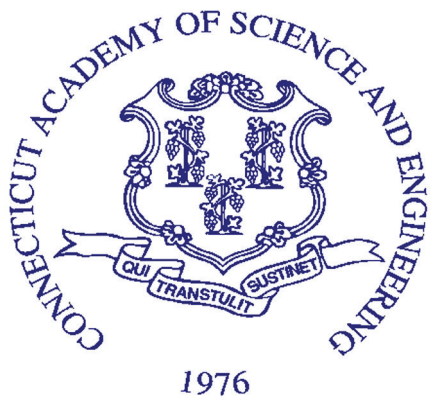
Connecticut Disparity Study: Phase 3

May 2016

A Report By

The Connecticut Academy of Science and Engineering



For

the Connecticut General Assembly and the Government Administration and Elections Committee

Connecticut Disparity Study: Phase 3

A Report By

The Connecticut Academy of Science and Engineering

Origin of Inquiry:	The Connecticut General Assembly
Date Inquiry Established:	August 21, 2015
Date Response Released:	May 11, 2016

© COPYRIGHT, 2016. CONNECTICUT ACADEMY OF SCIENCE AND ENGINEERING, INC. ALL RIGHTS RESERVED

This study was initiated at the request of the Connecticut General Assembly on August 21, 2015. The project was conducted by an Academy Study Committee with the support of staff of the Connecticut Economic Resource Center, Inc., serving as the study management team with assistance from Evolution Enterprises, LLC. The content of this report lies within the province of the Academy's Economic Development, Education and Human Resources, and Technology Technical Boards. The report has been reviewed by Academy Members Peter G. Cable, PhD and Gale F. Hoffnagle. Martha Sherman, the Academy's Managing Editor, edited the report. The report is hereby released with the approval of the Academy Council.

Richard H. Strauss
Executive Director

MEMBERS OF THE STUDY COMMITTEE ON THE CONNECTICUT DISPARITY STUDY: PHASE 3

Myron Genel, MD *(Academy Member)*
Professor Emeritus Pediatrics and
Senior Research Scientist
Yale School of Medicine

A. Walter Esdaile
Managing Director
New Haven Regional Contractors Alliance

Shantè Hanks
Director of Constituent Services
Office of Congressman Jim Himes

Lois McLaughlin
Director, Opportunities Program
State University of New York
Construction Fund

James Nixon
Former Director of Affirmative Action, MTA of New York; Former Chairman, Stamford Urban Redevelopment Commission; Owner & CEO (ret.) Inline Brake Manufacturing Corp.

Nalini Ravishanker, PhD *(Academy Member)*
Professor and Undergraduate Director
Department of Statistics
UConn

Gwendolyn Samuel
Founder
State of Black CT Alliance and
the CT Parents Union

Lil Snyder
Program Manager
Small Contractor Development Program
City of New Haven

RESEARCH TEAM

CONNECTICUT ECONOMIC RESOURCE CENTER, INC.

STUDY MANAGER
Alissa K. DeJonge, Vice President of Research

Sarah Ficenec, Economist
Myya McGregory, Research Analyst
Patricia McLaughlin, Consultant
Matt Ross, Consultant

EVOLUTION ENTERPRISES, LLC

STUDY CONSULTANT
Richard Pearce, Managing Member

ACADEMY PROJECT STAFF
Richard H. Strauss, Executive Director
Terri Clark, Associate Director
Ann G. Bertini, Assistant Director for Programs

CASE Advisor
Colette Holt, Attorney at Law, CASE Study Advisor

TABLE OF CONTENTS

EXECUTIVE SUMMARY

ES.1 STUDY PURPOSE

In furtherance of legislation adopted in the 2012 legislative session, Public Act 12-1 and Public Act 12-104, the Connecticut General Assembly requested that the Connecticut Academy of Science and Engineering (CASE) conduct a Disparity Study of the state's Small and Minority Business Set-Aside Program ("Set-Aside Program"). Public Act 12-1 provided an overview of the scope of work to be included in the study, and Public Act 12-104 provided initial project funding.

ES.2 STUDY PHASING

Initial research, previously conducted in Phase 1 and Phase 2 of the Disparity Study, identified that

- The state's executive branch agencies and other branches of state government responsible for awarding state contracts and overseeing the Set-Aside Program do not for the most part collect subcontractor data, including payment information.[1]
- A review of the legal issues and case law, including presentations to the CASE Study Committee by experts on minority business enterprise programs, identified examination of subcontractor data and financial information as a critical component of conducting a valid disparity study. Additionally, it was noted that unless quality data are collected and available for analysis as part of a disparity study, the results of the study could be challenged, and if such a challenge were successful, the whole study would be negated.

Therefore, as a result of the initial research findings, the scope of work for the Disparity Study was divided into four phases based on the goals of the project as specified in Public Act 12-1 and in the best interests of the State of Connecticut. As noted, Phase 1 and Phase 2 have been completed, Phase 3 is the subject of this report, and Phase 4 will be conducted at a later date.

- Phase 1 was completed in August 2013 and included a review and analysis of Connecticut's Set-Aside Program, legal issues, and stakeholder anecdotal information.
- Phase 2 was completed in May 2014 and included legislative and administrative initiatives, diversity data management system review, review of issue areas, and data and methodology for statistical analysis.
- Phase 3 *(current phase)*: The purpose of Phase 3 is to analyze whether or not disparities exist in Connecticut's geographic marketplace. For the purpose of this study,

1 It is noted that subsequent to the completion of Phase 1 and Phase 2 of the study, provisions of the Set-Aside Program (C.G.S §4a-60g) were amended in 2015 (Public Act 15-5) to include state-financed, quasi-public agency projects and municipal public works contracts, as of October 2015. Therefore, financial information regarding these expenditures commenced in fiscal year 2016. The analysis for Phase 3 of the study is based on historical data through fiscal year 2015.

"disparities" are defined as measurable differences between the experiences of one group of individuals or firms (e.g., members of minority communities or minority-owned firms) and the experiences of another group of individuals or firms (e.g., members of majority communities or majority-owned firms) with respect to certain indicators and within a given geographic location. Testing for marketplace disparities first requires the establishment of the appropriate geographic market relevant to all agencies' procurement and contracting (hereinafter referred to as "procurement") activity. An approximation of the state's geographic marketplace was developed using procurement data from the state's financial payment systems for this analysis.

The Phase 3 analysis was conducted using publicly available data and examined different measures of disparity in the geographic marketplace in an effort to identify whether minority- and women-owned businesses in the state are at a statistically significant disadvantage, a finding that would provide support for a state MBE and WBE Program. The following factors were examined to determine if disparities exist in the economy-wide marketplace by race and ethnicity or gender: business formation, earnings, credit access, homeownership and lending, and business performance.

- Phase 4: The final phase of the Disparity Study will provide an analysis of the availability and utilization of minority- and women-owned businesses. After the geographic marketplace identified in Phase 3 is confirmed, or revised, if necessary, using forthcoming data on prime contracts and subcontracts, the state's current utilization of minority- and women-owned businesses will be compared with the availability of these groups in the state's geographic market area. This comparison will be used to evaluate whether there is evidence of disparities, which may be indicative of discrimination, in state procurement based on the availability and utilization ratios. If such disparities are found, the final step in Phase 4 would be to determine the need for a MBE and WBE Program and if so, the percentage goals for utilization of minority- and women-owned businesses. Phase 4 is needed to complete the Disparity Study; the timeline for conducting Phase 4 is to be determined.

ES.3 PHASE 3 METHODOLOGY

Phase 3 of the Disparity Study builds upon the research and findings from the previous two phases. It provides research and key findings on the following issues

1. ***Approximating the State's Geographic Marketplace***: Defining the state procurement marketplace was the first step in statistically evaluating whether economy-wide disparities existed. State expenditure data were collected for the past three to five years from most state agencies, and the location(s) of the majority of the state's prime vendors was identified.[2] This analysis found that the state's geographic marketplace extends beyond the state borders.

   In addition to the expenditure data being incomplete in terms of agency coverage, it did not contain information on subcontractors. Therefore, in an effort to ensure that

2 As of early December 2015, data had been received from: CORE-CT, which records payments for the Executive and Judicial branches; the University of Connecticut and UConn Health systems; and the Connecticut State Colleges and Universities system. Requested financial data from the Legislative Branch was not received.

the results were robust to variations in the marketplace definition, three models of the geographic marketplace were used for each portion of the Phase 3 analyses. These three definitions were: Connecticut; a Regional market of Connecticut and its contiguous states (Massachusetts, New York, and Rhode Island); and the United States.

2. ***Analysis of Economy-wide Disparities:*** The second step of Phase 3 evaluated whether economy-wide disparities existed in the geographic marketplaces for indicators identified as having an impact on business formation and performance. For this, publicly-available data were collected and statistical analyses were conducted on five indicators: business formation; earnings; credit access; homeownership and lending; and business performance.[3]

ES.4 BRIEF STATEMENT PRIMARY CONCLUSION: PHASE 3

Disparities were found by race, ethnicity, and gender for business formation, earnings, credit access, homeownership and lending, and business performance. The magnitude of these disparities varied across each specification and for each marketplace, but the estimates were generally consistent in terms of statistical significance. The presence of these disparities was aligned with findings from peer-reviewed academic journals and from disparity studies conducted in other jurisdictions.

Completion of the Disparity Study is dependent on conducting Phase 4 of the study. Taken together, the results from Phases 1-4 will provide the necessary information to determine if there is a need for a state minority- and women-owned business enterprise program and the rationale that courts have deemed necessary in order for governments to operate such programs. If there is a need for a program, the results of the Phase 3 and Phase 4 statistical analyses will then be used to determine program goals.

ES.5 DETAILED SUMMARY OF PHASE 3 FINDINGS

ES.5.1 Approximating the State's Geographic Marketplace

Approximating the geographic market for procurement in the state involved identifying the location(s) of the majority of the state's prime vendors. To construct Connecticut's geographic marketplace, a request was made for five fiscal years (2011 - 2015) of financial data from the state's six payments databases. As of early December 2015, data were received from: CORE-CT, which records payments for the Executive and Judicial branches; the University of Connecticut and UConn Health systems; and the Connecticut State Colleges and Universities system. Requested financial data from the legislative branch was not provided.

The analysis in this phase found that the state's geographic marketplace extended beyond the state borders. Based on this analysis three models of the geographic marketplace were used for conducting the balance of the Phase 3 analyses:

3 For information on statistical analysis, see Appendix A.

1. ***Connecticut***: The state of Connecticut represented the location of the largest single grouping of vendors by state in each financial payment system and 64.5% of state procurement.
2. ***Regional (Connecticut, Massachusetts, New York, and Rhode Island)***: In total, vendors in these four states represented 77.9% of the state's procurement. Although it cannot be verified until more detailed procurement data is provided, it is likely that subcontractors would be located within many of the same or nearby geographic locations as the prime contractors.
3. ***United States:*** Procurement by the state of Connecticut included vendors throughout the country, and some subcontractors (not captured in the data) are likely located throughout United States. Therefore, the entire United States was used as the third definition of the state's geographic marketplace, both to include prime and subcontractors and as a sensitivity test of any disparities found in the other two marketplaces.

ES.5.2 Analysis of Economy-wide Disparities

The economy-wide disparity analyses conducted in this phase of the Disparity Study found disparities by race, ethnicity, and gender for every indicator, although the magnitude of the disparities varied by the indicator, marketplace, and minority group. The results of these analyses are summarized here and presented with considerably more detail in the following sections of the Phase 3 report.

ES.5.2.1 DISPARITIES IN BUSINESS FORMATION

The academic literature on entrepreneurship demonstrates that minorities and women have experienced long-standing disparities in business formation. Moreover, these groups face considerably more challenging financial constraints that restrict their ability to start a business. The presence of such disparities may affect the availability of businesses with which the government and prime contractors could conduct business.

The analysis in this section relied on microdata from the American Community Survey, which is an annual survey of American households conducted by the US Census Bureau. Women and minorities were found to be significantly less likely to be self-employed in Connecticut, the Regional marketplace, and the United States. These disparities persisted even when controls were added for location, education, industry, occupation, age, and year.

ES.5.2.2 DISPARITIES IN EARNINGS

Disparities in earnings, whether for employees or the self-employed, hinder wealth accumulation and access to capital. As a result, they have been shown to substantially influence both business formation and survival. Indeed, financial security has been shown to be a predictor of self-employment. Therefore, disparities in the earnings of women and minorities place them at a disadvantage for beginning and sustaining a business.

The analysis in this section used microdata drawn from the American Community Survey. Statistically significant disparities were found for both women and minorities in each marketplace, even after the inclusion of controls for location, education, industry, occupation,

age, and year. Moreover, the hourly wage disparities found in the Connecticut marketplace were larger than the hourly wage disparities in the Regional marketplace and in the United States. In addition, hourly wage disparities were of greater magnitude for self-employed females and minorities relative to their employed peers.

ES.5.2.3 DISPARITIES IN CREDIT ACCESS

Businesses of all sizes regularly need access to credit to support their operations, and this is especially the case for small or new businesses. There is an extensive body of research concerning the importance of access to credit for business growth and, similarly, extensive research about the disparate treatment of minority- and women-owned firms in the credit market. This differential treatment includes not only the rates of loans and credit approvals but also the interest rates the firms are charged. As a result of inadequate access to credit, entrepreneurs may be limited in their ability to maintain or grow their businesses and reluctant to apply for financing for fear of denial.

This analysis used national data collected by the Federal Reserve Board of Governors on small business finances. Minority- and women-owned businesses were found to be more likely to have their loan applications denied. These findings persisted with the inclusion of controls for firm credit information (e.g., firm bankruptcy within last seven years, Dun and Bradstreet credit score); firm financials (e.g., equity, sales, length of relationship with primary financial institution); other firm characteristics (e.g., age of firm, number of employees, industry); owner financials (e.g., number of owners, net worth, owner bankruptcy within last seven years); and other owner characteristics (e.g., years of experience, age, education). Minority- and women-owned businesses were also found to pay higher interest rates for approved loan applications and to be more likely to let their fear of having a credit application denied affect their decision to seek credit.[4]

ES.5.2.4 DISPARITIES IN HOMEOWNERSHIP AND HOME LENDING

Homeownership is an important asset for many entrepreneurs because it provides equity that can be drawn on for business formation and used as collateral when applying for credit. There is empirical evidence that minorities and women face unique barriers to homeownership, including discrimination in the real estate market and differential treatment in the mortgage credit market. Studies show that even when women and minorities own homes, they can experience a host of negative economic consequences such as higher cost burdens and greater exposure to risk. These disparities can then translate into fewer resources for starting and/or sustaining a business.

The analysis in this section used data from the American Community Survey and data compiled under the Home Mortgage Disclosure Act (HMDA). Minorities were found to have lower levels of homeownership and lower average home values than non-minority homeowners. Moreover, minorities were more likely to have their mortgage applications denied than non-minority applicants in all three marketplaces. These estimates persisted with the inclusion of controls for: applicant characteristics (e.g., loan amount, income, sole applicant interacted with demographics, income quintiles interacted with demographics); neighborhood characteristics

4 The findings on loan denial for female-owned businesses and for the interest rate charged on approved loans for both female- and minority-owned businesses were not statistically significant, likely due to the small sample size of the available data.

(e.g., tract population, the ratio of income in the census tract of the home to income in the metropolitan statistical area); and year and state fixed-effects (when applicable). Female applicants were also significantly more likely to have their applications denied in the Regional and United States marketplaces.

ES.5.2.5 DISPARITIES IN BUSINESS PERFORMANCE

A direct examination of disparities in business ownership and competitiveness is another important aspect of testing for the presence of an economy-wide disparity. Existing academic research has consistently shown that both minority- and women-owned businesses tend to be smaller than non-minority- and male-owned firms in terms of profits, receipts, and numbers of employees. Moreover, there is evidence that Black-owned businesses are more likely to be small and fail and that Black and Hispanic self-employment periods tend to be shorter than those of White or non-Hispanic entrepreneurs.

The analysis in this section used data from the US Census Bureau Survey of Business Owners. Minority- and women-owned businesses were found to be smaller in terms of number of employees and total receipts than non-minority- and male-owned businesses. These disparities existed in the Connecticut, Regional, and United States marketplaces and persisted with the inclusion of controls for: owner characteristics (e.g., age, education); business characteristics (e.g., age of business, industry); and management characteristics (e.g., number of owners, how business was acquired, if there was owner-manager). The findings on business performance indicate that the principal challenge with regard to minority- and women-owned businesses is their ongoing performance.

ES.6 CONCLUDING REMARKS

The following are the preliminary conclusions with respect to several requirements for a comprehensive disparity study. Consistent with the 2006 recommendations from the US Commission on Civil Rights and the National Cooperative Highway Research Program (NCHRP) "Guidelines for Conducting a Disparity and Availability Study for the Federal DBE Program, 2010," this phase of the Connecticut Disparity Study first developed an approximation of the state's geographic marketplace using available state procurement data on the location of state vendors. From this, three definitions of the state marketplace were developed: the state itself; a regional four-state market consisting of Connecticut plus Massachusetts, New York, and Rhode Island; and the full United States.

Publicly-available data were then used to investigate if economy-wide disparities existed in business formation, earnings, credit access, homeownership and home lending, and business performance. Evidence of disparities were found by race, ethnicity, and gender for the indicators across the marketplaces. The presence of these disparities, moreover, was found to be generally consistent with findings in existing academic literature and in disparity studies from other locations.[5]

5 See, for example, disparity studies on contracting in New York (NERA, 2010) and for the Metropolitan District Commission (Miller[3] Consulting, Inc., 2009), which provides water and sewer services in central Connecticut.

The next and final phase of this Disparity Study, Phase 4, is a necessary component in completing a legally defensible disparity study that requires more detailed data on both prime and subcontractors. Assuming that adequate provisions have been made to collect or acquire such data, Phase 4 will include the following:

1. ***Product Market Assessment***: State procurement by industry will be analyzed to support the availability and utilization analyses. This product market assessment will also help minority and female business owners target their business with the state.
2. ***Availability Analysis***: A detailed estimate of available minority- and women-owned businesses will be developed based on the state's geographic and product marketplaces. This will be used to evaluate the state's utilization of minority- and women-owned businesses and, if necessary, to develop program goals.
3. ***Utilization Analysis:*** The state's use of minority- and women-owned businesses will be analyzed and compared with state procurement in various product markets and by agency.
4. ***Possible Revisions to the Geographic Marketplace Definition:*** Detailed data on prime and subcontractors will be used to review and revise, if necessary, Connecticut's geographic marketplace developed in Phase 3.
5. ***Possible Revisions to the Examination of Economy-wide Disparities:*** The econometric analysis of economy-wide disparities will be revised if the contracting data collected in Phase 4 reveals a substantially different Connecticut geographic marketplace as noted or if the statistical data used in the Phase 3 analysis is updated and available.

Completion of the Disparity Study will provide the rationale and evidence based on legal requirements as set forth in relevant case law to determine if there is a need for a legislatively mandated minority- and women-owned business enterprise program. Completion of the study will determine whether a program is necessary and, if so, how that program should be structured. The current Set-Aside program goals were established legislatively over thirty years ago and have not been rigorously examined through a disparity study analysis in the intervening years.

It should be noted that, even prior to the completion of this study, the state could undertake the race-neutral policy measures recommended in Phase 1 and Phase 2 of this study. Not only would these measures support the state's minority- and women-owned businesses, but they could also help decrease the magnitude of the economy-wide disparities that were found in this phase of the study.

1.0 INTRODUCTION

At the request of the Connecticut General Assembly, the Connecticut Academy of Science and Engineering (CASE), in accordance with legislation adopted in the 2012 legislative session, Public Act 12-1 and Public Act 12-104, was asked to conduct a Disparity Study of the state's Small and Minority Business Set-Aside Program ("Set-Aside Program"). Public Act 12-1 provided an overview of the scope of work to be included in the study, and stated that: "*The study shall provide an analysis of existing statistical data concerning the state's current set-aside program, established under section 4a-60g of the general statutes, to determine whether its current form achieves the goal of facilitating the participation in state contracts of small contractors and minority business enterprises.*" Additionally, Public Act 12-104 provided initial project funding.

Initial research, previously conducted in Phase 1 and Phase 2 of the Disparity Study, identified that

- The state's executive branch agencies and other branches of state government responsible for awarding state contracts and overseeing the Set-Aside Program do not for the most part collect subcontractor data, including payment information.[6]
- A review of the legal issues and case law, including presentations to the CASE Study Committee by experts on minority business enterprise programs, identified examination of subcontractor data and financial information as a critical component of conducting a valid disparity study. Additionally, it was noted that unless quality data are collected and available for analysis as part of a disparity study, the results of the study could be challenged, and if such a challenge were successful, the whole study would be negated.

Therefore, as a result of the initial research findings, the scope of work for the Disparity Study was divided into four phases based on the goals of the project as specified in Public Act 12-1 and in the best interests of the State of Connecticut. As noted, Phase 1 and Phase 2 have been completed, Phase 3 is the subject of this report, and Phase 4 will be conducted at a later date.

- Phase 1 was completed in August 2013 and included a review and analysis of Connecticut's Set-Aside Program, legal issues, and stakeholder anecdotal information.
- Phase 2 was completed in May 2014 and included legislative and administrative initiatives, diversity data management system review, review of issue areas, and data and methodology for statistical analysis.
- Phase 3 *(current phase)*: The purpose of Phase 3 is to analyze whether or not disparities exist in Connecticut's geographic marketplace. For the purpose of this study,

6 It is noted that subsequent to the completion of Phase 1 and Phase 2 of the study, provisions of the Set-Aside Program (C.G.S §4a-60g) were amended in 2015 (Public Act 15-5) to include state-financed, quasi-public agency projects and municipal public works contracts, as of October 2015. Therefore, financial information regarding these expenditures commenced in fiscal year 2016. The analysis for Phase 3 of the study is based on historical data through fiscal year 2015.

"disparities" are defined as measurable differences between the experiences of one group of individuals or firms (e.g., members of minority communities or minority-owned firms) and the experiences of another group of individuals or firms (e.g., members of majority communities or majority-owned firms) with respect to certain indicators and within a given geographic location. Testing for marketplace disparities first requires the establishment of the appropriate geographic market relevant to all agencies' procurement and contracting (hereinafter referred to as "procurement") activity. An approximation of the state's geographic marketplace was developed using procurement data from the state's financial payment systems for this analysis.

The Phase 3 analysis was conducted using publicly available data and examined different measures of disparity in the geographic marketplace in an effort to identify whether minority- and women-owned businesses in the state are at a statistically significant disadvantage, a finding that would provide support for a state MBE and WBE Program. The following factors were examined to determine if disparities exist in the economy-wide marketplace by race and ethnicity or gender: business formation, earnings, credit access, homeownership and lending, and business performance. Appendix B provides a listing of Study Committee meetings and guest speakers.

- Phase 4: The final phase of the Disparity Study will provide an analysis of the availability and utilization of minority- and women-owned businesses. After the geographic marketplace identified in Phase 3 is confirmed, or revised, if necessary, using forthcoming data on prime contracts and subcontracts, the state's utilization of minority- and women-owned businesses will be compared with the availability of these groups in the state's geographic market area. This comparison will be used to evaluate whether there is evidence of disparities, which may be indicative of discrimination, in state procurement and contracting based on the availability and utilization ratios. If such disparities are found, the final step in Phase 4 would be to determine the need for a MBE and WBE Program and if so, the percentage goals for utilization of minority- and women-owned businesses. Phase 4 is needed to complete the Disparity Study; the timeline for conducting Phase 4 is to be determined.

2.0 APPROXIMATING THE GEOGRAPHIC MARKETPLACE

Approximating the geographic market for procurement in the state involves identifying the location(s) of the majority of the state's prime vendors. The Connecticut geographic marketplace models identified in this section are an approximation, since only data on purchases from state prime contractors—not subcontractors—were available electronically from the state's financial payment systems for this phase of the study. Additionally, in some cases the procurement data reflected accounts payable locations, rather than the office location from which the goods or services were contracted, as further discussed at the end of this section. The models of Connecticut's geographic marketplace will be used to conduct disparity analyses of the economy-wide marketplace that are included in this section. If these analyses find significant disparities by race or sex, it would indicate that minority- or women-owned businesses in the geographic marketplace are at a significant disadvantage, which would provide support for a MBE and WBE Program.

It is noted that Phase 4 of this study will utilize more complete procurement data, including subcontractor procurement information. Therefore, the geographic marketplace models developed in this section will be reviewed in Phase 4 of this study and revised, along with the disparity analyses presented in this phase of the study, if necessary.

To construct Connecticut's geographic marketplace models, financial data from the state's six payments databases for five fiscal years (2011 - 2015) was requested. As of early December 2015, data were received from the state's primary payments database, CORE-CT, which records payments for the executive and judicial branches; the University of Connecticut (UConn) and UConn Health systems; and the Connecticut State Colleges and Universities (CSCU) system. Data from the legislative branch were not provided.

2.1 PROCUREMENT BY CONNECTICUT

A summary of net spending recorded in each of the state's financial payment systems is shown in Table 2.1. Data from the executive and judicial branches as well as the data from the Board of Regents was provided for fiscal years 2011 – 2015. Due to implementation of new financial systems, the data for UConn was only available for fiscal years 2013 – 2015, and for UConn Health for fiscal years 2012 - 2015.

The data provided from the various financial systems generally included vendor names, identification numbers, payment addresses, brief payment descriptions, payment amounts, and procuring agencies.[7]

7 As part of the process of identifying the state's net spending via procurement in each of the financial payment systems, non-procurement related transactions were excluded from this analysis. See Appendix 2A for additional information.

TABLE 2.1 – NET SPENDING BY FINANCIAL PAYMENT SYSTEM

	CORE-CT	UConn	UConn Health	CSCU
Fiscal Years	**2011-2015**	**2013-2015**	**2012-2015**	**2011-2015**
Net Spending (millions)	$26,930	$996	$1,300	2,183

2.2 PROCUREMENT BY STATES

Table 2.2 shows the percent of net spending for selected states (including state rank by net spending), specifically Connecticut and those states contiguous to Connecticut as well as other states with net spending of greater than 5% of total net spending in each of the state's financial payment systems. For three of the financial payment systems, over 50% of procurement was from vendors with at least one physical location in Connecticut. For the UConn Health, the largest percent of procurement (35.6%) was from vendors located in Connecticut.

TABLE 2.2 PERCENT OF NET SPENDING FOR SELECTED STATES
BASED ON VENDOR LOCATION FOR EACH FINANCIAL PAYMENT SYSTEM

	CORE-CT *(rank)*	UConn *(rank)*	UConn Health *(rank)*	CSCU *(rank)*
Connecticut	**66.5% (#1)**	**59.0% (#1)**	**35.6% (#1)**	**58.4% (#1)**
Massachusetts	3.5% (#4)	15.4% (#2)	7.8% (#4)	9.0% (#2)
New York	8.0% (#2)	5.0% (#3)	11.7% (#2)	2.6% (#6)
Rhode Island	1.2% (#8)	0.5% (#14)	4.2% (#7)	0.2% (#22)
Regional *(CT, MA, NY, RI)*	**79.2%**	**79.9%**	**59.3%**	**70.2%**
Other states (>5%)				
	Arizona	-	Georgia	Virginia
	-	-	Illinois	-
	-	-	Maryland	-

A substantial portion of the state's procurement included vendors within a geographic area outside of Connecticut. Vendors from either Massachusetts or New York comprised the second largest group of vendors within each of the four systems. In addition, other states comprising at least 5% of procurement dollars in one of the financial payment systems include Arizona, Georgia, Illinois, Maryland, and Virginia.[8]

2.3 GEOGRAPHIC MARKETPLACE APPROXIMATION

This analysis indicates that the state's geographic marketplace extends beyond the state. Based on this analysis, three models of the geographic marketplace will be utilized for conducting the balance of the Phase 3 analyses:

8 Vendors located within counties bordering Connecticut comprised 2.3% of net spending within the four financial payment systems.

- ***Connecticut:*** The State of Connecticut represents the largest single grouping of vendors by state in each financial payment system and 64.5% of state procurement. One of the models that will be used as an approximation of the state's geographic marketplace will be the state itself, since M/WBE certification is currently limited to Connecticut companies.
- ***Regional:*** *(Connecticut, Massachusetts, New York, and Rhode Island)*: In total, vendors in these four states represented 77.9% of the state's procurement, and, with the exception of UConn Health, encompassed at least 70% of procurement in each financial payment system. In addition, it is considered likely that subcontractors would be located within many of the same or nearby geographic locations as prime contractors. Therefore, Connecticut plus its three bordering states will be used as a second model, to provide a broader approximation of the state's geographic marketplace.
- ***United States***: Because procurement by the state of Connecticut includes vendors throughout the country, some subcontractors (not captured in the data discussed) are likely to be located throughout the United States. Therefore, to include these prime and subcontract vendors, the entire United States will be used as a third model of the state's geographic marketplace. This will also serve as a sensitivity analysis of any disparities found in the Connecticut marketplace or the regional (Connecticut, Massachusetts, New York, and Rhode Island) marketplace as outlined.

