

Wagadu: A Journal of Transnational Women's & Gender Studies

Volume 9
Issue 1 *Special Issue: Gender Equity in Higher
Education*

Article 9

6-1-2011

Declining Faculty Wage Premiums: Analysis Over Time by Gender in the Public and Private Sectors

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Recommended Citation

Floss, Frederick (2011) "Declining Faculty Wage Premiums: Analysis Over Time by Gender in the Public and Private Sectors," *Wagadu: A Journal of Transnational Women's & Gender Studies*: Vol. 9: Iss. 1, Article 9.

Available at: <https://digitalcommons.cortland.edu/wagadu/vol9/iss1/9>

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DECLINING FACULTY WAGE PREMIUMS: ANALYSIS
OVER TIME BY GENDER IN THE PUBLIC AND PRIVATE
SECTORSFrederick G. Flossⁱ

Abstract: The wage premium is the relative wage of faculty members above that received by the average worker in the United States. This paper measures the wage premium by gender between faculty and full time workers from 1972 to 2007 using U.S. Census and the National Center for Education Statistics data on wages. The paper shows a decline in the returns to education for both genders. The implications of these trends are also discussed.

Over time, a number of factors represented by supply and demand will determine the salaries of faculty in the United States. Increases in the wages of faculty relative to other positions will induce more students to continue their education and go on to complete doctoral programs in the future. This will increase the supply of new faculty and tend to decrease future salaries until there is a new equilibrium or balance in the market for faculty. Declines in wages will have the opposite effect, sending a signal to potential graduate students that society wants to cut the number of faculty and disinvest in higher education. Since it takes years of preparation to become a faculty member, decisions to enter academia occur well before hiring. Further, the demand for faculty will depend on a different set of factors, such as the number of students or their majors. The current number of high school graduates, research dollars and the amount of funding provided by federal and state governments are factors that determine the numbers of positions; they are unknown to the entering graduate student. Analyzing these changes over time will show America's commitment to higher education.

Measuring similar changes in the number of degrees and relative wage by gender over time illustrates the commitment to equity in higher education as the economy changes and grows. The two market equilibria for faculty by gender are barometers for whether efforts to attain gender equity in hiring and salary are working or whether we need to employ other strategies.

Traditional studies of gender equity in higher education have tended to compare a base year with a more current year to analyze the changes between the two points; for example see West and Curtis (2006) or Bradburn and Sikora (2002). These studies tend to look at a large number of complex variables related to gender equity where data is not available for all years. This method misses the dynamics of the market and does not show whether the markets in higher education are moving towards gender equality. This paper will look at a smaller number of variables, which allows a complete set of time series data. A long-range story about the relationship between male and female salaries in the faculty and the greater economy emerges after looking at data from 1971 to 2009. The rest of this paper proceeds as follows. Section II discusses the number of college and doctoral degrees granted from 1971-2009. Starting in 1972, the percentage of total degrees for both male and female doctoral degrees peaked and then declined until after 1990, when the trend remains relatively constant. Between 1971 and 2009, the percentage of the total number of degrees that were doctoral degrees dropped from 2.31 percent to 1.81 percent. This decline is an indication of the lack of importance American society places on advanced higher education. Section III looks at how the changes in the number of degrees have affected the rate of return for male and females in higher education. A higher rate of return will induce more college graduates to go to graduate school and thereby increase the supply of potential new professors. How men and women react over time will determine whether the equilibrium labor market will correct for gender inequities. Section IV looks at faculty in the public and private sector to understand the different dynamics in more detail. The last section, Section V, combines the results from the different

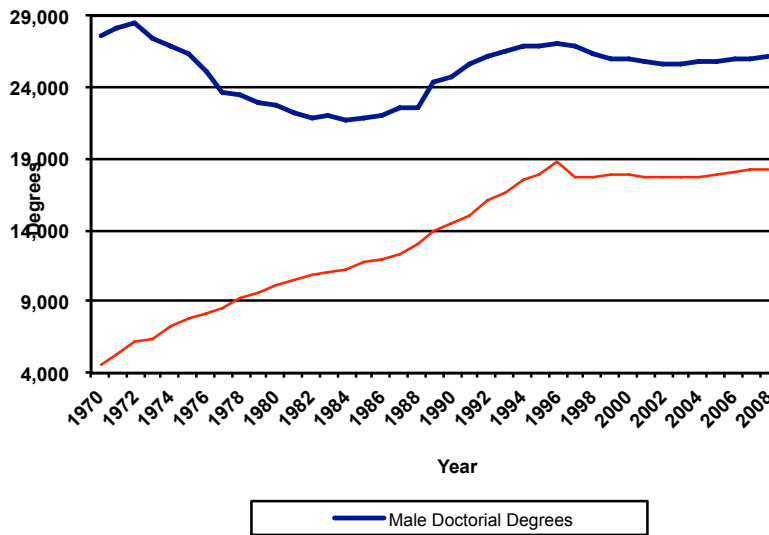
sections to give an overview of the long-term trends of gender inequity in higher education.

