

APPENDIX F.

Business Ownership in the Dane County Construction Industry

Approximately one in four construction industry workers in Dane County, Wisconsin were self-employed business owners in 2008 through 2012. Keen Independent examined business ownership in the local construction industry for different racial/ethnic and gender groups in Dane County using Public Use Microdata Samples (PUMS) data from the 1990 and 2000 Census and from the 2008 through 2012 American Community Survey (ACS). Note that “self-employment” and “business ownership” are used interchangeably in Appendix F.

A. Business Ownership Rates

Many studies have explored differences between minority and non-minority business ownership at the national level. Although overall self-employment rates have increased for minorities and women over time, a number of studies indicate that race/ethnicity and gender continue to affect opportunities for business ownership.¹ The extent to which such individual characteristics may limit business ownership opportunities differs from industry to industry and by location.

Construction industry. Compared to other industries, construction has a relatively large number of business owners. In 2008 through 2012, 24 percent of workers in the local construction industry were self-employed (in incorporated or unincorporated businesses) compared with only 7 percent of workers across all non-construction industries. However, rates of self-employment in the local construction industry vary by race/ethnicity and gender. Figure F-1 shows the percentage of workers who were self-employed in the construction industry by group for 1990, 2000 and 2008 through 2012. Due to small sample sizes, all minority groups are combined together and compared to non-Hispanic whites. Figure F-1 presents results for Dane County and for the United States as a whole.

¹ For example, see Waldinger, Roger and Howard E. Aldrich. 1990. *Ethnicity and Entrepreneurship*. Annual Review of Sociology. 111-135.; Fairlie, Robert W. and Bruce D. Meyer. 1996. *Ethnic and Racial Self-Employment Differences and Possible Explanations*. The Journal of Human Resources, Volume 31, Issue 4, 757-793.; Fairlie, Robert W. and Alicia M. Robb. 2007. *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(2), 289-323.; and Fairlie, Robert W. and Alicia M. Robb. 2006. *Race, Families and Business Success: A Comparison of African-American-, Asian- and White-Owned Businesses*. Russell Sage Foundation.

Figure F-1.

Percentage of workers in the construction industry who were self-employed, 1990, 2000 and 2008-2012

Dane County, WI	2008-2012	2000	1990
Race/ethnicity			
Minority	15.0 %	15.3 %	16.0 %
Non-Hispanic white	25.6	21.3	26.1
Gender			
Female	19.3 %	14.7 %	9.5 % **
Male	24.9	21.7	27.4
All individuals	24.3 %	21.0 %	25.8 %
United States	2008-2012	2000	1990
Race/ethnicity			
Minority	18.5 % **	14.1 % **	11.1 % **
Non-Hispanic white	27.2	25.4	21.0
Gender			
Female	16.2 % **	16.8 % **	13.5 % **
Male	25.1	23.3	19.7
All individuals	24.3 %	22.6 %	19.1 %

Note: *, ** Denotes that the difference in proportions between the minority and non-Hispanic white groups (or female and male groups) for the given Census/ACS year is statistically significant at the 90% or 95% confidence level, respectively.

Source: Keen Independent Research from 1990 and 2000 U.S. Census 5% sample and 2008-2012 ACS Public Use Microdata samples. The raw data extract was obtained through the IPUMS program of the MN Population Center: <http://usa.ipums.org/usa/>.

Business ownership rates in 2000. According to the 2000 Census, 21 percent of non-Hispanic whites working in the Dane County construction industry were self-employed. The business ownership rate for all minorities combined was 15 percent. This difference is not statistically different from business ownership rates for non-Hispanic whites due to the small sample size of minority construction workers in Dane County.

Fifteen percent of women working in the construction industry in Dane County were self-employed in 2000, compared with about 22 percent of men. Again, business ownership rates between men and women were not found to be statistically different, due to small sample size of female construction workers in Dane County.

The differences in Dane County construction business ownership rates between minorities and non-minorities as well as between men and women were consistent with the nation.

Changes in business ownership rates since 2000. Business ownership rates in the Dane County construction industry among minorities remained unchanged at 15 percent for 2008 through 2012, while the business ownership rate of non-Hispanic whites rose to 26 percent. Business ownership

rates for both males (25%) and females (19%) in the Dane County construction industry increased relative to ownership rates in 2000.

