University of Michigan Medical School Gender Salary Study:

Summary of Initial Findings

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Acknowledgements

This report reflects the combined efforts of a number of individuals from across the University of Michigan.

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Introduction

This report presents a summary of the findings of a statistical analysis of University of Michigan Medical School tenured and tenure-track faculty salaries. This study was conducted as a follow-up to an earlier analysis of University of Michigan tenured and tenure-track faculty in the Medical School (Courant, Corcoran, et al., 2005). The original Medical School faculty salary study was completed in 2005 and used 2001 salary data. (Hereinafter referred to as the 2005 medical salary study.) The goal of the current study was to update the analyses of the 2001 data using a similar approach but more recent salary data, from 2009. This report provides a "replication" of the previous results using the most current data, defining both the population under study and the variables used in the analysis as similarly as possible to the earlier study. In addition, we have extended the analysis in an effort to improve on the earlier studies. We are careful to distinguish between new and replicated analyses.

Both the earlier salary analyses and the current work were sponsored by the Office of the Provost and Executive Vice President for Academic Affairs, and conducted by groups of faculty and staff. The Medical School studies, including this one, draw upon the expertise of senior staff from the Medical School and from the Office of Academic Affairs. The detailed knowledge of both groups was essential to making analytic sense of administrative data generated by one complicated organization that sits within another complicated organization.

As with the previous studies we were especially interested in using the analysis to explore the possibility that there are systematic differences in pay by gender, and to provide baseline information for the provost and deans to better understand the structure of compensation among faculty. For reasons discussed in more detail in what follows, we interpret the estimates descriptively rather than causally and encourage the reader to do the same.

Population

The intent of the study is to examine compensation for regular tenure and tenure-track faculty in the Medical School. A number of adjustments were made in order to assure that the data were comparable (in the literal sense of affording comparison) across members of the population. The population is meant to be what one would normally think of as assistant professors, associate professors, and professors on the tenure track in the Medical School. To that end, the population included in this study consists of faculty members who met both of the following criteria for the twelve-month period from July 1, 2008 to June 30, 2009: (1) they held at least one paid Medical School appointment as professor with tenure, associate professor with tenure, or assistant professor, and (2) including other Medical School or University appointments, they were full-time over the twelve-month period. Faculty with Veterans Affairs Medical Center (VAMC) appointments were included if the combination of VAMC and University of Michigan appointments equaled full-time status and all other study criteria were fulfilled.

Faculty on public service, personal, extended sick, retirement or disability leaves were excluded. The study sample also excludes faculty who held only research track or clinical-titled appointments, along with faculty who held only DVM or DDS degrees. In the 2005 medical salary study faculty with administrative appointments whose salaries were primarily determined by their administrative duties were excluded. In the current study, faculty members with administrative appointments are included and categorized as either “normal” or “senior/super” administrators, with the latter category being those whose salaries are primarily determined by their administrative appointments; Appendix 1 (Page 22) lists the job titles associated with the two categories of administrators.

Dependent Variable

Compensation in the Medical School is complicated, and several of its components have changed since the previous study, with the result that data used in the 2009 analysis are not strictly comparable to the 2001 data used in the 2005 analysis. On the advice of staff members closely involved with Medical School pay, we determined that the measure of compensation that accords most closely with the idea of regular pay for professorial work in the Medical School (and that is, as a result, closest to the analogous measure in the previous study) consists of the sum of the following elements:

Full time academic salary (as of 6/1/09)
Supplement amount (as of 6/1/09)
Incentive payment made (10/1/08 – 9/30/09)

The "full time academic salary" category is capped in some departments and not in others. As a practical matter, the "full time academic salary" is supplemented by one or more other categories of pay for most faculty members. The category "supplement" is set annually during the merit process, and is based on clinical and research performance, market variability, retention, and group performance recognition. The "incentive" is used as a bonus to reward research, teaching and clinical productivity. Usage of "supplement" and "incentive" varies by department in terms of which activity categories they recognize. For our purposes, these differences in terminology are unimportant (See Appendix 2 (Page 23) for detailed explanation of salary components).

Two other components also play a role in Medical School compensation:

Administrative differentials (as of 6/1/09)
Market adjustment (as of 6/1/09)

Administrative differentials and market adjustments were not analyzed in the 2005 medical salary study but are important components of regular pay for some faculty. (We chose not to include administrative differentials in the 2005 medical salary study because we concluded that they were related to the

administrative role of the individual rather than his/her faculty role. Market adjustment was not included in the 2005 medical salary study because it was not utilized by the Medical School at that time.) Administrative differentials are set based on fair market value for the responsibilities being performed in an administrative position. Market adjustments are paid to faculty, chairs and associate deans based on information provided by the Association of American Medical Colleges (AAMC) faculty salary and dean salary benchmarking surveys (see *Report on Medical School Faculty Salaries 2008-09,* Association of American Medical Colleges and Appendix 2 "Faculty Salary Component Definitions" Page 23). We consider alternative compensation measures that include these components as a sensitivity analysis. Appendices 3 and 4 (Pages 25 and 26) provide detailed crosswalks between the components of compensation in the 2001 and 2009 data and the salary variables used in the two studies, respectively.

All of the analyses reported in the main text use the earnings measure referred to in Appendix 4 as "SUM4". It includes the academic salary, the incentive component and the supplement, but omits administrative differentials and market adjustments. In general, the results differ very little when we use alternative earnings measures; we note in the text when they do.

