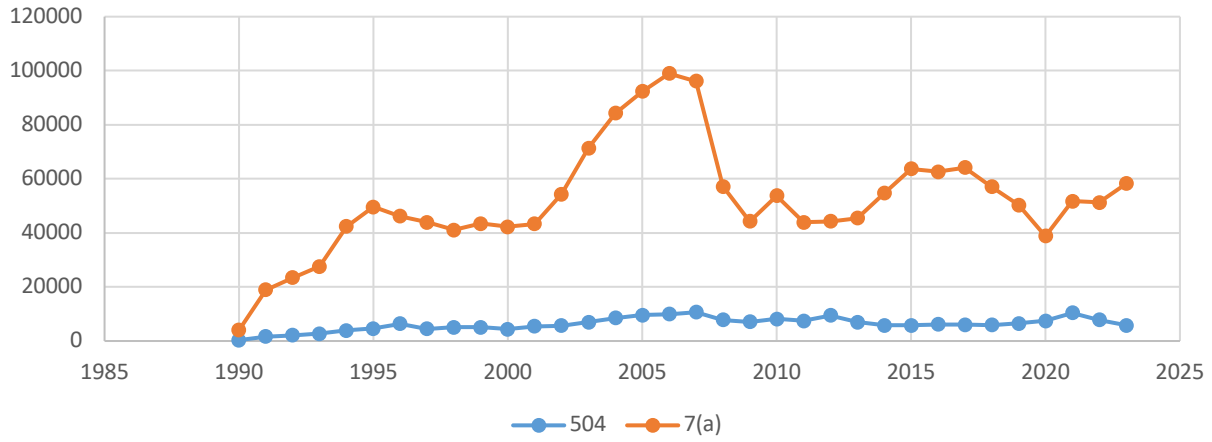


Figure 3: Average Loan Amount by Years

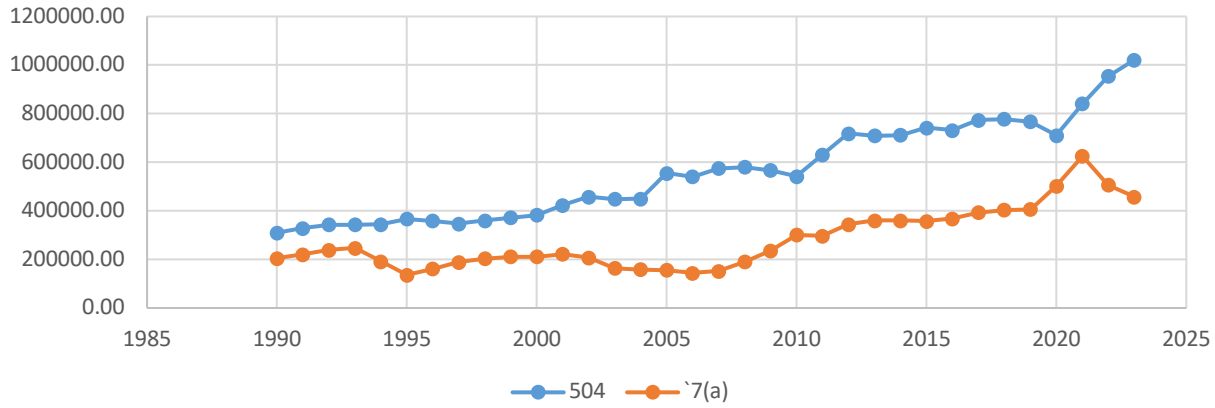


Figure 4: Number of Jobs Supported per Loan

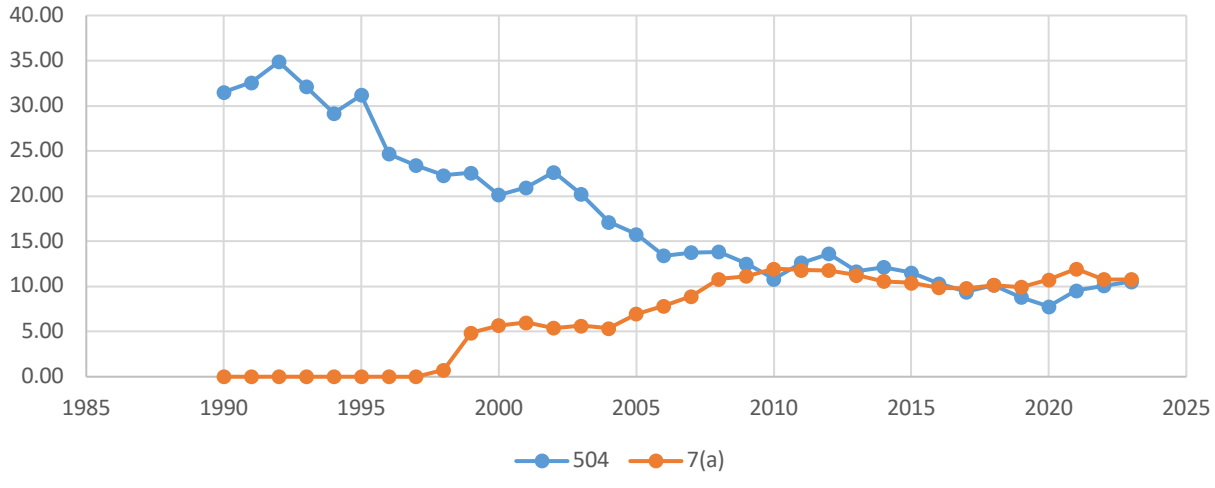


Table 2: SBA 504 and 7(a) Loans by Years

The table shows the total quantity of the loans approved, the average loan amount per loan, and the average numbers of job supported per loan by years during 1990-2023.

Year	SBA 504 loan Program			SBA 7(a) Loan Program			
	Qty	Gross Approved	Jobs Supported	Qty	Gross Approved	Guaranteed	Jobs Supported
1990	329	310118.9	31.52	3995	204255.5	165131.5	NA
1990	329	310118.9	31.52	3995	204255.5	165131.5	NA
1991	1631	329081.1	32.57	18909	220240	178484.3	NA
1992	2095	342914.7	34.87	23378	239259.3	196003.3	NA
1993	2764	343004.3	32.12	27585	246912.3	196545.4	NA
1994	3898	344758.4	29.18	42384	190968.9	147611.3	NA
1995	4637	367132.7	31.2	49538	136640.1	107868.1	NA
1996	6340	358662.4	24.67	46131	161401.3	119026.1	NA
1997	4434	346977	23.39	43952	188840.4	137318.2	0.01
1998	5064	359799.8	22.31	41106	203069.6	149082.2	0.77
1999	5132	372472.9	22.6	43392	211430.7	150316.7	4.87
2000	4423	381873	20.13	42262	211478.4	151922.9	5.67
2001	5420	422763.2	20.94	43269	221980.3	163860.1	6
