

SOME OBSERVATIONS ON GENDER AND WAGE DIFFERENCES IN THE INFORMATION TECHNOLOGY SECTOR

Lai C. Liu, The University of Texas – Pan American, liul@panam.edu
Kai S. Koong, The University of Texas – Pan American, koongk@panam.edu

ABSTRACT

Despite the unparalleled demand for information technology workers during the latter part of the last century, male professionals in this sector are found to have received higher salaries, bonuses, and raises than their female counterparts. This study examines the effect of gender on the salary earnings of men and women in the information technology sector for the period 1991 through 2001. Specifically, this study identifies the type of jobs contributing to the phenomenon, the magnitude of the differences, and trends, if any. The findings reported should be of interest to equity experts, federal and state policy makers, gender issues researchers, human resource managers, information technology professionals, and labor attorneys. Educators, placement counselors, and students selecting a program of study or entering the workforce will also find this study valuable.

Keywords: Information technology professional salary, salary gap and gender, wage differences

INTRODUCTION

President John F. Kennedy signed one of the most famous federal legislation relating to wages in 1963. Called the Equal Pay Act, this federal legislation made it illegal for employers to pay women less than men for jobs which are “substantially equal” (13). This new law was a major milestone in the social equity movement because his signature amended the Fair Labor Standards Act that did not address gender issues (12). The Civil Rights Act of 1965, that outlawed wage discrimination on the basis of race, color, sex, religion, national origin or disability, soon followed (14). In 1981 the Supreme Court made it clear that the Civil Rights Act prohibits wage discrimination even when the jobs are not identical.

About forty years have passed since the institution of the Equal Pay Act. In most industry sectors, women are still earning less than men. In the last ten years, the wage gap has narrowed by only four percent (5, 9). The small amount of progress has not deterred special interest groups and social equity experts in their quest to address and correct these phenomena. As a matter of fact, they have elevated the inequity issue to a new level. Wage inequality between men and women has become an issue that contains global, economic, social, legal, and political implications because “... equal pay is essential to attracting the best workers and keeping America competitive in this global economy” (3).

STATEMENT OF THE PROBLEM

Towards the end of the last millennium, the United States economy grew at a rate previously thought impossible. Cutting edge information technology helped transform businesses, produced enormous wealth, dampened inflation, increased productivity, created high-wage jobs, and

changed the way individuals work and live. Most people were financially better off during the economic expansion period. Individuals employed in the IT sector did particularly well. Their salaries were 85 percent higher than those enjoyed by the private sector as a whole (7, 10).

While it is true that many women did remarkably well during the economic boom period, women in this field were found to have earned less than their male counterparts, regardless of equivalent work of commensurate skill, effort, responsibility and working conditions (2, 5, 6, 11). A number of studies have even attempted to explain and account for the wage discrepancy. Some of the more common excuses offered are personal and job characteristic differences, that women are less comfortable in technical fields, and that women lack salary negotiation and assertiveness skills (1, 8). However, most of these attempts are weak justifications and do not have the type of scientific evidence to explain away the discrepancy (4).

STATEMENT OF THE OBJECTIVE

This study examines the wage differences reported by four categories of IT professionals from 1991 through 2001. Specifically, this study identifies the category of jobs contributing to the phenomenon, the magnitude of the differences, and trends, if any. The findings reported should be of interest to equity experts, federal and state policy makers, gender issues researchers, human resource managers, information technology professionals, and labor attorneys. Educators, placement counselors, and students selecting a program of study or entering the workforce will also find this study valuable.

METHODOLOGY

Data for this study were obtained from a federal source called *Employment and Earnings*. This annual publication is produced by the United States Department of Labor and is available free of charge. A total of eleven annual publications covering the period 1991 through 2001 were obtained for this study. The United States Census collects the raw data. Called the Current Population Survey (CPS), the data are collected monthly for the Bureau of Labor Statistics from a scientifically selected national sample of 50,000 households in all 50 states and the District of Columbia.

According to the Bureau of Labor Statistics, the wages reported are expressed in constant dollars rather than current dollars. The Consumer Price Index (CPI) is used for converting current dollars to constant dollars. Usual weekly earnings included wages, overtime pay, commissions and tips before taxes. All self-employed workers are excluded. "Usual weekly" is defined as half the weeks worked during the past four or five months. The reported data are estimated median wages. "Median" is defined as the amount that divides given earnings distribution into two equal groups, one above the median and one below. Ten percent of a given distribution have earnings below the upper limit of the first decile (90 percent have higher earnings); 25 percent have earnings below the upper limit of the first quartile (75 percent have higher earnings); 75 percent have earnings below the upper limit of the third quartile (25 percent have higher earnings); and 90 percent have earnings below the upper limit of the ninth decile (10 percent have higher earnings). The procedure for determining the median of earnings distribution places each reported weekly earning value into a \$50-wide interval, centered on a multiple of \$50. The

actual value of the median is estimated through the linear interpolation of the interval in which the median lies.

