Impact of California's Economic Climate on the State's Small Businesses

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Abstract—**California and Silicon Valley are reputable for being the heart of entrepreneurial startups. Small businesses and startups within the state have gone on to become successful business giants, while others have unfortunately had to close their doors for good. In this report we hypothesize how economic factors such as gross domestic product (GDP), employment and unemployment rates, inflation and interest rates affect the successes and failures of small businesses within California. By performing exploratory data analysis on various relevant datasets, we observe the results and compare it to our initial hypotheses. Through our observations, we suggest how California's community of small businesses can navigate through treacherous economical waters towards financial success.**

Index Terms — **California, economy, employment, gross domestic product, inflation, interest rate, small businesses, startups, unemployment**

I. INTRODUCTION

California and Silicon Valley have long been recognized as thriving hubs for entrepreneurial startups. The state's landscape is dotted with small businesses and startups that have risen to become industry giants. However, alongside these success stories are the tales of startups that faced challenges and ultimately had to shutter their operations. In this report, we delve into the relationship between economic factors and the fortunes of small businesses in California. Specifically, we explore how key economic indicators such as gross domestic product, employment and unemployment rates, inflation, and interest rates impact the successes and failures of small businesses across the state.

Our objective is to conduct a comprehensive analysis through exploratory data analysis on relevant datasets, aiming to uncover insights into the underlying dynamics of California's small business ecosystem. By formulating hypotheses around these economic factors and examining real-world data, we seek to validate or refine our initial assumptions. Through analysis and observation of trends, patterns, and correlations, we aim to gain a deeper understanding of how California's economic landscape influences the trajectories of small businesses and startups.

Ultimately, our findings and observations will also provide actionable insights and recommendations on how California's vibrant community of small businesses can navigate through economic uncertainties and chart a course towards sustained financial success.

II. RELATED WORKS

A. Gross Domestic Product

Gross Domestic Product (GDP) is a fundamental economic indicator that encapsulates the total monetary value of all goods and services produced within a country over a specific period. GDP reflects the overall health and performance of an economy, serving as a metric for assessing growth, productivity, and standard of living. In the context of GDP, the study of startup success and growth reveals insights into the diverse aspects of entrepreneurial ventures. The findings from the analysis done by Okrah, James & Nepp, Alexander & Agbozo, Ebenezer [1] of panel data on startup success and innovation in developed countries from 2006 to 2015 reveal trends in the factors influencing entrepreneurial endeavors. The positive correlation between internal market openness and innovation underscores the importance of competition in driving creativity and development within startups. Moreover, the impact of governmental policies on startup innovation, coupled with GDP's role as a foundational economic indicator, highlights the crucial role of supportive policy frameworks and a healthy economic environment in fostering a conducive ecosystem for startup growth. These findings are important for policymakers as they provide actionable insights to enhance trade and investment policies, increase government support for startups, and promote sustainable economic development. By understanding and leveraging these factors, policymakers can contribute to the creation of a thriving startup ecosystem that drives innovation, economic growth, and job creation.

Concurrently, Misra, Ajai & Jat, Dharm & Mishra, Durgesh [2] focus on Crunchbase data to unearth crucial insights and attributes that significantly influence startup outcome. They propose a machine learning model to predict startup success and failure accurately. Their findings underscore the interplay between startup activities, funding sources, and economic performance, highlighting the vital role startups play in shaping GDP growth and overall economic vitality.

B. Inflation/Interest Rates

Inflation rate in economics is measured by the change of the current CPI value from the previous year. CPI (Consumer Price Index) is a value that measures monthly change in prices paid by U.S. consumers. Cannice [3] analyzes how startup entrepreneurs through the guidance of Silicon Valley Venture Capitalists navigate through high inflation environments. As inflation rises, business costs rise as consumer spending decreases. As supply chain costs increase, hiring and retaining employees becomes a challenge. If the inflation rate stays high in the long term, startups will need to adjust to higher operational costs and thus require more funding. Rising inflation often leads to higher interest rates, creating less opportunities for startups to exit or have low exit values. Suggestions to tackle rising inflation rates include focusing on execution and scale, digitally distributing workforce through remote hirings, building with less capital than planned, and

raising financing when possible.

Sahu and Kshatriya [4] investigate how combined economic factors including inflation and interest rates affect the survival rates of startups. High levels of inflation lead to increased production expenses, financial instability, and reduced consumer buying power. Startups primarily with high fixed costs are subject to inflation rates and increasing operational costs. Interest rate changes affect the availability of capital for startups, thus impacting the amount of funding available for startups to grow.

