EXHIBIT 2

A ROBUST TELECOMMUNICATIONS MARKETPLACE: THE MOVEMENT TOWARDS OPEN NETWORKS ACCESSIBLE TO DIVERSE SUPPLIERS

Consistent with its statutory mandate to "make available . . . to all the people of the United States a rapid, efficient, nation-wide, and world-wide wire and radio communication service with adequate facilities at reasonable charges,"[1] the Commission has for more than two decades embraced an "open network" policy. In a series of actions touching virtually all elements of the telecommunications infrastructure, the Commission has moved inexorably away from closed, bundled architectures in which products and services are supplied by a few monopoly providers to more open telecommunications networks in which competition among a diverse population of suppliers is allowed to flourish. And, as the Commission has long recognized, with competition invariably comes, among other benefits, lower prices, a wider array of product and service alternatives, faster development and implementation of new technologies, greater responsiveness to customer needs and concerns and an increased emphasis on quality and efficiency.

A number of the Commission's pro-competitive policy initiatives have reached the point of maturation, achieving their objective of producing vigorously competitive marketplaces. Others are still in a formative stage, at this point merely

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[1] 47 U.S.C. §151.

holding out the promise of increased competition at a future date. A thematic constant among all of these initiatives, however, is the substitution of open architectures for closed systems with the attendent reduction of legal, regulatory and technological barriers to competition and innovation.

A few of the principal examples of the Commission's "open network" approach are discussed below.

Customer Premises Equipment

For all practical purposes, prior to 1968, the public telephone network was closed to interconnection of equipment or facilities not furnished by franchised telephone utilities. AT&T's tariffs prohibited customers from connecting any device to the network which was not telephone company supplied. A series of Commission and federal court decisions ultimately held that the application of this restriction to the "Hush-a-Phone" -- a simple cup-like device designed to provide some privacy and to help eliminate background noise when attached physically to a telephone mouthpiece -- constituted "an unwarranted interference with the telephone subscriber's right reasonably to use his telephone in ways that are privately beneficial without being publicly detrimental."[2] In its subsequent Carterfone decision,[3] the Commission extended open entry to customer premises equipment

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[2] Hush-a-Phone Corp. v. United States, 238 F.2d 266, 269 (D.C.Cir. 1956).

[3] Use of the Carterfone Device in Message Toll Telephone Service, 13 F.C.C.2d 420, aff'd on recon. 14 F.C.C.2d 571 (1968).

("CPE") that connected electronically, and not just physically, to the network, when it held unlawful AT&T's prohibition of the use of a device that interconnected two-way mobile radio systems with the wireline telephone network. Local telephone companies were nonetheless still permitted to require the use of protective connecting arrangements ("PCAs") as physical interfaces between customer provided equipment and the public network, thus preserving a formidable barrier to entry until the Commission replaced the PCA requirement with a Commission-administered equipment certification program in the late 1970s.[4]

CPE competition was still impeded, however, by the local telephone company practice of bundling CPE rental charges with rates for basic exchange telephone service. Most single-line residential and business exchange access lines and Centrex main station lines included, as part of the monthly tariff rate, a standard desk or wall-mounted single line telephone set and associated inside wiring. Thus, even if a customer replaced the "main" telephone instrument with a purchased unit, there would be no corresponding reduction in its monthly rate for telephone service. It was only when the Commission mandated full unbundling of CPE from basic telephone service and imposed "structural separation" requirements in the Second Computer

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[4] 47 C.F.R. §§68.1 - 68.506. Proposals for New or Revised Classes of Interstate and Foreign Message Toll Telephone Service (MTS) and Wide Area Telephone Service (WATS), 56 F.C.C.2d 593 (1975), modified on recon. 58 F.C.C.2d 716 (1976), 58 F.C.C.2d 736 (1976), aff'd sub nom. North Carolina Util. Comm'n v. FCC, 552 1036 (4th Cir.), cert. denied 434 U.S. 874 (1977).

Inquiry[5] that a truly open CPE environment was created.

The result has been the emergence of a vigorously competitive CPE marketplace. AT&T can no longer be said to dominate any segment of the market for telecommunications equipment. Thousands of vendors, including a host of small and mid-sized entrepreneurial firms, are currently supplying customers with tens of billions of dollars of terminal equipment. Prices have fallen, equipment options have increased substantially and new features have virtually mushroomed. In short, from the consumer's perspective, CPE competition has been an undeniable success.