In our regression (and quantile regression) analyses, we use the natural log of earnings as the dependent variable, rather than the level. We do this because a large body of literature in labor economics suggests that the log form yields a better fit in studies of earnings than does the level form. With the natural log of earnings as the dependent variable, the estimated coefficients have an (approximate) interpretation as the percentage change in expected earnings in response to a one unit change in the conditioning variable.

Conditioning Variables

In some of our analyses, we will statistically control for certain observed faculty characteristics correlated with both compensation and gender. Our choice of conditioning variables is constrained by what is available in the university's administrative payroll data and thus does not include direct measures of faculty productivity such as the quality and quantity of research publications, the quality and quantity of teaching, graduate student placement, or the volume of clinical services provided.

We present two sets of multivariate analyses. The first, which we call Model 1, includes the following conditioning variables:

1. Indicator for female
2. Indicators for race / ethnicity categories
3. Years employed at Michigan
4. Degree type (Ph.D., M.D. or D.O., both)
5. Indicators for department categories[1]
6. Indicators for administrative appointments
7. Fraction VAMC appointment
8. Indicator for an appointment outside the medical school
9. Natural log of market ratio
10. Indicator for being on sabbatical

Appendix 6 (Page 28) describes the conditioning variables in more detail while Appendix 7 (Page 29) provides descriptive statistics. These conditioning variables are identical to those in the 2005 Medical salary study, with the sole exception, noted above, of how we handle the indicator variables for faculty with administrative roles.

The market ratio variable captures outside market forces by measuring the average relative pay by field in a national set of institutions compiled by the Association of American Medical Colleges

[1] Appendix 5 (Page 26) shows the correspondence between departments and unit affiliations. We coded faculty with multiple appointments based on actual faculty FTE in each of the relevant departments. Categories were chosen informally to combine similar departments and avoid small cell sizes.

(AAMC). When computing market ratios for University of Michigan Medical School faculty, AAMC statistics for "Ph.D. or Other Doctoral Degree" were used to compare our seven basic science departments, and salary data were mapped to the Basic Science Departments national data. All other UM departments were mapped to the AAMC Departmental Salary Statistics Report for "M.D. Degree/Clinical Sciences." (*Report on Medical School Faculty Salaries 2008-2009*, Association of American Medical Colleges.)

Model 2 includes all of the variables included in Model 1 along with:

11. Indicator variables for current rank (assistant professor, associate professor, professor)
12. Indicators for years in rank categories
13. Interaction of rank indicators and years in rank category indicators

The literature on pay differentials by gender and race in the academy contains extended discussions of how to appropriately control for rank and years in rank. On the one hand, rank is clearly an important indicator of professional accomplishment, and it is plainly the case that rank is and should be a powerful predictor of salary level. On the other hand, if the processes that determine salary levels treat women and men differently, it is plausible that there is differential treatment in the processes that determine rank, with the implication that the estimated coefficients on the rank variables, and time in rank variables may include the effects of differential treatment in addition to the effects of otherwise unobserved performance at research, teaching and service. This, of course, complicates, their interpretation as well as the interpretation of the gender indicator.

The 2005 medical school salary study included the following text:

> "There is evidence that women are promoted more slowly than men, and thus, many economists working in this area have argued that if one controls for rank and years in rank, one is over-controlling, with the result that the measured effect of gender on salary is understated in the model reported in Model (2). It is the view of the authors of this report that the actual difference in salary that can be attributed to gender lies between Model (1) and Model (2)."

In fact, despite the interpretational difficulties associated with using rank and years in rank as conditioning variables, this argument is incorrect. The reason is that our model clearly omits many other relevant conditioning variables that would be required for a causal interpretation of the coefficient on the gender indicator. Rank and years in rank provide only a crude proxy for these missing covariates and there is no *a priori* reason to think that any difference in treatment in promotion or timing of promotion by gender that is captured by the rank and time in rank variables would necessarily outweigh the effects of the missing covariates.

Because the administrative data we use for this study does not describe or evaluate the work that faculty actually do in the lab and the clinic, our models cannot control for all of the relevant factors in determining compensation, including factors that might vary systematically with gender. If there are systematic differences between men and women faculty in the kinds of clinical or research work they do, and how generously that work is compensated, then the differences will show up as gender differences. We suggest that in response to findings of gender differences in either or both of our models, the Medical School may want to perform further analysis to understand whether clinical and research activities account for some part of the differences in compensation between men and women faculty, and, if so, whether the Dean's Office can identify whether these differences in activities result from differences in choices that correlate with gender or from gender-specific barriers of some sort.

Statistical Methods and Interpretation

In addition to presenting descriptive statistics broken down by gender for both the dependent and independent variables, we follow the 2005 medical salary study in using the method of linear regression to estimate differences in mean salaries conditional on various observed characteristics. Linear regression is called "analysis of covariance" in some disciplines. This method "holds constant", in a statistical sense, these other variables, yielding a conditional difference in means that is purged of

differences that result from the correlation between gender and the observed characteristics included in the regression.

It is important to reemphasize that our regression analyses consider only some of the variables that should predict salary. They omit important factors that account for individual salary differentials, including measures of performance, scholarly reputation, as well as the quality and quantity of an individual's contributions to the institution and to his/her academic field. Though we use a regression model to predict salaries, we expect to see variation around those predicted salaries because individuals who are identical in terms of rank, medical specialty and other variables are likely to be different in terms of their specific academic contributions. Therefore, this analysis is most useful when used in conjunction with other data relating to measures of academic performance and contribution to the institution.

