

Chapter 16

Academic Advancement and Gender: A Comparative Analysis

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16.1 Introduction

The ‘glass ceiling effect’ has been taken seriously by many as a characterization of the barriers women (and minorities) encounter as they seek advancement in career ladders towards top professional and managerial positions in their workplaces. The report by the U.S. GAO issued in October of 2010 highlights persistent gender pay inequality in pay and promotion to top managerial positions, particularly for working women with children in the U.S. Over the past 7 years the proportion of women in the managerial ranks did not change (39–40 %), and female managers still earn only 81 % of what their male counterparts receive (up only 2 % over the past decade). In terms of advancement to top managerial posts, only 13.5 % of the chief executive officers of corporations are women, and when the spotlight shifts to the CEO’s of Fortune 500 corporations only 2.7 % are women.

These reports come on the heels of new data that indicate that the share of doctorates awarded to women in the U.S. is increasing each year: from 37 % in 1991 to 46 % in 2011 (Survey of Earned Doctorates). Among U.S. citizens and permanent residents, women earned the majority of doctorate degrees each year since 2002. So the issue of the glass ceiling for academic women may appear puzzling. U.S. higher education enables women to earn advanced degrees and position themselves competitively in the academic labor market, but how do these women actually fare in initial placement and subsequent advancement to senior rank? According to the U.S. National Center for Education Statistics, the proportion of full time faculty who are women is 43 %, while the proportion of full professors who are women is only 26.9 % for 2009 (NCES 2010). Furthermore, the proportion of women in the academe in the recent years have gradually increased, while the proportion of full

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professors who are women remained stable. Meanwhile, a disproportionate number of U.S. women are finding academic employment in non-tenured fixed-term positions (Gappa et al. 2007).

Is the U.S. experience unique or are there parallel patterns in other countries? (Lie et al 1994) For the period circa 1990, Bain and Cummings (2000) compiled indicators on gender and academic advancement for 25 countries. In all 25 of these countries, women were a minority of the profession. In 16 of these countries women were less than one quarter of the profession. And in ten of the 25 academic systems for which data were available, less than one of every 10 full professors was a woman.

Since that time in many countries there have been impressive societal changes external to higher education that would seem logically to improve the position of women in higher education. These include movements promoting equal employment rights for women including in the academic marketplace. In several nations, this advocacy has led to important legislation and other related measures such as the Japanese government setting a target for the inclusion of women in the national university sector of the Japanese higher education system. At the same time, there have been changes inside higher education such as steps to improve the transparency of academic recruitment and promotion that may or may not have had some impact on women's advancement (Tierney and Bensimon 1996).

The external changes are sometimes portrayed as converging global trends that are more or less equally pervasive across all societies and thus are leading to similar structures in all higher educational systems. In contrast to this convergence perspective is the argument that the respective higher educational systems or groups of systems are constructing distinctive approaches.

This paper drawing on the new data seeks to update the earlier analysis:

- Are women more prevalent in academia than they were 15 years ago?
- Are women more prevalent in the senior ranks than they were 15 years ago?
- What in general are the determinants of women's advancement in academe?
- What national variations are evident in the determinants? Might it be said that external or internal factors are more salient, and is there a convergence in determinants or the persistence of divergence?

16.2 Sources of Data

The primary data source for the aforementioned early 1990s indicators was 'The 1992 Carnegie International Survey of the Academic Profession' (Altbach 1997), supplemented by information from other national surveys. The primary data source for the analysis presented below is 'The 2007 Changing Academic Profession Survey.' Both surveys were conducted by international consortia of higher education specialists. Both used a common definition of the university (all academics with full or at least 50 % part-time jobs at 4-year universities), and both surveys used similar sampling designs with a rough goal of achieving a minimum effective

Table 16.1 Aggregate trends in women's advancement in academia by country

Country	% of Academics who are women		% of senior rank academics who are women	
	1992	2007	1992	2007
Brazil	39	47	18	47
China	24	37	11	31
Germany	17	29	5	19
Japan	8	9	6	8
Korea	13	18	11	18
Mexico	36	35	60	32
Norway	24	38	9	28
UK	21	49	5	40
USA	26	42	14	37

Source: Carnegie Survey 1992 and CAP Survey 2007/2008

(taking into account the design effect) sample of 800 academics in each participating country/system.

The two surveys had a similar purpose, and there was overlap in approximately 60 % of the survey items. The 1992 survey was conducted in 14 countries and the 2007 survey was conducted in 18 countries; nine of the ten countries that were in both surveys are the focus of the information presented in Table 16.1 above.

16.3 Methods

Descriptive analysis of the proportion of academics that have a senior rank and the proportion of those with senior rank who are women will be used to answer the first two research questions on aggregate trends.

Concerning the determinants of women's advancement (question 3), we will engage in a series of multivariate analyses where academic rank (senior=1 and junior=0) is the dependent variable and gender (female=1 and male=0) is the key independent variable, with additional independent variables progressively entered in such a manner as to clarify the determinants of advancement.

Our approach will be to enter into the successive equations sets of variables that, according to the current literature, influence the career advancement of both women and men. The sets of variables we have identified include personal, work and organizational, disciplinary, institutional, and societal factors as discussed below.

In these successive equations in so far as gender has a statistically significant negative relation to rank, it will be argued that, despite the importance of these other factors, there is female gender bias. If the relation (coefficient) of gender is insignificant (or significant but positive), it will be argued that there is no gender bias.