If disparities are found in all three geographic marketplace approximations, the assumption can be made that economy-wide marketplace disparities exist however the state's geographic market is defined. These disparities, then, would indicate that minority- and women-owned businesses in the state are at a disadvantage, providing support for a MBE and WBE Program.

2.4 NOTES ABOUT CORE-CT DATA

CORE-CT system data provide information on all payments by the executive and judicial branches of the state government. However, there are two caveats about the use of this data for constructing the geographic marketplace approximations.

- The records only provide accounts payable addresses, rather than the actual geographic locations of vendors with which the state has contracted. For example, the address for one vendor in CORE-CT was in Illinois, although the corporate headquarters was in Ohio and there were three physical office locations in Connecticut, which may be where most of the procurement originated. Since the only address provided was for the vendor's office in Illinois, this vendor is included in the total procurement and spending from that state, although procurement could have been through the offices in Connecticut or the Ohio headquarters. Using accounts payable addresses likely understates the amount of procurement that occurs from vendor branch locations in Connecticut or bordering states.
- Some vendors had multiple addresses listed with no breakdown available for the amount spent by address. Any vendors with an address in Connecticut were included in the procurement for vendors in the state, on the assumption that procurement would occur with the most geographically proximate location; similarly, vendors without addresses in Connecticut were identified with the address that is closest to Connecticut.

These data limitations only affect the geographic marketplace approximations used in this phase of the Disparity Study. In Phase 4 of the study, data on actual contractor and subcontractor dollars awarded and dollars earned will be used to adjust, if necessary, the geographic marketplace models and related analyses in this section of the report, as well as for conducting the Phase 4 availability and utilization analyses.

3.0 DISPARITIES IN BUSINESS FORMATION

This section of the report examines the question of whether there are disparities in the rates of business formation. If minorities and women form businesses at a lower rate than non-minorities or men, a government can institute programs, such as a MBE or WBE program, so as to not be a "passive" contributor to such disparities. The presence of disparities may also affect the availability of businesses with which the government, or prime contractors, could contract.

This section includes a brief review of the empirical literature on race and gender disparities in business formation and on the determinants of self-employment;[9] overviews of the data and methodology used in this analysis, both of which are consistent with best practices for this part of a disparity study;[10] and the results of the quantitative analysis, with a focus on the three models of Connecticut's geographic marketplace developed in Section 2.

3.1 LITERATURE REVIEW

To date, there is an extensive body of literature examining racial and gender disparities in self-employment.[11] This includes work by Fairlie and Meyer (1996), who found disparities in self-employment rates across 60 ethnic and racial groups using 1990 Census data and controlling for age, education, immigrant status, and assimilation (see also Hout & Rosen, 2000; Blanchflower, 2008).[12] With more recent data, Fairlie (2013) has continued to find that both women and minorities are less likely to be entrepreneurs than men and non-minorities.

Much of this research focuses on the different self-employment rates of White and Black males. Using data from 1968-1989, Fairlie (1999) found that Black males were much less likely to be self-employed than White males, all else equal. One of the primary reasons for this was that Blacks were less likely to become self-employed and more likely to leave self-employment than Whites. Research by Fairlie and Meyer (2000) attributed substantially lower self-employment rates among Blacks to omitted variables like consumer and lending discrimination, asset and wealth differences, and risk aversion; this was despite the effects of converging educational attainment and the Great Migration of African Americans in the early through mid-twentieth century from the southern United States to the northern states. Kawaguchi (2005) identified the role of potential discrimination as a contributor to the likelihood of Black males choosing not to pursue self-employment.

With regard to disparities by gender, data from the Global Entrepreneurship Monitor (GEM) database reflected that, across all 37 GEM participating countries, female entrepreneurship was lower than male entrepreneurship (Minniti & Arenius, 2003). Empirical analysis of a similar

9 Disparity studies in other states have found disparities in self-employment by race and gender in their respective geographic marketplaces (see, for example, NERA, 2010, which was conducted on contracting in the state of New York).

10 See Wainwright and Holt (2010) and US Commission on Civil Rights (2006).

11 For a review of the literature on contributors to self-employment, see Georgellis, Sessions, and Tsitsianis (2005).

12 Blanchflower (2008) found that race and gender disparities in construction—which had been narrowing — widened after the *Croson decision regarding MWBE programs, but began narrowing again after post-Croson court cases upheld these programs.*

sample of GEM data by Verheul et al. (2004) revealed that women were more likely than men to become entrepreneurs as a response to unemployment in a recession. While overall female entrepreneurship has evolved in developed countries from being driven by the need for income to being driven by entrepreneurship opportunities, women in the United States exhibited less opportunity-driven entrepreneurship.[13]

Other drivers (and inhibitors) of female entrepreneurship have also changed. Verheul et al. (2004) found that though factors such as education, family background, and wage work (including income) can influence female entrepreneurs as they do men, labor market segregation and parenthood are at least two factors that affect female entrepreneurs differently.[14] Mincer (1985) also found that declines in family size and duration of marriage played a role in increasing female labor force participation, although Verheul et al. (2004) noted that, based on the findings of Uhlaner et al. (2002), higher female labor force participation should have had a positive impact on the female entrepreneurship rate.[15]

3.1.1 Determinants of Business Formation and Self-Employment

Differential rates of business formation have been found for minorities and women compared to non-minority men largely because certain factors influencing business formation affect women and minorities differently. Many studies have examined the importance of capital for starting a business. Sauer and Wilson (2015) and Le (1999), among others, found that access to liquid capital predicted transitions to self-employment. Others have examined the role of liquidity through lump sum inheritances or other capital infusions and found a similar effect (Hurst & Lusardi, 2004; Evans & Javanovic, 1989; Holtz-Eaken et al., 1993; Blanchflower & Oswald, 1998).[16]

There are a number of other factors that contribute to an individual's decision to pursue entrepreneurship, many of which have been found to have a differential effect for minorities and women. Evans and Leighton (1989) explored business formation and factors related to time such as age, wage work tenure, and labor market experience. They found that the likelihood of self-employment was higher both for those with longer job tenure and for those with unstable work histories. In addition, Fairlie (2013) investigated business formation prior to and during the Great Recession (2007 – 2009), and found that weakness in the labor market contributed to entrepreneurship, although this is more likely among those without employment at the time rather than the employed.[17]

Loestrom and Wang (2000) explored differences in the types of businesses formed by Hispanic entrepreneurs.[18] They found that a higher concentration of Hispanics in "low-barrier" industries could be a product of educational attainment. Self-selection into less capital-intensive industries

13 See Allen et al. (2007).

14 See also Hout and Rosen (1999); Wong, (1986); Caputo and Dolinsky (1998); Devine (1994).

15 Devine (1994) also noted that as women became more visible in the workplace, women entrepreneurs also became more visible.

16 The role of capital in business formation is discussed in the following sections on Disparities in Wages and Earnings, Disparities in Credit Access, and Disparities in Homeownership and Home Lending, and so will not be further discussed here.

17 Fairlie (2013) used data from 1996 to 2009, and the Great Recession began in the United States in December 2007.

18 Mora and Davila (2006) examined the contributors to high self-employment rates for immigrants along the United States-Mexico border.

could also be a product of credit constraints. Blanchflower and Wainwright (2005) found that industry can influence self-employment in other significant, but less quantifiable ways. In particular, they outlined network barriers as a significant challenge faced by women and minorities in the construction industry. Other studies have found that work experience in a family-owned business (Fairlie & Robb, 2007), a father's occupation or spouse's employment status (Le, 1999), or education (Feldman, Koberg, & Dean, 1991) also had an effect on the likelihood of self-employment (see also Borjas, 1986; Blanchflower & Oswald, 1998; Bernhardt, 1994).

The findings from this extensive body of literature demonstrate that both minorities and women generally have lower self-employment rates. The next section seeks to determine whether the pattern of disparate outcomes in self-employment rates (which could be attributed to prejudicial differences in various social constraints) exists across the state's geographic marketplaces.

3.2 DATA

The data used in this section were obtained from the Integrated Public Use Microdata Series (IPUMS-USA) for the 2008-2015 American Community Survey five-year samples from 2008 - 2015 (Ruggles et al., 2010). This sample contains over 15 million records for the United States, and 178,763 records for individuals in Connecticut. As a microdata set, each line of the IPUMS data represents an individual and his/her specific characteristics, rather than an aggregation of the data. This enables statistical analysis to be used to compare the impact of specific characteristics, such as race or gender, on the likelihood that an individual is self-employed, holding other characteristics such as education, location, and industry constant.

3.3 METHODOLOGY

A linear probability model was used to estimate differences in the rate of self-employment by race and gender. The dependent variable in this analysis is a binary indicator variable where a value of "1" indicates a respondent who is self-employed and "0" represents a respondent who "works for wage." Based on the literature review, controls were added to the model for age, education level, state of residence, industry, and occupation.[19]

3.4 FINDINGS

The first step in this analysis was to develop a model for estimating self-employment status using data on workers across the United States. The coefficient on the variable of interest in each of the estimates can be interpreted as the percentage point difference in the likelihood that a minority (either female or a racial/ethnic minority) is self-employed relative to a member of the omitted group (either males or non-minorities). The first specification (1) in Table 3.1 only includes controls for age and education. The other specifications (2-5) sequentially include controls for year, state, industry, and occupation of the respondent. The final specification (5) in Table 3.1, which includes all controls, will be used for the remainder of this analysis.[20]

19 The analysis was also restricted to working-age adults between ages 25 and 54.
20 This series of estimates with dummy variables for each minority group is included in Appendix 3A.

TABLE 3.1: LINEAR REGRESSION FOR PROBABILITY OF SELF-EMPLOYMENT IN THE UNITED STATES[21]

LHS: Self-Employed	(1)	(2)	(3)	(4)	(5)
Female	-0.04***	-0.04***	-0.04***	-0.02***	-0.02***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Minority	-0.03***	-0.03***	-0.03***	-0.03***	-0.02***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age	0.01***	0.01***	0.01***	0.01***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age-Squared	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Education FE	X	X	X	X	X
Year FE		X	X	X	X
State FE			X	X	X
Industry FE				X	X
Occupation FE					X
Observations	4,505,244	4,505,244	4,505,244	4,505,244	4,505,244

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance.
Note 2: Robust standard errors are contained in parentheses.
Note 3: Sample restricted to prime working age population defined as individuals 25 to 54 years old.
Note 4: The findings are robust to using a logistic regression rather than a linear probability model. See Appendix 3B for estimates with logit regression.

Table 3.2 examines differences in the likelihood that an individual participates in the labor market through self-employment across demographic groups in each of the three geographic marketplace approximations. Across all three geographies, both women and minorities experience a disparity in the likelihood of self-employment. Women are 3 percentage points less likely to be self-employed relative to male workers in the Connecticut and Regional marketplaces and 2 percentage points less likely to be self-employed relative to male workers in the United States. Minorities are 2 percentage points less likely to be self-employed relative to non-minority workers across all three geographies.

21 For more information on how to interpret the results in this section, see Appendix A.

TABLE 3.2: LINEAR REGRESSION FOR PROBABILITY OF SELF-EMPLOYMENT IN CONNECTICUT, REGIONAL MARKET, AND UNITED STATES

LHS: Self-Employed	Connecticut	Regional	United States
Female	-0.03***	-0.03***	-0.02***
	(0.00)	(0.00)	(0.00)
Minority	-0.02***	-0.02***	-0.02***
	(0.00)	(0.00)	(0.00)
Age	0.01***	0.01***	0.01***
	(0.00)	(0.00)	(0.00)
Age-Squared	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)
Observations	54,787	460,736	4,505,244

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance.
Note 2: Robust standard errors are contained in parentheses.
Note 3: Sample restricted to prime working age population defined as individuals 25 to 54 years old.
Note 4: The findings are robust to using a logistic regression rather than a linear probability model. See Appendix 3B for estimates with logit regression.
Note 5: Additional controls omitted from the table include education, year, state, industry, and occupation fixed-effects.

Table 3.3 presents estimates of the likelihood that an individual participates in the labor market through self-employment across more detailed definitions of demographic groups. African-Americans and Hispanic workers had the largest disparity in self-employment for the Connecticut marketplace; workers in each group were 3 percentage points less likely to be self-employed relative to White and non-Hispanic workers, respectively. The disparity for Black workers is the same in all three marketplaces, and Hispanic workers are 2 percentage points less likely to be self-employed relative to non-Hispanic workers in the Regional and United States marketplaces. While the results for workers of other minority races were not significant in the Connecticut marketplace (likely due to the small sample size), Native American and Asian workers face a significant disparity in the Regional and United States marketplaces.

TABLE 3.3: LINEAR REGRESSION FOR PROBABILITY OF SELF-EMPLOYMENT IN CONNECTICUT, REGIONAL MARKET, AND UNITED STATES WITH RACE AND ETHNICITY DETAILED RESULTS

LHS: Self-Employed		Connecticut	Regional	United States
Female		-0.03***	-0.03***	-0.02***
		(0.00)	(0.00)	(0.00)
Minority Status	**Black**	-0.03***	-0.03***	-0.03***
		(0.00)	(0.00)	(0.00)
	Asian	-0.01	-0.01***	-0.01***
		(0.01)	(0.00)	(0.00)
	Native American	-0.02	-0.02***	-0.03***
		(0.02)	(0.01)	(0.00)
	Multi-Racial	-0.01	0.00	0.00
		(0.01)	(0.00)	(0.00)
	Other Race	0.00	-0.01***	-0.01***
		(0.01)	(0.00)	(0.00)
	Hispanic	-0.03***	-0.02***	-0.02***
		(0.00)	(0.00)	(0.00)
Age		0.01***	0.01***	0.01***
		(0.00)	(0.00)	(0.00)
Age-Squared		0.00	0.00	0.00
		(0.00)	(0.00)	(0.00)
Observations		54,787	460,736	4,505,244

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance.
Note 2: Robust standard errors are contained in parentheses.
Note 3: Sample restricted to prime working age population defined as individuals 25 to 54 years old.
Note 4: The findings are robust to using a logistic regression rather than a linear probability model. See Appendix 3B for estimates with logit regression.
Note 5: Additional controls omitted from the table include education, year, state, industry, and occupation fixed-effects.

3.5 SUMMARY

The literature on entrepreneurship demonstrates that minorities and women have experienced long-standing but decreasing disparities in business ownership and formation. Moreover, they also are more impacted by various constraints on starting a business. Statistical analyses presented in this section support the narrative described through the existing literature, with both women and minorities being less likely to report self-employment. Both groups of labor market participants were found to be significantly less likely to report self-employment across Connecticut, the Regional marketplace, and the United States. The following sections will investigate whether disparities by race and gender exist in other aspects of the economy-wide marketplace, specifically in earnings, access to credit, homeownership and home lending, and business performance.

4.0 DISPARITIES IN EARNINGS

This section investigates whether there is a disparity in wages or earnings by race, ethnicity, or gender in the geographic marketplace. As noted elsewhere in this phase of the Disparity Study, courts have held that evidence of race or gender disparities in relevant economy-wide marketplaces provides a rationale for the adoption of MBE and WBE programs. By adopting appropriate programs, governments avoid being deemed to be "passive" or "indirect" contributors to such disparities. Further, retained earnings or wealth have been shown in the research to contribute to the likelihood of an individual's choice to start a business (e.g., Evans & Jovanovic, 1989; Fairlie & Krashinsky, 2012), so lower levels of wages or earnings would therefore likely limit the potential for new business creation by those population groups.

This section includes a brief review of the empirical literature on race and gender disparities in wages and earnings;[22] overviews of the data and methodology used in this analysis, both of which are consistent with best practices for this part of a disparity study; and the results of the quantitative analysis, with a focus on three models of Connecticut's geographic marketplace that were developed in Section 2.

4.1 LITERATURE REVIEW

In all of the studies reviewed for this analysis, research findings indicated that there were disparities by race and gender in wages for employees and for self-employed workers, although the size and statistical significance of these findings varied based on subdivisions within population groups (e.g., education levels) or the number of controlling factors (i.e., economy-wide characteristics). The results found by Altonji and Blank (1999) are typical, with the average White male earning over $6.00 per hour more than the average Black or Hispanic male or White female, and over $8.00 per hour more than the average Black or Hispanic female in 1996.[23] They were able to explain part of the wage gap as a result of education, experience, occupation, and location, but also found an unexplained portion of the gap that may be indicative of the effects of discrimination.[24]

A focus of the research on wages and earnings has been on the changes in the wage gap over time. Using US Census microdata, Mandel and Semyonov (2014) found that the earnings gap for women relative to men has decreased, but that most of the decrease was due to unexplained factors (i.e., once education, experience, and other personal and economic characteristics are controlled for), indicating a possible decrease in the effect of discrimination (see also

22 Disparity studies in other states have found disparities in earnings by race and gender in their respective geographic marketplaces (see, for example, NERA, 2010, which was conducted on contracting in the state of New York).

23 Hourly earnings are used rather than annual salaries because White males also tend to work more hours per week and more weeks per year than the other population groups.

24 Some research on the impact of discrimination on wages has explored statistical versus taste-based discrimination. The former is said to occur when firms have limited information about potential hires and, thus, will use observable characteristics to predict productivity (Phelps, 1972). The alternative is taste-based discrimination, which is defined by Becker (1957) as less favorable treatment of a minority group with identical productive characteristics to the majority group. See also Neumark (1998) or Fryer, Pager, and Spenkuch (2011).

Weinberger, 2011). Couch and Daly (2004) also found that improvement in Black men's wages relative to wages of Whites was substantially due to improved education and occupational diversity, with the relative importance of each changing over time (see also Couch and Daly, 2002). Altonji and Blank (1999) observed that the wage gap had decreased between White women and men since the late 1970s, due largely to the former's increasing labor force experience and education; however, the improvement due to these factors was offset somewhat, as women typically have been employed in lower-skill jobs, with greater returns accruing to higher-skill positions. They also found that the gaps between White men and Black and Hispanic men decreased in the 1960s, but then showed "little relative improvement (and even some deterioration) in the 25 years since" (p. 3149). Meanwhile, salaries of Black and White women were almost equal in the 1970s, but since then there has been less wage growth for Black women.

According to the research, one of the major factors contributing to the decreased wage gap over time has been improved or increased education for non-White males (O'Neill, 1990).[25] Neal and Johnson (1996) estimated that a significant portion of the wage gap was attributable to human capital formation in primary-secondary school years; Card and Krueger (1992) found that improved school quality explained a significant part of the decreasing wage differential between White and Black men born in the South. An important signifier of improved education is a college degree and higher education attainment rates for minorities and women (Arcidiacono, Bayer, & Hizmo, 2010; Chay & Lee, 2000; Kim, 2015).

The other major driver of the decreasing wage gap has been cyclical and structural changes in the national and regional economies. Hirsch and Winters (2014) found that cyclically, Black men appeared to be most vulnerable to unemployment and labor market conditions, with a 60-year peak in the Black-White earnings gap post-Great Recession in 2010 (see also Biddle & Hamermesh, 2013). Bound and Holzer (1993) found that shifting demand away from manufacturing reduced employment and wages for both Black and White males but had a greater effect on Black workers, accounting for 40%-50% of the employment decline for less educated young Black males in the 1970s (see also Bound & Freeman, 1992; Altonji & Blank, 1999; Gauchat, Kelly, & Wallace, 2012). Major geographic shifts for Black (Donohue & Heckman, 1991) and Hispanic populations (Altonji & Blank, 1999) have also affected the size of the wage gap between those workers and the White population.[26]

4.1.2 Earnings Gaps in Self-Employment

In regards to self-employment, studies have found many impediments to entering and sustaining entrepreneurship among minorities, particularly Blacks, and females. While industry-wide trends and macroeconomic and microeconomic factors also affect self-employment trends,[27] Fairlie and Meyer (1996) found that self-employment rates differed significantly across 60 ethnic and racial groups in the United States. They also found a positive association between a racial/

25 Controlling for previous wage, Fryer, Pager, and Spenkuch (2011) sought to capture skill bundles, non-cognitive skills (a shortcoming of the commonly used AFQT), and other human capital components that are not commonly held constant in wage gap analyses.

26 Hoffman (2014) found that state residence has a significant impact on the size of the gap between male-female earnings (see also Ryu, 2010). The geographic shifts mentioned refer to the Great Migration of the Black population from the South to northern cities in the early to mid-twentieth century and the more recent influx of Hispanic workers.

27 See also Hurst and Lusardi (2004), Blanchflower and Shadforth (2007), and Black, de Meza, and Jeffreys (1996) for (housing) market liquidity and influence on lending to entrepreneurs.

ethnic group's self-employment rate and earnings, and that immigrants groups from countries with high rates of self-employment did not also exhibit a high self-employment rate in the United States (see also Fairlie & Meyer, 2000).[28] Fairlie and Meyer (2007) identified that family roles, inheritances, and intergenerational business acumen have reduced Black self-employment rates.

Women have been half as likely to enter self-employment as males and often earn less when they are self-employed (Blanchflower, 2008). While women have become more visible in the workplace and as entrepreneurs, Devine (1994) found a disparity in earnings. Studies also consider the effects of many factors women face in transitioning to self-employment, including age, marriage status, health care, education, occupation, and a self-employed spouse (Devine, 1994; Hout & Rosen, 1999).

Consumer discrimination has also been explored as a possible contributor to lower economic outcomes among women and minority self-employed. Borjas and Bronars (1988) presented a model indicating that lower earnings among minority self-employed were due to customers preferring not to patronize them.[29] They found that consumer discrimination lowered earnings for self-employed Blacks while employer discrimination lowered salaries for employed Blacks regardless of skill (i.e., skilled Blacks have more incentive to be salaried while unskilled Blacks have more incentive to be self-employed). Blanchflower (2008) also discussed how minority- and women-owned construction businesses were often relegated to special trades and were more likely to be subcontractors than prime contractors, and identified the role of business networks in winning public contracts.

4.2 DATA

The data used in this section were obtained from the US Census Bureau Integrated Public Use Microdata Series (IPUMS-USA) for the American Community Survey five-year sample from 2008 - 2015 (Ruggles et al., 2010). This sample contains over 15 million records for the United States, and 178,763 records for individuals in Connecticut. As a microdata set, each line of the IPUMS data represents an individual and his/her specific characteristics, rather than an aggregation of the data. In this way, statistical analysis can be used to compare the impact of specific characteristics such as race or gender, as well as education level, location, and industry, on a dependent variable—in this case wages—while holding the other characteristics constant.

4.3 METHODOLOGY

Linear regression analysis was used to evaluate whether there were statistical disparities in earnings by race, ethnicity, and gender in the three marketplace approximations (Connecticut; Connecticut, Massachusetts, New York, and Rhode Island, called "Regional"; and the United States) identified in Section 2. The dependent variable in all cases was a log of hourly wages, which was calculated using IPUMS respondents' average annual wages and earnings divided by the weeks worked and the hours worked per week.[30] In this framework, the coefficient on

28 However, Hout and Rosen (1999) found that second generation male immigrants with family history of self-employment had a higher probability of being self-employed.

29 See Becker, 1957.

30 For the sample period chosen, the ACS data provided by IPUMS only provides the number of weeks worked in the past year in intervals. The midpoints of these intervals were used in the analysis.

categorical variables (such as race and gender) can be interpreted as the percent deviation from the omitted group.

The analysis was restricted to working-age adults between ages 25 and 55. Analyses by race and ethnicity are presented for specific population groups as well as for all non-White and non-Latino/Hispanic groups. The first series of analyses was for the United States, with fixed-effects for education, year, state, industry, and occupation. The full model, with all fixed-effects included, is then used for the detailed analysis. Findings are presented for each of the geographic marketplace models identified in Section 2 for all respondents with wages and earnings during the reporting years; results are then further broken down within each marketplace approximation into those who were employed by others and those who were self-employed.

4.4 FINDINGS

The first step in this analysis was to develop a model of wage determination using all workers in the United States marketplace (to ensure an adequate sample size). Various controls (the individual's age and education, the year and state, and the industry and occupation in which the individual worked) were introduced to the wage equation to identify their contributions to an individual's wage. The first specification (1) in Table 4.1 represents a basic Mincerian wage equation, which is the traditional approach to understanding the determinants of earnings. Specifications (2) to (5) sequentially add additional controls for year, state of residence, industry of employment, and occupation. (The latter two controls are for structural changes in the economy of the United States, e.g., recovery from the Great Recession, continued changes in relative employment in manufacturing and other industries.) The fifth (5) specification, as shown in Table 4.1, was the most comprehensive and included all of the fixed-effects. This last specification was used for the remainder of the analysis. Holding age, education, year, state, industry, and occupation constant isolates the effects of race, ethnicity, and gender on earnings.[31]

31 This series of wage estimates with separate dummy variables for each minority group are provided in Appendix 4A. Robustness tests with sample weights are included in Appendix 4B.

TABLE 4.1: WAGE ESTIMATES FOR THE UNITED STATES, ALL EMPLOYEES[32]

LHS: Log Hourly Wage	(1)	(2)	(3)	(4)	(5)
Female	-0.26***	-0.26***	-0.26***	-0.21***	-0.17***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Minority	-0.09***	-0.09***	-0.14***	-0.13***	-0.10***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age	0.07***	0.07***	0.07***	0.07***	0.06***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age-Squared	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Education FE	X	X	X	X	X
Year FE		X	X	X	X
State FE			X	X	X
Industry FE				X	X
Occupation FE					X
Observations	4,616,838	4,616,838	4,616,838	4,616,838	4,616,838

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: Sample restricted to prime working age population defined as individuals 25 to 54 years old.

4.4.1 Regression Analysis – Relative Earnings for All Workers

The first analysis using the three geographic marketplace approximations explores earnings disparities for all workers. The findings presented in Table 4.2 indicate that both women and minority men face a significant earnings disparity compared to non-minority males. These disparities are larger in Connecticut than in the United States when age, education, industry, occupation, and time period are held constant. Comparing across the geographic marketplace models, women face the largest disparity in hourly wage in Connecticut, where they make 19% less than males. Minorities also face a greater disparity in the Connecticut marketplace, making on average 14% less than their non-minority counterparts. Moreover, this disparity is greater in Connecticut than in the four-state Regional marketplace, in which the disparities in earnings are slightly less than in the United States.

32 The first iteration of the general specification represents the most simplistic form of the Mincerian wage equation; controls were added sequentially to each iteration that follows. For more information on how to interpret the results as presented in the Findings Section, see Appendix A.

TABLE 4.2: RELATIVE EARNINGS FOR ALL WORKERS IN CONNECTICUT, REGIONAL MARKET, AND UNITED STATES

LHS: Log Hourly Wage	Connecticut	Regional	United States
Female	-0.19***	-0.16***	-0.17***
	(0.01)	(0.00)	(0.00)
Minority	-0.14***	-0.08***	-0.10***
	(0.01)	(0.00)	(0.00)
Age	0.08***	0.07***	0.06***
	(0.00)	(0.00)	(0.00)
Age-Squared	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)
Observations	55,639	468,077	4,616,838

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: Sample restricted to prime working age population defined as individuals 25 to 54 years old.
Note 4: Additional controls omitted from the Table include education, year, state, industry, and occupation fixed-effects.

Table 4.3 provides a breakdown of the specification for all workers by race and ethnicity, which demonstrates some, but not large, differences in disparities among the minority racial and ethnic groups. Across all minority subgroups the wage differential between minorities and non-minorities in the Connecticut marketplace is greater than in the Regional marketplace and United States as a whole with the exception of Hispanics workers, for which the state disparity is the same as the disparity in the United States. All else equal, Black and Native American workers face the greatest disparities (14%) in the Connecticut marketplace, while Asian workers face a 10% disparity in the Regional marketplace. Hispanics face the smallest hourly wage gap in both the Regional and Connecticut marketplaces while those identifying as "other race" have the smallest hourly wage gap nationwide.

