

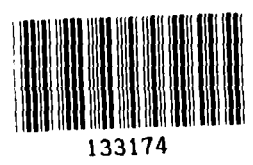
GAO

Report to the Chairman, Committee on
Small Business
House of Representatives

May 1987

SMALL BUSINESS

Evaluation of a Study
on Access to Capital



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RELEASED

**Resources, Community, and
Economic Development Division****B-226649****May 6, 1987****The Honorable John J. LaFalce
Chairman, Committee on Small Business
House of Representatives****Dear Mr. Chairman:**

In response to a March 24, 1986, request from Representative Parren J. Mitchell, then Chairman of the Committee on Small Business, we evaluated the Small Business Administration's (SBA) report entitled Access to Capital by Subcategories of Small Business. The report was prepared by the JACA Corporation (JACA). The subcategories in the JACA report consisted of women, men, minority, and nonminority business owners. As agreed with your staff, we focused our review only on the analysis upon which the study's conclusions on women business owners' access to capital were based.

Your office requested that this report be addressed to you as Chairman of the Committee on Small Business. On September 22, 1986, we briefed the Committee staff on our work to date and, as requested, we are providing our critique of SBA's report. Specifically, our report discusses (1) the methodology SBA and JACA used for the report and (2) the basis for the report's conclusion that, within the study's 3-year period, female business owners appeared to have been able to obtain commercial bank loans easier than their male counterparts. We found that although the study was reasonably designed, it has limitations. Specifically,

- because of the low response rate, there is no statistical assurance that conclusions based on the information collected are generalizable to the population from which the sampled businesses were drawn and
- while the use of the analytical technique—regression analysis—was appropriate, certain limitations may affect whether the analysis correctly isolated the effect of the gender of the business owner from the effects of the other factors (such as a firm's size) that may have contributed to the loan-granting decisions.

These issues are discussed below and addressed in more detail in the appendixes.

In addition to the above, policymakers should recognize that the JACA study only looked at the experiences of established businesses after they

had applied for credit. We believe that any overall conclusions on discrimination about access to credit should be based on data that include other factors such as the experiences of new business owners and the experiences of applicants during the pre-application stage. While this is not a criticism of the study, it is a caution that no global conclusions about female business owners' access to commercial bank credit should be made solely on the basis of the JACA study results.

Background

In September 1982, SBA contracted with the JACA Corporation to report on credit access for different categories of business owners. According to contract documents, SBA's main purpose for contracting to have the research done was to develop information on financial access, or the availability of credit to female business owners, and to obtain recommendations on measures such as changes in laws, regulations, programs, or policy emphasis to enhance financial access.

JACA submitted its final report to SBA in December 1985. After reviewing the report, SBA officially released the report in July 1986.

Study's Research Objectives and Methodology

JACA designed a very broad based national study to address questions regarding access to capital by female and male business owners. Two objectives of the contractor's study were to

- provide a portrait of female and male business owners, including, but not limited to, their access to capital and
- perform a statistical analysis of the factors that determined access to commercial bank credit for established businesses, including the demographic characteristics of such businesses during the 3-year period of the study.

SBA and JACA collected data from over 1,000 small business owners using a two-stage sampling procedure. In the first stage, SBA drew a sample of 240,000 businesses from its 1982 Master Establishment List (MEL) of 8.1 million businesses and sent each a brief questionnaire. The questionnaire requested information on the gender of the owner, the size of the firm, and the industry in which the firm was located. Of the 240,000 businesses, 21,000, or 8.8 percent, replied.

In the second stage sample, drawn by SBA, a detailed questionnaire was sent to 4,000 of the 21,000 businesses (2,000 female-owned and 2,000 male-owned firms). Each of these 4,000 businesses was sent a detailed

questionnaire that requested information on (1) the demographic and entrepreneurial characteristics of the business owner and (2) the characteristics of the firm, including its experience in obtaining commercial bank credit. Of the 4,000 businesses sampled, 1,017, or 25.4 percent, replied. Of the 1,017 respondents, 393 were females and 624 were males.

JACA analyzed the questionnaire data that was collected from its two-stage sampling procedure. Based on this data, JACA provided a portrait of female and male business owners and developed tables comparing the demographic and entrepreneurial characteristics of both female and male business owners. JACA also developed tables comparing the sources of capital, the success rates in acquiring commercial bank loans, and other characteristics of firms owned by males to those owned by females.