For the multivariate analysis, it is permissible to use either or both ordinary least squares regression (OLS) and logit regression. Logit regression tends to be pre-

ferred by statisticians as it minimizes the impact of heteroscedasticity in the independent variables—though in the analysis we have carried out we found essentially the same results with both of the multivariate procedures. For the main presentation we will use logit regression while for the initial country to country comparisons (summarized in Table 16.7), we will use OLS.

16.4 Results of Analysis

16.4.1 *Aggregate Trends in Women's Advancement in Academia*

Our initial interest is in two indicators of women's advancement in academia, getting a job in academia at a 4-year institution and obtaining promotion to the rank of full professor. Table 16.1 presents the trend for the nine countries that have comparable data for the early nineties and for 2007.

A broad conclusion is that women have made impressive advances in most of the countries for which chronological data are available both overall and at the professorial rank. For eight of the nine countries for which data is available both for 1992 and 2007, the proportion of women in academia has increased, and in 8 of the nine countries the proportion of senior rank academics who are women has also increased. Of course aggregate data is only part of the story. When the focus shifts to sub-sectors such as research universities the advances may be less evident. This cautionary note is especially applicable to the academic systems of more advanced societies.¹ Also it is notable that in one country (Mexico) women appear to have been proportionately more prevalent at the senior ranks in 1992 than in 2007.

16.4.2 *The Determinants of Entry to and Success in Academia*

While the relative position of women in academia has improved over the 15 year period from 1992 to 2007, nevertheless gender equality has not been achieved. There are a number of factors that are believed to have an impact, positively or negatively, on the position of women in labor markets including the academic labor market. Borrowing from the earlier Bain-Cummings model, these can be grouped into personal, organizational, professional, institutional, and societal factors. We will first review each of these factors, and then examine their import.

¹According to the CAP survey to be introduced below, in some of the emerging countries such as Argentina, Brazil, and Malaysia women appear to be outpacing men in the academic marketplace.

16.4.2.1 Personal

Foreign-Born Systems vary widely in their openness to academics that are foreign born as well as foreign trained. Where systems are open, it expands the range of talent that can be considered when making new appointments. Given this increased selectivity it might be presumed that foreign-born academics might be more qualified than the native born and hence would experience more rapid mobility. On the other hand, the foreign born may be handicapped in terms of the personal contacts that are useful in academic work, and they may also lack some of the personal and communication skills that are essential for maximizing communication in the classroom and in academic publications.

Family Status The academic career is highly competitive and demanding, particularly in the early years when new members have to prepare new courses and also engage in attractive research that leads to publications. These challenges tend to occur at the very same time that most young people consider marriage as well as child-birth (McElrath 1992). Those who actually decide to build families tend to experience considerable strain, finding they do not have as much time to devote to their work as their colleagues (Ward 2004; Perna 2001; Sax et al. 2002). This may lead to downward mobility or other adjustments that narrow opportunities.

Cultural Capital The academic job involves the management and development of knowledge, and individuals who come from homes with educated parents are more comfortable with these occupational demands.

Training An important factor influencing women's (and men's opportunities) is the relative success in completing high quality professional training including attendance at a prestigious graduate school, completion of high impact research, obtaining an advanced degree, and spending time as a post-doctoral student in a prestigious research setting (Tiechler 1996).

Experience In virtually any career, one of the most important determinants of advancement is how long the individual has been in the labor market. Bain and Cummings (2000) in their previous research found that women were a relatively new presence in academia and thus were more concentrated in the lower academic ranks. The small numbers of women who had more lengthy experience were in fact achieving advancement on par with their male colleagues.

16.4.2.2 Organizational

Tenure Track Systems vary widely in the predictability of job security with some offering all academics a stable job whereas others may rely heavily on fixed-term contracts and/or part-time contracts for many academic appointments. Academics who obtain these 'contingent' jobs are likely to feel insecure and may have heavier workloads and lower pay (Gappa et al. 2007). To the extent academics have a con-

tingent job, they tend to be disadvantaged in the competition for advancement. In general women are more likely to be contingent faculty than men.

Non-Academic Work Experience Arguably for some fields, especially the more professional fields such as education, law, business, and engineering there would seem to be advantages to spending part of one's career in a practical or applied role. This experience might enhance one's ability to convey relevant knowledge and establish useful research links with outside entities. On the other hand, extensive time outside of academia may make it difficult for an individual to adapt to the somewhat unique work demands of academia.

Time Budget One of the best predictors of how well an individual fares in work is the amount of time they put into it (Bellas and Toutkoushian 1999). And in academia where academic research is highly valued as a precondition for advancement, particularly critical is the amount of time that individuals devote to research (Porter and Umbach 2001). These generalizations apply equally to men and women.

Research Productivity The outcome of time devoted to research is, hopefully, the completion of high quality academic publications. An individual's research productivity has bearing both on the likelihood of initially securing an academic job and on the speed of advancement (Xie and Shauman 1998). Again this generalization applies equally to men and women.

16.4.2.3 Professional

Field The academic field that an individual is in can influence their opportunities in a variety of ways (Becher 1989). Women who find themselves in fields with many other women are more likely to receive psychological support as well as professional support.

Expansion of Field Just as with the expansion of systems, the differential expansion of fields can have an impact on opportunities for women. Women tend to favor certain fields over others—education and psychology rather than economics, biology rather than physics. If these fields are the growth areas in system expansion, then the opportunities for women will be enhanced.

