Gender Disparities in Higher Education and Academic Careers in Germany and the United States.

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The series *Policy Papers* demonstrates AICGS' commitment to advancing policy-relevant research using the tools of comparative methodology.

Developments in Germany are of interest because of the country's size, location and history. We need to understand public policy in Germany because Germany is a key international partner and because German preferences will continue to be an important ingredient in the formulation of EU policy regimes. Sometimes German solutions to pressing policy concerns are important because they have a "model" character. This is not necessarily a matter of praise or emulation. Indeed, German solutions may be untransferable or undesirable. Nevertheless, the constellation of institutions and practices that makes up Germany's "social market economy" provides the researcher with an unparalleled real time laboratory in organized capitalism. Over a variety of policy issues, comparison with Germany illuminates advantages and disadvantages of options that would not easily come to mind if the German "case" did not exist. Industrial relations, financial institutions, health-care reform, pollution abatement, intergovernmental relations, immigration, and employment training are just a few of the sectors for which a German component might pay high dividends to policy analysis.

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EXECUTIVE SUMMARY

For decades, reform of higher education to reflect a stronger orientation towards the structure of higher education in the United States has been called for in Germany. At the same time, the inclusion of women and minorities in science and academia has become a pressing issue in most industrialized countries, including Germany. When compared to the United States, the situation of female academics and scientists in Germany has often been described as being backward. This "backwardness," however, has barely been addressed systematically from a comparative perspective by either research on women's careers in academia and science and comprehensive comparative research on systems of higher education.

This paper explores gender inequality in higher education and careers in academia and science from a comparative perspective. The focus is on differences in the structure of higher educational systems, as well as differences in the structure of careers in academia and science. Referring to cross-sectional and longitudinal aggregate data on women's educational participation and their distribution across academic ranks, it shows that the integration of women is still far from equal to that of men in both countries. The relatively higher ratio of women in American higher education is linked to the traditional diversity and early social "openness" of the American educational system, as well as the successful political struggle and mobilization for equal access and participation in education. Contrary to the United States, the structuring of academic careers in Germany provides little counterweight to balance the gender-biased prerequisites needed to turn educational achievement into career success.

The sequence of qualification and employment stages in the course of a German academic career is vastly undefined when compared to the United States, since it does not provide clear, cumulative career components. In addition, the professorate as the academic unit of operation in Germany is located at the interface of all career-relevant decisions, thereby underlying the pronounced hierarchical structure of academic careers in Germany and promoting the high degree of and long-term dependency on the support and oversight of a single senior academic advisor. The aggregate data presented, however, also suggest that whereas access to academic positions poses the most important barrier to women in Germany, the situation in the United States points at a gender bias in the distribution of academic and scientific rewards. The conflicting findings show that with respect to advice for educational policymakers, prescriptions to further the

advancement of women are not readily available and transferable from the United States to Germany.

INTRODUCTION

In a comparative perspective, the United States are considered to have less gender stratification in academic and scientific occupations than other industrialized countries. According to calculations by *El País* it will take European women 475 years to reach equality with their male counterparts, given the slow advancement of women in European academia and science today (*Süddeutsche Zeitung* 4/18/1998). It is assumed that "women's achievements in higher education in the United States surpass those in many other industrial countries" (Jacobs 1996: p.154)Xincluding Germany. In Germany, the academic and scientific labor market remains strikingly segregated by gender and the "German academic community is one of the most male-dominated" (*Nature*, 6/4/1998: p.402) despite women's increasing gains in terms of educational participation and credentials. The German Government's Department of Education, Science, Research and Technology has only recently acknowledged this "backwardness" by referring explicitly to the comparatively higher ratio of females in higher education as well as in academic and scientific occupations in the United States (*Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie* 1998).

Why has the inclusion of women and other minorities in education and professional labor markets become a pressing issue in most industrialized countries (cf. *The Economist* 7/18/1998)? In a labor market supply perspective increasing international economic competitiveness forces nations to make full use of all their human capital to prevent being overtaken by other countries. Educating women (and other minorities) and investing in their human capital more fully is considered an indispensable response to the fluctuating number of scientists in the pipeline, e.g., in those fields where shortages are expected, and as a means to the enlargement of the professional workforce in general. In addition, demographic changes such as the increasing ethnic diversity of the work force as well as the rising demand of females for labor resonate within systems of higher education. The increasing educational participation of women and other minorities, however, has not been translated into equal career opportunities and outcomes yet. Finally, normative claims that academia and science should be organized along universalistic, democratic, and innovative principles are not in accordance with the evident lower representation of women as well as other minorities. The exclusion of social groups with certain characteristics from the realm of science

and the fabrication of knowledge is in mismatch with claims that science as a vocation is open to any talented individual and disregardful of ethnicity and gender.

The objective of this working paper is to explore cross-national differences of women's integration in academia and science. It is argued that on the one hand, research on gender disparities in academia and science and on barriers to women's careers has widely neglected cross-national, comparative approaches. Comprehensive comparative studies on higher educational systems as well as the scientific system on the other hand have traditionally paid little to none attention to the gender dimension. This "double neglect" is addressed in part one of this paper.

Part 2 of this paper provides a classification scheme from a comparative perspective. Women's participation in higher and academic education is separated from their careers in academia and science for analytical purposes. Therefore, section 2.1 addresses differences in the structure of higher education in Germany and the United States with regard to their expected effects on the participation of women. Section 2.2 tracks differences in the structure and structuring of academic careers in both countries. It is argued that women's representation in academic and scientific labor markets and occupations is closely related to differences in the building blocks of academic careers in Germany and the United States.

Cross-sectional and longitudinal empirical evidence on the integration of women in academia and science (or lack of it) in Germany and the United States is introduced in part 3 of this paper to illustrate and underline the extent of prevalent cross-national variation. In accordance with part 2, information on women's participation in higher education is distinguished from data on their participation in the academic labor market. It is argued that albeit on a considerably higher level in the United States, gender disparities are persistent across the academic career ladder in both countries.

Part 4 of this paper then discusses possible explanations for the cross-national differences in women's representation described in part 3 with regard to the openness of higher educational systems (4.1) and the structuring of academic careers (4.2). Finally, a necessary caveat is made with respect to the scope of generalizations and conclusions from the data presented (4.3).

In the concluding chapter of this paper, implications for future research are addressed first. Then, it is asked what lessons from how higher education is organized in the United States could be learned in Germany with respect to the future advancement of women.

1 COMPARING GENDER INEQUALITIES AND SYSTEMS OF HIGHER EDUCATION: A DOUBLE NEGLECT

Women's advancement in higher education is "a valid indicator of the sociopolitical status of women in different societies" (Windolf 1997: p.xii). It is widely acknowledged today that women "can certainly be regarded as the 'winners' in the expansion and the liberalization of educational policies, particularly in the European countries" (Windolf 1997: p.170). Comparative analysis has shown "a marked reduction in gender differences in means of educational attainment" during educational expansion until the late 1960s. Even a reverse trend in the "educational gender gap" in educational attainment over time could be observed in some countries, including Germany and the United States (Shavit and Blossfeld 1993: p.21). Statistics on the representation of women in academia and science, however, have continuously documented that despite recent gains in educational participation and attainment, academic and scientific occupations remain heavily segregated by gender, especially in the highest and most prestigious academic positions.[1]

As an indicator for this asymmetry the low numerical representation of women in academia, however, says little about the causes that contribute to this unequivocal finding. The underlying assumption for the analysis of gender disparities in academic and scientific careers is that the scientific system is organized along universalistic criteria, equally valid for men and women. Since the seminal work on the social organization of science by Merton (1973), the validity of the universalistic principle has been widely criticized. The normative structure that is assumed to glue together the Scientific Community has been found fractured by particularistic interests, especially by gender (Cole 1987; Zuckerman 1990). Assumed objective criteria for scientific success and merit are biased by gender, e.g., number of publications and the review system of scientific journals (Wenneras and Would 1997; Long and Fox 1995). Career requirements have been found to take those factors for granted, working to the disadvantage of women, e.g., the distribution of family responsibilities such as childcare. The negative effects of the "male scientific ethos" (Etzkowitz et al 1994a) on women's aspirations, perceptions and participation demarcate the apparent mismatch of women and science.

Research on women's careers in science has underlined the sequential and structural character of the barriers and obstacles women are faced with. Schools have been found to

[1] Empirical evidence on the representation of women in academia and science in Germany and the United States is provided in detail in part 3 of this paper.

shortchange girls rather than boys in terms of educational aspirations, support and acknowledgement. A lack of institutional support and latent and manifest discrimination often pattern women's experiences during high school, college, and university. This trend is prolonged during graduate education and doctor's degree studies. Women are granted less access to professional networks and invisible colleges, report a lack of mentoring and career support as well as a lack of availability of female role models (Seymour and Hewitt 1997; Hanson 1996; AAUW 1992; Etzkowitz et al. 1992, 1994b; Sonnert and Holton 1995a, 1995b; Lang and Sauer 1997; Onnen-Isemann and Nave-Herz 1996; Wetterer 1995, 1992; Geenen 1994; Onnen-Isemann and Oswald 1991).

In contrast to approaches that consider the marginalization of women in academic and scientific labor markets mainly a supply problem (see e.g., Federal Glass Ceiling Commission 1995; Vetter 1994), the focus in this paper is on the structural factors that account for persistent, gender-based inequalities.

> Over the last decades, investigations of women's integration, or lack of it, into the occupational sphere have focused increasingly on the structure of labor markets and organizations rather than on individual-level gender differences in socialization, education, family responsibilities, work experience, and achievement. These new approaches explore the ways institutional structures shape individual careers, often with different implications for women than for men. (Kulis and Miller-Loessi 1992: p.94)

From this perspective on careers, structural barriers to women's progress within the academic environment are acknowledged rather than focusing on persistent gender disparities in academic careers as the outcome of individual choices. Given the concurrence in findings on barriers to women in science and the assumed universal validity of the structures and norms that govern academic and scientific careers, it is astonishing that cross-national variation in women's advancement has hardly been addressed systematically from a comparative perspective (see Jacobs 1996).

If comparative research on science and higher education is considered, however, a "double neglect" is manifest. According to Joas (1990) it has bypassed the position of women in academia and science at large since its focus has traditionally been on the inner logic of knowledge fabrication and conditions for the progress of reason. The conditions for and consequences of the

transformation of 19th century elite education into 20th century mass higher education have been recognized as central dimensions of analysis as has the functional differentiation of the scientific system and its exponential growth in the 20th century. Due to their key position as gatekeepers for status and prestige, professional opportunities, political power, and channels of upward mobility in any country (Windolf 1997), universities have become subject to in-depth analysis. Universities have been and are assigned a central role with respect to the differentiation of professions and professional education, the emergence of the academic profession as an occupation, the social organization of academia and science, and political struggles over educational access and participation. The analysis of higher educational systems and their respective institutions from a comparative perspective has underlined considerable differences and diversity in how societies organize science and the fabrication of knowledge (Ben-David 1977; Clark 1983; Abbott 1988, especially chapter II; Stichweh 1994; Felt et al. 1995, esp. chapters 2 and 3; Ash 1997; Muller 1996; Teichler and Wasser 1992).

Systems of higher education have been found to differ along a continuum of governmental and market regulation, competitiveness, and in terms of the division of research as well as with respect to the organization, financing and efficiency of graduate education (Heidenheimer 1992; Clark 1993; Gumport 1992; see also: Hagstrom 1994). Archer (1979), in her comparative analysis of educational systems in European countries showed that higher educational systems are closely related to the degree of political centralization.[2] Differences in the shape and regulation of national science policy in France, Germany, the United Kingdom, and the United States have been studied recently by Braun (1997), and the extent and effects of academic cooperation and mobility have been examined comparatively by Smith et al. (1994).

