Entrepreneurial Careers of Women

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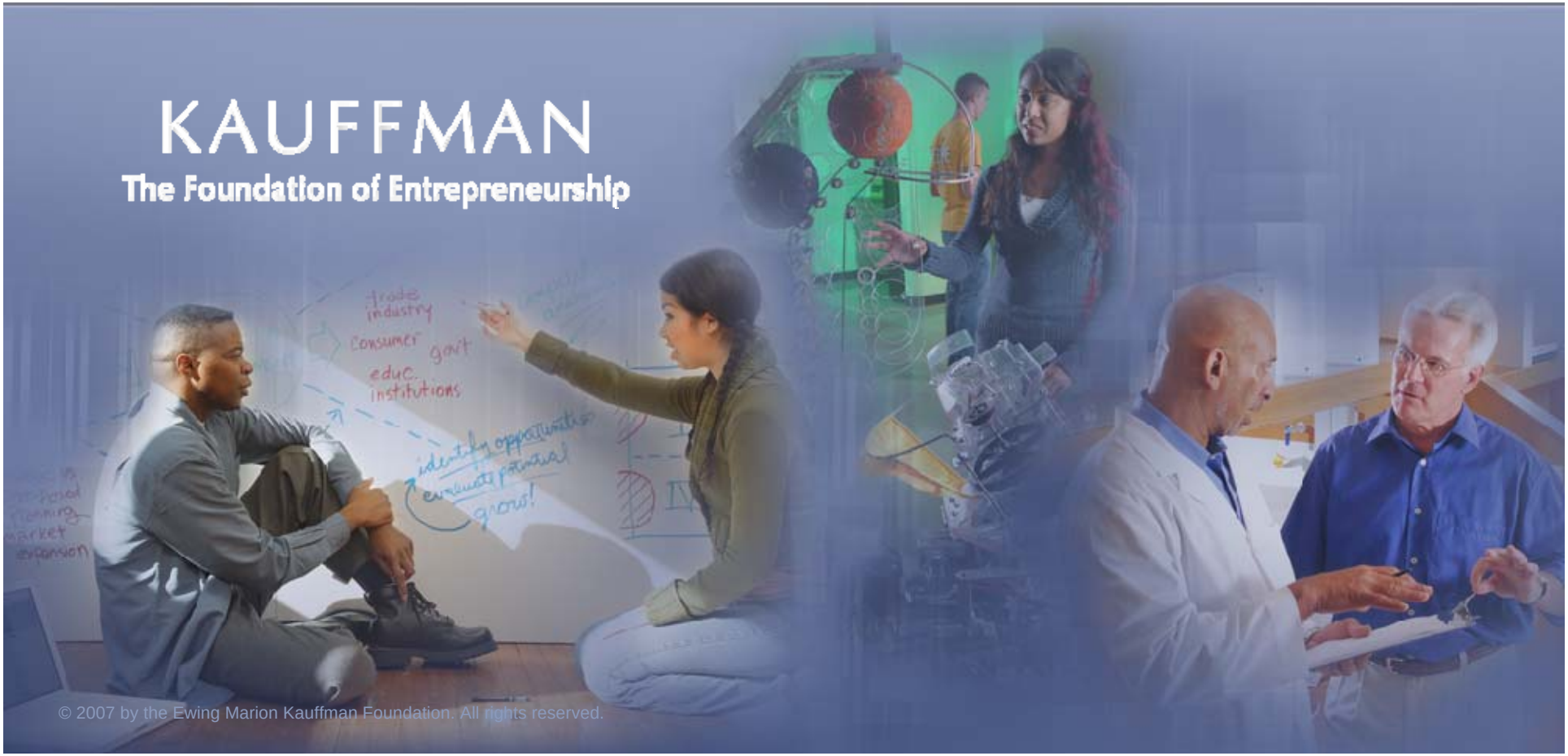
"Every individual that we can inspire, that we can guide, that we can help to start a new company, is vital to the future of our economic welfare."