Institutional Type Higher educational systems are composed of a variety of subsectors and layers (Cummings 1999). A crucial differentiating factor influencing women's opportunities for advancement is whether the employing institution is a research or a teaching institution. The former place greater stress on the research accomplishments of faculty and on the obtainment of research funding; keeping with those goals, the research institutions offer relatively more support for research and for obtaining research funding. Women insofar as they are somewhat new to the system may not have as strong a network as men, and hence may be at a disadvantage in gaining positions in research institutions (Aquirre 2000).

16.4.2.4 Institutional and/or Societal

Academic Models The modern higher educational institution traces its origins to the Western Medieval university, an institution owned by the church and run by clerics who without exception were males (Clark 1987). The trend towards secularizing the majority of IHE is relatively recent as is the trend towards welcoming women to become members of the academic profession. Indeed as late as 1900, women were simply ineligible for all academic posts in the UK. Ben-David (1977) has argued that there are no more than a handful of models for the organization of academic work including specifically the Germanic, French, English, and American variants. Others might add the Mediterranean, Japanese, and Soviet models. Arguably the more recently founded models are more gender open whereas the classical European models, often unknowingly have instituted practices that are gender biased. One example is the number of rungs in the academic hierarchy (Tiechler 1996); where there are many as in the UK system, the result is a relatively small number of senior posts thus stiffening the competition for promotion and potentially reducing the probability of a woman becoming a professor.

Gendered Culture Arguably virtually all contemporary societies have a masculine bias (Lie and O'Leary 1990; Chamberlain 1991), but this appears to be strongest in several of the East Asian nations and in several Middle Eastern and African societies. Japan and Korea influenced by Confucianism historically asserted that the place of a woman was in the home as mother and wife rather than in the labor market.

System Inclusiveness Systems that welcome students from diverse social backgrounds are also likely to be open to faculty from diverse backgrounds, and to the extent female faculty gain entry to the academic profession their prospects for advancement to senior positions are enhanced. A reasonable indicator of the inclusiveness of a system is the percentage of the tertiary level age cohort that attend higher education.

System Expansion It is difficult for an aspiring academic, male or female, to obtain an academic job if the higher educational system has a stable size, whereas in expanding systems new jobs are continuously opening (Reskin and Roos 1990). Systems may expand because they are becoming more inclusive or simply because the population is rapidly increasing. Among the major systems of today, China has experienced a 400 % increase in the number of academic jobs over the 1992–2007 period whereas the number of jobs in Japan has been essentially flat. Other systems range between these extremes. Expansion alone is no more favorable to men than to women, but in combination with other factors may enhance the prospects for aspiring female academics.

Egalitarian Culture Societies differ widely in the extent to which ethnic and socio-economic characteristics of individuals are used in personal evaluations and the distribution of rewards. To the extent such evaluations are stressed, it may be that the social hierarchy in academia is steep with relatively fewer senior positions. Also it may be that such positions are relatively closed to more marginal groups including

women. One indication of the relative egalitarianism of a society is the relative equality of the distribution of wealth and/or income.

System Maturity Systems differ in their degrees of self-sufficiency. Those that have been supported by advanced economies for a reasonable period of time are likely not only to have expanded but also have developed the capacity to train future generations of academics. Where this capacity exists and a significant proportion of academics are home grown, the academy may encounter pressure to more rapidly promote individuals to senior ranks. In contrast would be the academic systems of emerging economies that may be promoting the rapid expansion of higher education, but relying significantly on external systems for the training of the new recruits.

Systemic Policies Favoring Women Public policy can also have an influence on women's opportunities. Japan, a country with a surprisingly low percentage of women academics, has instituted laws and regulations requiring national universities to increase their proportion of women academics to a minimum of 30 %. Several of the Scandinavian countries have similar regulations (Smeby and Try 2005). In contrast would be countries such as the U.S. that have broadly phrased laws supporting equal employment rights but which do not specify particular targets. It might be surmised that the former approach is more favorable in opening up opportunities for women.

16.4.2.5 Interactions

Distinct from the direct impact of each of these variables on academic advancement is the possibility that particular variables in combination have a significant impact. For example, we will show below that being female is negatively correlated with holding a senior rank. We will also show that having a doctorate is positively correlated with holding a senior rank. There is additionally the possibility that women who hold the doctorate have a higher probability of advancement than women; without if so, we can say that there is a significant interaction between being female and holding a doctorate. We propose at different stages in the analysis below to examine the interaction of gender with all of the other independent variables of interest.

16.4.3 2007 Basic Multivariate Model

Our analytic strategy for identifying the determinants of senior rank follows essentially the same approach as our earlier work on the 1992 data-set. First we considered the relation of the core set of personal variables to senior rank (Table 16.2), and this suggested that having a highly educated father, obtaining a doctorate, and

Table 16.2 Advancement and personal variables

Variables in the equation	B	S.E.	Wald	df	Sig.	Exp(B)
Female	-0.383	0.032	141.209	1	0.00	0.682
Foreign born	-0.323	0.036	80.872	1	0.00	0.724
Children home	0.096	0.016	37.716	1	0.00	1.101
Care	-0.251	0.046	29.322	1	0.00	0.778
Father tertiary	0.236	0.032	54.433	1	0.00	1.266
Doctorate	0.74	0.03	591.228	1	0.00	2.095
Experience	0.126	0.002	3984.579	1	0.00	1.134
Constant	-2.142	0.043	2505.625	1	0.00	0.117

Source: CAP Survey 2007/2008

Cox = .250 Nagel = .334

lengthy experience were all positively related to senior rank. In contrast, being female, foreign born, and having dropped out of the labor market to provide care to a relative were all negatively related to obtaining a senior position. The one somewhat surprising finding was the positive relation between having children at home and achieving senior rank.

