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The entrepreneurial puzzle: explaining the gender gap

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Abstract We document the substantial gender gap that exists among university scientists with regard to entrepreneurial activity using a variety of measures and explore factors leading to the disparity. We focus particularly on the biomedical sciences. The contextual explanation that women are under-represented in the types of positions from which faculty typically launch entrepreneurial activity is the most obvious. But the data suggest that for the biomedical sciences context is not sufficient in explaining the entrepreneurial gap. We look elsewhere to factors affecting supply and factors affecting demand. The former include gender differences in attitudes towards risk, competition, ''selling'' of ''science,'' type of research and geographic location. The latter include the role of networks, preferences of venture capitalists and ''gender discounting.'' We explore the associated hypotheses. We provide few tests and conclude that the research agenda is wide open and interesting.

Keywords Entrepreneur · Technology transfer · Gender differences · Venture capital · Scientific productivity

JEL Classifications O31 · O34 · O38 · J44 · J71

This essay, which is based on a speech Stephan delivered at the Technology Transfer Meeting held in Kansas City, September 2005, reflects on the gender gap that exists among university scientists with regard to technology transfer, especially among faculty in the biomedical sciences, from which many of our examples and data are drawn. Section 1

Use of NSF data does not imply endorsement of the research methods or conclusions contained in this paper.

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documents the gap, while Sect. 2 explores the extent to which the gap can be explained by context. In Sect. 3 we explore supply differences between men and women that could potentially explain the difference in entrepreneurial activity, while Sect. 4 explores demand factors. We conclude in Sect. 5.

1 Documenting the gap

Beginning with disclosure, a substantial gap exists between women and men in each stage of technology transfer and entrepreneurial activity. Thursby and Thursby (2005), for example, in a study of disclosure activity of faculty at 11 research universities report that 6.74% of women at these universities have disclosed while 8.67% of men disclosed. When they estimate the probability of disclosing, controlling for a variety of factors, they find that the probability that a man discloses is 43% higher than the probability that a woman discloses. Ding et al. (2006a) study faculty patenting in life sciences and find that 5.65% of the 903 women faculty in their sample of 4,227 hold a patent, while 13.0% of the 3,324 men held at least one patent.[1] Another indicator of the gap is found in data relating to SBIR activity of faculty. While the SBIR program was not designed for faculty, but instead for small businesses, there are clearly overlaps and a number of faculty apply for awards. Tool and Czarnitzki (2005) study 338 SBIR awards to faculty from NIH. They find that 13.4% of the awards have a woman principal investigator (PI.)

Another indicator of the gap can be found by examining the gender composition of Scientific Advisory Boards (SABs) of companies going public, especially the gender composition of faculty who sit on these boards. Stephan et al. (forthcoming) study initial public offerings in biotechnology in the early 1990s and late 1990s. They find that 7.2% of academic SAB members were women for the early 1990s sample; by the late 1990s the percent had grown slightly and stood at 8.5%. Their findings are consistent with data reported by Ding et al. (2006).[2] Stephan, Thursby and Higgens also identify academic founders associated with the firms making the initial public offering. All told, they identify 65 founders; none were women. In a related study, Lowe and Gonzalez Brambila (2005) sample 150 entrepreneurs at 15 universities. They report that 9.3% are women.

Taken together, these numbers are quite convincing that a gender gap exists between women and men on university faculties with regard to technology transfer and entrepreneurial activity. In what follows we explore factors leading to this large disparity.

2 Context

The contextual explanation of the entrepreneurial puzzle is that women have historically been under-represented in the types of positions from which faculty typically launch entrepreneurial activity. Not only are they less likely to be employed at a Research One university but also, in a related manner, they are less likely to have the funding that leads to

[1] Bunker Whittington and Smith-Doerr (2005), study over 1,000 recipients of NIH training grants in cellular and molecular biology. They find that 30% of the male recipients patented compared to 14% of female recipients. The sample is not restricted to those employed in academe.

[2] The authors find only 50 women listed as scientific advisors, which represents 6.4% of the 771 academic scientists identified in this role.

