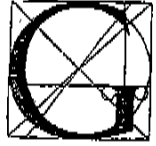

THE RELATIONSHIP BETWEEN INDUSTRIAL CONCENTRATION, FIRM SIZE, AND TECHNOLOGICAL INNOVATION

FINAL REPORT

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Gellman Research Associates, Inc.

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EXECUTIVE SUMMARY

The process of innovation is a subject of increasing interest and significance, and it is of special interest to those seeking to stimulate or support innovative activity. In this context, it is important to understand the relationships that exist between an innovating unit and the environment in which it operates. The desire to add to this understanding provided the impetus for initiating the research reported here.

This research focused on relationships between an innovating firm, and the industry of which it is a member, and innovative performance, with special emphasis on firm size. Industry characteristics singled out for study were concentration, growth, and capital intensity. The measures of innovation performance were the frequency of innovation and the speed at which innovation occurs.

All of the data on innovation performance were collected by Gellman Research Associates (GRA) either as part of this study or an earlier study commissioned by the National Science Foundation (NSF). Unlike many previous studies which employ proxies for innovative behavior, such as patented inventions or research and development (R&D) expenditures, the present effort examines in detail actual innovations brought to market. A total of 635 innovations were studied including 45 from the NSF study. To this information was added data on firm size, concentration, industry growth, and industry

capital intensity from various published sources. The data set was then used to examine various relationships.

The principal findings are:

1. Small firms produce 2.5 times as many innovations as large firms, relative to the number of people employed.
2. Small firms bring their innovations to market faster than large firms.
3. Large firms are 2.8 times more likely to be assisted in innovation by public funds.
4. Large firms in concentrated industries tend to acquire more of their innovations from other firms than do smaller companies.
5. Small-firm innovation rates based on employment are below the small firm average in diffuse industries (Concentration Ratio $\leq$ 0.2) and significantly above average in industries with $0.2 < CR \leq 0.4$.

6a. In industries where employment is increasing, large firms in highly concentrated industries ($0.6 < CR \leq 1.0$) innovate below the average of large firms in growing industries and above average for ($0.2 < CR \leq 0.6$).

6b. In industries where employment is decreasing, large firms in less concentrated industries ($CR \leq 0.4$) innovate above the average of large firms in declining industries and below average elsewhere.

7. Small and large firms exhibit substantially the same distributions of innovation with respect to concentration ratio. The intervals $0.2 < CR \leq 0.6$ in industries with increasing employment and $0 < CR \leq 0.4$ in industries with decreasing employment are the major producers of innovation.

8. Innovation performance by small firms is not affected by capital intensity.

9. Large firms innovate less in capital-intensive industries than in industries that are not capital intensive.

These principal findings have significant policy implications, including the following:

- The finding that small firms produce significantly more innovations than large firms per employee, coupled with earlier findings that small firms are more efficient in their use of R&D dollars,* indicates that public R&D funding of small technologically-aware firms will be significantly more cost-effective than the funding of larger firms.
- The cost-effectiveness of public funding of small firm R&D is further enhanced because small firm innovations are brought to market sooner than those of large firms.

Other findings are discussed in detail in the report.

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*Science Indicators 1976, Report of the National Science Board 1977, p. 116-118.

Chapter 1

INTRODUCTION AND FINDINGS

I. Introduction

The process of industrial innovation is a subject of increasing interest and significance, and it is of special interest to those seeking to stimulate or support innovative activity. In this connection, it is important to understand the relationships that exist between an innovating unit and the environment in which it operates. The desire to add to this understanding provided the impetus for initiating the research reported here.

The focus of this research is on relationships between an innovating firm and the industry of which it is a member and innovation performance. Special emphasis was given to the role of firm size as it affects the propensity of a firm to innovate. Industry characteristics singled out for study were concentration, growth, and capital intensity. The measures of innovation performance were the frequency of innovation and the speed at which innovation occurs.

Inquiries were also made into how and to what extent public funding enters the innovation process, including the marketing and distribution of innovations, and into the effect of successful innovation on the ownership of an innovating firm.

This study is one of several recent efforts to add to the store of knowledge and to further understanding of this subject. To the extent that the data collection techniques employed are similar, it is an extension of an earlier National Science Foundation study[1] of 500 innovations introduced between 1953 and 1973. Unlike many previous studies which employ proxies for innovating behavior, such as patented inventions or R&D expenditures, the present effort examined in detail actual innovations brought to market.

Of the 500 innovations reported in the NSF study, 277 were introduced by United States manufacturing firms and, of these, 45 were introduced after 1969. Data on these 45 innovations were combined with the data of the present study.

This study examines the effect on innovation performance of the following:

- industry concentration,
- industry captial intensity,
- firm size,
- markets for innovations,
- public funding of the innovation process,
- ownership of innovating firms,
- the effect of innovation upon ownership, and
- transfer of product innovations abroad.

[1] Indicators of International Trends in Technological Innovation, Washington, DC: National Science Foundation, 1976.

These questions were based on previous theoretical and empirical work on the relationships between innovation performance and firm and industry characteristics. One theory hypothesizes that highly concentrated industries should be more willing and able to undertake the process of innovation, a priori. This may be so if the process of innovation is costly and/or risky. By using their market power to attain higher profit levels, firms may be able to generate significant internal pools of funds which allow them to invest in relatively risky R&D without having to obtain capital from external sources.

Other theories concerning the beneficial effects of concentration on innovations include the following. Companies that are not subject to the short-run uncertainties of competition may be more willing to commit funds to long-range R&D projects. Moreover, monopolistic or oligopolistic firms may be better able to internalize the benefits from innovation through their more extensive distribution and marketing channels. Finally, because oligopolists often do not compete on a price basis, they may place more emphasis on non-price dimensions of competition such as product differentiation and innovation.

On the other hand, it has been hypothesized that firms in competitive industries have a greater incentive to innovate precisely because of the competitive nature of the market. (A small firm has more to gain from innovation.) A corollary to this view is that a high degree of market power breeds complacency and creates institutional

barriers to change. This point of view engenders the hypothesis that firms with considerable market power will innovate more slowly, but may be aggressive followers or imitators of smaller firms once the latter have completed the innovation process.

However, any attempt to test the above hypotheses requires that absolute firm size be distinguished from industry concentration (corresponding to some measure of market power). The above hypotheses have been cast in terms of industry concentration, but parallel arguments can be offered concerning the relationship between absolute firm size and innovation.

Specifically, it can be argued that large firms are better able to innovate because of their larger pool of financial resources. Conversely, those who believe that a small firm environment favors innovation would argue that increasing firm size leads to institutional inertia, thus slowing the desire to innovate.

Although the arguments concerning absolute firm size and industry concentration as they relate to innovation are somewhat parallel, it should be clear that the hypotheses themselves are quite distinct. Thus, for example, a result indicating that firms in competitive industries tend to innovate more than firms in concentrated industries does not, by itself, imply a relationship between firm size and innovating efficiency.

Because data on R&D expenditures per employee were not collected as part of this study, a direct comparison of innovative performance between small and large firms with respect to R&D expenditures

is not possible. On the other hand, a finding that small firms innovate at a greater frequency than large firms, based on the number of persons employed, would be consistent with earlier research which showed that small firms (less than 1,000 employees) produce about 4 times as many innovations as large firms per R&D scientist and engineer and that the cost per R&D scientist and engineer is almost twice as great in firms with over 1,000 employees than in firms with less than 1,000 employees.[2] A small firm in the present study is defined as a firm with less than 500 employees.

II. Principal Findings and Policy Implications

The detailed analyses leading to the findings of the study are given in Chapter 3. The principal findings are the following:

1. Small firms produce 2.5 times as many innovations as large firms, relative to the number of people employed.
2. Small firms require less time to take an innovation from performance specification to market introduction.
3. Large firms are 2.8 times more likely to be assisted in innovation by public funds.
4. Large firms in concentrated industries tend to acquire more of their innovations from other firms than do small firms.
5. Small-firm innovation rates based on employment are below the small firm average in diffuse industries (Concentration Ratio ≤ 0.2) and significantly above average in industries with $0.2 < CR \leq 0.4$.

[2] Small Firms and Federal R&D, 1977, Office of Management and Budget.

6a. In industries where employment is increasing, large firms in highly concentrated industries innovate below the average of large firms in growing industries ($0.6 < CR \leq 1.0$) and above average for ($0.2 < CR \leq 0.6$).

6b. In industries where employment is decreasing, large firms in less concentrated industries ($CR \leq 0.4$) innovate above the average of large firms in declining industries and below average elsewhere.

7. Small and large firms exhibit substantially the same distributions of innovation with respect to concentration ratio. The intervals $0.2 < CR \leq 0.6$ in industries with increasing employment and $0 < CR \leq 0.4$ in industries with decreasing employment are the major producers of innovations.

8. Innovation performance by small firms is not affected by capital intensity.

9. Large firms innovate less in capital-intensive industries than in industries that are not capital intensive.

Interpretation of Findings

One must proceed with caution in attempting to draw further inferences by combining two or more findings. For example, consider the following figure:

Innovation Performance of Large Firms

	Capital-Intensive Industry	Non-Capital Intensive Industry	Average Innovation Performance
Concentrated Industry	?	?	Below
Diffuse Industry	?	?	Above
Average Innovation Performance	Below	Above	

None of the relationships in the "boxes" shown above were explicitly tested. However, the results labeled "Average Innovation Performance" were tested. For example, large firms innovate less in concentrated industries than in diffuse industries. This finding, however, cannot be used to draw a conclusion about the innovation performance of large firms in either capital-intensive concentrated industries or non-capital-intensive concentrated industries.

Implications

The principal findings of the present study have unambiguous implications for public policy towards small businesses. First, the finding that small firms produce significantly more innovations than large firms per employee indicates that public R&D funding of small technologically-aware firms will be more cost-effective than the funding of large firms. The public benefits further from the fact that small firms bring their innovations to market sooner than large firms. However, the study indicates that large firm innovations are more likely to be assisted by public funds.

The results of this study support a conclusion that small firms more than carry their weight in terms of producing innovations and thereby add to the technological and economic progress of the United States. Increased public funding of such firms for innovative activities should therefore be encouraged.

III. Analysis

The industries generating the innovations reported in the survey are not homogeneous. Among other things, they vary with respect to growth, firm size, concentration, capital intensity, the age of their technological base, and the characteristics of their markets. These variables were used to partition the survey data into subsamples for further analysis.

One such partitioning reflects, in an approximate way, the familiar life cycle concept of product and industry develoment, with its stages of product introduction, market expansion, market stability, and finally, decline. The criteria for grouping the industries were formulated in terms of the changes in the number of establishments and the number of employees in an industry over a specified time interval.

Four groups, denoted by P1, P2, P3, and P4, were defined. Their definitions are given in Table 1.1, together with the number of innovating industries in each group and the number of innovations produced.

Table 1.1

DISTRIBUTION OF INDUSTRIES AND INNOVATIONS WITH RESPECT TO CHANGES IN NUMBER OF EMPLOYEES AND NUMBER OF ESTABLISHMENTS

P1: Establishments Increased or Data Not Available for 1967
Employment Increased

Industries:	57
Innovations	
Small Firms:	121
Large Firms:	207
Unknown:	50

P2: Establishments Increased or Data Not Available for 1967
Employment Decreased

Industries:	42
Innovations	
Small Firms:	89
Large Firms:	109
Unknown:	21

P3: Establishments Decreased
Employment Increased

Industries:	6
Innovations	
Small Firms:	2
Large Firms:	7
Unknown:	0

P4: Establishments Decreased
Employment Decreased

Industries:	16
Innovations	
Small Firms:	14
Large Firms:	14
Unknown	1

The data for determining changes in the number of establishments and employment are shown in Appendix C. These data were obtained from the United States Department of Commerce, Census of Manufactures.

Changes in the number of establishments were developed by comparing the number of industry establishments in 1972 with those in 1967. Changes in employment were obtained by comparing industry employment in 1976 with employment in 1967. Where 1967 employment figures were not available (NA), the comparison was made between 1976 and 1972 figures. Details are given in Chapter 3.

Industries in P1 are growing in terms of both number of establishments and employment; typically, these are newer industries in the sense that they either employ recently introduced technologies or compete in new markets, whether or not these markets were created by or exist independently of the new technology. In contrast, industries in P4 are in decline in terms of both employment and number of establishments; these industries typically employ old or developed technologies and compete in established but declining markets. Industry groups P2 and P3 are intermediate cases.

One might expect P1 industries to be more innovative than P2, P3, or P4 industries. This is illustrated in Table 1.2 which shows the frequency of innovations produced by industries for which ten or more innovations were reported in the survey. Appendix D provides additional details on the industries in each subsample.

Table I.2

DISTRIBUTION OF INNOVATIONS AMONG INDUSTRIES REPORTING TEN OR MORE INNOVATIONS

SIC Number	Industry Description	Population	Total
2821	Plastics, Synthetic Resins, and Nonvulcanizable Elastomers	P1	18
3079	Miscellaneous Plastics Products	P1	10
3551	Food Products Machinery	P1	10
3573	Electronic Computing Equipment	P1	32
3674	Semiconductors and Related Devices	P1	23
3714	Motor Vehicle Parts and Accessories	P1	18
3825	Instruments for Measuring and Testing of Electricity and Electrical Signals	P1	44
3829	Measuring and Controlling Devices, NEC	P1	26
3832	Optical Instruments and Lenses	P1	68
3861	Photographic Equipment and Supplies	P1	13
3545	Machine Tool Accessories and Measuring Devices	P2	16
3569	General Industrial Machinery and Equipment, NEC	P2	12
3662	Radio and Television Transmitting, Signaling, and Detection Equipment and Apparatus	P2	32
3811	Engineering, Laboratory, Scientific, and Research Instruments and Associated Equipment	P2	41
3823	Industrial Instruments for Measurement, Display, and Control of Process Variables	P2	33
3541	Machine Tools, Metal Cutting Types	P4	10

Chapter 2

DATA COLLECTION

I. Selection of Innovations

GRA compiled a sample of 590 innovative products in selected industries. The objectives of the sample selection process were as follows:

- to obtain a sample of innovations which, when combined with data from the NSF study on 45 innovations introduced after 1969, would be large enough to permit significant inferences to be drawn from an analysis of the innovation process;
- to represent innovations from the broad spectrum of industries as measured by concentration, growth rate, and capital intensity;
- to represent adequately innovations introduced by both large and small firms; and
- to concentrate on innovations marketed in the U.S. since 1970.

The sample served to identify a set of innovations for which basic information was available and which met the objectives listed above.

The sources of the sample are the publications listed in Table 2.1. Approximately 43 percent of the sample was selected from among the award-winning innovations described in Industrial Research & Development Magazine. The publication spans the period 1970-1979.

Table 2.1

SOURCES OF SAMPLE

Source Publication	Number of Innovations	Percentage of Total
Automotive Engineering	16	2.7
Aviation Week & Space Technology	2	0.3
EDN Magazine/Electrical Design News	14	2.4
Engineering Newsrecord	17	2.9
Food Engineering	32	5.4
IEEE Spectrum	21	3.6
Industrial Research & Development	252	42.7
Mechanical Engineering	8	1.4
Modern Plastics	14	2.4
Optical Engineering	17	2.9
Product Engineering	72	12.2
Review of Scientific Instruments	44	7.5
Tooling & Production	47	8.0
Ward's Auto World	23	3.9
Other	11	1.9
Total	590	100.0 %

Articles and advertisements in the source publications were surveyed to identify products or processes that had been offered for sale in the marketplace and which incorporated some aspect of technical change. From the reference in the periodical, basic information about the product was recorded, including a description of the innovation, the identity of the innovating company, the date of market introduction, and the source publication. The data form used to record this information is reproduced as Figure 2.1. The process of identifying and selecting innovations for a sample is similar to that used in an earlier study of innovation prepared by Gellman Research Associates, Inc. for the National Science Foundation.[3]

The periodicals surveyed were selected for their coverage of seven product areas that had been well-represented in the earlier NSF study. Three areas were chosen from among relatively concentrated industries, and four from relatively competitive industries. By this procedure, GRA sought to insure that the sample incorporated a sufficient number of innovations in each type of industry to support inferences about industry structure and innovation. The three relatively concentrated industries were defined by the Standard Industrial Classification[4] (SIC) Group Numbers 357 (Office, Computing and Accounting Machines); 371 (Motor Vehicles and Motor Vehicle Equipment); and

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[3]Indicators of International Trends in Technological Innovation, Washington, DC: National Science Foundation 1976.