TABLE 4.3: RELATIVE EARNINGS FOR ALL WORKERS WITH RACE AND ETHNICITY DETAILED RESULTS

LHS: Log Hourly Wage		Connecticut	Regional	United States
Female		-0.19***	-0.16***	-0.17***
		(0.00)	(0.00)	(0.01)
Minority Status	**Black**	-0.14***	-0.06***	-0.10***
		(0.01)	(0.00)	(0.00)
	Asian	-0.12***	-0.10***	-0.09***
		(0.01)	(0.00)	(0.00)
	Native American	-0.14**	-0.09***	-0.10***
		(0.07)	(0.02)	(0.00)
	Multi-Racial	-0.13***	-0.08***	-0.07***
		(0.03)	(0.01)	(0.00)
	Other Race	-0.12***	-0.08***	-0.04***
		(0.02)	(0.01)	(0.00)
	Hispanic	-0.09***	-0.04***	-0.09***
		(0.01)	(0.00)	(0.00)
Age		0.08***	0.07***	0.06***
		(0.00)	(0.00)	(0.00)
Age-Squared		0.00	0.00	0.00
		(0.00)	(0.00)	(0.00)
Observations		55,639	468,077	4,616,838

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: Sample restricted to prime working age population defined as individuals 25 to 54 years old.
Note 4: Additional controls omitted from the Table include education, year, state, industry, and occupation fixed-effects.

These findings demonstrate the presence of a significant disparity for the average woman or minority across the three geographic marketplace approximations identified for this study, even after holding constant many of the other factors identified as contributing to wage disparities, such as industry, occupation, education, location, and year. However, these disparities may vary if the individual is employed by others or self-employed. Therefore, these two categories of workers will be analyzed separately.

4.4.1.1 Relative Earnings for Employed Workers Only

This analysis includes only employed workers, defined as a respondent who "works for wages" in the IPUMS data, with the results for all minorities as a group shown in Table 4.4. Consistent with the findings for all workers, there is a significant disparity between White male workers and female workers and between non-minority male workers and minority workers. Women face a larger disparity than minorities in each of the three geographic marketplace approximations, with the largest disparity for female workers of 18% in Connecticut, and a disparity for minority workers of 14%.

TABLE 4.4: RELATIVE EARNINGS FOR EMPLOYED WORKERS IN CONNECTICUT, REGIONAL MARKET, AND UNITED STATES

LHS: Log Hourly Wage	Connecticut	Regional	United States
Female	-0.18***	-0.16***	-0.17***
	(0.01)	(0.00)	(0.00)
Minority	-0.14***	-0.08***	-0.10***
	(0.01)	(0.00)	(0.00)
Age	0.08***	0.07***	0.06***
	(0.00)	(0.00)	(0.00)
Age-Squared	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)
Observations	53,297	448,200	4,416,777

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: Sample restricted to prime working age population defined as individuals 25 to 54 years old.
Note 4: Additional controls omitted from the Table include education, year, state, industry, and occupation fixed-effects.

Comparing disparities among minority groups, all minority workers experience a significant disparity compared to non-minority workers, and the disparity is greatest in Connecticut compared to the other two geographies as shown in Table 4.5. Black workers in the state face the largest disparity, at 14%, while Hispanic workers have the smallest, at 9%. In the four-state Regional marketplace, Asian and Native American workers have the largest disparities, and Native Americans experience the largest disparity in United States.

TABLE 4.5: RELATIVE EARNINGS FOR EMPLOYED WORKERS WITH RACE AND ETHNICITY DETAILED RESULTS

LHS: Log Hourly Wage		Connecticut	Regional	United States
Female		-0.18***	-0.16***	-0.17***
		(0.00)	(0.00)	(0.01)
Minority Status	**Black**	-0.14***	-0.06***	-0.10***
		(0.01)	(0.00)	(0.00)
	Asian	-0.12***	-0.10***	-0.08***
		(0.01)	(0.00)	(0.00)
	Native American	-0.13*	-0.10***	-0.10***
		(0.07)	(0.02)	(0.00)
	Multi-Racial	-0.13***	-0.07***	-0.07***
		(0.00)	(0.01)	(0.00)
	Other Race	-0.12***	-0.08**	-0.04***
		(0.02)	(0.01)	(0.00)
	Hispanic	-0.09***	-0.04***	-0.09***
		(0.01)	(0.00)	(0.00)
Age		0.08***	0.07***	0.06***
		(0.00)	(0.00)	(0.00)
Age-Squared		0.00	0.00	0.00
		(0.00)	(0.00)	(0.00)
Observations		53,297	448,200	4,416,777

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: Sample restricted to prime working age population defined as individuals 25 to 54 years old.
Note 4: Additional controls omitted from the Table include education, year, state, industry, and occupation fixed-effects.

4.4.1.2 Relative Earnings for Self-Employed Workers Only

This analysis includes only self-employed workers. The results in Table 4.6 show that women and minority self-employed workers continue to face a disparity compared to non-minority males. The disparities are greater in Connecticut than in the Regional and United States geographic marketplaces. In addition, the disparities for both women and minorities are much larger for self-employed workers in all three geographies; within Connecticut specifically, self-employed women face a disparity 14 percentage points greater than women who work for others, while the disparity for self-employed minorities is 8 percentage points greater.

TABLE 4.6: RELATIVE EARNINGS FOR SELF-EMPLOYED WORKERS IN CONNECTICUT, REGIONAL MARKET, AND UNITED STATES

LHS: Log Hourly Wage	Connecticut	Regional	United States
Female	-0.32***	-0.28***	-0.26***
	(0.05)	(0.02)	(0.01)
Minority	-0.22***	-0.17***	-0.14***
	(0.06)	(0.02)	(0.00)
Age	0.13***	0.09***	0.08***
	(0.03)	(0.01)	(0.00)
Age-Squared	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)
Observations	2,342	19,877	200,061

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: Sample restricted to prime working age population defined as individuals 25 to 54 years old.
Note 4: Additional controls omitted from the Table include education, year, state, industry, and occupation fixed-effects.

Comparing the disparities for the different race and ethnic minorities, however, presents a slightly different picture of disparities in the three geographic marketplaces. Women and minorities still face disparities, although in some cases the significance is smaller or the coefficient is not statistically significant, likely due to the much smaller sample sizes. These findings also show the importance of analyzing disparities for minorities both in the aggregate and for their subgroups, since the range of disparities among the minority subgroups is much wider than in the other two models (All Workers and Employed Workers). There is a 27 percentage point difference between the disparities faced by multi-racial and Hispanic workers in Connecticut. Moreover, the difference in the disparities between Connecticut and the Regional and United States marketplace geographies is also much larger for this specification. Multi-racial and Native American workers face statistically significant disparities in Connecticut that are, respectively, 21 and 35 percentage points higher than they face in the Regional marketplace. In the Regional marketplace, Black and Asian self-employed women have smaller disparities as compared to self-employed women in both the Connecticut and Regional marketplaces, although this difference is not statistically significant for the Connecticut marketplace.

TABLE 4.7: RELATIVE EARNINGS FOR SELF-EMPLOYED WORKERS WITH RACE AND ETHNICITY DETAILED RESULTS

LHS: Log Hourly Wage		Connecticut	Regional	United States
Female		-0.32***	-0.28***	-0.26***
		(0.02)	(0.01)	(0.06)
Minority Status	**Black**	-0.17	-0.16***	-0.17***
		(0.11)	(0.04)	(0.01)
	Asian	-0.14	-0.17***	-0.13***
		(0.10)	(0.03)	(0.00)
	Native American	-0.44**	0.09	-0.20***
		(0.20)	(0.14)	(0.04)
	Multi-Racial	-0.45***	-0.24***	-0.14***
		(0.15)	(0.06)	(0.02)
	Other Race	-0.34*	-0.12**	-0.01***
		(0.18)	(0.05)	(0.02)
	Hispanic	-0.18*	-0.10***	-0.12***
		(0.10)	(0.03)	(0.01)
Age		0.12***	0.09***	0.08***
		(0.01)	(0.00)	(0.03)
Age-Squared		0.00	0.00	0.00
		(0.00)	(0.00)	(0.00)
Observations		2,342	19,877	2,000,061

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: Sample restricted to prime working age population defined as individuals 25 to 54 years old.
Note 4: Additional controls omitted from the Table include education, year, state, industry, and occupation fixed-effects.

4.5 SUMMARY

Overall, statistically significant disparities were found in each specification for both women and minorities. Moreover, hourly wage disparities in the Connecticut marketplace are larger and more pervasive than the hourly wage disparities existing in the Regional marketplace and in the United States for all minorities. In addition, hourly wage disparities were greater for self-employed females and minorities compared to their employed peers. When disaggregated into minority subgroups, it is clear that disparities are not uniform across subgroups and the three geographic marketplace approximations. This difference was greatest for self-employed workers, in which the disparity for some minority groups was more than twice that experienced by other self-employed minority individuals.

Consistent with the findings of the studies reviewed, these findings indicate that minorities and women receive lower hourly wages than their non-minority and male counterparts in all of the geographic marketplace approximations and worker specifications, even after location,

education, industry, occupation, age, and year are held constant. The literature supports that these disparities carry a twofold effect for female and minority entrepreneurship. Disparities in earnings, whether in the employee or self-employed market, hinder wealth accumulation and access to capital and therefore influence both entrepreneurial entry and survival. Fairlie and Meyer (1996) found that minority groups with higher wealth overall reflected the highest self-employment rates, indicating that, beyond barriers such as language and discrimination, the decision to enter self-employment was most affected by financial resources. Similar consideration has been given to entrepreneurial survival (Holtz-Eaken, Joulfaian, & Rosen, 1993). Financial security might be a potential prerequisite to self-employment for women as well.[33] As such, sustained earnings disparities place women and minorities at a disadvantage for entrepreneurship.

33 See Fairlie and Krashinsky (2004) for incidence of job loss and self-employment entry.

5.0 DISPARITIES IN CREDIT ACCESS

This section examines whether there are disparities by race, ethnicity, or gender in access to credit. As discussed in the section on disparities in business formation (Section 3), credit and liquidity constraints are important resources but can be difficult for entrepreneurs and small businesses to obtain.[34] If minorities and women experience decreased access to credit or do not seek credit because they feel they will be denied, this presents a significant challenge to forming and sustaining their businesses.

This section explores whether credit access disparities exist in the geographic marketplace. It includes a brief review of the empirical literature on race and gender disparities in credit access;[35] overviews of the data and methodology used in this analysis; and a discussion of the findings of the quantitative analysis.

5.1 LITERATURE REVIEW

An important resource for firms of all sizes and ownership structures, credit can be difficult to obtain, especially for small and new firms. As firms grow, so does their use of credit and access to better financing options.[36] Bitler, Robb, and Wolken (1998) found that 33% of smaller businesses used some form of credit, and research shows that access to external capital (either debt or equity) influences growth prospects (Robb, Coleman, & Stangler, 2014; Mijid, 2015). Growth has been deemed integral to small business survival (Phillips & Kirchhoff, 1989), and credit constraints can inhibit that growth.[37] Undercapitalization in the initial stages of a business can lead to discontinuance (as demonstrated in Section 3 on Business Formation).[38]

The small business credit market is dynamic but also vulnerable to macroeconomic conditions and perceptions. This is especially the case in the aftermath of the Great Recession, when credit access for small business was constrained by both lender conditions and new federal oversight of lending (Mills & McCarthy, 2014). Prior to this, in the 1990s, commercial banks were major sources of funding for small businesses (Bitler, Robb, & Wolken, 1998), but more recent research has revealed that, while many firms still rely on financial markets for some form of credit, this number has decreased by approximately 30% since 2008 (NFIB Research Foundation, 2012).

34 For more information on the importance of credit and liquidity for small businesses, see, for example, Hurst and Lusardi (2004); Evans and Javanovic (1989); Blanchflower and Oswald (1998); Holtz-Eakin, Joulfaian, and Rosen (1993); Mills and McCarthy (2014).

35 Disparity studies in other states have found disparities in credit access by race and gender in their respective geographic marketplaces (see, for example, NERA, 2010, which was conducted on contracting in the state of New York).

36 See Gregory et al. (2005); Berger and Udell (1998).

37 See Robb and Fairlie (2007); Beck and Demirguc-Kunt (2006). Other factors relating to internal finance also have an effect on growth rates (Carpenter & Petersen, 2002).

38 Van Auken and Horton (1994) found that limited access to financial markets for small businesses led to an inability to accumulate an adequate mix of start-up capital. They observed that the minority firms that were unable to obtain adequate funding through the financial markets reported continued financial difficulties that affected their operations. Other sources of financing for entrepreneurs include personal savings and credit lines (e.g., credit cards or home mortgages, as discussed in the following section) as well as funds from family, friends, and acquaintances.

Personal wealth currently plays a larger role in credit access and, because of the difficulties businesses face in the credit market, many entrepreneurs resort to using equity rather than debt to finance their business (Avery, Bostic, & Samolyk, 1998; Gregory et al., 2005). In addition, technological advances in the wake of the 2008 post-recession credit crunch have made alternative funding sources like microloans and "angel" investors more accessible to small businesses.[39]

5.1.1 Disparities in Credit Access

While access to credit is influenced by many factors including macroeconomic ones, there is evidence of disparities in credit access by race and gender in the literature. While the extent of ease of access to credit can change over time, Jappelli (1990) found that "young, single, non-home-owning, and non-White households" are more likely to be squeezed out of tight credit markets and also tend to ask for less credit than equally creditworthy Whites. Cavalluzzo and Cavalluzzo (1998) similarly found that White males were more likely to hold business loans and that there were statistically significant disparities for Black-, Hispanic-, and women-owned businesses in concentrated banking markets, all else equal.

Cavalluzzo and Cavalluzzo (1998) concluded that lenders treat loan applicants differently on the basis of demographics because they do not have enough information on the applicant. The findings of Ards and Meyer (2001) support this conclusion. They observed that people (both creditors and potential applicants) have negative perceptions of Black credit holders despite there being no statistically significant differences in the average level of creditworthiness of Blacks and Whites in their sample. They contend that this perception contributed to an aversion to credit among Blacks, leading many to save instead. They also stated that, among Blacks and Whites with the worst credit, the difference in the magnitude of the credit score could be explained by race. Controlling for creditworthiness, Blanchflower (1998) also found that Blacks were approximately twice as likely to be denied credit; a similar analysis revealed that Black-owned firms paid higher interest rates and had to provide more documentation to obtain initial loans (Blanchflower, 1998; Van Auken & Horton, 1994).

Moreover, Robb and Fairlie (2007) observed that minority-owned businesses were less likely to apply for loans for fear of denial. This denial would negatively impact the firm's credit score and make future borrowing even more difficult. In later surveys of business owners, Black owners also were disproportionately more likely to report concerns about credit and more likely to have funded their business with personal equity as opposed to credit or bank loans (Blanchflower, 1998; Van Auken & Horton, 1994). Henderson et al. (2015) also found evidence of disparity and that, among new start-ups, credit scores differed by race and gender. Differences in firm characteristics explained 93% of the male-female disparities in business credit scores but only 30% of the Black-White disparities in business credit scores, leading the researchers to conclude that minorities and women have been penalized both in determination of credit scores and in access to credit.[40]

Firm structure (e.g., size, age, management) can dictate capital structure, although gender has

39 For post-recession banking and lending innovations, see Mills and McCarthy (2014).

40 If business lines of credit were determined for minorities in the same way as businesses owned by White men, credit lines of Black owned businesses would double, while Latino and Asian-owned businesses credit lines would triple and female-owned businesses credit lines would double (Henderson et al., 2015).

also been found to influence financial structure by impeding access to credit. Robb and Wolken (2002) demonstrated differences in financing patterns and financial characteristics between female- and male-owned firms attributable to the credit market. Though male- and female-owned businesses reported similar credit histories, female-owned businesses were considered greater credit risks by Dun and Bradstreet (Robb & Wolken, 2002). Coleman (2000) compared access to capital and credit between men- and women-owned businesses and found that women-owned firms were less likely to use external financing.[41] While gender did not appear to have a significant direct effect on access to capital, female-owned firms were charged higher interest rates and had higher collateral requirements (Coleman, 2000).[42]

Carter et al. (2007) asserted that outcomes in all steps of the credit decision process were influenced by the gender of both the applicant and loan officer because of social and psychological factors. From a different perspective, both Mijid (2015) and Robb and Wolken (2002) found that female-owned firms were less likely to have applied for new credit based on fear of rejection.[43] Whether women business-owners experienced discrimination due to these factors as Carter et al. (2007) suggested or perceived discrimination as suggested by Mijid (2015), the higher probability of loan denial contributed to a cycle that could constrain female-owned business performance.

5.2 DATA

The data in this section were obtained from the 2003 Survey of Small Business Finances (SSBF), which was conducted by the Federal Reserve Board of Governors.[44] Information was collected in 2004-2005 on for-profit firms with fewer than 500 employees, and surveyed firms had to be in business both at the end of 2003 and on the date of the interview. The SSBF excluded financial and farm firms as well as subsidiaries. The SSBF contains microdata on the characteristics of 4,240 small firms and their ownership as well as on the financial services available to and used by those firms.[45] The findings for this section are only presented at the national level due to the small sample sizes at the subnational level.

5.3 METHODOLOGY

Based on the literature review, including other disparity studies, and the data available, three dependent variables were identified for analysis in this section: loan denial, interest rate on most recent approved loan, and fear of loan denial.

41 See also Gregory et al. (2005) and Robb, Coleman, and Stangler (2014).

42 Coleman (2000) notes that lenders appeared to discriminate on the basis of firm size, which puts female-owned firms at a disadvantage since female-owned firms are approximately half the size of male-owned firms and are more likely to be smaller on average.

43 Mijid (2015) contends that because of this, female-owned firms were smaller and in industries with less growth potential, thus increasing their probability of future loan denial.

44 The SSBF had been conducted three times prior to the data collection in 2004-2005, but has not been collected since. This data continues to be used for the economy-wide analyses in recent disparity studies. The data were retrieved from http://www.federalreserve.gov/pubs/oss/oss3/ssbf03/ssbf03home.html#ssbf03dat.

45 SSBF data includes five separate observations per firm as a result of five rounds of imputations done in cases of missing data; non-missing data were the same in each round of imputation. The result was 21,200 total observations, or 4,240 observations for each round of imputation. Because most of the data were not imputed and, thus, identical, only the first round of imputations was used for this analysis. Sensitivity tests using the other rounds of imputations did not produce substantially different results than those presented in this section.

The first outcome variable, loan denial, was assessed using a linear probability model (LPM). The dependent variable in this analysis was a binary indicator variable where a value of "1" indicated that the firm was denied for all credit applications in the previous three years and "0" indicated that the firm was never or sometimes denied in the previous three years. The second dependent variable was the original interest rate on the most recent approved loan and was assessed using a standard linear regression. The analysis was restricted to firms that had at least one approved loan in the previous three years.

The third dependent variable, fear of loan denial, was included because the above two variables may underestimate the credit market disparity of minority- and female-owned businesses if firms are choosing not to initiate credit applications because they believe the request will not be approved. Therefore, fear of loan denial was included in this analysis. It is assessed using an LPM in which a dependent variable of "1" indicated that the firm needed credit in the last three years but did not apply for fear that the application would be rejected.

For all analyses in this section, controls were added to the model, including:

- *Firm credit characteristics*: if firm had declared bankruptcy in last seven years; if firm had judgements against it in past three years; the number of business obligations that the firm had been more than 60 days delinquent on in past three years; and firm's Dun and Bradstreet credit score.
- *Firm financial characteristics*: firm's total sales, assets, and equity in prior fiscal year; if firm had an existing line of credit; the type of institution that provided the firm's primary financial services; and the length of relationship with the primary financial institution.
- *Other firm characteristics*: age of firm; how owner(s) acquired firm; industry; number of employees; firm type; firm market area; and if firm was located in a rural or urban area.
- *Owner financial characteristics*: the number of owners; the logs of the principal owner's net worth and home equity; if the principal owner had declared bankruptcy in last seven years; if the principal owner had judgements against him or her in past three years; and the number of business obligations that the principal owner had been more than 60 days delinquent on in past three years.
- *Other owner(s) characteristics*: the weighted average age, education, and years of experience of the firm's three primary owners.[46]

These controls were applied consistently across all three analyses—loan denial, interest rate, and fear of denial—with the exception of four additional variables included in the regressions for interest rates. The selection of control variables was motivated by the existing literature and showed effects that were generally consistent across the three dependent variables.

5.4 FINDINGS

The findings indicate that minority- and female-owned businesses experience disparities in the three aspects of credit market access in the United States. However, the magnitudes of the

46 Financial information for the firm's ownership was only collected for the firm's primary owner. The race, ethnicity, gender, age, education, and experience of the firm's ownership were collected for up to three of the firm's primary owners; the weighted average for the one, two, or three owners was then scaled to 100.

disparities differed based on the dependent variable and for female- and minority-business owners. Due to data limitations (e.g., small sample size), many of the coefficient estimates were not statistically significant. This does not mean that there is an absence of disparate treatment in credit markets, but rather that the data is not sufficient to provide strongly compelling evidence.

5.4.1 Findings on Loan Denial

The first step in each analysis in this section was to develop a model that could be used to explore disparate treatment as it relates to each dependent variable. The results for loan denial are shown in Table 5.1.[47] The first (1) specification included a limited number of control variables including those for firm location (specifically, the Census division) and the firm's credit characteristics. The other specifications in the table added variables that controlled for the firm's financial characteristics, other firm characteristics, the financial characteristics of the firm's principal owner, and other characteristics of the firms' three primary owners. These controls were introduced sequentially across specifications (2) to (5) in Table 5.1.

TABLE 5.1: LINEAR REGRESSION FOR PROBABILITY OF LOAN DENIAL IN THE UNITED STATES[48]

LHS: Loan Denial	(1)	(2)	(3)	(4)	(5)
Female	0.05**	0.03	0.03	0.03	0.03
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Minority	0.15***	0.13***	0.13***	0.11***	0.11***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Census division	X	X	X	X	X
Firm credit characteristics	X	X	X	X	X
Firm financial characteristics		X	X	X	X
Other firm characteristics			X	X	X
Owner financial characteristics				X	X
Other owner characteristics					X
Observations	1,845	1,845	1,845	1,845	1,845

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: The findings are robust to using a logistic regression rather than a linear probability model. See Appendix 5B for estimates with logit regression.
Note 4: See Section 5.3 more information on the control variables.

The final (5) specification in Table 5.1 indicates that, nationally, minority-owned businesses were more likely to have their loan requests denied relative to non-minority-owned businesses. This disparity is 11 percentage points and is statistically significant. Female-owned businesses were also more likely to have their loans denied relative to male-owned businesses, although this disparity was smaller than that encountered by minority-owned businesses. The estimated disparity for female-owned businesses was not statistically significant, and this was likely due

47 This series of estimates with dummy variables for each minority group is included in Appendix 5A. Robustness tests with sample weights are included in Appendix 5B.

48 For more information on how to interpret the results as presented in the Findings Section, see Appendix A.

to the sample size. The finding for female-owned businesses, then, should not be disregarded, but there was less support for this finding than for the coefficient for minority-owned businesses.

5.4.2 Findings on Interest Rates of Approved Loans

The second analysis in this section focused on the original interest rate on the firm's most recent approved loan. The specifications for this analysis were built through the same process as for the loan denial analysis. In addition to the control variables in the analysis of loan denial, characteristics of the approved loan were also included in this analysis. These characteristics included the amount of the loan and if the firm was required to have a compensating balance, a guarantee or cosigner, or collateral. These variables were added because they affect the risk of the loan, and financial institutions charge a higher interest rate for higher risk; however, they do decrease the number of observations available for this analysis.

The estimated coefficients from a linear regression are shown in Table 5.2.[49] The findings from the final (5) specification indicate the possible presence of disparities in the interest rate charged to minority- and female-owned firms. The magnitude of the disparity was larger for minority-owned firms. Specifically, minority-owned firms had interest rates that were 43% higher relative to non-minority-owned firms, while female-owned businesses had interest rates 15% higher than male-owned firms. The estimates for interest rate disparities were not statistically significant in the final specification. This is again because the small sample size reduces support for the estimates but does not mean the findings should be disregarded.

49 This series of estimates with dummy variables for each minority group is included in Appendix 5C. Robustness tests with sample weights are included in Appendix 5D.

TABLE 5.2: RELATIVE INTEREST RATES ON APPROVED LOANS IN THE UNITED STATES

LHS: Interest Rate	(1)	(2)	(3)	(4)	(5)
Female	0.39	0.29	0.18	0.18	0.15
	(0.28)	(0.28)	(0.27)	(0.26)	(0.26)
Minority	0.91***	0.62*	0.58*	0.51	0.43
	(0.34)	(0.33)	(0.32)	(0.32)	(0.32)
Census division	X	X	X	X	X
Firm credit and loan characteristics	X	X	X	X	X
Firm financial characteristics		X	X	X	X
Other firm characteristics			X	X	X
Owner financial characteristics				X	X
Other owner characteristics					X
Observations	1,060	1,060	1,060	1,060	1,060

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: See Section 5.3 more information on the control variables.

5.4.3 Findings on Fear of Loan Denial

The final analysis conducted in this section concerned the likelihood of a firm not applying for needed credit because the firm feared the loan would not be approved. As previously referenced, the model was developed by sequentially adding control variables, as is shown in Table 5.3.[50] The estimates in the final (5) specification suggest that both female- and minority-owned firms experienced a disparity. Minority-owned firms were 7 percentage points more likely not to apply for credit, while female-owned businesses were 5 percentage points more likely not to apply. Both findings were statistically significant.

50 This series of estimates with dummy variables for each minority group is included in Appendix 5E. Robustness tests with sample weights are included in Appendix 5F.

TABLE 5.3: LINEAR REGRESSION FOR PROBABILITY OF FEAR OF LOAN DENIAL IN THE UNITED STATES

LHS: Fear of Loan Denial	(1)	(2)	(3)	(4)	(5)
Female	0.06***	0.06***	0.05***	0.05***	0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Minority	0.11***	0.10***	0.10***	0.07***	0.07***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Census division	X	X	X	X	X
Firm credit characteristics	X	X	X	X	X
Firm financial characteristics		X	X	X	X
Other firm characteristics			X	X	X
Owner financial characteristics				X	X
Other owner characteristics					X
Observations	4,152	4,152	4,140	4,140	4,140

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: The findings are robust to using a logistic regression rather than a linear probability model. See Appendix 5F for estimates with logit regression.Note 4: See Section 5.3 more information on the control variables.

5.5 SUMMARY

Businesses of all sizes regularly need access to credit to support their operations, and this is especially the case for small or new businesses. There is an extensive body of research concerning the importance of access to credit for business growth and, similarly, extensive research about the disparate treatment of minority- and female-owned firms in the credit market. This differential treatment includes not only loan denial rates but also the interest rates the firms are charged for approved loans. As a result, firms may have to seek funding elsewhere (which may result in even higher interest rates, more risk, or less equity for the ownership), lack the ability to grow, or, in some cases, dissolve or sell their businesses.

The findings indicate that minority- and female-owned firms experience both a higher likelihood of their loan applications being denied and higher interest rates on their approved loans, relative to non-minority- and male-owned firms, even when all other factors are constant. Moreover, not only do these firms actually experience these disparities, but they are also more likely to let their fear of credit application denial affect their decision making regarding applying for credit. Therefore, as a result of these disparities, it may be more difficult for minority and female businesses owners to form or maintain businesses.

6.0 DISPARITIES IN HOMEOWNERSHIP AND HOME LENDING

This section investigates whether disparities exist in homeownership, an important asset for many entrepreneurs. Homeownership provides equity that can be drawn on for business formation, especially if access to other financial resources (e.g., credit) is limited. Homeownership equity is important for both wealth accumulation (Dietz & Haurin, 2003) and entrepreneurship (Fairlie, 2013).[51]

As discussed in this section, there is empirical evidence that minorities and women face unique barriers to homeownership, which can include discrimination in the real estate market and differential treatment in the mortgage credit market. Other studies show that women and minorities can experience negative economic consequences from homeownership such as higher cost burdens and greater exposure to risk. These disparities can translate into fewer resources for starting or sustaining a business.

This section explores whether there are disparities by race in homeownership and home lending in the geographic marketplace approximations. It includes a brief review of the empirical literature on race and gender disparities in homeownership and lending;[52] overviews of the data and methodology used in this analysis; and a discussion of the results of the quantitative analysis, with a focus on three models of Connecticut's geographic marketplace that were developed in Section 2.

6.1 LITERATURE REVIEW

There is a history of direct and indirect discrimination in housing markets, especially for Black homeowners. This included federal policies (by, for example, the Federal Housing Administration and the Home Owners Loan Corporation) that encouraged development of single-family homes in new suburbs (aided by, for example, the "redlining" of specific neighborhoods with significant minority populations) and private sector actions, such as neighborhood-level housing "covenants" that limited resale of the property to White families only (Bluestone, Stevenson, & Williams, 2008; Vigdor, 2009). These practices have been outlawed (either through legislation or the courts) over time, especially with the introduction of the Federal Equal Credit Opportunity Act (ECOA) of 1976, which outlawed lender discrimination on the basis of "race, color, religion, national origin, sex, marital status, or age of an applicant in any aspect of a credit transaction" (Ladd, 1982). However, there continues to be evidence of disparate treatment in the housing market, with major banks having to pay penalties for bias in mortgage writing (Savage, 2012). Moreover, studies reviewed for this analysis found continued disparities by race and gender in various aspects of homeownership and mortgage lending.