Interexchange Services

Having authorized private microwave networks eleven yeears earlier,[6] the Commission in 1969 approved a proposal by MCI to construct a Chicago-to-St. Louis point-to-point system "designed to meet the interoffice and interplant communications needs of small businesses."[7] This action generated a deluge of applications seeking authorization for similar microwave

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[5] Amendment of Section 64.702 of the Commission's Rules and Regulations, 77 F.C.C.2d 384, modified on recon. 84 F.C.C.2d 50 (1980), modified on further recon. 88 F.C.C.2d 512 (1981), aff'd sub nom., Computer & Communications Indus. Ass'n v. FCC, 693 F.2d 198 (D.C.Cir. 1982), cert. denied 461 U.S. 938 (1983), aff'd on second further recon. FCC 84-190 (released May 4, 1984).

[6] Allocations of Frequencies in Bands Above 890 Mc., 27 F.C.C. 359 (1959), modified on recon. 29 F.C.C. 825 (1960).

[7] Microwave Communications, Inc., 18 F.C.C.2d 953, 953 (1969).

facilities and ultimately prompted the Specialized Common Carrier rulemaking in which the Commission authorized limited "specialized" private line competition and directed AT&T to interconnect these dedicated services with its local and long distance networks.[8] In justifying market entry by specialized carriers, the Commission emphasized that these new market entrants were oriented towards meeting "the special and diverse technical and service requirements" of an emerging market, as well as towards "achieving the economics and other benefits that may flow from specialization."[9] Shortly thereafter, the Commission approved an interstate packet-switched communications network offering that introduced "value-added networks," which resold data processing functions through basic private line circuits[10] and ultimately authorized unlimited resale and shared use of private line services and facilities.[11]

Open entry and competition came to ordinary switched long-distance service following a series of Commission and

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[8] Specialized Common Carrier, Establishment of Policies and Procedures for Consideration of Applications to Provide Specialized Common Carrier Services in the Domestic Public Point-to-Point Microwave Radio Service, 29 F.C.C.2d 870, aff'd on recon 31 F.C.C.2d 1106 (1971), aff'd sub nom. Washington Util. & Transp. Comm'n v. FCC, 513 F.2d 1142 (9th Cir.), cert denied 423 U.S. 836 (1975).

[9] Id. at ¶70.

[10] Packet Communications, Inc., 43 F.C.C.2d 922 (1973).

[11] Resale and Shared Use of Common Carrier Services, 60 F.C.C.2d 261 (1976), recon. 62 F.C.C.2d 588 (1977), aff'd sub nom. American Tel. & Tel. Co. v. FCC, 572 F.2d 17 (2d Cir.), cert. denied, 439 U.S. 875 (1978).

consuming public continue to expand as options such as digital cellular, wireless private branch exchange, advanced digital cordless telephone and wirless local area network services continue to appear.

In licensing mobile services over the last decade, the Commission has always "placed its faith in competitive markets and service flexibility as the best path to provide greater choice and low prices for consumers."[30] Cellular radio, for example, has been a competitively-provided service from the outset and in order to "afford system designers a great deal of flexibility," the Commission imposed only minimum technical standards on the service.[31] Moreover, when the Commission perceived the need for a new generation of cellular technology and services, it relaxed its rules to facilitate this end.[32] Similarly with respect to SMR, the Commission has consistently emphasized the need for "flexiblity in designing facilities that

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[30] Amendment of the Commission's Rules to Establish New Personal Communications Services, 7 FCC Rcd. 5676 (1992).

[31] An Inquiry Into theUse of the Bands 825-845 MHz and 870-890 MHz for Cellular Communications Systems; and Amendment of Parts 2 and 22 of the Commission's Rules Relative to Cellular Communications Systems, 86 F.C.C.2d 469 (1981), modified on recon. 89 F.C.C.2d 58 (1982), modified on further recon. 90 F.C.C.2d 571 (1982).