With respect to the seminal work of Ben-David (1977) and Clark (1983), Gumport (1992) suggested that the premises of most comprehensive studies on national systems of higher education are "grounded in the tradition of structural-functionalist sociology" (p.1125-26). Higher educational systems are characterized "as having evolved and adapted their structures to cope with changing social circumstances" and to maintain stability through differentiation and integration (Ibid.). In the aftermath of this preoccupation with "system" and "function," a predominantly gender-neutral perspective on the comparison of national systems of higher

[2] However, as Heidenheimer (1997: p.10) pointed out, her "very attractive theory" is neglecting the fact that in reality, (higher) education in European nations is often organized according to the principle of state-level and not national sovereignty (*föderale Staaten*).

education has been established and solidified, driving the question of gender inequalities in higher education to the analytical and conceptual periphery.

The same pattern seems to apply to the social organization of science. Clark states that:

> Sweeping across all the fields and institutions, assumed by professors of biology, sociology, and classics alike, is the identity of the 'academic man'. All such men and women, in the doctrines of the profession, are part of a single 'community of scholars,' sharing an interest that sets them apart from others. Community members are entitled to special privileges, particularly 'freedom of research' and 'freedom of teaching.' Downgrading all external controls, the culture of the profession everywhere emphasizes personal autonomy and collegial self-government. It portrays altruistic commitment, suggesting that it is a high form of service to society to create knowledge, transmit the cultural heritage, and train the young to fulfill their highest potential. (Clark 1983: p.91)

Despite his reference to the "identity of the 'academic man,'" and although portraying the culture of the academic profession lucidly, Clark fails to take the consequences of this observation into account in the following. Indeed, it remains the sole and implicit hint on the "genderization of science" (Etzkowitz et al. 1992) throughout the book. It is hardly surprising, then, that the cross-national analysis of higher educational systems has neglected both women and gender inequalities under these conditions. The scope of most comparative studies on higher education still is on the emergence of larger educational structures and on documenting their cross-national variationXoften with a sidelong glance on favorable conditions for a nation's scientific success and productivity. Most studies do neither take substantial gender-based differences in higher education into account, nor do they refer to these differences as possible results of **how** higher educational systems are organized. Their main contribution, however, could be seen in the establishment of an initial framework for the comparison of national systems of higher education, which has then to be reread through the 'gender lens.'

The following part of this paper takes up this task. Differences in the structure of higher education in Germany and the United States are described and discussed with respect to their expected effect on the educational participation of women. Next, the structure and structuring of academic careers in both countries is addressed. How can the "ideal" academic career track in both countries be described? What are the distinct structural differences between academic careers

in Germany and the United States? What are their expected effects on the inclusion of women in the academic labor market in both countries?

2 GERMANY AND THE UNITED STATES: DIFFERENCES IN THE STRUCTURE OF HIGHER EDUCATION AND CAREERS IN ACADEMIA AND SCIENCE

Cross-national differences in how systems of higher education are organized are often seen as the result of political, economical, and social developments on the national level. How systems of higher education are run is thus considered as the unique expression of national cultures and traditions. Although educational systems in most industrialized Western countries are assumed to be grounded in similar roots and beliefs, the emergence of distinctive international differences is seen as a product of the national fabrics educational systems are woven in (see, e.g., Clark & Naeve 1992).

Mutual historical interest and a tradition of exchange mark comparisons between the systems of higher education in Germany and the United States. Today the United States are considered the successor to Germany's leading role in the world of science (Felt et al. 1997; with respect to the international dimension of research see Zacher 1997). The organization of higher education in the United States is assumed to have model character with regard to its efficiency, scientific productivity and success. The organization of American higher education is therefore often seen as a blueprint for change in Germany, especially with regards to the proclaimed crisis of mass higher education and universities in particular. In addition, it is assumed that the structure of higher education and academic careers alike in the United States provide favorable conditions to the integration of women.

In the following sections, differences in the structure of higher education (2.1) and the structuring of academic careers (2.2) are addressed, and their expected effects on women's integration are discussed. Although interrelated, women's access and participation in academic education is separated from women's representation in the academic labor market for analytical purposes.

2.1 Differences in the Structure of Higher Education in Germany and the United States

Sector Mix

First, variation in the sector mix is evident. Germany's system of (higher) education is predominantly public and controlled by the German states (*Kulturhoheit der Länder*) whereas the American system of higher education is characterized by a fairly extensive private sector.[3] Private universities in the United States differ from public ones in that they are not controlled by state or federal governments, and that they are not operated by publicly elected or appointed officials. In Germany, almost all students are enrolled in public institutions of higher education, in the United States 22 percent of all students are enrolled in private institutions of higher education. Although the financial support of private universities in the United States is supposed to come primarily from other than public funds, private institutions of higher education in the United States also receive funding from federal sources, e.g., federally supported student aid, federal grants and contracts.[4] Public institutions of higher education do receive money from other than federal sources, and charge tuition and fees, too.[5]

Differentiation of Institutions of Higher Education

The so-called two-year institutions of higher education in the United States are distinguished from four-year institutions of higher education by the range of degrees they are legally authorized to confer. Universities typically comprise one or more graduate or professional schools[6] and are distinguished by the number of doctoral and master's degrees conferred annually and their emphasis on research (see Appendix, Table A). The German system of higher education comprises the traditional technical and other universities (*Universitäten*), vocational colleges (*Fachhochschulen*), colleges of art (*Kunsthochschulen*) and colleges of civil administration for the

[3] In addition, the organization of science in Germany also provides a segment of autonomous, public non-university research units (Max-Planck-Institutes; other *Großforschungseinrichtungen*), where doctoral programs are offered and directors often occupy the position of a university professor.

[4] I owe this point to the expertise of Daniel Fallon.

[5] In 1994, the share of tuition and fees at private universities was 45 percent, opposed to only 24 percent at public universities. Federal grants and contracts account for 22 percent at private, and 17.5 percent at public universities. Large differences exist with respect to the share of state and other local appropriations, grants and contracts. They account for less than 3 percent at private universities and over 40 percent at public universities. The reverse picture exists with regard to the share of private gifts and endowments. They account for 22 percent of the revenue of private, and only 9 percent of public universities (U.S. Department of Education 1997c: p.244).

[6] Research universities' are defined as being "committed to graduate education through the doctorate, to give high priority to research, and to receive more than $15.5 million in federal research funds annually" (U.S: Department of Education 1997a: Table 242, p.259).

training of future civil servants, especially in technical occupations (*Verwaltungsfachhochschulen*), and other colleges and universities, e.g., pedagogical and theological colleges (*Statistisches Bundesamt* 1997a: p.393; cf. Appendix, Table B). The German vocational colleges were constituted legally as late as 1968 by a contract between the German states (*Staatsvertrag der Länder*). They offer a more specialized education in certain fields. Early professional experience is provided by internships, and in principle, qualified graduates of vocational universities are eligible to prolong their studies at "regular" universities, i.e., institutions that have the constitutional right to award doctoral degrees at their disposal.

Compared to Germany, higher educational institutions in the United States are organized along a principle of "polycontexturality" (Stichweh 1994: p.263). They vary considerably with regard to the range of degrees they are legally authorized to offer, entrance thresholds, control at the local level, and the *Bildung* they provide within certain institutions. Within this highly diversified system of higher education, institutions are stratified hierarchically along their reputation, and they compete with each other for students and personnel.

Higher educational institutions in Germany are organized along the general principle of stratified stepwise education on the national level. German universities are designed to provide advanced education following the successful attainment of the *Abitur* at the "*Gymnasium*"[7] and the admission of students usually is not controlled at the local level.[8] In principle, German universities are considered of equal standing and providing few status differences and no competition. Compared to the United States, there is only little vertical differentiation among higher educational institutions in Germany. Although both countries share a preference for educational "selecting in" (see Heidenheimer 1997: p.228), the German system of higher education traditionally stresses early and strong pre-selection following primary education (*Grundschule*), a process that is compensated via distinct institutional differentiation and vastly varying entrance thresholds in the United States.[9]

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[7] As opposed to vocational training provided by the so-called "dual system" in Germany.

[8] The so-called "*numerus clausus,*" i.e., a particular good *Abitur* as a prerequisite to the admission to certain fields of study has been introduced, in particular where demand far exceeded supply. In addition, the oversupply of *Abitur* recipients is distributed across German universities regionally via the ZVS (*Zentrale Vergabestelle von Studienplätzen*).

[9] The different design of universities in Germany and the United States has often been explained by their historical functions. German universities of the 19th century fulfilled the task of providing the government bureaucracy (the civil service) with suitable applicants (*Beamte*). The majority of university graduates in the United States traditionally found employment in the private sector since civil service positions were granted via political patronage, e.g., in the aftermath of elections.

Differentiation of Higher Education

Higher education in the United States is marked by the differentiation into undergraduate (associate's and bachelor's degrees) and graduate education (master's, Ph.D. and doctoral degrees). According to Gumport (1992), "although unplanned on a national scale, the crystallization of this linkage between graduate education and research, and an attempt to achieve excellence in both, became the hallmark of the modern United States research university" (p.1118). In Germany, universities provide advanced academic and professional education on the premise that the *Abitur* is at one's disposal. The degree structure is less differentiated i.e., intermediate degrees between the *Abitur* and university degrees are unknown in Germany. There is no clear break between academic and professional degree programs[10] and there is no equivalent to the bachelor's degree in the United States.[11] In this sense, the German system of higher education provides no college curriculum "buffer" (Nugent 1994: p.121) between general and specialized academic education since the *Abitur* is considered to prove an individual's maturity for university entrance (*Allgemeine Hochschulreife*).

In the United States, graduate education at specialized professional schools (Business, Law, Medical, Engineering) differs from graduate education in the natural sciences and the liberal arts and sciences. The latter is clearly designed toward a career in academia and science (cf. Gumbrecht 1997: p.989). In Germany, this distinction is only partly provided by different types of higher educational institutions and there is no clear break between professional and academic education at universities. Although graduate programs are offered by various American universities, doctoral education is "concentrated in the leading public and private American research universities, that grant 95 percent of the doctorate's and over 70 percent of the master's degrees" (Gumport 1992: p.1120).

[10] With respect to labor market supply issues it is often complained that German universities do not offer an intermediate degree such as the bachelor's degree in America. It is argued that keeping students on the university track until the very end of their studies is blocking both, labor market flexibility and individual preferences. Not everybody is planning to enter the academic or scientific labor market, where professional education and experience are considered a necessary prerequisite (see Solga et al. 1998).

[11] In a comparative perspective, it resembles the German *Vordiplom*, a series of tests that conclude the first two or three years of studies.

Planning, Decision-Making, Financing

Planning, decision-making and financing in higher education is more centralized in Germany than in the United States. In Germany, however, centralization refers to the fact that "the operating and financing responsibilities for all three levels of education is predominantly centered in one level of the government, that of the land" (Heidenheimer 1997: p.88). Both countries' federal structure is displayed in the sub-national and regional government of universities on the level of states (*Länder*). Neither country has federal authorities that administer the operation of any universities. Compared to Germany, American universities comprise fairly autonomous Board of Regents. Their control function is seen as both "representing the public interests" and ensuring considerable flexibility with respect to the speed of change (DeRudder 1996: p.70). Public funding and a constitutional guarantee to self-government (see: Heidenheimer 1992) make the scientific and higher educational institutions in Germany, including the federally funded, non-university research units, appear to be more autonomous from public and political interests and control. However, their dependence on public funding and the political control of (higher) education by state authorities make German universities especially vulnerable to cycles of economic stagnation or recession. In addition, German universities are more uniform in terms of faculty salaries and infrastructure; they also lack external control mechanisms and the strong arms of the American campus administration. Ties to former students are sporadic at German universities, alumni organizations are virtually non-existent and have no impact on their financial operation. In Germany, there is no equivalent to the development department at American universities, i.e., an institutionalized mechanism to collect private gifts and endowments.

Finally, the organization of research and science in the United States has contributed to the integration of basic and applied research at its universities, and to ensure a principle of public and political interest in science policy via the Congress of the United States (Braun 1997: p.261). Science policy in Germany has traditionally been characterized by functional patterns of cooperation between government and science. The funding for basic research at universities in Germany has traditionally been from public sources whereas applied research has traditionally been performed and financed outside the universities. The relation between educational and scientific institutions, coupled only loosely in the United States, is tighter in Germany.