C.   Unemployment Rates

Unemployment rate is a measure of the number of people who are unemployed as a percent of the total labor force, or sum of both employed and unemployed people. A high or low unemployment rate can be indicative of the state of the economy in the respective area. Which, in turn, could also be a value that is used to predict the success or failure rates of startups. A study performed by Parsa, et. al. [6] aims to determine relationships between unemployment rate, as well as other demographic variables, and success of restaurants in Boulder, CO. After gathering restaurant and demographic data from 5 ZIP codes in the city, they determined that "there is a direct relationship between the local unemployment rate and restaurant failure" on the basis that the highest unemployment rate was found in the ZIP code that was also found to have the highest rate of restaurant failures. However, this study only pertains to this particular area and doesn't evaluate the change over time, as we have done in our study, so it is not enough to say for certain that there is a correlation.

Additional research was performed by Musa and Semasinghe [7] evaluating the relationship between entrepreneurship and unemployment. In their findings, Musa and Semasinghe reported that they were able to identify that an inverse relationship exists between the two variables. They assert that higher unemployment rate can equate to lower entrepreneurship levels. This information is gathered from data corresponding to various countries (i.e. those with low unemployment rates also have high entrepreneurial activities). This is important to take into consideration upon conducting our own research because it could skew our results when trying to draw comparisons between the two in the context of startup successes and failures; if there are fewer entrepreneurs attempting to establish their small businesses, the data may not be sufficient. Therefore, we have verified that the numbers will suffice for our purposes.

III.   DATA ANALYSIS & OBSERVATIONS

In this section we conduct a thorough examination of the collected data to uncover insights into the impact of economic variables on small businesses in California. Through exploratory data analysis techniques, we analyze datasets related to gross domestic product (GDP), employment and unemployment rates, inflation, and interest rates. Utilizing statistical methods and visualization tools, we identify key trends, relationships, and patterns within the data. This section serves as a critical step in our analysis, laying the groundwork for deriving meaningful observations and drawing informed conclusions regarding the interplay between economic factors and small business outcomes in California.

A.   Data Analysis I

In this section, we identify general trends and patterns we expect from economic factors and how they impact California's small businesses. We provide our hypotheses and explain expected outcomes on factors relating to gross domestic product, employment and unemployment rates, inflation and interest rates and the impact on the success and failures of small businesses.

The first economic indicator that we explore is Gross Domestic Product (GDP). As California's GDP rises, we suspect that the number of failed startups and small businesses decreases, and vice versa. Increased GDP is often associated with overall economic growth, higher consumer spending, increased business investment, and improved access to capital. In such a scenario, startups and small businesses are likely to benefit from a more favorable economic environment. With higher GDP, there's a greater demand for goods and services, which can lead to increased market opportunities for startups. This can translate into higher revenues and profits for startups, reducing the likelihood of failure. Overall, higher GDP levels create an environment for startups to thrive and succeed, thereby potentially reducing the number of failed small businesses.

Conversely, decreased GDP can have adverse effects on startups and businesses. A declining GDP often signals economic slowdown, reduced consumer spending, tighter credit conditions, and lower business confidence. Startups may face challenges in generating sufficient revenue, attracting customers, securing funding, and sustaining operations. Reduced consumer spending can lead to lower demand for products or services offered by startups, impacting their sales and profitability. These economic headwinds make it more difficult for startups to survive and thrive, potentially leading to an increase in the number of failed startups as they struggle to navigate the challenging economic landscape.

On the topic of unemployment rates, this factor is also indicative of poor economic health. Individuals who are affected by unemployment will have greater financial constraints, reducing the number of people who can contribute to the demand of products. Additionally, high unemployment rate could lead to an decrease in consumer confidence, even regarding individuals who have not been burdened by the increasing unemployment rate and may have the financial means to buy consumer goods. This would also reduce the overall demand. Without demand, these small businesses will fail.

Besides lack of demand, small businesses may experience issues of their own due to the high rates of unemployment. It may be more difficult than usual to secure loans if the unemployment rate leads to stricter lending prices. It may be more difficult than usual to find workers who will accept a salary within the means of a startup if there is a larger pool of skilled workers looking for jobs. That is because there would

be an increase in demand for these talents, which in turn drives up labor costs. For these reasons, we believe there will be a direct relationship between unemployment and failure of small businesses and startups.

As inflation increases, costs of goods and services increase accordingly. Small businesses with manufacturing dependencies and supply chain costs are often subject to rising costs of goods. As costs increase, cash flow of startups are affected where funds are going towards operational and employment costs and lowering profit. We would assume with high inflation rate startups and small businesses within this sector would likely decline and close.