51 See Section 3: Disparities in Business Formation and Section 5: Disparities in Credit Access for additional discussion about the role of credit in entrepreneurship.

52 Disparity studies in other states have found disparities in homeownership and home lending in their respective geographic marketplaces (see, for example, BBC Research and Consulting, 2011, which was conducted on construction and related industries in the Portland, Oregon, area).

6.1.1 Disparity in Homeownership

In a study of twentieth century housing patterns, Collins and Margo (1999) found that Blacks were initially 20% less likely to own houses than Whites, but, beginning in the 1940s, there was an increase in Black homeownership, mortgage holdings, and home value. Though their results indicate a general narrowing of the Black-White homeownership gap, there is no accounting for overall evolution of Black wealth and family structure relative to Whites, fair housing legislation, and other more localized market characteristics.

Boehm and Schlottmann (2004) studied the theory that people transition from being renters to homeowners over their life cycle. The authors found evidence that minority households, across all income bands, were slower to achieve homeownership, less likely to move up the "housing hierarchy" (attaining increasing homeownership), and were more likely to return to renting. Although income and education were found to be strong predictors of homeownership, the disparity persisted even for high- income minority families who were 20% less likely to obtain homeownership than high-income non-White families.[53] They also found that the likelihood of homeownership declines with minority status, age, and "single status," especially for female heads of household (Boehm & Schlottmann, 2004, p. 122; see also Williams, 2015).

There have also been considerable gains in Hispanic homeownership, but a 26% gap remains in Hispanic and non-Hispanic homeownership rates (Cortes et al., 2007). McConnell (2013) analyzed this further by assessing whether this gap was due to the burden of housing cost relative to income and explored whether nativity and immigrant status had any bearing on this burden of housing cost.[54] Ultimately, unauthorized Latino immigrants experienced higher cost burdens relative to authorized Latino immigrants and other minority groups, even controlling for assimilation and income.[55]

The literature on female homeownership is much more limited and tends to be more dated. Burgess (1980) is typical, with a focus on both income differentials between men and women and a short discussion of possible gender discrimination and effects of the Fair Housing Act and the Equal Credit Opportunity Act in the 1970s. Haurin and Kamara (1992) also focus on gender differences in homeownership during this time period and found an increase in female ownership; however, because single male homeownership rates also increased, they believe structural economic changes were a more likely cause than policy decisions that made credit more accessible.

6.1.2 Disparity in Mortgage Lending

Evaluating disparities in mortgage lending itself has proven complex, with problems concerning omitted variables and the need to control for creditworthiness of loan applicants, loan institution characteristics, and factors affecting lender decisions.[56] In supplementing Home Mortgage Data Disclosure Act (HDMA) data with lender surveys, Munnell et al. (1996) found

53 Similar disparities persisted in probability of progressive home ownership, though Loving, Finke, and Salter (2011) found a dissimilar trend in accumulation of home equity, with wealthier Blacks able to avoid negative race effects.

54 For further exploration of immigrant status and homeownership, see Borjas (2002) and Coulson (1999).

55 The housing cost disparity between Latinos of different nativity and legal status was negligible.

56 Haurin, Herbert, and Rosenthal (2007) theorize that discrimination in the mortgage loan market is a factor of credit rationing. Based on Stiglitz and Weiss (1981), they assumed that lenders will seek to subsidize their risk through the interest rate of loans. All else equal, they assume that since lenders are risk averse, they will use race and ethnicity as predictors of risk, thus differentially applying interest rates to subsidize that risk.

that the ratio of loan denials for minority and White applicants with the same characteristics was 1.8 denials for minorities for every one denial for White applicants. Minority status was found to significantly increase the probability of denial across lender size and type even after holding financial factors constant and making the probability of denial a function of obligation ratios, wealth variables, and credit histories (see also Charles & Hurst, 2002).[57]

Bostic (1996) found two deciding factors in mortgage lending that have differential effects for White and minority applicants. White applicants tend to benefit from the application of debt-to income ratio requirements while minorities benefit from loan-to-value ratio requirements. Moreover, the effect was only observed for lower income minorities. Cheng, Lin, and Liu (2015) investigated the likelihood that Black applicants will be charged higher interest rates than their White counterparts. They found that, on average, Blacks pay 29 basis points more than comparable White buyers, with gaps being largest for Black women. Younger, less educated, and less creditworthy borrowers also face differential interest rate treatment.[58]

Yinger (1996) asserted that if this differential treatment based on credit worthiness was a demonstration of risk aversion, it should reduce the likelihood of default such that minorities default less than or equal to similarly creditworthy Whites. However, the distribution of creditworthiness was not equal among minorities and Whites, and, as a result, default rates at all levels of credit worthiness (*ceteris paribus*, interest rate differentials) indicated that minorities must meet a higher standard to qualify for loans and pay higher interest rates for those loans. Yinger argued that these differentials are implicitly discriminatory.[59] The author's findings support the theory that credit lenders make their decisions considering unobserved credit characteristics.[60]

Most of the research on disparities in mortgage lending focus on race rather than gender, as in studies of homeownership. Of the research that has been done, Ladd (1982) analyzed gender discrimination by mortgage lenders in the years immediately following the passing of ECOA. In her analysis of a series of New York and California marketplaces, she found that married, female sole applicants applying without a husband as a co-applicant were more than twice as likely to be denied mortgage credit as male-female (of non-childbearing age) co-applicants. Less statistically significant results indicated that lenders could have also discriminated against unmarried, older women. However, there was little evidence of statistically significant or sustained differential treatment of women applicants but rather a bias towards male-female married applicants.[61] Other studies (Robinson, 2012; Haurin & Kamara, 1992) found that motherhood, marital status, and income all posed barriers to homeownership for women but, when tested empirically, a residual unexplained disparity remained.

57 Charles and Hurst (2002) found that Black mortgage applicants were 73% more likely than Whites to be rejected (controlling for credit and demographics). Based on their findings, they hypothesized that this unexplained portion of the application gap was due to Blacks self-selecting out of applications because they anticipated rejection. Munnell et al. (1996) also discussed the possibility that disparities in the mortgage market might be due to minorities self-selecting out of the process.

58 See also Boehm and Schlottmann (2007).

59 See also Han (2004).

60 This also provides support for the approach of the Munnell et al. (1996) study.

61 Testing for more subtle forms of discrimination such as interest rates, maturity periods, income discounting, and loan-to-value ratios showed that female sole applicants were charged higher interest rates than equally comparable male-female applicants in three out of four marketplaces; lenders had a tendency towards underappraisal of properties female sole applicants were looking to purchase; and income discounting had adverse effects for both male and female sole-applicants over couples.

6.1.3 Role of Homeownership in Business Formation

Homeownership and the access to it is important for understanding business formation and availability because housing is often a household's largest asset. Owning a home offers access to equity that can be drawn on by individuals trying to start (or maintain) a business.[62] The primary importance of homeownership for small business formation is that it allows entrepreneurs to use their homes as collateral to, for example, access business loans or other personal lines of credit to support their businesses (see, for example, Corradin & Popov, 2013). Personal wealth, including home equity, is frequently included among the positive factors contributing to an individual's self-employment.[63] This is especially important because, as discussed in Section 5: Disparities in Credit Access, studies have reported that entrepreneurs typically face difficulty raising capital (Blanchflower & Oswald, 1998).

Increased home equity enables entrepreneurs to borrow against the value of their property and increases the likelihood that they will enter self-employment or remain self-employed. Corradin and Popov (2013) modelled career choice given liquidity constraints using data from the Survey of Income and Program Participation from 1996 to 2006 and found that a 10% increase in home equity raises the probability of transition to entrepreneurship by 14%. Further, there is also an increase in entrepreneurship when homeowners anticipate an increase in equity. Schmalz, Sraer, and Thesmar (2013), meanwhile, find a positive relationship between the value of housing as collateral and the likelihood of the homeowner becoming an entrepreneur (see also Fairlie & Krashinsky, 2012; Decker, 2015).

Moreover, Bostic (2004) found that deteriorations in credit quality over time accrued mainly to renters, implying that homeowners had greater leverage to accumulate wealth. Beyond minority or low-income status, the authors suggested that being a renter could preclude one from attaining the financial stability necessary to qualify for homeownership. This inference has significant policy implications because these populations therefore face greater challenges to wealth accumulation, higher housing cost burdens, and are exposed to more risk (in terms of mortgage terms and rates) when they finally enter the housing market. Minorities were also exposed to more risk in the housing crisis during the early 2000s through lending discrimination (subprime loans, etc.) and were also disproportionately foreclosed on by lenders; as a result, minority homeowners lost a greater proportion their net worth (Williams, 2015).

The importance, then, of access to homeownership is that it provides a readily available and accessible asset that can serve as a source of liquidity with which entrepreneurs can start their businesses or which they can rely on for existing businesses. Therefore, the next step in this analysis is to determine if minorities and women in the three geographic marketplace approximations have lower rates of homeownership and home lending.

6.2 DATA

The data used in this chapter were obtained from two sources: 1) the Integrated Public Use Microdata Series (IPUMS-USA) for the 2008-2015 American Community Survey five-year

62 However, homeownership or mortgage debt can also make entrepreneurship more risky for those with unstable incomes (Bracke, Hilber, & Silva, 2013).

63 See, for example, Holtz-Eakin et al. (1993) or Evans and Jovanovic (1989). For more information on the importance of credit for small and new businesses, see Section 5: Disparities in Credit Access and Section 3: Disparities in Business Formation.

samples (Ruggles et al., 2010) and 2) Home Mortgage Disclosure Act (HMDA) flat files from 2012 - 2014. As discussed in Section 4: Disparities in Earnings, the five-year IPUMS-USA data contains more than 15 million records for the United States, and 178,763 records for individuals in Connecticut. As a microdata set, each line of the IPUMS data represents an individual's specific characteristics, rather than an aggregation of the data.

The HMDA data files were retrieved from the website of the Federal Financial Institutions Examination Council (FFIEC),[64] a federal body that prescribes standards for consistent analysis of financial institutions for federal banking oversight bodies. As part of the HMDA, financial institutions above an asset threshold have to record details about all home mortgage applications including the results; this information is submitted annually to the FFIEC. Data reported on include: type and purpose of the loan; the loan amount; the income of the borrower(s); and the race, ethnicity, and gender of the borrower(s). Moreover, if the loan was denied, up to three reasons must be provided for the denial. Because data are collected on all mortgage applications, there are more than 47.5 million records for the three-year period examined in this section.

6.3 METHODOLOGY

Based on the review of the literature and the data available, disparities in homeownership and home lending in the geographic marketplace approximations were assessed using separate methodologies. First, to understand disparities in homeownership, the IPUMS data were examined using descriptive statistics to compare female and minority ownership rates and home values. T-tests were then used to determine if the differences between female and minority homeownership and home values were statistically different from those of males and non-minorities, respectively. It should be noted that these findings should only be used to understand whether a disparity exists; if disparities do exist, these findings would not explain what caused them.

Second, to examine disparities in home lending practices, a linear probability model was developed to measure differentials in the probability of loan denial for minorities and women. The dependent variable in this analysis of the HDMA data was a dichotomous variable where a value of "1" represented the loan denial and a "0" indicated approval.[65]

As income and loan amounts were established in the literature as considerations for an unbiased loan decision, income and loan amounts were broken into quintiles and included in the model.[66] The HMDA measurement comparing census tract to metropolitan statistical area (MSA) median income was included as a proxy control for neighborhood quality while total population in the census tract controlled for neighborhood density. State fixed-effects were also included to capture statewide homogeneity in home lending. Although the HMDA data did not contain a direct measure of an individual's credit score, an interaction term between each of

64 The data were retrieved from https://www.ffiec.gov/hmda/hmdaflat.htm.

65 Loan approval included both mortgages that were originated as well as those that would have been approved but were not accepted by the seller.

66 The highest income quintile (Q5) includes mortgage applicants with incomes in the highest 20%; the lowest income quintile (Q1) represents the lowest-income applicants and is the reference group for the other income quintiles.

the income quintiles and minority status was used as a suitable proxy.[67] To the extent that these interactions captured demographic heterogeneity in credit worthiness, the findings control for differences in lender expectations about default. Additionally, sole applicant status was included along with an interaction with minority status to control for differences across these groups.[68]

6.4 FINDINGS

The findings on homeownership rates, average home values, and probability of mortgage denial all demonstrate that most minority groups experience significant disparities in homeownership and lending, although these disparities differ slightly depending on the race or ethnicity of the individual. Disparities in homeownership rates and average home values followed by disparities in probability of mortgage denial will be discussed.

6.4.1 Homeownership Findings

Homeownership rates by gender, race, and ethnicity are shown in Table 6.1 for the three geographic marketplace approximations. In all three approximations, White and non-Hispanics/Latinos have higher rates of homeownership than minorities, and these differences are statistically significant at the 99% level. The difference between male and female homeownership rates is much smaller.

TABLE 6.1: PERCENTAGE OF POPULATION OWNING OR BUYING A HOME

		Connecticut	Regional	United States
Gender	**Male**	73.0%	64.1%	67.6%
	Female	73.9%	65.0%	69.9%
Race	**White**	79.5%	72.2%	73.7%
	Black	44.0%	37.8%	46.9%
	Asian	64.8%	56.3%	64.9%
	Native American	47.7%	47.9%	59.3%
	Multi-Racial	57.9%	45.4%	57.5%
	Other Race	32.3%	26.7%	47.1%
Hispanic	**Not Hispanic/ Latino**	77.2%	68.8%	71.3%
	Hispanic/ Latino	43.2%	33.2%	53.2%
Observations		72,273	621,697	6,210,827
Note: For working age population (25-55 years old).				

67 See also Ards and Myers (2001) on evidence of differential treatment of Blacks and Whites in the credit market as well as differential engagement in credit markets and Yinger (1996) for default rates and distribution of creditworthiness across minority groups and income levels.

68 See Boehm and Schlottmann (2003, p. 122) and Ladd (1982) for evidence of differential treatment of minority and female sole-applicants.

The average home values by gender, race, and ethnicity are presented in Table 6.2. While Hispanic/Latino homeowners had lower average home values, these differences were significant at the 99% level for both the United States and the Connecticut marketplaces, but not in the Regional marketplace. In all three geographic marketplaces, those of Asian or Pacific Islander descent had the highest average home values, while Black homeowners had the lowest average home values in Connecticut; Native Americans had the lowest average home value in the Regional and United States marketplaces. The difference in average home values for non-minority and minority homeowners was statistically significant in the three geographic marketplaces.

TABLE 6.2: AVERAGE HOME VALUES

		Connecticut	Regional	United States
Gender	**Male**	$419,462	$385,327	$262,152
	Female	$425,937	$389,824	$265,820
Race	**White**	$435,643	$380,566	$262,191
	Black	$262,627	$368,244	$189,782
	Asian	$440,969	$524,266	$433,262
	Native American	$277,686	$248,128	$161,534
	Multi-Racial	$334,476	$369,287	$276,830
	Other Race	$284,107	$367,170	$228,845
Hispanic	**Not Hispanic/ Latino**	$429,244	$387,526	$267,943
	Hispanic/ Latino	$330,397	$389,869	$231,622
Observations		53,095	401,419	4,271,612

Note 1: For working age population (25-55 years old).
Note 2: Restricted to homeowners.

These findings demonstrate that there are disparities in the rates of homeownership and home values, but the causes for these ownership patterns cannot be determined from these data or findings. Other factors influence different rates of homeownership and home values, including home location and size as well as the characteristics of the buyers. Rather, these findings are important to highlight the difference in equity that homeownership represents and that could be drawn on to start or support a small business.

6.4.2 Home Lending Findings

As previously discussed in this section, the literature also finds evidence that minorities and women face a disparity in home lending, especially in the rates of mortgage loan denial. Therefore, the probability of mortgage denial is also examined, building on models presented in the literature. Assuming lending decisions are made solely on the basis of income and other credit-based, market-based, or purpose-based factors, these factors should fully predict an individual's likelihood of being denied for a home mortgage. To the extent that these factors fully capture all observable characteristics that are legally under consideration by the lender, an individual's minority status and gender should not have a statistically significant effect on the denial rate.

The first step in this analysis was to develop a model of home denial, with the loan denial as the dependent variable. The coefficient on the variable of interest in each of the estimates can be interpreted as the percentage point difference in the likelihood that a minority (either female or a racial/ethnic minority) is denied for a home mortgage relative to a member of the omitted group (either male or non-minority applicants). Results are shown in Table 6.3. The first (1) specification includes a limited number of control variables including the presence of a co-applicant, the amount of the loan, state fixed-effects, and year fixed-effects. The other specifications in the table add variables that control for an individual's level of income, interactions for income with gender and race, population, and area median income. These controls are introduced sequentially across specifications (2) to (5) of Table 6.3, but the fifth (5) specification will be used for the remainder of the analysis.[69]

TABLE 6.3: LINEAR REGRESSION FOR PROBABILITY OF LOAN DENIAL IN THE UNITED STATES FOR THE PURCHASE OF OWNER OCCUPIED HOUSING[70]

LHS: Loan Denial	(1)	(2)	(3)	(4)	(5)
Female	0.03***	0.03***	0.04***	0.04***	0.04***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Minority	0.07***	0.06***	0.08***	0.08***	0.08***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Income Q2		-0.07***	-0.07***	-0.07***	-0.07***
		(0.00)	(0.00)	(0.00)	(0.00)
Income Q3		-0.09***	-0.08***	-0.08***	-0.08***
		(0.00)	(0.00)	(0.00)	(0.00)
Income Q4		-0.11***	-0.10***	-0.10***	-0.10***
		(0.00)	(0.00)	(0.00)	(0.00)
Income Q5		-0.13***	-0.12***	-0.12***	-0.11***
		(0.00)	(0.00)	(0.00)	(0.00)
Sole Applicant x Demographics+	X	X	X	X	X
Income x Demographics++			X	X	X
Population				X	X
Income (Tract to MSA)					X
Loan Amount+++	X	X	X	X	X
State FE	X	X	X	X	X
Year FE	X	X	X	X	X
Observations	9,142,931	9,142,931	9,142,931	9,142,931	9,142,931

+All specifications also include an interaction between 'Sole Applicant' and the demographic variables.
++Specifications (3)-(5) also include an interaction between the dichotomous variables for quintiles of applicant income and the demographic variables.
+++Loan amount was broken into quintiles at the national level and included as four dichotomous variables with the lowest quintile being omitted.
Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance.
Note 2: Robust standard errors are contained in parentheses.
Note 3: The findings are robust to using a logistic regression rather than a linear probability model. See Appendix 6B for estimates with logit regression.

69 This series of estimates for loan denial with dummy variables for each minority group is included in Appendix 6A.

70 For more information on how to interpret the results as presented in the Home Lending Findings Section, see Appendix A.

The full model is used in Table 6.4 to examine the likelihood of loan denial for women and minorities in the three geographic marketplaces. In all marketplaces, minorities face a significantly higher likelihood of getting denied for a home loan. The largest disparity is in the Connecticut marketplace, where minorities are 11 percentage points more likely to be denied for a mortgage relative to non-minority applicants. Women face a higher probability of loan denial in the United States (4 percentage points), while the probability for women in the Connecticut marketplace is not statistically significant.

TABLE 6.4: LINEAR REGRESSION FOR PROBABILITY OF LOAN DENIAL ACROSS MARKETPLACE GEOGRAPHIES FOR THE PURCHASE OF OWNER-OCCUPIED HOUSING

LHS: Loan Denial	Connecticut	Regional	United States
Female	-0.01	0.01***	0.04***
	(0.01)	(0.00)	(0.00)
Minority	0.11***	0.09***	0.08***
	(0.01)	(0.00)	(0.00)
Income Q2	-0.10***	-0.08***	-0.07***
	(0.01)	(0.00)	(0.00)
Income Q3	-0.13***	-0.11***	-0.08***
	(0.01)	(0.00)	(0.00)
Income Q4	-0.14***	-0.14***	-0.10***
	(0.01)	(0.00)	(0.00)
Income Q5	-0.16***	-0.15***	-0.11***
	(0.01)	(0.00)	(0.00)
Observations	87,751	643,836	9,142,931

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: The findings are robust to using a logistic regression rather than a linear probability model. See Appendix 6B for estimates with logit regression.
Note 4: All specifications include additional controls for sole applicant interacted with demographics, income quintiles interacted with demographics, population, the ratio of income in the census tract of the home to income in the MSA, loan amount, year fixed-effects, and state fixed-effects (when applicable).

Table 6.5 presents estimates of the disparity in the likelihood of loan denial across the three geographic marketplaces with the results provided by race and ethnicity (rather than as a minority group). With the exception of Asian residents in the Regional marketplace, all minority groups face an increased possibility of loan denial in the three marketplaces. Native American mortgage applicants face the largest probability of denial compared to White applicants; they are 9 percentage points more likely to be denied in Connecticut and 6 percentage points more likely to be denied in the Regional and United States marketplaces. Black applicants have a significant and substantial probability of denial in all marketplaces, with a probability of denial 7 percentage points higher than Whites in the Connecticut and United States marketplaces. Hispanics also had significant probabilities of denial, although the probabilities were smaller than for Black and Native American applicants.

TABLE 6.5: LINEAR REGRESSION FOR PROBABILITY OF LOAN DENIAL ACROSS MARKETPLACE GEOGRAPHIES, LOANS ISSUED FOR THE PURCHASE OF OWNER OCCUPIED HOUSING

LHS: Loan Denial		Connecticut	Regional	United States
Female		-0.01	0.01***	0.04***
		(0.00)	(0.00)	(0.01)
Minority Status	**Black**	0.07***	0.06***	0.07***
		(0.02)	(0.01)	(0.00)
	Asian	0.01	-0.01	0.01***
		(0.02)	(0.01)	(0.00)
	Native American	0.09**	0.06***	0.06***
		(0.04)	(0.01)	(0.00)
	Multi-Racial	0.04	0.01	0.03***
		(0.03)	(0.01)	(0.00)
	Hispanic	0.04*	0.02***	0.01***
		(0.02)	(0.01)	(0.00)
Income Q2		-0.10***	-0.08***	-0.07***
		(0.00)	(0.00)	(0.01)
Income Q3		-0.13***	-0.11***	-0.08***
		(0.00)	(0.00)	(0.01)
Income Q4		-0.15***	-0.14***	-0.10***
		(0.00)	(0.00)	(0.01)
Income Q5		-0.16***	-0.15***	-0.11***
		(0.00)	(0.00)	(0.01)
Observations		87,751	643,836	9,142,931

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance.
Note 2: Robust standard errors are contained in parentheses.
Note 3: The findings are robust to using a logistic regression rather than a linear probability model. See Appendix 6B for estimates with logit regression.
Note 4: All specifications include additional controls for sole applicant interacted with demographics, income quintiles interacted with demographics, population, the ratio of income in the census tract of the home to income in the MSA, loan amount, year fixed-effects, and state fixed-effects (when applicable).

6.5 SUMMARY

Disparities in homeownership were examined in this section since many entrepreneurs rely on equity built through homeownership to start or maintain their businesses (see, for example, Fairlie & Krashinsky, 2012; Corradin & Popov, 2013). This is because homeownership provides a sizable asset from which entrepreneurs or business owners can draw, especially when access to other credit is limited, as discussed in Section 5: Disparities in Credit Access. If minorities and women have more limited access to or rates of homeownership than non-minorities and men, their likelihood of entering self-employment is also lower.

The findings presented indicate that minorities in Connecticut, Regional and United States geographic marketplaces continue to experience lower levels of homeownership and lower average home values than non-minorities. Moreover, minorities also tend to face a higher probability of their applications for home mortgages being denied than non-minority applicants even when controlling for many factors that may influence lending decisions. These findings indicate that, in the three geographic marketplace approximations, minorities face barriers to wealth accumulation and in accessing this type of credit. Both of these barriers are expected to impact the ability of these individuals to form or sustain their own businesses.

7.0 DISPARITIES IN BUSINESS PERFORMANCE

The prior sections on economy-wide disparities by race, ethnicity, and gender have focused on rates of business formation and potential contributors to business formation including wages and earnings, access to credit, and homeownership and home lending. These analyses found disparities in all facets of business formation. The disparity in the earnings of self-employed women and minorities were the largest in terms of magnitude. Examining whether disparities exist with regard to new entrepreneurs is an important step in identifying whether there are economy-wide disparities in business ownership and competitiveness. However, ongoing performance is an equally important contributory factor.

This section explores whether disparities in business performance exist in the geographic marketplace. It includes a brief review of the empirical literature on race and gender disparities in business performance;[71] overviews of the data and methodology used in this analysis, both of which are consistent with best practices for this part of a disparity study; and the results of the quantitative analysis.

7.1 LITERATURE REVIEW

The literature has found that disparities exist in the performance of minority- and women-owned businesses (as measured by profits, receipts, or numbers of employees) relative to non-minority- and male-owned businesses, respectively. Using Census of Business Owners data from 1982-1986, Bates (1989) found that Black male-owned firms had the highest discontinuance rate (29.6%) compared to non-minority- (26.0%) and Asian male-owned firms (21.7%). Bates also found that Black-owned businesses were more likely to be small and have owners with lower levels of educational attainment. However, more successful Black-owned firms, defined as those with sales of $50,000 or more, had a slightly higher survival rate than non-minority firms.

In an earlier paper, Bates (1985) noted this human capital disadvantage in his assessment of minority business viability. In a regression of human capital and firm characteristic variables on return on investment, he found that minorities with above average human capital inputs earned higher profits than their minority business owner peers. He argued that these minority business owners were more educated and, as a result, were able to expand into industries with higher income potentials.

Using international Global Entrepreneurship Monitor data, Kollinger and Minniti (2006) found that Blacks were more than twice as likely as Whites to attempt to start a business. They were also, overall, the racial group with the highest propensity to start a business. However, the distribution of established business owners also revealed a statistically significant disparity in the percentage of established Black business owners compared to Whites, indicating higher failure rates beyond the initial start-up stages. Black business owners also tended to be younger and less educated.

71 Disparity studies in other states have found disparities in business performance by race and gender in their respective geographic marketplaces (see, for example, NERA, 2010, which was conducted on contracting in the state of New York).

Fairlie and Robb (2007) explored whether differences in work experiences and familial self-employment contributed to the disproportionate failure of Black-owned businesses. Black business owners were approximately 6.5% less likely than White business owners to have worked for a self-employed family member and 0.3% less likely to have inherited a business.[72] They found that racial differences in having a self-employed family member explained 8.9% of the Black-White gap in business closure rates while work experience in a family member's business explained 5.6%-11.6% of the Black-White gap in all business outcomes except profits.

Much of the literature supports Fairlie's (2004) contention that sustaining self-employment among minorities is a bigger challenge than low self-employment rates. Ahn (2011) observed that, in a 19-year observation window, both Blacks and Hispanics experienced less self-employment continuity than Whites, since an average spell of self-employment for Whites lasted 51 months compared to 36 and 39 months for Blacks and Hispanics, respectively. Moreover, both Hispanic and Black workers were more than twice as likely as White workers to leave self-employment for unemployment.[73] Ahn also found that the Black-White and Hispanic-White gap in predicted probability of surviving self-employment for one year (0.20 and 0.22 percentage points, respectively) is statistically significant and sustained over time.

The literature also generally indicates disparities in the performance of female-owned businesses relative to those of male-owned businesses. While Kalleberg and Leicht (1991) found no disparity in business outcomes between genders across industries, organizational structures, and owner attributes, other research reviewed contradicted their findings. For example, women's businesses are more likely to be smaller than men's (Aldrich, 1989; Hisrich, 1989; Loscocco & Robinson, 1991); furthermore, to attain the same average level of sales as a man's business, a female-owned business would have to grow to more than twice the size of a male-owned business.[74] Loscocco et al. (1991) also outlined trends indicating women business owners face a disadvantage relative to men, including the fact that female-owned businesses had less financial success than male-owned businesses (controlling for structural and personal variables; see also Fairlie and Robb, 2009; Rosa, Carter, & Hamilton, 1996). Beyond human capital factors and previous experience, evidence that female-owned businesses had lower sales than male-owned businesses of comparable size indicated structural disadvantages for female-owned businesses.

Cooper, Woo, and Dunkelberg (1989) found that, for young firms, size had a significant influence on growth and other business outcomes.[75] Smaller firms had higher percentage increases in sales, higher percentage increases in employment, and hired more employees over the course of their first year than businesses that began with more employees. In addition, while firms that were initially larger downsized over the course of the first year of operations, they tended to persist into the second year, while smaller ventures failed at twice the rate of larger

72 Results of linear regression revealed that, in general, the probability of business closure is 0.042 percentage points lower if the business owner worked for a family business while the probability of "large" profits is 0.032 percentage points higher. In each case the effect of previous work in a family business explained 15-26% of the sample mean for closure and profit.