Table 1: Basic Differences in the Structure of Higher Education in Germany and the USA

Dimension	United States	Germany
Sector mix	Public / private	Public
System of higher education	Diversified	Stratified
Institutional differentiation	High	Low
Institutional competition	High	Low
Differentiation of professional and academic education	High	Low
Planning, financing and decision-making in higher education	Decentralized	Centralized
Significance of alumni organizations, private gifts and endowments	High	Virtually none

Summary

It could be argued that structural diversity in American higher education, accompanied by a high degree of institutional differentiation and competition represents both cause for and effect of the integration of women and other minorities. It provided a structural openness and the necessary flexibility to incorporate demographic and other social changes such as the growing number of women and other minorities seeking access to higher education. Examples include the founding of women's colleges, the establishment of women's programs and gender studies as well as a more general market orientation. In addition, the system of higher education in the United States is more open to external influences such as public and political interests, e.g., ensuring the "equality of opportunity" in education. In Germany, the educational system is lacking this openness to external forces and interests. Market driven incentives and considerations that might promote the advancement of women and other minorities do play a minor role in German higher education.

It could also be hypothesized that the distinction between undergraduate and graduate education is helpful to the integration of women since academic and other professional career tracks are distinguished clearly and the educational opportunity structure is less opaque. In Germany, the distinction between academic and professional education is blurred. Universities are not committed or forced to lay emphasis on either specialized academic or professional education. In this sense, although university degrees (*Hochschulabschlüsse*) are indispensable to gain entry into professional and high-status labor markets, higher education is coupled only loosely to the requirements of the private sector. Structural inertia and a relative closeness appear to go hand in

hand with the slow advancement and lower representation of women in German academia and science.

In the following section, the structuring of academic careers in both countries is taken into account and discussed in more detail. What are the components of successful academic careers in Germany and in the United States? How can differences in the structure of academic careers in both countries be described? What are the expected effects of differences in how academic careers are organized on the integration of women?

2.2 Differences in the Structure of Academic Careers

In the previous section, it has been argued that the larger structure of the higher educational system in the United States is favorable to the inclusion of women and other minorities. In this part of the paper, differences in the structuring of academic careers in Germany and the United States are addressed. It is assumed that the obstacles and barriers women are faced with in terms of access to the most prestigious academic positions are comparable in both countries. Cross-national differences in women's representation across academic ranks however suggest the effects of differences in the organization and structuring of academic careers. These differences are described in the following. Finally, their expected consequences on women's careers in academia and science are discussed.

The Academic Career Track: Academic Education vs. Academic Employment

Academic careers in general are not easy to plan and uncertainty about career outcomes is high in Germany and the United States. In both countries the academic career track provides a succession of qualification and employment stages expected to finally run into the tenured professorate (see Figure 1 and 2 in the appendix). However, being included on one stage of the career track does not necessarily comprise inclusion on the next in both countries.

In Germany, the academic career track is largely determined by a succession of formal qualifications provided by the German universities.[12] This succession comprises doctor's degree studies (*Promotion*), followed by a phase of further postdoctoral qualification that is concluded by the *Habilitation* in most fields of study. The *Habilitation* represents the final academic

[12] Doctoral students may also be employed at one of the fairly independent non-university research units in Germany, where directors often occupy overlapping positions, e.g., at the Max-Planck-Gesellschaft, where directors of Max-Planck-Institutes at the same time hold the rank of a professor at universities.

qualification stage in Germany and provides a necessary prerequisite for being eligible for the professorate. However, academics completing this time-consuming task (*Privatdozenten/-innen*) are not immediately promoted to the rank of a tenured professor.[13] They first have to apply for open positions at universities and submit themselves to an application process (*Berufungsverfahren*). Unless a successful appointment with a university has been reached, "habilitated" persons may be employed as "master" research assistants (*Oberassistent/-innen*) at universities.[14]

In contrast to Germany, the academic career track in the United States is characterized by three distinctive building blocks. Graduate education is followed by employment as an assistant professor, which is in turn followed by promotion to the position of an associate professor, given that tenure is granted. In the United States, first, graduate education is considered an essential part of academic education and a necessary condition to gain academic employment. In Germany, there is no clear break between academic qualification and employment, e.g., teaching obligations. They go hand in hand as early as in the course of doctor's degree studies. This distinction is mirrored by the fact that doctoral students in Germany are usually not submitted to structured graduate programs and curricula as their American counterparts. In the United States, the emphasis is on studying rather than on collaboration. Graduate education in the United States is seen to combine supply function (advanced vocational training) and professional socialization. This process is differently organized in Germany, where there is "no clear break to distinguish basic and advanced study, with no organized graduate level" and no distinction "between academic and professional degree programs" (Gumport 1992: p.1118).

Second, in the United States academic employment as an assistant professor follows graduate education. In Germany, an academic position similar to that of the American assistant professor does not exist. As is the case with the higher differentiation of academic degrees, the

[13] The rank of a professor in Germany is divided into two categories, the so-called C3 and C4 positions. C4 professors make up roughly one-third (12,700) of all C3 and C4 positions. The profile of their position is better than that of C3 professors in terms of material and personal resources. Although both groups of professors are tenured, C4 professors have a higher salary at their disposal and more assistant positions assigned to them. C3 professors can improve their position by applying for C4 positions at other universities, or via dismissing calls from other universities, thereby "upgrading" their own position in negotiations with the university administration. To become a professor at vocational colleges (*Fachhochschulen*), the *Habilitation* is not obligatory, although a doctoral degree is required. Usually, professors at vocational colleges have no teaching or research assistants assigned to them, and in their work the emphasis is on teaching rather than on research.

[14] They are also entitled to seek temporary employment as a professor, i.e., replacing other professors in the time of their absence or if the position of a professor is vacant temporarily, e.g., over the course of application processes at other universities.

academic career track in the United States provides an intermediate position for academic employment. Being employed as an assistant professor can be seen as the equivalent for the eligibility of academics for the future professorate. Therefore, assistant professors in the United States are submitted to the tenure process. Other than the succession of academic qualifications that characterizes the academic career track in Germany, the tenure system in the United States is a fairly institutionalized procedure to evaluate academic employees. Institutions of higher education evaluate an assistant professor's eligibility for tenure in the sixth year of her or his seven-year employment. Some institutions review tenure-track candidates as often as once a year. The evaluation process basically consists of the peer and student review of an assistant professor's research, teaching, and service performance. The scholarly contributions of tenure-track candidates are "measured by both the quantity and quality of peer-reviewed publications and presentations, by success in obtaining research grants, and by other evidence that the professor is an active scholar. The more prestigious the institution, the more significant the research must be. Competence in teaching is demanded too, but is less important than research at the most prestigious universities. At colleges, which primarily award bachelor's degrees, although research contributions are increasingly demanded, teaching skills are more highly valued than they are at universities" (Valian 1998: p.219).[15] Given assistant professors are granted tenure, promotion to the position of an associate professor often follows immediately before finally being awarded the rank of a full professor several years later. In contrast to Germany, tenure in the United States defines the lawful work bond between universities and professors, i.e., professors are provided with tenured employment. In Germany, tenure is granted to university professors only. In addition, tenured university professors in Germany are granted the position and privileges of German civil servants (*Beamte*).

In contrast to Germany, formal and standardized qualification requirements after Ph.D. or doctor's degree studies, such as the Habilitation, are not customary in the United States. In the United States, academic recognition and acknowledgement of candidates for the professorate is provided by the scientific community and not by local faculties (*Fakultäten*) and federal ministries as is the case in Germany (*Berufungsverfahren*). The evaluation of professional work and

[15] As part of an institutional "trickle-down" process, prestigious universities in the United States often grant tenure to only one third, sometimes a maximum of one half of those academics who are employed on tenure-track. The other half or two third are then expected to find employment at other, often less prestigious institutions of higher education (Valian 1998: p.219).

academic merit is an ongoing, fairly systematic and institutionalized process for all academic position-holders in the United States. Compared to Germany, the academic career process as a whole has been found to be cumulative, continuous, and rather predictable in the United States (Wissenschaftsrat 1998: p.59).

Age Differences

In the United States, students and academics alike are considerably younger than in Germany when they earn their degrees. Recipients of associate degrees are usually about 19 years old, those of bachelor's degrees about 21 years, master's degree recipients are about 23 years old and Ph.D. and doctoral degree recipients are usually around 24 or 25 years old. In Germany, the average age of Abitur degree recipients is about 18 or 19 years old. First-year university students in Germany are about 22 years old, depending on the length of the obligatory German military or civil service, and whether apprenticeship and vocational training is prior to university entrance. The average age of university graduates is 28 years (Statistisches Bundesamt 1997b: p.15).[16] Consequently, the age of doctoral degree recipients in Germany in the average is in their early thirties, depending on field of study and academic responsibilities. At this age, American assistant professors are already approaching the end of their first seven-year academic employment. Given the requirements of the *Habilitation*, the age at which German academics become eligible for the professorate is varying widely, as is the age of doctoral degree recipients. Generally, as in the United States, the temporal sequencing from one stage of the career track to another is not regulated formally. However, an upper age limit to the employment of professors does exist in Germany in terms of the "*Höchstaltersgrenze,"* i.e., the application of professors has to take place before they are 53 years old.

Academic Unit of Operation

A further notable difference concerns the establishment of the department as a unit of operation in the United States, as opposed to the German system of chairs and institutes (*Ordinarieninstitute*). With respect to academic careers, the American model has traditionally been "based upon a professorial status, with the ability to initiate research, granted early in the

[16] It should be noted that conclusions drawn from the average length of studies in Germany are problematic since it is varying considerably depending on field of study, type of degree, e.g., diploma at vocational colleges or universities, and between universities.

academic career. Research was build up relatively inexpensively by hiring students as research assistants instead of using senior personnel, as in the traditional German model" (Etzkowitz et al. 1994: p.58). At American universities, departments are often made up of research groups headed by sometimes very young scientists, and fundraising is obligatory. In combination with the departmental organization, the hierarchical structure of academic careers is considerably weaker in the United States than it is in Germany, where the chairperson (*Lehrstuhlinhaber*) is the structuring principle and university professors are in charge of all research and teaching. Assistant professors in the United States, for instance, are as much part of academic committees, as are associate and full professors. There is basically no academic role they are not allowed to perform and they have to submit themselves and their work to an evaluation by their colleagues as have associate and full professors. In Germany, academic careers have been characterized by "symbolic distance," (Enders 1998: p.69) i.e., the gap between the professorate and all other academic positions is very wide in terms of prestige, recognition, influence, and autonomy. Compared to the rank of a professor, all other career stagesXoften stretching over a period of ten to fifteen years after university graduationXhave to be considered as subordinated.

The employment of several professors of equal rank within one department also helps to provide the system with considerable flexibility due to the emergence of smaller units working on certain aspects of a field. The establishment of the more egalitarian departmental system in American higher education is often seen as a reaction toward the pronounced hierarchical structure of German higher education, incomprehensible with the American democratic understanding (Felt et al. 1997: p.43).

National vs. Local Competition for Doctoral Students

Competition of and for graduate students is intense in the United States and takes place on the national level. Graduate students compete for access to public and private universities and colleges that offer graduate education while departments and faculty are in turn competing for the best students. Graduate programs resting atop undergraduate colleges combines "advanced study and research training of graduate students that could be structurally integrated with the work of faculty actively pursuing their research interests" (Gumport 1992: p.1117). Teaching funds established by state governments provide assistantship money for the tuition of undergraduate students. Research grants that are "competitively awarded to faculty," e.g., by the NSF, enable

them to "identify the students they wanted to support in their laboratories" (p.1123).[17] In Germany, institutional competition for doctoral students is virtually nonexistent and the labor market for doctoral students is decidedly local.[18] That is, university graduates usually become doctoral students at the universities they took their studies, often at the chair of their respective professor. They are employed in part-time and provided with fixed-term contracts. Funding may also come from grants and fellowships (*Stipendien*). If doctoral students do not occupy one of the scarce staff positions they are often engaged in and funded via research projects proposed and supervised by their respective professors.[19] In sum, in Germany, "professors, all of whom are civil servants, are in charge of all research and teaching in their institutes. . . . Their engagement in advanced levels of education is decidedly homogenous, without competition to attract or produce talented students as a drive toward differentiation or entrepreneurial incentives to create salary differentials for themselves" (p.1122).