There is a 90 percent level of confidence that an estimate based on a sample will differ by no more than 1.6 standard deviations from the true population value because of sampling error. Standard errors and earnings estimates are rounded for presentation purposes. Data are subject to non-sampling errors such as failure to sample a segment of a population, inability to obtain information or unwillingness of respondents to provide correct information. Individual differences such as length of employment, experience and skill level are excluded.

Information technology workers are classified into four subgroups. They include (a) mathematicians and computer scientists (MSC), (b) computer systems analysts and scientists (CSAS), (c) operations and systems researchers and analysts (OSRA), and (d) computer programmers (CP). The overall population is defined as the general workforce 16 years and older and who are employed full-time.

Three methods were used to examine the data set. First, raw data, in the form of constant dollars, were used to convey the actual weekly earnings of the two groups. Second, indices were generated and used to examine the long-term behavior of the earnings. The base year used was 1991. Finally, percentages between immediate years were computed and used to examine the short-term behavior of the data set.

FINDINGS

Table 1. Weekly Median Constant Dollar Earnings of IT Professionals

CATEGORY	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
MEN:											
MCS	\$823	\$839	\$879	\$874	\$895	\$929	\$947	\$986	\$1,056	\$1,055	\$1,159
CSAS	\$822	\$846	\$868	\$880	\$910	\$931	\$952	\$996	\$1,079	\$1,065	\$1,161
OSRA	\$809	\$803	\$901	\$817	\$799	\$889	\$926	\$937	\$952	\$986	\$1,074
CP	\$687	\$723	\$773	\$759	\$762	\$797	\$869	\$884	\$935	\$968	\$975
WOMEN:											
MCS	\$707	\$712	\$724	\$738	\$754	\$790	\$842	\$859	\$876	\$901	\$898
CSAS	\$732	\$730	\$766	\$761	\$783	\$813	\$850	\$890	\$907	\$922	\$918
OSRA	\$683	\$687	\$655	\$691	\$698	\$737	\$826	\$750	\$781	\$817	\$819
CP	\$609	\$608	\$694	\$693	\$681	\$741	\$742	\$715	\$788	\$868	\$867
GAP:											
MCS	\$116	\$127	\$155	\$136	\$141	\$139	\$105	\$127	\$180	\$154	\$261
CSAS	\$90	\$116	\$102	\$119	\$127	\$118	\$102	\$106	\$172	\$143	\$243
OSRA	\$126	\$116	\$246	\$126	\$101	\$152	\$100	\$187	\$171	\$169	\$255
CP	\$78	\$115	\$79	\$66	\$81	\$56	\$127	\$169	\$147	\$100	\$108
Average	\$103	\$119	\$146	\$112	\$113	\$116	\$109	\$147	\$168	\$142	\$216

As can be seen in Table 1, there were continuous wage gaps between the two groups from 1991 through 2001. First, in all four categories examined, men consistently received higher weekly median earnings than women. Second, the size of the gaps was different from one year to the next indicating that attempts were made to correct the inequity. However, the sudden and dramatic increases during subsequent years also provided strong evidences to show the amount of market resistance to correcting the phenomenon.

In constant dollars, the gaps appeared to have grown larger rather than smaller. In all four categories during the eleven years, the differences in weekly earnings between men and women were positive. In constant dollar terms, the gap appeared to have widened in every category. In general, it can be said that upon till 2000, women were receiving approximately 12 to 15 percent less than males each week. For example, women received an average weekly median income of \$103 less than males in 1991. In 2001, those gaps more than doubled and widened to \$216 in constant dollars. These real money differences translated to about 20 to 25 percent.

Using 1991 as the base year, an analysis of the long-term behavior of the raw data appeared to exhibit many of the same outcomes. There was one major difference. Compared to male programmers, female programmers showed a bigger index in 2000 because they had a major increase that year. In 2001, both groups have the same growth index. Other details about the long-term behavior of the data set are presented in Table 2.

