

Is the Glass Ceiling Cracking?: A Simple Test

Ting Hu
Business School, Tulane University

Myeong-Su Yun
Economics, Tulane University

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Correspondence:

Myeong-Su Yun, Department of Economics, Tulane University, 206 Tilton Hall, New Orleans, LA 70118, USA. Phone: +1 504 862-8356. Fax: +1 504 865-5869. Email: msyun@tulane.edu.

The glass ceiling is generally thought of as the transparent but real barriers which impede qualified women and other minorities from advancing up the job ladder into high level management positions. As any topic related to discrimination, it has been debated whether the glass ceiling exists or not. However, it is widely believed that a glass ceiling exists and that it operates substantially to exclude minorities and women from top levels of management. We ask whether the gender gap in high-paying and high-skill labor markets in terms of compensation and ranking has changed recently. If there exists the glass ceiling, it is quite likely to affect the gender gap in the high-paying and high-skill labor markets.

Our samples come from ExecuComp database for 14 years from 1992 to 2005. This database has been widely used in studying the gender gap in the high profile executive labor market (e.g., Bertrand and Hallock, 2001). The proportion of women in the sample has consistently increased from 1.37% (1992) to 6.85% (2005). The progress of women in executive labor market can be confirmed when we look at share of women in top rank jobs (CEO, Chair, Vice-Chair, and President), that is, 0.80% in 1992 to 4.30% in 2005, or the share of women in the top quintile in compensation that is, from 8.22% in 1992 to 12.67% in 2005. This may show that the status of women has gradually improved over last 14 years. When we look at the ratio of women's compensation to men's, women's compensation has been substantially lower than men's (less than 70%) and only recently it has increased to more than 70% of men's.

These descriptive statistics suggest there a substantial gender gap in terms of ranking and compensation. We first run regressions for compensation and probits for top ranking or not, with a gender variable (Female = 1) as one of the independent variables. This

exercise will show whether there are significant disparities between men and women in terms of compensation and ranking, if the estimate of the dummy variable Female is significant.

[Table 1 here]

As shown in the Table 1, the gender dummy variable Female is significant during years, except for 1997 and 1998 of regression of log-compensation. This means that there may be substantial gender disparities in both compensation and promotion to top rank jobs; it may indicate the existence of a glass ceiling.

Some may believe that the glass ceiling has weakened recent years judging from the higher representation of women in the executive labor market, in particular, in top ranking jobs. The coefficients of Female in the regression of compensation show that the gender disparities decrease until the late 1990s, then increases again. On the other hand, the coefficients of Female in the probit of top rank jobs show that the gender disparities may have decreased consistently.

To test whether the glass ceiling is cracking or not in recent years, we employ two test strategies; first, we test whether the coefficient of Female has changed substantially when compared to earlier years. Since the coefficient of Female represents disparities between men and women, this test can show whether there is a systematic change in the disparities over time. We apply the same binary comparison using estimates and variance from year-by-year regressions and probits.

[Table 2 here]

The results are shown in the Table 2. The binary comparison tests do not show consistently improving gender disparities. The year-by-year estimates of Female seem to indicate weakening until late 1990s and then restoration of the glass ceiling judging from the compensation regression. It is a little disappointing that the binary comparisons of Female estimates in the probit of top ranking jobs do not show significant changes over time, hence no statistically significant weakening of the glass ceiling. It is because that the descriptive statistics show that there has been consistent increase in the proportion of females in the top ranking jobs and the estimates of Female have decreased over time.

Our second test strategy is using difference-in-difference type analysis after pooling the samples. We run regression and probit including dummy variable of Female, year dummy variables, and interaction terms of Female and year dummy variables, in addition to other controlling variables. The estimates of the interaction terms are reported in Table 3.

[Table 3 here]

The estimates of the interaction terms of Female and year dummy variables show stronger results against cracking the glass ceiling. The year-by-year estimates of Female seems to indicate there might be weakening until the late 1990s and then restoration of the glass ceiling judging from the compensation regression. This results in a few significant binary comparison outcomes in the Table 2. The year-by-year probit

estimates of Female, though showing gradual improvement, do not show any significant changes. The difference-in-difference type estimates of the interaction terms show that basically there have been no significant changes in the glass ceiling whether studied using regression of compensation or probit of top ranking jobs.

Judging from compensation, researchers conclude that there was substantial improvement in addition to consistent increase in the share of female executives, but this phenomenon does not continue in recent years. In short, our test strategies show that some talks that there might be weakening of the glass ceiling and reducing gender disparities are more or less a myth which might be more promising in the late 1990s but have not materialized in the new century.