Potential causes of differences in business ownership rates. Researchers have examined whether there are disparities in business ownership rates after considering certain personal characteristics of business owners such as education and age. Several studies have found that disparities in business ownership still exist even after accounting for such race- and gender-neutral factors.

- **Financial capital.** Some studies have concluded that access to financial capital is a strong determinant of business ownership. Researchers have consistently found a positive relationship between startup capital and business formation, expansion and survival.² In addition, one study found that housing appreciation measured at the Metropolitan Statistical Area level is a positive determinant of becoming self-employed.³ However, unexplained differences in business ownership rates for minorities still exist after statistically controlling for those factors.⁴ Access to capital is discussed in more detail in Appendix G.
- **Education.** Education has a positive effect on the probability of business ownership in most industries. However, results of multiple studies indicate that minorities are still less likely to own a business than non-minorities with similar levels of education.⁵ Recent research confirms a significant relationship between education and ability to obtain startup capital.⁶
- **Intergenerational links.** Intergenerational links affect one's likelihood of self-employment. One study found that experience working for a self-employed family member increases the likelihood of business ownership for minorities.⁷
- **Immigration to the United States.** Time since immigration and assimilation into American society are also important determinants of self-employment, but unexplained differences in business ownership between minorities and non-minorities still exist when accounting for those factors.⁸

² See Lofstrom, Magnus and Chunbei Wang. 2006. *Hispanic Self-Employment: A Dynamic Analysis of Business Ownership*. Working paper, Forschungsinstitut zur Zukunft der Arbeit (Institute for the Study of Labor); and Fairlie, Robert W. and Alicia M. Robb. 2006. *Race, Families and Business Success: A Comparison of African-American-, Asian- and White-Owned Businesses*. Russell Sage Foundation.

³ Fairlie, Robert W. and Harry A. Krashinsky. 2006. Liquidity Constraints, Household Wealth and Entrepreneurship Revisited.

⁴ Lofstrom, Magnus and Chunbei Wang. 2006. *Hispanic Self-Employment: A Dynamic Analysis of Business Ownership*. Working paper, Forschungsinstitut zur Zukunft der Arbeit (Institute for the Study of Labor).

⁵ See Fairlie, Robert W. and Bruce D. Meyer. 1996. *Ethnic and Racial Self-Employment Differences and Possible Explanations*. The Journal of Human Resources, Volume 31, Issue 4, 757-793; and Butler, John Sibley and Cedric Herring. 1991. *Ethnicity and Entrepreneurship in America: Toward an Explanation of Racial and Ethnic Group Variations in Self-Employment*. Sociological Perspectives. 79-94.

⁶ Robb, Alicia, Fairlie, Robert w. and Robinson, David T. 2009. "Capital Injections among New Black and White Business Ventures: Evidence from the Kauffman Firm Survey." Working Paper. Federal Reserve Bank of Cleveland.

⁷ See Fairlie, Robert W. and Alicia M. Robb. 2006. *Race, Families and Business Success: A Comparison of African-American-, Asian- and White-Owned Businesses*. Russell Sage Foundation; and Fairlie, Robert W. and Alicia M. Robb. 2007. *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(2), 289-323.

⁸ See Fairlie, Robert W. and Bruce D. Meyer. 1996. *Ethnic and Racial Self-Employment Differences and Possible Explanations*. The Journal of Human Resources, Volume 31, Issue 4, 757-793; and Butler, John Sibley and Cedric Herring. 1991. *Ethnicity and*

B. Business Ownership Regression Analysis

Race/ethnicity and gender can affect opportunities for business ownership, even after accounting for individuals' race- and gender-neutral personal characteristics such as education, age and familial status. Recent research using data from 2007 through 2010 indicates minorities (including African Americans and Hispanic Americans) face greater credit constraints at business startup and throughout business ownership than non-Hispanic whites even after controlling for other factors including credit score.⁹

To further examine factors that predict business ownership, Keen Independent developed multivariate regression models to explore patterns of business ownership in Dane County. Those models estimate the effect of race/ethnicity and gender on the probability of business ownership while statistically controlling for other potentially influential factors.