Table 2. Index of Weekly Median Earnings of IT Professionals

CATEGORY	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
MEN:											
MCS	100	102	107	106	109	113	115	120	128	128	141
CSAS	100	103	106	107	111	113	116	121	131	130	141
OSRA	100	99	111	101	99	110	114	116	118	122	133
CP	100	105	113	110	111	116	126	129	136	141	142
WOMEN:											
MCS	100	101	102	104	107	112	119	121	124	127	127
CSAS	100	100	105	104	107	111	116	122	124	126	125
OSRA	100	101	96	101	102	108	121	110	114	120	120
CP	100	100	114	114	112	122	122	117	129	143	142
GAP:											
MCS	N/A	1	5	2	2	1	-4	-1	4	1	14
CSAS	N/A	3	1	3	4	2	0	-1	7	4	16
OSRA	N/A	-2	15	0	-3	2	-7	6	4	2	13
CP	N/A	5	-1	-4	-1	-6	4	12	7	-2	0
Average	N/A	2	5	0	1	0	-2	4	6	1	11

In three of the four categories examined, the indices for male IT professionals were always larger than those for female IT professionals. These three categories were MCS, CSAS, and OSRA. In

2001, all indices in the male category showed an increase. In the female category, they were either stagnant or lower. As a result of these outcomes, the largest wage gap between the two groups occurred in 2001. The OSRA category showed the slowest index growth during the eleven years. The gap between the two groups was a 13. The CSAS category was one of two categories that showed the fastest index change. However, the male CSAS index was larger than those of females by a factor index of 16. The CP category showed the fastest index growth. In 2001, there was a major change and as a result, the index for female CPs was equal to that for male CPs. On average, and with the exception of 1997, male IT professionals showed a larger index than their counterparts. Despite the major change in the female CP category in the latter two years, the average male IT professional is still better off than an average female IT professional by a factor index of 11.

Table 3. Percent Change Between Years in Weekly Median Earnings of IT Professionals

CATEGORY	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01	91-01 Total
MEN:											
MCS	1.94	4.77	-0.57	2.40	3.80	1.94	4.12	7.10	-0.09	9.86	35.26
CSAS	2.92	2.60	1.38	3.41	2.31	2.26	4.62	8.33	-1.30	9.01	35.55
OSRA	-0.74	12.20	-9.32	-2.20	11.26	4.16	1.19	1.60	3.57	8.92	30.65
CP	5.24	6.92	-1.81	0.40	4.59	9.03	1.73	5.77	3.53	0.72	36.11
Average	2.34	6.62	-2.58	1.00	5.49	4.35	2.91	5.70	1.43	7.13	34.39
WOMEN:											
MCS	0.71	1.69	1.93	2.17	4.77	6.58	2.02	1.98	2.85	-0.33	24.37
CSAS	-0.27	4.93	-0.65	2.89	3.83	4.55	4.71	1.91	1.65	-0.43	23.11
OSRA	0.59	-4.66	5.50	1.01	5.59	12.08	-9.20	4.13	4.61	0.24	19.89
CP	-0.16	14.14	-0.14	-1.73	8.81	0.13	-3.64	10.21	10.15	-0.12	37.66
Average	0.21	4.03	1.66	1.09	5.75	5.84	-1.53	4.56	4.82	-0.16	26.26
GAP:											
MCS	1.23	3.08	-2.50	0.23	-0.97	-4.64	2.10	5.12	-2.94	10.19	10.89
CSAS	3.19	-2.33	2.03	0.52	-1.52	-2.29	-0.09	6.42	-2.95	9.45	12.43
OSRA	-1.33	16.86	-14.82	-3.21	5.67	-7.92	10.39	-2.53	-1.04	8.68	10.76
CP	5.40	-7.22	-1.67	2.13	-4.22	8.90	5.37	-4.44	-6.62	0.84	-1.54
Average	2.12	2.60	-4.24	-0.08	-0.26	-1.49	4.44	1.14	-3.39	7.29	8.14

Using percentages between immediate years, there were some clearer evidences of attempts to narrow the weekly median earnings gap between the two groups. In three of the four categories, the differences in the percentage of change between immediate years do not appear to fit any patterns. Within each group, they appear to change between positive and negative values suddenly. One category, women MCS, showed consistent pay increases between years. Every year's percentage change was positive until 2000. Other details about the behavior and magnitude of changes between the respective consecutive years are presented in Table 3.

In 1998 through 2001, the women CP category showed very dramatic weekly median income increases. The difference was in the double digits. As a matter of fact, this is the only category that female did better than males in most years. In all four categories, 2001 was the worst year because women reported a wage stagnation or reduction while men continued to receive pay increases. This phenomenon brought about the largest annual pay gap between the two groups. Again, the OSRA category showed the lowest percentage change throughout the eleven years examined. In other words, irrespective of gender, this category did the poorest in terms of increase. As expected, women IT professionals showed the smaller percentage change. The bigger gaps between the two groups were in the CSAS and OSRA category.

SUMMARY AND CONCLUSION

In the past eleven years, this study found that women IT professionals were consistently earning less than their male counterparts. Using data from the United States Department of Labor, the outcomes reported here provided concrete evidences to show that there was a wage gap within the four categories of male and female IT professionals.