2002	5714	457760.9	22.66	54299	207087.2	152812.8	5.4
2003	6953	447725.5	20.22	71374	164113.2	118937.2	5.63
2004	8497	449925.9	17.12	84325	158747.8	112971.6	5.38
2005	9572	555257.8	15.78	92320	155456.4	110138.5	6.94
2006	9887	540970.5	13.4	98950	143579.1	100205.5	7.83
2007	10647	574800.8	13.77	96115	151403.8	106122.2	8.91
2008	7797	579531.1	13.83	57196	190387	136047.9	10.81
2009	7149	566765.8	12.51	44242	236106.7	192662.2	11.14
2010	8105	541397.8	10.82	53784	300748.5	246996.6	11.94
2011	7437	630877.3	12.63	43906	296791.4	213098.7	11.81
2012	9516	717733.4	13.63	44254	344728.7	251059.9	11.77
2013	6974	709435.4	11.67	45486	360298	264191.7	11.23
2014	5805	712214	12.14	54714	359451.1	263457.3	10.58
2015	5755	742118	11.51	63658	357509.7	262174.3	10.39
2016	6140	732201.7	10.31	62657	367734.6	269394.8	9.85
2017	6084	773175.7	9.4	64107	393046.3	288210.1	9.78
2018	5886	777457.2	10.16	57009	403055.5	295599.9	10.13
2019	6496	767412.4	8.81	50311	405749.6	297033.1	9.92
2020	7399	710142.7	7.79	38836	502896.8	366659	10.76
2021	10441	840441.1	9.55	51720	624924	518744.5	11.94
2022	7777	953688.7	10.08	51240	505868	368333	10.78
2023	5745	1021506	10.52	58226	457283.6	332937.3	10.77