73 All workers were found to be more likely to leave self-employment for wage work, indicating possibly better work opportunity.

74 Loscocco et al. (1991) found that for women to achieve the same structural positions as men, their businesses would need to generate an additional $1,293,600 million in sales, still nearly $1 million less than the average sales of a male-owned company; to generate the same level of sales as an average male-owned company, a woman's business would have to grow to 34 employees (the average size of a male-owned business is 14 employees).

75 "Young" firms were defined in the data as those in or around their first year of business.

ventures in the second year of the study. One possible reason for the higher success rate of larger firms is that they were more likely to have greater human capital resources (managerial experience, advisors, business classes, age, etc.) than smaller firms.

7.2 DATA

The data in this section were obtained from the US Census Bureau Survey of Business Owners (SBO) Public Use Microdata Sample (PUMS) from 2007.[76] The SBO is conducted every five years and collects information on both business and business ownership characteristics. The PUMS contains over 2 million records for businesses in the United States, and 29,918 records for businesses in Connecticut. As a microdata set, each line of the PUMS data represents a business' specific characteristics, rather than an aggregation of the data.

The Census Bureau takes several steps to maintain the anonymity of data in the SBO PUMS, some of which impact this analysis. First, the PUMS data from Rhode Island were combined with that from Vermont, since both states had under a minimum threshold of weighted businesses in this survey. There were three other such combinations (Alaska and Wyoming; Delaware and Washington, DC; and North Dakota and South Dakota). Second, PUMS receipts, payroll, and employment data were adjusted by a disturbance term in order to protect confidentiality. The PUMS data also does not include publicly-owned businesses and those for which owner characteristics including race and gender could not be easily discerned.

7.3 METHODOLOGY

Linear regression was used to evaluate if there were statistical disparities in business performance by race and gender in the three models of Connecticut's geographic marketplaces that were developed in Section 2. The analysis was conducted with two different dependent variables: the natural logarithms of number of employees and firm receipts. In this framework, the coefficient on categorical variables such as race and gender can be interpreted as the percent deviation from the omitted group.

For both analyses in this section, control variables were added to the model that included:

- *Business characteristics*: age of business; industry; and if business operated less than 12 months per year, less than 40 hours per week, or as a seasonal business.
- *Business management characteristics*: the number of owners; if the business was family owned; and if at last one business owner was a founder of the business, purchased the business, received the business as a gift or inheritance, manages the business, or has experience in self-employment.[77]

76 The data for these analyses were retrieved from http://www.census.gov/econ/sbo/pums.html?2007. The PUMS 2012 SBO data were scheduled for release in Spring 2016, and so were not available for use in these analyses.

77 The SBO only provides information for up to four owners; for firms with more than four owners, firm characteristics such as minority or female ownership are weighted estimates based on the owners for which the information was collected. Using this weighted ownership, firms were identified as minority- or female-owned if at least 51% of the business was held by an owner identified as a minority or woman.

7.4 FINDINGS

The findings for both business employment and business receipts indicate that minority- and female- owned businesses are disproportionately less successful in terms of business performance. Differences in business performance vary in the three geographic marketplaces and based on the race, ethnicity, and gender of the owners. The analysis of employment will be discussed first, followed by an analysis of business receipts.

7.4.1 Findings on Establishment Employment

The first step in this analysis was to develop the model using all businesses in the United States. Various controls were introduced into the model in stages to identify their impact on the overall model fit. The results are shown in Table 7.1. The first specification (1) controls for owner age and education as well as business location. The second specification (2) includes additional controls for business age and primary industry as well as a variable indicating whether the business operated less than full-time. The final specification (3) includes variables representing the number of owners of the business, how the business was acquired, and if any of the owners had previous self-employment experience. The fully developed model outlined in third specification is used for the remainder of the analysis.[78]

TABLE 7.1: AVERAGE ESTABLISHMENT EMPLOYMENT IN THE UNITED STATES[79]

LHS: Log Employment	(1)	(2)	(3)
Female	-0.20***	-0.11***	-0.04***
	(0.01)	(0.00)	(0.00)
Minority	-0.27***	-0.19***	-0.13***
	(0.01)	(0.01)	(0.01)
Age of owners	X	X	X
Education FE	X	X	X
State FE	X	X	X
Business characteristics		X	X
Business management			X
Observations	645,379	619,495	610,526

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: See Section 7.3 for more information on the control variables.

The findings in Table 7.2 show that minority-owned businesses have 33% fewer employees than non-minority-owned businesses in Connecticut. This is 20 percentage points larger than the size difference in the United States and 11 percentage points larger than in the Regional marketplace. It is also larger than the differences between female- and male-owned businesses in all three marketplaces. Female-owned businesses in Connecticut had 8% fewer employees in Connecticut and 4% fewer in the United States. In addition, the coefficient estimates for minority status were found to be statistically significant across all three geographies.

78 This series of wage estimates with separate dummy variables for each minority group are provided in Appendix 7A. Robustness tests with sample weights are included in Appendix 7B.

79 For more information on how to interpret the results as presented in the Findings Section, see Appendix A.

The coefficients for female status were significant in the Connecticut and United States marketplaces.

TABLE 7.2: AVERAGE ESTABLISHMENT EMPLOYMENT IN CONNECTICUT, REGIONAL MARKET AND UNITED STATES

LHS: Log Employment	Connecticut	Regional	United States
Female	-0.08**	0.01	-0.04***
	(0.04)	(0.02)	(0.00)
Minority	-0.33***	-0.22***	-0.13***
	(0.05)	(0.02)	(0.01)
Observations	8,383	58,587	610,526

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: See Section 7.3 for more information on the control variables.

Table 7.3 illustrates that the difference in number of employees varies by race and ethnicity group. Native American-owned businesses in Connecticut have the largest difference in business size compared to White-owned businesses. They have 56% fewer employees, and this coefficient is statistically significant. In contrast, Native American-owned businesses have more employees than White-owned businesses in the Regional and United States marketplaces, although neither of these estimates was statistically significant. Asian-owned businesses were also much smaller than White-owned businesses, especially in Connecticut. In the state, Asian-owned businesses were 48% smaller, and Asian-owned businesses had the largest size differential compared to White-owned businesses in the United States. Black-owned businesses were 21% smaller in Connecticut, 18% smaller in the Regional marketplace, and 7% smaller in the United States. All estimates for Asian- and Black-owned businesses were statistically significant. Hispanic-owned businesses were 8% smaller than non-Hispanic-owned businesses in Connecticut and 9% smaller in the Regional marketplace, although only the latter was statistically significant.

TABLE 7.3: AVERAGE ESTABLISHMENT EMPLOYMENT IN CONNECTICUT, REGIONAL MARKET AND UNITED STATES WITH DETAILED RACE AND ETHNICITY RESULTS

LHS: Log Employment		Connecticut	Regional	United States
Female		-0.08**	0.01	-0.04***
		(0.02)	(0.00)	(0.04)
Minority Status	**Black**	-0.21*	-0.18***	-0.07***
		(0.12)	(0.04)	(0.01)
	Asian	-0.48***	-0.28***	-0.25***
		(0.07)	(0.02)	(0.01)
	Native American	-0.56***	0.10	0.01
		(0.21)	(0.13)	(0.03)
	Multi-Racial	-0.30*	-0.11**	-0.18***
		(0.16)	(0.05)	(0.02)
	Other Race	-0.36	-0.19*	-0.11**
		(0.53)	(0.11)	(0.05)
	Hispanic	-0.08	-0.09***	0.01
		(0.09)	(0.03)	(0.01)
Observations		8,383	58,587	610,526

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: See Section 7.3 for more information on the control variables.

7.4.2 Findings on Establishment Receipts

As with employment, the analysis on establishment receipts begins by developing a model of business performance in the United States and gradually includes the series of controls. The results are shown in Table 7.4. The first specification (1) represents a basic equation, controlling for the age and education of the owners and for the location of the business by state. The second specification (2) includes variables representing the age and primary industry of the business as well as the variables signifying the business operated less than full-time. The final specification (3) includes variables representing the number of owners of the business, how the business was acquired, and if any of the owners had previous self-employment experience. This model is used for the remainder of the analysis of potential disparities in receipts.[80]

80 This series of wage estimates with separate dummy variables for each minority group are provided in Appendix 7C. Robustness tests with sample weights are included in Appendix 7D.

TABLE 7.4: AVERAGE ESTABLISHMENT RECEIPTS IN THE UNITED STATES

LHS: Log Receipts	(1)	(2)	(3)
Female	-1.09***	-0.58***	-0.43***
	(0.00)	(0.00)	(0.00)
Minority	-0.58***	-0.34***	-0.25***
	(0.01)	(0.00)	(0.00)
Age of owners	X	X	X
Education FE	X	X	X
State FE	X	X	X
Business characteristics		X	X
Business management			X
Observations	1,137,707	1,071,837	1,052,453

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: See Section 7.3 for more information on the control variables.

The estimates for the difference in average receipts are shown in Table 7.5. Both female- and minority-owned businesses are smaller than male- and non-minority-owned businesses, as measured by receipts, in all three marketplaces. Female-owned businesses are consistently 42% smaller than male-owned businesses in the Connecticut and Regional marketplaces and 43% smaller in the United States. Minority-owned businesses are 31% smaller in Connecticut, relative to non-minority-owned businesses. They are also 29% smaller in the Regional marketplace and 25% nationally. These estimates are all statistically significant.

TABLE 7.5: AVERAGE ESTABLISHMENT RECEIPTS IN CONNECTICUT, REGIONAL MARKET AND UNITED STATES

LHS: Log Receipts	Connecticut	Regional	United States
Female	-0.42***	-0.42***	-0.43***
	(0.03)	(0.01)	(0.00)
Minority	-0.31***	-0.29***	-0.25***
	(0.04)	(0.02)	(0.00)
Observations	15,037	103,580	1,052,453

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: See Section 7.3 for more information on the control variables.

The estimates for the average establishment receipts also indicated that the size differential in receipts varies by the race and ethnicity groups in the different marketplaces. Black-owned businesses have the largest difference with White-owned businesses in all marketplaces—they are 50% smaller in Connecticut, 48% smaller in the Regional marketplace, and 47% smaller in the United States. Asian-owned businesses were 25% smaller in the Connecticut and Regional marketplaces and 18% smaller in the United States. Businesses identified by owners identifying as multi-racial were 39% smaller in Connecticut, 28% smaller in the Regional

marketplace, and 27% smaller nationally. Hispanic-owned businesses were 15% smaller than non-Hispanic-owned businesses in the Connecticut marketplace, 13% smaller in the Regional marketplace, and 14% smaller nationally. Most of the coefficients for the minority and ethnicity groups were statistically significant, with the exception of Native American-owned business in the Connecticut and Regional marketplaces and, in all marketplaces, businesses owned by individuals identifying as a race other than Black, Asian, Native American, or multi-racial.

TABLE 7.6: AVERAGE ESTABLISHMENT RECEIPTS IN CONNECTICUT, REGIONAL MARKET AND UNITED STATES WITH DETAILED RACE AND ETHNICITY RESULTS

LHS: Log Receipts		Connecticut	Regional	United States
Female		-0.42***	-0.42***	-0.42***
		(0.01)	(0.00)	(0.03)
Minority Status	**Black**	-0.50***	-0.48***	-0.47***
		(0.08)	(0.03)	(0.01)
	Asian	-0.25***	-0.25***	-0.18***
		(0.06)	(0.02)	(0.01)
	Native American	-0.36	-0.07	-0.15***
		(0.25)	(0.11)	(0.02)
	Multi-Racial	-0.39***	-0.28***	-0.27***
		(0.12)	(0.05)	(0.02)
	Other Race	-0.10	-0.03	-0.06
		(0.28)	(0.11)	(0.05)
	Hispanic	-0.15**	-0.13***	-0.14***
		(0.07)	(0.03)	(0.01)
Observations		15,037	103,580	1,052,453

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: See Section 7.3 for more information on the control variables.

7.5 SUMMARY

In addition to the disparities in business formation examined in the other sections, the final step in this phase of the Disparity Study is to explore if there are also disparities in business performance. The literature has consistently shown that both minority- and female-owned businesses tend to be smaller than non-minority- and male-owned firms on a variety of different measures. This is the case even when other relevant business characteristics are held constant among the firms.

The findings presented indicate that, overall, female- and minority-owned firms have fewer employees and smaller total receipts than male- and non-minority-owned firms in Connecticut, the Regional marketplace, and nationally. The differences in number of employees and receipts also vary among the different race and ethnicity groups in the three marketplaces. Moreover, while female-owned businesses are smaller than male-owned businesses on both measures,

with the exception of number of employees in the Regional marketplace, the magnitude of the difference is much greater for receipts than for number of employees. These findings are in keeping with the other economy-wide analyses in this report, which were also found in the earnings of self-employed workers (see Section 4.4.1.2).

Combined with the findings on disparities in business formation (see Section 3.4), the findings presented here indicate that the principal challenge with regard to minority- and female-owned businesses is their ongoing performance, not their formation.

8.0 CONCLUDING REMARKS

The following are the preliminary conclusions with respect to several requirements for a comprehensive disparity study. Consistent with the 2006 recommendations from the US Commission on Civil Rights and the National Cooperative Highway Research Program (NCHRP) "Guidelines for Conducting a Disparity and Availability Study for the Federal DBE Program, 2010", this phase of the Connecticut Disparity Study first developed an approximation of the state's geographic marketplace using available state procurement data on the location of state vendors. From this, three definitions of the state marketplace were developed: the state itself; a regional four-state market consisting of Connecticut plus Massachusetts, New York, and Rhode Island; and the full United States.

Publicly-available data were then used to investigate if economy-wide disparities existed in business formation, earnings, credit access, homeownership and home lending, and business performance. Evidence of disparities were found by race, ethnicity, and gender for the indicators across the marketplaces. The presence of these disparities, moreover, was found to be generally consistent with findings in existing academic literature and in disparity studies from other locations.[81]

The next and final phase of this Disparity Study, Phase 4, is a necessary component in completing a legally defensible disparity study that requires more detailed data on both prime and subcontractors. Assuming that adequate provisions have been made to collect or acquire such data, Phase 4 will include the following:

1. ***Product Market Assessment:*** State procurement by industry will be analyzed to support the availability and utilization analyses. This product market assessment will also help minority and female business owners target their business with the state.
2. ***Availability Analysis:*** A detailed estimate of available minority- and women-owned businesses will be developed based on the state's geographic and product marketplaces. This will be used to evaluate the state's utilization of minority- and women-owned businesses and, if necessary, to develop program goals.
3. ***Utilization Analysis***: The state's use of minority- and women-owned businesses will be analyzed and compared with state procurement in various product markets and by agency.
4. ***Possible Revisions to the Geographic Marketplace Definition:*** Detailed data on prime and subcontractors will be used to review and revise if necessary Connecticut's geographic marketplace developed in Phase 3.
5. ***Revisions to the Examination of Economy-wide Disparities***: The econometric analysis of economy-wide disparities will be revised if the contracting data collected in Phase 4 reveals a substantially different Connecticut geographic marketplace as noted or if the statistical data used in the Phase 3 analysis is updated and available.

81 See, for example, disparity studies on contracting in New York (NERA, 2010) and for the Metropolitan District Commission (Miller[3] Consulting, Inc., 2009), which provides water and sewer services in central Connecticut.

Completion of the Disparity Study will provide the rationale and evidence based on legal requirements as set forth in relevant case law to determine if there is a need for a legislatively mandated minority- and women-owned business enterprise program. Completion of the study will determine whether a program is necessary and, if so, how that program should be structured. The current Set-Aside program goals were established legislatively over thirty years ago and have not been rigorously examined through a disparity study analysis in the intervening years.

It should be noted that, even prior to the completion of this study, the state could undertake the race-neutral policy measures recommended in Phase 1 and Phase 2 of this study. Not only would these measures support the state's minority- and women-owned businesses, but they could also help decrease the magnitude of the economy-wide disparities that were found in this phase of the study.

REFERENCES

EXECUTIVE SUMMARY

Miller3 Consulting, Inc. 2009. Disparity Study Final Report.

NERA Economic Consulting. 2010. "The State of Minority- and Woman-Owned Business Enterprise: Evidence from New York." Prepared for the New York State Department of Economic Development.

3.0: DISPARITIES IN BUSINESS FORMATION

Allen, I. Elaine, Amanda Elam, Nan Langowitz, and Monica Dean. "Global Entrepreneurship Monitor: 2007 Report on Women and Entrepreneurship." London: Global Entrepreneurship Monitor.

Bernhardt, Irwin. 1994. "Comparative Advantage in Self-Employment and Paid Work." The Canadian Journal of Economics 27, no. 2 (1994): 273-289.

Blanchflower, David G. 2008. "Minority Self-employment in the United States and the Impact of Affirmative Action Programs." National Bureau of Economic Research Working Paper 13972.

--- and Oswald, Andrew, J. "What Makes and Entrepreneur?" Journal of Labor Economics 16, no. 1 (1998).

Blanchflower, David G. and Jon Wainwright. "An Analysis of the Impact of Affirmative Action Programs on Self-Employment in the Construction Industry." National Bureau of Economic Research Working Paper 11793.

Borjas, George J. 1986. "The Self-Employment Experience of Immigrants". National Bureau of Economic Research Working Paper 1942.

Caputo, Richard K. and Arthur Dolinsky. "Women's Choice to Pursue Self-Employment: The Role of Financial and Human Capital of Household Members." *Journal of Small Business Management* 36, no. 3 (1998): 8-17.

Devine, Teresa J. 1994. "Characteristics of Self-Employed Women in the United States." Monthly Labor Review. http://www.bls.gov/mlr/1994/03/art3full.pdf.

Evans, David S. and Boyan Jovanovic. "An Estimated Model of Entrepreneurial Choice under Liquidity Constraints." *Journal of Political Economy* 97, no. 4 (1989): 808–27.

Evans, David S. and Linda S. Leighton. "Some Empirical Aspects of Entrepreneurship." *The American Economic Review* 79, no. 3 (1989): 519-535.

Fairlie, Robert W. "The Absence of the African-American Owned Business: An analysis of the Dynamics of Self-Employment." *Journal of Labor Economics* 17, no.1 (1999): 80-108.

---. "Entrepreneurship, Economic Conditions, and the Great Recession." *Journal of Economics & Management Strategy* 22, no. 2 (2013): 207-231.

--- and Bruce D. Meyer. "Ethnic and Racial Self-Employment Differences and Possible Explanations." *The Journal of Human Resources* 31, no. 4 (1996): 757-793.

---. "Trends in Self-Employment among White and Black Men during the Twentieth Century." The Journal of Human Resources 35, no. 4 (2000): 643-669.

Fairlie, Robert W. and Robb, Alicia M. "Why are Black-Owned Businesses Less Successful than White-Owned Businesses? The Role of Families, Inheritances, and Business Human Capital." *Journal of Labor Economics* 25, no. 2 (2007): 289-323.

Feldman, Howard D., Christine S. Koberg, and Thomas J. Dean. "Minority Small Business Owners and Their Paths to Ownership." *Journal of Small Business Management* 29, no. 4 (1991): 12-27.

Georgellis, Yannis, John G. Sessions, and Nikolaos Tsitsianis. "Self-Employment Longitudinal Dynamics: A Review of the Literature." *Economic Issues* 10, part 2 (2005): 51-84.

Holtz-Eaken, Douglas, David Joulfaian, and Harvey S. Rosen. 1993. "Sticking It Out: Entrepreneurial Survival and Liquidity Constraints." National Bureau of Economic Research Working Paper 4494.

Hout, Michael and Harvey Rosen. "Self-employment, Family Background, and Race." *The Journal of Human Resources* 35, no. 4 (2000): 670-692.

---. 1999. "Self-employment, Family Background, and Race." National Bureau of Economic Research Working Paper 7344.

Hurst, Erik and Lusardi, Annamaria. "Liquidity Constraints, Household Wealth, and Entrepreneurship." *Journal of Political Economy* 112 (2004): 319-347.

Kawaguchi, Daiji. 2005. "Negative Self Selection into Self-employment among African Americans." *Topics in Economic Analysis & Policy* 5, issue 1.

Le, Anh T. "Empirical Studies of Self-Employment." *Journal of Economic Surveys* 13, no. 4 (1999): 381-416.

Loftstrom, Magnus and Chunbei Wang. "Mexican-Hispanic Self-Employment Entry: The Role of Business Start-Up Constraints." *The Annals of the American Academy* 613 (2007): 32-46.

Mincer, J. "Intercountry Comparisons of Labor Fforce Trends and of Related Developments: An Overview." *Journal of Labor Economics* 3, no. 1 (1985): S1-S32.

Minniti, Maria and Pia Arenius. 2003. "Women in Entrepreneurship." Paper presented at The Entrepreneurial Advantage of Nations: First Annual Global Entrepreneurship Symposium, United Nations Headquarters, April 29, 2003.

Mora, Marie T. and Alberto Dávila. "Mexican Immigrant Self-Employment Along the U.S.-Mexico Border: An Analysis of 2000 Census Data." *Social Science Quarterly* 87, no. 1 (2006): 91-109.

NERA Economic Consulting. 2010. "The State of Minority- and Woman-Owned Business Enterprise: Evidence from New York." Austin: NERA Economic Consulting.

Ruggles, Steven, J. Trent Alexander, Katie Genadek, Ronald Goeken, Matthew B. Schroeder, and Matthew Sobek. (2010). Integrated Public Use Microdata Series: Version 5.0 [Machine-readable Database]. Retrieved from https://usa.ipums.org/usa/.

Sauer, Robert M. and Tanya Wilson. 2015. "The Rise of Female Entrepreneurs: New Evidence on Gender Differences in Liquidity Constraints." IZA Discussion Paper No. 8981.

Uhlaner, L. M., A. R. Thurik, and J. Hutjes. 2002. "Post-Materialism as a Cultural Factor Influencing Entrepreneurial Activity across Nations." ERIN Report Series Research in Management No. 2002-62-STR.

Verheul, Ingrid, André van Stel, and Roy Thurik. 2003. Explaining Female and Male Entrepreneurship across 29 Countries. Discussion Papers on Entrepreneurship, Growth and Public Policy #0804.

Wong, Yue-Chim. 1986. "Entrepreneurship, Marriage, and Earnings." *The Review of Economics and Statistics* 68, no. 4 (1986): 693-699.

4.0: DISPARITIES IN EMPLOYEE EARNINGS

NERA Economic Consulting. 2010. "The State of Minority- and Woman-Owned Business Enterprise: Evidence from New York." Prepared for the New York State Department of Economic Development.

Altonji, Joseph G. and Rebecca M. Blank. 1999. "Race and Gender in the Labor Market.," in *Handbook of Labor Economics* Vol. 3, eds. Orley Ashenfelter and David Card, 3143-3259. Amsterdam: Elsevier Science B.V.

Arcidiacono, Peter, Patrick Bayer, and Aurel Hizmo. "Beyond Signaling and Human Capital: Education and Revelation of Ability." *American Economic Journal: Applied Economic* 2 (2010): 76-104.

Becker, Gary. 1957. *The Economics of Discrimination*. 2nd ed. Chicago: University of Chicago Press, 1957.

Biddle, Jeff E and Daniel S. Hamermesh. "Wage Discrimination Over the Business Cycle." *IZA Journal of Labor Policy* 2, no. 7 (2010): 1-19.

Blanchflower, David G. 2008. "Minority Self-Employment in the United States and the Impact of Affirmative Action Programs." National Bureau of Economic Research Working Paper 13972.

Blanchflower, David. G and Andrew J. Oswald. "What Makes and Entrepreneur?" *Journal of Labor Economics* 16, no. 1 (1998): 26-60.

Blanchflower, David G. and Chris Shadforth. 2007. "Fear, Unemployment, and Migration." National Bureau of Economic Research Working Paper 13506.

Black, Jane, David de Meza, and David Jeffreys. "House Prices, the Supply of Collateral and the Enterprise Economy." *The Economic Journal* 106, no. 434 (1996): 60-75.

Borjas, George J. and Stephen G. Bronars. 1988. "Consumer Discrimination and Self-Employment." National Bureau of Economic Research Working Paper 2627.

Bound, John and Richard B. Freeman. "What Went Wrong? The Erosion of Relative Earnings and Employment Among young Black Men in the 1980s." *The Quarterly Journal of Economics* 107, no. 1 (1998): 201-232.

Bound, John and Harry J. Holzer. "Industrial Shifts, Skills Levels, and the Labor Market for White and Black Males." *The Review of Economics and Statistics* 75, no. 3 (1993): 387-396.

Bradford, William D. "The 'Myth' That Black Entrepreneurship Can Reduce the Gap in Wealth Between Black and White Families." *Economic Development Quarterly* 28, no.3 (2014): 254-269.

Caputo, Richard K. and Arthur Dolinsky. "Women's Choice to Pursue Self-Employment: The Role of Financial and Human Capital of Household Members." *Journal of Small Business Management* 36, no. 3 (1998): 8-17.

Card, David and Alan B. Krueger. "School Quality and Black-White Relative Earnings: A Direct Assessment." *The Quarterly Journal of Economics* 107, no. 1 (1992): 151-200.

Chay, Kenneth Y. and David S. Lee. "Changes in Relative Wages in the 1980s: Returns to Observed and Unobserved Skills and Black-White Wage Differentials." *Journal of Econometrics* 99 (2000): 1-38.

Couch, Kenneth. "The Improving Relative Status of Black Men." Federal Reserve Bank of San Francisco Working Paper 2004-02.

--- and Mary C. Daly. "Black-White Wage Inequality in the 1990s: A Decade of Progress." *Economic Inquiry* 40, no. 1 (2002): 31-41.

Devine, Teresa J. 1994. "Characteristics of Self-Employed Women in the United States." *Monthly Labor Review*. http://www.bls.gov/mlr/1994/03/art3full.pdf.

Donahue, John J. III and James Heckman. "Continuous Versus Episodic Change: The Impact of Civil Rights Policy on the Economic Status of Blacks." *Journal of Economic Literature* 31 (1991): 1603-1643.

Dunn, Thomas and Douglas Holtz-Eaken. 1996. "Financial Capital, Human Capital, and the Transition to Self-Employment: Evidence from Intergenerational Links." National Bureau of Economic Research Working Paper 5622.

Evans, David S. and Boyan Jovanovic, "An Estimated Model of Entrepreneurial Choice under Liquidity Constraints." *Journal of Political Economy* 97, no. 4 (1989): 808–827.

Fairlie, Robert W. "The Absence of the African-American Owned Business: An Analysis of the Dynamics of Self-Employment." *Journal of Labor Economics* 17, no. 1 (1999): 80-108.

--- and Krashinsky, Harry A. "Liquidity Constraints, Household Wealth, and Entrepreneurship Revisited." *Review of Income and Wealth* 58, no. 2 (2012): 279-306.

Fairlie, Robert W. and Meyer, Bruce D. "Ethnic and Racial Self-Employment Differences and Possible Explanations." *Journal of Human Resources* 31, no. 4 (1996): 757-793.

---. "Trends in Self-Employment among White and Black Men During the Twentieth Century." *The Journal of Human Resources* 35, no. 4 (2000): 643-669.

Fairlie, Robert W. and Alicia M. Robb. "Why are Black-Owned Businesses Less Successful than White-Owned Businesses? The Role of Families, Inheritances, and Business Human Capital." *Journal of Labor Economics* 25, no. 2 (2007): 289-323.

Fryer, Ronald G. Jr., Devah Pager, and Jörg L. Spenkuch. Racial Disparities in Job Finding and Offered Wages. 2011. National Bureau of Economic Research Working Paper 17462.

Gauchat, Gordon, Maura Kelly, and Michael Wallace. "Occupational Gender Segregation, Globalization, and Gender Earnings Inequality in U.S. Metropolitan Areas." *Gender and Society* 26, no. 5 (2012): 718-747.

Hirsch, Barry T. and John V. Winters. "An Anatomy of Racial and Ethnic Trends in Male Earnings In the U.S." *Review of Income and Wealth* 60, no. 4 (2014): 930-947.

Hoffman, Saul D. "Geography and Gender: Variation in the Gender Earnings Ratio across U.S. States." *Social Science Quarterly* 96, no. 1 (2015): 235-250.

Holtz-Eaken, Douglas, David Joulfaian, Harvey S. Rosen. 1993. "Sticking It Out: Entrepreneurial Survival and Liquidity Constraints." National Bureau of Economic Research Working Paper 4494.