Next when we added several variables reflecting the organizational environment (Table 16.3), virtually all of the above relations remained, with the exception that the children at home variable became insignificant. Additionally, being in a tenure track position, collaborating domestically, and having a strong publication record all had significant positive associations with senior rank. In contrast, working at a research university, having worked outside of higher education, and collaborating internationally were negatively related to gaining a senior position. Interestingly the number of hours an academic devoted to research had no relation to advancement. Controlling for these other factors, being a woman continued to have a significant negative influence on achieving senior rank.

Next we supplemented the basic model (the combination of personal and organizational factors) by adding the interactions of being female and each of the constituent variables as reported in Table 16.4.² Once these interactions were introduced into the equation, ‘the sign for female as such became positive’ (but not significant) whereas the direction of the signs for all of the other variables was unchanged. In nearly all of the analysis that follows, the sign for female remains positive, adding weight to our fundamental conclusion that being a woman as such is not a hindrance to advancing to senior rank.

²The interaction variables were computed by multiplying the gender variable times each of the other independent variables. For example gender with values of 1 and 0 times doctorate with values of 1 and 0 ends up with three products of 0 and one product of 1, the latter being the combination of being female and having a doctorate.

Table 16.3 Advancement with personal and organizational variables

	B	S.E.	Wald	Sig.	Exp(B)
Female	-0.373	0.035	113.773	0	0.689
Foreign Born	-0.151	0.042	13.196	0	0.86
Children at home	0.017	0.017	0.99	0.32	1.017
Care	-0.218	0.05	19.352	0	0.804
Father has tertiary education	0.166	0.035	22.867	0	1.18
Doctorate	0.4	0.037	116.749	0	1.491
Experience	0.121	0.002	3127.166	0	1.128
University sector	-0.308	0.037	67.862	0	0.735
Hours per week for research	0	0.001	0.006	0.939	1
Collaborate with domestic partner	0.1	0.038	6.926	0.008	1.105
Collaborate with international partners	-0.186	0.04	21.614	0	0.83
Ln of articles	0.321	0.019	292.177	0	1.378
Outside	-0.082	0.04	4.133	0.042	0.921
Tenure track	0.633	0.034	355.326	0	1.883
Constant	-2.272	0.058	1527.192	0	0.103

Source: CAP Survey 2007/2008

Cox = .272 Nagel = .364

Table 16.4 Advancement with personal and organizational

Variables plus interactions with gender	B	Wald	Sig.
Female	0.063	0.311	0.577
Several variables omitted from table display	-0.066	3.465	0.063
FemChild	-0.185	3.26	0.071
FemCare	0.227	9.026	0.003
FemxDoctor	-0.007	4.85	0.028
FemxRes	-0.154	3.945	0.047
FemUniv	-0.141	3.58	0.058
FemDCollab	-0.064	2.707	0.1
	-2.447	1153.367	0

Source: CAP Survey 2007/2008

Cox = .274 Nagel = .366

Concerning the interaction variables, the combination of being female and having a doctorate was positively associated with advancement whereas the combination of being female and working at a research university was negatively associated with advancement. This pattern of results suggests that research-oriented work environments may throw up obstacles to female advancement, while females who obtain a doctorate enjoy a relative advantage over their sisters without doctorates as well as over all men.

16.4.4 The Import of Academic Field

Building on the above model we added dummy variables reflecting the several academic fields (in Table 16.5). There were some variations by field in terms of the proportion of academics in senior ranks. Specifically there are proportionately more senior rank positions in the humanities, business-law, and engineering; and fewer in the life sciences and medicine. But introducing these field variables did not add much to the explanatory power of the equation (e.g. the increase in the adjusted R-squared after adding the academic fields was less than 1 %).

We also considered the interactions of gender with the respective fields, but these were largely insignificant and added little to the adjusted R-squared. For example, there was only a weak suggestion that women who specialized in business-law or physical sciences were less successful in achieving advancement than men. Hence for subsequent steps in this analysis, we dropped the field and field interaction variables.

16.4.5 Similarities and Differences in National Patterns

If the global processes of convergence are as strong as some suggest, then the above conclusions on the determinants of women's advancement would apply equally to all of the systems under investigation. However, as we illustrate below in Table 16.6, there is considerable variation between systems—specifically, (a) the proportion of academics holding a senior rank vary widely by country, (b) the above model when applied at the country level varies considerably across countries—from slightly over 10 % of the variance in the case of Japan to nearly 60 % of the variance in the case of Norway, and (c) the variables that are most salient also differ by country.

16.4.6 National Equations

To explore the universality of the basic model, we decided to compute and compare national regressions. For this we decided to use ordinary least squares regression (OLS) as the associated statistics enable a better grasp of the variables that are most influential in accounting for senior rank—specifically with OLS, we have access not only to the indicator of statistical significance but also to the standardized regression coefficients.

First we looked at the basic model without interactions, and then we added the interactions which we report in Table 16.6. Influencing the strength of explanation is the variance in the dependent variable, so in the second column of Table 16.6 we indicate by country the proportion of each sample that hold senior rank. In most of the countries the proportion is 50 % \pm 15 %. Two exceptions are Argentina and Japan, and thus it is not surprising that the adjusted R-squared for these two countries is low.