An extensive body of literature examines whether race- and gender-neutral personal factors such as access to financial capital, education, age and family characteristics (e.g., marital status) help explain differences in business ownership. That subject has also been examined in other disparity studies. For example, prior studies in Minnesota and Illinois have used econometric analyses to investigate whether disparities in business ownership for minorities and women working in the construction industry persist after statistically controlling for race- and gender-neutral personal characteristics.^{10, 11} Those studies have incorporated probit econometric models using PUMS data from the 2000 Census and have been among the materials that agencies have submitted to courts in subsequent litigation concerning implementation of the Federal DBE Program.

The Keen Independent study team used similar probit regression models to predict business ownership from multiple independent or “explanatory” variables.¹² Independent variables included:

- Personal characteristics that are potentially linked to the likelihood of business ownership—age, age-squared, disability, marital status, number of children in the household, number of elderly people in the household and English-speaking ability;
- Indicators of educational attainment;
- Measures and indicators related to personal financial resources and constraints—home ownership, home value, monthly mortgage payment, dividend and interest income and additional household income from a spouse or unmarried partner; and

Entrepreneurship in America: Toward an Explanation of Racial and Ethnic Group Variations in Self-Employment. Sociological Perspectives. 79-94.

⁹ Robb, Alicia. 2012. “Access to Capital among Young Firms, Minority-owned Firms, Women-owned Firms and High-Tech Firms.” Small Business Administration.

¹⁰ National Economic Research Associates, Inc. 2000. *Disadvantaged Business Enterprise Availability Study*. Prepared for the Minnesota Department of Transportation.

¹¹ National Economic Research Associates, Inc. 2004. *Disadvantaged Business Enterprise Availability Study*. Prepared for the Illinois Department of Transportation.

¹² Probit models estimate the effects of multiple independent or “predictor” variables in terms of a single, dichotomous dependent or “outcome” variable — in this case, business ownership. The dependent variable is binary, coded as “1” for individuals in a particular industry who are self-employed; “0” for individuals who are not self-employed. The model enables estimation of the probability that a worker in a given estimation sample is self-employed. The study team excluded observations where the Census Bureau had imputed values for the dependent variable, business ownership.

- Variables representing the race/ethnicity and gender of the individuals included in the analysis.

The study team developed one model using PUMS data from the 2000 Census and a model using ACS data for 2008 through 2012.

Due to the small sample size for the Dane County construction industry, Keen Independent developed probit regression models of business ownership in the Wisconsin construction industry for 2000 and 2008 through 2012. All workers in the Wisconsin construction industry are included in the model and any Dane County effects are estimated by using county-level control variables. In addition, the study team developed simulations of business ownership rates if minorities and women had the same probability of business ownership as similarly situated non-Hispanic whites and males, respectively.

Construction industry in 2000. Figure F-2 presents the coefficients for the probit model for individuals working in the Wisconsin construction industry in 2000. The model indicates that several race- and gender-neutral factors are statistically significant predictors of business ownership for workers in the construction industry:

- Older individuals were more likely to be business owners, but the effect was smaller for the oldest individuals;
- Individuals with more children were more likely to be business owners;
- Home ownership was associated with a lower probability of business ownership but for those who did own a home, higher home values were associated with a higher likelihood of business ownership;
- Workers with greater interest and dividend income were more likely to own a business;
- Higher income levels of a spouse or partner were associated with a higher probability of business ownership; and
- Having less than a high school education was associated with a higher probability of business ownership.

After statistically controlling for race- and gender-neutral factors, statistically significant disparities in business ownership rates remained for Hispanic Americans and women working in the Wisconsin construction industry and for African Americans in the Dane County construction industry.

Figure F-2.
Wisconsin construction industry
business ownership model, 2000

Note:

Hispanic Americans in Dane County, Subcontinent Asian Americans in Dane County, Other Minorities in Dane County and Minority Females in Dane County were excluded from the final regression due to small sample sizes.

*, ** Denote statistical significance at the 90% and 95% confidence levels, respectively.

Source:

Keen Independent Research from 2000 Census data. The raw data extract was obtained through the IPUMS program of the MN Population Center: <http://usa.ipums.org/usa/>.