Table 3: Descriptive Statistics

Variable	Source	Mean	Std. dev.	Max	Min
Real State GDP	BEA	51279.11	3640.1	57073.76	43502.98
Unemployment rate	BLS	5.36	1.41	8.68	3.29
504 gross loan per job supported	SBA	47440.71	32076.96	107359.5	11559.54
7(a) gross loan per job supported	SBA	188767.7	646385.7	3327567	17659.51
7(a) guaranteed loan per job supported	SBA	136801.1	464411.2	2388046	12374.42
Bank deposit per capita	FDIC	48.76	38.93	121.89	10.38
Location quotient for manufacturing	BLS	0.95	0.03	0.99	0.91
House price index	FHFA	181.43	58.32	335.86	100

BEA: Bureau of Economic Analysis; BLS: Bureau of Labor Statistics; FHFA: Federal Housing Finance Agency; FDIC: Federal Deposit Insurance Corporation. The data for real state GDP per capita obtained from BEA directly is only available from 1997 to 2019. The date for the number of jobs supported under 7(a) loan program is not available until 1997, so the descriptive statistics calculated for 7(a) gross loan per job supported and 7(a) guaranteed loan per job supported are for the 1997-2023 sample period.

Table 4: Correlations

Panel A	$ln(SBA)^a$	$ln(DEP)$	$ln(LQ)$	$ln(HPI)$
$ln(SBA)^a$	1.0000			
$ln(DEP)$	0.0821***	1.0000		
$ln(LQ)$	-0.0497	0.2609***	1.0000	
$ln(HPI)$	0.6198**	0.0132	-0.2293***	1.0000
Panel B	$ln(SBA)^b$	$ln(DEP)$	$ln(LQ)$	$ln(HPI)$
$ln(SBA)^b$	1.0000			
$ln(DEP)$	-0.0567	1.0000		
$ln(LQ)$	0.0142	0.2609***	1.0000	
$ln(HPI)$	-0.3431***	0.0132	-0.2293***	1.0000

$ln(SBA)^a$is the log of SBA 504 *gross* loan per job supported; $ln(SBA)^b$ is the log of SBA 7(a) *guaranteed* loan per job supported; $ln(DEP)$ is the log of bank deposit per capita, $ln(LQ)$ is the log of the location quotient; $ln(HPI)$ is the log of house price index. ** = significance at 5% level, and *** = significance at the 1% level. The data for real state GDP per capita obtained from BEA directly is only available from 1997 to 2019, so the correlations calculated are for the 1997-2019 sample period.

VI. Empirical results

Table 5 presents the results of the impact of SBA lending on the state-level real GDP and unemployment rate for 504 and 7(a) loan programs separately in Panels A and B, respectively. Before we investigate the statistically significance of the parameter estimates specified in equation (1), we need to check if our dynamic panel data model with GMM estimator is appropriate by testing the overidentifying restriction based on Hansen's J-test. The p-values of this test ranging from 15.16% to 29.68% reported in Table 5 imply that the instruments used in our GMM estimation are valid. We can now examine the statistical significance of the parameter estimates in the model. Notice from the table that the coefficients (β_1) on the lagged dependent variable, $\log(RSGP_{t-1})$, for 504 loans (0.8316) and 7(a) loans (0.9054) are positive and statistically significant at the 1% level. Similarly, coefficients (β_1) on $\log(UNEMP_{t-1})$ for 504 loans (0.6843) and 7(a) loans (0.5933) are also positive and statistically significant at 1% level. These results imply the persistence of both dependent variables and thus justify the use of the dynamic panel data model. The main interest of this study is the β_2 coefficient on $\log(SBA_{t-1})$ which measures the impact of the SBA lending calculated as the (log) amount of SBA approved loan per job supported on the (log) stat-level real GDP per capita, $\log(RSGP_t)$, and it is positive and statistically significant at the 1% level for both programs (0.006 for 504 loans and 0.0046 for 7(a) loans), suggesting that the SBA lending does have a positive impact on the economic performance at state level.