Geographical Mobility, Internal Careers

In contrast to the United States, academic careers in Germany are patterned by geographical immobility, often following the structuring principle of the professorate. Therefore, it is not unusual that German academics change their respective workplace as late as after having finished the *Habilitation* and being appointed to the rank of a professor at other universities. In the United States, academic careers are characterized by early and continuous geographical mobility, e.g., between high school, undergraduate and graduate education. After having finished graduate education, American academics enter the national academic and scientific labor market by applying for the position of an assistant professor. Given that tenure is granted, the mobility principle in the United States is reversed since internal careers are possible via a seven-year and plus employment at a particular institution. In Germany, the later stage of the academic career

[17] These funding mechanisms have been criticized for the concentration of funding at the more prestigious research and doctoral institutions and across certain fields of study, leaving on their own other institutions (and their students) as well as certain disciplines.

[18] Sometimes, other research organizations compete with universities for doctoral students. This competition is local because campus and other research sites are usually very close geographically.

[19] Funding for projects and positions via so-called *Drittmittel* i.e., from federal, European, and other sources (*Deutsche Forschungsgemeinschaft*, European Community, Hans-Boeckler or Volkswagen-Stiftung) is increasing and has lead too a broadening of an initial basis for fledgling scientists. If funding is terminated, however, academics and scientists may literally find themselves 'on the road' given the scarcity of equivalent positions outside the academic labor market and contracting public budgets. To doctoral students and professors alike this situation is unsatisfying because it means the inevitable loss of qualified and trained personnel, and considerable uncertainty (Thieme 1990: p.107-115).

track, i.e., appointment to the position of a full professor, necessarily involves mobility since in-house appointments are a rare exception of the rule although they are not unlawful. All earlier career stages, however, do not require geographical mobilityXinternal academic careers are possible.

Geographical mobility is closely associated with another building principle of the American academic career track. Via the establishment of advisory systems and mentoring commissions, in combination with the structuring of graduate programs on the departmental level, the emphasis in the United States has traditionally been on academic support by many and on mobility until a tenured position has been acquired. In Germany, academic support and mentoring is not institutionalized and the recruitment of doctoral students, their supervision and support rests in the hands of their respective professors. Therefore, single persons provide academic support, if any. As is the case in the United States, German professors have the right (and plight) to select and accept candidates for doctor's degree studies and to supervise their work. From a long-term perspective on academic careers, however, the formally indispensable affiliation with university professors as early as in the course of doctor's degree studies carries on until the hurdles of the *Habilitation* have been successfully managed and overcome. In contrast to the United States, academic careers in academia and science in Germany are accompanied by a long time of academic and geographic dependency on one particular senior academic person. The narrowness and continuance of this relationship has often been portrayed as that of "master and servant". It especially underlines the personalization of the transfer of career relevant resources and knowledge from early on.

Table 2: Basic Differences in the Structure of Academic Careers in Germany and the USA

Dimension	United States	Germany
Standardization	High	Low
Age Grading	Middle	Low
Academic education/qualification and employment	Separated, after Ph.D.	Blurred, after university graduation
Academic unit of operation	Professor	Department
Hierarchization	Middle	High
Personalization	Middle	High
Academic responsibilities	Early	Late
Evaluation	Yes	No
Tenure system	Yes	Yes
Habilitation	No	Yes
Research and teaching	Split	Merged
Mobility	Early, High	Late, Low
Internal Career Opportunities	Late	Early
Competition	High	Low

In sum, the academic career track in the United States could be described as a continuous and formalized stepwise "channeling," fueled by a flexible degree structure and institutional competition. In the United States, "selectivity and competition are prominent features of advancement from one level of education to the next," with a series of "degrees and examinations . . . that underpin some sorting" and the "reputational hierarchy among institutions of higher education" serving to solidify it (Gumport 1992: p.1119). The transition process from undergraduate to graduate education as well as first academic employment as an assistant professor occurs much earlier. In Germany, the career succession is vague since overlookable career models have not been established (Teichler 1990: p.38). The lower predictability of academic careers in Germany[20] is determined by a lack of clarity about how academic positionsXexcept for the professorateXshould be related to the academic career track at universities and by the granting of fixed-term contracts until late in the course of careers (Enders 1998: p.70).

Summary

What conclusions could be drawn with regard to the integration of women from the differences in the structuring and organization of academic careers described above?

In terms of women's advancement, one could argue that the standardization of graduate education as well as the tenure system provides overlookable and cumulative career componentsXa condition that might be favorable to the integration of women into the academic and other professional work place. In Germany, the succession of qualification and employment stages in the course of an academic career is vastly underdetermined when compared to the United States. Preparation for academic careers does not follow a model of stepwise channeling into advanced studies that are then concluded with doctor's degree studies. The channeling into academic careers in German is a rather arbitrary, largely non-institutionalized procedure, often following nontransparent, idiosyncratic selection and recruitment criteria in the aftermath of university graduation. This intransparancy might work to the disadvantage of female academics since standardized criteria for the recruitment of fledgling scientists do not exist in Germany where the academic community is predominantly male.

[20] As early as in 1919, Max Weber (1968), in his famous talk on science as a vocation (*Wissenschaft als Beruf*) noted that academic life in Germany is a wild hazard ("*Das akademische Leben ist also ein wilder Hazard"*) (p. 588).

The professorate as the academic unit of operation in Germany is located at the interface of all career-relevant decisions. Given the pronounced hierarchical structure of academic careers in Germany, and the high degree of and long-term dependency on the support and oversight of a single senior academic advisor, female academics might be less integrated in their respective academic and scientific environment than their male counterparts. Compared to the United States, compensating and balancing institutionalized measures, e.g., advisory systems, equality and independence in terms of academic roles and responsibilities, and the evaluation of academic position holders are unknown in Germany.

Given the availability of intermediate academic positions and ranks in the United States, female academics might find it much easier to oversee and plan their career following graduate education. In addition, academics in the United States are considerably younger than their German counterparts at the time of their first academic employment. Since qualification and employment are not distinguished clear-cut along the German academic career track, the planning of careers and synchronization with other aspirations might prove especially difficult for women.

The following part of this paper addresses these assumptions by providing empirical evidence on women's representation in higher education and the academic labor market. It is shown that the association between academic education (enrollment, degrees) and employment (academic ranks) is asymmetric in both countries, albeit on a more balanced level in the United States. The same pattern is found with regard to the uneven distribution of female students and faculty across fields of study and disciplines in both countries. With regard to the temporal dimension of women's advancement in academic occupations, the situation in Germany is described as decidedly desynchronized when compared to the United States.

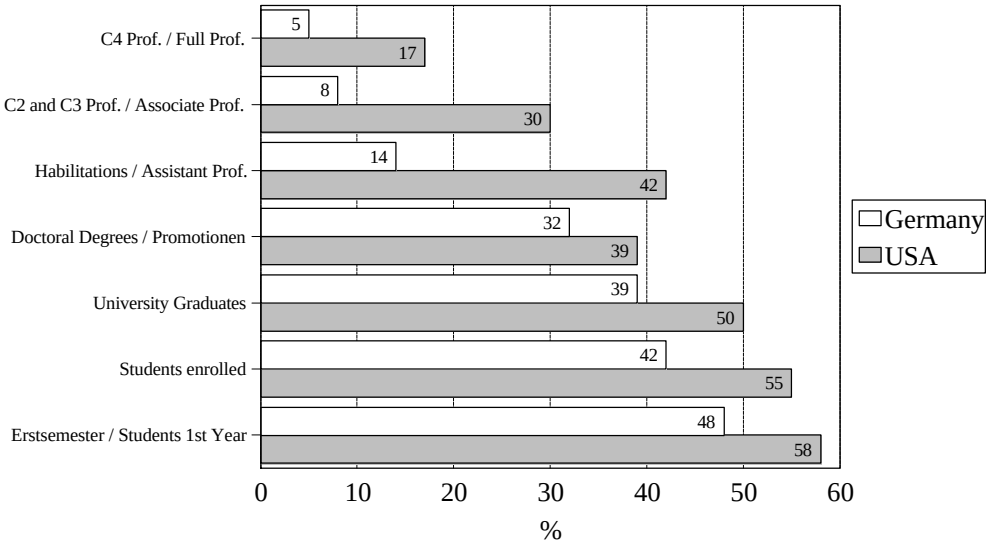
3 A COMPARATIVE PERSPECTIVE ON THE ACADEMIC CAREER LADDER: PERSISTENT INEQUALITIES

In this part of the paper, empirical evidence on women's representation in higher education and the academic labor market in Germany and the United States is introduced. Given the lack of individual-level data on careers in academia and science, aggregate data are presented. Figure 1 provides a cross-sectional comparison of women's participation across different academic qualification stages and positions in 1995. From the bottom to the top women's

participation is decreasing with every stage of the academic qualification and employment ladder in both countries.

Figure 1: Women in Germany and the United States

Academic Qualifications and Ranks 1995 (in %)



Source: Statistisches Bundesamt 1997a; U.S. Department of Education 1997a; National Science Foundation 1997

Enrollment

In 1995, women have surpassed men in enrollment in higher education in the United States on the level of "1st year students" (58 percent) and among students enrolled in institutions of higher education (55 percent). In both countries, the overall number of female students enrolled is slightly lower than the number of first year university students. Figure 1 compares university and equivalent degrees received by female students in Germany (*Diplom, Magister Artium, Staatsprüfungen*) with the proportion of female master's degrees recipients in the United States.[21] In 1995, 50 percent of all master's degrees in the United States were awarded to women. The corresponding percentage of female university graduates in Germany (*Diplom-, Staats- und Magisterprüfungen*) is considerably lower with 39 percent.

[21] In the following, the German *Lehramtsprüfungen*, i.e., the diploma indispensable to become a schoolteacher, are excluded from the analysis. The teaching profession in Germany, however, is as heavily feminized as in the United States. In 1995, women accounted for 73 percent of all graduates in teacher's education in Germany. In 1994, American women received 77 percent of all bachelor degrees and 77 percent of all Master degrees in education (U.S. Department of Education 1997a: table 253).

The distribution of degrees varies with gender across discipline in both countries, and large gender differences exist with regard to degrees conferred when controlled by field of study (*Statistisches Bundesamt* 1997a: p.402). In 1995, German women accounted for 65 percent of all university degree recipients in the so-called language and cultural sciences (*Sprach- und Kulturwissenschaften*, e.g., theology, history, philosophy, psychology, language sciences), 59 percent in the arts and art sciences (*Kunst, Kunstwissenschaften*), 47 percent in the agricultural sciences (*Agrar-, Forst- und Ernährungswissenschaften*), 44 percent in medicine (*Humanmedizin*), 38 percent in the social sciences, law, and economics (*Rechts-, Wirtschafts- und Sozialwissenschaften*), 33 percent in mathematics and the natural sciences (*Mathematik, Naturwissenschaften*, including computer sciences), and for only 14 percent in engineering (*Ingenieurwissenschaften*). In the United States (U.S. Department of Education 1997a: p.267f., table 250), women received 72 percent of master's degrees awarded in psychology in 1995, 49 percent in the social sciences (economics, political science, sociology and other social sciences), 48 percent in the biological and agricultural sciences, 30 percent in the physical sciences (astronomy, chemistry, physics), 30 percent in the earth, atmospheric, and ocean sciences (including the geo-sciences), 30 percent in the mathematical and computer sciences and 16 percent in engineering (chemical, civil, electrical, industrial, mechanical, and other engineering).

A more detailed look on the distribution of men and women across selected fields of study shows that the female field concentration ratio is varying considerably in both countries.[22] Table 3 indicates these ratios for those fields of study where women have been traditionally underrepresented. For Germany, the female field ratio at vocational colleges is listed separately in parentheses.

[22] The female field ratio is calculated by dividing the number of degrees conferred to females, through the number of degrees conferred to males in the same field. A ratio of 0.56 in a given field such as business management, for example, puts slightly more than one female degree recipient against two male degree recipients. The higher the female field ratio, the more women earned degrees when compared to their male counterparts in the respective fields (see U.S. Department of Education 1997b: p.278, table 28-1).