Degrees

The total number of doctoral degrees granted per year in 2009 was 44,300, and increased by a little over 12,000 between 1970 and 2009.ⁱⁱ During that time, the number of female doctoral degrees grew from 4,577 to 18,200, a 3.7 percent yearly grow rate. At the same time, the number of male degrees per year actually declined. Table 1 shows the trend in the number of degrees. Women made a dramatic increase in the total number of doctoral degrees granted from 1970 to 1996. Both male and female degrees have remained flat since 1996.

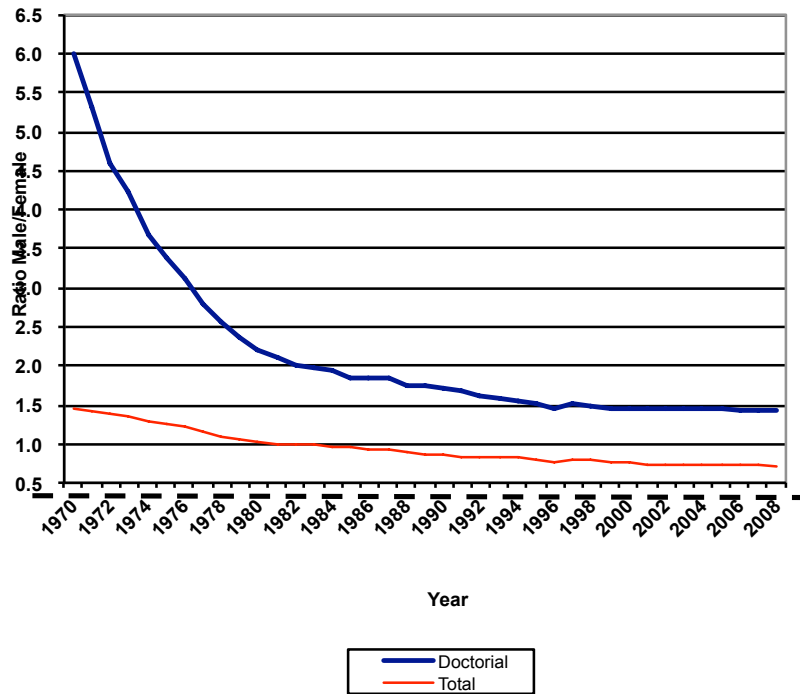
TABLE 1

Doctoral Degrees Conferred by Gender



During the period from 1971-2009, the total number of faculty positions grew from 474,000 to 578,302, or by 22 percent. A close inspection of the doctoral degrees granted reveals that the number grew by 38 percent. In other words, during the period when women were entering the higher education labor force, supply outstripped demand by 16 percent. This is an important result because as women are making inroads, there is market pressure lowering overall wages. In reaction to this, the growth in the number of degrees has flattened out since 1996.

More doctoral degrees are conferred to men than women, even though women have made dramatic gains. There may be a number of reasons for the dramatic increase by women in higher education degrees, and then the leveling off of the number of degrees earned by men and women. Initially, women made breakthroughs in specific disciplines. Then it became harder for them to enter as graduate students into fields where discrimination against women is still prevalent. Further, for both men and women, the number of degrees leveled off as it became less financially attractive to enter higher education. By comparison, as early as 1981, women were earning more college degrees than men were. Table 2 shows the comparison over time of the ratio of men to women by type of degree granted. In Table 2, when the ratio falls below 1.0 (the dotted line), women a larger number of degrees than men. Women make up 58.5 percent of the college degrees granted in 2009, but only 41.1 percent of the doctoral degrees.