In terms of the unemployment rate, the β_2 coefficient on $\log(SBA_{t-1})$ is negative and statistically significant at the 1% level for 7(a) loans (-0.0646). This suggests that SBA lending under the 7(a) loan program does reduce the state-level unemployment rate. Specifically, a 1% increase in the amount of SBA 7(a) loans per job supported is associated with a 0.0646% decrease in the state-level unemployment rate. Conversely, the coefficient β_2 for 504 loans is positive and statistically significant at the 5% level (0.0182), indicating that SBA lending under the 504 loan program may actually increase the unemployment rate. This contradictory finding raises questions about whether SBA lending effectively reduces unemployment. The relationship is complex. Easier access to capital through SBA lending may enable small businesses to expand and hire more workers, representing a positive scale effect. However, it could also lead to capital-labor substitution, which would reduce employment if capital and labor are considered gross substitutes. Furthermore, even if the scale effect is dominant, any increase in employment could be limited if SBA lending crowds out other sources of capital. The overall employment effect may also be reduced if there are negative spillovers onto competing firms, leading to a crowding-out effect. Consequently, it is plausible that the 504 loan program could negatively impact employment since it primarily focuses on fixed assets.

Another interest of this study is the impact of SBA lending during the GFC. As can been seen, the β_3 coefficient on $\log(SUB * SBA)_{t-1}$ is negative and statistically significant at the 1% level for both 504 loans (-0.0022) and 7(a) loans (-0.0019) with respect to the state-level real GDP per capita. With respect to the state-level unemployment rate, β_3 coefficient is positive and statistically significant at the 1% level for both 504 loans (0.0344) and 7(a) loans (0.0289), indicating that the positive impact of both SBA lending programs on the state-level real GDP and employment before the crisis was reduced during the crisis. Because the research on how the SBA lending contributed to the state-level economic performance during the GFC has not been fully exploited in the literature, the empirical results from this study have shed light on this issue and have very significant public policy implications for how SBA guaranteed lending should be

reevaluated. Particularly researchers need to empirically reassess the success of key policy initiatives to mitigate the damage done by the credit crunch associated with the GFC.

Table 5: Dynamic Panel Data Model with GMM Estimator: SBA Gross Loan per Job Supported

This table reports the parameter estimates of the dynamic panel data model specified in equation (1) utilizing the GMM approach for two SBA lending programs: 504 loans in Panel A and 7(a) loans in Panel B.