Table 3: Female Field Concentration Ratio of Degrees Conferred, by Field of Study

Fields of Study	Master's and equivalent degrees		Doctoral degrees	
	United States	Germany**	United States	Germany
Natural sciences	0.55	0.57 (0.88)	0.69	0.35
Life sciences	0.92	1.17 (---)	1.09	0.75
Physical sciences	0.35	0.10 (0.15)	0.44	0.08
Mathematics	0.51	0.40 (0.69)	0.45	0.21
Computer sciences and engineering	0.19	0.17 (0.17)	0.21	0.08
Computer and Information sciences	0.29	0.20 (0.18)	0.29	0.14
Engineering	0.15	0.16 (0.17)	0.20	0.07
Business management	0.48	0.56 (0.76)	0.63	0.23

** Germany: academic year 1995 excluding professional teaching (*Lehramtsprüfungen*); U.S.: academic year 1994.
Sources: USA: U.S. Department of Education 1997b: p.278, table 28-2; Germany: own calculations; Statistisches Jahrbuch 1997, Table 16.12, p.402.

With the exception of the life sciences and biology, where the female/male ratio is approximately 1:1 in the United States (0.92), and 1,2:1 in Germany (1.17), the female field ratio is as low as could be expected across the fields indicated. Overall, the female/male ratio is approximately 1:2 in the natural sciences at large (0.55 vs. 0.57). In mathematics, the female/male ratio is 1:2 in the United States, and slightly lower in Germany with a ratio of 1:2,5 (0.51 vs. 0.40). However, the largest difference between Germany and the United States concerns the physical sciences. In the United States, the female/male ratio is slightly higher than 1:3, whereas the corresponding ratio is 1:10 in Germany.

The gender gap in degree recipients also widens considerably in the computer sciences and engineering, where the female/male ratio is 1:5 in the United States and Germany. A closer look at engineering reveals a female/male ratio of 1:6,5, whereas the ratio in computer and information sciences is 1:3,5 in the United States, and 1:5 in Germany. In business management in the United States, when compared to the German *Wirtschaftswissenschaften*, i.e., the so-called *Betriebs- und Volkwirtschaftslehre*, the female/male ratio is slightly lower than in Germany (0.48 vs. 0.56).

In the fields selected, the female/male ratio is higher at vocational colleges throughout. In contrast to German universities, vocational colleges do not offer degrees in all fields of study. Most notably, vocational colleges cover twice the number of degrees conferred by universities in engineering (30.104 vs. 17.854), but only 16 percent of degrees awarded in mathematics and the natural sciences (3.821 vs. 19.591). Interestingly, the computer sciences account for the lion's share in the natural sciences at vocational colleges (76 percent), whereas the corresponding percentage in mathematics and the natural sciences at universities is only 16 percent. The total

number of degrees conferred in computer science, however, is very similar at vocational colleges (2.913) and universities (3.257).

Advanced / Graduate Education

Figure 1 also shows the overall distribution of women receiving a doctoral degree in Germany and the United States. In 1995, women received 39 percent of the doctoral degrees conferred in the United States, compared to 32 percent in Germany. Women's participation in both countries is dropping off between graduation and earning a doctoral degree. However, table 3 (above) shows that this drop-off is much more severe in Germany than it is in the United States. In both countries the distribution of doctoral degrees can be seen as a prolongation of the trend in the distribution of master's and comparable degrees, albeit on a comparatively higher level in the United States, where women can improve the female/male ratio to their advantage throughout. The reverse picture is true with regard to the female field ratio in Germany: It is dropping off heavily across all fields of study under examination. This process suggests that the female potential in academia and science is made better use of in the United States than in Germany, especially since the fields selected are those in which women have traditionally been marginalized the most.

Academic Ranks

Finally, figure 1 compares the distribution of female faculty by academic rank in Germany and the United States.[23] Since "habilitated" academics in Germany and assistant professors in the United States have to be considered the future pool for the professorate, assistant professors in the United States are compared to the percentage of female academics who earned their *Habilitation* in Germany. Associate professors are compared to the rank of C2 and C3 professors in Germany to indicate the hierarchically lower segment among the tenured professorate. Finally, the most prestigious academic positions in Germany and the United States, the rank of a C4 and a full professor respectively, are compared.

[23] One might note that a cross-sectional comparative approach to male and female percentages within ranks is difficult because we usually compare "people of disparate ages and experiences" (Valian 1998: p.217). Thus, the effect of the time consuming path successful academic careers have to overcome might also be cloaked. As comparative empirical studies of these topics are virtually non-existent, the comparison presented here serves well as a means to the ends.

Among the 1532 *Habilitations* conferred in Germany in 1995, only 211 were awarded to females (14 percent). Since the *Habilitation* is the formal prerequisite to become a professor, the proportion of qualified females in Germany is and remains at a critical level, especially when compared to the high proportion of female assistant professors (42 percent) in the United States and to the number of doctoral degrees conferred in Germany.

Tables 4 and 5 provide further information on the percentage of women faculty at German universities and at higher educational institutions in the United States. Overall, female faculty accounts for 25 percent in Germany as opposed to 33 percent in the United States. In both countries considerable differences across fields of study and academic rank exist. However, in the United States, women seem to be better represented across all stages under examination, although females are strongly represented at the bottom of the academic hierarchy, i.e., in the ranks of instructors and lecturers where they account for 49 and 51 percent respectively.

Table 4: United States: Full-time Instructional Faculty in Institutions of Higher Education, by Academic Rank, and Sex (percentages in parentheses).

Academic Rank	Total Number (100%)	Number of Females
Total Faculty	545.706	182.276 (33 %)
Professors	157.253	26.679 (17 %)
Associate professors	120.696	36.190 (30 %)
Assistant professors	129.159	54.337 (42 %)
Instructors	67.700	33.357 (49 %)
Lecturers	13.714	7.025 (51 %)
Other faculty	57.184	24.688 (43 %)

Source: U.S. Department of Education 1997a: p.239, table 226; academic year 1993.

In Germany, women are underrepresented in the highest academic positions despite their increased and increasing educational attainment and credentials. In 1995, women accounted for a total of only 8 percent of the professorate. Among the most prestigious rank of a C4 professor women account for less than 5 percent.[24] Tables 4 and 5 also shows that the professorate is segmented almost equally in numbers in the United States, i.e., there are considerably more academic positions to fill than in Germany.

[24] The German Department of Statistics (*Statistisches Bundesamt*) calculated thatXgiven an average retirement age of 65 yearsXnearly fifty percent of the German professors employed today are going to retire (*emeritieren*) in the course of the next seven years (*Statistisches Bundesamt* 1997b). This is not only an unprecedented event in the history of German higher education but does also leave ample room for structural change. Over the last decades, professorial positions had been occupied mainly by the tenured post-war professorate and new positions were not created. This situation has been blamed to contribute considerably to the inertia and inflexibility of the German system of higher education.

Table 5: Germany: Faculty in Institutions of Higher Education, by Academic Rank, and Sex (academic year: 1995, percentages in parentheses).

Academic Rank	Total Number (100%)	Number of Females
Total faculty (hauptberufliches wissenschaft-liches und künstlerisches Personal)	152.401	34.490 (23 %)
Professors (C2-, C3-, C4-Professoren / -innen)	37.672	3.073 (8 %)
Research and teaching assistants (Dozenten / -innen und Assistenten/ -innen)	16.193	4.001 (25 %)
Scientific employees (wissenschaftliche und künstlerische Mitarbeiter-/innen)	92.506	25.148 (27 %)
Special instructors and lecturers (Lehrkräfte für besondere Aufgaben)	6.030	2.268 (38 %)

Source: Statistisches Bundesamt 1997a: p.410.

Faculty and Disciplines

Woman faculty in Germany and the United States is distributed unevenly across disciplines. In 1992, the proportion of female full-time instructional faculty in the United States varied considerably with program area. The lowest proportion of female faculty is employed in engineering (4 percent), the highest proportion in education (42 percent) and in the health sciences (44 percent). Overall, the proportion of female faculty in 1992 was 18 percent in the natural sciences, 23 percent in the social sciences, 27 percent in business, 29 percent in the fine arts, 30 percent in law, and 35 percent in the humanities. Female faculty in Germany is also distributed unevenly across academic fields (see Appendix figure 4). As could be expected the proportion of female faculty (11 percent) and professors (2 percent) is lowest in engineering and highest (43 percent and 14 percent) in the language and cultural sciences. In between, the proportion of female faculty and professors is 20 percent and 4 percent respectively in mathematics and the natural sciences. In the social sciences, law, and economics females account for 30 percent of faculty and 10 percent of professors. The corresponding proportions in the agricultural sciences are 31 percent and 8.5 percent, and 35 percent and 6 percent in medicine.[25]

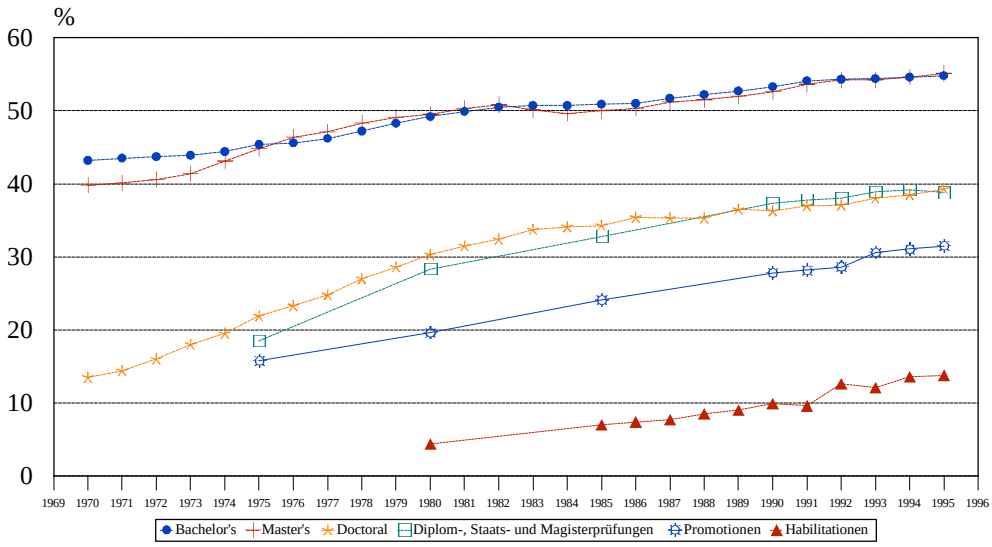
In both countries, albeit on a higher level in the United States, the proportion of female faculty employed is considerably lower than the proportion of academic degrees awarded to females; differences in the proportion of female students across fields of studies and disciplines are prolonged at the faculty level.

[25] This by no means exhaustive list should be further differentiated since it could be assumed that women often tend to be "ghettoized" within certain academic disciplines i.e., they may be shunted to specific areas and topics, e.g., women in sociology are expected to specialize in gender issues.

Women's Participation: Development over Time

How has the participation of women in higher education in Germany and the United States developed over time? First, the percentage of degrees awarded to women in Germany and the United States is compared in figure 2. In the upper half of figure 2, bachelor's and master's degrees awarded to women in the United States are shown. In the middle of figure 2, the percentage of female doctoral and Ph.D. degree recipients in the United States is depicted together with the percentage of female university graduates in Germany (squares). Below these lines the percentage of doctoral degrees (*Promotionen*) and Habilitations conferred to women in Germany is shown.

Figure 2: Percentage of Degrees Awarded to Women
in Germany and the United States 1970 - 1995 (All Fields)



Overall, a similar trend in both countries is obvious between the 1970s and 1995: Women in the United States and Germany have continuously increased their share of awarded degrees. In the United States, women received 43 percent of all bachelor's degrees and 40 percent of all master's degrees awarded in 1970. In 1995, the respective percentage was 55 percent among both bachelor's and master's degrees, thereby surpassing their male counterparts at the beginning of the 1980s. In Germany, women received only 18.5 percent of all university degrees awarded in

1975, but 39 percent in 1995, i.e., they caught up with their male counterparts but have not surpassed them yet.