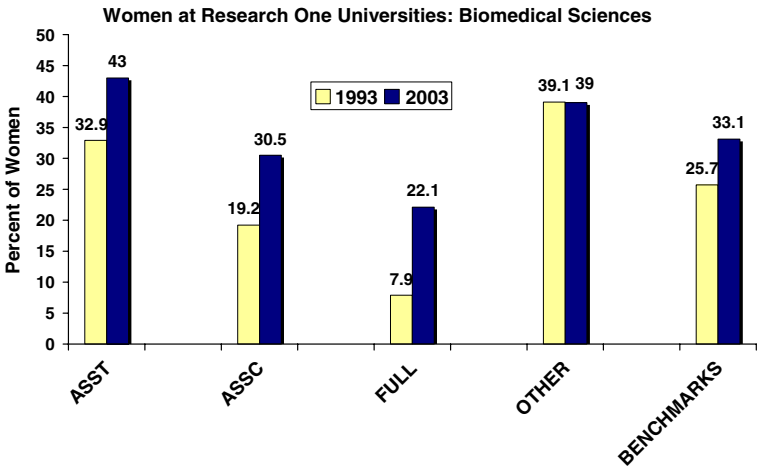


Fig. 1 Women at Research One university: biomedical sciences

success in academe. This is the most obvious explanation as to why a gap exists since it has been shown that much of what has been referred to as the publishing puzzle is explained by organizational context (Xie and Shauman 1998).[3]

Figure 1 explores the importance of context, focusing on the gender composition of faculty positions in the biomedical sciences at Research One universities. Data are drawn from the Survey of Doctorate Recipients (SDR), administered by Science Resources Statistics (SRS) at the National Science Foundation. Data are displayed for the ranks of ''assistant,'' ''associate,'' ''full'' and ''other'' positions for the two periods 1993 and 2003 (the latest year for which data are currently available.) The figure clearly shows that compared to the benchmark (25.7%), women were considerably underrepresented in the ranks of associate and full professor in 1993, and overrepresented in the ranks of assistant and ''other.'' Inroads have been made during the 1990s, and, by 2003, 22.1% of full professors were women, although the percent is still lower than the 2003 benchmark, which indicates that a third of all biomedical scientists were women. The percent of associates who were women also increased during the decade and was close to the benchmark of 33.1% by 2003. Women remained overrepresented in ''assistant'' and ''other.''

Another way of examining the contextual data is to display appointments by the gender composition of tenured positions and tenure-track positions in biomedical science departments at Research One universities. This is done in Fig. 2. The data show that in 2003 women occupied approximately 34% of tenured positions at Research One universities and 31% of tenure-track positions—almost exactly the same percent as their distribution in the pool of those trained in the field. Moreover, the percent of tenured positions held by women grew by a factor of almost three during the decade.

A key source of funding for researchers in the life sciences is the National Institutes of Health. Application and award rates provide a different window for viewing context. The data are displayed in Fig. 3 for the period 1980–2003. We see that during the period the percent of applications from women increased, going from approximately 15% to 25% and that the relatively small gender gap in success rates closed quite recently.

[3] Family context also is important in explaining the productivity puzzle (Smith-Doerr 2004).

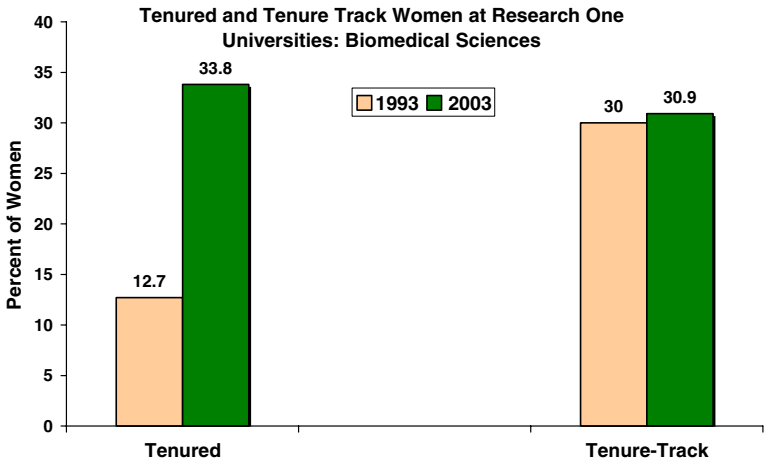
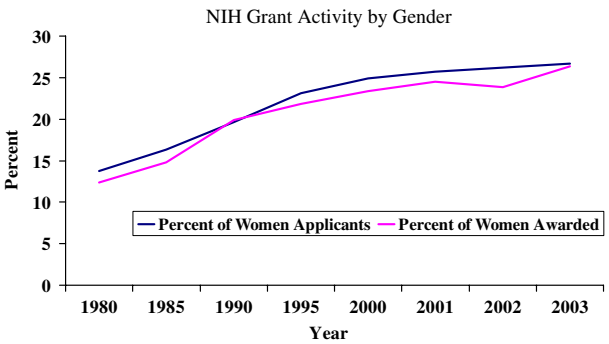