Interest rates are set by the Federal Open Market Committee (FOMC), and have a direct relationship to inflation rates. With higher interest rates, it's more costly for businesses to take out loans for expansion. High interest rates lead to less funding for startups and less opportunities to exit successfully. Due to rising costs and rates, businesses have reduced financial support needed for financial success. We also assume with higher interest rates small businesses are more likely to fail and close.

B.   Data Analysis II

In this section we discuss our findings after performing exploratory data analysis on our relevant datasets and whether it aligns with the trends we predicted. The underlying data structures, deviations from trends, unexpected findings, and unexpected patterns are further analyzed.

The average annual percent change in California's GDP from 1997 to 2022 was found to be 2.88% (adjusted to the dollar value in 2012).
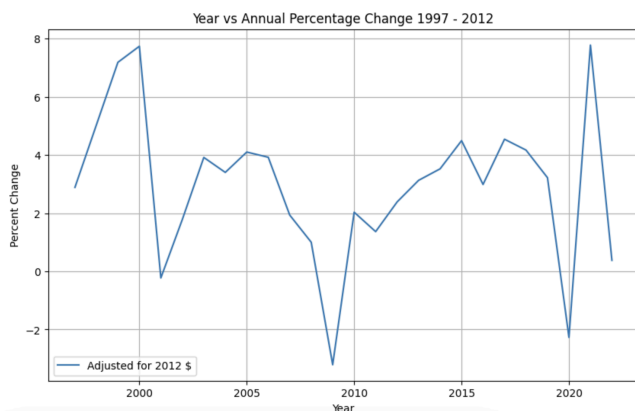

Figure 1: Year vs. Annual Percentage Change in GDP 1997-2012

We observed that there were two major dips in GDP. Namely, in 2007 and 2020. Both of these dips can be attributed to historical periods that heavily impacted the economy: The 2007-2008 Financial Crisis and the Covid-19 Pandemic. Both these time periods saw a significant decrease in GDP and thus economic conditions.

Looking at Figure 5 below, we are able to see the number of closed startups in California from 1987 to 2015. For the purposes of this study, we have defined a failed startup as one that closed, and did not get acquired or that did not exit. Comparing Figure 1 with the bar chart of closed businesses,

we can see that the number of failed businesses shot up in 2007, corroborating the observation seen in the line chart around the time of the 2007-2008 Financial Crisis.
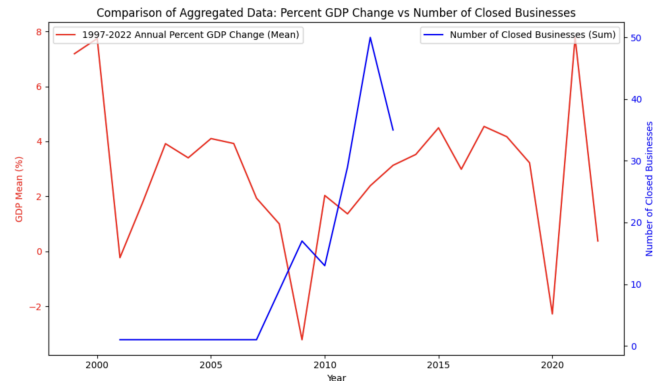

Figure 2: Percent GDP Change vs. Number Closed Businesses Over Time

The observations do not suggest that there is a causal relationship between the state's average percent rise and fall in GDP and the number of closed businesses. While we are able to visually observe an inverse correlation between the two factors, the lack of startup data post 2015 and the existence of confounding factors within the economy dissuade us from declaring correlation. Furthermore, the correlation coefficient was found to be 0.1298, suggesting that there is a weak positive linear relationship between the number of closed businesses per year and the percent GDP changes per year. However, the relationship is not strong enough to imply a significant or direct causal connection between these variables.
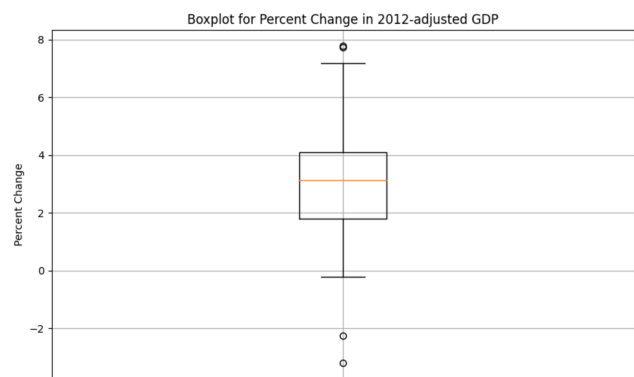

Figure 3: Boxplot for Percent Change in 2012-Adjusted GDP

Outlier and anomaly analysis results revealed several outliers that should be looked at due to their substantial deviation from the interquartile range (IQR). These include values such as 7.74%, -3.21%, -2.27%, and 7.78%, which represent periods of exceptional economic growth or decline compared to the norm observed within the dataset. These outliers offer valuable insights into the economic dynamics of California, highlighting potential periods of rapid expansion or contraction that may have been influenced by various economic factors or external events. Further analysis and contextualization of these outlier periods can contribute significantly to a deeper understanding of California's

economic landscape and its resilience to economic fluctuations.