Factors thought to determine access to commercial bank credit were analyzed using the responses of those owners who reported formally applying for a commercial bank loan during the 3-year period covered by the study (generally 1981-1984). Access to capital was measured as a loan application success rate. The success rate was calculated as the ratio of the number of loan applications approved to the number of written loan applications submitted within the 3-year period. Based on this approach, JACA concluded that female business owners of established firms "appear to have had an easier time" than male business owners in obtaining commercial bank loans in the 3-year period covered by the study.

No Assurance That Conclusions Are Generalizable Because of Low Response Rate

Based on our review of SBA's report, it appears that SBA and JACA employed generally accepted social science sampling and data collection methods, including methods used to deal with nonresponse problems. Despite these efforts and the fact that data were collected on over 1,000 businesses, in our opinion, there is no statistical assurance that conclusions based on the information collected is generalizable to the larger population from which the sampled businesses were drawn. This lack of assurance is caused by the low response rates to both the brief and the detailed questionnaire, 8.8 and 25.4 percent, respectively.

Given the 8.8 percent response rate obtained by SBA in the first stage sample, there is no statistical assurance that the conclusions drawn by JACA could be generalizable to the larger population (8.1 million) from which the sampled businesses were originally drawn; this would be true even if JACA had received a 100-percent response rate to the second

stage sample. The JACA report concedes this problem, stating that it is not known how representative the respondents to the brief questionnaire are of all firms on the 1982 MEL.

We discussed this issue with SBA officials and they agreed that there is no assurance that the responding businesses are representative of established businesses on the 1982 MEL with respect to the differential access to commercial credit experiences of female and male business owners. However, SBA said that it is reasonable to assume that the respondents are representative based on the nonresponse analysis it performed.¹ Nevertheless, in our view, the low response rate seriously limits the study's results as a valid basis for drawing reliable conclusions on female business owners access to commercial bank credit. (See app. I.)

Limitations of Statistical Analysis Technique Used

JACA used a statistical analysis technique called regression analysis to study the relationship between application success rates and several factors related to the business, the loan request, and the owner. Regression analysis is a statistical technique that measures the relationship between a factor of interest and one or more explanatory factors that may affect it. Regression analysis shows association or relationship; it does not indicate causality. Although regression analysis does not enable an analyst to conclude which other factors cause a change in the factor of interest, it can provide statistics that the analyst can use to

- test which, if any, of the explanatory factors (e.g., gender of owner) are statistically significant in explaining differences in the factor of interest (in this case, the proportion of loan applications accepted);
- measure how much the differences in the factor of interest are explained by changes in the other factors and whether they are statistically significant; and
- predict values for the factor of interest that will occur if one or more of the other factors change.

Although regression analysis was an appropriate analytical technique, we noted certain limitations that may have affected whether the analysis correctly isolated the effect of the gender of the business owner from the effects of the other factors that may have contributed to the

¹According to SBA officials, the nonresponse analysis included contacting, by telephone, those businesses that did not return the brief questionnaire and then comparing the information collected with that reported by questionnaire respondents.

loan-granting decision. Specifically, these include (1) potential measurement errors in factors used in the analysis and (2) omission from the analysis of some factors, such as projected cash flow and solvency of firm, that may affect success in obtaining commercial bank credit. (See app. II.)

Objectives, Scope, and Methodology

To respond to the request, we evaluated the extent to which the SBA study results can be reliably used to draw generalizable conclusions as to whether female business owners generally received equal access to commercial bank credit during the period studied. Because we were asked to focus our review on the basis for the conclusions regarding female versus male experiences with access to credit, we did not review the basis of other conclusions dealing with marital status and minority status. As also agreed with your staff, we did not evaluate the researchers' performance in planning and carrying out the study but only evaluated the basis for the conclusions reached by JACA. We were also requested to conduct a follow-up survey to determine whether or not any subcategory of business borrowers is systematically discouraged from formally applying for bank loans. Based on the results of earlier work for this request, we concluded, and the Committee staff agreed, that conducting the follow-up would not be feasible.

Our work was performed between June and December 1986. We reviewed the SBA study and other relevant studies and literature in the area of access to commercial bank credit. We also reviewed a critique of the study done by the National Association of Women Business Owners and talked to selected female business owners and bankers. We discussed the study's research design and data analysis methods with responsible SBA and JACA officials. We then evaluated the study's research and statistical methods to determine the strengths and weaknesses of its conclusions regarding female versus male experiences with access to credit.