Results of the Replication Analysis

Table 1 (below) presents mean salaries of faculty at the University of Michigan Medical School by gender and rank. A total of 732 faculty members, including 172 women and 560 men, were analyzed in this study. The table shows that the average salary for women Medical School faculty is less than that of men, both overall, and at every rank. The average salary for women faculty in the Medical School was $185,440; while the average for male faculty was $239,024. Table 1 also reveals that part of this difference is clearly due to rank and time since degree. In particular, women are less likely than men to be full professors: only 34 percent of women are full professors, while 56 percent of men are full professors. The average female faculty member received her degree 21 years ago; the average male faculty member received his 24 years ago. However, even within ranks men's average salaries are consistently higher than those of women.

Table 1. Medical School Gender Salary Study 2009: Summary statistics for faculty by gender			
	WOMEN	MEN	ALL
Number	172	560	732
Mean Years since degree	21	24	23
Mean Years at UM	13	16	15
Mean Salary (*)	$185,440	$239,024	$226,433
Rank			
Assistant Professor	37%	21%	25%
Associate Professor	29%	23%	24%
Full Professor	34%	56%	51%
Mean Salary by Rank			
Assistant Professor	$149,987	$186,806	$173,787
Associate Professor	$187,991	$219,809	$211,011
Full Professor	$221,779	$266,228	$259,216
(*)Includes Full Time Academic Salary, Supplement and Incentive			

Table 2 (below) summarizes the results from our regression analyses; the full set of coefficient estimates appears in Appendix 8 (page 30). These analyses allow us to "hold constant" the effects of differences in observed characteristics, such as departmental affiliation, that correlate with both earnings and gender. Recall that we use the natural log of earnings as the dependent variable, so that the coefficients on the gender and race/ethnicity variables have the interpretation of approximate percentage differences. The first column of estimates in Table 2 (below) corresponds to Model 1, while the second corresponds to Model 2. The number in parentheses below each coefficient estimate is the estimated standard error.[2] We have included stars to highlight coefficient estimates that differ statistically from zero at conventional levels.

[2] Unlike the 2005 report, we provide standard errors that correct for the possibility that the error variance varies with conditioning variables, a possibility that is suggested by the fact that it varies by gender. In this particular context the correction does not make much difference to the magnitudes of the standard errors.

Table 2. Medical School Gender Salary Study 2009:
Effects of Gender on the Natural Log of Faculty Salaries

	MODEL	
	1	**2**
	coefficient (standard err.)	*coefficient (standard err.)*
Independent Variables		
Female	-0.074**	-0.039*
	(0.018)	(0.016)
Asian or Pacific Islander	-0.045	-0.014
	(0.027)	(0.025)
Black, American Indian, Alaskan Native, Hispanic	0.018	-0.002
	(0.043)	(0.038)
Gender and race are predictors	**X**	**X**
Controls for years at UM and type of degree(s)	**X**	**X**
Controls for department, market ratio, non-medical appointment, VAMC appointment, administrative appointment, and sabbatical	**X**	**X**
Controls for rank and years in rank		**X**
Adjusted R^2	0.733	0.792
(n)	732	732

* p<.05

** p<.01

The Model 1 estimates imply a conditional mean difference in compensation of about 7.4 percent between male and female medical school faculty. This differential in favor of male faculty is statistically significant at conventional levels. Model 2, which also conditions on rank and time in rank, yields a smaller, but still statistically significant, estimate of a 3.9 percent compensation disadvantage for women.

We repeated the estimation of Models 1 and 2 using alternative measures of earnings consisting of only academic salary, academic salary plus supplement plus incentive, academic salary plus supplement plus incentive plus administrative differentials and academic salary plus supplement, incentive, administrative differentials and market adjustments. The estimates appear in Appendix 9 (Page 31). For all but the first of these, changing the composition of the dependent variable changes the

estimated conditional mean differences by faculty gender very little. When using only academic salary ("SUM2") as the dependent variable, we find smaller (and in the case of Model 2, statistically insignificant) estimates, but we view this measure as inferior to the others because academic salaries are subject to ceilings in several Medical School departments.

The estimated coefficients on the female indicator from the 2005 medical salary study (see Table 2 of Courant, Corcoran et al., 2005 reprinted below) that correspond to our preferred estimates in Table 2 equal 7.5 percent for the analogue to Model 1 and 4.7 percent for the analogue to Model 2. Both estimates do not differ statistically from the corresponding estimates in the current study, indicating that, at least in terms of these conditional mean differences between male and female faculty members, the medical school salary structure has not changed appreciably.

2005 Medical Salary Study
Table 2
Effects of Sex on Faculty Salaries

	MODEL	
	1 *coefficient (standard err.)*	**2** *coefficient (standard err.)*
INDEPENDENT VARIABLES		
Female	-0.075 ** (0.024)	-0.047 * (0.021)
Asian or Pacific Islander	-0.032 (0.031)	-0.023 (0.028)
Black, American Indian, Alaskan Native, Hispanic	-0.002 (0.043)	0.034 (0.039)
Gender and race are predictors	**X**	**X**
Controls for years at UM and type of degree(s)	**X**	**X**
Controls for department, market ratio, non-medical appointment, VAMC appointment, administrative appointment, and sabbatical	**X**	**X**
Controls for rank and years in rank		**X**
Adjusted R^2	0.725	0.781
(n)	595	595