Fig. 2 Tenured and tenure track women at Research One universities: biomedical sciences

We conclude that women are underrepresented at Research One institutions in the top ranks and in the share of NIH grants they receive, but that the disparity is less pronounced today than it was in the past. Moreover, the data remind us that a not insignificant number of women have been working (and receiving grants) in top departments for a considerable period of time. We conclude that context is not sufficient for explaining the entrepreneurial under-representation of women. We must look elsewhere. Two suspects readily come to mind: (1) factors affecting supply (if you are an economist) or factors affecting gender-based differences (if you are a sociologist) and (2) factors affecting demand (for the economists among us) or factors affecting gender biases in entrepreneurial opportunities (if you are a sociologist). Before moving on to examine the first set of factors, we note that it is difficult at times to distinguish whether a factor belongs in the ''supply'' or ''demand'' category; moreover, interactions occur between the two which can augment gender effects.

Fig. 3 NIH grant activity by gender (Preusch 2004)



3 Supply

Gender-based differences appear to exist on a number of attributes that may affect the predisposition or enthusiasm for and interest in commercial activity. In discussing these differences, care must be taken not to assume that they are necessarily innate; some of these differences undoubtedly relate to differential patterns of socialization and thus are endogenous. Here we explore several differences.

3.1 Risk and attitudes towards money

There is well-documented evidence that women are generally more risk averse than men with regard to financial decisions. Jianakoplos and Bernasek (1998), for example, estimate the impact of household wealth and other socioeconomic variables on the ratio of risky assets to wealth using U.S. data from the 1998 Survey of Consumer Finances. They find that, other things being equal, single women hold a lower proportion of risky assets than do single men and conclude that single women are more risk averse. Olsen and Cox (2001) and Fehr-Duda et al. (2004) provide an explanation for the gender gap in risk aversion based on laboratory experiments. Their research shows that women, and women financial professionals, tend to place a greater weight on loss potential than do men and, that relative to men, women tend to underestimate large probabilities of gain.[4] Risk aversion and the tendency to discount rare but large events could be a factor in discouraging women from entering into entrepreneurial activity, which has highly skewed returns.

It is also possible that interest in money and or comfort level with financial transactions varies by gender. In her interviews with women scientists at ''Big School,'' Murray found that several women expressed unease around financial issues. One, for example, told her that ''I don't even balance my checkbook.'' (Murray and Graham 2006, p 23). The scientist continued by saying that ''Money and business are really scary to me. Sometimes I feel as if I can barely manage my own grant.'' (Ding et al. 2006b, p 16). Only one of the female respondents expressed the hope to ''become independently wealthy'' through entrepreneurial activity, and she was from the junior-faculty cohort (Murray and Graham 2006, p 26).

3.2 Competition

Another explanation as to why female scientists are less likely to engage in entrepreneurial activity than are male scientists relates to differential attitudes towards competition. In a recent NBER Working Paper (No. 11474), Niederle and Vesterlund (2005) explore the

[4] The existing literature, however, does not provide a conclusive answer to the question of whether a gender gap exists with regard to risk aversion. Johnson and Powell (1994), for example, provide empirical evidence regarding differences in risk propensity by gender in ''managerial'' and ''non-managerial'' populations, employing data from a random sample of 50 betting offices throughout the United Kingdom. The authors find significant differences between the ''non-managerial'' and ''managerial'' population, with the former being more risk averse. They suggest that risk propensity does not vary by gender but by ability and training. Gutter et al. (2003) use data from the 1998 Survey of Consumer Finances to examine differences in risk tolerance by gender. The authors find that women, on average, have a lower subjective risk tolerance than men, but that no gender differential exists with regard to the tolerance of objective risk. The difference between the two measures is that subjective measurements are influenced by factual information, values, opinions, and knowledge, whereas objective measurements are based on facts and observed behavior.