TABLE 2**Ratio of Male to Female Degrees Conferred**

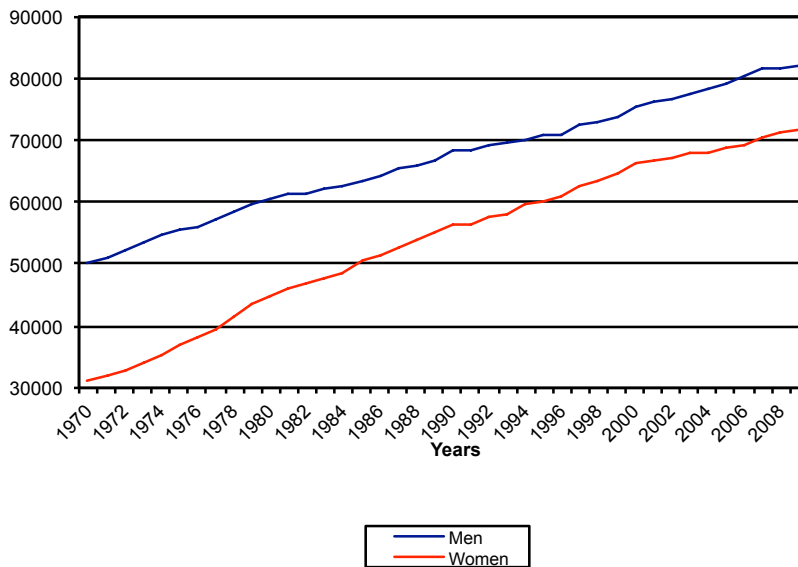
The general labor force does not show the dramatic leveling off of the percentage of jobs going to women, as Tables 1 and 2 shows for doctoral degrees. From 1970-2009, the labor force as a whole grew at 89.17 percent, while the number of college degrees grew at only 72.6 percent. Since more and more jobs require a college degree, relative demand for college-educated graduates is growing faster than the number of college degrees granted.ⁱⁱⁱ As long as demand outpaces supply, the relative wage for college graduates compared with high school graduates has room to increase. A

unique situation exists where there is excess demand for college graduates and excess supply for doctoral degree graduates.

Table 3 shows the increase in the United States civilian workforce from 1970-2009.^{iv} Men make up 53.3 percent of the total workforce. They make up a larger portion of the workforce because they account for a larger portion of those positions that do not need a college degree. However, women as a percentage of the workforce are growing at a faster rate. Over this period, women in the labor force are growing at 2.17 percent, while men in the labor force are growing at 1.26 percent per year. Women will eventually make up a larger portion of the workforce if these trends continue.

TABLE 3

**U.S. Civilian Employment
by Gender**



In each of these three areas—doctoral degrees, college degrees and the civilian workforce—women are becoming more prominent. These trends will have an impact on how the growth in wages for different categories will proceed. When demand is above supply, wages will increase, other things being equal, and the opposite will happen when supply exceeds demand. This will then send a message to the next generation of students on whether they should pursue more education.

Rate of Returns to Education

The rate of return to education is the annual amount of wages received above some base amount; for example, the difference between a doctoral and a college degree. From an economic perspective, those continuing in their educational career expect to make a positive rate of return or they would not continue with additional education. By continuing, a student pays not only tuition and fees, but gives up the opportunity to enter the workforce and make a salary.

The rate of return to education is:

$$WF - 1$$

w_{HE} is the wage rate for a particular group of female or male professors, while w_{WF} is the wage rate for the base group, such as the wage rate of the male workforce. There is a long tradition of looking at rates of return to education and training in the economic literature, starting with Becker (1964).