With regard to doctoral degrees awarded to women in the United States, figure 2 indicates a similar development. In 1970 women earned only 13.5 percent of all doctoral degrees, but 39 percent in 1995. In Germany, women were awarded 18.5 percent of all doctoral degrees conferred in 1975 and 31.5 percent in 1995. It is particularly interesting that the gap between university and doctoral degrees is considerably smaller in Germany (about 7 percent), than it is in the United States (16 percent), probably reflecting the stronger labor market orientation in higher education in the United States.

With respect to the starting point in figure 2, it is also obvious that women in higher education in the United States profited from an already high level of educational participation at the beginning of the 1970s. The percentage of females earning a doctoral degree in the United States is almost equal to the percentage of females earning a university degree in Germany. The participation of women in higher education in Germany today corresponds to where American women have been in the 1970s.

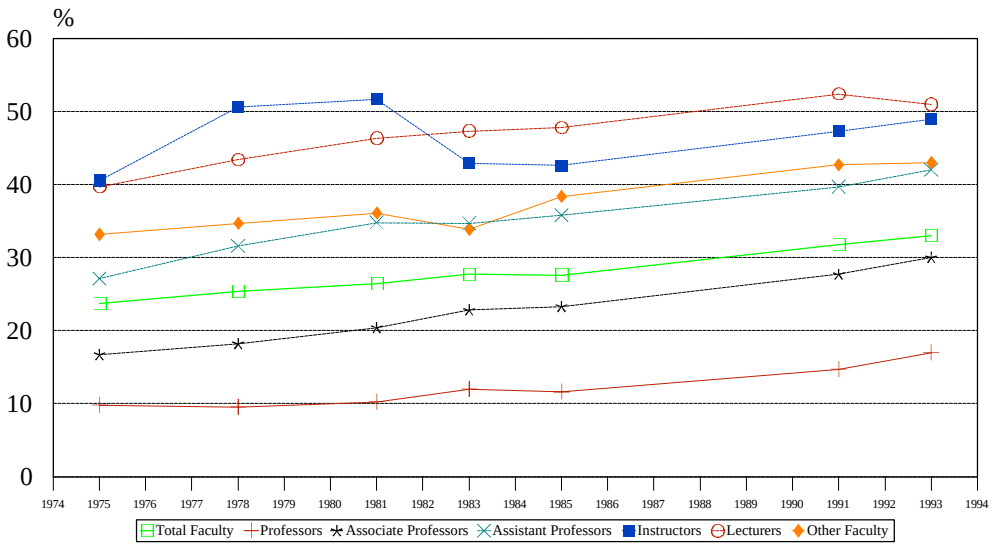
Finally, figure 2 provides information on the percentage of *Habilitations* earned by women since the 1980s (lowest line; triangles). Despite the increase in the proportion of women receiving university and doctoral degrees, the number of *Habilitations* completed by female academics remained low in Germany, although their absolute number nearly doubled between 1980 and 1995.

Faculty

Figure 3 indicates that women in the United States have made considerable progress across all academic ranks over the last two decades. Between 1975 and 1993 women increased their participation among all full-time faculty members steadily from 24 percent to 33 percent. Figure 3 shows that women have been traditionally represented especially strong at the bottom of the academic hierarchy, i.e., in the rank of instructors and lecturers. Among the professorate, the proportion of females has been increasing steadily since the 1970s while at the same time leaving the relative distance between ranks intact. The recent “Annual Report on the Economic Status of the Profession 1997-98” of the American Association of University Professors acknowledged that the distribution of men and women within rank continues to vary greatly: “Male full professors

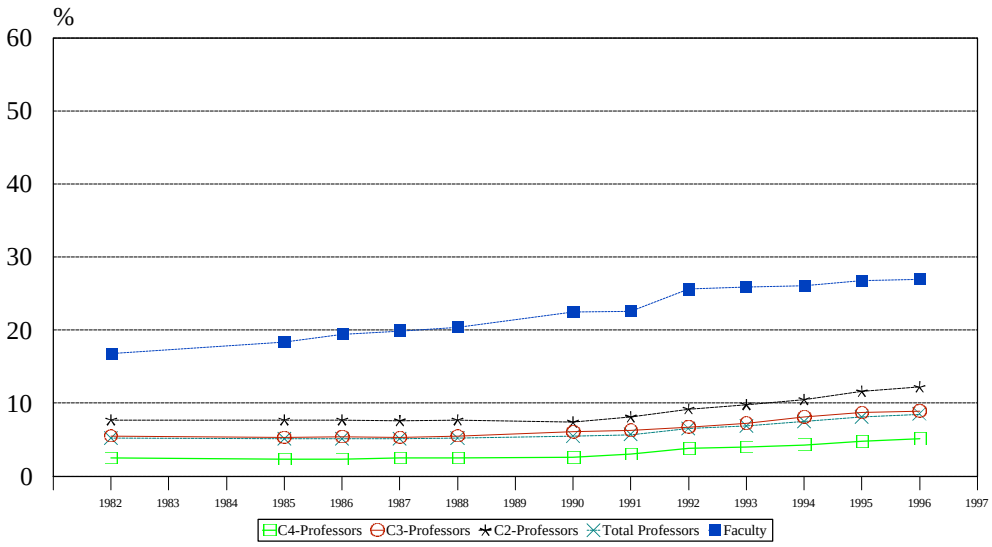
outnumber female full professors by almost 5 to 1; at the assistant professor rank, the percentage of male and female professors is almost equal" (AAUP 1998).

Figure 3: Proportion of Women Among U.S. Full-Time Faculty in Higher Education 1975 - 1993 (in %)



Sources: Stephan & Kassis 1997: p.50-51; U.S. Department of Education 1997a: p.239

Figure 4: Proportion of Women Among German Full-Time Faculty 1982 - 1996 (in %)



Sources: Bundesministerium für Bildung und Wissenschaft 1994; Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie 1998.

When compared to the percentage of female university professors in Germany since the 1980s (see figure 4), three notable trends are obvious. First, the proportion of female professors in Germany has been and is dramatically low overall and across all disciplines over time (see also figure 3 in the appendix). Compared to the United States, the starting point in figure 4 is below the 10 percent mark, and has not improved very much since. This trend suggests stability rather than change at the highest academic level in Germany, thus underlining the incomplete process of women's integration. Second, overall, the proportion of female full-time faculty in Germany is considerably lower in Germany than it is in the United States. Although women's participation has been increasing continuously since the 1980s it remained below the 30 percent mark in 1996. Third, figure 4 shows a rise in women's participation in 1992 due to the inclusion of the former GDR where women's representation was especially strong in the *Mittelbau* of the universities. Since then, however, the "old" trend has been continued, albeit on a higher level than before the German reunification with regard to woman faculty. Among the German professorate, the reunification improved women's participation only slightly without changing the uneven gender-based distribution significantly.[26]

From the empirical evidence presented in this chapter it could be argued that women's educational participation and their representation in the academic labor market comprise two different albeit interrelated analytic dimensions. Gender equality in educational participation and achievements do not necessarily lead to similar gains in academic and scientific employment. In the following chapter, the cross-national differences in the extent of women's integration are discussed and related to differences in the structure of higher education and academic careers. It is argued that structural differences and context do matter in terms of women's advancement in academia and science but with conflicting results.

4 TURNING WOMEN'S EDUCATIONAL ACHIEVEMENT INTO CAREER SUCCESS

Openness of Higher Education

The relative openness of higher education in Germany and the United States may be addressed by ways of summarizing the aforementioned differences in the structure of higher

[26] Adler (1997) argued that a cartel of predominantly male professors ("*Gestaltungseliten"*) made successfully use of their ties and networks to establish the West-German academic and scientific structures in the aftermath of the

education with respect to the integration of women and other minorities.[27] In Germany, women in academia and science have to be considered as "latecomers" when compared to their American counterparts. Historically, women in Germany have been granted access to universities and were entitled to take their studies as late as 1908, a process that started seventy years earlier in the United States (in 1833), and up to forty years earlier in several other European countries (Costas 1995). In addition, German women lost the gains they made in the 1920s and early 1930s during the Third Reich since their access to universities had been prohibited almost completely. The "absolute number of students and the proportion of women had been returned almost to their levels before the First World War" (Windolf 1997: p.51). Women's educational participation in Germany recovered only slowly from this set-back but especially so during the years of the *Bildungsreform* in the late 1960s and early 1970s. The longitudinal data presented in this paper lend support to the notion that the history of women's access to universities and participation in German higher education is a process of "'catching-up' with other Western democracies" (Windolf 1997: p.74).

Furthermore, it has been argued that the political struggle for emancipation and democratization of education in Germany has not been accompanied by a strong women's movement. From a mobilization perspective (Karen 1991), the higher enrollment of women in higher education in the United States might then be seen as an inevitable result of their successful political struggle for recognition i.e., genderXas well as race and ethnicityX"have emerged as official categories" (Ibid. p.229).[28] Contrary to this development, the prohibition of sex discrimination in education has never become a law in Germany, as is the case with Title IX (1972) in the United States (cf. Wahl 1997). Germany also lacks "affirmative action" that has become a political **and** juridical institution in the United States.

Heidenheimer (1997), in his recent comprehensive study of school and university policies in different countries, concludes that the early "emphasis on equality of opportunity, and its incorporation through access to advanced education, engendered a close linkage between patterns

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reunification to the disadvantage of female academics and scientists. In sociology, for example, only 1 out of 24 professors appointed in the former GDR until 1993 was female (p.68-69).

[27] In this sense, the relative "openness" of higher educational systems is referred to as both cause and effect here.

[28] "Advances in access to various resources follow this pattern of official group recognition that usually follows the group's constitution of itself, through political mobilization, as a social category to be reckoned with" (Karen 1991, p.229; footnote 3). However, Karen is right in pointing out that this is clearly not the case with "social class."

of political and educational equalization in the United States."[29] The "opening of higher education opportunities for women on a fairly large scale coincided with the buildup of the movement for women's suffrage, creating a positive symbiosis with strong impact on the political culture." In other countries, e.g., Japan and Switzerland, a "spillover of equality" from one domain to another did not happen, and women's educational and labor market aspirations have long been dampened by the perpetuation of traditional gender roles (p.204-208).[30]

In contrast to historical sequences of social openness and closure that dominated women's access to higher education in Germany, the participation of women in higher education in the United States followed a pattern of early access and continuous participation. When compared to Germany, the traditional diversity and early social "openness" of the American educational system at large is evident. In this context, higher education in the United States has provided flexible responses to changing social environments and external pressures, i.e., the ongoing influx of public and political concerns for equality of educational opportunities. The high degree of institutional differentiation, competition and autonomy is opposed diametrically against the monolithic structure of the higher educational system in Germany it originally emerged from. Thus, the (functional) differentiation of (higher) education and institutions of higher education in the United States not only followed from social change but has also solidified the access of diverse social groups.

Academic Careers and the Realm of the Professorate

With regard to women's successful careers in academia and science in Germany, the data presented in the previous chapter indicate that female academics are and have been especially scarce among the professorate. In contrast to the more balanced succession of women's representation through the professorate in the United States, the proportion of women is decreasing steeply through doctoral education and in terms of the number of *Habilitations* conferred. The data presented indicate that this pattern has been intact for nearly two decades.

[29] In addition, for the United States as a country of immigration "it was harder to deny women the right to achieve enfranchisement through education, when this route was being broadly propagated for immigrant males" (Heidenheimer 1997: p.206).

[30] It should be noted that the focus of Heidenheimer's comparative study is on the institutional and political frame of links and tiers between primary, secondary and/or tertiary education (student enrollment), and not on academic and scientific careers and labor markets. However, both Windolf and Heidenheimer underline the importance of comparatively analyzing gender inequalities in higher education from an integrated perspective, i.e., by taking the historical-political and economical context into account.

Therefore, it could be concluded that the structure and building blocks of academic careers in Germany are and have been resistant to social change in terms of women's gains in educational access and achievement.

In part 2, academic careers in Germany have been described as less standardized than in the United States. Furthermore they are not embedded within an institutionalized evaluation and advisory system and lack the standardization of the American tenure system that is accompanied by the active recruitment and retention of candidates through institutions of higher education (departments). These procedures are lacking in Germany, where the institutional regulation of careers is generally low, mentoring is sporadic, and incentives for institutional competition as well as competition for academic and scientific personnel are only poorly developed.