[4]Executive Office of the President, Office of Management and Budget, Standard Industrial Classification Manual, 1972. Washington, DC: GPO.

Innovation No. _____
Innovation Rank _____
Preliminary No. _____

Figure 2.1

INNOVATION DATA FORM

PART I: DESCRIPTIVE DATA

1. Description of the Innovation: _____

2. Innovating Organization: _____

   Name: _____

   Address: _____

   Telephone: _____

   SIC Number or Product Lines (If Known): _____

3. Date of Market Introduction: _____

4. Country of Market Introduction: United States

5. Source: _____

Form 11/30/79 Signature: _____ Date Completed: _____

386 (Photographic Equipment and Supplies). The four relatively more competitive industries were defined by SIC Group Numbers 307 (Miscellaneous Plastics Products); 354 (Metalworking Machinery and Equipment); 355 (Special Industry Machinery, except Metalworking Machinery); and 383 (Optical Instruments and Lenses).

Collection of the Sample

The sample that resulted from this selection process represented a broader range of products than the seven areas originally chosen for emphasis. One reason is that products serving an industry come from a diversity of sources, including other industries that provide components and supplies. In addition, technologies developed in one industry may be applied to the products of numerous other industries. For example, many of the innovations in the machine tool industry involve numerical control equipment based on electronic and computer technologies.

The range of industries introducing innovations reported in the sample, including 45 post-1969 innovations from the NSF study, is shown in Table 2.2. A four-digit SIC number was assigned to each innovation on the basis of its characteristics as a product. In the hypothetical case of a laser alignment device for machine tools, for example, the SIC number assigned would be 3545, which covers machine tool accessories. At a later point in the study, the SIC numbers of the industry that first introduced the innovation would be assigned; in the case of a laser alignment device, it could have been a computer company, an electronics firm, or an organization in some other industry.

Table 2.2

DISTRIBUTION OF SAMPLE, BY 3-DIGIT SIC CODE*

SIC No.	Frequency	SIC No.	Frequency
205	1	347	3
222	1	349	11
229	1	352	2
239	1	353	9
249	1	354	39
251	1	355	20
264	1	356	22
266	1	357	38
281	8	358	4
282	24	359	2
283	1	361	3
284	2	362	8
285	2	363	1
286	2	364	4
287	2	365	1
289	10	366	36
301	1	367	41
307	10	369	16
322	2	371	21
325	1	372	2
326	1	373	1
327	1	375	2
329	5	381	43
331	3	382	114
332	1	383	68
335	2	384	7
339	1	385	2
341	1	386	13
342	1	387	1
343	2	395	1
344	4		
345	4		
346	1		

*Includes 45 post-1969 innovations from NSF study.

II. Collection of Survey Data*

More detailed and accurate information was obtained for a subset of the sample. Beginning with the company identified in the source publication from the sample, telephone interviewers attempted to locate people familiar with the history of the product, its development, and its marketing. These individuals may have participated in the innovation process at any of several stages and in various roles. Occasionally, several individuals contributed information about the development of a single innovation. The telephone inquiries, together with mailed questionnaires where necessary, proved to be a highly efficient means of locating and obtaining information about the development of a product and the innovating organization. Typically, this kind of information is not available from public sources or corporate records.

The information sought in the telephone/mail survey is described in Part II of the Innovation Data Form (Figure 2.2). These data were obtained for a subsample of innovations. (Firm size information was obtained for another 314 innovations.) The size of the subsample was limited by the following causes:

- inability to locate the innovating company or individuals,
- refusal by a company to participate in the survey, or
- failure to substantially complete the questionnaire.

*Excludes 45 NSF innovations.

Figure

GELLMAN RESEARCH ASSOCIATES, INC.

PART II: DETAILED INNOVATION HISTORY

A. History of Product (or Process) Development

1. Identify and date key elements in the preproduction stage:

Key Element	Date	Not Known	Not Applicable	No Response	Question Omitted
(a) performance criteria					
(b) preliminary engineering designs finalized					
(c) prototype/pilot-project/ bench model					

2. Identify and date key elements in the production and marketing of the innovation:

Key Element	Date	Not Known	Not Applicable	No Response	Question Omitted
(a) first production					
(b) meet government regulation					
(c) first order/contract/ delivery					
(d) modifications after first delivery (required by customer)					
(e) start-up sales promotion					
(f) first retail sales					

Figure (Cont'd)

B. Technology

3. Was any part of the technology underlying the innovation:

(a) developed by R&D activity within the organization?

_____ Yes _____ Not Known _____ No Response
_____ No _____ Not Applicable _____ Question Omitted

(b) acquired through merger or acquisition of a going concern?

_____ Yes _____ Not Known _____ No Response
_____ No _____ Not Applicable _____ Question Omitted

(c) developed abroad?

_____ Yes _____ Not Known _____ No Response
_____ No _____ Not Applicable _____ Question Omitted

(d) acquired by license?

_____ Yes _____ Not Known _____ No Response
_____ No _____ Not Applicable _____ Question Omitted

(e) patented (by this organization or another)?

_____ Yes _____ Not Known _____ No Response
_____ No _____ Not Applicable _____ Question Omitted

(f) Was the technology acquired in any other way not mentioned above?

_____ Yes _____ Not Known _____ No Response
_____ No _____ Not Applicable _____ Question Omitted

If yes, please specify: _____

_____

_____

Figure 2 Cont'd)

C. Governmental Role

4. (a) Were public funds, contracts, grants, etc., used to assist the innovating enterprise?

_____ Yes _____ Not Known _____ No Response

_____ No _____ Not Applicable _____ Question Omitted

(b) If yes, which specific activities related to innovation did public funds support?

_____ Basic Research _____ Other (specify) _____

_____ Applied Research _____

_____ Development _____ Not Known

_____ Engineering _____ Not Applicable

_____ Production-Oriented Activities _____ No Response

_____ Marketing and Distribution _____ Question Omitted

D. The Innovating Organization

5. Describe the type of organization you are (e.g., retail, industrial, wholesale, farm, research institution, university): _____

_____

_____ Not Known _____ No Response

_____ Not Applicable _____ Question Omitted

6. What is the present size of the organization (no. of employees)?

_____ 0 _____ 100-249

_____ 1-9 _____ 250-499

_____ 10-19 _____ 500-999

_____ 20-99 _____ 1000+

6. If only a rough approximation is possible:
(cont.)

_____ 0
_____ 20-99
_____ 100-499
_____ 500-999
_____ 1000+
_____ Not Known
_____ Not Applicable
_____ No Response
_____ Question Omitted

7. (a) When the innovation was introduced, was the size of the organization very different?

_____ Yes
_____ No
_____ Not Known
_____ Not Applicable
_____ No Response
_____ Question Omitted

(b) If yes, how many employees did it have?

_____ 0
_____ 1-9
_____ 10-19
_____ 20-99
_____ 100-249
_____ 250-499
_____ 500-999
_____ 1000+

If only a rough approximation is possible:

_____ 0
_____ 20-99
_____ 100-499
_____ 500-999
_____ 1000+
_____ Not Known
_____ Not Applicable
_____ No Response
_____ Question Omitted

8. Describe the organization's present form of ownership.

_____ Closely held corporation, partnership or sole proprietorship
_____ Publicly held corporation (shares traded on exchange)
_____ Government-owned or controlled
_____ Not Known
_____ Not Applicable
_____ No Response
_____ Question Omitted

9. (a) Was the form of ownership different when the innovation was introduced?

_____ Yes _____ Not Known _____ No Response
_____ No _____ Not Applicable _____ Question Omitted

(b) If yes, describe the previous form of ownership:

_____ Closely held
_____ Publicly held
_____ Government-owned or controlled

_____ Not Known _____ No Response
_____ Not Applicable _____ Question Omitted

10. (a) At the time of market introduction, was the innovative product the firm's only product?

_____ Yes _____ Not Known _____ No Response
_____ No _____ Not Applicable _____ Question Omitted

(b) Is the innovative product now the firm's only product?

_____ Yes _____ Not Known _____ No Response
_____ No _____ Not Applicable _____ Question Omitted

(c) Was the innovative product the first product in what later became a broad line?

_____ Yes _____ Not Known _____ No Response
_____ No _____ Not Applicable _____ Question Omitted

E. Market Information

11. What product(s)/types of product(s) do you sell (in general)? _____

_____

_____

_____

_____ Not Known _____ No Response
_____ Not Applicable _____ Question Omitted

Figure 1 Cont'd)

12. To whom do you sell this product: To what types of organizations? (producers, distributors, consumers, government organizations, or users internal to your organization).

_____

_____

_____

_____ Not Known _____ No Response

_____ Not Applicable _____ Question Omitted

13. Was the innovative product introduced into a market not previously served by the innovating organization?

_____ Yes _____ Not Known _____ No Response

_____ No _____ Not Applicable _____ Question Omitted

14. (a) Was the innovative product sold abroad before it was introduced in the U.S.?

_____ Yes _____ Not Known _____ No Response

_____ No _____ Not Applicable _____ Question Omitted

(b) If yes, was it sold abroad by you or by another company? _____

15. Has the product been sold abroad since it was introduced in the U.S.?

_____ Yes _____ Not Known _____ No Response

_____ No _____ Not Applicable _____ Question Omitted

Figure 2 (Cont'd)

Section F

16. Further comments: _____

17. Sources of information (please list the key sources of information provided in the survey). Where possible, associate the source with the item number on the form: _____

Part II Completion Date: _____ Signature: _____

The distribution of innovations for the industries represented in the subsample is shown in Table 2.3. It should be noted that Table 2.3 includes the 45 NSF innovations.

Summaries of the survey data for the 206 questionnaires are presented in Appendix A. Similar data on the 45 post-1969 NSF innovations are given in Appendix B. The summaries profile the responses to the survey questions. In referring to these data, it should be noted that the distributions of time series data are given both with respect to the year in which an event (e.g., prototype developed) occurred and with respect to the elapsed time between the event and the introduction of the innovation to the market.

In testing a hypothesis, the maximum amount of data available for that test was used. Thus, the sample for testing hypotheses on the effect of concentration included all innovations for which firm size was available. Other questions could only be examined with respect to those innovations for which Part II of the Data Form was complete.

III. Collection of Industry Data

While the telephone survey provided valuable information for individual innovations and firms, it was necessary to obtain additional industry-specific data on the number of establishments, employment, concentration, and capital intensity. These data were needed to develop statistical tests on the relationship between innovation behavior and three industry characteristics: concentration, capital intensity and growth.

Table 2.3

DISTRIBUTION OF INNOVATIONS BY 3-DIGIT SIC CODE BASED ON QUESTIONNAIRE*

SIC No.	Frequency	SIC No.	Frequency
205	0	347	3
222	1	349	4
229	0	352	0
239	1	353	4
249	0	354	8
251	0	355	6
264	1	356	8
266	0	357	24
281	7	358	0
282	12	359	0
283	1	361	2
284	2	362	4
285	0	363	1
286	1	364	1
287	2	365	0
289	4	366	16
301	0	367	16
307	7	369	7
322	1	371	13
325	1	372	2
326	0	373	0
327	0	375	0
329	1	381	13
331	1	382	37
332	0	383	24
335	0	384	4
339	0	385	2
341	0	386	6
342	0	387	0
343	1	395	0
344	1		
345	1		
346	1		

*Includes 45 post-1969 innovations from NSF study.

The measure of concentration used was the 4-firm concentration ratio by value of shipments in the 1972 Census of Manufactures[5] for 4-digit SIC industry groups.

Capital intensity was defined as gross stocks per employee, where gross stocks represent capital assets on hand adjusted for discards of worn-out assets. Data on gross stocks were obtained from the capital stock data base compiled by the Bureau of Labor Statistics in the U.S. Department of Labor. These data are available, with few exceptions, only the 3-digit SIC level; correspondingly, 3-digit employment data were used to calculate capital intensity.

A Growth Rate for each 4-digit industry was defined as:

$$\text{Annual Growth Rate} = \frac{(1976\ \text{Employment}) - (1967\ \text{Employment})}{9.0 \times (1967\ \text{Employment})}$$

In industries where 1967 employment data were unavailable, 1972 employment was used instead, and the comparable estimate is:

$$\text{Annual Growth Rate} = \frac{(1976\ \text{Employment}) - (1972\ \text{Employment})}{4.0 \times (1972\ \text{Employment})}$$

The data on establishments, employment, concentration, capital intensity, and growth are given in Appendix C. Data on establishment employment by size of owning company are given in Appendix E.

[5]U.S. Department of Commerce, Bureau of the Census, 1972 Census of Manufacture, Vol. 1, Subject and Special Statistics, Table 4. Washington, DC: GPO, 1976.

Chapter 3

DATA ANALYSIS

I. Introduction

The industries generating the innovations reported in the survey are not homogeneous. They vary with respect to growth, firm size, concentration, capital intensity, the age of their technological base, and the characteristics of their markets. These variables were used to partition the sample into subsamples for further analysis.

Of the 121 industries represented in the survey, 70 industries showed an increase in the number of establishments from 1967 to 1972, 22 showed a decline in the number of establishments and 29 did not have data available on the number of establishments for 1967.

Four industry groupings denoted by P1, P2, P3, and P4, were defined as follows:

- P1--Establishments increased or data not available for 1967
  Employment increased
- P2--Establishments increased or data not available for 1967
  Employment decreased
- P3--Establishments decreased
  Employment increased
- P4--Establishments decreased
  Employment decreased

Table 3.1 shows the number of industries and the distribution of innovations by firm size within P1, P2, P3, and P4. Tables 3.2 and 3.3 show the distribution of innovations and employment in P1, P2, P3, and P4 with respect to concentration ratio and firm size.

Table 3.1

DISTRIBUTION OF INDUSTRIES AND INNOVATIONS IN THE SUBSAMPLES P1, P2, P3, AND P4

P1:	Industries	57
	Innovations	
	Small Firms	121
	Large Firms	207
	Unknown	50
P2:	Industries	42
	Innovations	
	Small Firms	89
	Large Firms	109
	Unknown	21
P3:	Industries	6
	Innovations	
	Small Firms	2
	Large Firms	7
	Unknown	0
P4:	Industries	16
	Innovations	
	Small Firms	14
	Large Firms	14
	Unknown	1

Table 3-2

DISTRIBUTION OF INNOVATIONS AND EMPLOYMENT WITH RESPECT TO CONCENTRATION RATIO FOR SMALL FIRMS*

INNOVATIONS

Concentration Ratio	Subsample P1	P2	P3	P4	Total
$0 \leq CR \leq 0.2$	17	31	1	0	49
$0.2 < CR \leq 0.4$	41	46	0	11	98
$0.4 < CR \leq 0.6$	56	7	1	3	67
$0.6 < CR \leq 0.8$	7	2	0	0	9
$0.8 < CR \leq 1.0$	0	3	0	0	3
	121	89	2	14	226

EMPLOYMENT (1000)

Concentration Ratio	Subsample P1	P2	P3	P4	Total
$0 \leq CR \leq 0.2$	421	160	15	-	596
$0.2 < CR \leq 0.4$	153	134	13	145	445
$0.4 < CR \leq 0.6$	161	76	4	17	258
$0.6 < CR \leq 0.8$	78	4	-	10	92
$0.8 < CR \leq 1.0$	3	4	1	0	8
	816	378	33	172	1399

*Includes 45 NSF cases

Table 3.3

DISTRIBUTION OF INNOVATIONS AND EMPLOYMENT WITH RESPECT TO CONCENTRATION FOR LARGE FIRMS*

INNOVATIONS

Concentration Ratio	Subsample P1	P2	P3	P4	Total
$0 \leq CR \leq 0.2$	21	42	0	0	63
$0.2 < CR \leq 0.4$	74	43	1	7	125
$0.4 < CR \leq 0.6$	82	17	5	0	104
$0.6 < CR \leq 0.8$	29	4	0	5	38
$0.8 < CR \leq 1.0$	1	3	1	2	7
	207	109	7	14	337

EMPLOYMENT (1000)

Concentration Ratio	Subsample P1	P2	P3	P4	Total
$0 \leq CR \leq 0.2$	379	418	43	-	840
$0.2 < CR \leq 0.4$	389	433	133	212	1167
$0.4 < CR \leq 0.6$	791	827	39	73	1730
$0.6 < CR \leq 0.6$	812	29	-	46	887
$0.8 < CR \leq 1.0$	337	162	4	8	511
	2708	1869	219	339	5135

*Includes 45 NSF cases

Tables 3.4 through 3.7 compare the distribution of innovations with the distribution of employment with respect to concentration ratio for small and large firms in subsamples P1 and P2. In testing for a concentration ratio (CR) effect, the null hypothesis is that there is no effect and that innovation is directly proportional to employment.