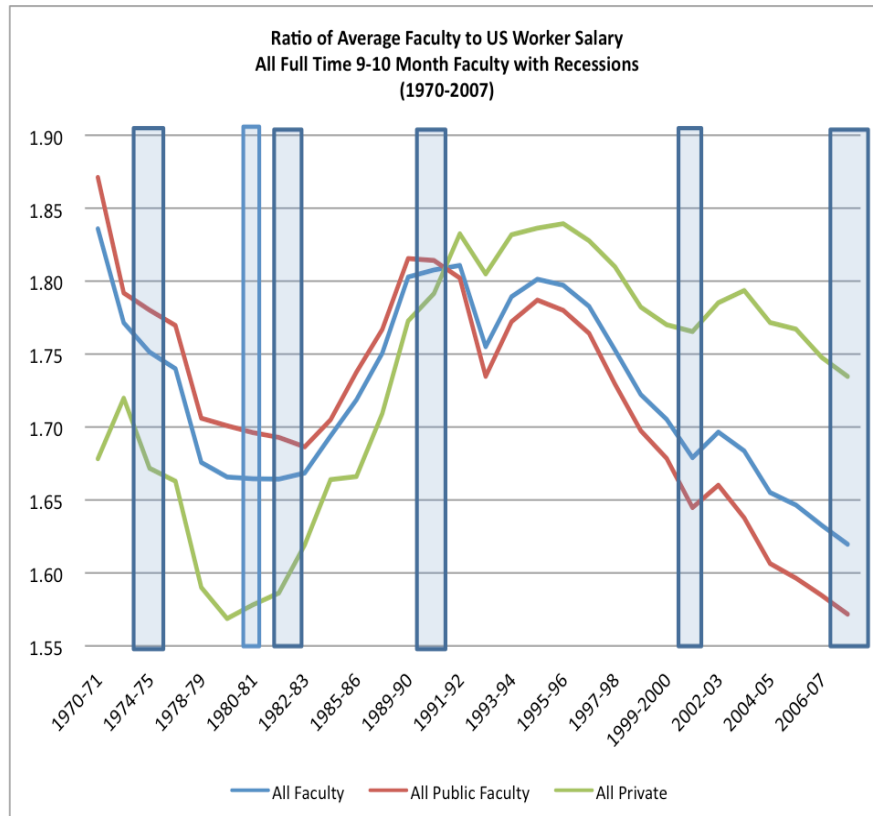
An example of this return for a female faculty member when the average female faculty salary is \$63,347 and the average female salary in the workforce is \$43,889 is

$$43,889 - 1 = .443$$

The rate of return to education for a female faculty member is 44.3 percent per year. Looking at this rate of return for different groups over time is a measure of the importance the economy puts on additional education. Measuring these rates of return over time shows how in equilibrium, society values higher education. They are also a measure of discrimination between groups. In a world without discrimination, the rates of return for male and female workers should be the same when they have the same education level. Discrimination against a group is measured by how much lower their return is when compared to another group with equal education. Looking over a long time period shows the history of society's fight against discrimination and whether we are making progress.

Table 4 shows the rate of return over time of faculty members in the public and private sectors.^v The graph can be broken into two parts. The first is the years 1970-1990, where rates of return drop and then rebound. This is the period of the Vietnam War and the drop and rebound in returns is a reaction by the government and others to the protests over the war. The second period, starting in 1990 and continuing until the present, shows a cyclical downward trend. Each top of a cycle is lower than the preceding top and each bottom is lower than the bottom before it. One suggestion for this decline is that the jobs in the workforce as a whole now require more education, so the difference in education levels between higher education and the workforce has declined. However, this would assume the level and amount of education for doctoral degrees has remained stagnant. Instead, the economy is signaling a move away from using resources in the academy.^{vi}

TABLE 4



The shaded blue areas in Table 4 show the years when the economy goes into recession. In the table, there is no relationship between the drops in return and economic condition. In addition, the decline in returns since 1990 coincides with the shift in position of the public and private sector. Before 1990, the rate of return to public sector faculty is higher than in the private sector; this is further evidence of society’s disinvestment in the public sector. These relationships continue for other groups such as two-year and four-year schools, or by rank.^{vii}

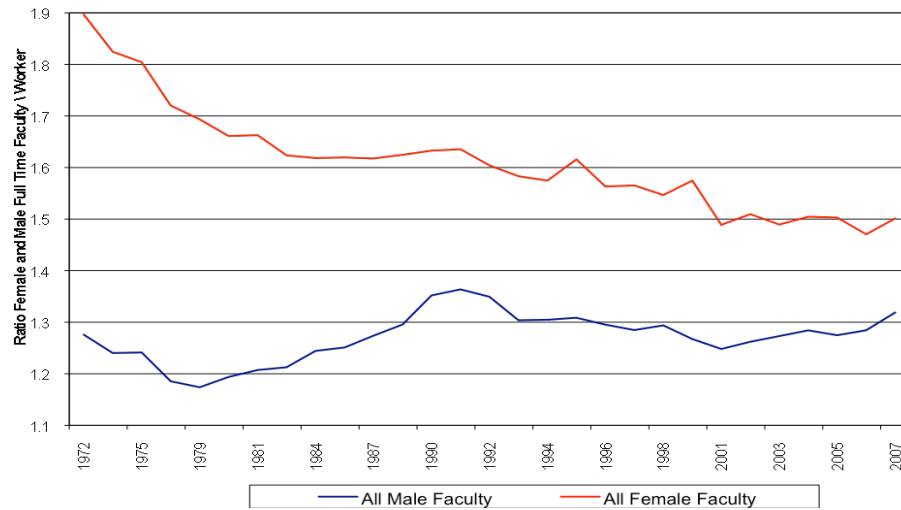
Gender and rate of return in higher education