* p<.05
** p<.01

In addition to the differential in compensation related to gender, the coefficients of the control variables (not reported in Table 2 but reported in Appendix 8 (Page 30) in the regressions for Model 2 indicate that faculty with both a medical degree and a Ph.D. in a clinical department earn 11.2% less, on average, and faculty with both a medical degree and a Ph.D. and holding an appointment in a basic science department earn approximately 53% less, on average, than those with only a medical doctorate (M.D. or D.O.). Faculty with only a Ph.D. earn approximately 58% less, on average, than those with only a

medical doctorate. Individuals with normal administrative appointments earn 7.6% more, on average, than those without such appointments, and individuals with super administrative appointments earn approximately 22.3% more, on average, than those without such appointments. We also note in passing the surprisingly large r-squared values associated with both Model 1 and Model 2. The relatively small number of conditioning variables included in Model 1 account for over 70 percent of the variance in log earnings, using our preferred earnings measure; the corresponding figure for Model 2 reaches nearly 80 percent. The Medical School salary structure contains a great deal of systematic variation, much of it due to differences across department categories.

Patterns of wage differences can be further explored by identifying individuals who have unusually high or unusually low salaries. One way to do this is to tabulate data for individuals whose actual salaries are much higher (or much lower) than their predicted salaries based on the estimated regression model. For each faculty member in our sample, we predicted a salary using estimates from a regression model identical to Model 2 except for the omission of the gender indicator. We subtracted predicted earnings based on this model from actual earnings. When this difference is positive, actual earnings are higher than predicted by the variables included in the model. When this difference is negative, actual earnings are lower than predicted.

Table 3 (below) reports the numbers and proportions of men and women whose actual salaries are much higher (or lower) than their predicted salaries. The distributions of actual minus predicted salary differ significantly by gender.[3] Women's salaries are more tightly clustered around their predicted salaries than are men's salaries: 57% of women's salaries, but only 47.9% of men's salaries fall within one-half standard deviation of their predicted salaries, where the standard deviation refers to the residuals from the earnings equation. Less than 6% of women have salaries that are one or more standard deviations above their predicted salaries and only two women have a salary that is more than two standard deviations above their predicted salary. About 16% of men have salaries that are one or

[3] A chi-square test of grouped differences is significant at the 0.05 level.

more standard deviations above their predicted salaries, and 3% have salaries that are two or more standard deviations above their predicted salaries. We do not find meaningful gender differences when looking at salaries that are much lower than predicted.

Table 3. Medical School Gender Salary Study 2009:
Number of Appointments with Unusually High or Low Salaries

	Men	Women	ALL
TOTAL N =	560	172	732
Salary residual >2 standard deviations above the mean			
Category N=	17	2	19
% of TOTAL N	3.0%	1.1%	2.6%
Salary residual 1-2 standard deviations above the mean			
Category N=	72	7	79
% of TOTAL N	12.9%	4.1%	10.8%
Salary residual 0.5-1 standard deviation above the mean			
Category N=	68	21	89
% of TOTAL N	12.1%	12.2%	12.2%
Salary residual 0.5 above to 0.5 standard deviations below the mean			
Category N=	268	98	366
% of TOTAL N	47.9%	57.0%	50.0%
Salary residual 0.5 below to 1 standard deviation below the mean			
Category N=	70	21	91
% of TOTAL N	12.5%	12.2%	12.4%
Salary residual 1-2 standard deviations below the mean			
Category N=	50	19	69
% of TOTAL N	8.9%	11.1%	9.4%
Salary residual >2 standard deviations below the mean			
Category N=	15	4	19
% of TOTAL N	2.7%	2.3%	2.6%

Further Analyses: Quantile Regression

Our primary extension relative to the 2001 study involves the estimation of gender differences using quantile regression models. Quantile regression models estimate conditional quantile functions, where a quantile is, for example, a percentile of the conditional earnings distribution. Thus, for example, a median regression, which corresponds to a quantile regression at the median (or 50th percentile), allows us to estimate the difference in the conditional median between male and female Medical School faculty. Similarly, we also estimate quantile regression models for the 10th, 25th, 75th and 90th percentiles. Another way of thinking about quantile regression is as a more formal version of the residual analysis described in the preceding section. If, for example, the male earnings distribution, conditional on the covariates included in our models, has more outliers than the female distribution, this will show up in the quantile regressions as larger (in absolute value) gender differences in the quantiles that correspond to the tails of the distribution, such as the 10th and the 90th.

The estimated coefficients on the female gender indicator from these models appear in Table 4 (below). The upper panel of the table presents estimates using the 2009 data while the lower panel presents estimates based on the 2001 data used in the 2005 medical salary study.