The unemployment rate in California has many inclines and declines throughout history, with the most significant spike falling between 2006 and 2010. It began at just 4.9% unemployment in 2006 and reached a peak of 12.5% in a matter of 4 years, which we can see in the graph in Figure 4. There is also a large decrease from 2010 until 2019, where it settles at just 4.1%, followed by another major spike when in 2020 the unemployment rate for the year averages 10.2%. These values are based on seasonally-adjusted monthly unemployment rates.
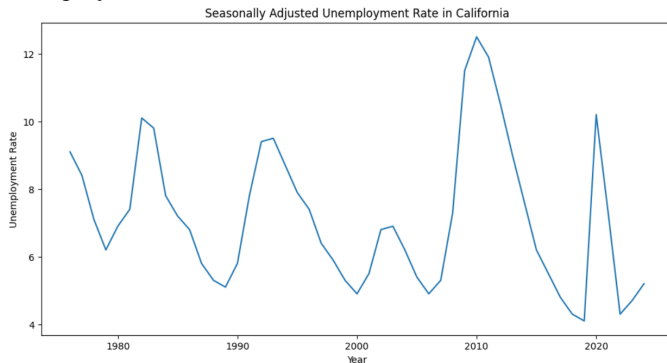
Figure 4: Average unemployment rates from 1976 - 2025.

In Figure 5, we can see that from 1995 to 2010 there is a major increase in the total number of startups being founded in California. However, there is also a significant increase in the number of startups that fail. Revisiting the unemployment rate in California over time, we see there is a similar trend in the percentage of startups that are failing relative to the total number founded. This has been illustrated in Figure 6. However, the trend of unemployment rate increase seems to follow behind percent of startups that fail by a few years. For example, if we look at the same spike in unemployment rate 2006 to 2010, we will see that just a few years prior, from 2003 to 2008, there was a spike in the ratio of startup failures to successes. The proceeding downward trend in failure to success ratio is from 2008 until 2013, whereas for unemployment rate it went from 2010 to 2019.
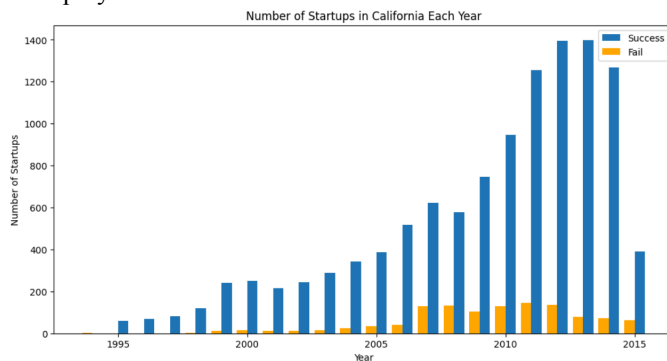

Figure 5: Number of startups to succeed and fail from 1995 - 2015. Based on founding date and date of receiving final funding, respectively.
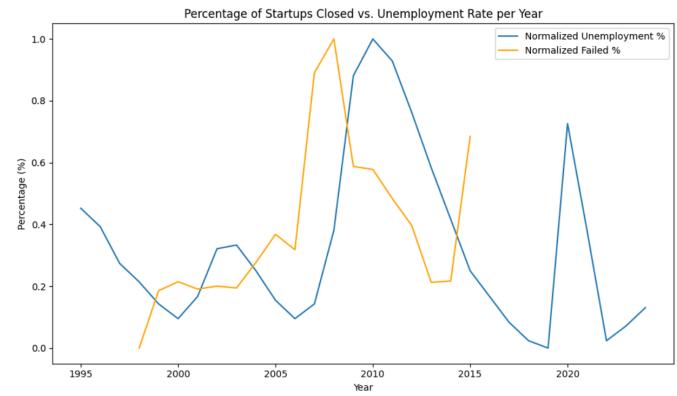

Figure 6: Normalized unemployment rate vs. normalized percent of startups failing from 1995 - 2025.