Variable	Coefficient
Constant	-3.1289 **
Age	0.0507 **
Age-squared	-0.0003 **
Married	-0.0163
Disabled	-0.0504
Number of children in household	0.0530 **
Number of people over 65 in household	0.0509
Owns home	-0.1147 *
Home value (\$000s)	0.0015 **
Monthly mortgage payment (\$000s)	-0.0618
Interest and dividend income (\$000s)	0.0061 **
Income of spouse or partner (\$000s)	0.0029 **
Speaks English well	0.6932
Less than high school education	0.1431 **
Some college	-0.0002
Four-year degree	0.0206
Advanced degree	0.0375
Hispanic American	-0.4114 **
African American	0.0551
African American in Dane County	-1.0769 *
Native American	-0.2053
Native American in Dane County	1.2485 *
Asian-Pacific American	0.0525
Asian-Pacific American in Dane County	0.4552
Subcontinent Asian American	0.3189
Other minority	0.7325
Female	-0.1363 **
Female in Dane County	-0.3222
Minority Female	0.1538
Dane County	-0.0252

Simulations of business ownership rates. The probit modeling approach allowed for simulations of business ownership rates for minorities and women if they had the same probability of business ownership as similarly situated non-Hispanic whites and males, respectively. To conduct those simulations, Keen Independent took the following steps:

1. Keen Independent performed a probit regression analysis predicting business ownership using only non-Hispanic white (or non-Hispanic white male) construction workers in the dataset.¹³
2. The study team then used the coefficients from that model and the mean personal characteristics of individual minority groups (or women) working in the local construction industry (i.e., personal characteristics, indicators of educational attainment

¹³ That version of the model excluded the race/ethnicity and gender indicator variables, because the value of all of those variables would be the same (i.e., 0).

and indicators of personal financial resources and constraints) to estimate the probability of business ownership of such groups.

The results of those simulations yielded estimates of business ownership rates for non-Hispanic whites (or non-Hispanic white males) who shared similar characteristics of minorities (or women) working in the Wisconsin construction industry. Higher simulated rates indicate that, in reality, race/ethnicity or gender makes it less likely for minorities and women to own businesses than similarly-situated non-Hispanic whites (or non-Hispanic white males). Keen Independent performed those calculations for only those groups for which race/ethnicity or gender was a statistically significant negative factor in business ownership (i.e., Hispanic Americans, African Americans in Dane County and women).

Figure F-4 presents simulated business ownership rates (i.e., “benchmark” rates) for Hispanic Americans, African Americans in Dane County and non-Hispanic white women, and compares them to the actual, observed mean probability of business ownership for those groups. The disparity index was calculated by taking the actual business ownership rate for each group and dividing it by each group’s benchmark rate, and then multiplying the result by 100. Values less than 100 indicate that, in reality, the group is less likely to own businesses than what would be expected for similarly-situated non-Hispanic whites (or non-Hispanic white males)—in other words that race/ethnicity (or gender) affects the likelihood of those groups owning businesses in the local construction industry. Similar simulation approaches have been incorporated in other disparity studies that courts have reviewed.

Figure F-3.
Comparison of actual business ownership rates to simulated rates
for Wisconsin construction workers, 2000

Group	Self-employment rate		Disparity index (100 = parity)
	Actual	Benchmark	
Hispanic American	8.2%	17.3%	48
African American in Dane County	4.2%	22.4%	19
Non-Hispanic white female	20.9%	23.6%	89

Note: As the benchmark figure can only be estimated for records with an observed (rather than imputed) dependent variable, comparison is made with only this subset of the sample. For this reason, actual self-employment rates may differ slightly from those in Figure F-1.

Source: Keen Independent Research from statistical models of 2000 Census data. The raw data extract was obtained through the IPUMS program of the MN Population Center: <http://usa.ipums.org/usa/>.

Comparisons of the actual, observed business ownership rate of Hispanic Americans in the Wisconsin construction industry with the benchmark based on simulated business ownership rates of similarly-situated non-Hispanic white construction workers showed that Hispanic Americans own businesses at 48 percent of the rate that would be expected of non-Hispanic white construction workers who share similar personal, financial and educational characteristics. African Americans in Dane County (disparity index of 19) also owned businesses at rates substantially lower than what would be expected based on the simulated business ownership rates of similarly-situated non-Hispanic white construction workers.

Non-Hispanic white women own businesses at 89 percent of the rate that would be expected based on the simulated business ownership rates of similarly-situated non-Hispanic white male construction workers.