— Ewing Kauffman



Agenda

- Review literature on high-tech firms and women entrepreneurs
- Introduce Kauffman Firm Survey
- Specific results on entrepreneurial career patterns of women in young high-tech firms

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Women Entrepreneurs in High-tech: Previous Research

- A relatively small number of studies have specifically examined the experience of women and high-tech entrepreneurship.
  - An even smaller number of studies are based on randomized or non-convenience samples.
  - We are not including self-employment studies here of which there are more (but still limited) dealing with scientists
- Full citations and additional studies included in *Sources of Financing for New Technology Firms: A Comparison by Gender*, which is included in your conference materials.

Previous Research

- Tai and Sims (2005) studied the employees of seven high-tech firms. Women were significantly more likely to hold supervisory positions, while men held senior management positions, even though the two groups were comparable in terms of education and experience.
- The authors noted that this pattern poses a particular problem for women who face almost insurmountable barriers in gaining managerial experience at the most senior levels.
- Feyerherm and Vick (2005) interviewed high-achieving Generation X women managers in high-tech firms, those born between 1965 and 1980, to find that 50 percent of those interviewed were considering other career opportunities.
- The women in this study felt stereotyped, undervalued, and underutilized in the male-dominated high-tech culture.

Previous Research

- In a study of Irish women, Cross and Lineham (2006) found evidence of occupational segregation within the high-tech sector
  - The authors interviewed twenty women who were junior or middle managers in high-tech firms to find that their respondents experienced significant difficulties in managing work-life balance.
  - Although some firms had family-friendly policies, managers were nevertheless expected to work long hours and to be available for meetings scheduled after the end of the working day.
  - Women were also excluded from informal networking opportunities, leading them to feel isolated and frustrated.
  - Because of these barriers, the women interviewed felt it would be very difficult for them to reach the senior ranks.
  - At the same time, the authors noted a type of self-imposed glass ceiling, in that a number of their interviewees did not want the increased workload and stress associated with a leadership position.

Previous Research

- Hollowell et al. (2006) surveyed technology entrepreneurs in northwestern England and found that women reported experiencing greater difficulty because of preconceptions people had about their gender.
- The women in their study reported difficulties in being taking seriously, as well as the assumption that women lacked entrepreneurial skills.
- The authors found that dissatisfaction with the male-dominated culture in high-tech led women to leave not only technology-based jobs, but the technology industry entirely.

Previous Research

- Mayer (2008) studied women-owned high-tech firms in four metropolitan regions in the United States: Silicon Valley, Boston, Washington, D.C., and Portland, Oregon.
  - She found women-owned high-tech firms were smaller by average revenues and employment in all four regions.
  - Women entrepreneurs more likely to participate in high-tech sectors such as software publishing, computer systems design services, management and consulting services, and research services, whereas men more likely to be in manufacturing.
  - Mayer also noted that male-dominated sectors were more lucrative than those dominated by women, and concluded that women entrepreneurs face two major barriers in the high-tech sector. First, they are unable to gain managerial expertise and work experience that would provide human capital as well as necessary networks and relationships. Second, structural barriers (including capital) often prevent women from entering more capital-intensive and male-dominated high-tech sectors.

Previous Research

- Brush et al. (2001) initiated the Diana Project in 2001 to explore women entrepreneurs in high-growth ventures including those in technology and bioscience.
  - The authors found only 4.8 percent of venture capital investments went to women-owned firms from1953 through 1998. This had increased to 5 percent by 2001.
  - Brush et al. noted that women entrepreneurs may lack the managerial experience required by equity investors if they are unable to gain human capital in the form of executive or technical management.
  - The authors also observed that the venture capital industry is a relatively closed and male-dominated network.