Table 4. Medical School Gender Salary Study 2009: Quantile Regression Analyses

	SUM 4: 2009 Data (N=732) Parameter Estimate (SE) for Female				
	10th	25th	50th	75th	90th
Model 1	-.014 (.031)	-.050 (.020)*	-.061 (.017)*	-.077 (.026)*	-.094 (.030)*
Model 2	.036 (.029)	-.012 (.019)	-.024 (.013)	-.054 (.018)*	-.081 (.019)**
	SUM 4: 2001 Data (N=595) Parameter Estimate (SE) for Female				
	10th	25th	50th	75th	90th
Model 1	-.019 (.036)	-.035 (.020)	-.086 (.018)**	-.122 (.028)**	-.121 (.031)**
Model 2	-.014 (.033)	-.024 (.020)	-.051 (.017)*	-.070 (.021)*	-.092 (.031)*
	* p<.05				
	**p<.0001				

The results prove quite interesting. For the specification corresponding to Model 2, and thus including the rank and year in rank conditioning variables, the estimates are 0.036, -0.012, -0.024, -0.054, -0.081 for the 10^{th}, 25^{th}, 50^{th}, 75^{th} and 90^{th} percentiles, respectively. Substantively, at the low end of the distribution, female Medical School faculty members have higher earnings than male faculty, though the difference at the 10^{th} percentile is not statistically different from zero. At the upper end of the conditional distribution, male faculty salaries exceed female salaries by about five percent at the 75^{th} percentile and by over eight percent at the 90^{th} percentile. Both differences are statistically significant at conventional levels. The important substantive conclusion from this analysis is that whatever is generating gender differences in the conditional mean of earnings in the Medical School is going on primarily at the upper end of the conditional earnings distribution. That suggests a focus, in response to this report, on those male and female faculty members with large positive earnings residuals.

The lower panel of Table 4 shows that a very similar pattern holds in the 2001 data, though without the positive gender coefficient estimate at the 10^{th} percentile.

Further Analyses: Subgroups

We performed two subgroup analyses of interest. In the first, we investigated whether the patterns already described hold for faculty hired before 2002 (Appendix 10 – Page 32). These faculty were included as subjects of the 2005 study and some of them were surely affected by salary adjustments made in response to that study. The second group consists of faculty hired during or after 2002. This group is included in the 2009 data but not in the 2005 study. This subgroup analysis is particularly interesting in light of the salary adjustments made in response to the earlier study.

For the sample of faculty members hired before 2002, again using the natural log of the academic salary plus the supplement plus incentive pay ("SUM4") as the dependent variable, Model 2 yields an estimated gender differential of -0.0248 in favor of men with a standard error of 0.0204. In contrast, Model 2 estimated on data using only faculty members hired during or after 2002, a group that includes not only junior faculty but also many senior faculty members, yields an estimated gender differential of -0.0635 with a standard error of 0.0272. The latter estimate, but not the former, is statistically significant at conventional levels. This subgroup analyses indicates that the overall gender differential discussed above is concentrated among faculty members hired during or after 2002.

We also estimated separate versions of Model 1 by rank (Appendix 11 – Page 33). This can be thought of as a version of Model 2 in which all of the conditioning variables are interacted with the rank indicators. We obtained estimated gender differences in conditional mean earnings of -0.0500, -0.0498, and -0.0047 for assistant professors, associate professors and professors, respectively; in all cases the differences favored men. The estimate for assistant professors is statistically significant, while that for associate professors is significant at the 10 percent level and that for full professors is not significant. These findings suggest that the overall mean gender differential discussed above is concentrated among junior faculty.

Summary and Conclusions

This study has identified a number of important and interesting findings based on our analysis of the 2009 Medical School faculty earnings data:

1. Even our simple regression models explain a surprising amount of the variation in the salary data. In quantitative terms, the relatively small number of covariates we include account for over 70 percent of the variance in log earnings in both Models 1 and 2. Much of the action here is the department category indicators.

2. The overall conditional mean differences in earnings between female and male Medical School faculty members differ surprisingly little from those found in the 2005 Medical salary study. This is true for both the model without rank and time in rank and the model that includes those variables, though the difference is smaller in the latter model. In both cases, the mean difference favors male faculty, by just under eight percent in Model 1 and just over four percent in Model 2. We note again that, because we omit numerous relevant productivity-related variables from both models, the results are descriptive and suggestive, rather than causal or definitive.

3. Our quantile regression analysis revealed that the gender differences in Medical School faculty earnings are concentrated in the upper quantiles (i.e. the upper right tail) of the "conditional" earnings distribution. Below the conditional median, male and female faculty members do not appear very different.

4. Subgroup analyses indicated that the overall difference in mean earnings is concentrated among faculty hired during or after 2002 and among junior faculty.

Appendix 1:
Administrative Titles Assigned to the Normal and Super Categories

Normal Administrators	
101	ACU Director
102	ACU Director and Division Chief
103	Added Duties
104	Assistant Chair
105	Associate Chair
105	Associate Chair for Research
105	Associate Chair Peds
106	Associate Chief Clinical Res
107	Administrative Duty outside Medical School
108	Associate Dean & Director
109	Associate Director
110	Associate Division Chief
111	Associate Division Chief and Cancer Assoc Director
113	Chair Radiation Saftey Comm
114	Clinical Affairs Role
115	Clinical Director
115	Clinical Trials Director
115	Director
115	Director Academic Program
115	Director Blood Bank
115	Director Clinical Affairs
115	Director Graduate Education
115	Director Imaging Division
115	Director of Home Med
115	Director PEAR
115	Director Upjohn
115	GRECC Director
115	Medical Director
115	Residency Director
117	Co-Director
125	Director outside Medical School
129	Division Chief
130	Division Chief & Director
131	Division Director
132	Division Director Nuc Med
135	Head of Ultrasound
136	IRB Admin duties
138	Past Chair
139	PIBS and Pharm 502 Admin duties
140	Psychology Chief
141	QACC & Surgical Pathology
143	Section Director
144	Section Head
145	Section Chief VA
146	Washtenaw TB Program Participation
147	Assistant Dean
Super Administrators	
201	Associate Dean
202	Associate Dean & Associate Vice-Pres
203	Associate Dean and Dir Acad Prog
204	Director outside Medical School
205	Chief of Staff & Asst Dean
206	Co-Director MBNI
208	Department Chair
209	Director Cancer Center
213	Sr Associate Dean
215	Vice Provost outside Medical School
216	Associate Dean outside Medical School
217	Associate VP outside Medical School
218	Director CCMB

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Appendix 2:
Faculty Salary Component Definitions

Base Reduction to this component would only be made in extenuating circumstances.