		Panel A: 504 Gross Loan		
	$Y_t = ln(RSGP_t)$		$Y_t = ln(UNEMP_t)$	
$ln(RSGP_{t-1})$	0.8316	(0.0057)***	0.6483	(0.0077) ***
$ln((SBA_{t-1})$	0.0060	(0.0012) ***	0.0182	(0.0076) **
$ln(SUB * SBA_{t-1})$	-0.0022	(0.0001) ***	0.0344	(0.0070) ***
$ln(DEP_{t-1})$	-0.0025	(0.0007) ***	0.0014	(0.0035)
$ln(LQ_{t-1})$	0.0671	(0.0057) ***	-0.0196	(0.0161)
$ln(HPI_{t-1})$	0.0203	(0.0018) ***	-0.1421	(0.0205) ***
HJ-Stat	54.8322		50.3969	
P-Value (J)	0.2019		0.2685	
# of observations	1068		1566	
		Panel B: 7(a) Gross Loan		
	$Y_t = ln(RSGP_t)$		$Y_t = ln(UNEMP_t)$	
$ln(RSGP_{t-1})$	0.9054	(0.0058) ***	0.5933	(0.0080) ***
$ln((SBA_{t-1})$	0.0046	(0.0007) ***	-0.0646	(0.0023) ***
$ln(SUB * SBA_{t-1})$	-0.0019	(0.0001) ***	0.0289	(0.0036) ***
$ln(DEP_{t-1})$	-0.0022	(0.0011)	-0.0076	(0.0026) ***
$ln(LQ_{t-1})$	0.0301	(0.0064) ***	-0.1500	(0.0263) ***
$ln(HPI_{t-1})$	0.0105	(0.0022) ***	-0.1781	(0.0136) ***
J-Stat	58.0573		50.6022	
P-Value (J)	0.1516		0.2968	
# of observations	976		1180	

$Y_{i,t} = \beta_0 + \beta_1 Y_{i,t-1} + \beta_2 SBA_{t-1} + \beta_3 (SUB * SBA)_{t-1} + \beta_4 DEP_{i,t-1} + \beta_5 LQ_{i,t-1} + \beta_6 HPI_{i,t-1} + \varepsilon_{i.t}$ (1)

Where $Y_{i,t}$ represents the real state-level gross product ($RSGP$) per capita or unemployment rate ($UNEMP$) of state i at time t; SBA_{t-1}, which is the lagged SBA *gross* loan per job supported; SUB is a dummy variable equal to one during the 2007-2009 global financial crisis (GFC) and zero otherwise. $DEP_{i,t-1}$ is bank deposit per capita, $LQ_{i,t-1}$, is the location quotient; $HPI_{i,t-1}$ is the house price index; $\varepsilon_{i.t}$ represents a mean-zero disturbance term. All the variables in equation (1) have been convert to log values. HJ-Stat is Hansen's J statistic. P-Value (J) is the associated P-value of HJ-test. Robust standard errors clustered at the state level are shown in parentheses ** = significance at 5% level, and *** = significance at the 1% level. The data for real state GDP per capita obtained directly from BEA is only available from 1997 to 2019, so equation (1) was estimated over this sample period when the dependent variable is $ln(RSGP_t)$.

We next consider our control variables. The β_4 coefficient on $\log(DEP_{i,t-1})$ for the state-level real GDP per capita is statistically significant at the 1% level only for SBA 504 loans with a negative sign (-0.0025), suggesting the negative correlation between the state-level real GDP and

financial development or market liquidity in the state. If the bank deposit per capital can be a proxy for the financial development or liquidity of state economy, this negative correlation seems to be counterintuitive given that a liquid financial market should promote economic growth. However, while bank deposits are essential for the functioning of the banking system, high deposit rates can sometimes lead to lower GDP growth, as they can reduce the amount of money available for lending and investment. Our result is very close to the finding by Driscoll (2004) who used a panel of annual data on the U.S. states and concluded that that shocks to the supply of bank loans generally have a small and often negative effect on state personal income. For the state-level unemployment rate, this β_4 coefficient on $\log(DEP_{i,t-1})$ is significant for SBA 7(a) loans with a negative sign (-0.0076), implying that a well-developed financial market with more liquidity will reduce the state-level unemployment rate, which is one would expect and is also consistent with previous studies including Armstrong et al. (2014), Shaffer (2006), Levine (1997), and Craig et al. (2008).