[32] Amendment of Parts 2 and 22 of the Commission's Rules to Permit Liberalization of Technology and Auxilliary Service Offerings in the Domestic Public Cellular Radio Tellicommunications Service, 3 FCC Rcd 7033 (1988), modified on recon. 5 FCC Rcd 1138 (1990).

will meet the specialized and particular requirements of the user, whereever that user may be."[33]

Consistent with its flexible approach to wireless services, the Commission has recognized the need to adopt a PCS regulatory structure that allows "flexibility in implementing new services and technologies."[34] As the Commission has stated, PCS licensing policies should "respond to the needs of the marketplace."[35]

Thematic Constants

A number of thematic constants emerge from the Commission's application of its open network/diverse providers policies to CPE and interexchange, exchange access, enhanced and wireless services. These basic, and often interrelated, principals, goals and concerns -- outlined below -- are intertwined throughout the Commission's existing initiatives and will likely guide its future efforts to ensure that all telecommunications networks are as open, responsive and pro-competitive as possible.

* All other things being equal, an open architecture is superior to a closed system. Consistent with the need to preserve the reliability and integrity of the

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[33] An Inquiry Relative to the Future Use of the Frequency Band 806 - 960 MHz, 51 F.C.C.2d 945 at ¶64.

[34] Amendment of the Commission's Rules to Establish New Personal Communications Services, 7 FCC Rcd. 5676 at ¶24.

[35] Id.

network, system access should be as broad and as complete as possible.

* To the maximum extent possible, barriers to entry, including legal, regulatory and technical constraints, should be eliminated. Artificial entry barriers generally do little more than impede competition.

* Market forces are invariably superior to regulation in marketplace governance. Regulation is essential when necessary to prevent monopoly abuses or ensure a level competitive playing field. In almost all other circumstances, the market is better able to identify and satisfy new telecommunications and information services needs.

* Efforts should be made to facilitate market participation by even thinly-capitalized entrepreneurs. Innovation is often driven by small and mid-sized companies.

* Restrictions on types of use and limits on eligibility should be kept to a minimum. Such restrictions tend to be highly arbitrary, representing artificial barriers to entry.

* Consistent with ensuring efficient, cost-effective system operation, network offerings should be disaggregated to the maximum extent possible. Modularity enhances efficiency, facilitates innovation and ensures that users pay only for those services they actually utilize.

* System architecture should be dynamic and robust. Only if sufficient flexibility is integrated into the system construct will innovation flourish. Control should be disbursed to the maximum extent possible.

* System architecture must be flexible enough to address diverse uses and to satisfy niche markets. Efforts should be made to encourage and facilitate the emergence of niche use providers.

* Rates and charges should be cost-driven; monopoly or other exploitative forms of pricing should not be permitted.

* Sufficient safeguards should be introduced to avoid anticompetitive conduct. Competition can

only flourish if the playing field remains essentially level.

Application to PCS

The Commission has a unique opportunity in the context of personal communications services ("PCS") to apply its open network/diverse providers policies from the outset to a new service. Grant of the proposal presented here by AMT and DSST would introduce an open architecture into the PCS construct which would incorporate virtually all of the pricipals listed above. Certainly, such an action would fulfill the Commission's objective of ensuring that future, as well as existing, systems are as "open, responsive and procompetitive as possible."[36]

As envisioned by AMT/DSST, the Commission would designate a host Specialized PCS carrier in each market. In conjunction with its use of a portion of the freqencies allocated to it, the designated host carrier would be obliged to provide access to the remaining portion of those frequencies and to coordinate frequency use among multiple unlicensed PCS service providers ("PSPs"). The host carrier would also be required to provide its PSPs with nondiscriminatory access to its switching platform and other basic infrastructure components, including interconnection to the public switched network, on a tariffed, equal access basis.

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[36] Intelligent Networks, 6 FCC Rcd. 7256 (1991).

Two key barriers to entry would be eliminated through such an open architecture. First, unlicensed entities would be able to participate in the PCS market through the frequency allocation made available to the carrier's carrier. Second, the infrastructure provided by the host carrier would reduce the high capital costs that would otherwise inhibit market entry.

Market participation by diverse providers, including small and mid-sized companies, would be facilitated by the elimination of these regulatory and financial barriers to entry. Small companies that would not have been able to aquire frequencies in spectrum auctions or to finance the construction of market-wide PCS systems, would be able to provide innovative services as unlicensed PCS service providers at primarily discrete geographic locations. In large part due to the participation of multiple small service providers, system architecture, as well as service functionalities, would remain dynamic and robust.