Table 16.5 Advancement's relation to basic set, research, field, and selected interactions

	B	S.E.	Wald	df	Sig.	Exp(B)
Female	0.113	0.113	0.986	1	0.321	1.119
Foreign Born	-0.079	0.051	2.463	1	0.117	0.924
ChildrenHome	0.049	0.021	5.289	1	0.021	1.051
Care	-0.09	0.08	1.272	1	0.259	0.914
Father Tertiary	0.183	0.045	16.179	1	0	1.201
Doctorate	0.302	0.048	40.091	1	0	1.352
Experience	0.125	0.003	2106.332	1	0	1.133
University	-0.262	0.047	30.786	1	0	0.77
Outside	-0.079	0.041	3.741	1	0.053	0.924
Tenure Track	0.634	0.043	217.676	1	0	1.886
Research Hours	0.002	0.002	1.361	1	0.243	1.002
Collaborative Dom	0.168	0.048	12.31	1	0	1.182
Collaborative Intl	-0.184	0.04	20.785	1	0	0.832
Ln Articles	0.359	0.023	240.731	1	0	1.432
FemxForBorn	-0.122	0.091	1.783	1	0.182	0.886
FemxChild	-0.074	0.035	4.33	1	0.037	0.929
FemxCare	-0.172	0.103	2.805	1	0.094	0.842
FemxFatherT	-0.052	0.071	0.536	1	0.464	0.95
FemxDoctor	0.254	0.076	11.194	1	0.001	1.29
FemxExper	-0.007	0.005	2.434	1	0.119	0.993
FemxTenTrack	-0.009	0.069	0.016	1	0.898	0.991
FemxRes	-0.006	0.003	4.075	1	0.044	0.994
FemUniv	-0.164	0.078	4.452	1	0.035	0.848
FemDCollab	-0.134	0.075	3.212	1	0.073	0.875
FemLnArt	-0.076	0.039	3.744	1	0.053	0.927
Humanities	0.178	0.058	9.281	1	0.002	1.195
Social Sciences	0.103	0.066	2.452	1	0.117	1.109
Business Law	0.221	0.06	13.631	1	0	1.248
Life Sciences	-0.071	0.068	1.087	1	0.297	0.931
Physical Sciences	0.118	0.058	4.065	1	0.044	1.125
Engineering	0.235	0.057	17.001	1	0	1.264
Medicine	-0.306	0.061	25.47	1	0	0.737
Constant	-2.556	0.077	1092.425	1	0	0.078

Source: CAP Survey 2007/2008

Cox = .277 Nagel = .370

The overall pattern for the national equations is similar to that for the international equation—experience is often prominent as is tenure track appointment, number of articles, and having a doctorate. In only one country, Mexico, is being a woman a liability. In the case of two emerging systems—Portugal and S. Africa, after controlling for other factors, women have an advantage. The interactions of female with father's education, tenure track, and having a doctorate were also relatively prominent.

Table 16.6 Summary of national equations

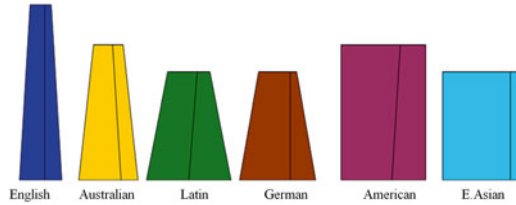
Country	Senior rank %	Adjusted R-Squared	Most important predictors of advancement
Argentina	31	0.1	Experience-FemChild-FemFor + FemArt
Australia	20	0.318	Experience + Articles-FemUniv
Brazil	59	0.131	Articles-Father + TenureT + FemFath
Canada	71	0.331	Experience + Child-Care + FemTenure-FemU
China	57	0.464	TenureT + Doctorate-Father + Articles + FemFath
Finland	27	0.34	Doctorate + TenureT + Experience + Articles
Germany	39	0.464	Experience + Doctorate + Children + FemExp
Hong Kong	45	0.447	Experience + TenureT + Articles
Italy	62	0.306	Experience-FemU + ForBorn + IntlCol
Japan	87	0.102	Experience + TenureT + Articles
S. Korea	64	0.396	Experience-TenureT + Child
Malaysia	23	0.441	Experience + Doctorate-FemDoc-Care + Articles
Mexico	72	0.414	Experience-Female + Children + FemExp + Articles
Norway	58	0.667	TenureT + Doctorate + Experience-FemT
Portugal	20	0.303	Experience + TenureT + Female + Articles
South Africa	62	0.125	Experience + Female-FemDoc-FemFather
U. Kingdom	43	0.279	Doctorate + TenureT-FemTenure + Articles
U.S.	64	0.391	Experience + TenureT + Articles-ResHrsIntCol

Source: CAP Survey 2007/2008

On the other hand, there are some interesting variations in national patterns. Specifically, beyond recognizing the prominence of experience in several of the countries ‘having a doctorate’ was strongly associated with advancing to senior rank (Finland, Norway, Germany, the UK, and Malaysia). In several others, having a ‘tenure track position’ was associated with senior rank (the US, S. Korea, Japan, Hong Kong, and Portugal). ‘Producing numerous articles’ was associated with senior rank in Australia and Brazil. ‘Family factors’ were somewhat more prominent in Argentina, Mexico, and S. Africa. And the remaining countries—Italy, China, and Canada—had patterns that could not be easily grouped with the others.