The coefficients on the remaining two control variables are consistent with our expectations and previous literature. For example, the β_5 coefficient on $\log(LQ_{i,t-1})$ is statistically significant at the 1% level with a positive sign with respect to the state-level real GDP for SBA 504 loans (0.0671) and 7(a) loans (0.0301), implying a 1% increase in the location quotient for manufacturing sector is associated with a 0.0671% (0.0301%) increase in the state-level real GDP under each lending program, respectively. This same coefficient with the expected negative sign is insignificant for the state-level unemployment rate for SBA 504 loans (-0.0196) but statistically significant at the 1% level for 7(a) loans (-0.15), implying that a 1% increase in the state manufacturing employment relative to that of the U.S. is associated with a 0.15% decrease in state-level unemployment rate. Finally, the β_6 coefficient on $\log(HPI_{i,t-1})$ with respect to the state-level real GDP has the expected positive sign and statistically significant at the 1% level for both lending programs (0.0203 vs. 0.0105), and with respect to the state-level unemployment rate, the coefficient also has the correct negative sign and statistically significantly at the 1% level for both lending programs (-0.1421 vs. -0.1781). Based on the statistical significance and the size of the estimated β_6 coefficient on $\log(HPI_{i,t-1})$, it shows that the house price index is not only statistically significant but economically important in predicting the state economic performance.

VII. Robustness check

The results reported in Panel B of Table 5 show a statistically significant and positive impact of SBA lending on both state-level real GDP and employment rate when using the total *gross* loan approved per job supported under SBA 7(a) loan program. Since SBA also provides the information on the portion of gross loans which are guaranteed under 7(a) program, it would be interesting to see if the positive impact found in Panel B of Table 5 may have been over-stated if the guaranteed portion of 7(a) gross loan per job supported is used in the GMM estimation.[5] The results reported in Table 6 show that the model is not rejected by the Hansen's J-test and in addition the statistical significance and the sign of the coefficient estimates are virtually unchanged. For example, the β_1 coefficient on the lagged dependent variable is statistically significant and positive for both $ln(RSGP_{t-1})$ and $ln(UNEMP_{t-1})$. The main interest of β_2 coefficient on $ln(SBA_{t-1})$ is still statistically significant and positive for state-level real GDP (0.0062) and negative (-0.0607)

[5] SBA does not provide the information on the guaranteed portion of gross loans under 504 loan program, so we only re-estimate the model for SBA 7(a) loan program for the robustness check.

for the unemployment rate, suggesting that even though the average of SBA 7(a) guaranteed loan per job supported ($136801.1) is smaller than the average of the overall gross loan per job supported ($188767.7) shown in Table 3, the positive impact of SBA lending under 7(a) loan program on state-level real GDP and employment remain strong especially in reducing unemployment rate (a 0.0607% drop with a 1% increase in the SBA guaranteed lending per job supported). Regarding the β_3 coefficient on the SBA lending during the GFC, similar to the finding in Table 5, it is statistically significant and negative with respect to state-level real GDP and positive for state-level unemployment rate, implying that the positive impact on promoting state economic growth and reducing unemployment rate from SBA lending programs diminished during the crisis. The β_4 coefficient on $ln(DEP_{t-1})$ remains statistically insignificant with respect to state-level real GDP, but is statistically significant and negative (-0.0082) with respect to state unemployment rate. The β_5 coefficient on $ln(LQ_{t-1})$ is statistically significant and positive for both state-level read GDP (0.0254) and unemployment rate (-0.1586), suggesting that a higher concentration of manufacturing industry not only improves state-level real GDP, but also reduces the state unemployment rate. Finally, the β_6 coefficient on $ln(HPI_{t-1})$ is also statistically significant and positive for both state-level read GDP (0.0129) and unemployment rate (-0.1699), indicating that an increase in the house price index would stimulate state-level economic growth and improve its employment.

Table 6: Dynamic Panel Data Model with GMM Estimator: SBA 7(a) Guaranteed Loan per Job Supported

This table reports the parameter estimates of the dynamic panel data model specified in equation (1) utilizing the GMM approach for SBA 7(a) loans.