Regulation could be kept to a minimum by prescribing basic system parameters and then permitting the host carrier to coordinate the frequency use of its PSPs; the PSPs, in turn, would be driven exclusively by market demand. Certainly, use restrictions or eligibility limits would not be required. Network disaggregation and cost-based pricing could be imposed at a macro level and would likely provide adequate protection against anticompetitive abuses.

The result should be a vibrant marketplace of PSP services, offered by diverse, entrepreneurial firms in response to market demand. Instead of a select few bearing full responsbility for innovation or worse yet dictating what services would be offered, a multitude of small market-responsive players would actively contribute to the development of new and innovative services.

In an open architecture regime, the Specialized PCS marketplace could mirror the explosive development of the personal computer ("PC") industry in the early 1980s. When IBM introduced the PC in 1981, it adopted an open architecture with published hardware and software interfaces, rather than a closed, proprietary system design. This single decision both facilitated and encouraged entry by literally thousands of start-up firms, which in turn produced a rich array of hardware, peripherals and applications software targeted at virtually every aspect of human endeavor. The availablility of these applications created an enormous demand for PCs and related products and produced a marketplace far more dynamic and robust than would have resulted had "after-market" entry been impeded. The PCS marketplace could be every bit as robust and dynamic if, consistent with its flexible approach to wireless technology, the Commission adopts an open architecture in which competition among a diverse population of suppliers is allowed to flourish.

EXHIBIT 3

SMALL BUSINESS PARTICIPATION IN PCS

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OVERVIEW

The foregoing Joint Petition For Further Rulemaking rests, in part, on the theory that small business plays a critical role in the economy and, therefore, that small business participation in the telecommunications segment of the economy (and in the nascent PCS industry in particular) should be protected and encouraged by the FCC. This Exhibit provides support for this theory in three ways: first, the Exhibit quantifies to the extent possible, and places in perspective, the importance of small business participation in the national economy; second, it describes the economic importance that the Federal government has ascribed to small businesses through the enactment of legislation and the institution of programs aimed at protecting and encouraging small business participation in the economy in general; and third, the exhibit describes the FCC's responsibility for encouraging small business participation in the PCS industry in particular.

I. THE ROLE OF SMALL BUSINESS IN THE NATIONAL ECONOMY

Small businesses play a vital role in the nation's economy. Almost 98% of the businesses in the country employ less than 100 employees.[1] Despite their key role, small firms and

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[1]U.S. Dept. of Commerce, Bureau of the Census, County Business Patterns 1988 (1990). The Census Bureau defines small businesses as firms with less than 100 employees. Id.

their contribution to the national economy have typically been overlooked by economists who tend to concentrate almost exclusively on the country's largest and most dominant firms.[2] An alternative view, however, suggests that small firms and entrepreneurship are playing a much more important role in the economy than had been previously acknowledged, particularly in the areas of growth and technological change and innovation.[3] The following attempts to place the role of small businesses in a proper perspective.

A. Definition of Small Business

Any discussion of the relative contributions made to the economy by small versus large firms obviously requires a working definition of small business. Unfortunately, however, there is no single, universally accepted definition of small business. The appropriate definition depends on the policy issue or question being analyzed and/or the industry being studied. Indeed, the Small Business Act,[4] which established the Small Business Administration ("SBA") for the purpose of furthering the interests of small business in the national economy, left the definition of small business intentionally vague: "[f]or the purposes of this Act, a small business concern shall be deemed to

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[2]See Acs, Small Business Economics: A Global Perspective, Challenge (Nov.- Dec. 1992), pp. 38-44.

[3]Id.

[4]15 U.S.C. § 631 et seq.

be one which is independently owned and operated and which is not dominant in its field of operations,"[5] leaving it up to the SBA to draft specific definitions.

Accordingly, the SBA developed the Standard Industrial Classification (SIC) system, a complex set of size standards defining business size on an industry-specific basis.[6] The various criteria used include employment numbers, business receipts and the value of a business' assets. The size standards are specific for each industry, represented by a four digit SIC code. Although no specific SIC code exists for PCS, the Office of Advocacy of the SBA has indicated that the closest is radiotelephone communications -- SIC code 4812, for which the size standard is 1,500 employees.[7] Noting, however, the inappropriateness of this size standard, and the current lack of data on PCS, the Office of Advocacy has recommended that the FCC endeavour to establish a small business size standard for PCS in Docket 90-314.[8]

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[5]15 U.S.C. § 632.