Academic Supplement The portion of the Academic Salary that is set at an appropriate level for time and rank and is to recognize the faculty member's contribution to all missions. This salary component is variable and may be modified annually during the merit program process.

Academic Salary Total of Base and Academic Supplement equals the Academic Salary and is referred to as the Full-Time Rate (FTR) in the HR system. This is the salary that is used for grant applications up to the NIH cap.

Supplement This salary component is variable and set annually during the merit process. It is used for clinical and research performance based on expected norms, market variability, retention, and group performance recognition.

Incentive This variable salary component is used as a bonus to reward research, teaching and clinical productivity. This component has an annual limit associated with it that may vary from year to year and is set annually during the merit program process. This component can be paid monthly, quarterly, annually or in lump sum payments and the payment amount may vary throughout the year.

Administrative Differential This salary component reflects administrative or additional administrative responsibilities performed by an individual. The salary for this component of compensation is set based on fair market value for the responsibilities being performed in an administrative position. This component is used only while the administrative services are performed.

Projected Salary Is used for calculating an individual's benefit premiums for Life Insurance and Long Term Disability (LTD) and is based on the prior year performance. This projected salary is the total of Academic Salary (Base + Academic Supplement), Supplement, Incentive (projected amount to be paid), and Administrative Differential.

Salary Cap This is the maximum possible amount that can be paid to an individual in a given year. The Salary Cap is set every year and is based on internal and external benchmarks and reflects fair market value. In assessing the fair market value, the Medical School compares salaries internally to an individual's peers and superiors and within the salary structure determined by the University; and, externally, to similarly situated individuals based on published data (e.g., Associate of American Medical Colleges (AAMC), Medical Group Management Association (MGMA), American Medical Group Association (AMGA), etc.). The 90^{th} percentile in most circumstances will be used to set the Salary Cap.

An individual's proposed total compensation may exceed the 90th percentile if an additional analysis is employed which looks to the following as to whether the individual:

- Demonstrates and defines leadership within the University and relationship to peers;
- Consistently exceeds expectations for services provided and sets the benchmark by which their peers are assessed internally and externally;
- Progressively increases their responsibility within the University and is an innovator in their field;
- Demonstrates leadership in their field nationally and internationally and leadership in national and international organizations;
- Provides services so specialized to the University as to significantly contribute to the charitable mission of the organization.

In some situations it may be necessary to use more than one salary survey because there may not be enough granularities for a specific subspecialty. In rare circumstances, it may also be necessary to create a salary survey for very specific subspecialties by calling peer institutions.

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Appendix 3:
Crosswalk between 2001 and 2009 Compensation Measures

2001	2009
Base	N/A
Academic Supplement	N/A
Academic Salary	Academic Salary
(Note: The Academic Salary is the total of the Base and the Academic Supplement, and is equal to the University Full-Time Rate (FTR)	
Clinical Supplement A	Supplement
Clinical Supplement B Actual	Incentive Actual
Clinical Supplement B Limit	N/A
Administrative Differential	Administrative Differential
NA	Market

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Appendix 4:
Salary Measures Used in 2001 and 2009 Studies

2001	2009
SUM1 = base	Not analyzed
SUM2 = SUM1 + academic supplement	SUM2 = fulltime academic salary (base)
SUM3 = SUM2 + clinical A supplement.	SUM3 = SUM2 + supplement
SUM4 = SUM3 + clinical B supplement	SUM4 = SUM 3 + incentive
SUM5 = SUM3 + clinical B supp. limit	Not analyzed
Not analyzed	SUM6 = SUM4 + admin differential
Not analyzed	SUM7 = SUM6 + market adjustment

SUM4 is the primary dependent variable of interest in both the 2001 and 2009 studies.

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Appendix 5:
Medical School Gender Salary Study 2009: Department Unit Affiliation Categories

Category	N	% of Sample	Units Included
1	98	13.39%	Anesthesiology, Int Med-Cardiology, Radiology, Radiation Oncology
2	121.5	16.60%	OB/GYN, Ophthalmology, Otorhinolaryngology, Kresge Hearing Research Inst., Surgery, General Surgery, Urology
3	14	1.91%	Peds-Cardiology, Peds-Neonatal/Perinatal, Peds-Intensive Care
4	52	7.10%	Dermatology, Pathology, Emergency Medicine
5	85	11.61%	Family Medicine, Int Med-General Medicine, Peds-Ambulatory Care, Physical Medicine & Rehabilitation, Psychiatry, Psychiatry Admin-Central, Behavioral Health
6	164.5	22.47%	Internal Medicine, Int Med-Allergy, Int Med-Rheumatology, Int Med-Endocrine and Metabolism, Int Med-Gastroenterology, Int Med-Hematology/Oncology, Int Med-Geriatric Medicine, Int Med-Hypertension, Int Med-Infectious Diseases, Int Med-Molecular Med. & Genetics, Int Med-Pulmonary/Critical Care, Int Med-Nephrology, Neurology
7	57	7.79%	Cardiac Surgery, Neurosurgery, Orthopaedic Surgery, Pediatric Surgery, Plastic Surgery, Thoracic Surgery, Vascular Surgery
8	29	3.96%	Pediatric & Communicable Diseases, Peds-Endocrinology, Peds-Genetics, Peds-Hematology/Oncology, Peds-Neurology, Peds-Gastroenterology, Peds-Infectious Diseases, Peds-Nephrology, Peds-Pulmonary Medicine
9	111	15.16%	Medical School Administration, Cell and Developmental Biology, Biological Chemistry, Human Genetics, Microbiology and Immunology, Pharmacology, Molecular and Integrative Physiology, Medical Education
Total	732	100.00%	