Agency Comments

Generally, SBA stated that the limitations we cited about the JACA study are generic to reasonably designed social science analysis and do not significantly affect the value of the research. We acknowledge the value of the research but believe it is still important to caution readers about its limitations. In particular, we believe that it is important to emphasize that no global conclusions about female business owners' access to commercial bank credit should be made solely on the basis of the JACA

study results. SBA's detailed comments and GAO's responses are included in appendix IV.

Unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days after the date of this letter. At that time, we will make copies available to appropriate committees; the Administrator, SBA; the Director, Office of Management and Budget; and other interested parties.

This report was prepared under the direction of John H. Luke, Associate Director. Other major contributors are listed in appendix V.

Sincerely yours,

A handwritten signature in cursive script that reads "J. Dexter Peach". The signature is written in black ink and is positioned above the printed name and title.

J. Dexter Peach
Assistant Comptroller General

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Abbreviations

GAO General Accounting Office
MEL Master Establishment List
SBA Small Business Administration

No Assurance That Conclusions Are Generalizable Because of Low Response Rate

In its report on access to credit, the JACA Corporation concluded that in the industries where female-owned businesses are represented, female business owners of established firms "appear to have had an easier time" than male business owners in obtaining commercial bank loans during the 3-year period of the study.

Although the Small Business Administration (SBA) study attempted to obtain a nationally representative sample, there is no assurance that the study's conclusions regarding female versus male experiences with access to capital are generalizable to the larger population of businesses from which the samples were drawn. This lack of assurance is caused by the low response rates to both the initial brief questionnaire (8.8 percent) and the subsequent detailed questionnaire (25.4 percent).

Of the 240,000 businesses SBA originally sampled from the 8.1 million universe,¹ 21,000 businesses (8.8 percent) responded to a brief questionnaire which asked the gender of the owner and the type and size of the firm. From the 21,000 respondents, another sample of 4,000 business owners was drawn. This sample was sent a detailed questionnaire requesting information about their experience with access to commercial credit. Of these 4,000, 1,017 (25.4 percent) responded.

Of the 1,017 responding, the proportion of business owners represented in the analysis of access to capital was further reduced because many respondents did not provide enough information to be included in the analysis. According to JACA officials, if there was no response to any one of the characteristics/variables listed as determinants of success, the questionnaire response could not be used by the contractor. JACA was unable to tell us and we were unable to determine how many respondents were excluded from the data for this reason.

The JACA report states that it is not known how representative the respondents to the brief questionnaire are of all firms on the 1982 MEL. SBA agrees that there is no assurance that the responding businesses are representative of established businesses on the 1982 MEL with respect to the differential access to commercial credit experiences of female and male business owners. However, SBA said that it is reasonable to assume that the respondents are representative based on some nonresponse analysis SBA said it performed. Results from this type of analysis did not

¹The population of business firms from which the sample is drawn is SBA's Master Establishment List (MEL) of 8.1 million businesses. The List is a combination of a Dun & Bradstreet list and a "yellow pages" telephone listing.

convince us of the reasonableness of the assumption because of the limitations inherent in the analysis techniques available for use.

SBA officials told us that they investigated the problems of nonresponse with commonly used social science research methods. According to the officials, these methods included contacting, by telephone, sampled businesses that did not return the brief questionnaire and then comparing the information collected with that reported by questionnaire respondents. The officials also said that since the businesses that returned the questionnaire were similar to those contacted by telephone with respect to characteristics tested (such as size of firm, gender of owner, and industry), they would feel comfortable concluding that the respondents to the brief questionnaire were representative of established firms on the 1982 MEL.

The type of nonresponse analysis SBA reported having performed is consistent with generally accepted social science research methods. However, the results of the analysis do not provide, in our opinion, reliable evidence that the businesses responding to the questionnaire are representative, with respect to their experience gaining access to commercial credit, of the larger population of established businesses on the 1982 MEL. The SBA analysis made the following assumptions, namely:

- Telephone respondents and mail respondents have identical experience on all characteristics of interest, including success in obtaining access to commercial credit.
- Businesses from which information could not be collected either by mail or telephone have the same characteristics as those from whom information was collected.

Since we cannot substantiate that the above is true, we do not agree with SBA officials' conclusion that the businesses analyzed in the SBA study are necessarily a representative sample of the population of businesses from which they were drawn.

Statistical Analysis Technique Used

In addition to the low response rate discussed in appendix I, we found some limitations related to the statistical analysis upon which the study's conclusions on access to capital were based. Specifically, these limitations include (1) potential measurement errors in the factors used in the analysis and (2) omission from the analysis of certain factors that may affect success in obtaining commercial credit. These limitations may affect whether the analysis correctly isolated the effect of the gender of the business owner from the effects of other factors that contributed to the loan-granting decisions.