II. Findings

1.a Within P1, the frequency of innovation by small firms in very diffuse industries ($0 < CR < 0.2$) is well below the average rate per employee for all small firms in P1, and the frequency of innovation in slightly and moderately concentrated industries ($0.2 < CR < 0.6$) is greatly in excess of the average rate per employee.

1.b Within P2, small firms in very diffuse industries ($0 \leq CR \leq 0.2$) and in moderately concentrated industries ($0.4 < CR \leq 0.6$) innovate less than the average rate per employee for all small firms in P2. Firms with concentration ratios in the interval $0.2 < CR \leq 0.4$ tend to innovate above the average rate per employee.

2.a Within P1, large firms tend to innovate above the average rate (per employee for all large firms in P1) with slight and moderate concentration ($0.2 < CR < 0.6$) and below the average rate in the upper range of $0.6 < CR < 1.0$.

Table 3-4

COMPARISON OF THE DISTRIBUTION OF INNOVATIONS WITH THE DISTRIBUTION OF EMPLOYEES WITH RESPECT TO CONCENTRATION RATIO FOR SMALL FIRMS IN PI

Concentration Ratio	Innovations		Employment (1000)	
	f	%	f	%
$0 \leq CR \leq 0.2$	17	14	421	52
$0.2 < CR \leq 0.4$	41	34	153	19
$0.4 < CR \leq 0.6$	56	46	161	20
$0.6 < CR \leq 0.8$	7	6	78	10
$0.8 < CR \leq 1.0$	0	0	3	0
	121		816	

$\chi^2 = 93$

DF* = 3

Sig. Level: 1%

*Degrees of freedom equals 3 as the result of combining the intervals $0.6 < CR \leq 0.8$ and $0.8 < CR \leq 1.0$ for the χ^2 test.

Table 3-5

COMPARISON OF THE DISTRIBUTION OF INNOVATIONS WITH THE DISTRIBUTION OF EMPLOYEES WITH RESPECT TO CONCENTRATION RATIO FOR SMALL FIRMS IN P2

Concentration Ratio	Innovations		Employment (1000)	
	f	%	f	%
$0 \leq CR \leq 0.2$	31	35	160	42
$0.2 < CR \leq 0.4$	46	52	134	35
$0.4 < CR \leq 0.6$	7	8	76	20
$0.6 < CR \leq 0.8$	2	2	4	1
$0.8 < CR \leq 1.0$	3	3	4	1
	89		378	

$\chi^2 = 20$
D.F.* = 3
Sig. Level: 1%

*The intervals $0.6 < CR \leq 0.8$ and $0.8 < CR \leq 1.0$ were combined for the χ^2 test.

Table 3-6

COMPARISON OF THE DISTRIBUTION OF INNOVATIONS WITH THE DISTRIBUTION OF EMPLOYEES WITH RESPECT TO CONCENTRATION RATIO FOR LARGE FIRMS IN P1

Concentration Ratio	Innovations		Employment (1000)	
	f	%	f	%
$0 \leq CR \leq 0.2$	21	10	379	14
$0.2 < CR \leq 0.4$	74	36	389	14
$0.4 < CR \leq 0.6$	82	40	791	29
$0.6 < CR \leq 0.8$	29	14	812	30
$0.8 < CR \leq 1.0$*	1	0	337	12
	207		2708	

$\chi^2 = 114$

DF* = 3

SL = 1%

*The intervals $0.6 < CR \leq 0.8$ and $0.8 < CR \leq 1.0$ were combined for the χ^2 test.

Table 3-7

COMPARISON OF THE DISTRIBUTION OF INNOVATIONS WITH THE DISTRIBUTION OF EMPLOYEES WITH RESPECT TO CONCENTRATION RATIO FOR LARGE FIRMS IN P2

Concentration Ratio	Innovations		Employment (1000)	
	f	%	f	%
$0 \leq CR \leq 0.2$	42	39	418	22
$0.2 < CR \leq 0.4$	43	39	433	23
$0.4 < CR \leq 0.6$	17	16	827	44
$0.6 < CR \leq 0.8$	4	4	29	2
$0.8 < CR \leq 1.0$*	3	3	162	9
	109		1869	

$\chi^2 = 47$
D.F.* = 3
Sig. Level: 1%

*The intervals $0.6 < CR \leq 0.8$ and $0.8 < CR \leq 1.0$ were combined for the χ^2 test.

2.b Within P2, the innovation performance of large firms is similar to that noted in P1 but shifted toward the lower concentration ratios. The frequency of innovation is above average at the low end ($0 \leq CR \leq 0.4$) and below average for moderate concentration ($0.4 < CR \leq 0.6$).

3. Small and large firms exhibit substantially the same distributions of innovations with respect to concentration ratio in both P1 and P2 (Table 3.8). The interval $0.2 < CR \leq 0.6$ in P1 and the interval $0 \leq CR \leq 0.4$ in P2 are the major producers of innovations.

4. The number of innovations per million employees in industries with growing employment differs significantly from that in industries with declining employment. For small firms the rates are respectively 145 and 187 innovations per million employees. The corresponding rates for large firms are 73 and 56 innovations per million employees. The average rate taken over all small firms is 162 innovations per million. For large firms the rate is 66 per million.

5. Small firms produce significantly more innovations than large firms per employee. See Tables 3.9 and 3.10. Overall, small firms produce 2.5 times as many innovations per employee as large firms.

6. The distributions of innovations by small and large firms were compared with respect to the following time variables measured from the year of market introduction:

T_{CRIT} - Year performance criteria established

T_{ENG} - Year preliminary design finalized

T_{PROTO} - Year prototype developed

T_{PROD} - Year of first production

Table 3-8

COMPARISON OF THE DISTRIBUTION OF INNOVATIONS
WITH RESPECT TO CONCENTRATION RATIO-AND-FIRM SIZE

Concentration Ratio	INNOVATIONS			
	P1 Firm Size		P2 Firm Size	
	Small	Large	Small	Large
$0 \leq CR \leq 0.2$	17	21	31	42
$0.2 < CR \leq 0.4$	41	74	46	43
$0.4 < CR \leq 0.6$	56	82	7	17
$0.6 < CR \leq 0.8$	7	29	2	4
$0.8 < CR \leq 1.0$	0	1	3	3
	121	207	89	109
	$\chi^2 = 7.0$		$\chi^2 = 4.3$	
	DF* = 3		DF* = 3	
	SL: 10%		SL: NS	

*Combined the intervals $0.6 < CR \leq 0.8$ and $0.8 < CR \leq 1.0$.

Table 3-9

COMPARISON OF THE FREQUENCY OF INNOVATION BETWEEN SMALL AND LARGE FIRMS IN INDUSTRIES FOR WHICH THE NUMBER OF ESTABLISHMENTS INCREASED AND EMPLOYMENT INCREASED (P1)

	Innovations	Industry Employment (1000)
Small Firms	121	816
Large Firms	207	2708

$\chi^2 = 35$
D.F. = 1
Sig. Level: 1%

Table 3-10

COMPARISON OF THE FREQUENCY OF INNOVATION BETWEEN SMALL AND LARGE FIRMS IN INDUSTRIES FOR WHICH THE NUMBER OF ESTABLISHMENTS INCREASED AND EMPLOYMENT DECREASED (P2)

	Innovations	Industry Employment (1000)
Small Firms	89	378
Large Firms	109	1869

$\chi^2 = 112$
D.F. = 1
Sig. Level: 1%

The distributions of these variables are given in Table 3.11.

Analysis of these distributions indicates that small firms tend to bring their innovations to market sooner than large firms. The mean time from the establishment of performance criteria to market introduction is 2.22 years for small firms and 3.05 years for large firms.

Table 3.12 shows that, on average, small firms take less time to carry out each of the several activities on the path from the establishment of performance criteria to market introduction.

7. Table 3.13 shows a frequency distribution with respect to concentration ratio of innovations introduced by large firms. In the concentration ratio range $0 \leq CR \leq 0.4$, 20 percent of the innovations were acquired from outside the firm. In the interval $0.6 < CR \leq 1.0$, 34 percent were acquired from outside. This difference is significant at the 10 percent level and tends to support the hypothesis that a greater proportion of the innovations introduced by large firms in concentrated industries is acquired from outside the firm than is the case for large firms operating in less concentrated industries.

The corresponding hypothesis for small firms is not supported by the data. In the interval $0 \leq CR \leq 0.4$, 23 percent (8 of 35) of the innovations were acquired from outside small firms. In the interval $0.06 < CR \leq 1.0$, 17 percent (1 of 6) were acquired from outside.

Table 3-11

DISTRIBUTION OF INNOVATIONS WITH RESPECT TO TIME FOR ACTIVITIES LEADING TO THE INTRODUCTION OF INNOVATION

	T_{CRIT}		T_{ENG}		T_{PROTO}		T_{PROD}	
Year**	SM	LG	SM	LG	SM	LG	SM	LG
-5	6	42	3*	11*	5	15	-	-
-4	4	19	4*	14*	3*	5*	-	-
-3	7	26	3	17	1*	13*	-	-
-2	16	35	14	33	3	30	3	13
-1	21	30	22	40	35	53	10	22
0	-	-	13	15	13	32	49	95
+1	-	-	-	-	-	-	4	6
Mean Time	-2.22	-3.05	-1.53	-2.06	-1.35	-1.67	-0.18	-0.31
	χ^2 = 12.6		χ^2 = 7.34		χ^2 = 12.8		χ^2 = 1.80	
	DF = 4		DF = 4		DF = 4		DF = 3	
	SL: 5%		SL: NS		SL: 5%		SL: NS	

*Data in intervals combined for χ^2 test.
**High (Low) year in each column includes events reported in earlier (later) years.

Table 3.12

MEAN TIMES FOR ACTIVITIES BETWEEN ESTABLISHMENT OF PERFORMANCE CRITERIA AND MARKET INTRODUCTION

Mean Time To:	Small Firms	Large Firms
Engineer Product	0.69 years	0.99 years
Develop Prototypes	0.18	0.39
Establish Production	1.17	1.36
Sales Start Up	0.18	0.31
Mean Time from Establishment of Performance Criteria to Market Introduction	2.22 years	3.05 years

Table 3.13

DISTRIBUTIONS OF INNOVATIONS WITH RESPECT TO CONCENTRATION RATIO AND PARTITIONED BY SOURCE OF INNOVATION*

Concentration Ratio	Small Firms		Large Firms	
	Total Innovations	Innovations Acquired From Outside	Total Innovations	Innovations Acquired From Outside
$0 \leq CR \leq 0.2$	14	3	34	5
$0.2 < CR \leq 0.4$	21	5	65	15
$0.4 < CR \leq 0.6$	30	10	49	14
$0.6 < CR \leq 0.8$	5	1	25	9
$0.8 < CR \leq 1.0$	1	0	4	1
	71	19	177	44

*Includes 45 NSF cases

8. Table 3.14 shows the distributions of innovations for small firms with respect to a measure of industry capital intensity (capital stocks per employee) and a measure of industry growth (annual employment growth rate).

Table 3.15 shows the distribution of employees among small firms in industries generating innovations reported in the survey, with respect to industry capital stocks per employee and industry employment growth rate.

Tables 3.14 and 3.15 are the basis for testing the hypothesis that the frequency of small firm innovation is independent of industry capital intensity. Table 3.16 compares the distribution of innovations in small firms in industries for which total employment increased with the distribution of small firm employees in the same industries. Table 3.17 does the same for industries with decreasing total employment. The data indicate that the frequency of innovation by small firms is not affected by industry capital intensity.

Tables 3.18 and 3.19 show a different pattern for large firms. The frequency of innovation by large firms appears to be related to the capital intensiveness of its industry. Large firms in the more capital-intensive industries tend to be significantly less innovative than large firms in less capital-intensive industries.

Other Findings

9. Table 3.20 indicates that large firms receive more frequent public funding for innovation-related purposes than do small firms. It also shows that small and large firms apply public funds to the same purposes with substantially the same frequencies.

Table 3.14

DISTRIBUTION OF INNOVATIONS* FROM SMALL FIRMS WITH RESPECT TO INDUSTRY CAPITAL STOCK PER EMPLOYEE (S), AND EMPLOYEE GROWTH (G)

Employee Growth	Capital Stock Per Employee ($1000)			
	$S \leq 10$	$10 < S \leq 15$	$15 < S \leq 20$	$20 < S$
$G \leq 0$	5	52	37	9
$0 < G$	5	79	22	12

*Excludes 45 NSF cases.

Table 3.16

COMPARISON IN INDUSTRIES WITH INCREASING EMPLOYMENT OF THE FREQUENCY OF INNOVATION BY SMALL FIRMS WITH THE DISTRIBUTION OF EMPLOYEES WITH RESPECT TO CAPITAL STOCK PER EMPLOYEE*

S: Capital Stock per Employee ($1,000)	Distribution of Innovations	Distribution of Employees (1,000)
$S \leq 15$	84	376
$15 < S \leq 20$	22	113
$20 < S$	12	47
	118	536

$\chi^2 = 0.61$
DF = 2
SL: NS

*Excludes 45 NSF cases.

Table 3.17

COMPARISON IN INDUSTRIES WITH DECLINING EMPLOYMENT OF THE FREQUENCY OF INNOVATION BY SMALL FIRMS WITH THE DISTRIBUTION OF EMPLOYEES WITH RESPECT TO CAPITAL STOCK PER EMPLOYEE*

S: Capital Stock per Employee ($1,000)	Distribution of Innovations	Distribution of Employees (1,000)
$S \leq 10$	5	44
$10 < S \leq 15$	52	204
$15 < S \leq 20$	37	152
$20 < S$	9	36
	103	436

$\chi^2 = 3.16$

DF = 3

SL: NS

*Excludes 45 NSF cases.

Table 3.18

COMPARISON IN INDUSTRIES WITH INCREASING EMPLOYMENT OF THE FREQUENCY OF INNOVATION BY LARGE FIRMS WITH THE DISTRIBUTION OF EMPLOYEES WITH RESPECT TO CAPITAL STOCK PER EMPLOYEE*

S: Capital Stock per Employee ($1,000)	Distribution of Innovations	Distribution of Employees (1,000)
$S \leq 10$	8	141
$10 < S \leq 15$	112	839
$15 < S \leq 20$	30	834
$20 < S$	36	790
	186	2,604

$x^2 = 68$

DF = 3

SL: 1%

*Excludes 45 NSF cases.

Table 3.20

USE OF PUBLIC FUNDS

(DF = 1 for all cases)

	Was technology developed by R&D?		Were public funds used?	
	S	L	S	L
No	4	8	62	145
Yes	66	168	4	30
χ^2	0.003		3.98	
SL	NS		5%	

APPLICATION OF PUBLIC FUNDING

	Basic Research		Applied Research		Development		Engineering	
	S	L	S	L	S	L	S	L
No	2	16	2	7	1	5	2	13
Yes	2	13	2	22	3	25	2	17
χ^2	0.04		0.24		0.08		0.08	
SL	NS		NS		NS		NS	

	Production		Distribution and Marketing		Other	
	S	L	S	L	S	L
No	3	19	4	26	4	27
Yes	1	10	0	3	0	2
χ^2	0.04		0.06		0.09	
SL	NS		NS		NS	

10. Table 3.21 indicates that most small firms reporting innovations were closely held (78 percent) at the time the innovation was introduced and that 17 percent of the small firms changed their form of ownership following introduction of an innovation.

11. Table 3.22 shows that at the time of market introduction, an innovation is more likely to be a firm's only product if the firm is small than if a firm is large. It also shows that the innovations of small firms are more likely to initiate a broad line of new products. Table 3.23 shows that the percentage of small firm innovations introduced into consumer markets and government markets is greater than that of large firms and that a greater percentage of large firm innovations are for internal users.

12. Table 3.24 indicates that a greater percentage of small firms tend to also sell their product abroad after introduction.

Table 3.21

BUSINESS OWNERSHIP

Has ownership form changed?