Summarizing Women Entrepreneurs in HT Previous Research

- These studies suggest that women have a difficult time gaining the types of senior management level experience in high-tech that would make them attractive to external providers of capital.
- Further, it appears that women in high-tech are still largely excluded from both formal and informal networks that could provide them with either leadership experience or access to capital.

Kauffman Firm Survey (KFS)

- KFS motivation to gain a better understanding of:
  - New firm dynamics
  - Firm innovation
  - Firm performance and survival
  - Firm financing
  - High-tech industries
  - Entrepreneurs (owners of firms)
- Annual collection on 4,928 firms founded in 2004
- Largest, longest panel survey on new firms in the world
- Planned currently as eight-year panel (collecting data for calendar years 2004 through 2011)

Detailed Data (annual collection, 4 years currently available)

- Firm characteristics
  - Industry, Legal Form, # of Owners, # of Employees (PT/FT), Types of Customers, Location
- Firm strategy and innovation
  - Product/Service Offerings, Intellectual Property, Licensing In, Licensing Out, R&D
- Detailed financial information
  - Equity & Debt Financing, Income Statement Info (Revenue, Expenses, Profits), Balance Sheet Info (Assets, Liabilities, Equity)
- Employees
  - Types of Benefits Offered, Task/Work Structure
- Owner characteristics/work behaviors (up to 10 owners)
  - Education, Age, Race, Ethnicity, Gender, Citizenship, Immigrant Status, Hours Worked, Previous Years of Work Experience, Previous Start-up Experience (same/different industry as this firm)

2-Digit NAICS by Primary Owner Gender

(percentage of firms, 2004)

	Female	Male
Agriculture, Forestry, Fishing and Hunting	1.7%	1.0%
Mining	0.2%	0.3%
Construction	5.2%	12.3%
Manufacturing	5.3%	6.4%
Wholesale Trade	6.2%	5.4%
Retail Trade	19.3%	12.5%
Transportation and Warehousing	1.9%	2.9%
Information	2.3%	3.5%
Finance and Insurance	2.7%	5.6%
Real Estate and Rental and Leasing	5.9%	4.8%
Professional, Managements, and Educational Services	15.9%	18.5%
Administrative and Support and Waste Management and Remediation Service	10.0%	11.8%
Health Care and Social Assistance	6.0%	1.9%
Arts, Entertainment, and Recreation	4.1%	2.1%
Accommodation and Food Services	2.0%	2.8%
Other Services (except Public Administration)	11.4%	8.1%

Source: Kauffman Firm Survey Microdata. Sample includes only surviving firms over the 2004-2007 period, and firms that have been verified as going out of business over the same period. Sample size 3,974.

Comparing All Firms to High Tech Firms

- ALL (30.8 percent have a female primary owner)
- High Tech (14.7 percent have a female primary owner)
  - Biotech
  - Other high tech

  (combined due to sample size of biotech)

Preliminary Research Results

Industry Classifications: BIOTECH

NAICS 111191 Oilseed and grain combination farming
NAICS 111421 Nursery and tree production
NAICS 111920 Cotton farming
NAICS 111998 All other miscellaneous crop farming
NAICS 311211 Flour milling
NAICS 325193 Ethyl alcohol manufacturing
NAICS 325199 All other basic organic chemical manufacturing
NAICS 325221 Cellulosic organic fiber manufacturing
NAICS 325222 Noncellulosic organic fiber manufacturing
NAICS 325611 Soap and other detergent manufacturing
NAICS 325612 Polish and other sanitation good manufacturing
NAICS 325613 Surface active agent manufacturing
NAICS 334510 Electromedical apparatus manufacturing
NAICS 334516 Analytical laboratory instrument manufacturing
NAICS 334517 Irradiation apparatus manufacturing
NAICS 339111 Laboratory apparatus and furniture manufacturing
NAICS 339112 Surgical and medical instrument manufacturing
NAICS 339113 Surgical appliance and supplies manufacturing
NAICS 325411 Medicinal and botanical manufacturing
NAICS 325412 Pharmaceutical preparation manufacturing
NAICS 325413 In-vitro diagnostic substance manufacturing
NAICS 325414 Other biological product manufacturing
NAICS 541710 Physical, engineering and biological research