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Appendix 6:
Medical School Gender Salary Study 2009: Definitions of Variables Used in the Regressions

Sum2	Natural log of Full-time Academic Salary
Sum3	Natural log of Full-time Academic Salary + Supplement
Sum4	Natural log of Full-time Academic Salary + Supplement + Incentive
Sum6	Natural log of Full-time Academic Salary + Supplement + Incentive + Administrative Differentials
Sum7	Natural log of Full-time Academic Salary + Supplement + Incentive + Administrative Differentials + Market Adjustment
Gender	Male=0
	Female=1
Race	Asian, Pacific Islander=1
	Black, American Indian, Alaskan Native, Hispanic=1
	[White is the excluded category]
Non-Medical Appointment	Yes=1
Normal Administrator	Yes=1
Super Administrator	Yes=1
VA Appointment	Yes=1
Market Ratio	The natural logarithm of the ratio of the mean salary by subspecialty and rank to the mean salary of all fields by rank. The means were based on AAMC data.
Rank	Professor=1
	Associate Professor with 1-6 years=1
	Associate Professor with 7 or more years=1
	[Assistant Professor is the excluded category]
Rank by Years in Rank	Professor by Years in Rank=1
	Associate Professor with 1-6 Years by Years in Rank=1
	Associate Professor with 7 or more Years by Years in Rank=1
	[Assistant Professor by Years in Rank is the excluded category]
Departmental Units	Dummy variables were constructed for nine Departmental Unit Affiliation Categories. Appendix Table 3A shows affiliation categories. Members of that department=1 [Category 6 (Internal Medicine) is the excluded category]
Sabbatical	Fraction of the year not on sabbatical
Highest Degree	M.D. or D.O. and Ph.D. in Clinical Field=1
	M.D. or D.O. and Ph.D. in Basic Science Field=1
	Ph.D. only=1
	[M.D. or D.O. only was the excluded category]
Years at UM	Based on Employee Hire Date
Years in Rank	Based on Job Entry Date

Indicator variables are used to capture the information in categorical variables. A categorical variable with j categories requires j-1 indicator variables in order to capture the information in the original variable. Each indicator variable corresponds to one category of the original variable; if a respondent was a member of that category, he or she is a "1" on that indicator variable. Otherwise, he or she is a "0". For faculty members with more than one eligible Medical School appointment, the indicator variables are coded as fractions, reflecting the fraction of the faculty's time associated with each appointment.

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Appendix 7:
Description By Gender

Rank		
Professor	34.3	56.25
Associate Prof with 1-6 years	20.35	15.00
Associate Prof with 7+ years	8.14	7.32
Assistant Prof	37.21	20.89
Departmental Unit Affiliation Category		
Anesthesiology, Int Med-Cardiology, Radiology, Radiation Oncology	9.88	14.46
OB/GYN, Ophthalmology, Otorhinolaryngology, Kresge Hearing Research Inst., Surgery, General Surgery, Urology	19.19	16.60
Peds-Cardiology, Peds-Neonatal/Perinatal, Peds-Intensive Care	0.58	2.32
Dermatology, Pathology, Emergency Medicine	4.07	8.22
Family Medicine, Int Med-General Medicine, Peds-Ambulatory Care, Physical Medicine & Rehabilitation, Psychiatry, Psychiatry Admin-Central, Behavioral Health	15.11	10.72
Internal Medicine, Int Med-Allergy, Int Med-Rheumatology, Int Med-Endocrine and Metabolism, Int Med-Gastroenterology, Int Med-Hematology/Oncology, Int Med-Geriatric Medicine, Int Med-Hypertension, Int Med-Infectious Diseases, Int Med-Molecular Med. & Ge	22.51	22.86
Cardiac Surgery, Neurosurgery, Orthopaedic Surgery, Pediatric Surgery, Plastic Surgery, Thoracic Surgery, Vascular Surgery	3.49	9.11
Pediatric & Communicable Diseases, Peds-Endocrinology, Peds-Genetics, Peds-Hematology/Oncology, Peds-Neurology, Peds-Gastroenterology, Peds-Infectious Diseases, Peds-Nephrology, Peds-Pulmonary Medicine	7.56	3.04
Medical School Administration, Cell and Developmental Biology, Biological Chemistry, Human Genetics, Microbiology and Immunology, Pharmacology, Molecular and Integrative Physiology, Medical Education	20.93	13.92
Not on Sabbatical at any time during the year	97.67	98.39
Degree Type		
MD and PhD in Clinical Department	9.88	13.57
MD and PhD in Basic Science Department	0.58	1.43
PhD only	37.79	28.39
VA Appointment	15.12	10.71

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Appendix 8:
Medical School Gender Salary Study 2009: Coefficient Estimates for Models 1 and 2