possibility that, holding other things equal, women dislike competition more than men. In an experiment in which women and men were allowed to choose between a winner-take-all tournament form of compensation or a piece rate form of compensation for solving problems, 75% of the men chose the winner-take-all scheme while only 35% of the women did so. Moreover, when the researchers compared men and women with the same (high) performance in an earlier (exclusively tournament) competition, women had about a 38% lower probability of choosing the subsequent tournament then did men. This suggests that these high performing women did not earn as much as they could have earned if they had chosen the tournament form of compensation.[5] This gender differential in attitudes towards competition may explain why a number of senior women faculty at Big School depicted commercial activity as ''not fun'' and ''too contentious.'' (Murray and Graham 2006, p 22).

3.3 Selling of science

Entrepreneurship in science requires an ability to ''sell'' the science, whether it is initially to the technology transfer office or down the road to a venture capitalist or underwriter. Not only is it helpful to sell, it is helpful to be able to engage in successful self-promotion. One reason that women may engage in less entrepreneurial activity than men is that they may be less predisposed to ''sell'' the science that they are doing. It is quite possible that gender differences exist in this ability. Murray's interviews with scientists at Big School are certainly consistent with this. One woman faculty member, for example, told her, in reference to male colleagues, ''They seem to be so comfortable making these grandiose statements and selling themselves.'' (Murray and Graham 2005, slide 13)

3.4 The importance of asking

Women faculty members sometimes explain their lack of entrepreneurial activity by saying that ''they were not invited'' to participate in a start-up activity. There is clearly something to this concern and we will return to this later in this essay. But it is also important to note that there is a literature that suggests that women are less likely to ask than are men. In their recent book *Women Don't Ask*, Babcock and Laschever (2003) explore the hypothesis of gender differences with regard to asking and document many situations in which differences exist. Their work suggests that women are less likely to seek out opportunities than are men. It is particularly cogent for our current discussion since much of the research was done in an academic setting.

Their research resonates with budget data collected by NIH which documents that, historically, NIH budgets have been lower for women then for men. Part of this differential can be attributed to budget asks which have traditionally been lower for women than for men.[6] However, in recent years this has not been the case, and since 2000 the average award to women has been larger than the average award to men (Preusch 2004).

[5] Among the group who performed poorly in the initial tournament, men are more likely to subsequently choose the tournament mode than women, indicating that underperforming men choose contests where they could not earn as much as they would if they were to choose the piece rate form of compensation.

[6] Lower asks, of course, may reflect lower pay, which in turn may be related to rank and institutional setting.

3.5 Type of research

Not all research is created equal with regard to the prospect of successful commercialization. Thus, a plausible explanation is that gender differences exist in research focus, with women choosing foci with less commercial possibilities than men. We are unaware of any research that systematically sets out to test this hypothesis. And until this is done, the verdict is wide open in this regard. However, it is interesting to note that Murray's case study suggests that women at Big School were working in ''small'' areas. Men, in describing their female colleagues' research areas could be far from charitable, describing them as ''uninteresting.'' To the extent these gender differences exist, they may relate to attitudes towards risk, with women choosing the less risky course in ''small'' areas. Research focus also could relate to one's ability to sell one's science. Small is safe but not grandiose enough to sell effectively.

3.6 Characteristics venture capitalists like

Careful reading of initial public offerings suggests that venture capitalists look for certain attributes among the scientists that they choose to invest in or invite to participate in a scientific advisory board. Two such characteristics are high productivity and a ''title.'' Both can serve as signals to the investment community.[7] Women are less likely than men to have either characteristic. A study by Fox (2005), for example, shows that faculty women are almost twice as likely as men to publish zero or one paper during the period studied, while men are twice as likely as women to be at the high end of the productivity distribution, publishing 20 or more papers.[8] Titles, too, are important signals to investors and it has only been in recent years that women have begun to occupy such positions as ''dean'' or ''vice president of research'' on a regular basis. One woman faculty member at Big School reported that she had 20 invitations to sit on SABs following her appointment to a top administrative position, remarking that, ''even though my science had not changed at all, suddenly people thought I was more useful to them and they wanted to involve [me] in commercial activities'' (Murray and Graham 2006, p 16).