On the assumption that these groupings might be the best way to characterize national differences, we created dummy variable for each and added these dummy variables along with their interactions with gender to the basic equation. This equation had a Cox R-squared of .303 (Nagel of .345) that is a marginal improvement on the basic equation. However, all of the dummies were negatively associated with senior rank, thus did not improve our insight into the determinants of academic advancement.

Fig. 16.1 Contrasting institutional types



16.4.7 Institutional (and Country) Impact

In the analysis of the 1992 data we and others argued that institutional differences were important, but it may be that the institutional differences are not as clear cut today. For example, China which once followed the Soviet higher education model has adopted many of the features of the U.S. model; similarly Canada has minimized some of its Anglophone features in favor of U.S. practice. And across Western Europe, the pressure of ERASMUS has led to some convergence in national types. Nevertheless we explored this dimension by grouping selected countries in terms of institutional affinities.

These affinities are, as depicted in Fig. 16.1, (a) the vertical dimension of the number of academic ranks ranging from the E. Asian and German systems with three to the English system with six; (b) the horizontal dimension of the proportion of academics in each rank which is somewhat pyramidal in the English and German cases, and relatively equal in the US and East Asian cases; and (c) the prevalence of women in the respective ranks. These three principles led to six types in the 2000 analysis, e.g. US, Australian, English, German, East Asian, Latin American, and for this study we have added the Chinese institutional type.³

All of the institutional types have a significant association with senior rank, with the Latin, East Asian, and Chinese types having a positive coefficient and the Australian, English, and German types having a negative coefficient. Additionally the adjusted R-squared (cox) increased from 28 to 32 %. This finding suggested the value of further exploration of system types. Hence we computed the interactions of female with each of these types and entered them into another equation (Table 16.7).

Looking at Table 16.7, we can infer that East Asia has relatively more positions at Senior Rank, and while relatively few women currently have senior positions in East Asia, the institutional type is relatively open to the advancement of women. By way of contrast, in Latin America a relatively high proportion of positions are senior, women are relatively plentiful in academia, and women have reasonable access to these senior positions. China is somewhat similar to Latin America. In contrast with the above three settings, women appear relatively disadvantaged in the UK, Germany, and Australia. The U.S. type appears to be gender neutral.

³As the China was not part of the 2000 analysis and it does not resemble the Japanese and Korean patterns, we decided to create separate dummy variables for the Chinese and East Asian cases.

Table 16.7 Advancement's relation to institutional types with interactions

	B	S.E.	Wald	df	Sig.	Exp(B)
Female	0.179	0.141	1.617	1	0.204	1.196
Foreign Born	0.151	0.059	6.431	1	0.011	1.163
ChildrenHome	0.062	0.022	7.601	1	0.006	1.064
Care	-0.107	0.083	1.647	1	0.199	0.899
Father Tertiary	0.079	0.049	2.629	1	0.105	1.082
Doctorate	0.512	0.052	97.553	1	0	1.668
Experience	0.131	0.003	2160.215	1	0	1.14
University	-0.037	0.058	0.403	1	0.525	0.964
Outside	-0.09	0.059	2.291	1	0.13	0.914
Tenure Track	0.68	0.046	217.761	1	0	1.973
Research Hours	-0.003	0.002	2.071	1	0.15	0.997
Collaborative Dom	0.217	0.05	18.756	1	0	1.242
Collaborative Intl	0.169	0.044	14.712	1	0	1.184
Ln Articles	0.335	0.025	183.865	1	0	1.397
Femx ForBorn	-0.129	0.104	1.547	1	0.214	0.879
Femx Child	-0.084	0.037	5.101	1	0.024	0.92
Femx Care	0.034	0.108	0.099	1	0.753	1.034
Femx FatherT	-0.002	0.075	0.001	1	0.981	0.998
FemxDoctor	0.213	0.083	6.543	1	0.011	1.237
FemxExper	-0.008	0.005	2.943	1	0.086	0.992
FemxOutside	-0.157	0.093	2.869	1	0.09	0.855
FemxTenTrack	0.007	0.074	0.008	1	0.928	1.007
Femx Univ	-0.311	0.091	11.602	1	0.001	0.732
FemxRes	-0.005	0.003	2.409	1	0.121	0.995
Femx DCollab	-0.135	0.079	2.919	1	0.088	0.874
FemxLnArt	-0.046	0.042	1.202	1	0.273	0.955
US Type	0.368	0.114	10.34	1	0.001	1.445
Australia Type	-1.669	0.133	157.946	1	0	0.188
English Type	-0.205	0.089	5.312	1	0.021	0.815
German Type	-0.81	0.099	66.764	1	0	0.445
Latin Type	0.937	0.073	163.853	1	0	2.553
EastAsia Type	0.878	0.09	95.407	1	0	2.406
China Type	1.332	0.072	343.35	1	0	3.788
Femx US	0.285	0.17	2.824	1	0.093	1.33
Femx Australia	-0.121	0.218	0.307	1	0.58	0.886
Femx English	0.224	0.14	2.573	1	0.109	1.251
Femx German	0.08	0.188	0.18	1	0.672	1.083
Femx Latin	-0.034	0.11	0.094	1	0.759	0.967
Femx EAsia	0.285	0.187	2.325	1	0.127	1.33
Femx China	0.07	0.114	0.377	1	0.539	1.073
Constant	-3.333	0.09	1360.331	1	0	0.036

Source: CAP Survey 2007/2008

The focus on institutional types offers much promise, and in future work it would be desirable to formulate alternate types such as a Francophone model or a post-Soviet model.