[6]See 13 C.F.R. §121.601 (1992).

[7]See Statement of Barry Pineles, Assistant Chief Counsel for Market Competition, Office of Advocacy, United States Small Business Administration, Before the Small Business Advisory Committee ("SBAC") of the Federal Communications Commission, p. 1 (submitted on June 23, 1993 as part of the SBAC Public Hearing Record in FCC Gen. Dkt. 90-314). See infra Section III.A. for a discussion of the SBAC.

[8]Id. at 3-4. The Office of Advocacy also emphasized the importance of a PCS size code if, as is now the case, Congress' auction legislation (see section II. C., infra) mandates that the

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As a general matter, the SBA bases its size definitions on employment numbers. Firms with fewer than 500 employees are generally considered "small."[9] When more precise numbers are required, the SBA uses the following breakdown: under 20 employees, very small; 20-99, small, 100-499, medium; and 500 or more, large.[10] The number 500 is often used in SBA and other reports as a useful employment cutoff between large and small firms.[11]

The Regulatory Flexibility Act ("RFA"),[12] which requires federal agencies to consider the impacts of their regulations on small entities including, but not limited to small businesses, relies on the definition of small business contained in § 632 of the Small Business Act. As explained above, however, the SBA has

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[8](...continued)
FCC adopt methodologies to protect the interests of small businesses without defining a small business. Id. at note 4. The Office of Advocacy further suggested that a definition based on the number of customers served may be more useful for defining small radiotelephone communications firms. Id. at note 3.

[9]U.S. Small Business Administration, The State of Small Business, 1992, p. 20. But see Census Bureau definition, supra note 1.

[10]These size breakdowns are consistent with the standard business employment, asset, and receipt size classes established on May 18, 1982 by the Office of Management and Budget in conjunction with the SBA for use by all Federal agencies when publishing business data. See 13 C.F.R. Part 121.

[11]See, e.g., U.S. Small Business Administration, supra note 9; U.S. Small Business Administration, Issue Alert Number 8: Innovation in Small Firms, 1986, p. 1.

[12]Pub. L. No. 96-354, 94 Stat. 1164, 5 U.S.C. § 601 et seq. (1981).

drafted more specific definitions pursuant to § 632. Thus, Federal agencies can and do use the SBA's definitions for purposes of complying with the RFA.

B. **Small Business and the National Economy**

Of the 5,073,795 businesses recorded by the 1990 census, 5,059,772, or 99.7%, employ less than 500 employees.[13] Indeed, almost 98% of the businesses in the country employ less than 100 employees.[14] Therefore, based on numbers of employees, the vast majority of businesses in the country are small businesses. Sole proprietorships make up the vast majority of small businesses, accounting for roughly 85 percent.[15] Most of these are so-called "hobby businesses" which are not the sole source of income for the owner. As a whole, small firms (less than 500 employees) constitute about 43 percent of the country's private sector gross domestic product, and one-half of all private sector employment.[16]

Although the contributions of small firms to the national economy have historically been ignored in comparison to those of large firms, small firms are now thought to make two

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[13]U.S. Dept. of Commerce, Bureau of the Census, County Business Patterns 1988 (1990). As noted above, the Census Bureau defines small businesses as firms with less than 100 employees.

[14]Id.

[15]Id.

[16]U.S. Small Business Administration, Issue Alert Number 8: Innovation in Small Firms, 1986, p. 1.

critical contributions to the national economy: they contribute disproportionately to the economy's growth (especially in the area of high technology), and they are the source of considerable innovative activity.

1. **Small Firms and Growth**

Small firms have generally played the role of an incubator for growth of the national economy. For example, during the 1976-1986 decade, small firms with fewer than 500 employees expanded over 80 percent in high technology industries, more than twice as fast as in the general economy.[17] Very small firms, with 20 or fewer employees accounted for most of that job creation.[18] During the period from 1988 to 1990, small firms with fewer than 20 employees created almost 4.1 million new jobs, and grew annually at a rate of 9 percent. In comparison, during the same period, firms with 500 or more employees lost over 500,000 jobs.[19] Similarly, from 1988 to 1990, small businesses (defined as firms with less than 500 employees) grew almost 3

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[17]Philips, The Increasing Role of Small Firms in the High-Technology Sector: Evidence From the 1980's, prepared for the annual meeting of the National Association of Business Economists, Washington, D.C. (Sept. 23-27, 1990), p. 4. See also Light, Small Business: The Job Engine Needs Fuel, Business Week (Mar. 1, 1993).