	S	L
No	53	133
Yes	11	4
x^2	10.88	
SL	1%	
DF	1	

Previous form of ownership

	S	L
Closely Held	53	24
Publicly Held	15	146
X^2	87.51	
SL	1%	
DF	1	

Table 3.22

PRODUCT LINE

(DF = 1 for all cases)

	Was Innovation Only Product		Is Innovation Now Only Product		Was Innovation First in Broad Line		Did Product Enter a New Market	
	S	L	S	L	S	L	S	L
No	62	175	62	135	41	130	38	117
Yes	9	2	4	2	26	46	29	57
x^2	13.33		1.88		3.15		2.12	
SL	1%		NS		10%		NS	

Table 3.23

PRODUCT MARKET CLASS

(DF = 1 for all cases)

	PRODUCERS		DISTRIBUTORS		CONSUMERS		GOVERNMENT		INTERNAL	
	S	L	S	L	S	L	S	L	S	L
NO	26	56	56	114	26	114	32	114	65	152
YES	41	120	6	23	41	62	35	62	2	24
χ^2	0.77		1.21		12.36		5.16		4.70	
SL	NS		NS		1%		5%		5%	

Table 3.24

INTERNATIONAL MARKETING

Was product first sold abroad?

	S	L
No	60	122
Yes	5	11
χ^2	0.02	
SL	NS	
DF	1	

Was product sold abroad after U.S. introduction?

	S	L
No	6	28
Yes	58	106
χ^2	3.27	
SL	10%	
DF	1	

Appendix A

SBA SURVEY DATA

SPSS DATA SYSTEM 08/ /80

FILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

PRODSIC4 4-DIGIT PRODUCT SIC CODE

CODE	FREQ	PCT	ADJ PCT	CUM PCT	CODE	FREQ	PCT	ADJ PCT	CUM PCT	CODE	FREQ	PCT	ADJ PCT	CUM PCT
2221.	1	0	0		3531.	1	0	19		3873.	1	0	48	
2819.	7	3	4		3532.	1	0	20		3674.	9	4	52	
2821.	7	3	7		3542.	5	2	22		3678.	1	0	52	
2822.	3	1	9		3545.	2	1	23		3679.	2	1	53	
2824.	1	0	9		3559.	3	1	25		3691.	2	1	54	
2841.	1	0	10		3561.	1	0	25		3692.	1	0	55	
2869.	1	0	10		3562.	2	1	26		3693.	3	1	56	
2879.	2	1	11		3568.	1	0	27		3694.	1	0	57	
2891.	1	0	12		3569.	4	2	29		3714.	11	5	62	
2892.	1	0	12		3573.	16	8	36		3728.	2	1	63	
2899.	1	0	13		3579.	1	0	37		3811.	11	5	68	
3079.	3	1	14		3612.	1	0	37		3822.	1	0	69	
3229.	1	0	15		3613.	1	0	38		3823.	11	5	74	
3291.	1	0	15		3621.	2	1	39		3824.	1	0	75	
3312.	1	0	16		3623.	1	0	39		3825.	14	7	82	
3433.	1	0	16		3629.	1	0	40		3829.	8	4	85	
3443.	1	0	17		3636.	1	0	40		3832.	22	11	96	
3452.	1	0	17		3641.	1	0	41		3841.	2	1	97	
3471.	1	0	17		3661.	2	1	42		3843.	1	0	98	
3494.	2	1	18		3662.	10	5	47		3861.	5	2	100	
3497.	1	0	19		3671.	1	0	47						

VALID CASES 206 MISSING CASES 0

FILE SBAZ (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

PRODSIC3 3-DIGIT PRODUCT SIC CODE

CODE	FREQ	ADJ PCT	CUM PCT	CODE	FREQ	ADJ PCT	CUM PCT	CODE	FREQ	ADJ PCT	CUM PCT
222.	1	0	0	344.	1	0	17	364.	1	0	41
281.	7	3	4	345.	1	0	17	366.	12	6	47
282.	11	5	9	347.	1	0	17	367.	14	7	53
284.	1	0	10	349.	3	1	19	369.	7	3	57
286.	1	0	10	353.	2	1	20	371.	11	5	62
287.	2	1	11	354.	8	4	24	372.	2	1	63
289.	3	1	13	355.	3	1	25	381.	11	5	68
307.	3	1	14	356.	7	3	29	382.	35	17	85
322.	1	0	15	357.	17	8	37	383.	22	11	96
329.	1	0	15	361.	2	1	38	384.	3	1	96
331.	1	0	16	362.	4	2	40	386.	5	2	100
343.	1	0	16	363.	1	0	40				

VALID CASES 206 MISSING CASES 0

FILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

ORGSIC4 4-DIGIT ORGANIZATION SIC CODE

CODE	FREQ	ADJ PCT	CUM PCT	CODE	FREQ	ADJ PCT	CUM PCT	CODE	FREQ	ADJ PCT	CUM PCT
2296.	1	0	0	3519.	1	0	19	3674.	10	5	51
2819.	7	3	4	3531.	1	0	20	3675.	1	0	51
2821.	6	3	7	3540.	1	0	20	3679.	2	1	52
2822.	3	1	8	3542.	4	2	22	3691.	2	1	53
2824.	1	0	9	3545.	1	0	23	3692.	1	0	54
2841.	1	0	9	3559.	3	1	24	3693.	3	1	55
2869.	1	0	10	3561.	1	0	25	3694.	2	1	56
2879.	1	0	10	3562.	2	1	26	3714.	11	5	62
2891.	1	0	11	3569.	1	0	26	3721.	1	0	62
2892.	1	0	11	3569.	4	2	28	3728.	1	0	63
3069.	1	0	12	3573.	15	7	35	3811.	10	5	67
3079.	3	1	13	3579.	1	0	36	3822.	1	0	68
3229.	1	0	14	3612.	1	0	36	3823.	10	5	73
3291.	1	0	14	3613.	1	0	37	3824.	1	0	73
3312.	1	0	15	3621.	1	0	37	3825.	14	7	80
3433.	1	0	15	3623.	1	0	38	3829.	7	3	83
3452.	1	0	16	3629.	1	0	38	3832.	23	11	95
3460.	1	0	16	3636.	1	0	39	3841.	2	1	96
3471.	1	0	17	3641.	1	0	39	3843.	1	0	96
3483.	1	0	17	3661.	2	1	40	3861.	3	1	98
3490.	1	0	17	3662.	10	5	45	7391.	3	1	99
3494.	2	1	18	3671.	1	0	46	8922.	1	0	100
3497.	1	0	19	3672.	1	0	46	9651.	1	0	100

VALID CASES 206 MISSING CASES 0

FILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

IRGSIC3 3-DIGIT ORGANIZATION SIC CODE

CODE	FREQ	ADJ PCT	CUM PCT	CODE	FREQ	ADJ PCT	CUM PCT	CODE	FREQ	ADJ PCT	CUM PCT
220.	1	0	0	346.	1	0	16	366.	12	6	45
281.	7	3	4	347.	1	0	17	367.	15	7	52
282.	10	5	9	348.	1	0	17	369.	8	4	56
284.	1	0	9	349.	4	2	19	371.	11	5	62
286.	1	0	10	351.	1	0	19	372.	2	1	63
287.	1	0	10	353.	1	0	20	381.	10	5	67
289.	2	1	11	354.	6	3	23	382.	33	16	83
306.	1	0	12	355.	3	1	24	383.	23	11	95
307.	3	1	13	356.	8	4	28	384.	3	1	96
322.	1	0	14	357.	16	8	36	386.	3	1	98
329.	1	0	14	361.	2	1	37	739.	3	1	99
331.	1	0	15	362.	3	1	38	892.	1	0	100
343.	1	0	15	363.	1	0	39	965.	1	0	100
345.	1	0	16	364.	1	0	39				

VALID CASES 206 MISSING CASES 0

PS ATC SYS [illegible] 08/20/80

ILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

JOURNAL SOURCE PUBLICATION

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
AUTOMOTIVE ENG'G	1.	9	4.4	4.5	4.5
AVIATION WEEK	2.	2	1.0	1.0	5.6
ENG'G NEWS RECORD	3.	3	1.5	1.5	7.1
FOOD ENGINEERING	4.	3	1.5	1.5	8.6
IEEE SPECTRUM	5.	6	2.9	3.0	11.6
INDUSTRIAL R&D	6.	88	42.7	44.4	56.1
MODERN PLASTICS	7.	5	2.4	2.5	58.6
OPTICAL ENG'G	8.	8	3.9	4.0	62.6
PRODUCT ENG'G	9.	25	12.1	12.6	75.3
SCI. INSTRUMENTS	10.	9	4.4	4.5	79.8
TOOLING & PRODUCTION	11.	11	5.3	5.6	85.4
WARD'S AUTO WORLD	12.	14	6.8	7.1	92.4
MECHANICAL ENG'G	13.	2	1.0	1.0	93.4
ELEC. DESIGN NEWS	14.	13	6.3	6.6	100.0
NOT LISTED	0.	8	3.9	MISSING	100.0
	TOTAL	206	100.0	100.0	

VALID CASES 198 MISSING CASES 8

FILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

YEAR YEAR OF MARKET INTRODUCTION

CODE	FREQ	ADJ PCT	CUM PCT	CODE	FREQ	ADJ PCT	CUM PCT	CODE	FREQ	ADJ PCT	CUM PCT
67.	1	0	0	67.	3	1	6	75.	24	12	51
69.	1	0	1	69.	5	2	8	76.	39	19	70
70.	2	1	2	70.	12	6	14	77.	21	10	81
71.	1	0	2	71.	9	4	18	78.	28	14	94
72.	1	0	3	72.	14	7	25	79.	10	5	99
73.	2	1	4	73.	12	6	31	80.	2	1	100
74.	1	0	4	74.	18	9	40				

VALID CASES 206 MISSING CASES 0

FILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

ENEA PERFORMANCE CRITERIA ESTABLISHED

CODE	FREQ	ADJ PCT	CUM PCT	CODE	FREQ	ADJ PCT	CUM PCT	CODE	FREQ	ADJ PCT	CUM PCT
52.	1	1	1	65.	5	3	9	73.	14	8	64
57.	1	1	1	66.	1	1	10	74.	26	15	79
59.	1	1	2	67.	5	3	13	75.	24	14	93
60.	1	1	2	68.	10	6	18	76.	8	5	97
61.	1	1	3	69.	12	7	25	77.	4	2	99
62.	1	1	3	70.	17	10	35	78.	1	1	100
63.	2	1	5	71.	15	9	44				
64.	3	2	6	72.	21	12	56				

MISSING DATA

CODE	FREQ	CODE	FREQ	CODE	FREQ
8.	10	9.	22		

VALID CASES 174 MISSING CASES 32

FILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

NEB PRELIMINARY ENG'G DESIGNS FINALIZED

CODE	FREQ	ADJ PCT	CUM PCT	CODE	FREQ	ADJ PCT	CUM PCT	CODE	FREQ	ADJ PCT	CUM PCT
55.	2	1	1	66.	1	1	9	73.	20	12	52
59.	1	1	2	67.	3	2	11	74.	13	8	60
60.	2	1	3	68.	4	2	13	75.	30	18	77
62.	1	1	4	69.	9	5	18	76.	17	10	88
63.	1	1	4	70.	13	8	26	77.	14	8	96
64.	3	2	6	71.	7	4	30	78.	6	4	99
65.	4	2	8	72.	16	10	40	79.	1	1	100

MISSING DATA

CODE	FREQ	CODE	FREQ	CODE	FREQ
9.	25	9.	13		

VALID CASES 150 MISSING CASES 39

FILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

NEQ PROTOTYPE DEVELOPED

CODE	FREQ	ADJ PCT	CUM PCT	CODE	FREQ	ADJ PCT	CUM PCT	CODE	FREQ	ADJ PCT	CUM PCT
52.	1	1	1	68.	4	2	13	75.	32	18	73
56.	2	1	2	69.	6	3	16	76.	17	10	82
60.	1	1	2	70.	10	6	22	77.	21	12	94
62.	1	1	3	71.	11	6	28	78.	9	5	99
64.	4	2	5	72.	14	8	36	79.	1	1	100
65.	5	3	8	73.	19	11	47				
67.	4	2	10	74.	14	8	55				

M I S S I N G D A T A

CODE	FREQ	CODE	FREQ	CODE	FREQ
7.	4	8.	19	9.	7

VALID CASES 176 MISSING CASES 30

SYSTEM

SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

FIRST PRODUCTION

FREQ	ADJ PCT	CUM PCT	CODE	FREQ	ADJ PCT	CUM PCT	CODE	FREQ	ADJ PCT	CUM PCT
1	0	0	68.	1	0	7	75.	23	11	55
1	0	1	69.	8	4	11	76.	39	19	74
2	1	2	70.	12	6	17	77.	24	12	86
1	0	2	71.	10	5	22	78.	20	10	96
1	0	3	72.	14	7	29	79.	9	4	100
3	1	4	73.	11	5	34				
4	2	6	74.	19	9	43				

MISSING DATA

CODE	FREQ	CODE	FREQ
3			

CASES 203 MISSING CASES 3

SPSS BATCH SYSTEM 1 08/19/80

FILE SCA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

TWCB GOVERNMENT REGULATION MET

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	64.	1	0.5	2.4	2.4
	65.	1	0.5	2.4	4.8
	68.	1	0.5	2.4	7.1
	69.	1	0.5	2.4	9.5
	70.	3	1.5	7.1	16.7
	71.	1	0.5	2.4	19.0
	73.	6	2.9	14.3	33.3
	74.	2	1.0	4.8	38.1
	75.	5	2.4	11.9	50.0
	76.	8	3.9	19.0	69.0
	77.	6	2.9	14.3	83.3
	78.	4	1.9	9.5	92.9
	79.	3	1.5	7.1	100.0
DAGGING	7.	7	3.4	MISSING	100.0
NOT APPLICABLE	8.	132	64.1	MISSING	100.0
NO RESPONSE	9.	25	12.1	MISSING	100.0
	TOTAL	206	100.0	100.0	

VALID CASES 42 MISSING CASES 164

PS_ .ATC .YS 08/2"/80

FILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

XCC FIRST ORDER-CONTRACT-DELIVERY

CODE	FREQ	ADJ PCT	CUM PCT	CODE	FREQ	ADJ PCT	CUM PCT	CODE	FREQ	ADJ PCT	CUM PCT
57.	1	1	1	67.	3	2	6	74.	22	11	45
58.	1	1	1	68.	1	1	7	75.	26	13	58
60.	2	1	2	69.	7	4	10	76.	29	15	73
62.	1	1	3	70.	12	6	16	77.	22	11	84
63.	1	1	3	71.	12	6	22	78.	25	13	97
65.	2	1	4	72.	13	7	29	79.	6	3	100
66.	1	1	5	73.	9	5	34				

MISSING DATA

CODE	FREQ	CODE	FREQ	CODE	FREQ
8.	4	9.	6		

VALID CASES 196 MISSING CASES 10

SPSS DATA SYS... 08/27/80

FILE S042 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

INCO MODIFICATIONS AFTER FIRST DELIVERY

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	67.	1	0.5	2.3	2.3
	70.	1	0.5	2.3	4.7
	71.	2	1.0	4.7	9.3
	72.	1	0.5	2.3	11.6
	73.	2	1.0	4.7	16.3
	74.	6	2.9	14.0	30.2
	75.	3	1.5	7.0	37.2
	76.	6	2.9	14.0	51.2
	77.	4	1.9	9.3	60.5
	78.	11	5.3	25.6	86.0
	79.	5	2.4	11.6	97.7
	80.	1	0.5	2.3	100.0
ONGOING	7.	75	36.4	MISSING	100.0
NOT APPLICABLE	8.	73	35.4	MISSING	100.0
NO RESPONSE	9.	15	7.3	MISSING	100.0
	TOTAL	206	100.0	100.0	

VALID CASES 43 MISSING CASES 163

FILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

WOR START-UP SALES PROMOTION

CODE	FREQ	ADJ PCT	CUM PCT	CODE	FREQ	ADJ PCT	CUM PCT	CODE	FREQ	ADJ PCT	CUM PCT
61.	1	1	1	71.	10	7	18	77.	18	12	82
62.	1	1	1	72.	11	7	26	78.	18	12	94
65.	2	1	3	73.	11	7	33	79.	6	4	98
68.	1	1	3	74.	11	7	40	80.	3	2	100
69.	7	5	8	75.	19	13	53				
70.	5	3	11	76.	25	17	70				

MISSING DATA

CODE	FREQ	CODE	FREQ	CODE	FREQ
7.	2	8.	37	9.	18

VALID CASES 149 MISSING CASES 57

SPSS DATA SYS) 08/20/80

FILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

TOPIC DEVELOPED ABROAD

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
NO	0.	184	89.3	90.6	90.6
YES	1.	19	9.2	9.4	100.0
NO RESPONSE	9.	3	1.5	MISSING	100.0
	TOTAL	206	100.0	100.0	

VALID CASES 203 MISSING CASES 3

SPSS/PC+ BYS

FILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

THREED ACQUIRED BY LICENSE

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
NO	0.	183	88.8	91.0	91.0
YES	1.	18	8.7	9.0	100.0
NO RESPONSE	9.	5	2.4	MISSING	100.0
	TOTAL	206	100.0	100.0	

VALID CASES 201 MISSING CASES 5

PASS ITCI TST

TITLE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

THREE PATENTED

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
NO	0.	52	25.2	26.9	26.9
YES	1.	141	68.4	73.1	100.0
NOT APPLICABLE	8.	2	1.0	MISSING	100.0
NO RESPONSE	9.	11	5.3	MISSING	100.0
	TOTAL	206	100.0	100.0	

VALID CASES 193 MISSING CASES 13

SP... BAT... SYS 08/[illegible]/80

FILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

THREE ACQUIRED IN ANY OTHER WAY

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
NO	0.	167	81.1	85.6	85.6
YES	1.	28	13.6	14.4	100.0
NO RESPONSE	9.	11	5.3	MISSING	100.0
	TOTAL	206	100.0	100.0	

VALID CASES 195 MISSING CASES 11

SPSS DATA SYS...

FILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

FGOVRA WERE PUBLIC FUNDS USED?

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
NO	0.	174	84.5	87.0	87.0
YES	1.	26	12.6	13.0	100.0
NO RESPONSE	9.	6	2.9	MISSING	100.0
	TOTAL	206	100.0	100.0	

VALID CASES 200 MISSING CASES 6

SPSS DATA SYS ... 18/ 80

TLE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

OURBI PUBLIC FUNDING--BASIC RESEARCH

ATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
O	0.	14	6.8	53.8	53.8
ES	1.	12	5.9	46.2	100.0
OT APPLICABLE	8.	176	85.4	MISSING	100.0
O RESPONSE	9.	4	1.9	MISSING	100.0
	TOTAL	206	100.0	100.0	

ALID CASES 26 MISSING CASES 180

OSS BATCH SYSTEM

ILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

OURP2 PUBLIC FUNDING--APPLIED RESEARCH

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
IO	0.	6	2.9	23.1	23.1
ES	1.	20	9.7	76.9	100.0
OT APPLICABLE	8.	176	85.4	MISSING	100.0
O RESPONSE	9.	4	1.9	MISSING	100.0
	TOTAL	206	100.0	100.0	

VALID CASES 26 MISSING CASES 180

SAT SYS

LC SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

P93 PUBLIC FUNDING--DEVELOPMENT

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	0.	4	1.9	15.4	15.4
	1.	22	10.7	84.6	100.0
APPLICABLE	8.	176	85.4	MISSING	100.0
RESPONSE	9.	4	1.9	MISSING	100.0
	TOTAL	206	100.0	100.0	

VALID CASES 26 MISSING CASES 180

SPSS BATCH SYSTEM

FILE S8A2 (CREATION DATE = 09/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

FOUR84 PUBLIC FUNDING--ENGINEERING

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
NO	0.	12	5.8	46.2	46.2
YES	1.	14	6.8	53.8	100.0
NOT APPLICABLE	8.	176	85.4	MISSING	100.0
NO RESPONSE	9.	4	1.9	MISSING	100.0
	TOTAL	206	100.0	100.0	

VALID CASES 26 MISSING CASES 180

PSS BATCH SYSTEM

FILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

Q0805 PUBLIC FUNDING--PRODUCTION

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
NO	0.	22	10.7	84.6	84.6
YES	1.	4	1.9	15.4	100.0
NOT APPLICABLE	8.	176	85.4	MISSING	100.0
NO RESPONSE	9.	4	1.9	MISSING	100.0
	TOTAL	206	100.0	100.0	

VALID CASES 26 MISSING CASES 180

SPSS BATCH SYSTEM

FILE SBA7 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

SOURCE PUBLIC FUNDING--MKTG. & DISTRIBUTION

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
NO	0.	23	11.2	88.5	88.5
YES	1.	3	1.5	11.5	100.0
NOT APPLICABLE	8.	176	85.4	MISSING	100.0
NO RESPONSE	9.	4	1.9	MISSING	100.0
	TOTAL	206	100.0	100.0	

VALID CASES 26 MISSING CASES 180

FILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

FOURB7 PUBLIC FUNDING--OTHER ACTIVITIES

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
NO	0.	24	11.7	92.3	92.3
YES	1.	2	1.0	7.7	100.0
NOT APPLICABLE	8.	176	85.4	MISSING	100.0
NO RESPONSE	9.	4	1.9	MISSING	100.0
	TOTAL	206	100.0	100.0	

VALID CASES 26 MISSING CASES 180

SBAZ (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

PREVIOUS FORM OF OWNERSHIP

VALUE LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
SOLE HELD	0.	70	34.0	34.8	34.8
JOINT HELD	1.	126	61.2	62.7	97.5
GOVERNMENT-OWNED	2.	2	1.0	1.0	98.5
NONPROFIT	3.	3	1.5	1.5	100.0
NOT APPLICABLE	8.	3	1.5	MISSING	100.0
NO RESPONSE	9.	2	1.0	MISSING	100.0
	TOTAL	206	100.0	100.0	

VALID CASES 201 MISSING CASES 5

SP[illegible] RAT[illegible] SYS [illegible] 08/[illegible]/80

FILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

TENC WAS INNOVATION THE 1ST IN BROAD LINE?

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
NO	0.	130	63.1	65.0	65.0
YES	1.	70	34.0	35.0	100.0
NOT APPLICABLE	8.	4	1.9	MISSING	100.0
NO RESPONSE	9.	2	1.0	MISSING	100.0
	TOTAL	206	100.0	100.0	

VALID CASES 200 MISSING CASES 6

ILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

WELVEA PRODUCT SOLD TO GOVERNMENT ORGS.

ATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
IO	0.	115	55.8	57.5	57.5
ES	1.	85	41.3	42.5	100.0
O RESPONSE	9.	6	2.9	MISSING	100.0
	TOTAL	206	100.0	100.0	

VALID CASES 200 MISSING CASES 6

FILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

YEARIA YEAR PERFORMANCE CRITERIA ESTABLISHED

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	-10.	1	0.5	0.6	0.6
	-11.	2	1.0	1.1	1.7
	-10.	2	1.0	1.1	2.9
	-9.	3	1.5	1.7	4.6
	-8.	4	1.9	2.3	6.9
	-7.	8	3.9	4.6	11.5
	-6.	4	1.9	2.3	13.8
	-5.	16	7.8	9.2	23.0
	-4.	18	8.7	10.3	33.3
	-3.	27	13.1	15.5	48.9
	-2.	43	20.9	24.7	73.6
	-1.	41	19.9	23.6	97.1
	0.	4	1.9	2.3	99.4
	2.	1	0.5	0.6	100.0
	09.	32	15.5	MISSING	100.0
	TOTAL	206	100.0	100.0	

FILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

VARIABLE YEAR PERFORMANCE CRITERIA ESTABLISHED

CODE		
-12.	**	1)
-11.	***	2)
-10.	***	2)
-9.	****	3)
-8.	*****	4)
-7.	*********	8)
-6.	*****	4)
-5.	******************	16)
-4.	********************	18)
-3.	******************************	27)

ILE S3A2 (CREATION DATE = 08/19/87) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

YEAR18 YEAR PRELIMINARY ENG'G DESIGNS FINALIZED

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	-11.	1	0.5	0.6	0.6
	-10.	1	0.5	0.6	1.2
	-9.	1	0.5	0.6	1.8
	-8.	2	1.0	1.2	3.0
	-6.	6	2.9	3.6	6.5
	-5.	1	0.5	0.6	7.1
	-4.	15	7.3	9.9	16.1
	-3.	17	8.3	10.1	26.2
	-2.	40	19.4	23.8	50.0
	-1.	56	27.2	33.3	83.3
	0.	24	11.7	14.3	97.6
	1.	2	1.0	1.2	98.8
	3.	1	0.5	0.6	99.4
	7.	1	0.5	0.6	100.0
	99.	38	18.4	MISSING	100.0
	TOTAL	206	100.0	100.0	

SPSS BATCH SYSTEM

FILE SBA2 (CREATION DATE = 08/19/90) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

YEAR1B YEAR PRELIMINARY ENG'G DESIGNS FINALIZED

```
CODE
     I
-11. ** (      1)
     I
     I
     I
-10. ** (      1)
     I
     I
     I
 -9. ** (      1)
     I
     I
     I
 -8. ** (      2)
     I
     I
     I
 -6. **** (      6)
     I
     I
     I
 -5. ** (      1)
     I
     I
     I
 -4. ********* (     15)
     I
     I
     I
 -3. ********** (     17)
     I
     I
     I
 -2. ************************ (     40)
     I
     I
     I
 -1. ******************************** (     56)
     I
     I
```

FILE S0A2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

```
          I
     0.   ************* (     24)
          I
          I
          I
     1.   ** (      2)
          I
          I
          I
     3.   ** (      1)
          I
          I
          I
     7.   ** (      1)
          I
          I
          I
    99.   ******************** (     30)
(MISSING) I
          I
          I.........I.........I.........I.........I.........I
          0        20        40        60        80       100
          FREQUENCY
```

VALID CASES 168 MISSING CASES 38

PSS BATCH SYSTEM 08/25/80

ILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

EARIC YEAR PROTOTYPE DEVELOPED

ATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	-10.	1	0.5	0.6	0.6
	-9.	1	0.5	0.6	1.1
	-8.	1	0.5	0.6	1.7
	-7.	2	1.0	1.1	2.8
	-6.	7	3.4	4.0	6.8
	-5.	8	3.9	4.5	11.4
	-4.	6	2.9	3.4	14.8
	-3.	10	4.9	5.7	20.5
	-2.	23	11.2	13.1	33.5
	-1.	79	38.3	44.9	78.4
	0.	30	14.6	17.0	95.5
	1.	5	2.4	2.8	98.3
	3.	2	1.0	1.1	99.4
	7.	1	0.5	0.6	100.0
	99.	30	14.6	MISSING	100.0
	TOTAL	206	100.0	100.0	

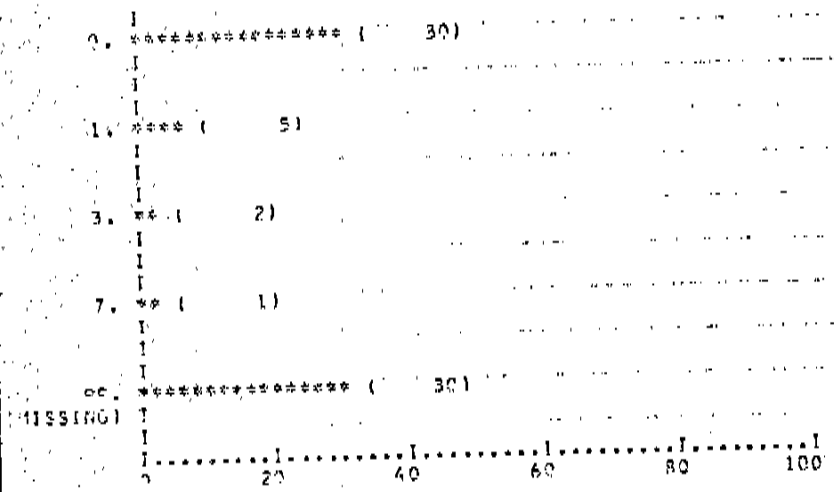
```
SPSS DATA SYSTEM                                                                                    08/20/80
FILE  SBA2     (CREATION DATE = 08/19/80)   SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

YEAR1C    YEAR PROTOTYPE DEVELOPED

    CODE
          I
   -10.   ** (      1)
          I
          I
          I
    -8.   ** (      1)
          I
          I
          I
    -9.   ** (      1)
          I
          I
          I
    -7.   ** (      2)
          I
          I
          I
    -6.   ***** (      7)
          I
          I
          I
    -5.   ***** (      8)
          I
          I
          I
    -4.   **** (      6)
          I
          I
          I
    -3.   ****** (     10)
          I
          I
          I
    -2.   ************* (     23)
          I
          I
          I
    -1.   ************************************** (     79)
          I
          I
```

OSS BATCH SYSTEM

ILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES



VALID CASES 176 MISSING CASES 30

OPS ATC SYS 09/22/80

FILE SBAZ (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

YEARBA YEAR OF FIRST PRODUCTION

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	-8.	1	0.5	0.5	0.5
	-6.	2	1.0	1.0	1.5
	-5.	3	1.5	1.5	3.0
	-4.	1	0.5	0.5	3.4
	-3.	1	0.5	0.5	3.9
	-2.	8	3.9	3.9	7.9
	-1.	32	15.5	15.8	23.6
	0.	145	70.4	71.4	95.1
	1.	7	3.4	3.4	98.5
	2.	1	0.5	0.5	99.0
	3.	1	0.5	0.5	99.5
	9.	1	0.5	0.5	100.0
	99.	3	1.5	MISSING	100.0
	TOTAL	206	100.0	100.0	

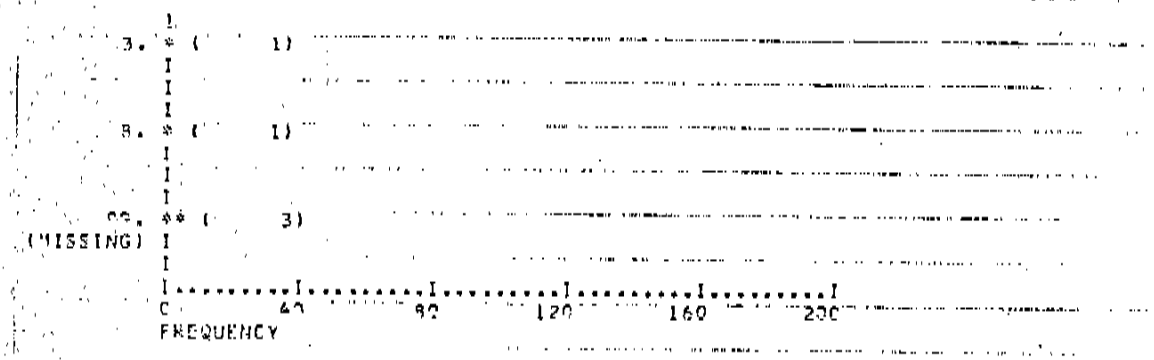
SPSS DATA SYS1...

FILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

YEAR2A YEAR OF FIRST PRODUCTION

CODE		
-8.	*	(1)
-6.	**	(2)
-5.	**	(3)
-4.	*	(1)
-3.	*	(1)
-2.	***	(8)
-1.	*********	(32)
0.	**********	(145)
1.	***	(7)
2.	*	(1)

FILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES



VALID CASES 203 MISSING CASES 3

SPSS DATA SYS... 08/20/80

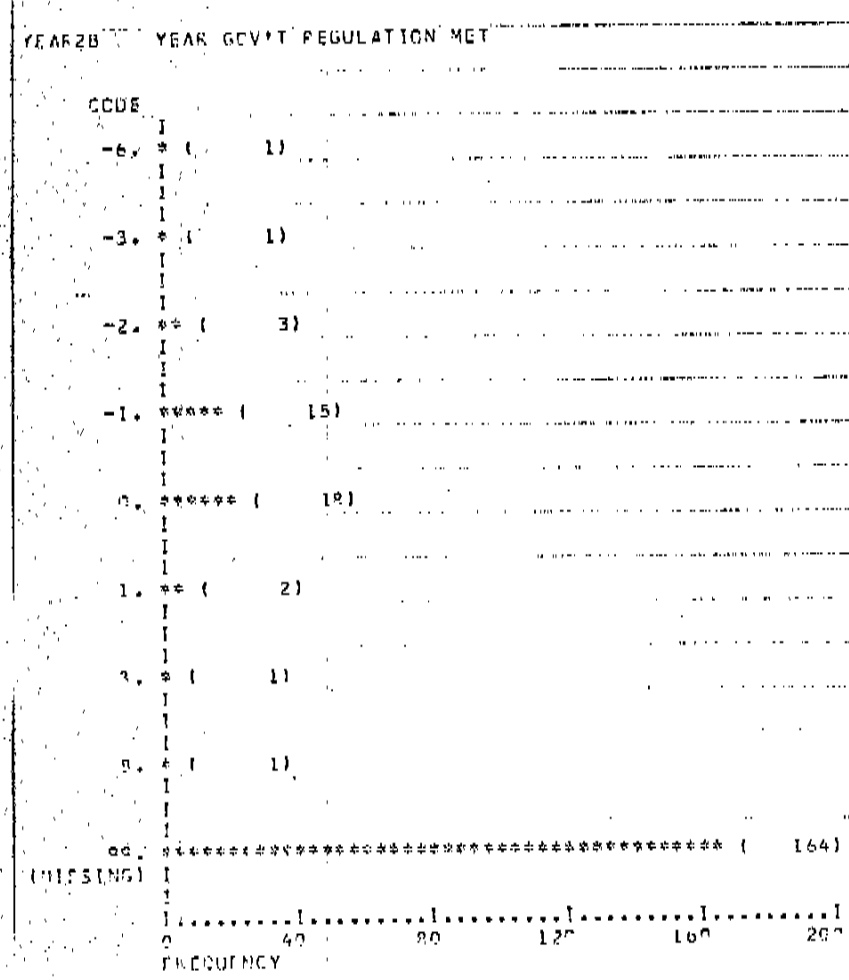
FILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

YEAR20 YEAR GOV'T REGULATION MET

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	-6.	1	0.5	2.4	2.4
	-3.	1	0.5	2.4	4.8
	-2.	3	1.5	7.1	11.9
	-1.	15	7.3	35.7	47.6
	0.	18	8.7	42.9	90.5
	1.	2	1.0	4.8	95.2
	3.	1	0.5	2.4	97.6
	8.	1	0.5	2.4	100.0
	99.	164	79.6	MISSING	100.0
	TOTAL	206	100.0	100.0	

FILE SBA2 (CREATION DATE = 08/19/90) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

YEARGB YEAR GOVT REGULATION MET



PSS BATCH SYSTEM

FILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

VAR20 YEAR OF FIRST ORDER-CONTRACT-DELIVERY

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	-9.	1	0.5	0.5	0.5
	-6.	1	0.5	0.5	1.0
	-5.	1	0.5	0.5	1.5
	-4.	1	0.5	0.5	2.0
	-3.	3	1.5	1.5	3.6
	-2.	5	2.4	2.6	6.1
	-1.	35	17.0	17.9	24.0
	0.	146	70.9	74.5	98.5
	1.	1	0.5	0.5	99.0
	3.	1	0.5	0.5	99.5
	8.	1	0.5	0.5	100.0
	^9.	10	4.9	MISSING	100.0
	TOTAL	206	100.0	100.0	

FILE SBA2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

YEAR YEAR OF MARKET INTRODUCTION

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	70.	11	24.4	24.4	24.4
	71.	12	26.7	26.7	51.1
	72.	17	37.8	37.8	88.9
	73.	5	11.1	11.1	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 45 MISSING CASES 0

FILE SBA2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

CNEB PRELIMINARY ENG'G DESIGNS FINALIZED

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	65.	2	4.4	8.3	8.3
	67.	3	6.7	12.5	20.8
	68.	3	6.7	12.5	33.3
	69.	3	6.7	12.5	45.8
	70.	7	15.6	29.2	75.0
	71.	5	11.1	20.8	95.8
	72.	1	2.2	4.2	100.0
NO RESPONSE	9.	21	46.7	MISSING	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 24 MISSING CASES 21

FILE SBA2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

CREC PROTOTYPE DEVELOPED

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	67.	2	4.4	5.7	5.7
	68.	5	11.1	14.3	20.0
	69.	6	13.3	17.1	37.1
	70.	11	24.4	31.4	68.6
	71.	5	11.1	14.3	82.9
	72.	3	6.7	8.6	91.4
	73.	3	6.7	8.6	100.0
NO RESPONSE	9.	10	22.2	MISSING	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 35 MISSING CASES 10

FILE SBA2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

T&CB GOVERNMENT REGULATION NET

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	62.	1	2.2	16.7	16.7
	70.	1	2.2	16.7	33.3
	71.	1	2.2	16.7	50.0
	72.	2	4.4	33.3	83.3
	73.	1	2.2	16.7	100.0
NO RESPONSE	9.	39	86.7	MISSING	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 6 MISSING CASES 39

FILE SBA2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

TWOC FIRST CREER-CONTRACT-DELIVERY

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	69.	1	2.2	4.2	4.2
	70.	7	15.6	29.2	33.3
	71.	8	17.8	33.3	66.7
	72.	7	15.6	29.2	95.8
	73.	1	2.2	4.2	100.0
NO RESPONSE	9.	21	46.7	MISSING	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 24 MISSING CASES 21

FILE SBA2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

TYPE START-UP SALES PROJECTION

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	69.	3	6.7	33.3	33.3
	70.	1	2.2	11.1	44.4
	71.	4	8.9	44.4	88.9
	72.	1	2.2	11.1	100.0
NO RESPONSE	9.	36	80.0	MISSING	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 9 MISSING CASES 36

FILE SBA2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

THCF FIRST SALES

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	70.	4	8.9	40.0	40.0
	71.	2	4.4	20.0	60.0
	72.	3	6.7	30.0	90.0
	73.	1	2.2	10.0	100.0
NO RESPONSE	9.	35	77.8	MISSING	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 10 MISSING CASES 35

FILE S8A2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

THEEEA DEVELOPED BY R&D

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
NO	0.	1	2.2	2.3	2.3
YES	1.	42	93.3	97.7	100.0
NO RESPONSE	9.	2	4.4	MISSING	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 43 MISSING CASES 2

FILE SBA2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

THEEEC ACQUIRED BY MERGER OR ACQUISITION

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
NO	0.	43	95.6	100.0	100.0
NO RESPONSE	9.	2	4.4	MISSING	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 43 MISSING CASES 2

FILE S8A2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

THFEDC DEVELOPED ABROAD

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
NO	0.	41	91.1	97.6	97.6
YES	1.	1	2.2	2.4	100.0
NO RESPONSE	9.	3	6.7	MISSING	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 42 MISSING CASES 3

FILE SBA2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

THREED ACQUIRED BY LICENSE

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
NO	0.	40	88.9	93.0	93.0
YES	1.	3	6.7	7.0	100.0
NO RESPONSE	9.	2	4.4	MISSING	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 43 MISSING CASES 2

USE CATCH SYSTEM

ILL SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY—COMPUTER

CAP2C YEAR OF FIRST ORDER-CONTRACT-DELIVERY

CODE		
-9.	*	(1)
-6.	*	(1)
-5.	*	(1)
-4.	*	(1)
-3.	**	(3)
-2.	**	(5)
-1.	**********	(35)
0.	**********	(146)
1.	*	(1)
3.	*	(1)

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OSS BATCH SYSTEM
FILE   SBA2      (CREATION DATE = 08/19/80)   SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

          I
       8. * (      1)
          I
          I
          I
      00. **** (     10)
(MISSING) I
          I
          I.........I.........I.........I.........I.........I
          0         40        80        120       160       200
          FREQUENCY

VALID CASES      106      MISSING CASES     10
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FILE SBAZ (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

YEARZD YEAR OF POST-DELIVERY MODIFICATIONS

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	-4.	1	0.5	2.3	2.3
	-1.	2	1.0	4.7	7.0
	0.	15	7.3	34.9	41.9
	1.	13	6.3	30.2	72.1
	2.	7	3.4	16.3	88.4
	3.	2	1.0	4.7	93.0
	4.	1	0.5	2.3	95.3
	8.	1	0.5	2.3	97.7
	9.	1	0.5	2.3	100.0
	99.	163	79.1	MISSING	100.0
	TOTAL	206	100.0	100.0	

PSS BATCH SYSTEM

ILE SBA2 (CREATION DATE = 09/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

YEAR2D YEAR OF POST-DELIVERY MODIFICATIONS

CODE		
-4.	*	(1)
-1.	**	(2)
0.	*****	(15)
1.	****	(13)
2.	***	(7)
3.	**	(2)
4.	*	(1)
8.	*	(1)
9.	*	(1)
99.	**********	(163)
(MISSING)		

PSC ATC SYST 08/2[illegible] PAGE

ILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

EAR2E YEAR OF SALES PROMOTION CAMPAIGN

ATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	-8.	1	0.5	0.7	0.7
	-5.	1	0.5	0.7	1.3
	-4.	1	0.5	0.7	2.0
	-3.	1	0.5	0.7	2.7
	-2.	2	1.0	1.3	4.0
	-1.	26	12.6	17.4	21.5
	0.	95	46.1	63.8	85.2
	1.	11	5.3	7.4	92.6
	2.	8	3.9	5.4	98.0
	3.	2	1.0	1.3	99.3
	9.	1	0.5	0.7	100.0
	99.	57	27.7	MISSING	100.0
	TOTAL	206	100.0	100.0	

PSC DATC... SYS ...

ILE SBA2 (CREATION DATE = 98/19/89) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

EAR2E YEAR OF SALES PROMOTION CAMPAIGN

```
CODE
      I
  -8. ** (      1)
      I
      I
      I
  -5. ** (      1)
      I
      I
      I
  -4. ** (      1)
      I
      I
      I
  -3. ** (      1)
      I
      I
      I
  -2. ** (      2)
      I
      I
      I
  -1. ************** (     26)
      I
      I
      I
   0. ************************************************** (     95)
      I
      I
      I
   1. ******* (     11)
      I
      I
      I
   2. ***** (      8)
      I
      I
      I
   3. ** (      2)
      I
      I
```

FILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

```
          I
     9. ** (      1)
          I
          I
          I
    99. ******************************** (     57)
(MISSING) I
          I
          I.........I.........I.........I.........I.........I
          0        20        40        60        80       100
          FREQUENCY
```

VALID CASES 149 MISSING CASES 57

SPSS DATA SYSTEM

FILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

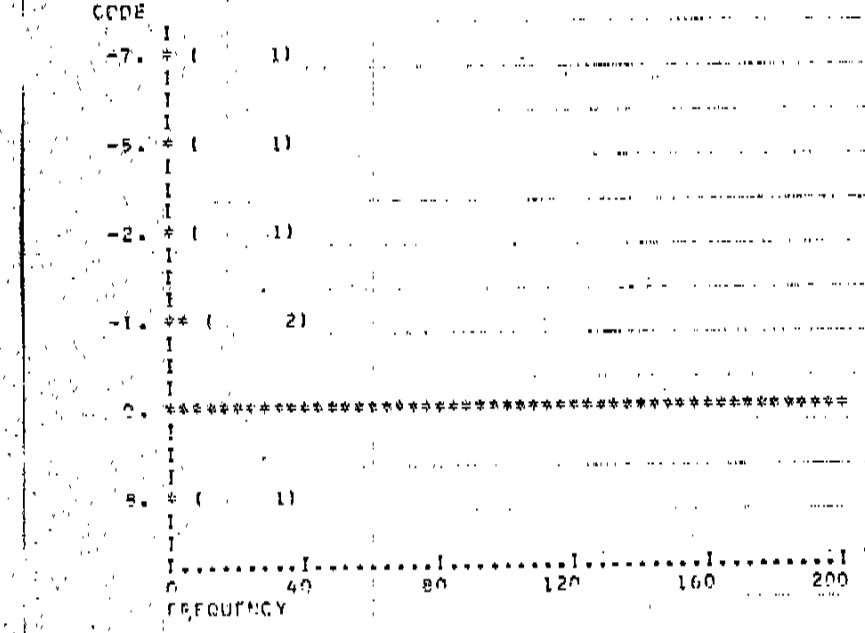
YEAR2F YEAR OF FIRST SALES

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	-7.	1	0.5	0.5	0.5
	-5.	1	0.5	0.5	1.0
	-2.	1	0.5	0.5	1.5
	-1.	2	1.0	1.0	2.4
	0.	200	97.1	97.1	99.5
	8.	1	0.5	0.5	100.0
	TOTAL	206	100.0	100.0	

ILE SBA2 (CREATION DATE = 08/19/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

PAR2F YEAR OF FIRST SALES

```
CODE
      I
 -7. * (      1)
      I
      I
      I
 -5. * (      1)
      I
      I
      I
 -2. * (      1)
      I
      I
      I
 -1. ** (      2)
      I
      I
      I
  0. ************************************************** (    200)
      I
      I
      I
  8. * (      1)
      I
      I
      I.........I.........I.........I.........I.........I
      0        40        80       120       160       200
      FREQUENCY
```



VALID CASES 206 MISSING CASES 0

Appendix B

POST-1969 NSF SURVEY DATA

FILE SBA2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

PRODSIC4 4-DIGIT PRODUCT SIC CODE

CODE	FREQ	ADJ PCT	CUM PCT	CODE	FREQ	ADJ PCT	CUM PCT	CODE	FREQ	ADJ PCT	CUM PCT
2395.	1	2	2	3479.	2	4	31	3662.	4	9	64
2641.	1	2	4	3499.	1	2	33	3679.	2	4	69
2024.	1	2	7	3532.	1	2	36	3714.	2	4	73
2833.	1	2	9	3535.	1	2	38	3811.	2	4	78
2843.	1	2	11	3552.	2	4	42	3829.	4	9	87
2899.	1	2	13	3559.	1	2	44	3832.	2	4	91
3079.	4	9	22	3569.	1	2	47	3841.	1	2	93
3255.	1	2	24	3573.	3	7	53	3851.	2	4	98
3463.	1	2	27	3574.	1	2	56	3861.	1	2	100

VALID CASES 45 MISSING CASES 0

FILE SBA2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

THREEF ACQUIRED IN ANY OTHER WAY

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
NO	0.	39	86.7	90.7	90.7
YES	1.	4	8.9	9.3	100.0
NO RESPONSE	9.	2	4.4	MISSING	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 43 MISSING CASES 2

FILE SBA2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

FCUPA WERE PUBLIC FUNDS USED?

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
NO	0.	34	75.6	82.9	82.9
YES	1.	7	15.6	17.1	100.0
NO RESPONSE	9.	4	8.9	MISSING	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 41 MISSING CASES 4

FILE SBA2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

FOCPBI PUBLIC FUNDING--BASIC RESEARCH

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
NO	0.	4	8.9	50.0	50.0
YES	1.	4	8.9	50.0	100.0
ACT APPLICABLE	8.	34	75.6	MISSING	100.0
NO RESPONSE	9.	3	6.7	MISSING	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 8 MISSING CASES 37

FILE SBA2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

FCUFB2 PUBLIC FUNDING--APPLIED RESEARCH

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
NO	0.	3	6.7	37.5	37.5
YES	1.	5	11.1	62.5	100.0
NOT APPLICABLE	8.	34	75.6	MISSING	100.0
NO RESPONSE	9.	3	6.7	MISSING	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 8 MISSING CASES 37

FILE SBA2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

FCGPB3 PUBLIC FUNDING--DEVELOPMENT

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
NO	0.	2	4.4	22.2	22.2
YES	1.	7	15.6	77.8	100.0
NOT APPLICABLE	8.	34	75.6	MISSING	100.0
NO RESPONSE	9.	2	4.4	MISSING	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 9 MISSING CASES 36

FILE SBA2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

FOUR07 PUBLIC LENDING--OTHER ACTIVITIES

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
NO	0.	8	17.8	100.0	100.0
NOT APPLICABLE	8.	34	75.6	MISSING	100.0
NO RESPONSE	9.	3	6.7	MISSING	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 8 MISSING CASES 37

FILE SBA2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

MINED PREVIOUS FORM OF OWNERSHIP

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
CLOSELY HELD	0.	8	17.8	17.8	17.8
PUBLICLY HELD	1.	36	80.0	80.0	97.8
GOVERNMENT-OWNED	2.	1	2.2	2.2	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 45 MISSING CASES 0

FILE SBA2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

TENC WAS INNOVATION THE 1ST IN BROAD LINE?

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
NO	0.	43	95.6	95.6	95.6
YES	1.	2	4.4	4.4	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 45 MISSING CASES 0

FILE SBA2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

TWELVE1 PRODUCT SOLD TO PRODUCERS

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
NO	0.	21	46.7	46.7	46.7
YES	1.	24	53.3	53.3	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 45 MISSING CASES 0

FILE SBA2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

TWELVE3 PRODUCT SOLD TO CONSUMERS

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
NO	0.	32	71.1	71.1	71.1
YES	1.	13	28.9	28.9	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 45 MISSING CASES 0

FILE SBA2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

TWELVE4 PRODUCT SOLD TO GOVERNMENT ORGS.