The average effective federal funds reserve rate (interest rate) from 1954 to 2017 was found to be 4.91%, while the inflation rate average was 3.53%.
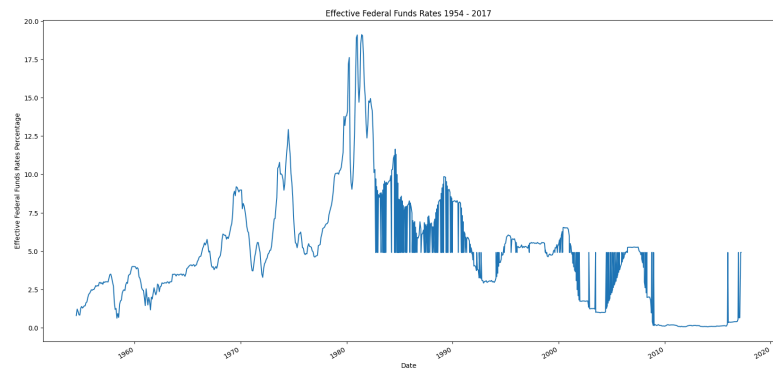

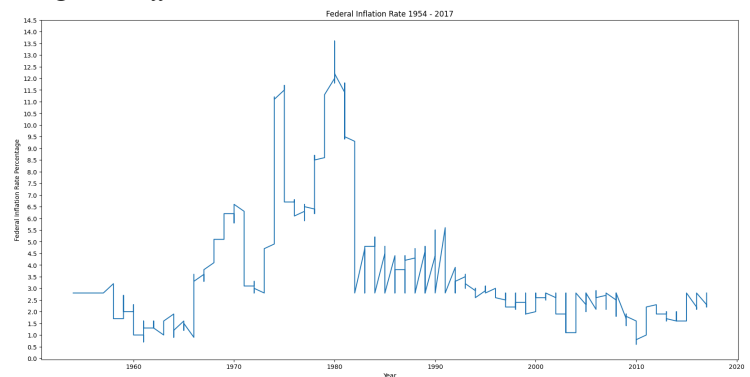*Figure 7: Effective Federal Funds Rate 1954 - 2017*

Figure 8: Federal Inflation Rate 1954 - 2017

Inflation and interest rates were high from the 1970s to 1980s. Interest rates reached up to 19%, while inflation rates reached up to 13%. After this period, inflation rates seemed to fluctuate but only by a few percentages. The period from the 1970s to 1980s was known as the "Great Inflation", a period where there were policies that allowed an excessive growth in the supply of money set by the Federal Reserve.

From 2000 to 2024, the average federal funds reserve rate was found to be 1.81%. Inflation rates received a big drop in percentage around 2007 and 2008 and continued to stay low for several years until increasing again from 2015. In December 2007, the start of the U.S. recession occurred damaging the economy as a result of home borrowers unable to repay their loans. Interest rates are set low by the federal

government to stimulate economic growth during a recession. A drop occurred in 2020 and maintained low for a few years before spiking back up around 2022.
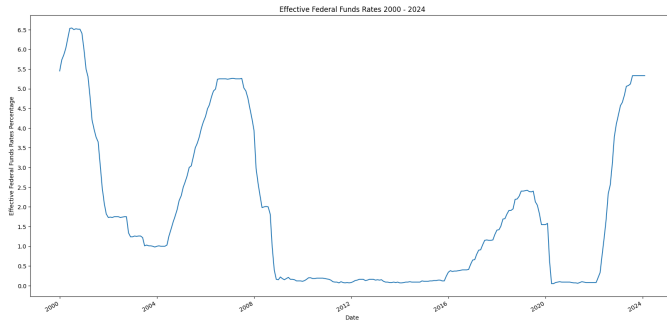

Figure 9: Effective Federal Funds Rate 2000 - 2024

From 1950 to 2022, the average inflation rate for California in all urban areas was 3.72%. From 2000 to 2022, the average inflation rate in California was found to be 2.83%. In 2007, a big dip in inflation occurred and slowly increased back the following years due to the recession.
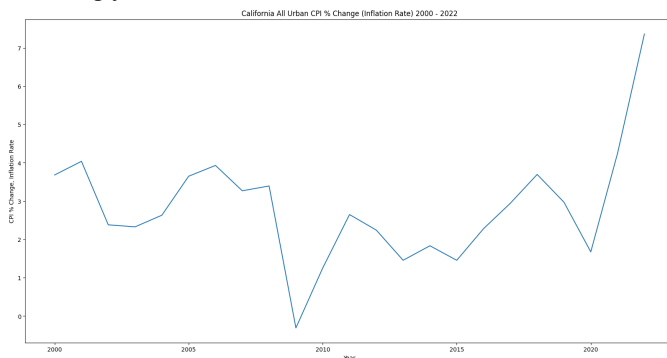