Industry Classifications: OTHER HIGH TECH

334111 Electronic Computers
334112 Computer Storage Devices
334113 Computer Terminals
334119 Other Computer Peripheral Equipment
334210 Telephone Apparatus
334220 Radio & TV Broadcasting & Wireless Communications Equipment
334290 Other Communications Equipment
335921 Fiber Optic Cables
334310 Audio & Video Equipment
334411 Electron Tubes
334412 Bare Printed Circuit Boards
334414 Electronic Capacitors
334415 Electronic Resistors
334416 Electronic Coils, Transformers, & other Inductors
334417 Electronic Connectors
334418 Printed Circuit Assembly
334419 Other Electronic Components
334413 Semiconductor & Related Devices
333295 Semiconductor Machinery
334511 Search, Detection, Navigation, Guidance, Aeronautical, and Nautical Systems and Instruments
334512 Automatic Environmental Controls
334513 Industrial Process Control Instruments
334514 Totalizing Fluid Meter & Counting Devices
334515 Electricity Measuring & Testing Equipment
334519 Other Measuring & Controlling Instruments
333314 Optical Instrument & Lens
333315 Photographic & Photocopying Equipment

Industry Classifications: OTHER HIGH TECH

- 517110 Wired Telecommunications Carriers
- 517211 Paging Services
- 517212 Cellular & Other Wireless Telecommunications
- 517310 Telecommunications Resellers
- 517410 Satellite Telecommunications
- 517510 Cable & Other Program Distribution
- 517910 Other Telecommunications
- 518111 Internet Service Providers
- 518112 Web Search Portals
- 518210 Data Processing, Hosting, & Related Services
- 511210 Software Publishers
- 541511 Custom Computer Programming
- 541512 Computer Systems Design
- 541513 Computer Facilities Management
- 541519 Other Computer Related Services
- 541330 Engineering Services
- 541380 Testing Laboratories
- 611420 Computer Training

Primary Owner Characteristics by Gender

	ALL		HIGH TECH	
	Male	Female	Male	Female
Owner Age	45.0	44.7	44.8	44.8
Average Hours Worked (week)	43.5	39.8	42.4	35.9
Previous Industry Work Experience (years)	13.2	9.0	16.3	12.1
Number of Previous Startups	1.17	0.60	1.27	0.69
Startups in same industry	43.0%	33.0%	54.9%	12.1%
High School Graduate or Less	15.3%	10.7%	5.4%	4.2%
Some College	34.7%	41.5%	26.1%	42.3%
College Degree	32.1%	29.0%	38.2%	34.4%
Graduate Degree	17.9%	18.8%	30.3%	19.0%

Firm Characteristics by Primary Owner's Gender

	ALL		HIGH TECH	
	MALE	FEMALE	MALE	FEMALE
Legal Form				
Sole Proprietorship	32.4%	44.3%	26.7%	31.2%
Partnership	5.1%	7.0%	2.3%	9.1%
Corporation	29.9%	22.8%	39.5%	38.3%
Limited Liability Corporation	32.7%	25.9%	31.4%	21.4%
Home Based				
Home Based	49.4%	51.5%	54.2%	66.1%
Intellectual Property				
Have Patents	2.5%	1.4%	6.9%	4.6%
Have Copyrights	8.9%	7.8%	16.1%	15.0%
Have Trademarks	14.2%	12.5%	21.3%	23.3%
Employment				
Employer Firm	43.0%	34.5%	39.4%	26.3%
Average Employment	2.11	1.24	1.75	1.13