16.4.8 Percent of Positions That Are Senior Rank

While the concept of institutional type has appeal conceptually, there is a more efficient way to illustrate its relevance to this study. One of the above dimensions is the proportion of academics that hold senior rank; it should be obvious that the relative prevalence of senior rank openings directly influences the likelihood that an individual academic will advance to senior rank. Keeping that in mind, we constructed the variable, Percent of Positions in the System that are Senior Rank which, as noted in Table 16.6, ranges from Japan with 87 % to Australia and Portugal with 20 %.

Senior Rank and its interaction with female were added to the basic equation, and this new equation realized a Cox Adjusted R-Squared of 35 % (Nagel of 46 %), an impressive 8 % advance in explained R-squared over the basic equation. Thus we can say that systems vary widely in the prevalence of senior rank and this relative prevalence has a strong impact on the likelihood of an individual advancing to senior rank.

Senior Rank and its Interaction with Female was also considered. The adjusted R-Squared is about the same. The sign of Fem*Senior Rank is positive and significant suggesting women are more likely to advance in systems with a relatively high proportion of positions that are senior rank. However, when this interaction is introduced the sign of Female alone shifts to negative (though insignificant).

16.4.9 Societal Level Factors

It has been suggested that societal level features might have an impact on gender and advancement, including Inclusiveness, Expansion, Egalitarianism, System Maturity, and Emerging System. We developed indicators for each of these features as elaborated in Appendix. Some of these system level factors were related to each other—inclusive positively with egalitarian and mature and negatively with expanding and emerging, expanding positively with emerging and negatively with inclusive and mature, egalitarian positively with inclusive and emerging—but most had weak to negligible zero-order relations with gender and advancement.

When the system level factors were added to the basic model (leaving out emerging economies as it is essentially the obverse of mature economies), they increased the adjusted R-squared by about 4 % above the level of the basic equation (cox up to .300 and nagel up to .400). Most of the societal level factors were ‘statistically significant,’ and the direction of their signs was interesting. As expected, in the more

mature and more egalitarian societies the probability of an academic holding senior rank was greater, but the probability was less in the more inclusive and expanding societies. In that the more mature societies also tend to be more inclusive, this statistical outcome is surprising.

There may, of course, be limitations in our operationalization of these concepts, but it turns out that these system level factors added no more to our explanatory quest than the aforementioned institutional types. Additionally as we have noted some of the statistical patterns were counter-intuitive. For these reasons, we think of the approach relying on societal level factors as simply providing an alternate (and possibly inferior) perspective for examining of the link between gender and advancement.

16.5 Summing Up

As a general rule, the key to academic advancement is a doctorate, a tenure track job, experience, and academic research productivity. Children at home is not a big liability, but breaking career to look after children or adults is. Better educated parents have a positive effect, especially in the developing world.

There are fewer senior rank opportunities in top tier institutions, and this has a negative impact on the advancement of both men and women. There also fewer opportunities in the life sciences and medicine for both men and women. Research collaboration contributes, with international collaboration more important in advanced countries while domestic collaboration is more important in the emerging countries.

Women have made impressive advances in the academies of most of the countries for which chronological data is available both overall and at the professorial rank. For all of the nine countries for which data is available both for 1992 and 2007, the proportion of women in academia has increased, and in eight of the nine countries the proportion of full professors who are women has also increased.

While overall Females are not as advanced as men, the difference can be explained away by the liabilities females face (as seen in interactions). In several systems females do as well as men or even better, once the interactions are considered; Mexico is a notable exception.

Academic advancement and in particular female academic advancement appears to be shaped by the institutional culture of academies. Some systems have more positions relative to the size of the population—Finland, S. Korea, Norway, and the U.S. are the most expanded. Some systems have a greater proportion of senior positions than others—Japan, Canada, and Mexico are notable. Some systems may be more gender biased than others—Mexico and possibly some of the Western European systems.

These differences that were internal to national systems had a greater impact on the likelihood of individual advancement than did the differences external to national academic systems, such as recent system expansion, system inclusiveness, egalitari-

anism, and economic maturity. The implication is that the key to enhancing prospects for advancement including the prospects for women lies more within academic systems than without.

These differences are important and deserving of further inquiry, but what stands out most from this analysis is the extent of agreement across academic systems in the criteria for advancement of men and women—with the prominent emphasis on experience and productivity.

Appendix

Table 16.A.1 Variables Included in 1992 total, 2007 total, 2007 Country Specific Regressions (Those marked with * will be excluded from Country Regressions)

Variable	Details
Professor	Respondent has senior rank
Gender	Female as 1, male as 0
Foreign Born	Foreign born as 1
Children at Home	Children at home as 3 for 3 or more, 2, 1, 0
Care	Care as 1
Father has HE	Yes as 1
Ph.D. or equivalent	Doctorate as 1, other as 0
Seniority (experience)	Number of years employed in higher education
Position at Research U	Yes as 1
Outside Employment	Yes as 1
Tenure Track Position	Yes as 1
Research time	Self-report of hours spent on research per week when classes are in session
Collaborative Dom	Yes as 1
Collaborative Intl	Yes as 1
Product	Self report of academic articles published over the past 3 years. The natural log of the total score is used in the analysis.
Humanities	Literature, language, arts, and philosophy
Social Sciences	Anthropology, economics, geography, political science, and sociology
Business and Law	Business and Law
Education and Psychology	Education and Psychology
Life Sciences	Biology, agriculture, and veterinary sciences
Health	Medicine, nursing, and public health
Engineering	Engineering, technology, and computer science
Natural Sciences	Physics, chemistry, mathematics
American type*	A dummy variable including the United States
Australian type*	A dummy variable including Australia
English type*	A dummy variable including the United Kingdom and Hong Kong
German type*	A dummy variable including Germany