[18]Id.

[19]U.S. Small Business Administration, The State of Small Business, 1992, p. 44.

percent annually, compared with an annual contraction of more than one-half of one percent for large firms.[20]

The increased role of small businesses during the 1980's has to do with fundamental changes in the country's industrial structure. Improved methods of production are shifting workers from positions in large manufacturing plants to jobs in the retail and service industries where smaller firms have typically thrived.

Small businesses have also developed sources of employment through their active role in exploring and developing the industries that have growth potential. On average, all of the small-business dominated industries grow in employment faster than large-business dominated industries. This includes the high technology industries where the strongest job growth is in industries dominated by small firms.[21]

Small firms constitute a large proportion of the high technology business cluster critical to the national economy. Application of the SBA's definition of high technology activity[22] yields an estimate of about 100,000 firms in the U.S. in 1986

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[20]Id. at 45.

[21]Phillips, supra note 18, at 4.

[22]The SBA uses two criteria to determine if a given industry is within the high technology sector. The first is the percentage of scientists and engineers in the industry generally considered a good proxy for Research and Development ("R&D") expenditures. The second ranks those industries with the highest direct R&D expenditures per dollar of sales.

performing R&D activity. More than 90 percent of these firms have fewer than 100 employees, and 80 percent have less than 50 employees.[23]

High technology industries grew faster than the economy as a whole during the decade ending in 1986, the last year for which accurate data is available.[24] From 1976 to 1986, high technology industries increased employment from 5.5 million workers (7.98 percent of the labor force) to 7.69 million workers (8.44 percent of the labor force).[25] This increase resulted from an expansion of high technology industries by 39.8 percent during the period, while overall employment grew by only 32.2 percent.[26]

According to a SBA study, firms with fewer than 500 employees created almost 40 percent of the new jobs in the high technology sector between 1976 and 1986.[27] Small firms now account for about 25 percent of total employment in this sector, as opposed to 18.7 percent in 1976.[28] Firms with less than 500 employees expanded by 81.8 percent in high technology industries

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[23]Scheirer, The Population and Birth Rates of High Technology Firms, 1976-1986, U.S. Small Business Administration, 1989.

[24]Phillips, supra note 18, at 2.

[25]Id.

[26]Id.

[27]Id. at 21.

[28]Id.

during the 10 year period analyzed by the study.[29] Small, high technology firms thus produced jobs at more than double the rate of the economy as a whole.

As noted above, the most dynamic part of small firm job creation has come from very small firms with less than 20 employees. These firms created 15 percent of the new jobs in the high technology sector, but made up only 3.8 percent of high technology employment in the base year, 1976. Therefore, very small high technology companies contributed almost four times their expected share of new jobs during the decade tracked by the SBA study.

There are signs however that the small business job boom will not continue in the 90's. According to a December, 1992 survey by the National Federation of Independent Business, only 13 percent plan to expand employment in 1993, and 10 percent plan reductions.[30] Continued slow growth seems likely.[31]

Questions have also been raised about the quality of small firm jobs. Such firms tend to pay their employees less, offer poorer benefits, and generally provide poorer working conditions than larger businesses.[32] Workers in companies with more than 500 employees earn about a third more than those in

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[29]Id. at 4.

[30]Id.

[31]See Statement of Barry Pinelas, supra note 7, at 1-2.

[32]See Acs, supra note 2, at 43.

companies with fewer than 500 employees.[33] Small firm employees are also less likely to receive health insurance, pensions, and other fringe benefits. For example, while 100 percent of companies with 500 or more employees offered their workers some sort of health benefits, only 55 percent of the companies with fewer than 500 employees did the same.[34] However, if corrections are made for industry differences and geographic areas, as well as worker characteristics (such as education and experience), two-thirds of the large-firm wage premium disappears.[35] Some experts believe that if unobservable characteristics could also be controlled, the large-firm premium would disappear altogether.[36]

2. Small Business and Innovation

Conventional wisdom concludes that large firms are innovation leaders because of certain assumptions concerning the relationship between size, market power, and research and development capability. In large firms, the fixed costs of R&D can be spread over more units, and market power allows such companies to price new products to recover their development costs.