Figure 10: California Inflation Rate 2000 - 2022

From 1998 to 2015, there were 1177 California startups that closed operations. A majority of the startups that last received funding and ended up closing occurred from 2007 to 2012.
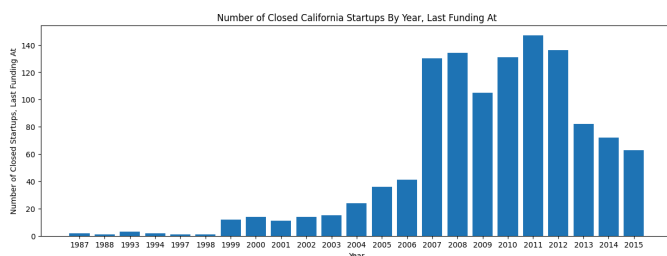

Figure 11: California Closed Startups 1987 - 2015

In 2008, the inflation rate for California was 3.4%. The federal reserve rate in 2008 was 3.84%. The California inflation rate dropped to -0.3% in 2009 and slowly increased the next few years as startups continued to close. The federal reserve rate dropped from ~2.00% towards the end of 2008 down to a low 0.15% going into 2009. The trend here shows

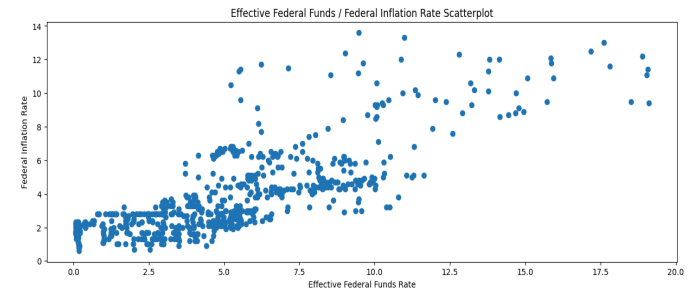that as interest rates change, inflation rates change as well.

Figure 12: Inflation Rate / Interest Rate Scatterplot

The observations do not justify that high interest rates and inflation rates have a direct correlation to closures of startups. From 2007 to 2012, rates were low in order to accommodate other economic factors to help recover and slow down the economy. Prior to 2007, interest rates and inflation rates were relatively higher and the number of startups closing and receiving last funding was lower. While a combination of other factors including inflation and interest rates may affect the success rate of startups, it is not the sole factor in doing so.
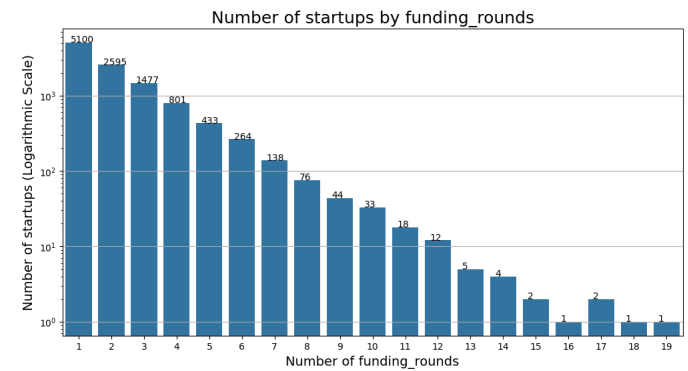

Figure 12: No.of Startups/Funding rounds

This graph indicates that the largest number of startups are concentrated in the earliest funding rounds, with a significant drop-off as the number of rounds increases. This suggests a common venture capital trend where a large pool of new companies compete for initial funding, but only a few progress to later stages, which typically means they have shown some level of success or promise.
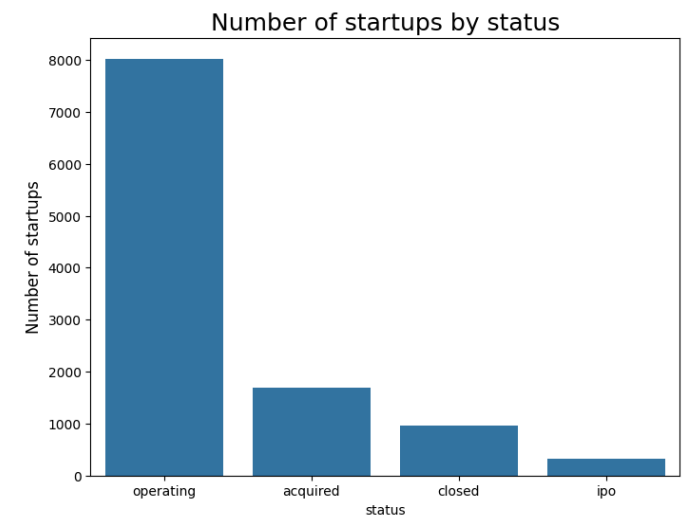
Figure 13: No. of startups/ status