The female faculty rate of return was approximately 90 percent per year (1.90 -1, in Table 5) at the start of the 1970s. It trends down continuously until 2002, when it levels out at 50 percent through the end of the 2009. For male faculty, there is a relatively constant rate of return of around 30 percent per year over the entire 38-year period. These returns correspond to the number of doctoral degrees granted. Male faculty degrees have been constant, while female degrees increase dramatically until 2000, where they level off, as shown in Table 1. This will occur if women are reacting to the changes in returns to education, as standard economic models predict. More women enter the market as the rate of return to education increases, and then when it declines, the number of graduates entering programs declines.

Table 5 gives the rate of return of education for male and female faculty. The male returns show the effects of the Vietnam War with a decline and a rebound in returns over the 1970s. This is not true for female faculty, which sees a continuous decline over the entire period. Since 2000, female and male rates of return level off. Over the same period, female faculty has a 20 percent greater rate of return than that of male faculty. This should induce more women to enter higher education until the rates of return to education are equal for both groups. Discrimination is the traditional explanation for why these rates are not equal. This discrimination can take many forms, such as limiting the number of graduate positions in fields where women are most likely to apply, thereby keeping the supply of female faculty low and the rate of return higher than that in fields dominated by men.

TABLE 5

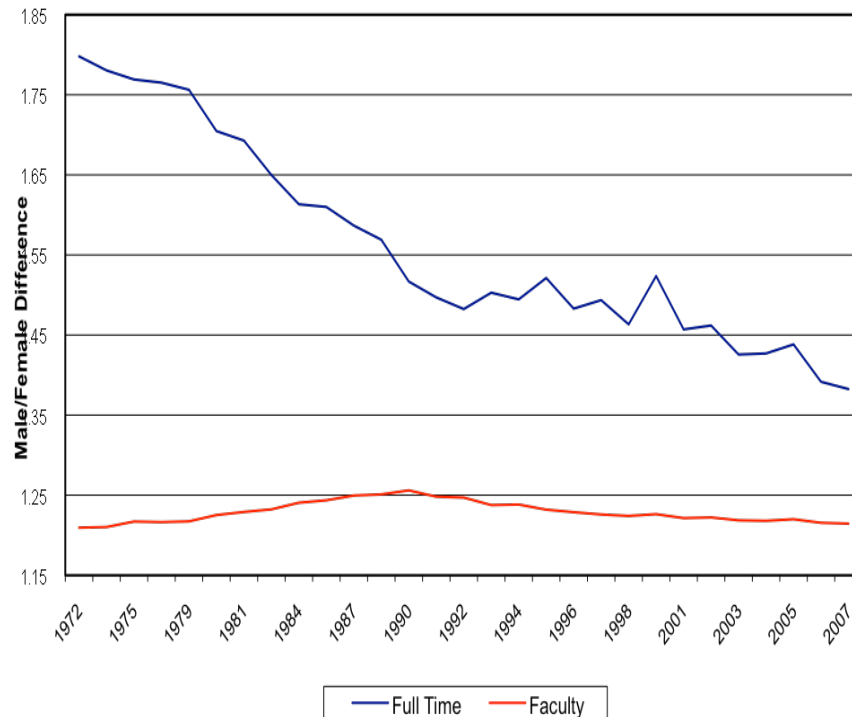
**Ratio of Average Salary for Male and Female Faculty to Male and Female Worker
(1970-2008)**



While the rate of return for female faculty is higher than that for males, this does not mean female and male faculty are making comparable salaries. The ratio of male to female faculty has not improved over time. In fact, the distance between male and female faculty salaries increased from 1970 until 1990. This is not true for the economy as a whole, where women made progress over most of this period. In the general economy, women have received higher salaries by being more educated than their male counterparts are; this cannot be true in higher education if a Ph.D. is required for all. Table 6 shows these relations.