3.7 Tradeoffs

Women traditionally have more responsibilities outside the workplace than do men. This can constrain the amount of time available to allocate to engaging in entrepreneurial activity. Family appears to have much less of a constraining effect on men. Not one of the men in the Big School interviews talked about family concerns as it related to entrepreneurial activity.[9]

[7] Stephan et al. (forthcoming) find a strong positive relationship between the citations to SAB members' articles and the proceeds raised at the time of the initial public offering.

[8] Fox surveyed full-time, tenured, or tenure-track faculty in doctoral-granting departments in computer science, chemistry, electrical engineering, microbiology and physics during the period 1993–1994.

[9] This is not to say that the Big School women stated that family constrained the amount of time they had for commercial activity. Rather, they talked about balancing their commitment to lab work, students and teaching.

3.8 The importance of geography

It is well known that innovation tends to be concentrated in certain geographic centers in the U.S. A variety of factors contribute to this, including the availability of knowledge spillovers and venture capital (Jaffe 1989, Audretsch and Feldman 1996a, b, Feldman and Audretsch 1999, Feldman 1994, Anselin et al. 1997, 2000; Black 2004.) Thus, a logical question to ask in trying to explain the entrepreneurial puzzle is whether women are as likely as men to be working in these geographically ''hot'' areas. To investigate this hypothesis, we study the relative concentration of women to men in three areas widely noted for their innovative activity: California, Massachusetts and North Carolina. Our relative measure is the percent of all women in tenure track positions working in the area, divided by the percent of men in tenure track positions working in the area. Data are taken from the SDR and are restricted to those trained in the biomedical sciences working at Research One institutions. The data are summarized in Table 1. A ratio of less than one is consistent with the idea that faculty women in the biomedical sciences have a lower probability of being located in a ''hot'' geographic area than do faculty men. Interestingly enough we find, with but one exception, that the ratios are greater than one, suggesting exactly the opposite. On the other hand, our results suggest that to the extent that geography has provided an ''advantage'' to women, it provides less of an advantage today than in the past. In all instances the ratios are declining.

3.9 Exposure to commercial activity

Peer effects can play an important role in creating entrepreneurial attitudes. Thus, the extent to which exposure to commercial activity varies by gender could provide another plausible explanation for the entrepreneurial gap. Several factors lead one to suspect that women are less likely to work with colleagues who are engaged in commercialization than are men. Evidence, though limited to those in the economics profession, suggests that researchers are more likely to write with researchers of the same gender (Feber and Teiman 1980; McDowell and Smith 1992). Moreover, to the extent that friendships are gender-based, women have a lower probability of associating with colleagues who are patenting, commercializing or having contact with industry. One female scientist, explaining to Murray and Graham why she had not been asked to join a SAB, said ''Maybe I have more female friends in science than male friends and so they ask their friends, not me'' (Murray and Graham 2006, p 17). The low participation of women on SABs also means that women have less exposure to commercial activity than do men and thus have fewer opportunities to become ''serial'' SAB members, since participation in one SAB often opens the possibility of participation in another. It is perhaps because women have fewer commercial ties than men that TTO offices have been found to play a more important role for women than for men in patenting (Ding et al. 2006b). Some of these differential peer effects, of course, may exist because of attitudes which keep women from full participation in commercial activity and thus are more appropriately placed among what we call ''demand'' factors.[10]

[10] Ding et al. (2006) find no gender difference in the number of co-authorship ties to scientists who have previously started or advised for-profit biomedical companies.

Table 1 Percent women to percent men, selected states Research One universities, biomedical sciences

Year	California	Massachusetts	North Carolina
1993	1.13	1.11	1.03
2003	1.02	1.07	.91

4 Demand

The demand explanation asks whether women faculty have the same opportunity to participate in entrepreneurial activity as do men.