Hout, Michael and Harvey S. Rosen. 1999. "Self-Employment, Family Background, and Race." National Bureau of Economic Research Working Paper 7344.

Hurst, Erik and Annamaria Lusardi. "Liquidity Constraints, Household Wealth, and Entrepreneurship." *Journal of Political Economy* 112 (2004): 319-347.

Johnson, Kecia, Jeremy Pais, and Scott J. South. "Minority Population Concentration and Earnings: Evidence from Fixed-Effects Models." *Social Forces* 91, no. 1 (2012):181-208.

Kim, ChangHwan. "New Color Lines: Racial/Ethnic Inequality in Earnings among College-Educated Men." *The Sociological Quarterly* 56 (2015): 152-184.

Mandel, Hadas and Moshe Semyonov. "Gender Pay Gap and Employment Sector: Sources of Earnings Disparities in the United States, 1970-2010." *Demography* 51 (2014): 1597-1618.

Neal, Derek A. and William R. Johnson. "The Role of Premarket Factors in Black-White Wage Differences." *The Journal of Political Economy* 105, no. 5 (1996): 869-895.

Neumark, David. 1998. "Labor Market Information and Wage Differentials by Race and Sex." National Bureau of Economic Research Working Paper Series. Working Paper 6573.

Nopo, Hugo, Nancy Daza, and Johanna Ramos. "Gender Earnings Gaps around the World: A Study of 64 Countries." *International Journal of Manpower* 33, no. 5 (2012): 464-513.

O'Neill, June. "The Role of Human Capital in Earnings Differences between Black and White Men." *Journal of Economic Perspectives* 4, no. 4 (1990): 25-45.

Oyelere, Ruth Uwaifo and Willie Belton. "Black-White Gap in Self-Employment. Does Intra-race Heterogeneity Exist?" *Small Business Economics* 41 (2013): 25-39.

Pais, Jeremy. "Socioeconomic Background and Racial Earnings Inequality: A Propensity Score Analysis." *Social Science Research* 40 (2011): 37-49.

Phelps, Edmund S. "The Statistical Theory of Racism and Sexism." *The American Economic Review* 62, no. 4 (1972): 659-661.

Ryu, Kirak. "State Policies and Gender Earnings Inequality: A Multilevel Analysis of 50 U.S. States based on U.S. Census 2000 Data." *The Sociological Quarterly* 51 (2010): 266-254.

Steven Ruggles, J. Trent Alexander, Katie Genadek, Ronald Goeken, Matthew B. Schroeder, and Matthew Sobek. Integrated Public Use Microdata Series: Version 5.0 [Machine-readable database]. Minneapolis, MN: Minnesota Population Center [producer and distributor], 2010.

United States Department of Commerce. 2006. Hispanic-Owned Firms: 2002.SB02-00CS-HISP (RV). Washington, D.C. https://www.census.gov/prod/ec02/sb0200cshisp.pdf.

United States Commission on Civil Rights. 2006. Disparity Studies as Evidence of Discrimination in Federal Contracting. Washington, D.C.

Weinberger, Catherine J. "In Search of the Glass Ceiling: Gender and Earnings Growth Among U.S. College Graduates in the 1990s." *Industrial and Labor Relations Review* 64, no. 5 (2011): 949-980.

Wong, Yue-Chim. 1986. "Entrepreneurship, Marriage, and Earnings." *The Review of Economics and Statistics* 68, no. 4 (1986): 693-699.

5.0: DISPARITIES IN CREDIT ACCESS

Ards, Sheila D. and Samuel L. Myers, Jr. "The Color of Money: Bad Credit, Wealth, and Race." *American Behavioral Scientist* 42, no. 2 (2001): 223-239.

Avery, Robert B., Raphael W. Bostic, Katherine A. Samolyk. "The Role of Personal Wealth in Small Business Finance." *Journal of Banking & Finance* 22 (1998): 1019-1061.

Beck, Thorsten and Demirguc-Kunt, Asli. "Small and Medium-Size Enterprises: Access to Finance as a Growth Constraint" *Journal of Banking & Finance* 30, no. 11 (2006): 2931-2943.

Berger, Allen N. and Udell, Gregory F. "The Economics of Small Business Finance: The Roles of Private Equity and Debt Markets in the Financial Growth Cycle." *Journal of Banking & Finance* 22, no. 6 (1998): 613-673.

Bitler, Marianne P., Alicia M. Robb, and John D. Wolken. "Financial Services Used by Small Businesses: Evidence from the 1998 Survey of Small Business Finance." *Federal Reserve Bulletin* 87, no. 4 (2001): 183-205.

Blanchflower, David G. 2008. "Minority Self-employment in the United States and the Impact of Affirmative Action Programs." National Bureau of Economic Research Working Paper 13972.

-- and Andrew J. Oswald. "What Makes an Entrepreneur?" *Journal of Labor Economics* 16, no. 1 (1998): 26-60.

Carpenter, Robert E. and Bruce C. Petersen. "Is the Growth of Small Firms Constrained by Internal Finance?" *The Review of Economics and Statistics* 84, no. 2 (2002): 298-309.

Carter, Sara, Eleanor Shaw, Wing Lam, and Fiona Wilson. "Gender, Entrepreneurship, and Bank Lending: The Criteria and Processes Used by Bank Loan Officers in Assessing Applications." *Entrepreneurship Theory and Practice* 31, no. 3 (2007): 427-444.

Cavalluzzo, Ken S. and Linda C. Cavalluzzo. "Market Structure and Discrimination: The Case of Small Businesses." *Journal of Money, Credit, and Banking* 30, no. 4 (1998): 771-792.

Coleman, Susan. "Access to Capital and Terms of Credit: A Comparison of Men- and Women-Owned Small Businesses." *Journal of Small Business Management* 38, no. 3 (2000): 37-52.

Evans, David S. and Boyan Jovanovic. "An Estimated Model of Entrepreneurial Choice under Liquidity Constraints." *Journal of Political Economy* 97, no. 4 (1989): 808-827.

Gregory, Brian T., Matthew W. Rutherford, Sharon Oswald, and Lorraine Gardiner. "An Empirical Investigation of the Growth Cycle Theory of Small Firm Financing." Journal of Small Business Management 43, no. 4 (2005): 382–392.

Henderson, Loren, Cedric Herring, Hayward Derrick Horton, and Melvin Thomas. "Credit Where Credit is Due?: Race, Gender, and Discrimination in the Credit Scores of Business Startups." *The Review of Black Political Economy* 42 (2015): 459–479.

Holtz-Eakin, Douglas, David Joulfaian, and Harvey S. Rosen. 1993. "Entrepreneurial Decisions and Liquidity Constraints." National Bureau of Economic Research Working Paper 4526.

Hurst, Erik and Annamaria Lusardi. "Liquidity Constraints, Household Wealth, and Entrepreneurship." *Journal of Political Economy* 112 (2004): 319-347.

Jappelli, Tullio. "Who Is Credit Constrained in the U.S. Economy?" *The Quarterly Journal of Economics* 105, no. 1 (1990): 219-234.

Mijid, Naranchimeg. "Why Are Female Small Business Owners in the United States Less Likely to Apply for Bank Loans than Their Male Counterparts?" *Journal of Small Business & Entrepreneurship* 27, no. 2 (2015): 229-249.

Mills, Karen Gordon and Brayden McCarthy. 2014. "The State of Small Business Lending: Credit Access during the Recovery and How Technology May Change the Game." Harvard Business School Working Paper 15-004.

NERA Economic Consulting. 2010. "The State of Minority- and Woman-Owned Business Enterprise: Evidence from New York." Prepared for the New York State Department of Economic Development.

NFIB (National Federation of Independent Business) Research Foundation. 2012. "Small Business, Credit Access, and a Lingering Recession."

Phillips, Bruce D. and Bruce A. Kirchhoff. "Formation, Growth, and Survival; Small Firm Dynamics in the U.S. Economy." *Small Business Economics* 1, no. 1 (1989): 65-74.

Robb, Alicia, Susan Coleman, and Dane Stangler. 2014. "Sources of Hope: Women's Entrepreneurship." Ewing Marion Kauffman Foundation.

Robb, Alicia M. and Robert W. Fairlie. "Access to Financial Capital among U.S. Businesses: The Case of African American Firms." *The Annals of the American Society* 613 (2007): 47-71.

Robb, Alicia and John Wolken. 2002. "Firm, Owner, and Financing Characteristics: Differences between Female- and Male-Owned Small Businesses." FEDS Working Paper No. 2002-18.

Van Auken, Howard E. and Hayward Horton. "Financing Patterns of Minority-Owned Small Business." *Journal of Small Business Strategy* (1994): 31-43.

6.0 DISPARITIES IN HOMEOWNERSHIP AND HOME LENDING

Ards, Sheila D. and Samuel L. Myers, Jr. "The Color of Money: Bad Credit, Wealth, and Race." *American Behavioral Scientist* 42, no. 2 (2001): 223-239.

BBC Research & Consulting. *Portland Development Commission Disparity Study.* Denver: BBC Research & Consulting, 2011.

Blanchflower, David G. and Andrew J. Oswald. "What Makes an Entrepreneur?" *Journal of Labor Economics* 16, no. 1 (1998): 26-60.

Bluestone, Barry, Mary Huff Stevenson, and Russell Williams. *The Urban Experience: Economics, Society, and Public Policy*. New York: Oxford University Press, Inc., 2008.

Boehm, Thomas P. and Alan M. Schlottmann. "The Dynamics of Race, Income, and Homeownership." *Journal of Housing Economics* 8 (2004): 217-232.

---. "Mortgage Pricing Differentials Across Hispanic, African-American, and White Households: Evidence from the American Housing Survey." *Cityscape* 9, no. 2 (2007): 93-136.

Borjas, George J. 2002. "Homeownership in the Immigrant Population." National Bureau of Economic Research Working Paper 8945.

Bostic, Raphael W. 1996. "The Role of Race in Mortgage Lending: Revisiting the Boston Fed Study." Federal Reserve Board of Governors Division of Research and Statistics Working Paper.

---, with Paul S. Calem and Susan M. Wachter, "Hitting the Wall: Credit as an Impediment to Homeownership," in *Building Assets, Building Credit: Creating Wealth in Low-Income Communities*, eds. Nicolas P. Retsinas and Eric S. Belsky, 155-172. Washington, D.C.: Brookings Institution Press, 2005.

Bracke, Philippe, Christian Hilber, and Olmo Silva. 2013. "Homeownership and Entrepreneurship: The Role of Commitment and Mortgage Debt." IZA Discussion Paper 7417.

Burgess, Sharon L. "Female Heads of Household: Their Prospects for Homeownership." *Journal of Home Economics* 72, no. 4 (1980): 21-24.

Charles, Kerwin Kofi and Erik Hurst. "The Transition to Home Ownership and the Black-White Wealth Gap." *The Review of Economics and Statistics* 84, no. 2 (2002): 281-297.

Cheng, Ping, Zhenguo Lin, and Yingchun Liu. "Racial Discrepancy in Mortgage Interest Rates." *The Journal of Real Estate Finance and Economics* 51, no. 1 (2015): 101-120.

Collins, William J. and Robert A. Margo. 1999. "Race and Home Ownership, 1900 to 1990." National Bureau of Economic Research 7277.

Corradin, Stefano and Alexander A. Popov. 2013. "House Prices, Home Equity and Entrepreneurships." European Central Bank Working Paper 1544.

Cortes, Alvaro, Christopher E. Herbert, Erin Wilson, and Elizabeth Clay. "Factors Affecting Hispanic Homeownership: A Review of the Literature." *Cityscape* 9, no. 2 (2007): 53-91.

Coulson, N. Edward. "Why Are Hispanic- and Asian-American Homeownership Rates So Low? Immigration and Other Factors." *Journal of Urban Economics* 45, no. 2 (1999): 209-227.

Dietz, Robert D. and Donald R. Haurin. "The Social and Private Micro-level Consequences of Homeownership." *Journal of Urban Economics* 54, no. 3 (2003): 401-450.

Evans, David S. and Boyan Jovanovic. "An Estimated Model of Entrepreneurial Choice under Liquidity Constraints." *Journal of Political Economy* 97, no. 4 (1989): 808-827.

Fairlie, Robert W. "Entrepreneurship, Economic Conditions, and the Great Recession." *Journal of Economics & Management Strategy* 22, no. 2 (2013): 207-231.

--- and Harry A. Krashinsky. "Liquidity Constraints, Household Wealth, and Entrepreneurship Revisited." *The Review of Income and Wealth* 52, no. 2 (2012): 279-306.

Han, Song. "Discrimination in Lending: Theory and Evidence." *Journal of Real Estate Finance and Economics* 29, no. 1 (2004): 5-46.

Haurin, Donald R., Christopher E. Herbert, and Stuart S. Rosenthal. "Homeownership Gaps Among Low-Income and Minority Households." *Cityscape* 9, no. 2 (2007): 5-51.

Haurin, Donald R. and Duewa A. Kamara. "The Homeownership Decision of Female-Headed Households." *Journal of Housing Economics* 2 (1992): 293-309.

Holtz-Eakin, Douglas, David Joulfaian, and Harvey S. Rosen. 1993. "Entrepreneurial Decisions and Liquidity Constraints." National Bureau of Economic Research Working Paper 4526.

Ladd, Helen F. "Equal Credit Opportunity: Women and Mortgage Credit." *American Economic Review* 72, no. 2 (1982): 166-170.

Loving, Ajamu C., Michael S. Finke, and John R. Salter. "Does Home Equity Explain the Black Wealth Gap?" *Journal of Housing and the Built Environment* 27, no. 4 (2012): 427-451.

McConnell, Eileen Diaz. "Who has Housing Affordability Problems? Disparities in Housing Cost Burden by Race, Nativity, and Legal Status in Los Angeles." *Race and Social Problems* 5, no. 3 (2013): 173-190.

Munnell, Alicia H., Geoffrey M. B. Tootell, Lynn E. Browne, and James McEneaney. "Mortgage Lending in Boston: Interpreting HMDA Data." *The American Economic Review* 86, no. 1 (1996): 25-53.

Robinson, Judith K. "Race, Gender, and Familial Status: Discrimination in One U.S. Mortgage Lending Market." *Feminist Economics* 8, no. 2 (2002): 63-85.

Ruggles, Steven, J. Trent Alexander, Katie Genadek, Ronald Goeken, Matthew B. Schroeder, and Matthew Sobek. (2010). *Integrated Public Use Microdata Series: Version 5.0* [Machine-readable Database]. Retrieved from https://usa.ipums.org/usa/.

Savage, Charlie. "Wells Fargo Will Settle Mortgage Bias Charges." *The New York Times* (New York, NY), July 12, 2012. http://www.nytimes.com/2012/07/13/business/wells-fargo-to-settle-mortgage-discrimination-charges.html?_r=0.

Schmalz, Martin C., David A. Sraer, and David Thesmar. 2013. "Housing Collateral and Entrepreneurship." National Bureau of Economic Research Working Paper 19680.

Stiglitz, Joseph E. and Andrew Weiss. "Credit Rationing in Markets with Imperfect Information." *The American Economic Review* 71 no. 3 (1981): 393-410.

Vigdor, Jacob L., "Race: The Perplexing Persistence of Race," in *Making Cities Work: Prospects and Policies for Urban America*, ed. Robert P. Inman, 201-225. Princeton: Princeton University Press, 2009.

Williams, Aleatra. 2015. "Lending Discrimination, the Foreclosure Crisis and the Perpetuation of Racial and Ethnic Disparities in Homeownership in the U.S." *William & Mary Business Law Review* 6, no. 2. http://scholarship.law.wm.edu/wmblr/vol6/iss2/6.

Yinger, John. "Why Default Rates Can't Shed Light on Mortgage Discrimination." *Cityscape* 2, no. 1 (1996): 25-31.

7.0: DISPARITIES IN BUSINESS PERFORMANCE

Ahn, Taehyun. "Racial Differences in Self-Employment Exits." *Small Business Economics* 36, no. 2 (2011): 169-186.

Aldrich, Howard E. "Networking among Women Entrepreneurs." In *Women-Owned Businesses*, Edited by Oliver Hagan, Carol Rivchun, and Donald L. Sexton. New York: Praeger Press, 1989.

Bates, Timothy. "The Changing Nature of Minority Business: A Comparative Analysis of Asian, Nonminority, and Black-Owned Businesses." *The Review of Black Political Economy* 18, no. 2 (1989): 25-42.

---. "Entrepreneur Human Capital Endowments and Minority Business Viability." *The Journal of Human Resources* 20, no. 4 (1985): 540-554.

Cooper, Arnold, Carolyn Y. Woo, and William C. Dunkelberg. "Entrepreneurship and the Initial Size of Firms." *Journal of Business Venturing* 4 (1989): 317-332.

Fairlie, Robert W. "Recent Trends in Ethnic and Racial Business Ownership." *Small Business Economics* 23, no. 3 (2004): 203-218.

--- and Alicia M. Robb. "Why are Black-Owned Businesses Less Successful than White-Owned Businesses? The Role of Families, Inheritances and Business Human Capital." *Journal of Labor Economics* 25, no. 2 (2007): 289-323.

---. "Gender Differences in Business Performance: Evidence from the Characteristics of Business Owners Survey." *Small Business Economics* 33 (2009):375-395.

Hisrich, Robert D., 1989. "Women Entrepreneurs: Problems and Prescriptions for Success in the Future." In *Women-Owned Businesses*, Edited by Oliver Hagan, Carol Rivchun, and Donald L. Sexton. New York: Praeger Press, 1989.

Kalleberg, Arne L. and Kevin T. Leicht. "Gender and Organizational Performance: Determinants of Small Business Survival and Success." *Academy of Management Journal* 34, no. 1 (1991): 136-161.

Köllinger, P. and M. Minniti. "Not for Lack of Trying: American Entrepreneurship in Black and White." *Small Business Economics* 27, no. 1 (2006): 59-79.

Loscocco, Karyn A., and Joyce Robinson. "Barriers to Women's Small-Business Success in the United States." *Gender & Society* 5 (1991): 511-532.

---, Richard H. Hall, and John K. Allen. "Gender and Small Business Success: An Inquiry into Women's Relative Disadvantage." *Social Forces* 70, no. 1 (1991): 65-85.

NERA Economic Consulting. 2010. "The State of Minority- and Woman-Owned Business Enterprise: Evidence from New York." Austin: NERA Economic Consulting.

Rosa, Peter, Sara Carter and Daphne Hamilton. "Gender as a Determinant of Small Business Performance: Insights from a British Study." *Small Business Economics* 8, no. 6 (1996): 463-478.

8.0: CONCLUDING REMARKS

Miller3 Consulting, Inc. 2009. Disparity Study Final Report.

NERA Economic Consulting. 2010. "The State of Minority- and Woman-Owned Business Enterprise: Evidence from New York." Prepared for the New York State Department of Economic Development.

APPENDIX A
STATISTICAL ANALYSIS METHODOLOGY

The statistical analyses presented in Phase 3 of the Disparity Study relied heavily on multivariate regression analysis. Multivariate regression analysis estimates the relationships between an explanatory variable and an outcome variable, holding all other independent variables constant.[82] The results from the analyses are presented in generally accepted formats with limited explanation of the techniques themselves. This appendix sets forth the types of statistical analysis used in this report, how to interpret the results, and brief definitions of key terms. It is not intended to be a complete and comprehensive discussion of regression analysis, but rather as an aid in reading this report.

A.1 HOW REGRESSION ANALYSIS WAS CONDUCTED

Regression analysis offers a methodology to compare the impacts of different explanatory variables (also called the independent variables)[83] on an outcome variable (also called the dependent variable), holding all other factors constant. Applying a regression model allows researchers to estimate the magnitude of the relationship between the two variables numerically (through the coefficient estimate, defined below) as well as to diagnose the reliability of that estimate (through the standard error and p-value, defined below).

While there are many different models that can be used to estimate a regression, the three used in this study's analyses are:

1. ***Ordinary least squares (OLS) regression*** – Ordinary least squares regression is the most common type of linear regression model. The results of the regression estimate the effect of an independent variable on the outcome variable, holding all other independent variables constant.

   Ordinary least squares regression was used for the estimates in the sections on disparities in earnings (Section 4), credit access (Section 5), and business performance (Section 7).

2. ***Linear probability model*** (LPM) – An OLS regression is referred to as a linear probability model when the dependent variable is binary or dichotomous (i.e., it can only take the value of "0" or "1"). LPM coefficient estimates can be directly interpreted as the marginal effect of a change in an independent variable on the probability that the dependent variable occurs.[84]

82 A regression with one independent variable is called "simple linear regression," while a regression with more than one independent variable is called "multiple linear regression."

83 The term "***control variables***" refers to independent variables that are included in a regression in order to balance heterogeneous variation that could potentially confound the effect from the variable of interest.

84 There are concerns about the precision of the coefficient estimates and about heteroscedasticity, or the distribution of the variables across the range of potential values, when using LPM, which is why the robustness of the findings were verified with logistic regression.

3. LPM was used for the sections of this report on disparities in business formation (Section 3), credit access (Section 5), and home ownership and home lending (Section 6).

4. ***Logistic regression*** – Logistic regression (also known as "logit") is an alternative model to OLS that can be used when the dependent variable is binary or dichotomous. Logit regression produces estimates that are more difficult to interpret than coefficient estimates using an LPM.[85] As a result, logit regression was only used in this report to verify the significance of the estimates obtained using the LPM.

In most situations, the choice of a regression model is determined by the circumstances with some discretion left to the researcher. Researchers often address this discretion by showing that their estimates are valid across alternative models through a process known as a ***robustness*** check. Although often motivated by prior research and theoretical underpinnings, variable selection is also somewhat discretionary. As such, researchers show that their estimates hold when additional variables (or alternative definitions) are included in the regression through a process known as a ***sensitivity analysis***. Robustness and sensitivity analysis are not used to obtain a desired result from the data, but rather to assess the accuracy of the statistical findings. For example, the data used in LPM regressions in Phase 3 of the study (e.g., business formation, credit access, and home lending) were also used in logistic regressions to ensure the robustness of the findings, while the three different definitions of the geographic marketplace were tested throughout this phase using a sensitivity analysis.

A.1.1 Interpreting Regression Results

The findings from the regression analyses conducted in Phase 3 are presented in tables according to common practice in empirical economics. In this appendix, the general format of the tables is discussed. Table A.1, the first table presented in Section 4.0: Disparities in Earnings (Table 4.1: Wage Estimates for the United States, All Employees), is used as an example.

85 The coefficients produced through logit regression are known as "log odds," and must be transformed mathematically to provide the odds ratio of the occurrence, which are still not easily interpretable.

TABLE A.1: WAGE ESTIMATES FOR THE UNITED STATES, ALL EMPLOYEES

LHS: Log Hourly Wage (A)	(1) (B)	(2)	(3)	(4)	(5) (D)
Female	-0.26***	-0.26***	-0.26***	-0.21***	-0.17***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Minority (C)	-0.09***	-0.09***	-0.14***	-0.13***	-0.10***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age	0.07***	0.07***	0.07***	0.07***	0.06***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age-Squared	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Education FE (E)	X	X	X	X	X
Year FE (F)		X	X	X	X
State FE			X	X	X
Industry FE				X	X
Occupation FE					X
Observations (G)	4,616,838	4,616,838	4,616,838	4,616,838	4,616,838

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance.
Note 2: Robust standard errors are contained in parentheses.
Note 3: Sample restricted to prime working age population defined as individuals 25 to 54 years old. (H)

Item A: "LHS: Log Hourly Wage"
This part of the table identifies the dependent variable, or the outcome variable that the regression is explaining, in the analysis. "LHS" means "left-hand side."

Item B: Columns and column headers
Each column in a table represents a ***specification***, or a variation on the regression analysis for the dependent variable. For tables in which the column headers are numbers, such as Table A.1., this indicates a series of regression specifications in which additional explanatory variables are added sequentially. These additional variables, known as controls, help ensure that the coefficient estimates for the variable of interest are not driven by excluded factors. For the other tables in Phase 3, the headers of "Connecticut," "Regional," or "United States" indicate the geographic marketplace included in the analysis.

Item C: Independent variables
The first column in the regression table contains a list of the independent variables included in the analysis. These variables can be continuous, categorical, or dichotomous. In the latter two cases (which may also be called ***dummy variables*** or ***indicator variables***), the estimates show the effect of moving from the omitted group (e.g., an observation where the binary variable has a value of "0") to treatment (an observation where the binary variable has a value of "1"). For the analyses conducted in Phase 3, this means that estimates for: "females" should always be considered relative to "males"; "minority" relative to "White and non-Latino"; each race relative to "White"; and "Hispanic" compared to "non-Hispanic."

Another special type of independent variable (which is not present in Table A.1 but was used in Section 6: Disparities in Homeownership and Home Lending) is an ***interaction variable***, which represents the combined effect of two separate independent variables on the outcome variable. (Table 6.3, for example, includes two interaction variables: "Sole Applicant x Demographics" and "Income x Demographics.")

Item D: Coefficients and standard errors
For each independent variable, a regression produces a coefficient estimate for each variable and a standard error. The top number in each cell is the ***coefficient***, or the estimated effect of the independent variable on the dependent variable when all other independent variables are held constant. The interpretation of the coefficient depends on the type of regression model used.

In standard econometric notation, the coefficient may be followed by asterisks or other symbols, which denote the ***statistical significance*** of the coefficient, or the confidence level. Statistical significance represents the probability that a change in an independent variable is associated with a change in the dependent variable.[86] In the regression estimates in this report, statistical significance is measured with the ***p-value***, and significant p-values are represented by *, **, or *** asterisks. More asterisks indicate a higher confidence level (i.e., a lower p-value). A coefficient estimate with a higher confidence level (i.e., level of statistical significance) has a smaller chance of being random when, in reality, there is no relationship between the independent and dependent variable. It should be noted that, in the regressions conducted in Phase 3, lack of statistical significance does not necessarily indicate a lack of disparity. Rather, it may simply be due to the small sample size or other factors.

The second value in each cell is the ***standard error***, which provides an estimate of the potential variability in the coefficient estimate (i.e., lower values indicate higher confidence in the estimate). Standard errors are used in the determination of the confidence level associated with specific variables. "***Robust standard errors***," as included in Table A.1, correct for the presence of an unequal distribution of observation values in the data.

Item E: Variables with "FE"
Variables designated with "FE" in the tables indicate "***fixed-effects***" variables, which are special classifications of independent, binary variables. These variables attempt to control for a factor that is known to influence the dependent variable but that was not otherwise incorporated in the regression analysis. The most common fixed-effects variables control for time (e.g., year that the observation was gathered) or space (e.g., the state in which the person or firm was located), so each "FE" variable typically represents many binary variables (e.g., "state FE" often includes 51 binary variables for the 50 states and Washington, DC). Fixed-effects variables can represent other explanatory factors as well (e.g., the industry or occupation in which a person works).

Item F: Variable inclusion indicator
An "X" in a table cell indicates that the variable for that row was included in the regression analysis. As shown in column (1) of Table A.1, there is an "X" in the row for Education FE, indicating that this variable was included in the model but the year, state, industry, and occupation fixed-effects were not. Column (2) indicates that the Year FE was included as well as

86 Formally, statistical significance represents the probability of rejecting the null hypothesis (i.e., there is no relationship between the variables).

the Education FE, but not the other three fixed-effects variables, and so on. The coefficients and standard errors for these variables were not included in the tables for ease of reading.

Item G: Number of observations
Each table includes the number of observations included in the regression analysis for each model. For the sections included in Phase 3, these observations represent individuals (Section 3 on business formation and Section 4 on earnings), firms (Section 7 on business performance), or loan decisions (Section 5 on credit access and Section 6 on home lending).

Item H: Table notes
Each table in Phase 3 includes a series of notes about how the regression was conducted. These notes provide more information about interpreting the data in each table, including the values to which the asterisks of significance correspond, age restrictions if the observations represent individuals, or the list of control variables that do not vary among the models.

A.2 INTERPRETING NON-REGRESSION ANALYSES

Regression analysis provides a method of examining the relationship between an explanatory variable and an outcome of interest, because it allows the researcher to incorporate the impact of other factors and hold them constant. For this reason, it is the preferred methodology for understanding economy-wide disparities by race, ethnicity, and gender. However, the data available may restrict the usefulness of regression analysis. In these situations, other statistical methods or simple data tabulations may be performed to provide some information, but with the understanding that the information does not imply causality.

Specifically, ***T-tests*** were used in Section 6: Disparities in Homeownership and Home Lending to understand whether differences in homeownership rates and average home values for females and minorities were statistically different from those of men and non-minorities, respectively. As in the tests of statistical significance discussed above, these tests provide information regarding whether the differences between the groups were the result of random chance or due to another factor. However, when the results of T-tests are significant, the findings do not provide information on why that difference may exist.