Reference

Bertrand, Marianne and Kevin F. Hallock (2001), "The gender gap in top corporate jobs," *Industrial and Labor Relations Review*, 55, 3-21.

Table 1. Estimate of Female

	Compensation (Regression)		Top Rank (Probit)	
	Estimate	(S.E.)	Estimate	S.E.
1992	-0.225**	(0.090)	-0.528***	(0.154)
1993	-0.171***	(0.058)	-0.492***	(0.114)
1994	-0.196***	(0.060)	-0.700***	(0.100)
1995	-0.161***	(0.044)	-0.726***	(0.092)
1996	-0.155***	(0.044)	-0.603***	(0.079)
1997	-0.051	(0.041)	-0.673***	(0.073)
1998	-0.059	(0.040)	-0.606***	(0.071)
1999	-0.107***	(0.040)	-0.608***	(0.066)
2000	-0.078**	(0.038)	-0.622***	(0.064)
2001	-0.151***	(0.043)	-0.610***	(0.062)
2002	-0.181***	(0.033)	-0.603***	(0.060)
2003	-0.090***	(0.027)	-0.555***	(0.058)
2004	-0.132***	(0.028)	-0.499***	(0.056)
2005	-0.107***	(0.026)	-0.490***	(0.058)

Note: ***, **, and * denote significance at the 1, 5 and 10 percent respectively. The dependent variable for the regression and probit are log compensation and a binary variable of top rank. Independent variables include firm characteristics; market value of the firm, sales, assets, and industry in addition to the gender variable of Female. Regression of compensation also includes a dummy variable of top rank as one of independent variables.

Table 2-1. Binary Comparison of Regression Estimates of Female

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1992	0	0	0	0	0	*	*	0	0	0	0	0	0	0
1993	0	0	0	0	0	*	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	**	*	0	*	0	0	0	0	0
1995	0	0	0	0	0	*	*	0	0	0	0	0	0	0
1996	0	0	0	0	0	*	0	0	0	0	0	0	0	0
1997	*	*	**	*	*	0	0	0	0	*	**	0	0	0
1998	*	0	*	*	0	0	0	0	0	0	**	0	0	0
1999	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	*	0	0	0	0	0	0	0	**	0	0	0
2001	0	0	0	0	0	*	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	**	**	0	**	0	0	**	0	*
2003	0	0	0	0	0	0	0	0	0	0	**	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0	0	*	0	0	0

Note: ***, **, and * denote significance at the 1, 5 and 10 percent respectively.

Table 2-2. Binary Comparison of Probit Estimates of Female

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1992	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0	0	*	*
1995	0	0	0	0	0	0	0	0	0	0	0	0	**	**
1996	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0	0	0	0	*	**
1998	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	*	**	0	*	0	0	0	0	0	0	0	0
2005	0	0	*	**	0	**	0	0	0	0	0	0	0	0

Note: ***, **, and * denote significance at the 1, 5 and 10 percent respectively.

Table 3. Estimates of Interaction Terms of Female and Year Dummy Variables

	Compensation (Regression)		Top Rank (Probit)	
	Estimate	(S.E.)	Estimate	(S.E.)
1993	0.060	(0.112)	0.043	(0.191)
1994	-0.000	(0.112)	-0.167	(0.183)
1995	0.021	(0.104)	-0.196	(0.179)
1996	0.041	(0.104)	-0.066	(0.173)
1997	0.136	(0.103)	-0.133	(0.170)
1998	0.117	(0.102)	-0.071	(0.169)
1999	0.075	(0.102)	-0.070	(0.168)
2000	0.110	(0.102)	-0.081	(0.167)
2001	0.033	(0.103)	-0.066	(0.166)
2002	0.007	(0.100)	-0.063	(0.165)
2003	0.091	(0.098)	-0.020	(0.164)
2004	0.048	(0.098)	0.035	(0.164)
2005	0.079	(0.098)	0.042	(0.165)

Note: ***, **, and * denote significance at the 1, 5 and 10 percent respectively. No estimates are significant. The dependent variable for the regression and probit are log compensation and a binary variable of top rank. Independent variables include firm characteristics; market value of the firm, sales, assets, and industry in addition to the gender variable of Female, year dummy variables and the interaction terms of Female and year dummy variables. Regression of compensation also includes a dummy variable of top rank as one of independent variables.