(continued)

Table 16.A.1 (continued)

Variable	Details					
Latin type*	A dummy variable including Argentina, Mexico and Brazil					
East Asian type*	A dummy variable including Japan and Korea					
China type*	A dummy variable including China					
Fem*	Female * Indicated variable					
Appendix. Institutional and Societal Operations						
Country	Historical	Inclusive (% cohort in HE)	Expanding (# HE Enrollees 2005/1985)	Egalitarian (based on Gini Index of Income)	Mature	Emerging economy
Argentina	French	65	433 %	1	0	1
Australia	English	72	314 %	2	1	0
Brazil	French	24	250 %	1	0	1
Canada	English, American	62	297 %	2	1	0
China	Russian, US	20	1837 %	2	0	1
Finland	German	92	248 %	3	1	0
Germany	German	55	178 %	2	1	0
Hong Kong	English	31	399 %	2	0	1
Italy	French	66	180 %	2	1	0
Japan	Japanese, US	55	167 %	3	1	0
S. Korea	Japanese, US	85	250 %	3	0	1
Malaysia	English	32	1268 %	2	0	1
Mexico	French	24	304 %	1	0	0
Norway	German	80	270 %	3	1	0
Portugal	French	56	417 %	2	0	0
South Africa	English	15	200 %	2	0	0
United Kingdom	English	60	275 %	1	1	0
United States	US	83	220 %	2	1	0

¹For inclusive 0–30=1, 31–50=2, 51–70=3, 71–100=4²For expanding 0–200=1, 201–300=2, 301–500=3, and 501 plus=4

References

- Altbach, P. G. (Ed.). (1997). *The international academic profession: Portraits of fourteen countries*. Princeton: Carnegie Foundation.
- Aquirre, A. (2000). *Women and minority faculty in the academic workplace: Recruitment, retention, and academic culture*. San Francisco: Jossey-Bass.
- Bain, O., & Cummings, W. K. (2000). Academe's glass ceiling: Societal, professional-organizational, and institutional barriers to the career advancement of academic women. *Comparative Education Review*, 44(4), 493–514.
- Becher, T. (1989). *Academic tribes and territories*. Great Britain: St. Edmundsbury Press.
- Bellas, M. L., & Toutkoushian, R. K. (1999). Faculty time allocations and research productivity: Gender, race, and family effects. *The Review of Higher Education*, 22(4), 367–390.
- Ben-David, J. (1977). *Centers of learning*. New York: Wiley.
- Chamberlain, M. (1991). *Women in academe: Progress and prospects*. New York: Russell Sage.
- Clark, B. R. (Ed.). (1987). *The academic profession: National, disciplinary, and institutional settings*. Berkeley: University of California Press.
- Cummings, W. K. (1999). The institutions of education: Compare, compare, compare. *Comparative Education Review*, 43, 413–437.
- Gappa, J. M., Austin, A. E., & Trice, A. G. (2007). *Rethinking faculty work: Higher education's strategic imperative*. San Francisco: Jossey Bass.
- Lie, S. S., & O'Leary, V. E. (Eds.). (1990). *Storming the tower: Women in the academic world*. London: Kogan Page.
- Lie, S. S., Malik, L., & Harris, D. (Eds.). (1994). *The gender gap in higher education*. London: Kogan Page.
- McElrath, K. (1992). Gender, career disruption, and academic rewards. *Journal of Higher Education*, 63(3), 269–281.
- National Center for Education Statistics. (2010). *Integrated Postsecondary Education Data System (IPEDS)*. Tables, Retrieved from <http://nces.ed.gov/ipeds/>
- Perna, L. W. (2001). The relationship between family responsibilities and employment status among college and university faculty. *Journal of Higher Education*, 72(5), 584–611.
- Porter, S. R., & Umbach, P. D. (2001). Analyzing faculty workload data using multilevel modeling. *Research in Higher Education*, 42(2), 171–196.
- Reskin, B. F., & Roos, P. A. (Eds.). (1990). *Job queues, gender queues: Explaining women's inroads into male occupations*. Philadelphia: Temple University Press.
- Sax, L. J., Hagedorn, L. S., Arredondo, M., & Dicrisi, F. A., III. (2002). Faculty research productivity: Exploring the role of gender and family-related factors. *Research in Higher Education*, 43(4), 423–446.
- Smeby, J. C., & Try, S. (2005). Departmental contexts and faculty research activity in Norway. *Research in Higher Education*, 46(6), 593–619.
- Tiechler, U. (1996). The conditions of the academic profession: An international comparative analysis of the academic profession in Western Europe, Japan, and the U.S. In P. A. M. Maassen & F. A. Van Vught (Eds.), *Inside academia: New challenges of the academic profession* (pp. 15–65). Utrecht: Center for Higher Education Policy Studies.
- Tierney, W. G., & Bensimon, E. M. (1996). *Promotion and tenure: Community and socialization in academe*. Albany: SUNY Press.
- Ward, K., & Wolf-Wendel, L. (2004). Academic motherhood: Managing complex roles in research universities. *The Review of Higher Education*, 27(2), 233–257.
- Xie, Y., & Shauman, K. (1998). Sex differences in research productivity: New evidence about and old puzzle. *American Sociological Review*, 63, 847–870.