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
NO	0.	33	73.3	73.3	73.3
YES	1.	12	26.7	26.7	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 45 MISSING CASES 0

FILE SBA2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

THELVES PRODUCT SOLD TO INTERNAL USERS

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
NO	0.	31	68.9	68.9	68.9
YES	1.	14	31.1	31.1	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 45 MISSING CASES 0

File SBA 2 (Creation Date = 10/20/80) Small Business Administration Study--Completed Cases

Size FCPNEF CRG. Size--AC. of Employees

Category Label	Code	Absolute Freq	Relative Freq (Pct)	Adjusted Freq (Pct)	Cum Freq (Pct)
< 500	1.	5	35.6	35.6	35.6
500 of MCRE	2.	39	64.4	64.4	100.0
Unknown		1			
TOTAL		45	100.0	100.0	

Valid Cases 45 Missing Cases 0

FILE SBA2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

YEARIA YEAR PERFORMANCE CRITERIA ESTABLISHED

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	-7.	1	2.2	3.0	3.0
	-6.	4	8.9	12.1	15.2
	-5.	3	6.7	9.1	24.2
	-4.	5	11.1	15.2	39.4
	-3.	6	13.3	18.2	57.6
	-2.	8	17.8	24.2	81.8
	-1.	6	13.3	18.2	100.0
	99.	12	26.7	MISSING	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 33 MISSING CASES 12

FILE SBA2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

YEAPLP YEAR PRELIMINARY ENG'G DESIGNS FINALIZED

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	-5.	2	4.4	8.7	8.7
	-4.	3	6.7	13.0	21.7
	-3.	3	6.7	13.0	34.8
	-2.	7	15.6	30.4	65.2
	-1.	8	17.8	34.8	100.0
	99.	22	48.9	MISSING	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 23 MISSING CASES 22

FILE S8A2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

YEAR1C YEAR PROTOTYPE DEVELOPED

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	-4.	2	4.4	5.9	5.9
	-3.	4	8.9	11.8	17.6
	-2.	11	24.4	32.4	50.0
	-1.	9	20.0	26.5	76.5
	0.	6	13.3	17.6	94.1
	1.	2	4.4	5.9	100.0
	99.	11	24.4	MISSING	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 34 MISSING CASES 11

FILE SBA2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

YEAR28 YEAR GOVT REGULATION MET

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	-8.	1	2.2	16.7	16.7
	0.	5	11.1	83.3	100.0
	59.	39	86.7	MISSING	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 6 MISSING CASES 39

FILE SBA2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINTSTRATION STUDY--COMPLETED CASES

YEAR2C YEAR OF FIRST ORDER-CONTRACT-DELIVERY

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	-1.	5	11.1	20.8	20.8
	0.	19	42.2	79.2	100.0
	99.	21	46.7	MISSING	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 24 MISSING CASES 21

FILE SBA2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

YEAR2E YEAR OF SALES PROMOTION CAMPAIGN

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	-1.	4	8.9	50.0	50.0
	0.	4	8.9	50.0	100.0
	99.	37	82.2	MISSING	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 8 MISSING CASES 37

FILE SBA2 (CREATION DATE = 10/20/80) SMALL BUSINESS ADMINISTRATION STUDY--COMPLETED CASES

YEAF2F YEAR OF FIRST SALES

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	0.	8	17.8	88.9	88.9
	1.	1	2.2	11.1	100.0
	99.	36	80.0	MISSING	100.0
	TOTAL	45	100.0	100.0	

VALID CASES 9 MISSING CASES 36

Appendix C

INDUSTRY DATA

Four-Digit SIC Number 1972	(1) Total Number of Employees 1967 (000)	(2) Number of Employees/Small Establishments 1972 (000)	(3) Number of Employees/Large Establishments 1972 (000)	(4) Total Number of Employees 1972 (2)+(3) (000)	(5) Total Number of Employees 1976 (000)	(6) Total Number of Establishments 1967	(7) Total Number of Establishments 1972	(8) Four-Firm Concentration Ratio 1972	(9) Gross Stocks 1972 3-Digit SIC (millions)	(10) Capital Intensity Ratio 1972 3-Dig.SIC (000)	(11) Annual Growth Rate 1967-1976	(12) Annual Growth Rate 1972-1976
2052	42.5	16.1	25.0	41.1	41.0	348	315	59	$ 3,075.9	11.2	-.004	-
2221	108.6	46.2	103.5	149.7	161.1	596	412	39	1,553.4	39.0	.054	-
2295	17.5	11.5	6.4	18.0	17.1	178	203	35	1,200.9	16.2	-.003	-
2499	NA	57.2[a]	5.8[a]	63.0	66.7	NA	3,133	18	1,140.1	12.0	-	.015
2515	31.2	25.9[a]	5.7[a]	31.6	25.8	1,013	977	24	2,002.5	5.7	-.019	-
2661	11.7	6.8	4.8	11.6	9.4	94	92	52	326.8	28.2	-.022	-
2819	NA	26.0	37.7	63.8	74.6	NA	384	34	6,679.0[b]	21.9	-	.042
2821	NA	27.0	27.8	54.8	56.2	NA	323	27	4,581.4[b]	83.6	-	.006
2822	12.6	3.9	7.9	11.8	10.6	48	59	62	828.8[b]	70.2	-.018	-
2824	57.2	3.2	73.1	76.3	69.3	40	61	74	10,761.8	49.3	.024	-
2841	30.3	18.3	13.2	31.5	29.8	668	642	62	2,384.8	19.3	-.002	-
2851	66.1	60.1	5.9	65.9	60.4	1,701	1,599	22	1,202.3	17.1	-.010	-
2869	95.1	31.2	70.5	101.7	109.3	NA	514	43	14,074.4	103.6	.017	-
2879	NA	8.1[a]	4.1[a]	12.2	15.4	NA	388	39	4,144.8	79.4	-	.066
2891	NA	14.2[a]	0.7[a]	14.9	14.3	NA	463	19	2,380.5	28.5	-	-.010
2892	32.8	6.7	12.2	18.9	11.8	92	92	67	2,380.5	28.5	-.071	-
2899	NA	31.6	5.5	37.1	36.6	NA	1,606	16	2,380.5	28.5	-	-.003
2911	106.7	35.5	65.3	100.8	101.7	437	323	31	21,827.5	142.4	-.005	-
3011	92.7	10.0	97.5	107.5	103.9	182	206	73	3,461.3	27.0	.013	-
3079	NA	296.8	50.2	346.9	375.2	NA	7,698	8	4,873.6	15.0	-	.020
3229	42.5	13.6	32.3	45.9	43.6	185	252	66	2,654.9	19.4	.003	-
3264	13.4	6.8	6.6	13.4	11.3	74	83	46	501.6[b]	11.3	-.017	-
3281	16.6	15.0	0.0[a]	15.0	15.2	811	908	18	149.2[b]	9.9	-.009	-
3291	27.2	15.2[a]	9.3[a]	24.5	24.7	361	392	49	2,498.5	20.3	-.010	-
3293	NA	17.6	10.1	27.7	27.6	NA	374	27	2,498.5	20.3	-	-.001
3299	5.3	6.3	0.0[a]	6.3	7.8	330	491	28	2,498.5	20.3	.052	-
3297	9.9	6.8[a]	1.3[a]	8.1	9.0	92	90	38	2,498.5	20.3	-.010	

a = Value interpolated from available data.

b = Value represents gross stocks at the 4-digit SIC level.

Four-Digit SIC Number 1972	(1) Total Number of Employees 1967 (000)	(2) Number of Employees/Small Establishments 1972 (000)	(3) Number of Employees/Large Establishments 1972 (000)	(4) Total Number of Employees 1972 (2)+(3) (000)	(5) Total Number of Employees 1976 (000)	(6) Total Number of Establish-ments 1967	(7) Total Number of Establish-ments 1972	(8) Four-Firm Concentration Ratio 1972	(9) Gross Stocks 1972 3-Digit SIC (millions)	(10) Capital Intensity Ratio 1972 3-Dig.SIC (000)	(11) Annual Growth Rate 1967-1976	(12) Annual Growth Rate 1972-1976
3312	533.1	24.1	445.0	469.1	451.9	329	364	45	$30,913.8	53.0	-.017	-
3313	10.4	4.8	4.7	9.5	8.3	34	40	74	30,913.8	53.0	-.022	-
3321	138.0	74.3	64.0	138.4	136.0	1,061	993	34	3,944.3	17.8	-.002	-
3351	40.3	15.9	21.8	37.8	34.1	125	149	39	6,386.6	31.4	-.017	-
3399	NA	7.8	0.0	7.8	9.8	NA	168	26	1,239.7	17.8	-	.064
3411	60.3	38.9	29.6	68.5	61.1	299	396	66	2,016.9	28.4	.001	-
3425	6.3	4.9[a]	1.7[a]	6.6	6.8	85	91	51	2,106.6	13.4	.009	-
3432	14.5	13.7	4.9	18.6	18.8	214	230	26	777.1	9.5	.033	-
3433	NA	22.2	8.7	30.9	24.0	533	432	22	777.1	9.5	-	-.056
3443	96.4	65.3	27.6	93.0	119.6	1,465	1,486	29	4,223.5	9.8	.027	-
3452	67.2	40.9	19.7	60.6	58.8	662	678	16	1,680.0	17.1	-.014	-
3471	55.1	54.9	0.0	54.9	58.5	3,241	3,264	5	879.2	10.2	.007	-
3494	95.3	54.4	39.5	93.9	102.7	666	780	11	3,028.2	19.4	.009	-
3496	NA	20.0	3.7	23.7	30.3	19	1,211	11	3,028.2	19.4	-	.070
3497	6.6	4.0[a]	1.4[a]	5.4	6.0	72	63	45	3,028.2	19.4	-.010	-
3523	NA	46.1	58.5	104.6	127.3	NA	1,548	47	1,901.2[b]	14.3	-	.054
3531	133.1	42.4	91.4	133.8	144.8	651	748	43	2,951.3[b]	22.1	.010	-
3532	21.7	11.5	9.9	21.3	31.9	212	240	41	3,819.6	13.2	.052	-
3535	27.4	22.8	4.5	27.2	28.8	446	492	22	3,819.6	13.2	.006	-
3537	27.0	12.7	13.1	25.8	23.3	351	380	50	3,819.6	13.2	-.015	-
3541	87.2	27.1	25.4	52.5	58.1	903	894	22	4,550.5	15.8	-.037	-
3542	29.2	15.7	8.4	24.1	27.9	350	383	18	4,550.5	15.8	-.005	-
3545	60.3	37.1	9.9	47.0	51.0	1,141	1,231	19	4,550.5	15.8	-.017	-
3546	NA	7.3	15.8	23.1	22.0	NA	88	48	4,550.5	15.8	-	-.012
3549	NA	12.9[a]	0.7[a]	13.6	14.7	NA	393	15	4,550.5	15.8	-	.020
3551	32.6	26.1	5.8	31.9	34.2	642	688	18	2,434.5	13.6	.005	-

a = Value interpolated from available data.

b = Value represents gross stocks at the 4-digit SIC level.

Four-Digit SIC Number 1972	(1) Total Number of Employees 1967 (000)	(2) Number of Employees/Small Establishments 1972 (000)	(3) Number of Employees/Large Establishments 1972 (000)	(4) Total Number of Employees 1972 (2)+(3) (000)	(5) Total Number of Employees 1976 (000)	(6) Total Number of Establishments 1967	(7) Total Number of Establishments 1972	(8) Four-Firm Concentration Ratio 1972	(9) Gross Stocks 1972 3-Digit SIC (millions)	(10) Capital Intensity Ratio 1972 3-Dig.SIC (000)	(11) Annual Growth Rate 1967-1976	(12) Annual Growth Rate 1972-1976
3554	21.3	11.2	4.1	15.3	18.0	220	218	32	$ 2,434.5	13.6	-.017	-
3555	29.2	16.3	7.6	23.9	22.5	522	574	42	2,434.5	13.6	-.025	-
3559	71.3	47.7	24.5	72.2	76.1	1,129	1,384	20	2,434.5	13.6	.007	-
3561	NA	32.5	23.0	55.5	62.8	660	559	17	3,853.1	14.4	-	.033
3562	58.8	12.2	38.8	50.9	49.2	124	135	53	1,047.4[b]	20.6	-.018	-
3563	78.3	5.6	17.3	22.9	26.8	NA	84	47	3,853.1	14.4	-.073	-
3567	16.1	10.4	3.2	13.6	13.3	255	266	30	3,853.1	14.4	-.019	-
3568	NA	14.3	13.4	27.7	29.0	NA	155	36	3,853.1	14.4	-	.012
3569	39.4	33.3	3.6	36.9	39.2	758	901	10	3,853.1	14.4	-.001	-
3573	98.9	35.0	109.6	144.6	165.7	178	602	51	3,211.2	13.1	.075	-
3574	38.4	3.7	18.9	22.5	19.7	138	79	73	3,211.2	13.1	-.054	-
3576	6.5	4.6[a]	1.9[a]	6.5	7.4	76	97	50	3,211.2	13.1	.015	-
3579[c]	20.7	11.0	23.4	34.5	36.7	177	217	60	3,211.2	13.1	.086	-
3585	NA	49.8	101.0	150.8	131.3	NA	774	40	1,519.1[b]	10.1	-	-.032
3586	6.4	2.9	4.3	7.2	7.4	49	57	51	2,182.5	14.5	.017	-
3592	NA	7.6	19.1	26.7	31.1	NA	113	53	2,146.1	10.2	-	.041
3612	45.6	13.2	32.7	45.9	38.8	190	216	59	1,246.1	6.4	-.017	-
3613	68.5	31.1	37.8	68.9	65.3	482	568	51	1,246.1	6.4	-.005	-
3621	112.8	31.2	59.4	90.6	90.7	409	426	47	2,599.6	12.3	-.022	-
3623	13.7	8.9	6.6	15.5	16.1	147	166	41	2,599.6	12.3	.019	-
3624	11.9	4.0	7.3	11.3	12.0	65	72	80	2,599.6	12.3	.001	-
3629	17.9	10.3	9.9	20.2	19.6	219	258	31	2,599.6	12.3	.011	-
3636	6.4	1.5[a]	3.8[a]	5.3	7.6	86	75	84	2,162.2	11.0	.021	-
3641	29.5	8.2	23.1	31.3	28.4	106	143	90	2,007.1	9.9	-.004	-
3643	40.1	23.5	24.9	48.3	43.8	375	401	30	2,007.1	9.9	.010	-
3648	NA	9.6	3.1	12.7	10.0	NA	190	29	2,007.1[b]	9.9	-	-.053
3651	116.7	16.3	70.2	86.5	71.5	340	372	49	927.9[b]	10.7	-.043	-

a = Value interpolated from available data.

b = Value represents gross stocks at the 4-digit SIC level.

c = All values include SIC Number 3572.

Four-Digit SIC Number 1972	(1) Total Number of Employees 1967 (000)	(2) Number of Employees/Small Establishments 1972 (000)	(3) Number of Employees/Large Establishments 1972 (000)	(4) Total Number of Employees 1972 (2)+(3) (000)	(5) Total Number of Employees 1976 (000)	(6) Total Number of Establishments 1967	(7) Total Number of Establishments 1972	(8) Four-Firm Concentration Ratio 1972	(9) Gross Stocks 1972 3-Digit SIC (millions)	(10) Capital Intensity Ratio 1972 3-Dig.SIC (000)	(11) Annual Growth Rate 1967-1976	(12) Annual Growth Rate 1972-1976
3661	115.4	9.1	125.4	134.4	105.2	106	203	0	$ 1,953.2[b]	14.5	-.010	-
3662	409.9	90.0	229.1	319.2	316.3	1,296	1,773	19	4,973.6	11.6	-.025	-
3671	18.6	1.1	10.3	11.4	NA	NA	25	NA	4,735.6	14.0	-.043	-
3673	18.2	4.6	15.9	20.5	19.5	56	53	55	4,735.6	14.0	.008	-
3674	85.4	19.9	77.1	97.0	102.5	177	327	57	4,735.6	14.0	.022	-
3676	NA	12.3	8.2	20.5	17.4	NA	86	43	4,735.6	14.0	-	-.038
3677	NA	20.3	3.3	23.6	7.9	NA	247	14	4,735.6	14.0	-	-.060
3679	NA	67.3	33.4	100.7	98.3	NA	1,850	36	4,735.6	14.0	-	-.006
3691	19.3	16.7	5.5	22.1	23.1	232	212	57	1,274.7	10.4	.022	-
3692	11.0	5.4	3.0	8.4	10.4	49	48	92	1,274.7	10.4	-.006	-
3693	7.9	5.4	6.7	12.1	18.0	82	104	54	1,274.7	10.4	.142	-
3694	55.4	15.0	42.9	57.9	57.7	264	290	65	552.2[b]	9.5	.005	-
3699	18.8	20.0	0.0	20.0	NA	NA	998	NA	1,274.7	10.4	.007	-
3711	321.2	5.9	333.3	339.2	324.3	181	231	93	16,835.0	18.9	.001	-
3714	364.9	100.0	299.9	399.9	410.0	1,674	2,119	61	16,835.0	18.9	.014	-
3715	22.9	15.9	8.8	24.7	21.4	179	255	45	16,835.0	18.9	-.007	-
3728	NA	32.1	70.1	102.2	100.0	NA	694	33	7,613.7[b]	15.3	-	-.005
3731	138.8	26.8	117.8	144.6	166.3	415	455	47	1,483.2[b]	10.3	.022	-
3751	12.0	4.8	12.8	17.6	13.7	91	222	65	146.0[b]	8.3	.016	-
3811	46.1	24.3	13.1	37.4	43.5	677	743	22	501.6[b]	13.4	-.006	-
3822	31.4	6.1	24.6	30.7	31.5	105	131	57	1,722.2	16.6	.000	-
3823	NA	15.3[a]	23.5[a]	38.8	35.6	NA	192	35	1,722.2	16.6	-	-.021
3824	NA	6.0[a]	2.8[a]	8.8	13.8	NA	61	57	1,722.2[b]	16.6	-	.142
3825	NA	24.8	28.1	52.9	61.1	NA	632	38	660.2[b]	12.5	-	.039
3829	NA	13.1	11.7	24.8	26.9	NA	595	23	1,722.2[b]	16.6	-	.021
3832	25.4	14.3	4.3	18.6	26.3	370	494	42	264.6[b]	14.2	.004	-
3841	22.0	21.6[a]	12.9[a]	34.5	42.8	321	506	32	911.2	10.0	.105	-
3843	10.2	9.7[a]	2.7[a]	12.4	15.3	334	429	35	911.2	10.0	.056	-
3861	94.9	19.8	74.9	94.7	107.3	557	627	74	2,372.1	21.0	.015	-
3873	35.2	11.2[a]	19.6[a]	30.8	33.1	223	202	55	204.1	6.7	-.007	-
3955	6.5	5.0[a]	0.6[a]	5.6	3.9	107	84	37	335.2	9.9	-.044	-

a = Value interpolated from available data.
b = Value represents gross stocks at the 4-digit SIC level.