4.1 Role of networks

Social networks play an important role in fostering commercial activity among faculty. They come in play, for example, in the formation of scientific advisory boards and introductions to venture capitalists.[11] Numerous studies concerning other types of entrepreneurial ventures suggest that women are at a disadvantage compared to men to receive referrals. In a study of 353 would-be entrepreneurs, Renzulli et al. (2000), for example, found that women have less diverse networks than men. Although little data exists to examine the hypothesis that women are excluded from academic-entrepreneurial networks, the data presented at the beginning of this paper concerning the gender composition of SABs as well as the fact that no founders were women are certainly consistent with this idea.

One avenue by which faculty become involved in commercial activity is through requests from former students (Murray 2004) who have gone to work in industry or in venture capital to become involved in a commercial enterprise. In this respect, women faculty are at a disadvantage to men, given that there is some evidence that they train fewer graduate students and postdocs on average than do men, a consequences of women having smaller labs than men. In a dataset assembled to study laboratories doing work in nanotechnology, Chang found that—conditional upon having at least one postdoctoral student—the labs of male faculty had on average 3.3 postdocs; those of women had 2.2. In terms of graduate students, the differential was less pronounced (Stephan et al. forthcoming). Conditional upon having a graduate student in the lab, the labs of men had 7.6 on average, those of women had 7.0. Murray and Graham (2006) found that women have smaller labs at Big School than do men but do not provide data concerning the difference.[12]

[11] The line between networks and peer effects is murky. Here we think of peer effects playing a role in forming attitudes towards commercialization. Networks are seen as providing opportunities to pursue commercial activity and build commercial experience.

[12] Fox (2003), in a survey of faculty, finds that women faculty do not have fewer male students on their teams than do male faculty, but they do have a higher number of women students and hence have, on average, larger teams. The difference between Fox's findings and those noted in the text may relate to the fact that Fox samples across doctoral-granting institutions while Murray studies one elite institution and Chang draws his data from 14 highly rated institutions.

Table 2 Venture capitalists by gender in silicon valley and Massachusetts

Title	Total	% Women
Advisory Board	88	2.27
Advisory Board, Scientific	70	5.71
Analyst/Senior Analyst	21	38.10
Associate/Senior Associate	40	7.5
Director/Senior Director	43	25.58
Entrepreneur-in-Residence	11	9.09
Executive-in-Residence	9	0
Founder/Co-Founder	29	3.45
Kauffmann Fellow	1	0
Managing/General Partner	105	5.71
Managing/Senior Managing Director	109	5.50
Managerial not classified elsewhere	10	0
Partner/Venture Partner	143	12.59
Principal/Senior Principal	62	16.13
President/Vice President/CEO	25	8
Other	49	18.37
Total	815	9.94

4.2 Venture capitalists

Commercialization requires venture capital. One explanation for a gender gap is that venture capitalists have a higher comfort level with men than with women and thus contribute to the gender gap. As one ''Big School'' woman scientist said to Murray, ''They just said we are sorry we can't include you but the investors are just not interested in women scientists'' (Murray and Graham 2005, slide 13). The extent to which this is a prevailing attitude among venture capitalists could be a result of the gender composition of venture capital firms. One woman scientist at Big School included the observation that ''venture capitalists are male'' as a reason why she had not assumed the role of CEO after starting a company (Murray and Graham 2006, p 18).

To investigate the gender face of venture capital firms, we examined VC firms placing money in biotechnology in Silicon Valley and Massachusetts during the first quarter of 2006. Data come from the MoneyTree report complied by Thomson Financial.[13]

We looked at a total of 78 VC firms, 48 of which made placements in Silicon Valley and 30 of which made placements in Massachusetts. We found a total of 815 individuals listed on the web pages for these 78 firms. We find that 90% of these individuals are men. Table 2 displays the data by title. We see that gender composition varies considerably by position. Analysts, who generally have little contact with academic scientists and have low status in the VC world, are more likely to be women than are any other VC position (38%). By contrast, founders are exceedingly unlikely to be women (3.5%) as are managing general partners (5.7%). Women have more of a presence, although it is low, among partners and principals (12.6% and 16.1%, respectively). Membership on scientific advisory boards was

[13] The report is produced by PriceWaterHouseCoopers and the National Venture Capital Association. The data is available on line at: www.pwcmoneytree.com.

overwhelmingly male—indeed, among the 70 scientific advisory board members, we could identify only four women. The same pattern held for the gender composition of the more broadly based advisory boards, of which only two of the 88 were women.