TABLE 6

Salary Ratios Faculty and Full Time Workers
(Male/Female)



In the workforce as a whole and in higher education, females have become a larger part of total employment. The differences in salary for higher education are never as great as in the workforce, but since salaries are higher in higher education compared with the workforce, the ratio understates the comparison between the two groups. These salary ratios do not depend on rank and are similar for both full and assistant professors.^{viii} Putting Tables 5 and 6 together, the rates of return for female and male faculty have stabilized over much of the last decade, with little or no change in salary equity between the groups.

Public-Private Sector Faculty

In Table 4, private sector faculty’s rates of return overtook the public sector’s returns by 1990 and private sector faculty continues to enjoy a higher rate of return than public sector faculty. Traditionally, the economic explanation is disinvestment by state government in higher education as government’s share of the total university budget declines. Breaking down the rates of return by gender and sector give more information as to why female faculty has not made more progress. Table 7 shows that the only group not to see a drop in the rate of return is private sector male faculty. With the public sector larger than the private sector, it is the disinvestment of the public sector that is driving the wage dynamics in higher education.^{ix}

TABLE 7

Ratios of Average Salaries by Gender in Public and Private Sectors

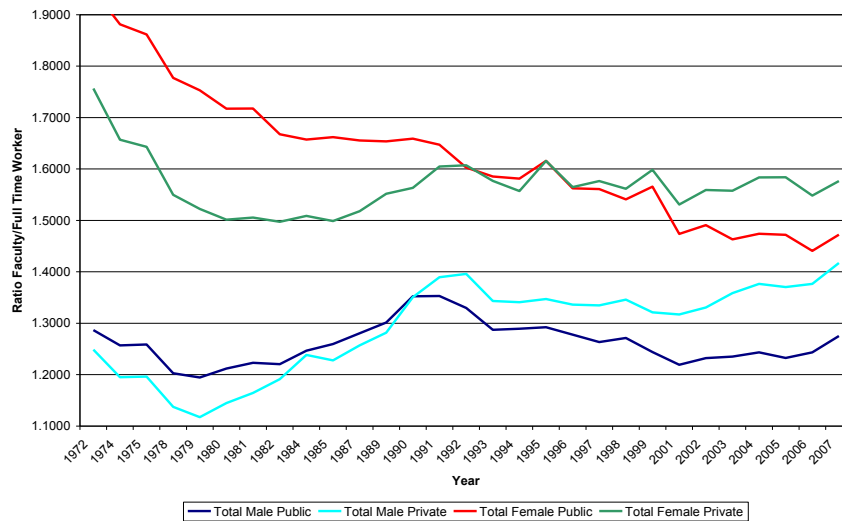
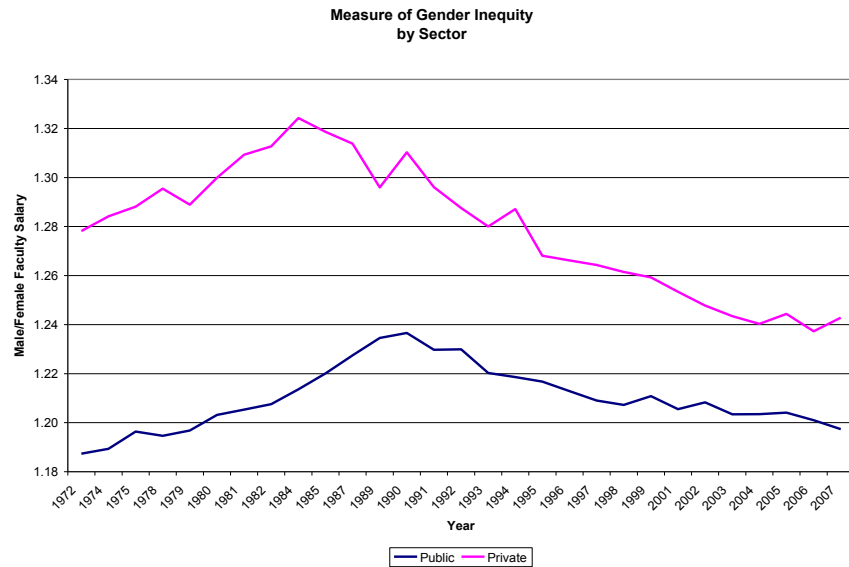


Table 7 shows the returns in the private sector for male and females cross over the public sector and become higher around

1990. Just as important: private sector females follow a pattern similar to those of private and public sector men, while public sector female faculty declines over the entire period. Careful inspection reveals that the private sector male faculty is at its highest rate in 2008, the last year data is available. This is not true for any other group. In percentage terms, the public sector female category dropped by about twice as much as male faculty in the public sector.