Academic careers in Germany have also been expected to be more personalized than in the United States. It is not assumed here that personal ties and professional networks do not play an important role in the United States since they are crucial to **any** successful career in academia and science.[31] As the academic unit of operation and the needle eye through which academic careers and academic reproduction are steered, the double function of the professorate in Germany however fuels the impact of these tacit premises on careers in academia and science. In the absence of a generally valid sequencing and evaluation of academic qualifications and ranks the structure of academic careers in Germany provides little counterweight to these otherwise gender-biased prerequisites to turn achievement into success.

With regard to the *Habilitation* it has long been argued that its requirements, in combination with the strong age grading of academic careers in Germany, place a special burden on female academics and scientists. The *Habilitation* is often seen pivotal with the assumed ticking of the biological clock and the conflicting aspirations women face in terms of having children and bearing family responsibilities. Female (and male) academics in Germany not only earn their doctoral degree considerably later than their American counterparts. Compared to other countries such as France, family and social policy in Germany has traditionally offered little incentives and support for working women with children, two-earner families and dual career couples. This structuring principle of the male breadwinner also demarcates careers in academia

[31] As is the case in Germany, careers in the United States are not created by formal degrees but require an underlying network that is often fractured by gender rather than being based on "merit." This concerns for example the relationship and interaction between advisors and advisees in terms of mentoring and support of careers, the provision of professional networks, access to the "inner circle" and "invisible colleges" as well as the professional integration of women into a traditionally male-dominated culture.

and science. Academic and scientific employers and organizations provide little or no institutionalized arrangements for a successful combination and management of family and professional life.

In addition, the "successful" management of the *Habilitation* depends on the level of support and mentoring through professors or other senior advisors that in turn determines the availability of professional networks and the level of academic integration. Across all important dimensions, women have been found lacking both availability and quality of these necessary, often institutionally granted prerequisites to a successful career in academia and science, often as early as during their doctoral studies.[32] Although a pool of suitable female candidates for the professorate does exist in Germany, it appears to be almost invisible given the stability of the low ratio of female professors over time (cf. Lehnert et al. 1998, esp. chapter 4, p.44-54). The harsh drop-off in women's participation between doctoral degrees and *Habilitations* conferred (minus 17 percent in 1995) in Germany implies that the *Habilitation* poses a final barrier to the integration of women because it amplifies and bundles up the male standards along which academic careers in Germany are generally organized.[33]

A Caveat

The comparative perspective applied in this paper has primarily focused on differences in women's aggregate integration. However, although seemingly advanced from this comparative cross-national perspective, the inclusion of women and minorities in higher education is far from complete in the United States. The transformation of educational access into achievement, and in turn achievement into career success, is fractured heavily by gender.

In its recent review of "Title IX at 25" the National Coalition for Women and Girls in Education (NCWGE) conceded that progress in women's access to higher education has been considerable, whereas employment opportunities and recruitment of women lack a comparable development. The authors concluded that although "there is no question that Title IX has opened

[32] Findings from our own research on the careers of scientists in the Max-Planck-Gesellschaft suggest that women consider leaving science as early as in the course of their doctor's degree studies. When compared to their male counterparts they often report fewer coaching and mentoring by their senior advisors and a lack of integration into the scientific communityXfactors that contribute to the cooling out and attrition of both men and women scientists.

[33] With regard to its requirements, however, it should be noted that the *Habilitation* in principle provides a fairly standardized qualification procedure for both male *and* female academics. In turn, alternative criteria for its replacement, e.g., quantity of publications or other academic and scientific merits might be to the disadvantage of female candidates.

doors previously closed to women and girls . . . there is still room for improvement. One pattern remains especially evident: Women's numbers tend to decrease as their rank in the career ladder or the prestige of the educational institution increases" (NCWGE 1998: p.7). The American Association of University Women stressed the need to retain "guidelines and provisions that encourage women and minorities in nontraditional fields" since women have been traditionally underrepresented "in many critical fields," and because "many fields of advanced study remain occupationally segregated, dominated by either men or women" (AAUW 1998). Collins (1998) found that "women's relative representation in academe is dropping in relation to their increasing availability" and that "women and minority faculty are promoted and tenured more slowly and less often than white men." She concludes that "despite the antidiscrimination laws" and against "claims that affirmative action is causing widespread 'reverse discrimination' . . . the forces that keep women from achieving success in academe are thriving; women are losing rather than gaining grounds" (p.45-47). In sum, a look behind the aggregate data shows that in the United States, "women are considerably less successful in academia than men are. Women earn less money, are promoted and granted tenure more slowly, and work at less prestigious institutions" (Valian 1998: p.220; see also Finkelstein et al. 1998).

In part 2 of this paper, it has been argued that the cumulative and fairly standardized career succession in the United States should have a positive impact on the integration of women scientists. The structure of the tenure system, and especially the tenure decision itself, however, has been criticized for opening the door to discrimination against women and other minorities: "The process for achieving tenure is notoriously vague and arbitrary. Most faculty receive no written guidelines for achieving tenure. . . . Tenure decisions are largely subjective. The lack of clear, consistent performance criteria allows opportunities for discrimination" (Collins 1998: p.53). This until now "highly arbitrary, subjective, political process" (Ibid.) has been experienced as deeply ambiguous and often opaque by those who have to submit themselves to it (see, e.g., Tierney and Bensimon 1996). In this sense, although generally in favor to the integration of women academics when compared to Germany, it does not necessarily prevent discrimination through the "back door," e.g., at the local level. Stephan and Kassis (1997), in their study of differences in the proportion of women employed at several universities, have underlined that "case studies are a good reminder that what is true in the aggregate need not to be true of an individual institution" (p.74).

The analysis of aggregate data on women's integration from a comparative perspective also cloaks the negative consequences of the depicted higher degree of institutional heterogeneity and differentiation in the larger structure of American higher education. Unstructured nationally, and with considerable variation in terms of entrance thresholds and institutional feeder functions, the quantity of women's integration has to be balanced against the quality of their integration by future research. Found to be favorable to the general inclusion of women and minorities into academic ranks and positions, the structural differentiation and diversity of higher education in the United States engendered the stratification of its rewards, e.g., in terms of salaries, at the same time strikingly uneven. By stressing the sheer quantity of women's integration in the United States, these differences are easily underestimated (cf. Table 6).

Table 6: Full-time Instructional Faculty and Staff in the United States, Fall 1992.

	Women	Men
Full-time faculty at all institutions of higher education* (100 % = 502,060)	33 %	67 %
Total Income		
Under $ 10,000 (1 %)	47 %	53 %
10,000 to 24,999 (3 %)	59 %	41 %
25,000 to 39,999 (25 %)	53 %	47 %
40,000 to 54,999 (30 %)	35 %	65 %
55,000 to 69,999 (18 %)	21 %	79 %
70,000 to 84,999 (9 %)	16 %	84 %
85,000 to 99,999 (5 %)	12 %	88 %
100,000 or more (9 %)	13 %	87 %

*Excluding faculty at all „other" institutions of higher education (N = 26,200).
Source: U.S. Department of Higher Education 1997a: Table 230, p.244.

The structure of academic careers in Germany has been characterized as having successfully withstood the advancement of women into the highest academic and scientific ranks and positions. Contrary to Germany, where the data presented suggest that access to academic positions seems to be the largest problem, the situation in the United States points at a heavy gender bias in the assignment of academic and scientific rewards. The position of women in the world of academia and science in the United States has been described as that of "second-class citizens" by Cole (1987: p.374). The incompleteness of women's integration in Germany varies stronger with discipline and field of study than with academic labor market sectors. Women are underrepresented to a similar extent regardless of the unit of observation chosen, female

academics in Germany in these terms still struggle for their right to become eligible for citizenship in and full access to the academic community.

The recently issued recommendations of the German Scientific Council (*Wissenschaftsrat*) lend support to this notion when compared to the scope of a political program recently initiated in the United States. The *Wissenschaftsrat* stressed the need to introduce "recruitment and employment policies designated to increase the number of female academics, and [academic institutions] should be rewarded financially for their success in doing so" (Nature 1998: 402).[34] Not promoting the advancement of women, the president of the Scientific Council argued, might lead to severe damage since "Germany can not afford to close out a considerable part of its young and fledgling scientists" (*Süddeutsche Zeitung* 05/19/1998). In the United States bill H.R. 3007 was introduced to the House of Representatives in November 1997 with the aim to "establish the Commission on the Advancement of Women in Science, Engineering, and Technology Development to study and report to the President and the Congress on the recruitment, retention, and advancement in science, engineering, and technology" (THOMAS 1998). The goals of this Commission are to pay special attention to the elimination of artificial barriers, to promote work force diversity and sensitize employers to the need to recruit and retain women scientists, as well as to encourage the replication of successful recruitment and retention programs by universities, corporations and Federal agencies (see H.R. 3007 IH, 1998: 2-3).[35] It addresses fields where women have been traditionally underrepresented in the United States and where an increase in the shortage of skilled workers is expected.

5 DISCUSSION

It has been the aim of this paper to explore cross-national differences in women's integration in academia and science from a comparative perspective. If the focus is moved to the

[34] It also warned that relying on special programs might not be enough, without a new hiring policy in place, e.g., by employing more women on regular staff positions at universities by taking into account the proportion of women on preceding academic qualification levels. Though influential, the recommendations of the *Wissenschaftrat* "do not have legal authority, and it is up to the universities to decide if and how far they are adopted" (Nature 1998: p.402).

[35] The main duty of the Commission is to conduct a study via the NSF to provide a detailed account of the quantity and type of women's underrepresentation. In addition, it is intended to study employer's recruitment practices, and to compile an overview of available research on successful practices, policies, and programs to issue recommendations employers can follow.

broader implications of the empirical evidence discussed two questions emerge. First, what are the directions for future cross-national research on gender inequalities in higher education? Second, what is to be learned from the integration of women in American higher education?

Implications for Future Research

Clearly, more individual-level research and data are needed. How are differences in the underlying structure of the complex and dynamic process of passing through the pipeline (or not) perceived and enacted by academics and scientists in both countries? How are they interwoven with other aspects of their life?

With regards to the development in the United States, Windolf (1997) argued that the "exceptionally pattern of expansion . . . suggests that the role of women in American society has changed more fundamentally than in any of the other countries" (p.170-171). The cross-national differences in the extent of women's educational participation and achievement addressed in this paper might also be referred to differences at the macro-level, e.g., women's increasing overall labor force participation. The role governments and states play with respect to the labor-market integration of women via social and family policies warrants further attention. Since Esping-Andersen's seminal work on the typology of welfare states is increasingly taken up with respect to gender, and especially so with regard to the effects of public employment on women's labor market integration (cf. the contributions in Sainsbury 1994, Gornick and Jacobs 1998), it provides an initial basis for future cross-national research.

The relation between gender stratification in educational and occupational systems also warrants further attention. Hanson et al. (1996) studied the gender stratification in the scientific pipeline in seven different countries.[36] Their results suggest "gender stratification is far greater in the occupational segment of the science pipeline than in the education segment in each of the countries" and that the "massive inclusion of women in education and occupation systems that often comes along with economic development might contribute to gender stratification in these systems" (Ibid., p.285-286).[37]

Alternative modes of organization and (re)structuring do not prevent from further discrimination as the American example suggests. In this context the role academic organizations

[36] United States, Canada, Finland, Japan, Sweden, Thailand, and New Zealand

[37] A necessary prerequisite for these analyses, however, is the availability of cross-national data on women's educational and occupational participation.

and institutions play with regard to the gender-based mediation of careers has to be examined by future research. Instead of focusing on possible generalizations from aggregate data and the broader structural context, cross-national research and policy makers alike should take successful remedies and measures at the local level into account to promote the integration of women. Different types of higher educational institutions in the United States have been found to vary with regard to the recruitment and retention of females and in terms of the quantity and quality of programs and policies to their advancement (Valian 1998). Etzkowitz et al. (1994) pointed out that "administrative actions, even if they do not change attitudes, can affect behavior" (p.62). Their results show that "specific steps could be taken at the local level to mitigate the negative effects of the male scientific ethos on the recruitment of women . . ." since "in those instances where a department faced this situation and altered its behavior, women's participation improved dramatically" (p.65).