The high number of operating startups may reflect a healthy startup environment where businesses are able to sustain operations over time. The number of startups that have closed is significant, but when compared to those still operating, it may suggest that while startup failure is a reality, a larger portion are managing to survive.
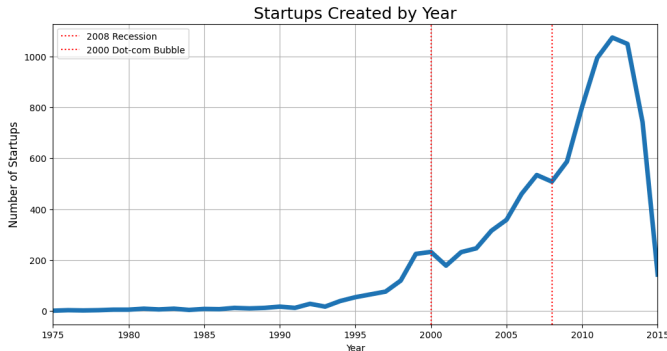

Figure 14: No. of startups created by year 1975-2015

The sharp increase in startups leading up to the 2000 dot-com bubble burst and the subsequent decline post-2000 illustrate the boom and bust cycle that can occur in tech-centric economies.

When evaluating unemployment rate data per month, there are 4 outliers, all of which falling in the year 2020. The COVID-19 pandemic that reached the United States in March of 2020 caused an alarming increase in unemployment, resulting in a record high of 15.7% (16.1% with seasonal adjustments) in April 2020. The other 3 outliers we see in our data were in the proceeding 3 months, with values between 13.7-15.7%, before finally falling to 11.9% in August, and ending in 9.0% in December.
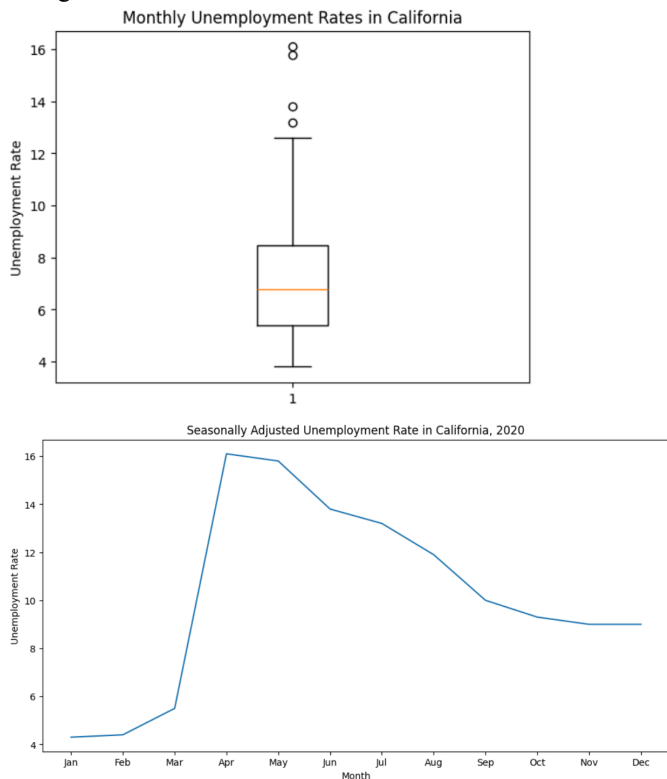
The effective federal funds rate data from 1954 to 2017 contained 43 outliers from its box plot structure. The outlier values contained federal funds rate values exceeding the upper outlier bound of 10.62%. The rates occurred from 1973 to 1984, which aligns in U.S. history during the "Great Inflation" era.
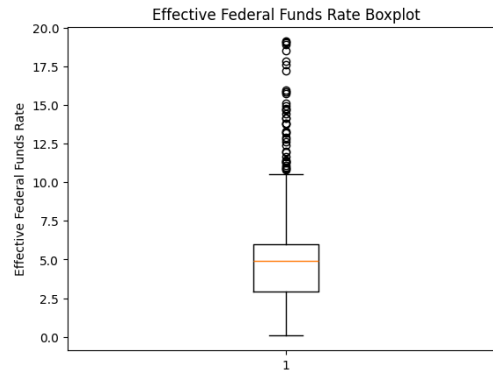
The federal inflation rate data contained 64 outliers from the box plot structure. The values exceed the upper outlier bound of 7.45%. These rates occurred from 1973 to 1984, which also aligns with the "Great Inflation" period.
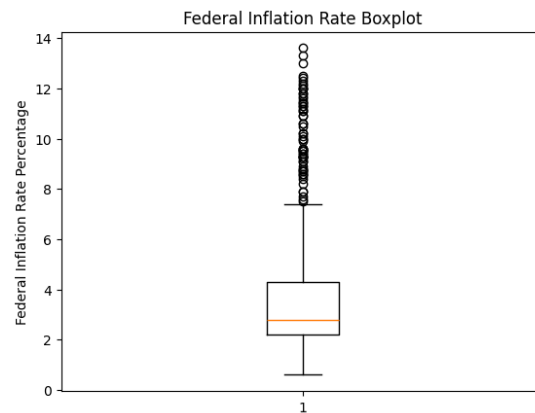
The examination of California's startup ecosystem through the lens of funding rounds, current operational status, and temporal creation trends reveals a highly dynamic and competitive landscape. The distribution of startups across funding rounds showcases an expected pattern of attrition, where a vast majority garner initial funding but progressively fewer secure subsequent rounds, suggesting rigorous investor scrutiny and the inherent challenges of scaling. Moreover, the status distribution underscores the reality of the startup journey, with a large number of ventures still in operation, juxtaposing the much smaller proportions that reach acquisition or IPO—milestones of substantial success—against those that have shuttered. Temporal analysis correlates the peaks and troughs of startup creations with economic inflection points like the dot-com bubble and the 2008 recession, reflecting the sensitivity of entrepreneurial activity to broader economic cycles. Collectively, these observations offer a narrative of an ecosystem that is not only subject to the high-stakes nature of startup success and failure but also intricately tied to the fluctuating tides of the economic climate.