APPENDIX B
STUDY COMMITTEE MEETINGS AND GUEST SPEAKERS

The following is a list of study committee meetings, including presentations given to the CASE study committee by guest speakers and the CASE Research Team. In the electronic version of this report, links to meeting proceedings are highlighted in blue.

OCTOBER 8, 2015 – MEETING 1

- **Welcome:** Richard H. Strauss, Executive Director, CASE
- **Overview of Phase 3 Scope of Work and Work Plan -** Presentation Materials
  Alissa DeJonge, *Study Manager;* Vice President of Research, CERC
- **Update on Phase 3**
- **Committee Discussion and Next Steps**

DECEMBER 8, 2015 – MEETING 2

- **Welcome:** Richard H. Strauss, Executive Director, CASE
- **Guest Speakers:**
  Daraius Irani, PhD, Associate Vice President, Division of Innovation and Applied Research, Towson University and Executive Director, Applied Research and Technical Services Group
  Susan Steward, Economist, Regional Economic and Studies Institute
  Topic: Technical Assistance, Maryland DOT
- **Research Team Update -** Presentation Materials
  Alissa DeJonge, *Study Manager;* Vice President of Research, CERC
- **Committee Discussion and Next Steps**

FEBRUARY 10, 2016 – MEETING 3

- **Welcome:** Richard H. Strauss, Executive Director, CASE
- **Speaker:**
  Colette Holt, *Study Advisor* and Attorney at Law, Holt & Associates
  Topic: Phase 3 Research Considerations
- **Research Team Update –** Presentation Materials
  Alissa DeJonge, *Study Manager;* Vice President of Research, CERC
- **Committee Discussion and Next Steps**

APRIL 6, 2016 – MEETING 4

- **Welcome:** Richard H. Strauss, Executive Director, CASE
- **Research Team –** Presentation Materials
  Sarah Ficenec, Economist, CERC
- **Committee Discussion and Next Steps**

APPENDIX 2A
PREPARING DATA FROM STATE FINANCIAL PAYMENT SYSTEMS

As noted in Section 2, data were received for five of the six financial divisions of the state government in response to a request for expenditure data made in October 2015. However, the data provided from each financial system included some transactions that were not with external vendors or which otherwise needed to be excluded from net spending. These data were refined for the purpose of this analysis by excluding the following specific types of payments:

1. Redacted information: CORE-CT names and addresses of some vendors were redacted by the Office of the State Comptroller to meet privacy requirements (e.g., HIPAA). Similarly, UConn and UConn Health did not provide data about payments/refunds to students or patients.
2. No addresses: CSCU and UConn data did not include addresses for some vendors.
3. Extraneous payments: The data from CORE-CT and from the CSCU system included payments that were not procurement from external vendors. These payments were excluded based on the account description provided in the data. Examples of such account descriptions include the following:
    - Accumulated leave
    - Board member fees
    - Campaign grants
    - Charitable donations
    - Client subsidies
    - Compensatory damages
    - Criminal injury awards
    - Employee reimbursements
    - Fellowships and stipends
    - FICA
    - Finance fees and interest charges
    - Fringe benefits
    - General honoraria
    - Graduate assistants
    - Grants/pass-through grants

- Jury duty
- Longevity payments
- Meal allowance
- Medicare taxes
- Membership dues
- Operating revenue (expenditures)
- Overtime
- Payments to inmates/clients
- Pension payments to retirees
- Petty cash
- Prizes and awards
- Punitive damages
- Refunds
- Rewards
- Salaries and wages
- Settlements
- Student grants and aid
- Taxes, assessments and liens
- Travel/mileage reimbursement
- Tuition reimbursement
- Unclaimed property payments
- Unemployment compensation
- Workers compensation awards

4. Intrastate payments: The data from CORE-CT and the UConn financial payment systems included payments that were to other branches of government and, thus, not part of the state's external purchasing from vendors. These include
    - CORE-CT: Payments to other state agencies or to local governments in the state.
    - CORE-CT: Payments by UConn, UConn Health, and CSCU, which would have been captured through those entities' financial systems.
    - UConn payments: Payments within the UConn and UConn Health systems.
5. Cancelled invoices: Cancelled invoices from the CSCU data.

It should be noted that some payments within the CORE-CT or CSCU systems met multiple reasons for exclusion, such as being a pass-through grant to a municipal government in the state or an honoraria payment without a payee address.

Table 2A.1 shows the total expenditures for each financial payment system as the data were provided for the years indicated, the total value of exclusions as noted above, and the net spending, which is also presented in Table 2.1.

TABLE 2A.1: TOTAL AND NET SPENDING BY FINANCIAL PAYMENT SYSTEM

	CORE-CT	UConn	UConn Health	CSCU
Fiscal Years	**2011-2015**	**2013-2015**	**2012-2015**	**2011-2015**
Total Expenditures (millions)	$122,053	$999	$1,324	$2,574
Exclusions* (millions)	$95,124	$3	$24	$391
Net Spending (millions)	$26,930	$996	$1,300	$2,183
* Represents state payments not related to procurement or for which addresses were not provided.				

APPENDIX 3A
DISPARITIES IN BUSINESS FORMATION WITH RACE AND ETHNICITY BREAKDOWN

TABLE 3A.1: LINEAR REGRESSION FOR PROBABILITY OF SELF-EMPLOYMENT IN THE UNITED STATES WITH RACE AND ETHNICITY DETAILED RESULTS

LHS: Self-Employed		(1)	(2)	(3)	(4)	(5)
Female		-0.04***	-0.04***	-0.04***	-0.02***	-0.02***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Minority Status	**Black**	-0.05***	-0.05***	-0.05***	-0.04***	-0.03***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Asian	0.00	0.00	-0.01***	-0.01***	-0.01***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Native American	-0.03***	-0.03***	-0.04***	-0.03***	-0.03***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Multi-Racial	0.00	0.00	-0.01***	0.00	0.00
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Other Race	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Hispanic	-0.02***	-0.02***	-0.02***	-0.03***	-0.02***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age		0.01***	0.01***	0.01***	0.01***	0.01***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age-Squared		0.00	0.00	0.00	0.00	0.00
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Education FE		X	X	X	X	X
Year FE			X	X	X	X
State FE				X	X	X
Industry FE					X	X
Occupation FE						X
Observations		4,505,244	4,505,244	4,505,244	4,505,244	4,505,244

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance.
Note 2: Robust standard errors are contained in parentheses.
Note 3: Sample restricted to prime working age population defined as individuals 25 to 54 years old.
Note 4: The findings are robust to using a logistic regression rather than a linear probability model. See Appendix 3B for estimates with logit regression.

APPENDIX 3B
ROBUSTNESS TESTS FOR SELF-EMPLOYMENT SPECIFICATIONS

TABLE 3B.1: LOGISTIC REGRESSION FOR PROBABILITY OF SELF-EMPLOYMENT IN THE UNITED STATES

LHS: Self-Employed	(1)	(2)	(3)	(4)	(5)
Female	-0.51***	-0.51***	-0.51***	-0.29***	-0.33***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Minority	-0.32***	-0.32***	-0.39***	-0.35***	-0.34***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age	0.18***	0.18***	0.18***	0.19***	0.19***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age-Squared	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Education FE	X	X	X	X	X
Year FE		X	X	X	X
State FE			X	X	X
Industry FE				X	X
Occupation FE					X
Observations	4,505,244	4,505,244	4,505,244	4,176,511	4,176,511

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance.
Note 2: Robust standard errors are contained in parentheses.
Note 3: Sample restricted to prime working age population defined as individuals 25 to 54 years old.

TABLE 3B.2: LOGISTIC REGRESSION FOR PROBABILITY OF SELF-EMPLOYMENT IN THE UNITED STATES WITH RACE AND ETHNICITY DETAILED RESULTS

LHS: Self-Employed		(1)	(2)	(3)	(4)	(5)
Female		-0.50***	-0.50***	-0.50***	-0.29***	-0.33***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Minority Status	**Black**	-0.77***	-0.77***	-0.77***	-0.61***	-0.59***
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
	Asian	-0.02***	-0.02***	-0.09***	-0.06***	-0.09***
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
	Native American	-0.43***	-0.43***	-0.48***	-0.40***	-0.41***
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
	Multi-Racial	-0.04***	-0.04***	-0.06***	-0.02	-0.03**
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
	Other Race	-0.06***	-0.06***	-0.06***	-0.08***	-0.09***
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
	Hispanic	-0.19***	-0.19***	-0.28***	-0.33***	-0.30***
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Age		0.18***	0.18***	0.18***	0.19***	0.19***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age-Squared		0.00	0.00	0.00	0.00	0.00
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Education FE		X	X	X	X	X
Year FE			X	X	X	X
State FE				X	X	X
Industry FE					X	X
Occupation FE						X
Observations		4,505,244	4,505,244	4,505,244	4,176,511	4,176,511

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance.
Note 2: Robust standard errors are contained in parentheses.
Note 3: Sample restricted to prime working age population defined as individuals 25 to 54 years old.

TABLE 3B.3: LOGISTIC REGRESSION FOR PROBABILITY OF SELF-EMPLOYMENT IN CONNECTICUT, REGIONAL MARKET, AND UNITED STATES

LHS: Self-Employed	Connecticut	Regional	United States
Female	-0.39***	-0.35***	-0.33***
	(0.04)	(0.01)	(0.00)
Minority	-0.39***	-0.29***	-0.34***
	(0.05)	(0.01)	(0.00)
Age	0.22***	0.21***	0.19***
	(0.02)	(0.01)	(0.00)
Age-Squared	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)
Observations	51,654	431,502	4,176,511

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance.
Note 2: Robust standard errors are contained in parentheses.
Note 3: Sample restricted to prime working age population defined as individuals 25 to 54 years old.
Note 4: Additional controls omitted from the table include education, year, state, industry, and occupation fixed-effects.

TABLE 3B.4: LOGISTIC REGRESSION FOR PROBABILITY OF SELF-EMPLOYMENT IN CONNECTICUT, REGIONAL MARKET, AND UNITED STATES

LHS: Self-Employed		Connecticut	Regional	United States
Female		-0.39***	-0.35***	-0.33***
		(0.01)	(0.00)	(0.04)
Minority Status	**Black**	-0.68***	-0.53***	-0.59***
		(0.09)	(0.02)	(0.01)
	Asian	-0.06	-0.09***	-0.09***
		(0.09)	(0.02)	(0.01)
	Native American	-0.19	-0.30**	-0.41***
		(0.42)	(0.12)	(0.02)
	Multi-Racial	-0.17	0.01	-0.03**
		(0.14)	(0.04)	(0.01)
	Other Race	-0.02	-0.13***	-0.09***
		(0.11)	(0.03)	(0.01)
	Hispanic	-0.41***	-0.23***	-0.30***
		(0.07)	(0.02)	(0.01)
Age		0.22***	0.21***	0.19***
		(0.01)	(0.00)	(0.02)
Age-Squared		0.00	0.00	0.00
		(0.00)	(0.00)	(0.00)
Observations		51,654	431,502	4,176,511

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance.
Note 2: Robust standard errors are contained in parentheses.
Note 3: Sample restricted to prime working age population defined as individuals 25 to 54 years old.
Note 4: Additional controls omitted from the table include education, year, state, industry, and occupation fixed-effects.

APPENDIX 4A
EARNINGS DISPARITIES WITH RACE AND ETHNICITY BREAKDOWN

TABLE 4A.1: WAGE ESTIMATES FOR UNITED STATES, ALL EMPLOYEES WITH RACE AND ETHNICITY DETAILED RESULTS

LHS: Log Hourly Wage		(1)	(2)	(3)	(4)	(5)
Female		-0.26***	-0.26***	-0.26***	-0.21***	-0.17***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Minority Status	**Black**	-0.14***	-0.14***	-0.15***	-0.15***	-0.10***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Asian	0.01***	0.01***	-0.07***	-0.06***	-0.09***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Native American	-0.15***	-0.15***	-0.14***	-0.13***	-0.10***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Multi-Racial	-0.06***	-0.06***	-0.08***	-0.08***	-0.07***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Other Race	-0.02***	-0.02***	-0.05***	-0.05***	-0.04***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Hispanic	-0.08***	-0.08***	-0.13***	-0.12***	-0.09***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age		0.07***	0.07***	0.07***	0.07***	0.06***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age-Squared		0.00	0.00	0.00	0.00	0.00
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Education FE		X	X	X	X	X
Year FE			X	X	X	X
State FE				X	X	X
Industry FE					X	X
Occupation FE						X
Observations		4,616,838	4,616,838	4,616,838	4,616,838	4,616,838

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: Sample restricted to prime working age population defined as individuals 25 to 54 years old.

APPENDIX 4B
ROBUSTNESS TESTS FOR EARNINGS SPECIFICATIONS

TABLE 4B.1: WAGE ESTIMATES FOR UNITED STATES, ALL EMPLOYEES

LHS: Log Hourly Wage	(1)	(2)	(3)	(4)	(5)
Female	-0.25***	-0.25***	-0.24***	-0.20***	-0.17***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Minority	-0.10***	-0.10***	-0.14***	-0.13***	-0.10***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age	0.07***	0.07***	0.07***	0.07***	0.06***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age-Squared	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Education FE	X	X	X	X	X
Year FE		X	X	X	X
State FE			X	X	X
Industry FE				X	X
Occupation FE					X
Observations	4,616,838	4,616,838	4,616,838	4,616,838	4,616,838

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: Sample restricted to prime working age population defined as individuals 25 to 54 years old.

TABLE 4B.2: WAGE ESTIMATES FOR UNITED STATES, ALL EMPLOYEES WITH RACE AND ETHNICITY DETAILED RESULTS

LHS: Log Hourly Wage		(1)	(2)	(3)	(4)	(5)
Female		-0.24***	-0.24***	-0.24***	-0.20***	-0.17***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Minority Status	**Black**	-0.13***	-0.13***	-0.14***	-0.14***	-0.10***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Asian	0.01***	0.01***	0.08***	-0.06***	-0.09***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Native American	-0.15***	-0.15***	-0.13***	-0.12***	-0.10***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Multi-Racial	-0.05***	-0.05***	-0.07***	-0.07***	-0.06***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Other Race	-0.02***	-0.02***	-0.05***	-0.05***	-0.04***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Hispanic	-0.09***	-0.09***	-0.14***	-0.13***	-0.10***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age		0.07***	0.07***	0.07***	0.07***	0.06***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age-Squared		0.00	0.00	0.00	0.00	0.00
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations		4,616,838	4,616,838	4,616,838	4,616,838	4,616,838

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: Sample restricted to prime working age population defined as individuals 25 to 54 years old.
Note 4: Additional controls omitted from the Table include education, year, state, industry, and occupation fixed-effects.

TABLE 4B.3: RELATIVE EARNINGS FOR ALL WORKERS IN CONNECTICUT, REGIONAL MARKET, AND UNITED STATES

LHS: Log Hourly Wage	Connecticut	Regional	United States
Female	-0.18***	-0.15***	-0.17***
	(0.00)	(0.00)	(0.00)
Minority	-0.14***	-0.10***	-0.10***
	(0.00)	(0.00)	(0.00)
Age	0.07***	0.07***	0.06***
	(0.00)	(0.00)	(0.00)
Age-Squared	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)
Observations	55,639	468,077	4,616,838

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: Sample restricted to prime working age population defined as individuals 25 to 54 years old.
Note 4: Additional controls omitted from the Table include education, year, state, industry, and occupation fixed-effects.

TABLE 4B.4: RELATIVE EARNINGS FOR ALL WORKERS WITH RACE AND ETHNICITY DETAILED RESULTS

LHS: Log Hourly Wage		Connecticut	Regional	United States
Female		-0.19***	-0.16***	-0.17***
		(0.00)	(0.00)	(0.01)
Minority Status	**Black**	-0.14***	-0.06***	-0.10***
		(0.01)	(0.00)	(0.00)
	Asian	-0.12***	-0.10***	-0.09***
		(0.01)	(0.00)	(0.00)
	Native American	-0.14**	-0.09***	-0.10***
		(0.07)	(0.02)	(0.00)
	Multi-Racial	-0.13***	-0.08***	-0.07***
		(0.03)	(0.01)	(0.00)
	Other Race	-0.12***	-0.08***	-0.04***
		(0.02)	(0.01)	(0.00)
	Hispanic	-0.09***	-0.04***	-0.09***
		(0.01)	(0.00)	(0.00)
Age		0.08***	0.07***	0.06***
		(0.00)	(0.00)	(0.00)
Age-Squared		0.00	0.00	0.00
		(0.00)	(0.00)	(0.00)
Observations		55,639	468,077	4,616,838

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: Sample restricted to prime working age population defined as individuals 25 to 54 years old.
Note 4: Additional controls omitted from the Table include education, year, state, industry, and occupation fixed-effects.

TABLE 4B.5: RELATIVE EARNINGS FOR EMPLOYED WORKERS IN CONNECTICUT, REGIONAL MARKET, AND UNITED STATES

LHS: Log Hourly Wage	Connecticut	Regional	United States
Female	-0.18***	-0.18***	-0.17***
	(0.00)	(0.00)	(0.00)
Minority	-0.13***	-0.13***	-0.10***
	(0.00)	(0.00)	(0.00)
Age	0.07***	0.07***	0.06***
	(0.00)	(0.00)	(0.00)
Age-Squared	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)
Observations	53,297	53,297	4,416,777

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: Sample restricted to prime working age population defined as individuals 25 to 54 years old.
Note 4: Additional controls omitted from the Table include education, year, state, industry, and occupation fixed-effects.

TABLE 4B.6: RELATIVE EARNINGS FOR EMPLOYED WORKERS WITH RACE AND ETHNICITY DETAILED RESULTS

LHS: Log Hourly Wage		Connecticut	Regional	United States
Female		-0.18***	-0.15***	-0.17***
		(0.00)	(0.00)	(0.00)
Minority Status	**Black**	-0.12***	-0.07***	-0.10***
		(0.00)	(0.00)	(0.00)
	Asian	-0.13***	-0.12***	-0.09***
		(0.00)	(0.00)	(0.00)
	Native American	-0.10	-0.07***	-0.10***
		(0.34)	(0.01)	(0.01)
	Multi-Racial	-0.09***	-0.07***	-0.06***
		(0.00)	(0.00)	(0.00)
	Other Race	-0.12***	-0.08**	-0.04***
		(0.00)	(0.00)	(0.00)
	Hispanic	-0.10***	-0.06***	-0.09***
		(0.00)	(0.00)	(0.00)
Age		0.07***	0.07***	0.06***
		(0.00)	(0.00)	(0.00)
Age-Squared		0.00	0.00	0.00
		(0.00)	(0.00)	(0.00)
Observations		53,297	448,200	4,416,777

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: Sample restricted to prime working age population defined as individuals 25 to 54 years old.
Note 4: Additional controls omitted from the Table include education, year, state, industry, and occupation fixed-effects.

TABLE 4B.7: RELATIVE EARNINGS FOR SELF-EMPLOYED WORKERS IN CONNECTICUT, REGIONAL MARKET, AND UNITED STATES

LHS: Log Hourly Wage	Connecticut	Regional	United States
Female	-0.33***	-0.25***	-0.26***
	(0.00)	(0.00)	(0.01)
Minority	-0.26***	-0.19***	-0.14***
	(0.00)	(0.01)	(0.01)
Age	0.14***	0.10***	0.09***
	(0.00)	(0.00)	(0.00)
Age-Squared	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)
Observations	2,342	19,877	200,061

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: Sample restricted to prime working age population defined as individuals 25 to 54 years old.
Note 4: Additional controls omitted from the Table include education, year, state, industry, and occupation fixed-effects.

TABLE 4B.8: RELATIVE EARNINGS FOR SELF-EMPLOYED WORKERS WITH RACE AND ETHNICITY DETAILED RESULTS

LHS: Log Hourly Wage	Connecticut	Regional	United States
Female	-0.33***	-0.25***	-0.26***
	(0.00)	(0.00)	(0.01)
Minority	-0.26***	-0.19***	-0.14***
	(0.00)	(0.01)	(0.01)
Age	0.14***	0.10***	0.09***
	(0.00)	(0.00)	(0.00)
Age-Squared	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)
Observations	2,342	19,877	200,061

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: Sample restricted to prime working age population defined as individuals 25 to 54 years old.
Note 4: Additional controls omitted from the Table include education, year, state, industry, and occupation fixed-effects.

APPENDIX 5A
BUSINESS LOAN DENIAL DISPARITIES WITH RACE AND ETHNICITY BREAKDOWN

TABLE 5A.1: LINEAR REGRESSION FOR PROBABILITY OF LOAN DENIAL IN THE UNITED STATES WITH RACE AND ETHNICITY DETAILED RESULTS

LHS: Loan Denial		(1)	(2)	(3)	(4)	(5)
Female		0.04*	0.03	0.03	0.02	0.03
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Minority Status	**Black**	0.37***	0.32***	0.33***	0.28***	0.29***
		(0.07)	(0.06)	(0.06)	(0.06)	(0.06)
	Asian	0.07	0.06	0.05	0.04	0.04
		(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
	Native American	0.05	0.04	0.05	0.06	0.06
		(0.09)	(0.09)	(0.09)	(0.09)	(0.08)
	Hispanic	0.09*	0.08	0.08	0.07	0.07
		(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Census division		X	X	X	X	X
Firm credit characteristics		X	X	X	X	X
Firm financial characteristics			X	X	X	X
Other firm characteristics				X	X	X
Owner financial characteristics					X	X
Other owner characteristics						X
Observations		1,845	1,845	1,845	1,845	1,845

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: The findings are robust to using a logistic regression rather than a linear probability model. See Appendix 5B for estimates with logit regression.
Note 4: Robust standard errors are contained in parentheses.
Note 3: See Section 5.3 more information on the control variables.

APPENDIX 5B
ROBUSTNESS TEST FOR BUSINESS LOAN DENIAL SPECIFICATIONS

TABLE 5B.1: LINEAR REGRESSION FOR PROBABILITY OF LOAN DENIAL IN THE UNITED STATES

LHS: Loan Denial	(1)	(2)	(3)	(4)	(5)
Female	0.03	0.02	0.02	0.02	0.03
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Minority	0.15***	0.13***	0.12***	0.11**	0.11**
	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)
Census division	X	X	X	X	X
Firm credit characteristics	X	X	X	X	X
Firm financial characteristics		X	X	X	X
Other firm characteristics			X	X	X
Owner financial characteristics				X	X
Other owner characteristics					X
Observations	1,845	1,845	1,845	1,845	1,845

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: The findings are robust to using a logistic regression rather than a linear probability model. See Table 5B.3 for estimates with logit regression.
Note 4: See Section 5.3 more information on the control variables.

TABLE 5B.2: LINEAR REGRESSION FOR PROBABILITY OF LOAN DENIAL IN THE UNITED STATES WITH RACE AND ETHNICITY DETAILED RESULTS

LHS: Loan Denial		(1)	(2)	(3)	(4)	(5)
Female		0.02	0.01	0.01	0.02	0.02
		(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Minority Status	**Black**	0.42***	0.37***	0.38***	0.34***	0.35***
		(0.09)	(0.09)	(0.08)	(0.09)	(0.09)
	Asian	0.04	0.02	0.02	0.02	0.02
		(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
	Native American	0.15	0.16	0.17	0.17	0.17
		(0.12)	(0.12)	(0.12)	(0.12)	(0.12)
	Hispanic	0.03	0.02	0.02	0.00	0.00
		(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
Census division		X	X	X	X	X
Firm credit characteristics		X	X	X	X	X
Firm financial characteristics			X	X	X	X
Other firm characteristics				X	X	X
Owner financial characteristics					X	X
Other owner characteristics						X
Observations		1,845	1,845	1,845	1,845	1,845

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: The findings are robust to using a logistic regression rather than a linear probability model. See Table 5B.4 for estimates with logit regression.
Note 4: See Section 5.3 more information on the control variables.

TABLE 5B.3: LOGISTIC REGRESSION FOR PROBABILITY OF LOAN DENIAL IN THE UNITED STATES

LHS: Loan Denial	(1)	(2)	(3)	(4)	(5)
Female	0.46**	0.26	0.30	0.29	0.39
	(0.20)	(0.22)	(0.23)	(0.24)	(0.24)
Minority	1.19***	0.97***	0.95***	0.86***	0.91***
	(0.20)	(0.22)	(0.23)	(0.24)	(0.24)
Census division	X	X	X	X	X
Firm credit characteristics	X	X	X	X	X
Firm financial characteristics		X	X	X	X
Other firm characteristics			X	X	X
Owner financial characteristics				X	X
Other owner characteristics					X
Observations	1,845	1,840	1,837	1,837	1,811

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: See Section 5.3 more information on the control variables.

TABLE 5B.4: LOGISTIC REGRESSION FOR PROBABILITY OF LOAN DENIAL IN THE UNITED STATES WITH RACE AND ETHNICITY DETAILED RESULTS

LHS: Loan Denial		(1)	(2)	(3)	(4)	(5)
Female		0.43**	0.24	0.28	0.26	0.36
		(0.22)	(0.23)	(0.24)	(0.24)	(0.21)
Minority Status	**Black**	2.10***	1.77***	1.89***	1.77***	1.96***
		(0.30)	(0.33)	(0.36)	(0.41)	(0.41)
	Asian	0.68*	0.48	0.39	0.32	0.36
		(0.39)	(0.45)	(0.46)	(0.47)	(0.47)
	Native American	0.38	0.58	0.59	0.76	0.78
		(0.68)	(0.62)	(0.67)	(0.68)	(0.66)
	Hispanic	0.76**	0.61	0.63	0.54	0.55
		(0.36)	(0.38)	(0.39)	(0.40)	(0.41)
Census division		X	X	X	X	X
Firm credit characteristics		X	X	X	X	X
Firm financial characteristics			X	X	X	X
Other firm characteristics				X	X	X
Owner financial characteristics					X	X
Other owner characteristics						X
Observations		1,845	1,840	1,837	1,837	1,811

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: See Section 5.3 more information on the control variables.

APPENDIX 5C
INTEREST RATE DISPARITIES WITH RACE AND ETHNICITY BREAKDOWN

TABLE 5C.1: ESTIMATED INTEREST RATES IN THE UNITED STATES WITH RACE AND ETHNICITY DETAILED RESULTS

LHS: Interest Rate		(1)	(2)	(3)	(4)	(5)
Female		0.43	0.32	0.21	0.20	0.17
		(0.28)	(0.27)	(0.26)	(0.26)	(0.28)
Minority Status	**Black**	1.47*	1.03	0.99	0.83	0.78
		(0.82)	(0.89)	(0.83)	(0.88)	(0.87)
	Asian	0.52	0.32	0.30	0.21	0.06
		(0.45)	(0.41)	(0.39)	(0.40)	(0.40)
	Native American	-0.58	-0.70	-0.61	-0.69	-0.71
		(1.14)	(1.12)	(1.05)	(1.09)	(1.09)
	Hispanic	1.42**	1.11**	1.02*	1.02*	0.98*
		(0.61)	(0.56)	(0.56)	(0.54)	(0.54)
Census division		X	X	X	X	X
Firm credit and loan characteristics		X	X	X	X	X
Firm financial characteristics			X	X	X	X
Other firm characteristics				X	X	X
Owner financial characteristics					X	X
Other owner characteristics						X
Observations		1,060	1,060	1,060	1,060	1,060

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: See Section 5.3 more information on the control variables.

APPENDIX 5D
ROBUSTNESS TEST FOR INTEREST RATE SPECIFICATIONS

TABLE 5D.1: AVERAGE INTEREST RATES IN THE UNITED STATES

LHS: Interest Rate	(1)	(2)	(3)	(4)	(5)
Female	0.38	0.35	0.15	0.20	0.20
	(0.57)	(0.59)	(0.51)	(0.51)	(0.52)
Minority	0.93**	0.59	0.53	0.37	0.26
	(0.46)	(0.47)	(0.45)	(0.45)	(0.46)
Census division	X	X	X	X	X
Firm credit and loan characteristics	X	X	X	X	X
Firm financial characteristics		X	X	X	X
Other firm characteristics			X	X	X
Owner financial characteristics				X	X
Other owner characteristics					X
Observations	1,060	1,060	1,060	1,060	1,060

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: See Section 5.3 more information on the control variables.