The American Model of Higher Education: A Blueprint for Change?

For decades, a stronger orientation towards the structure of higher education in the United States has been called for in Germany. The discussion on educational reforms and restructuring in Germany, however, has paid little attention to the effects on the advancement of women so far. Casting higher education in new forms could therefore burst open opportunities hitherto not accessible to women and the assumed structural inertia of how academia and science is organized in Germany alike.

From the comparative perspective applied in this paper possible structural interventions have been identified to promote women's careers in German academia and science. The establishment of standardized academic and scientific career models as well as the systematic and standardized evaluation of academic candidates and position-holders could reduce the already drastic loss of women at earlier career stages. The more equal departmental organization of higher educational institutions could block the gate-keeping functions of the professorate both in terms of academic authority and control. An institutionalized mentoring and advisory system could counterbalance persistent idiosyncrasies in the recruitment and promotion of academic offspring. More institutional differentiation and competition could multiply the few prevailing career opportunities for women.

In Germany, the number of women in influential scientific councils and commissions is low (see *Wissenschaftsrat* 1998; Osborn 1997: p.165-166) and the abundance of guidelines, recommendations, and statutes related to issues of gender equality in Germany has lead to few improvements and often poor results, if any (see, e.g., *Bund-Länder-Kommission für Bildungsplanung und Forschungsförderung* 1989, 1996). Some faculties and universities lack any regulation by a federal or the state government to implement a policy of equal opportunity, or they are simply not willing to do so. In addition, the variety of federal and state laws is not very clear about how to improve equal opportunity, provided they address the question at all (Pfarr 1997). Contrary to Germany, where "generational renewal" is still expected to change women's unequal participation, the United States have "already passed the first stage of policy interventionXthe legal prohibition of gender discrimination" (Sonnert and Holton 1995a: p.189). However, legal changes and opening the doors of higher educational institutions and workplaces have not been enough to secure women's full access to careers in academia and science in the United States (Sonnert and Holton 1995a: p.189). The "impetus for greater diversity . . . did not come from within the power elite but was the result of external pressures" (Zweigenhaft and Domhoff 1998: 190). It is among the "ironies of diversity" that affirmative action[38] strengthened the white, male power elite in the United States by providing them with "buffers, ambassadors, tokens, and legitimacy" (Ibid. p.191). Programs and policies, in this sense, solidified and reaffirmed inequality rather than changing it. It left the underlying power structure intact, and forced those concerned to adjust and adapt their identity to it. Despite its positive impact and exemplary reform character, the efficiency and enforcement of affirmative action has shown to be extremely dependent on political pressure and support, as the recent rollback in the United States suggests (Reskin 1998).

The conflicting findings explored in this paper show that with respect to advice for educational policy makers, prescriptions to further the advancement of women are not readily available and transferable from the United States: "Most Germans and the European Union want to import the American model of higher education. The American system should not be imported as it is, but as it should be" (Henry Etzkowitz, AICGS 1998: p. 2).

[38] Historically designed as a job creation program to answer the African-American uproar in American cities during the mid-1960s.

Appendix

Table A: Institutions of higher education and branches, by type, and control of institution in the United States 1995-96.

	Total	Public Institutions	Private Institutions
	3.706	1.655 (45 %)	2.051 (55 %)
2-year	1.462	1.047 (72 %)	415 (28 %)
4-year	2.244	608 (27 %)	1.636 (73 %)
Among 4-year institutions:			
Research (committed to graduate education through the doctorate, give high priority to research and receive more than $15.5 million in federal research funds annually)	125	85 (68 %)	40 (32 %)
Doctoral (Offer a full range of baccalaureate programs and are committed to education through the doctorate. They award at least 40 doctoral degrees annually in 5 or more disciplines)	115	66 (57 %)	49 (43 %)
Master (Offer a full range of baccalaureate programs and are committed to education through the master's degree. They award at least 20 master degrees per year)	571	278 (49 %)	293 (51 %)
Baccalaureate (Primarily undergraduate colleges with major emphasis on baccalaureate degrees)	747	114 (15 %)	633 (85 %)
Other 4-year (Other specialized 4-year institutions awarding degrees primarily in single fields of study, such as medicine, business, fine arts, theology and engineering)	686	65 (9 %)	621 (91 %)

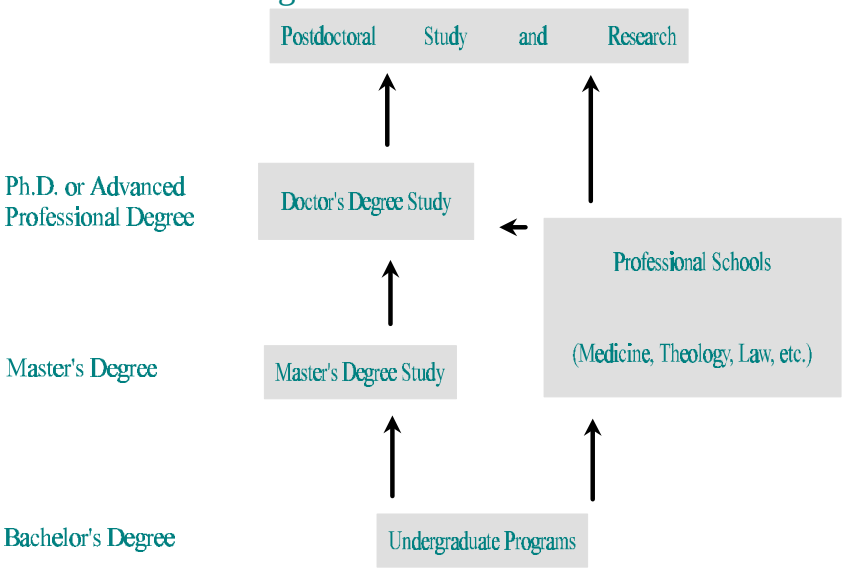
Source: U.S. Department of Education 1997a: p.259, Table 242.

Table B: Institutions of higher education by type in Germany 1996.

Total Number	335
Technical and other universities (legally authorized to offer doctoral degrees)	113
Vocational colleges (*Fachhochschulen*)	146
Colleges of Art (*Kunsthochschulen*)	46
Colleges of Civil Administration (*Verwaltungsfachhochschulen*)	30

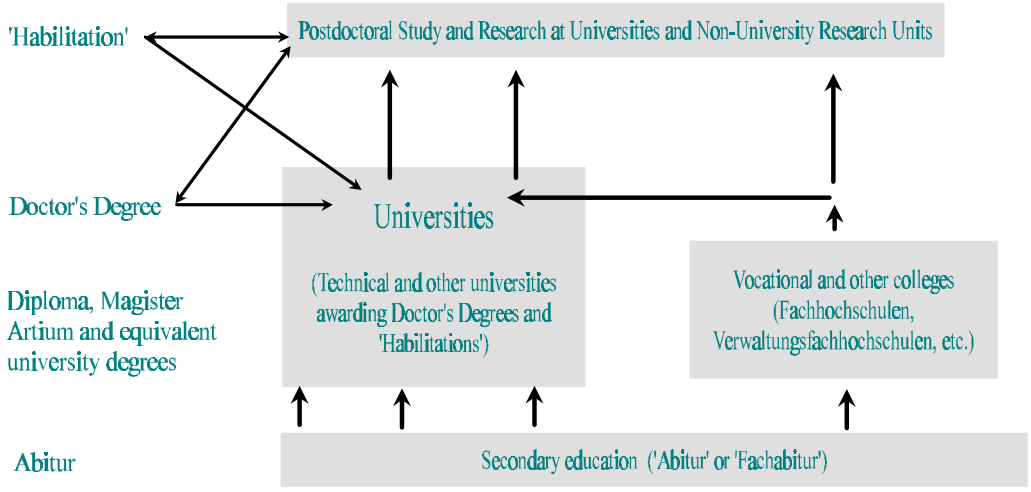
Source: *Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie* 1996: p.53-63.

Appendix Figure 1: The Structure of Higher Education in the United States



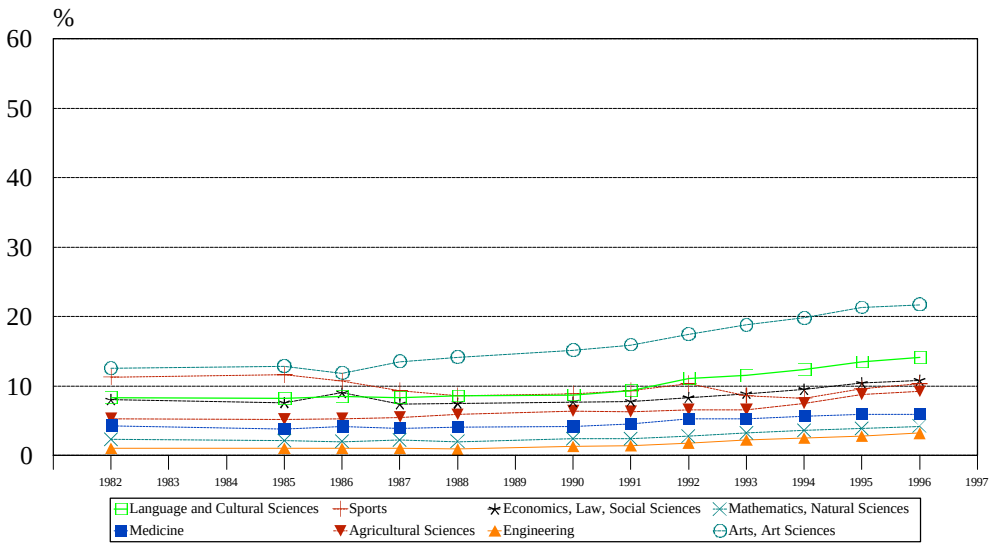
Source: U.S. Department of Education. NCES 1997a: p.7.

Appendix Figure 2: The Structure of Higher / Academic Education in Germany



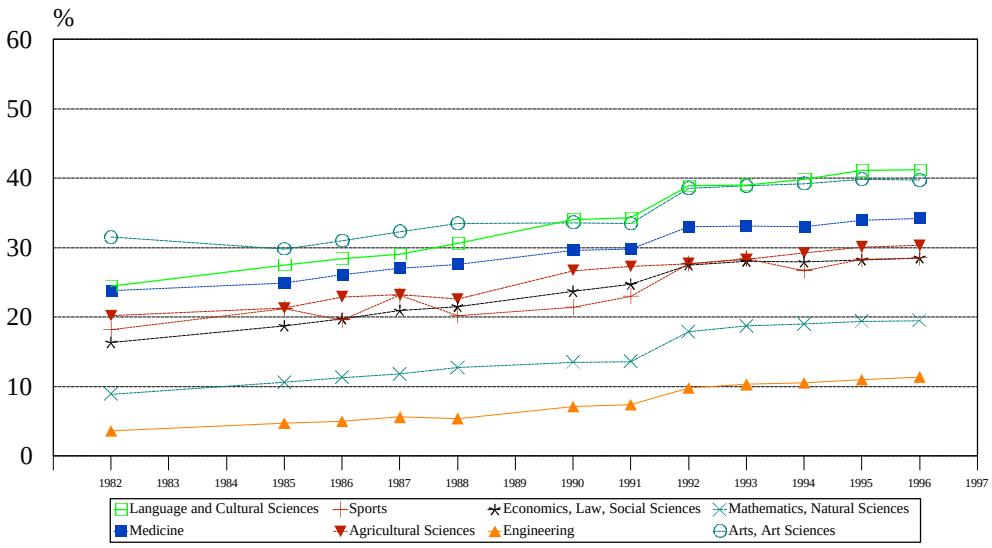
Source: BMBF 1994

Appendix Figure 3: Proportion of Women Among German Professorate by Field 1982 - 1996 (in %)



Sources: Bundesministerium für Bildung und Wissenschaft 1994; Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie 1998.

Appendix Figure 4: Proportion of Women Among German Full-Time Faculty by Field 1982 - 1996 (in %)



Sources: Bundesministerium für Bildung und Wissenschaft 1994; Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie 1998.

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