Firm Outcomes by Primary Owner's Gender

	ALL		HIGH TECH	
	Male	Female	Male	Female
2004				
Revenues	$ 60,459	$ 38,540	$ 64,552	$ 52,375
Profits	$ 26,300	$ 16,095	$ 29,727	$ 38,694
Assets	$ 80,189	$ 47,172	$ 72,135	$ 47,035
2007				
Revenues	$ 176,050	$ 92,312	$ 205,349	$ 122,648
Profits	$ 60,717	$ 36,021	$ 58,002	$ 61,671
Assets	$ 137,370	$ 78,382	$ 136,009	$ 79,733
Survival (through 2007)	75.1%	69.5%	79.8%	81.3%

Primary Field of Study for Highest Degree by Primary Owner's Gender

	ALL		HIGH TECH	
	Male	Female	Male	Female
Sciences	25.9%	21.1%	44.1%	42.1%
Business	34.2%	32.0%	22.0%	27.4%
Technical	10.9%	6.8%	13.0%	14.2%
Liberal Arts	26.4%	38.6%	20.2%	16.3%
Other	2.7%	1.5%	0.7%	0.0%

** Surviving Firms Only

Capital Structure by Primary Owner Gender (2004)

	ALL		HIGH TECH	
	Male	Female	Male	Female
Owner Equity	$ 31,340	$ 22,288	$ 27,674	$ 20,126
Informal Equity	$ 1,691	$ 1,669	$ 1,748	$ 1,489
Formal Equity	$ 9,555	$ 948	$ 16,120	$ 3,641
Owner Debt	$ 3,043	$ 4,489	$ 3,653	$ 1,944
Informal Debt	$ 8,821	$ 4,972	$ 8,410	$ 1,692
Formal Debt	$ 35,809	$ 23,777	$ 23,545	$ 20,024
Total Financial Capital	$ 90,259	$ 58,142	$ 81,150	$ 48,915
Owner Equity	34.7%	38.3%	34.1%	41.1%
Informal Equity	1.9%	2.9%	2.2%	3.0%
Formal Equity	**10.6%**	**1.6%**	**19.9%**	**7.4%**
Owner Debt	3.4%	7.7%	4.5%	4.0%
Informal Debt	9.8%	8.6%	10.4%	3.5%
Formal Debt	39.7%	40.9%	29.0%	40.9%

New Financial Injections in 2007 by Primary Owner Gender

2007	ALL Male	ALL Female	HIGH TECH Male	HIGH TECH Female
Owner Equity	$ 6,570	$ 4,651	$ 9,839	$ 6,977
Informal Equity	$ 723	$ 432	$ 591	$ 343
Formal Equity	$ 3,020	$ 654	$ 7,534	$ 5,474
Owner Debt	$ 2,607	$ 2,775	$ 3,754	$ 5,631
Informal Debt	$ 3,368	$ 1,340	$ 1,716	$ 903
Formal Debt	$ 27,428	$ 13,898	$ 24,607	$ 15,209
Total New Injections	$ 43,716	$ 23,750	$ 48,041	$ 34,537

10.4% of male-owned firms received Formal Equity at least once over the 2004-2007 period, compared with 5.8% of women-owned firms. The most common source of formal equity was informal investors/angel investors.

Accessing the Data: Two Approaches

- Public-use Microdata
  - Available on the web
  - Identifying features omitted
  - Can be used to get familiarity with data and some research
  - www.kauffman.org/kfs
- Data Enclave
  - Secure server available via remote access
  - More identifying variables available
  - Teams of geographically distributed researchers can access and share code, results and work in collaborative environment
  - http://dataenclave.norc.org/
- Series of reports ~monthly from Kauffman

Conclusions

- Little research looking at women in high-tech firms but like other areas of entrepreneurial careers appears to be significant gender differences.
- Particular contribution of this research is understanding in much more detail how gender differences appear and evolve in capital acquisition and other innovation-related activities.
- Future research plans include likely expansion of research into specific industries, examination of new questions added to look at growth expectations, activities related to universities, and other aspects of innovation.