In Table 8, the ratio of male to female salaries in the public and private sector are given. The private sector, while paying better for both male and female faculty, also has a greater degree of wage dispersion. As states cut spending on public higher education, the gender discrimination in all of higher education will increase, as the private sector becomes a larger portion of the total. This decline in the public sector will also have the effect of raising the average salary for both male and female faculty without an actual increase in any individual's salary increase, simply by changing the weights between the public and private sector.

TABLE 8



Conclusion

Gender inequity in higher education is a result of a system of supply and demand equilibriums. Changes in one or all of the supply and demand equations can have important impacts on whether equal pay and opportunity are available to all in the academy. Over the last four decades, public policy has been to move to equality for women. In public and private higher education, little or no progress in closing the gap between male and female faculty salaries is apparent since the early 1990s. Given the higher level of discrimination in private higher education and cuts to public higher education, the prospect is for the gap to grow.

In this paper, the rate of return to education is a measure of both excess supply and demand in higher education. Over time, the rate of return to doctoral education has declined for female faculty, which should slow the number of women who enter the professoriate. Under traditional economic paradigms, this decline should raise female salaries relative to men and close the gap. This

has not happened and the relationship between male and female faculty salary has remained relatively stable, suggesting discrimination. The use of times series data as opposed to single year comparisons of other studies show that the problem is multifold. During the 1970s and 1980s, women graduated from graduate programs in greater numbers; that has tapered off since 1990. While women in the general workforce can raise their salaries compared to their male counterparts by becoming more educated, this is not true for tenure track female professors where the terminal degree for all is the Ph.D., so this option to close the discrimination gap is not open to female faculty. Finally, the disinvestment in the public sector will increase the level of discrimination, as a larger portion of the higher education workforce will be in the private sector where discrimination is larger.

Market dynamics are working in the wrong direction to correct discrimination against female faculty. Excess supply for faculty is keeping salaries low while at the same time, higher rates of return bring more women into the market without raising wages to the same level as their male counterparts.

Overall, Table 4 shows the rate of return to faculty of all types has continued to decline since the early 1990s. Since almost 80 percent of total costs of education are labor costs, this shows disinvestment by the United States in doctoral education—just as women are entering the profession in larger numbers. This disinvestment in both the public and private sectors is somewhat puzzling when most countries are increasing their investment in higher education as the only way to compete in a more globally challenging world. More importantly, it moves America away from equality as other countries are starting to address this problem.

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ⁱⁱ U.S. Department of Education, National Center for Education Statistics, *Earned Degrees Conferred; Projections of Education Statistics to 2009*.

ⁱⁱⁱ The supply of workers does not depend only on the number of individuals entering the workforce, but also on those retiring. If the rate of retirement is relatively constant over time, then the growth in degrees will be equal to the growth in the supply of workers. Since the demand for college graduates has grown faster than those without college degrees, the growth in the labor force underestimates the demand for college graduates.

^{iv} Bureau of Labor Statistics, "Civilian Workforce Tables," 2009.

^v Faculty salaries are from NCES **Table 257**, "Average salary of full-time instructional faculty on 9-month contracts in degree-granting institution," *Education Digest 2009*. Workforce salaries are from Bureau of Economic Analysis, *REIS* data set.

^{vi} One example of this is the push for distance learning and other models, which look to increase "productivity" by increasing the number of student degrees produced by an individual faculty member.

^{vii} See Floss (2009) for a more complete look at the relationships between rank and rate of return.

^{viii} See Floss (2009) for the relationships between different ranks.

^{ix} See NCES Table 243 for the number of faculty by sector. In 2007, the public sector 4-year colleges had 1,741,699 faculty compared with 1,157,266 for the private four-year sector.