- In constant dollar terms, the wage gap is a real phenomenon. Since 1991 and as recent as 2001, female IT professionals in comparable job categories were earning less money than their male counterparts. This wage gap is found in all the categories examined. There was a dramatic widening of the gap in 2001.
- The individual group growth in earnings, as measured using 1991 as the base year, showed that the only category that female weekly median earnings are growing faster than their male counterparts is in the computer-programming (CP) sector. That is brought about by a major jump in the weekly median earnings index of female CPs in 2000 and 2001. They shared the same index in 2001.
- The individual group change in earnings, as examined using the percentages between years, fluctuated from one year to another showing that there was some attempts at minimizing the inequity. However, taken over the eleven-year period, the women group is still about 8 percent behind, on average.
- Irrespective of gender, OSRA is the slowest growing category.
- During the first ten-year period studied, women were earning about 12 to 15 percent less in real dollar terms each week than their male counterparts. That gap has widened in real dollar terms to about 20 to 25 percent in 2001.

Like the population at large, this study found that the difference in weekly median wage earnings of males and female IT professionals was rather substantial. That average difference ranged from a low of \$103 to a high of \$216 per week. Converting these ranges to an annual amount and based on the year 2001 figures, it takes the average woman IT professional 15 to 16 months to make the same amount of constant money as her average male counterpart make in one year. Even though the long-term growth index and the percentage of increase between consecutive years are showing some trends that can minimize the wage gap, both these trends must be interpreted with caution. It must be pointed out that their beginning base measures are different. For example, the indices for female computer programmers showed double digits increases in 1999 and 2000. As a result, their ending index in 2000 was larger than their male counterparts. However, in real dollars, female computer programmers started with a lower base figure. In 2001, they are still making \$108 less a week than their male counterparts.

Irrespective of reasons, causes, and excuses, this pay inequity found here is a sensitive human resource issue. As a result, the findings in this study should be taken seriously. Wage discrepancies can lead to expensive lawsuits between employees and their employers. It is also bad for corporate morale. From a society's point of view, unequal compensation based on any kind of race, class, and gender issues is also unhealthy for the economy. Finally, in the case of the methodology applied in this study, indices and percentages are found to be useful for evaluating long term and short-term progress. However, this inequity can only be resolved satisfactorily when the real dollar difference between the two groups is minimized. To achieve that objective and given the dramatic wage gap in 2001, it could take several years of double-digit pay adjustments before the two groups can be considered equal.

ACKNOWLEDGEMENTS

The research effort was supported in part by a grant from the Computing and Information Technology Center at the University of Texas Pan American.

REFERENCES

1. England P. (1992). *Comparable Worth: Theories and Evidence*. New York: Aldine de Gruyter.
2. Fabris, Peter. (March 1998). For What You're Worth, *CIO Magazine*, 11(10), 60-66.
3. Garza, Irasema. (June 22, 2000). Worth More Than We Earn: Fair Pay for Working Women, retrieved February 22, 2001 from <http://www.dol.gov/dol/wb/public/programs/fpcworth.htm>
4. Levine, Linda. (June 12, 2000). Congressional Research Service Report for Congress 95-661: The Male-Female Wage Gap: A Fact Sheet, retrieved February 24, 2001 <http://www.cnie.org/nle/econ-65.html>
5. Mason, Bob. (March 2001). What Women Want (Equal Pay Task Force), *People Management*, 7(5), 53.
6. Matevaschuk, Jennifer. (April 1999). Gender Gap is Smaller in Technology, *InformationWeek*, (731), 54.
7. Menezes, Joaquim. (August 1999). Pay Rates Reveal IT's Gender Gap, *Computing Canada*, 25(31), 11-12.
8. Pfeffer, J., and Davis Blake. (1987). The Effect of the Proportion of Women on Salaries: The Case of College Administrators, *Administrative Science Quarterly*, (32), 1-24.
9. Rowel, Arden. (January 15, 2001). The Fence: Should Women Earn the Same as Men? retrieved February 26, 2001 from <http://www.thefence.com/debate.asp3fforumid%3D234>
10. Shapiro, Robert J., L. Price, and J. Mayer. (2000). *Digital Economy 2000*. Office of Policy Development, Economic and Statistics Administration Washington, D.C.: U. S. Department of Commerce, xiii.
11. Trombly, Maria. (February 2001). Wall Street IT Women Trail Men in Pay, *Computerworld*, 35(7), 14.
12. United States Code. (1938). Fair Labor Standards Act, Section 209.
13. United States Code. (1963). Equal Pay Act. Section 206(d), Volume 29, Pub. L 88-38.
14. United States Code. (1965). Civil Rights Act. Pub. L 88-3.
15. Wilde, Candee. (June 2000). Women in IT Strive for Equal Job Compensation, *InformationWeek*, (790), 226-229.