Construction industry in 2008 through 2012. Figure F-4 presents the coefficients from the probit model predicting business ownership in the Wisconsin construction industry in 2008 through 2012. Many of the same race- and gender-neutral factors important to predicting business ownership in the 2000 model also had an impact in 2008 through 2012:

- Older individuals were more likely to be business owners, but the effect was smaller for the oldest individuals;
- Individuals with more persons over the age of 65 living in the household were more likely to be business owners;
- Higher home values and higher monthly mortgage payments were associated with a higher probability of business ownership;
- Individuals who speak English well were more likely to own a business; and
- Having less than a high school education was associated with a higher probability of business ownership.

After controlling for race- and gender-neutral factors, a statistically significant difference remained in the business ownership rates of female construction workers.

Figure F-4.
Wisconsin construction industry business ownership model, 2008-2012

Note:

African Americans in Dane County, Subcontinent Asian Americans and Subcontinent Asian Americans in Dane County, Other Minorities in Dane County and Minority Females in Dane County were excluded from the final regression due to small sample size.

*, ** Denote statistical significance at the 90% and 95% confidence levels, respectively.

Source:

Keen Independent Research from 2008-2012 ACS data. The raw data extract was obtained through the IPUMS program of the MN Population Center: <http://usa.ipums.org/usa/>.

Variable	Coefficient
Constant	-2.7196 **
Age	0.0479 **
Age-squared	-0.0003 **
Married	-0.0302
Disabled	0.0239
Number of children in household	0.0297
Number of people over 65 in household	0.0951 *
Owns home	-0.0434
Home value (\$000s)	0.0007 **
Monthly mortgage payment (\$000s)	0.0595 *
Interest and dividend income (\$000s)	0.0021
Income of spouse or partner (\$000s)	0.0010
Speaks English well	0.5049 **
Less than high school education	0.2317 **
Some college	-0.0717
Four-year degree	-0.0342
Advanced degree	0.1889
Hispanic American	-0.0465
Hispanic American in Dane County	0.1330
African American	-0.0862
Native American	-0.1277
Native American in Dane County	0.4954
Asian-Pacific American	-0.3499
Asian-Pacific American in Dane County	1.3812
Other minority	1.0216
Female	-0.3705 **
Female in Dane County	0.0140
Minority Female	-0.0634
Dane County	-0.0910

Simulations of business ownership rates. Using the same approach as for the 2000 data, the study team used the 2008 through 2012 results to simulate business ownership rates if women had the same probability of self-employment as similarly situated non-Hispanic white males. Figure F-5 shows actual and simulated (“benchmark”) business ownership rates for non-Hispanic white women construction workers in Wisconsin. Again, Keen Independent performed those simulations for only those groups where race/ethnicity or gender was a statistically significant predictor of business ownership (i.e., women).

Figure F-5.
Comparison of actual business ownership rates to simulated rates
for Wisconsin construction workers, 2008-2012

Group	Self-employment rate		Disparity index (100 = parity)
	Actual	Benchmark	
Non-Hispanic white female	18.0%	28.6%	63

Note: As the benchmark figure can only be estimated for records with an observed (rather than imputed) dependent variable, comparison is made with only this subset of the sample. For this reason, actual self-employment rates may differ slightly from those in Figure F-1.

Source: Keen Independent Research from statistical models of 2008-2012 ACS data. The raw data extract was obtained through the IPUMS program of the MN Population Center: <http://usa.ipums.org/usa/>.

Non-Hispanic white women construction workers (disparity index of 63) owned construction businesses at rates that were slightly less than two-thirds of what would be expected based on the simulated business ownership rates of similarly-situated non-Hispanic white male construction workers.

C. Summary

Disparities in business ownership were present in the Wisconsin construction industry:

- In both 2000 and 2008 through 2012, business ownership rates for minorities were lower than that of non-Hispanic whites.
- After statistically controlling for a number of race- and gender-neutral factors affecting business ownership, substantially fewer Hispanic Americans and African Americans in Dane County owned firms than what would be expected if they owned businesses at the same rate as similarly-situated non-Hispanic whites in 2000. Those disparities were not found in the 2008 through 2012 ACS data.
- In 2000 and in 2008 through 2012, women working in the local construction industry had substantially lower rates of business ownership than men. After controlling for a number of race- and gender-neutral factors using 2000 Census data and 2008 through 2012 ACS data, disparities persisted in business ownership rates for women.