JACA used a statistical analysis technique called regression analysis in an attempt to isolate the effect of the gender of the business owner from the effects of other factors that contributed to the loan-granting decision. JACA analyzed the effect that characteristics of the owner, the firm, and the loan application had on the proportion of loan applications submitted in a 3-year period that were granted (success rate). The determinants of success, as indicated by the results of the regression analysis, are summarized in appendix III.

In general, regression results are most credible when all relevant factors are included in the analysis and are measured accurately. In the JACA analysis, potential problems in measuring data and the possible exclusion of some important variables suggest that the results be interpreted cautiously.

Use of Proxies Introduced Measurement Error

Measurement errors in any of the factors used to explain success rates (such as years of experience owning a business, number of employees, or percent of loan applications during the 3-year period that were long term) may lead to either an upward or a downward bias in estimating the effects of all the explanatory factors in the analysis, including the one for owner's gender. Thus, the effect of gender on access to capital could be misstated when measurement errors are present.

One source of measurement error occurs when information thought to affect loan application success rates is unavailable and a related measure, called a proxy, is used instead. It is common to use proxies in social science research. JACA used two types of proxies in its analysis. The first type of proxy was used because data collected at a specific point in time were used to approximate conditions over the period studied. For example, the categories of owner's years of experience, the firm's credit rating at the time the questionnaire was completed, and the size of the firm were used to explain the proportion of loan applications approved

over the previous 3-year period. Since the owner's age, firm size, and firm credit rating categories could have changed over the 3-year period, measurement error was introduced.

The second type of proxy was introduced when characteristics of the most recent loan application accepted and/or rejected were used to characterize all applications submitted in the 3-year period. Data on whether or not the owner applied to a bank where he/she had maintained two or more accounts in the past were used to explain the applicant's success rate on loan applications submitted over the past 3 years. Since an applicant may have applied to more than one bank during the 3-year period, the number of accounts the owner had at the bank recently applied to may not be a true indication of the number of accounts maintained at other banks applied to and included in the loan success rate calculation. Given the two types of proxies used in the analysis, there was some degree of measurement error in the analysis and, as a result, the effect of gender on access to capital could be misstated.

Relevant Factors Omitted From Analysis

As a general principle, in performing regression analysis it is desirable to include all the relevant factors likely to be important in explaining variation in the event being studied (the dependent variable). If some factors are omitted, the estimates of the effects of the included factors might differ from the estimates that would be obtained with the additional factors included. In practice, for a variety of reasons related to theoretical limitations and data availability, regression equations often include only a subset of possible explanatory factors selected.

In a typical analysis of the type JACA performed, the factors included in the analysis, taken together, explain only a fraction of the variability in the dependent variable. In general, the larger the fraction of the variation that can be explained by the included factors, the less likely that there might be some omitted factors that can explain a significant amount of the remaining unexplained variation. In the JACA study, the factors included together explain less than 20 percent of the variation in the dependent variable. Although this percent is low compared to some studies, it is not unusual for a study of this type.

A relatively low ability to explain variation in the dependent variable does not necessarily mean that inclusion of omitted factors would change any estimates of the effects of the included factors. For any particular factor, such as the gender of a loan applicant, an identical study,

including additional explanatory factors, would be likely to yield substantially different estimates of its effect only if the additional factors included were correlated with the gender factor. We do not know if any of the possible factors that JACA did not include—either economic factors or non-economic ones—would be either statistically significant factors in explaining variation in the dependent variable or correlated with the gender of the applicant. That possibility does exist, however, and may be considered more likely in this study than in some others because of the relatively low explanatory power of the regression equation. Accordingly, for this reason as well as others already discussed, we believe that the findings of the JACA study should be interpreted cautiously.

Determinants of Success Rates of Established (Not New) Firms in Applying for Commercial Bank Loans in the Last 3 Years^a

Characteristic/Variable	Coefficient ^b	Levels of statistical significance (Percent)
I. Intercept	0.6254	99
II. Degree of business knowledge/ experience of the owner		
3 to 9 years of experience in owning a business	0.1582	95
More than 9 years experience in owning a business	0.2008	99
III. Characteristics of the firm		
Size of the firm		
- One to four employees	0.0916	95
- More than four employees	0.1083	95
Credit rating of the firm		
- Excellent	0.0864	99
- Poor	-0.3685	99
- None	-0.2777	99
IV. Characteristics of the loan application		
Percent of loan applications that are for long-term loans (more than 5 years to maturity)	-0.1483	99
Owner applied to a bank where he/she had maintained two or more accounts in the past (1 if yes)	0.0418	90
V. Demographic characteristics of the owner		
Dummy, sex (1 if a male)	-0.0581	95
Dummy, minority (1 if a minority)	-0.0192	Not Significant
Dummy, divorced (1 if divorced)	-0.1316	99

^aSuccess rates are the percent of loan applications in the last 3 years that were accepted.