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[33] Id.

[34] ICF Incorporated, Health Care Coverage and Costs in Small and Large Business, U.S. Small Business Administration, 1987.

[35] See Acs, supra note 2, at 43.

[36] Id.

However, recent research does not support the assumption that large firms are the source of most innovative activity. The SBA's Office of Advocacy has completed a number of research projects over the past decade which have shed new light on the value of small firm innovation.[37] The SBA's key research findings are summarized below:

- Small firms innovate at a per person rate twice that of large firms. In a study conducted for the SBA by the Futures Group, a total of 8,074 innovations were identified and then grouped by firm size. By comparing total employment of the innovating enterprises in the 362 industries with the total number of innovations, the Futures Group found that there were only 313 innovations per million employees for large firms and 745 per million employees for small firms.[38] Small firms were estimated to be responsible for 55 percent of all innovations.[39]

- Small business spends more on R&D than large firms. On average, small firms spent 4.7 percent of their revenue on R&D activity, as opposed to 3.1 for large firms.[40]

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[37]In SBA studies, an innovation is generally defined as any new product or service brought to market, or a "significant" improvement on an existing product or service. See, e.g., The Futures Group, Characterization of Innovations Introduced on the U.S. Market in 1982, U.S. Small Business Administration, Office of Advocacy, 1984, p. 1.

[38]The Futures Group, supra note 38, at 4.

[39]Id.

[40]National Science Foundation, Utilization of New Data for the Assessment of the Level of Innovation in Small American Manufacturing Firms, 1991, p. 6.

- Small business spends proportionately twice as much of their R&D dollars on fundamental research as large firms. Six percent of all small firm[41] R&D funds in 1981 were spent on basic research while large firms spent only 3 percent.[42] Small firms spent 28 percent of their R&D funds on applied research; large firms spent 20 percent. Large firms, on the other hand, outspent small firms on development, 77 percent to 66 percent.

- Small firms translate R&D spending into new products more efficiently than large firms. A National Science Foundation study found that smaller firms had 2.1 new products per $1 million of R&D, 3.5 times the rate for all firms.[43]The average number of new products introduced in 1985 per $100 million in sales was 12.2 for small firms and 5.0 for large firms.[44]

- Employment in a small firm was 22 percent more likely to increase as a result of innovation than was employment in a large firm.[45]

II. FEDERAL STATUTES AND PROGRAMS PROTECTING AND PROMOTING SMALL BUSINESS PARTICIPATION IN THE ECONOMY

Given the importance of small business to the nation's economy as described above, it is not surprising that the Federal Government over the years has attempted to protect and promote the interests of small business. Begining with the enactment of the Small Business Act in 1953, followed by the Regulatory Flexibility Act of 1980, and continuing most recently with the

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[41]For the purposes of this study a small firm was defined as having 1,000 or fewer employees.

[42]National Science Foundation, Trends to 1982 in Industrial Support of Basic Research, NSF 83-302, 1983, Table B-2.

[43]National Science Foundation, supra note 41, at 5.

[44]Id.

[45]The Futures Group, supra note 39, at 14.

adoption of the Communications Licensing and Spectrum Allocation Improvement Act of 1993, Federal statutes have implemented policies and programs promoting small business participation in the economy.

A. Small Business Act

The Small Business Act, 15 U.S.C. § 631 et seq., created the Small Business Administration to carry out the declared policy of Congress "to aid, counsel, assist and protect . . . the interests of small business concerns in order to preserve free competitive enterprise." The Act established the SBA as an independent federal agency and charged it with furthering the interests of small business in the national economy. Section 631 of the Act declares Congress's belief that the development of the potential capacity of small business is critical to the preservation and expansion of the national economy. As noted above, the Act also broadly defined small business, leaving it to the SBA to draft specific definitions, which it has done in the form of the SIC system.

B. The Regulatory Flexibility Act

Congress enacted the RFA to ensure that federal regulators consider the impact of their regulations on small business[46] to ensure that the ability of small businesses to

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[46]In addition to small business, the Act also covers small organizations and small government jurisdictions. The Act defines small organizations as any nonprofit enterprise which is
(continued...)