TABLE 5D.2: ESTIMATED INTEREST RATES IN THE UNITED STATES WITH RACE AND ETHNICITY DETAILED RESULTS

LHS: Interest Rate		(1)	(2)	(3)	(4)	(5)
Female		0.44	0.40	0.17	0.22	0.21
		(0.60)	(0.52)	(0.51)	(0.53)	(0.58)
Minority Status	**Black**	1.08	0.49	0.37	-0.33	-0.49
		(1.18)	(1.34)	(1.49)	(1.67)	(1.63)
	Asian	0.25	0.06	0.07	-0.21	-0.37
		(0.66)	(0.66)	(0.60)	(0.60)	(0.60)
	Native American	-0.96	-0.81	-0.29	-0.34	-0.25
		(1.84)	(1.86)	(1.58)	(1.60)	(1.58)
	Hispanic	1.83***	1.39***	1.20**	1.24**	1.14**
		(0.59)	(0.53)	(0.50)	(0.50)	(0.52)
Census division		X	X	X	X	X
Firm credit and loan characteristics		X	X	X	X	X
Firm financial characteristics			X	X	X	X
Other firm characteristics				X	X	X
Owner financial characteristics					X	X
Other owner characteristics						X
Observations		1,060	1,060	1,060	1,060	1,060

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: See Section 5.3 more information on the control variables.

APPENDIX 5E
FEAR OF LOAN DENIAL DISPARITIES WITH RACE AND ETHNICITY BREAKDOWN

TABLE 5E.1: LINEAR REGRESSION FOR PROBABILITY OF FEAR OF LOAN DENIAL IN THE UNITED STATES WITH RACE AND ETHNICITY DETAILED RESULTS

LHS: Fear of Loan Denial		(1)	(2)	(3)	(4)	(5)
Female		0.06***	0.05***	0.05***	0.04***	0.05***
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Minority Status	**Black**	0.26***	0.25***	0.25***	0.17***	0.18***
		(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
	Asian	0.04	0.03	0.03	0.03	0.02
		(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
	Native American	0.03	0.03	0.03	0.00	0.00
		(0.05)	(0.05)	(0.06)	(0.05)	(0.05)
	Hispanic	0.08**	0.08**	0.08**	0.05*	0.05
		(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Census division		X	X	X	X	X
Firm credit characteristics		X	X	X	X	X
Firm financial characteristics			X	X	X	X
Other firm characteristics				X	X	X
Owner financial characteristics					X	X
Other owner characteristics						X
Observations		4,152	4,152	4,140	4,140	4,140

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: The findings are robust to using a logistic regression rather than a linear probability model. See Appendix 5F for estimates with logit regression.
Note 4: See Section 5.3 more information on the control variables.

APPENDIX 5F
ROBUSTNESS TEST FOR FEAR OF LOAN DENIAL SPECIFICATIONS

TABLE 5F.1: LINEAR REGRESSION FOR PROBABILITY OF FEAR OF LOAN DENIAL IN THE UNITED STATES

LHS: Fear of Loan Denial	(1)	(2)	(3)	(4)	(5)
Female	0.06***	0.06***	0.06***	0.06***	0.06***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Minority	0.12***	0.11***	0.11***	0.07**	0.06**
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Census division	X	X	X	X	X
Firm credit characteristics	X	X	X	X	X
Firm financial characteristics		X	X	X	X
Other firm characteristics			X	X	X
Owner financial characteristics				X	X
Other owner characteristics					X
Observations	4,152	4,152	4,140	4,140	4,140

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: The findings are robust to using a logistic regression rather than a linear probability model. See Table 5F.3 for estimates with logit regression.
Note 4: See Section 5.3 more information on the control variables.

TABLE 5F.2: LINEAR REGRESSION FOR PROBABILITY OF FEAR OF LOAN DENIAL IN THE UNITED STATES WITH RACE AND ETHNICITY DETAILED RESULTS

LHS: Fear of Loan Denial		(1)	(2)	(3)	(4)	(5)
Female		0.06***	0.06***	0.06***	0.06***	0.06***
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Minority Status	**Black**	0.24***	0.23***	0.23***	0.15***	0.15***
		(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
	Asian	0.04	0.03	0.03	0.02	0.02
		(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
	Native American	0.01	0.01	0.01	-0.03	-0.03
		(0.07)	(0.07)	(0.07)	(0.06)	(0.06)
	Hispanic	0.11**	0.12**	0.11**	0.07	0.06
		(0.05)	(0.05)	(0.05)	(0.05)	(0.04)
Census division		X	X	X	X	X
Firm credit characteristics		X	X	X	X	X
Firm financial characteristics			X	X	X	X
Other firm characteristics				X	X	X
Owner financial characteristics					X	X
Other owner characteristics						X
Observations		4,152	4,152	4,140	4,140	4,140

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: The findings are robust to using a logistic regression rather than a linear probability model. See Table 5F.4 for estimates with logit regression.
Note 4: See Section 5.3 more information on the control variables.

TABLE 5F.3: LOGISTIC REGRESSION FOR PROBABILITY OF FEAR OF LOAN DENIAL IN THE UNITED STATES

LHS: Fear of Loan Denial	(1)	(2)	(3)	(4)	(5)
Female	0.51***	0.42***	0.36***	0.39***	0.41***
	(0.11)	(0.11)	(0.12)	(0.12)	(0.12)
Minority	0.82***	0.75***	0.73***	0.55***	0.53***
	(0.13)	(0.13)	(0.13)	(0.14)	(0.14)
Census division	X	X	X	X	X
Firm credit characteristics	X	X	X	X	X
Firm financial characteristics		X	X	X	X
Other firm characteristics			X	X	X
Owner financial characteristics				X	X
Other owner characteristics					X
Observations	4,152	4,135	4,123	4,123	4,123

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: See Section 5.3 more information on the control variables.

TABLE 5F.4: LOGISTIC REGRESSION FOR PROBABILITY OF FEAR OF LOAN DENIAL IN THE UNITED STATES WITH RACE AND ETHNICITY DETAILED RESULTS

LHS: Fear of Loan Denial		(1)	(2)	(3)	(4)	(5)
Female		0.49***	0.41***	0.36***	0.39***	0.41***
		(0.11)	(0.12)	(0.12)	(0.12)	(0.11)
Minority Status	**Black**	1.48***	1.36***	1.36***	1.04***	1.08***
		(0.21)	(0.22)	(0.22)	(0.25)	(0.26)
	Asian	0.36	0.32	0.29	0.25	0.20
		(0.22)	(0.22)	(0.23)	(0.24)	(0.24)
	Native American	0.24	0.23	0.22	0.04	0.04
		(0.39)	(0.38)	(0.39)	(0.37)	(0.38)
	Hispanic	0.61***	0.60***	0.58***	0.47**	0.41*
		(0.21)	(0.22)	(0.22)	(0.24)	(0.24)
Census division		X	X	X	X	X
Firm credit characteristics		X	X	X	X	X
Firm financial characteristics			X	X	X	X
Other firm characteristics				X	X	X
Owner financial characteristics					X	X
Other owner characteristics						X
Observations		4,152	4,135	4,123	4,123	4,123

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: See Section 5.3 more information on the control variables.

APPENDIX 6A
MORTGAGE LOAN DENIAL DISPARITIES WITH RACE AND ETHNICITY BREAKDOWN

TABLE 6A.1: LINEAR REGRESSION FOR PROBABILITY OF MORTGAGE LOAN DENIAL IN THE UNITED STATES WITH RACE AND ETHNICITY DETAILED RESULTS

LHS: Loan Denial		(1)	(2)	(3)	(4)	(5)
Female		0.03***	0.03***	0.04***	0.04***	0.04***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Minority Status	**Black**	0.12***	0.11***	0.08***	0.08***	0.07***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Asian	0.04***	0.03***	0.00	0.00	0.01***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Native American	0.09***	0.09***	0.06***	0.06***	0.06***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Multi-Racial	0.06***	0.06***	0.03***	0.03***	0.03***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	Hispanic	0.05***	0.04***	0.01***	0.01***	0.01***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Income Q2			-0.07***	-0.07***	-0.07***	-0.07***
			(0.00)	(0.00)	(0.00)	(0.00)
Income Q3			-0.09***	-0.09***	-0.09***	-0.08***
			(0.00)	(0.00)	(0.00)	(0.00)
Income Q4			-0.11***	-0.11***	-0.11***	-0.10***
			(0.00)	(0.00)	(0.00)	(0.00)
Income Q5			-0.13***	-0.12***	-0.12***	-0.11***
			(0.00)	(0.00)	(0.00)	(0.00)
Sole Applicant x Demographics+		X	X	X	X	X
Income x Demographics++				X	X	X
Population					X	X
Income (Tract to MSA)						X
Loan Amount +++		X	X	X	X	X
State FE		X	X	X	X	X
Year FE		X	X	X	X	X
Observations		9,142,931	9,142,931	9,142,931	9,142,931	9,142,931

+All specifications also include an interaction between 'Sole Applicant' and the demographic variables.
++All specifications also include an interaction between the dichotomous variables for quintiles of applicant income and the demographic variables.
+++Loan amount was broken into quintiles at the national level and included as four dichotomous variables with the lowest quintile being omitted.
Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance.
Note 2: Robust standard errors are contained in parentheses.
Note 3: The findings are robust to using a logistic regression rather than a linear probability model. See Appendix 6B for estimates with logit regression.

APPENDIX 6B
ROBUSTNESS TEST FOR MORTGAGE LOAN DENIAL SPECIFICATIONS

TABLE 6B.1: LOGISTIC REGRESSION FOR PROBABILITY OF MORTGAGE LOAN DENIAL IN THE UNITED STATES

LHS: Loan Denial	(1)	(2)	(3)	(4)	(5)
Female	0.28***	0.29***	0.33***	0.33***	0.32***
	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Minority	0.55***	0.47***	0.40***	0.40***	0.35***
	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Income Q2		-0.43***	-0.44***	-0.44***	-0.44***
		(0.00)	(0.00)	(0.00)	(0.00)
Income Q3		-0.57***	-0.60***	-0.59***	-0.58***
		(0.00)	(0.00)	(0.00)	(0.00)
Income Q4		-0.79***	-0.82***	-0.81***	-0.79***
		(0.00)	(0.00)	(0.00)	(0.00)
Income Q5		-0.97***	-0.96***	-0.96***	-0.88***
		(0.00)	(0.01)	(0.01)	(0.01)
Sole Applicant x Demographics+	X	X	X	X	X
Income x Demographics++			X	X	X
Population				X	X
Income (Tract to MSA)					X
Loan Amount+++	X	X	X	X	X
State FE	X	X	X	X	X
Year FE	X	X	X	X	X
Observations	9,142,931	9,142,931	9,142,931	9,142,931	9,142,931

+All specifications also include an interaction between 'Sole Applicant' and the demographic variables.
++Specifications (3)-(5) also include an interaction between the dichotomous variables for quintiles of applicant income and the demographic variables.
+++Loan amount was broken into quintiles at the national level and included as four dichotomous variables with the lowest quintile being omitted.
Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance.
Note 2: Robust standard errors are contained in parentheses.

TABLE 6B.2: LOGISTIC REGRESSION FOR PROBABILITY OF MORTGAGE LOAN DENIAL IN THE UNITED STATES WITH RACE AND ETHNICITY DETAILED RESULTS

LHS: Loan Denial		(1)	(2)	(3)	(4)	(5)
Female		0.28***	0.28***	0.32***	0.32***	0.31***
		(0.00)	(0.01)	(0.01)	(0.01)	(0.00)
Minority Status	**Black**	0.79***	0.74***	0.45***	0.45***	0.42***
		(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	Asian	0.33***	0.29***	-0.01	0.00	0.02
		(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	Native American	0.62***	0.60***	0.38***	0.37***	0.36***
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
	Multi-Racial	0.48***	0.46***	0.19***	0.18***	0.20***
		(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
	Hispanic	0.43***	0.33***	0.05***	0.06***	0.04***
		(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Income Q2			-0.44***	-0.45***	-0.45***	-0.44***
			(0.00)	(0.00)	(0.00)	(0.00)
Income Q3			-0.58***	-0.61***	-0.61***	-0.59***
			(0.00)	(0.00)	(0.00)	(0.00)
Income Q4			-0.80***	-0.84***	-0.83***	-0.80***
			(0.00)	(0.00)	(0.00)	(0.00)
Income Q5			-0.98***	-0.99***	-0.99***	-0.90***
			(0.00)	(0.01)	(0.01)	(0.01)
Sole Applicant x Demographics+		X	X	X	X	X
Income x Demographics++				X	X	X
Population					X	X
Income (Tract to MSA)						X
Loan Amount +++		X	X	X	X	X
State FE		X	X	X	X	X
Year FE		X	X	X	X	X
Observations		9,142,931	9,142,931	9,142,931	9,142,931	9,142,931

+All specifications also include an interaction between 'Sole Applicant' and the demographic variables.
++All specifications also include an interaction between the dichotomous variables for quintiles of applicant income and the demographic variables.
+++Loan amount was broken into quintiles at the national level and included as four dichotomous variables with the lowest quintile being omitted.
Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance.
Note 2: Robust standard errors are contained in parentheses.

TABLE 6B.3: LOGISTIC REGRESSION FOR PROBABILITY OF MORTGAGE LOAN DENIAL IN THE UNITED STATES, REGIONAL, AND CONNECTICUT

LHS: Loan Denial	Connecticut	Regional	United States
Female	0.07	0.18***	0.32***
	(0.07)	(0.02)	(0.01)
Minority	0.55***	0.51***	0.35***
	(0.07)	(0.03)	(0.01)
Income Q2	-0.66***	-0.53***	-0.44***
	(0.05)	(0.02)	(0.00)
Income Q3	-0.88***	-0.72***	-0.58***
	(0.05)	(0.02)	(0.00)
Income Q4	-1.08***	-1.02***	-0.79***
	(0.06)	(0.02)	(0.00)
Income Q5	-1.25***	-1.14***	-0.88***
	(0.06)	(0.02)	(0.01)
Observations	87,751	643,836	9,142,931

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: All specifications include additional controls for sole applicant interacted with demographics, income quintiles interacted with demographics, population, the ratio of income in the census tract of the home to income in the MSA, loan amount, year fixed-effects, and state fixed-effects (when applicable).

TABLE 6B.4: LOGISTIC REGRESSION FOR PROBABILITY OF MORTGAGE LOAN DENIAL IN THE UNITED STATES, REGIONAL, AND CONNECTICUT WITH RACE AND ETHNICITY DETAILED RESULTS

LHS: Loan Denial		Connecticut	Regional	United States
Female		0.06	0.18***	0.31***
		(0.02)	(0.01)	(0.07)
Minority Status	**Black**	0.42***	0.32***	0.42***
		(0.12)	(0.04)	(0.01)
	Asian	0.02	-0.11**	0.02
		(0.13)	(0.05)	(0.01)
	Native American	0.53**	0.34***	0.36***
		(0.21)	(0.07)	(0.01)
	Multi-Racial	0.23	0.06	0.20***
		(0.18)	(0.06)	(0.02)
	Hispanic	0.22*	0.12***	0.04***
		(0.12)	(0.04)	(0.01)
Income Q2		-0.66***	-0.53***	-0.44***
		(0.02)	(0.00)	(0.05)
Income Q3		-0.88***	-0.73***	-0.59***
		(0.02)	(0.00)	(0.05)
Income Q4		-1.09***	-1.03***	-0.80***
		(0.02)	(0.00)	(0.06)
Income Q5		-1.26***	-1.16***	-0.90***
		(0.02)	(0.01)	(0.06)
Observations		87,751	643,836	9,142,931

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance.
Note 2: Robust standard errors are contained in parentheses.
Note 3: All specifications include additional controls for sole applicant interacted with demographics, income quintiles interacted with demographics, population, the ratio of income in the census tract of the home to income in the MSA, loan amount, year fixed-effects, and state fixed-effects (when applicable).

APPENDIX 7A
ESTABLISHMENT EMPLOYMENT WITH RACE AND ETHNICITY BREAKDOWN

TABLE 7A.1: ESTABLISHMENT EMPLOYMENT IN THE UNITED STATES WITH RACE AND ETHNICITY DETAILED RESULTS

LHS: Log Employment		(1)	(2)	(3)
Female		-0.20***	-0.11***	-0.04***
		(0.00)	(0.00)	(0.01)
Minority Status	**Black**	-0.34***	-0.18***	-0.07***
		(0.01)	(0.01)	(0.01)
	Asian	-0.35***	-0.30***	-0.25***
		(0.01)	(0.01)	(0.01)
	Native American	-0.14***	-0.06**	0.01
		(0.03)	(0.03)	(0.03)
	Multi-Racial	-0.34***	-0.27***	-0.18***
		(0.02)	(0.02)	(0.02)
	Other Race	-0.22***	-0.12**	-0.11**
		(0.05)	(0.05)	(0.05)
	Hispanic	-0.11***	-0.04***	0.01
		(0.01)	(0.01)	(0.01)
Age of owners		X	X	X
Education FE		X	X	X
State FE		X	X	X
Business characteristics			X	X
Business management				X
Observations		645,379	619,495	610,526

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: See Section 7.3 for more information on the control variables.

APPENDIX 7B
ROBUSTNESS TEST FOR EMPLOYMENT SPECIFICATIONS

TABLE 7B.1: AVERAGE ESTABLISHMENT EMPLOYMENT IN THE UNITED STATES

LHS: Log Employment	(1)	(2)	(3)
Female	-0.18***	-0.12***	-0.06***
	(0.01)	(0.01)	(0.01)
Minority	-0.09***	-0.11***	-0.08***
	(0.01)	(0.01)	(0.01)
Age of owners	X	X	X
Education FE	X	X	X
State FE	X	X	X
Business characteristics		X	X
Business management			X
Observations	645,379	619,495	610,526

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: See Section 7.3 for more information on the control variables.

TABLE 7B.2: ESTABLISHMENT EMPLOYMENT IN THE UNITED STATES WITH RACE AND ETHNICITY DETAILED RESULTS

LHS: Log Employment		(1)	(2)	(3)
Female		-0.18***	-0.12***	-0.06***
		(0.01)	(0.01)	(0.01)
Minority Status	**Black**	-0.13***	-0.06***	0.00
		(0.01)	(0.01)	(0.01)
	Asian	-0.12***	-0.18***	-0.17***
		(0.01)	(0.01)	(0.01)
	Native American	0.02	0.06*	0.10***
		(0.03)	(0.03)	(0.03)
	Multi-Racial	-0.15***	-0.16***	-0.10***
		(0.02)	(0.02)	(0.02)
	Other Race	-0.11*	-0.09	-0.07
		(0.06)	(0.06)	(0.06)
	Hispanic	-0.03***	-0.01	0.02*
		(0.01)	(0.01)	(0.01)
Age of owners		X	X	X
Education FE		X	X	X
State FE		X	X	X
Business characteristics			X	X
Business management				X
Observations		645,379	619,495	610,526

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: See Section 7.3 for more information on the control variables.

TABLE 7B.3: AVERAGE ESTABLISHMENT EMPLOYMENT IN CONNECTICUT, REGIONAL MARKET AND UNITED STATES

LHS: Log Employment	Connecticut	Regional	United States
Female	-0.04	-0.06***	-0.06***
	(0.02)	(0.01)	(0.02)
Minority	-0.18***	-0.12***	-0.08***
	(0.02)	(0.01)	(0.02)
Observations	8,383	58,587	610,526

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: See Section 7.3 for more information on the control variables.

TABLE 7B.4: AVERAGE ESTABLISHMENT EMPLOYMENT IN CONNECTICUT, REGIONAL MARKET AND UNITED STATES WITH DETAILED RACE AND ETHNICITY RESULTS

LHS: Log Employment		Connecticut	Regional	United States
Female		-0.04	-0.06***	-0.06***
		(0.02)	(0.01)	(0.05)
Minority Status	**Black**	-0.03	-0.07*	0.00
		(0.10)	(0.04)	(0.01)
	Asian	-0.30***	-0.15***	-0.17***
		(0.07)	(0.02)	(0.01)
	Native American	-0.46*	-0.05	0.10***
		(0.27)	(0.11)	(0.03)
	Multi-Racial	-0.23*	0.08	-0.10***
		(0.13)	(0.06)	(0.02)
	Other Race	0.02	-0.07	-0.07
		(0.37)	(0.10)	(0.06)
	Hispanic	0.00	-0.10***	0.02*
		(0.10)	(0.03)	(0.01)
Observations		8,383	58,587	610,526

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: See Section 7.3 for more information on the control variables.

APPENDIX 7C
ESTABLISHMENT RECEIPTS WITH RACE AND ETHNICITY BREAKDOWN

TABLE 7C.1: ESTABLISHMENT RECEIPTS IN THE UNITED STATES WITH RACE AND ETHNICITY DETAILED RESULTS

LHS: Log Receipts		(1)	(2)	(3)
Female		-1.08***	-0.57***	-0.42***
		(0.00)	(0.00)	(0.00)
Minority Status	**Black**	-1.04***	-0.61***	-0.47***
		(0.01)	(0.01)	(0.01)
	Asian	-0.38***	-0.25***	-0.18***
		(0.01)	(0.01)	(0.01)
	Native American	-0.38***	-0.25***	-0.15***
		(0.03)	(0.02)	(0.02)
	Multi-Racial	-0.56***	-0.37***	-0.27***
		(0.02)	(0.02)	(0.02)
	Other Race	-0.27***	-0.11**	-0.06
		(0.05)	(0.05)	(0.05)
	Hispanic	-0.43***	-0.22***	-0.14***
		(0.01)	(0.01)	(0.01)
Age of owners		X	X	X
Education FE		X	X	X
State FE		X	X	X
Business characteristics			X	X
Business management				X
Observations		1,137,707	1,071,837	1,052,453

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: See Section 7.3 for more information on the control variables.

APPENDIX 7D
ROBUSTNESS TEST FOR RECEIPTS SPECIFICATIONS

TABLE 7D.1: AVERAGE ESTABLISHMENT RECEIPTS IN THE UNITED STATES

LHS: Log Receipts	(1)	(2)	(3)
Female	-0.75***	-0.43***	-0.32***
	(0.00)	(0.00)	(0.00)
Minority	-0.19***	-0.13***	-0.09***
	(0.01)	(0.01)	(0.01)
Age of owners	X	X	X
Education FE	X	X	X
State FE	X	X	X
Business characteristics		X	X
Business management			X
Observations	1,137,707	1,071,837	1,052,453

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: See Section 7.3 for more information on the control variables.

TABLE 7D.2: ESTABLISHMENT RECEIPTS IN THE UNITED STATES WITH RACE AND ETHNICITY DETAILED RESULTS

LHS: Log Receipts		(1)	(2)	(3)
Female		-0.74***	-0.43***	-0.32***
		(0.00)	(0.00)	(0.00)
Minority Status	**Black**	-0.66***	-0.46***	-0.38***
		(0.01)	(0.01)	(0.01)
	Asian	0.16***	0.09***	0.08***
		(0.01)	(0.01)	(0.01)
	Native American	-0.22***	-0.17***	-0.13***
		(0.03)	(0.03)	(0.03)
	Multi-Racial	-0.24***	-0.16***	-0.13***
		(0.02)	(0.02)	(0.02)
	Other Race	-0.02	-0.02	0.01
		(0.05)	(0.05)	(0.05)
	Hispanic	-0.18***	-0.10***	-0.04***
		(0.01)	(0.01)	(0.01)
Age of owners		X	X	X
Education FE		X	X	X
State FE		X	X	X
Business characteristics			X	X
Business management				X
Observations		1,137,707	1,071,837	1,052,453

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: See Section 7.3 for more information on the control variables.

TABLE 7D.3: AVERAGE ESTABLISHMENT RECEIPTS IN CONNECTICUT, REGIONAL MARKET AND UNITED STATES

LHS: Log Receipts	Connecticut	Regional	United States
Female	-0.33***	-0.33***	-0.32***
	(0.04)	(0.01)	(0.00)
Minority	-0.14***	-0.13***	-0.09***
	(0.05)	(0.02)	(0.01)
Observations	15,037	103,580	1,052,453

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: See Section 7.3 for more information on the control variables.

TABLE 7D.4: AVERAGE ESTABLISHMENT RECEIPTS IN CONNECTICUT, REGIONAL MARKET AND UNITED STATES WITH DETAILED RACE AND ETHNICITY RESULTS

LHS: Log Receipts		Connecticut	Regional	United States
Female		-0.33***	-0.32***	-0.32***
		(0.01)	(0.00)	(0.04)
Minority Status	**Black**	-0.42***	-0.41***	-0.38***
		(0.08)	(0.03)	(0.01)
	Asian	0.04	0.03	0.08***
		(0.07)	(0.02)	(0.01)
	Native American	-0.01	-0.11	-0.13***
		(0.23)	(0.12)	(0.03)
	Multi-Racial	-0.32***	-0.18***	-0.13***
		(0.12)	(0.05)	(0.02)
	Other Race	0.10	0.17	0.01
		(0.25)	(0.11)	(0.05)
	Hispanic	-0.02	-0.09***	-0.04***
		(0.07)	(0.03)	(0.01)
Observations		15,037	103,580	1,052,453

Note 1: Coefficient estimates with * have a p-value ≤ .1, ** have a p-value ≤ .05, and *** have a p-value ≤ .01 significance
Note 2: Robust standard errors are contained in parentheses.
Note 3: See Section 7.3 for more information on the control variables.

MAJOR STUDIES OF THE ACADEMY

2015

- Addressing Family Violence in Connecticut: Strategies, Tactics and Policies
- Winter Highway Maintenance Operations: Connecticut
- Shared Clean Energy Facilities
- Methods to Measure Phosphorus and Make Future Predictions

2014

- Energy Efficiency and Reliability Solutions for Rail Operations and Facilities
- Connecticut Biomedical Research Program: Analysis of Key Accomplishments
- Peer Review of a CL&P/UConn Report Concerning Emergency Preparedness and Response at Selective Critical Facilities
- Connecticut Disparity Study: Phase 2

2013

- Analyzing the Economic Impacts of Transportation Projects
- Health Impact Assessments Study
- Connecticut Disparity Study: Phase 1
- Connecticut Stem Cell Research Program Accomplishments

2012

- Strategies for Evaluating the Effectiveness of Programs and Resources for Assuring Connecticut's Skilled Workforce Meets the Needs of Business and Industry Today and in the Future
- Benchmarking Connecticut's Transportation Infrastructure Capital Program with Other States
- Alternative Methods for Safety Analysis and Intervention for Contracting Commercial Vehicles and Drivers in Connecticut

2011

- Advances in Nuclear Power Technology
- Guidelines for the Development of a Strategic Plan for Accessibility to and Adoption of Broadband Services in Connecticut

2010

- Environmental Mitigation Alternatives for Transportation Projects in Connecticut
- The Design-Build Contracting Methodology for Transportation Projects: A Review of Practice and Evaluation for Connecticut Applications
- Peer Review of an Evaluation of the Health and Environmental Impacts Associated with Synthetic Turf Playing Fields

2009

- A Study of the Feasibility of Utilizing Waste Heat from Central Electric Power Generating Stations and Potential Applications
- Independent Monitor Report: Implementation of the UCHC Study Recommendations

2008

- Preparing for Connecticut's Energy Future
- Applying Transportation Asset Management in Connecticut
- A Study of Weigh and Inspection Station Technologies
- A Needs-Based Analysis of the University of Connecticut Health Center Facilities Plan

2007

- A Study of the Feasibility of Utilizing Fuel Cells to Generate Power for the New Haven Rail Line
- Guidelines for Developing a Strategic Plan for Connecticut's Stem Cell Research Program

2006

- Energy Alternatives and Conservation
- Evaluating the Impact of Supplementary Science, Technology, Engineering and Mathematics Educational Programs

Connecticut Academy of Science and Engineering
805 Brook Street, Building 4-CERC, Rocky Hill, CT 06067-3405
Phone: 860-571-7143 • e-mail: acad@ctcase.org
web: www.ctcase.org

Connecticut Academy of Science and Engineering

The Connecticut Academy is a non-profit institution patterned after the National Academy of Sciences to identify and study issues and technological advancements that are or should be of concern to the state of Connecticut. It was founded in 1976 by Special Act of the Connecticut General Assembly.

Vision

The Connecticut Academy will foster an environment in Connecticut where scientific and technological creativity can thrive and contribute to Connecticut becoming a leading place in the country to live, work and produce for all its citizens, who will continue to enjoy economic well- being and a high quality of life.

Mission Statement

The Connecticut Academy will provide expert guidance on science and technology to the people and to the State of Connecticut, and promote its application to human welfare and economic well-being.

Goals

- Provide information and advice on science and technology to the government, industry and people of Connecticut.
- Initiate activities that foster science and engineering education of the highest quality, and promote interest in science and engineering on the part of the public, especially young people.
- Provide opportunities for both specialized and interdisciplinary discourse among its own members, members of the broader technical community, and the community at large.

Connecticut Academy of Science and Engineering
805 Brook Street, Building 4-CERC, Rocky Hill, CT 06067-3405
Phone: 860-571-7143 • e-mail: acad@ctcase.org
web: www.ctcase.org