We Need Your Help

- If you are passionate about supporting additional data collection or aggregation by gender, please connect with us as there are exciting new developments in the statistical infrastructure here in the U.S. which promise to open up great opportunities but that will need vocal advocates.
- Track our research at www.kauffman.org or more specific developments on entrepreneurship and innovation data on my blog – Data Maven – at www.kauffman.org/datamaven.

Contact Us

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Thank you!

Extra Slides

Firm Outcomes by Primary Owner's Gender

	Female	Male	Female/Male Ratio
2004			
Average Revenue	$ 38,540	$ 60,459	0.64
Average Profits	$ 16,095	$ 26,300	0.61
Average Assets	$ 47,172	$ 80,189	0.59
2007 (survivors)			
Average Revenue	$ 92,312	$ 176,007	0.52
Average Profits	$ 36,021	$ 60,717	0.59
Average Assets	$ 78,382	$ 137,370	0.57
2007 Status			
Permanently Closed Operations	25.8%	19.5%	1.323
Sold to or Merged w/Another Firm	3.0%	3.7%	0.811
Temporarily Closed or Other	1.6%	1.7%	0.941
Survived until 2007	69.5%	75.1%	0.925

Capital Structure by Primary Owner Gender (2004)

	Female	Male	Female/Male Ratio
Owner Equity	$ 22,288	$ 31,340	0.71
Insider Equity	$ 1,669	$ 1,691	0.99
Outsider Equity	**$ 948**	**$ 9,555**	**0.10**
Owner Debt	$ 4,489	$ 3,043	1.48
Insider Debt	$ 4,972	$ 8,821	0.56
Outsider Debt	$ 23,777	$ 35,809	0.66
Total Financial Capital	$ 58,142	$ 90,259	0.64
Owner Equity	38.3%	34.7%	1.10
Insider Equity	2.9%	1.9%	1.53
Outsider Equity	**1.6%**	**10.6%**	**0.15**
Owner Debt	7.7%	3.4%	2.29
Insider Debt	8.6%	9.8%	0.87
Outsider Debt	40.9%	39.7%	1.03

Source: Kauffman Firm Survey Microdata. Sample includes only surviving firms over the 2004-2007 period, and firms that have been verified as going out of business over the same period. Sample size 3,974.

Capital Structure of Subset by Gender (2004)

	Female	Male	Female/Male
Employer Firms Only (2004)			
Owner Equity	$ 32,467	$ 45,875	0.708
Insider Equity	$ 3,207	$ 2,634	1.218
Outsider Equity	$ 2,138	$ 17,474	0.122
Owner Debt	$ 6,332	$ 4,070	1.556
Insider Debt	$ 8,699	$ 15,602	0.558
Outsider Debt	$ 38,995	$ 56,786	0.687
Total Financial	$ 91,837	$ 142,441	0.645
Firms that Survived through 2007 Only			
Owner Equity	$ 20,318	$ 31,119	0.653
Insider Equity	$ 1,547	$ 1,169	1.324
Outsider Equity	$ 1,004	$ 10,808	0.093
Owner Debt	$ 4,146	$ 2,801	1.480
Insider Debt	$ 4,176	$ 8,790	0.475
Outsider Debt	$ 27,466	$ 34,853	0.788
Total Financial	$ 58,658	$ 89,540	0.655
Firms that had 100K in revenues in 2007			
Owner Equity	$ 34,376	$ 44,896	0.766
Insider Equity	$ 1,720	$ 1,783	0.965
Outsider Equity	$ 2,581	$ 18,256	0.141
Owner Debt	$ 6,035	$ 3,057	1.974
Insider Debt	$ 5,239	$ 14,504	0.361
Outsider Debt	$ 57,274	$ 50,276	1.139
Total Financial	$ 107,225	$ 132,771	0.808