	7(a) Guaranteed Loan			
	$\boldsymbol{Y_t = ln(RSGP_t)}$		$\boldsymbol{Y_t = ln(UNEMP_t)}$	
$\boldsymbol{ln(RSGP_{t-1})}$	0.9104	(0.0092) ***	0.5986	(0.0080) ***
$\boldsymbol{ln((SBA_{t-1})}$	0.0062	(0.0006) ***	-0.0607	(0.0025) ***
$\boldsymbol{ln(SUB * SBA_{t-1})}$	-0.0020	(0.0002) ***	0.0289	(0.0044) ***
$\boldsymbol{ln(DEP_{t-1})}$	-0.0025	(0.0015)	-0.0082	(0.0032) **
$\boldsymbol{ln(LQ_{t-1})}$	0.0254	(0.0045) ***	-0.1586	(0.0248) ***
$\boldsymbol{ln(HPI_{t-1})}$	0.0129	(0.0018) ***	-0.1699	(0.0149) ***
J-Stat	50.1631		49.6131	
P-Value (J)	0.2761		0.3313	
# of observations	976		1180	

$Y_{i,t} = \beta_0 + \beta_1 Y_{i,t-1} + \beta_2 SBA_{t-1} + \beta_3 (SUB * SBA)_{t-1} + \beta_4 DEP_{i,t-1} + \beta_5 LQ_{i,t-1} + \beta_6 HPI_{i,t-1} + \varepsilon_{i.t}$ (1)

Where $Y_{i,t}$ represents the real state-level gross product ($RSGP$) per capita or unemployment rate ($UNEMP$) of state i at time t; SBA_{t-1}, which is the lagged SBA-7(a) *guaranteed* loan per job supported; SUB is a dummy variable equal to one during the 2007-2009 global financial crisis (GFC) and zero otherwise. $DEP_{i,t-1}$ is bank deposit per capita, $LQ_{i,t-1}$, is the location quotient; $HPI_{i,t-1}$ is the house price index; $\varepsilon_{i.t}$ represents a mean-zero disturbance term. All the variables in equation (1) have been convert to log values. HJ-Stat is Hansen's J statistic. P-Value (J) is the associated P-value of HJ-test. Robust standard errors clustered at the state level are shown in parentheses ** = significance at 5% level, and *** = significance at the 1% level. The data for real state GDP per capita obtained directly from BEA is only available from 1997 to 2019, so equation (1) was estimated over this sample period when the dependent variable is $ln(RSGP_t)$.

VIII. Conclusion

The common belief about small businesses is that they are vital engines of economic growth. Consequently, promoting small business growth has become a significant concern for government officials and policymakers. Due to imperfections in credit markets, resulting from information asymmetry, small businesses often face credit rationing more frequently than larger companies. To address this issue, the Small Business Administration (SBA), which is responsible for supporting small businesses, has partnered with financial intermediaries to extend loans through its guaranteed loan programs. If SBA loan guarantees effectively reduce credit rationing for small business loans, we should observe a relationship between the measures of SBA guaranteed lending activities and overall economic performance. However, existing empirical studies have not conclusively determined whether SBA's guaranteed lending programs have a positive or negative impact on economic performance, which has motivated this current study.

Using a panel of state-level data from 1990 to 2023, we examine whether SBA lending through two distinct loan programs—504 and 7(a)—has a significant impact on state-level real GDP and the unemployment rate, and how this impact changed during the global financial crisis of 2007-2009. Employing a dynamic panel data model with a Generalized Method of Moments (GMM) estimator, we find a statistically significant positive impact of SBA lending on promoting state-level output for both loan programs. Additionally, we discover that SBA lending under the 7(a) loan program significantly reduces the state unemployment rate. Specifically, a 1% increase in SBA 7(a) loans per job supported correlates with a decrease of more than six basis points (0.06%) in the state unemployment rate. Given the steady growth of the SBA loan guarantee programs over the years, these positive impacts on economic growth and employment rates warrant continued support for the SBA loan guarantee programs. However, these positive effects diminished during the global financial crisis, resulting in a 0.002% decrease in state-level real GDP and a 0.03% increase in the state unemployment rate for both loan programs. This reduced effectiveness of SBA lending on state economic performance during the financial crisis indicates that more effort could have been made to mitigate the decline related to the crisis in state economic performance.

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