4.3 Women aren't asked

For many academic scientists commercial opportunities arise from being asked by others, be it colleagues, former students or venture firms, to participate in entrepreneurial activity. To the extent that there is a gender bias in these asks, women are less likely to participate in commercial activity.[14] While we have already noted the role that colleagues, venture capitalists and former students can play in creating gender differences, we have yet to examine the role that ''cold-calls'' play and the possible gender bias that arises.

Cold-calls often occur as the result of the scientist receiving considerable attention, generally as a result of a publication. Several factors conspire to make it less likely that women faculty will receive these calls than their male colleagues. First, the ''small'' areas that women work in can contribute to their research receiving less publicity than the work of certain men. Second, women may be less adept at selling their research results to others and thus getting the national and international attention that such research generates. Third, and of course related, women are less likely to be selected for the type of honors that make them attractive to deal makers, such as membership in the National Academy of Science, the Lasker Prize, or the Nobel Prize.[15] Fourth, the reputation of women who have these desirable characteristics may be discounted by those seeking to put together deals.

4.4 Gender discounting

Gender discounting occurs when, holding everything else equal, the accomplishments of women are viewed differently than those of men, or, to say it a bit differently, women with identical accomplishments to men receive differential treatment. Several women in Murray and Graham's study with apparently comparable academic credentials to men ''describe cases of clear and explicit exclusion from the biotechnology industry; they were not invited by investors to found firms and their colleagues explicitly excluded them from SABs.'' (Murray and Graham 2006, p 16).

4.5 It's a man's world at top pharma

Attitudes towards women's potential to successfully compete in the entrepreneurial world are also likely influenced by the attitudes towards women at large pharma companies and the positions women occupy at these companies. To the extent this plays an important role, it is important to recognize that as of 2005 not one of the chief scientists or heads of research at a big pharma firm was a woman. The degree to which big pharma is unwelcoming to women was expressed in an article appearing in *Science* in July 2005 (Mervis

[14] The line between gender differences in ''being asked'' and networks is grey, as is much of this discussion, when we seek to place explanations into a framework, but it is worth noting.

[15] In the past 20 years only 2 of the 45 Laser Prize recipients have been women; only 10% of the members of the biochemistry section of the National Academy of Sciences are women.

2005, p 724). It quotes Abbie Celniker, whose company was acquired by Wyeth in 1995, as saying with regard to why she left Wyeth: ''We didn't see a career progression unless we learned to play golf and use the men's room.''

4.6 A new club?

It is also plausible that wittingly or unwittingly, entrepreneurial science opened the possibility of having a ''boys' club'' when it emerged on campuses in the late 1970s. To the extent this occurred, the timing was ripe, coming at a time when the ''academic club'', that was once almost exclusively male, had been opened, partly through affirmative action, to women and underrepresented minorities.

5 Conclusion and caveats

A clear gender gap exists at every stage of commercialization among university faculty. Women are less likely to disclose then are men, less likely to patent, and less likely to engage in entrepreneurial activity, such as starting a company or serving on a scientific advisory board. Here we have examined factors that contribute to this disparity. Context, the most obvious suspect, clearly plays a role, but it is not the sole explanation. We must look elsewhere.

Here we have laid out certain of these explanations, dividing them for stylistic purposes between forces of supply and those of demand. Although this facilitates exposition, care must be taken in viewing the world in such black and white terms. Clearly interaction occurs between the two. A case in point is that attitudes towards women affect socialization which in turn affects women's willingness to seek out commercial ventures.

Our essay has provided few tests of the hypotheses that we explore. We leave systematic testing to others. One such example is an examination of the role VC firms play in determining the gender mix of entrepreneurial activity. Another is the role that gender plays in choosing research focus and size of lab. A third is the degree to which this discussion, which is largely based on characteristics of entrepreneurial activity in the biological sciences, extends to other areas of academic science. The research agenda is wide open and interesting. We invite others to explore the entrepreneurial puzzle.

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