^bThe estimated average change in the success rate associated with a unit change in the variable or characteristic, when the other independent variables are held constant.

Note: There are 459 degrees of freedom in the equation, and the R² is .1784.

Comments From the Small Business Administration

Note: GAO comments supplementing those in the report text appear at the end of this appendix.



U.S. SMALL BUSINESS ADMINISTRATION
WASHINGTON, D.C. 20416

OFFICE OF CHIEF COUNSEL FOR ADVOCACY

March 30, 1987

Mr. J. Dexter Peach
Assistant Comptroller General
General Accounting Office
Washington, D. C. 20548

Dear Mr. Peach:

Thank you for the opportunity to review and comment on your proposed report, Small Business: Evaluation of a Study on Access to Capital (GAO/RCED-87-94).

Your report found that the study was reasonably designed, but has methodological limitations. The limitations you itemize are generic to reasonably designed social science analysis; and, do not, in our opinion, represent significant limitation on the value of the research.

In response to GAO's specific points:

1. GAO discusses our low survey-response rate.

SBA's follow-up to the low response was a telephone survey of non-respondents, which GAO admits is "consistent with generally accepted social science research methods". Nonetheless, GAO remains "unconvinced". We cannot agree.

The ultimate solution to a low-response rate is a census of all members of the subject population. This is clearly beyond the ability of any institution, excepting the Bureau of Census, which has legal authority to require responses.

SBA and its contractor sampled non-respondents by telephone until a combined sample was developed sufficient to eliminate non-response bias. The method used represents standard statistical practice which was documented in full for GAO. We do not believe that, given our follow up, the usefulness of the sample is restricted in any way by the size of the initial response.

See comment 1.

Letter to J. Dexter Peach

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2. GAO admits the use of regression analysis was appropriate", but cites limitations "common to such analysis".

We agree that there are limitations. We do not believe the "inherent" limitations of regression analysis significantly imperil the utility of this report. GAO is, in effect, making a general methodological point that regression analysis is not a perfect system. When social and econometric experts push the boundaries of research methodology to presently unavailable levels of certainty, we will insist that our researchers use those techniques. Until that day, however, we have absolute confidence in the research methodology utilized by Dr. Ando.

I should also add that your draft letter to the Chairman cautioning against global conclusions about all women business owners may well lead the reader to infer that SEA has suggested such conclusions. That is not, and has not, been the case. As the enclosed press release from June 1986 indicates, we have taken great care in applying the results of the research to the question analyzed: the credit history of established women business owners. If the GAO feels compelled to put a caution in the letter, it should clarify that the SBA has accurately characterized the report.

In summary, we regard the JACA report as excellent, methodologically sound research, shedding light on an important public policy issue for which there is no similar literature. Dr. Ando was asked to present her work at the 1986 Annual Meeting of The North American Economics Association. Along with similar research of credit history of minority entrepreneurs, supported by the Minority Business Development Administration, the SBA study has been published and discussed in several professional economic journals. Judged by the professional notice and attention the JACA report is receiving, it is an important contribution to the economic literature and to public policy discussion.

Sincerely,



Frank S. Swain
Chief Counsel for Advocacy

Enclosure (1)

See comment 2.

See comment 3.

The following are GAO's comments on the Small Business Administration's letter dated March 30, 1987.

GAO Comments

1. We acknowledge SBA's efforts to eliminate nonresponse bias in its initial sample and that was addressed in the draft report. However, we still believe that because a large portion of the businesses are not represented by responses to either the mail or telephone surveys, nonresponse bias is a potential problem that could affect the conclusions in the JACA study.

2. We do not disagree that regression analysis has certain limitations. However, as discussed in the report, it is still important to note that the limitations may affect whether the analysis correctly isolated the effect of the gender of the business owner from the effects of other factors that contributed to the loan-granting decisions.

3. We did not suggest in the report that SBA had inaccurately characterized the study. Rather, we only wanted to point out that no global conclusions about female business owners' access to commercial bank credit should be made solely on the basis of the JACA study results. As we have pointed out, we do not intend that our opinion on global conclusions on discrimination be considered a criticism of the JACA study.

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