Gellman Research Associates, Inc.

Four Digit SIC Number 1972	(1) Total Number of Employees 1967 (000)	(2) Number of Employees/Small Establishments 1972 (000)	(3) Number of Employees/Large Establishments 1972 (000)	(4) Total Number of Employees 1972 (2)+(3) (000)	(5) Total Number of Employees 1976 (000)	(6) Total Number of Establishments 1967	(7) Total Number of Establishments 1972	(8) Four-Firm Concentration Ratio 1972	(9) Gross Stocks 1972 3-Digit SIC (millions)	(10) Capital Intensity Ratio 1972 3-Dig.SIC (000)	(11) Annual Growth Rate 1967-1976	(12) Annual Growth Rate 1972-1976
2395	13.5	15.9[a]	0.8[a]	16.7	14.6	1,107	898	22	$ 1,050.3	6.2	-.009	-
2641	37.1	22.9	14.3	37.2	39.7	397	426	36	3,768.5	19.0	.008	-
2833	8.4	5.0[a]	2.8[a]	7.8	14.4	126	140	59	4,003.8	27.0	.079	-
2843	5.7	6.2[a]	0.7[a]	6.9	6.9	164	178	28	2,384.8	19.3	.023	-
3255	12.6	8.4	2.9	11.3	12.5	145	156	49	1,261.2	20.7	-.001	-
3463	10.1	2.8	3.0	5.8	5.1	NA	46	71	209.0[b]	36.0	-.055	-
3479	26.2	26.9	0.7	27.6	27.7	1,443	1,497	15	879.2	10.2	.006	-
3499	49.4	53.2	8.3	61.5	62.2	1,266	2,343	16	3,028.2	19.4	.029	-
3552	39.7	20.6	12.1	32.7	25.7	560	579	31	2,434.5	13.6	-.039	-
3851	25.6	14.3	12.4	26.7	26.7	461	499	56	245.0	9.2	.005	-

a = Value interpolated from available data.

b = Value represents gross stocks at the 4-digit SIC level.

Appendix D

INNOVATING INDUSTRIES

INNOVATING INDUSTRIES IN P1:
ESTABLISHMENTS INCREASED - EMPLOYMENT INCREASED

SIC #	Description
2499	Wood Products, NEC
2641	Paper Coating and Glazing
2819	Industrial Inorganic Chemicals, NEC
2821	Plastic Materials, Synthetic Resins, and Non-Vulcanized Elastomers
2824	Synthetic Organic Fibers, Except Cellulosic
2833	Medicinal Chemicals and Botanical Products
2843	Surface Active Agents, Finishing Agents, Sulfunated Oils and Assistants
2869	Industrial Organic Chemicals, NEC
2879	Pesticides and Agricultural Chemicals, NEC
3011	Tires and Inner Tubes
3079	Miscellaneous Plastics Products
3229	Pressed and Blown Glass and Glassware, NEC
3299	Non-Metallic Mineral Products, NEC
3399	Primary Metal Products, NEC
3411	Metal Cans
3425	Hand Saws and Saw Blades
3432	Plumbing Fixture Fittings and Trim (Brass Goods)
3443	Fabricated Plate Work (Boiler Shops)
3471	Electroplating, Plating, Polishing, Anodizing and Coloring
3479	Coating, Engraving, and Allied Services, NEC
3494	Valves and Pipe Fittings, Except Plumbers' Brass Goods
3496	Miscellaneous Fabricated Wire Products
3499	Fabricated Metal Products, NEC
3523	Farm Machinery and Equipment
3531	Construction Machinery and Equipment
3532	Mining Machinery and Equipment Except Oil Field Machinery and Equipment
3535	Conveyors and Conveying Equipment
3549	Metalworking Machinery, NEC
3551	Food Products Machinery
3559	Special Industry Machinery, NEC
3568	Mechanical Power Transmission Equipment
3573	Electronic Computing Equipment
3576	Scales and Balances, Except Laboratory
3579	Office Machines, NEC
3586	Measuring and Dispensing Pumps
3592	Carburetors, Pistons, Piston Rings, and Valves
3623	Welding Apparatus, Electric
3624	Carbon and Graphite Products
3629	Electrical Industrial Apparatus, NEC
3643	Current-Carrying Wiring Devices
3674	Semiconductors and Related Devices

SIC #	Description
3693	Radiographic X-Ray, Fluoroscopic X-Ray, Therapeutic X-Ray, and Other X-Ray Apparatus and Tubes; Electromedical and Electrotherapeutic Apparatus
3694	Electrical Equipment for Internal Combustion Engines
3699	Electrical Machinery, Equipment, and Supplies, NEC
3711	Motor Vehicles and Passenger Car Bodies
3714	Motor Vehicle Parts and Accessories
3731	Ship Building and Repairing
3751	Motorcycles, Bicycles, and Parts
3822	Automatic Controls for Regulating Residential and Commercial Environments and Appliances
3824	Totalizing Fluid Meters and Counting Devices
3825	Instruments for Measuring and Testing of Electricity and Electrical Signals
3829	Measuring and Controlling Devices, Not Elsewhere Classified
3832	Optical Instruments and Lenses
3841	Surgical and Medical Instruments and Apparatus
3843	Dental Equipment and Supplies
3851	Opthalmic Goods
3861	Photographic Equipment and Supplies

INNOVATING INDUSTRIES IN P2:
ESTABLISHMENTS INCREASED - EMPLOYMENT DECREASED

SIC #	Description
2295	Coated Fabrics, Not Rubberized
2822	Synthetic Rubber (Vulcanized Elastomers)
2891	Adhesives and Sealants
2892	Explosives
2899	Chemicals and Chemical Preparations, NEC
3255	Clay Refractories
3264	Porcelain Electrical Supplies
3281	Cut Stone and Stone Products
3291	Abrasive Products
3293	Gaskets, Packing, and Sealing Devices
3312	Blast Furnaces, Steel Works, and Rolling Mills
3313	Electrometallurgical Products
3351	Rolling, Drawing, and Extruding of Copper
3452	Bolts, Nuts, Screws, Rivets and Washers
3463	Nonferrous Forgings
3537	Industrial Trucks, Tractors, Trailers, and Stackers
3542	Machine Tools, Metal Forming Types
3545	Machine Tool Accessories and Measuring Devices
3546	Power Driven Hand Tools
3552	Textile Machinery
3555	Printing Trades Machinery and Equipment
3562	Ball and Roller Bearings
3563	Air and Gas Compressors
3567	Industrial Process Furnaces and Ovens
3569	General Industrial Machinery and Equipment, NEC
3585	Air Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment
3612	Power, Distribution, and Specialty Transformers
3613	Switchgear and Switchboard Apparatus
3621	Motor and Generators
3641	Electric Lamps
3648	Lighting Equipment, NEC
3651	Radio and Television Receiving Sets, Except Communication Types
3661	Telephone and Telegraph Apparatus
3662	Radio and Television Transmitting, Signaling, and Detection Equipment and Apparatus
3671	Radio and Television Receiving Type Electron Tubes, Except Cathode Ray
3676	Resistors, for Electronic Applications
3677	Electronic Coils, Transformers, and Other Inductors
3679	Electronic Components, NEC
3715	Truck Trailers

SIC #	Description
3728	Aircraft Parts and Auxiliary Equipment, NEC
3811	Engineering, Laboratory, Scientific, and Research Instruments and Associated Equipment
3823	Industrial Instruments for Measurement, Display, and Control of Process Variables; and Related Products

INNOVATING INDUSTRIES IN P3:
ESTABLISHMENTS DECREASED - EMPLOYMENT INCREASED

SIC #	Description
2221	Broad Woven Fabric Mills, Man-Made Fiber and Silk
2395	Pleating, Decorative and Novelty Stitching, and Tucking for the Trade
3561	Pumps and Pumping Equipment
3636	Sewing Machines
3673	Transmitting, Industrial, and Special Purpose Electron Tubes
3691	Storage Batteries

INNOVATING INDUSTRIES IN P4:
ESTABLISHMENTS DECREASED - EMPLOYMENT DECREASED

SIC #	Description
2052	Bread and Other Bakery Products, Except Cookies and Crackers
2515	Mattresses and Bedsprings
2661	Building Paper and Building Board Mills
2841	Soap and Other Detergents, Except Specialty Cleaners
2851	Paints, Varnishes, Lacquers, Enamels, and Allied Products
2911	Petroleum Refining
3297	Nonclay Refractories
3321	Gray Iron Foundries
3433	Heating Equipment, Except Electric and Warm Air Furnaces
3497	Metal Foil and Leaf
3541	Machine Tools, Metal Cutting Types
3554	Paper Industries Machinery
3574	Calculating and Accounting Machines, Except Electronic Computing Equipment
3692	Primary Batteries, Dry and Wet
3873	Watches, Clocks, Clockwork Operated Devices, and Parts
3955	Carbon Paper and Inked Ribbons

APPENDIX E

ESTABLISHMENT EMPLOYMENT BY SIZE OF OWNING COMPANY

1972 EMPLOYMENT IN ESTABLISHMENTS

Four-Digit SIC Number 1972	Total Employees	Employees in Establishments Owned By Small Firms	
		%	Number
2052	41,118	21.1	8,676
2221	145,515	8.7	12,660
2295	17,271	25.0	4,318
2395	16,691	79.5	13,269
2499	62,967	64.8	40,803
2515	31,530	64.6	20,368
2641	38,506	23.2	8,933
2661	11,992	7.7	923
2819	62,407	6.1	3,807
2821	55,663	10.7	5,956
2822[1]	11,780	8.3	978
2824[1]	76,314	1.7	1,297
2833[2]	8,437	30.3	2,556
2841[3]	31,416	27.0	8,482
2843[2]	6,876	56.3	3,871
2851	65,826	42.6	28,042
2869	101,721	5.3	5,391
2879	12,291	31.2	3,835
2891[2]	14,899	38.5	5,736
2892[2]	18,204	8.2	1,493
2899	37,571	43.8	16,456
2911	100,738	4.9	4,936
3011	107,455	2.9	3,116
3079	349,167	47.8	166,902
3229	45,817	13.6	6,231
3255	11,269	25.1	2,829
3264	13,351	21.1	2,817
3281	15,028	81.2	12,203
3291	24,487	24.9	6,097

Continued

Four-Digit SIC Number 1972	Total Employees	Employees in Establishments Owned By Small Firms	
		%	Number
3293	27,707	35.0	9,697
3297	8,084	16.5	1,334
3299	6,273	71.4	4,479
3312	469,374	1.3	6,102
3313[2]	9,495	14.1	1,339
3321	138,283	33.0	45,633
3351	37,713	10.5	3,960
3399[2]	7,800	53.6	4,181
3411[3]	68,339	5.5	3,759
3425[1]	6,489	39.4	2,557
3432	18,354	35.8	6,571
3433	31,142	41.3	12,862
3443	94,709	43.4	41,104
3452	60,007	33.0	19,802
3463[1]	5,754	23.1	1,329
3471	54,926	90.4	49,653
3479	27,362	77.8	21,288
3494	93,370	26.9	25,117
3496	33,131	74.8	24,782
3497	5,571	36.1	2,011
3499	61,153	60.6	37,059
3523	104,870	31.0	32,510
3531	133,794	15.0	20,069
3532	21,710	29.0	6,296
3535	27,176	48.6	13,208
3537	25,838	32.5	8,397
3541	53,087	30.5	16,192
3542	25,074	36.3	9,102

Continued

Four-Digit SIC Number 1972	Total Employees	Employees in Establishments Owned By Small Firms	
		%	Number
3545	46,278	48.0	22,213
3546[1]	22,678	8.5	1,928
3549	13,541	64.6	8,747
3551	31,930	53.5	17,083
3552	32,665	38.5	12,576
3554	14,930	47.5	7,092
3555	23,938	37.4	8,953
3559	72,245	40.8	29,476
3561	57,879	25.1	14,528
3562	51,053	8.4	4,288
3563[2]	21,000	11.7	2,457
3567	13,563	43.9	5,954
3568	27,522	20.3	5,587
3569	36,947	53.4	19,730
3573	144,619	14.2	20,536
3574[2]	24,431	6.5	1,588
3576	6,545	35.5	2,323
3579	34,659	16.1	5,580
3585	150,830	13.9	20,965
3586	7,241	23.9	1,731
3592	26,657	10.0	2,666
3612[2]	46,841	12.0	5,621
3613	69,643	14.7	10,238
3621	90,282	10.5	9,480
3623	15,467	33.1	5,120
3624[2]	11,322	23.0	2,604
3629	20,168	34.3	6,918
3636[1]	5,264	22.5	1,184
3641[1]	31,262	5.3	1,657
3643	49,964	24.3	12,141

Continued

Four-Digit SIC Number 1972	Total Employees	Employees in Establishments Owned By Small Firms	
		%	Number
3648	12,681	29.3	3,716
3651	86,722	9.0	7,805
3661	136,149	2.6	3,540
3662	318,497	13.4	42,679
3671	11,441	8.2	938
3673[1]	20,455	5.3	1,084
3674	87,602	12.4	10,863
3676	20,510	16.4	3,364
3677	23,981	52.0	12,470
3679	112,617	36.7	41,330
3691	22,122	11.2	2,478
3692	8,416	3.5	295
3693[2]	11,998	24.2	2,904
3694	57,611	13.2	7,605
3699	19,302	61.3	11,832
3711[3]	340,412	1.0	3,404
3714	398,747	9.8	39,077
3715	24,708	27.3	6,745
3728	102,136	14.7	15,014
3731	144,583	11.0	15,904
3751	18,276	19.2	3,509
3811	37,118	37.0	13,734
3822	30,652	9.3	2,851
3823[3]	35,631	17.5	6,235
3824[2]	8,805	22.3	1,964
3825	54,891	28.6	15,699
3829	24,587	29.1	7,155
3832	18,810	42.8	8,051
3841	34,497	26.8	9,245

Continued

Four-Digit SIC Number 1972	Total Employees	Employees in Establishments Owned By Small Firms	
		%	Number
3843	12,270	45.7	5,607
3851	26.626	31.4	8,361
3861	94,587	10.6	10,026
3873	30,919	16.9	5,225
3955	5,572	32.9	1,833

Notes: [1]Data withheld for one firm with 250 to 499 employees. Firm assumed to have 499 employees.

[2]Data withheld for two firms with 250 to 499 employees. Each firm assumed to have 499 employees.

[3]Data withheld for three firms with 250 to 499 employees. Each firm assumed to have 499 employees.

Source: Special Report of the U.S. Census Bureau to the U.S. Small Business Administration.