IV. Discussions & Community Contributions

GDP is a vital tool for California's small business owners, offering direct insights into the state's economic landscape. By monitoring GDP trends, they can gauge market conditions, identify growth opportunities, and make informed decisions. A rising GDP signifies a robust economy which is advantageous for small businesses seeking expansion or market entry. Additionally, understanding the correlation between GDP changes and industry-specific performance enables small business owners to anticipate challenges, adapt strategies, and stay resilient in dynamic economic environments.

Understanding the effect of high and low unemployment rates on the economy and success of small businesses is important to optimize operations. In particular, entrepreneurs must be conscious of labor market trends. As unemployment rates decrease, there is in turn an increase in job opportunities and consumer spending. This is beneficial for small businesses as it will result in higher demand for goods and services. However, it also means there is a smaller pool for hiring. Small businesses in turn need to consider offering competitive wages and benefits.

Small businesses with high operational costs and supply chain dependencies are more likely to be affected by rising interest and inflation rates. Rising operational costs affects profits gained from business operations. For these types of businesses to succeed, various suggestions can be applied for rising interest and inflation rates. Utilizing a remote workforce helps to offset rising costs. Shifting focus on making one's product a market fit and growing the company to become sustainable and scalable. Modeling higher costs over time to prepare for inflation rate values. Raising funds instead of borrowing loans with interest rates. According to Pattyn [5], adjusting requirement prioritization towards cash flow analysis and return on investments.

V. Conclusions

The correlation coefficient of 0.1298 for average percent change in CA GDP and number of closed small businesses in the state, suggests that there is a weak positive linear relationship between the two factors. However, the relationship is not strong enough to imply a significant or direct causal connection between these variables. We are able to see that around the time of the 2007-2008 Financial Crisis, CA GDP declined significantly and the number of failed small businesses spiked soon after. However, given the correlation coefficient value and the lack of small business data after 2015, it is not possible to say whether or not California's GDP is correlated with the success or failure of its small businesses. Despite these limitations, startups can still benefit from using GDP as an indicator of broader economic trends, informing strategic decision-making and risk management strategies, although it should be complemented with more direct data on small business performance.

There is not a strong direct correlation between unemployment rate and failure of small businesses in the state of California. In fact, data gathered between the years 1998 and 2015 indicate that there is only a 0.245 correlation coefficient. Interestingly, if you offset the unemployment rate data by 2 years (i.e. comparing small business data from 1998 with unemployment rate in 2000), then the correlation coefficient increases to 0.774. This may be the result of an issue with the small business data, as we do not have exact information on when each business was closed. We instead use the last date of receiving funding and consider this to be the failure date, which might account for the 2 year offset. For the purposes of this study, however, we cannot consider this speculation sufficient, and the correlation itself that we calculated is not strong enough to draw any conclusions about the relationship between the two factors.

Inflation rates and interest rates have a direct economic relation. When inflation rises, interest rates are raised to slow down consumer spending. California startups and small businesses with high operating costs must be aware of these rates and navigate accordingly. Startups need to be aware of high inflation and interest rates and analyze their financial execution, but can still succeed under such circumstances.

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