	Model 1: SUM4				Model 2: SUM4		
	PE	Robust SE	p		PE	Robust SE	p
Intercept	12.151	0.071	<.0001		11.940	0.068	<.0001
Female	-0.074	0.018	<.0001		-0.039	0.016	0.014
Asian	-0.045	0.027	0.092		-0.014	0.025	0.573
Black/Other	0.018	0.043	0.674		-0.002	0.038	0.948
Campus Appointment	0.015	0.061	0.811		-0.009	0.053	0.869
Super Administrator	0.315	0.042	<.0001		0.223	0.037	<.0001
Normal Administrator	0.139	0.019	<.0001		0.076	0.018	<.0001
VA Appointment	-0.024	0.024	0.305		-0.013	0.019	0.490
Natural log of the Market Ratio	0.702	0.068	<.0001		0.527	0.068	<.0001
Professor	x	x	x		0.399	0.045	<.0001
Associate with 1-6 years	x	x	x		0.222	0.052	<.0001
Associate with 7+ years	x	x	x		0.095	0.086	0.267
Professor*years	x	x	x		-0.017	0.009	0.046
Assoc1_6*years	x	x	x		-0.017	0.013	0.206
Assoc7+*years	x	x	x		-0.009	0.010	0.408
Dept. Units 1	0.037	0.046	0.414		0.102	0.043	0.018
Dept. Units 2	0.028	0.036	0.441		0.095	0.034	0.006
Dept. Units 3	0.004	0.045	0.926		0.017	0.035	0.623
Dept. Units 4	0.074	0.034	0.032		0.085	0.030	0.004
Dept. Units 5	0.047	0.030	0.121		0.066	0.028	0.017
Dept. Units 7	0.165	0.058	0.005		0.313	0.056	<.0001
Dept. Units 8	0.042	0.048	0.384		0.019	0.036	0.595
Dept. Units 9	0.447	0.053	<.0001		0.355	0.049	<.0001
Time not on sabbatical	0.078	0.066	0.238		0.112	0.055	0.041
MDandPhD_Clinical	-0.103	0.027	0.000		-0.112	0.024	<.0001
MDandPhD_Science	-0.434	0.098	<.0001		-0.528	0.093	<.0001
PhDonly	-0.559	0.031	<.0001		-0.582	0.027	<.0001
Years at UM	0.005	0.001	<.0001		-0.007	0.001	<.0001
Years in Rank	x	x	x		0.027	0.009	0.002
R-squared	0.741				0.800		
Adj R-squared	0.733				0.792		

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Appendix 9:
Medical School Gender Salary Study 2009: Results for Alternative Salary Measures

Model 1: Not Including Rank Variables as Predictors			
	Adjusted R^2	Coefficient for Female	Significance of coefficient
SUM2: Natural Log of Full time Academic Salary	0.573	-0.0431	0.0070
SUM3: Natural Log of Full time Academic Salary+Supplement	0.719	-0.0686	<.0001
SUM4: Natural Log of Full time Academic Salary+Supplement + Incentive	0.733	-0.0744	<.0001
SUM6: Natural Log of Full time Academic Salary + Supplement + Incentive+Administrative Differential	0.746	-0.0748	<.0001
SUM7: Natural Log of Full time Academic Salary + Supplement + Incentive+Administrative Differential+Market Adjustment	0.747	-0.0746	<.0001

Model 2: Including Rank Variables as Predictors			
	Adjusted R^2	Coefficient for Female	Significance of coefficient
SUM2: Natural Log of Full time Academic Salary	0.661	-0.0176	0.2073
SUM3: Natural Log of Full time Academic Salary+Supplement	0.805	-0.0292	0.0381
SUM4: Natural Log of Full time Academic Salary + Supplement+Incentive	0.792	-0.039	0.0140
SUM6: Natural Log of Full time Academic Salary + Supplement + Incentive+Administrative Differential	0.803	-0.0392	0.0120
SUM7: Natural Log of Full time Academic Salary + Supplement + Incentive+Administrative Differential+Market Adjustment	0.804	-0.0389	0.0131

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Appendix 10:

Medical School Gender Salary Study 2009: Model 2 by Hired Before 2002 v. Hired During or After 2002							
	Sample=Hired before 2002				Sample=Hired during or after 2002		
	(N=521)				(N=211)		
	PE	Robust SE	p		PE	Robust SE	p
SUM2	-0.00076	0.01661	0.9632		-0.03409	0.02273	0.1354
SUM3	-0.01502	0.01833	0.413		-0.05703	0.02265	0.0127
SUM4	-0.02475	0.02041	0.2258		-0.0635	0.02722	0.0207
SUM6	-0.02449	0.01967	0.2138		-0.06431	0.0274	0.02
SUM7	-0.02383	0.01984	0.2303		-0.06199	0.02731	0.0244

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Appendix 11:

Medical School Gender Salary Study 2009: Model 1 by Rank									
	Professors N=374			Associate Professors N=177			Assistant Professors N=181		
	PE	Robust SE	p	PE	Robust SE	p	PE	Robust SE	p
SUM2	0.0163	0.0207	0.4315	-0.0204	0.0222	0.3595	-0.0176	0.0190	0.3555
SUM3	0.0074	0.0252	0.7678	-0.0452	0.0254	0.0773	-0.0378	0.0189	0.0464
SUM4	-0.0047	0.0277	0.8666	-0.0498	0.0289	0.0869	-0.0500	0.0228	0.0301
SUM6	-0.0045	0.0259	0.8617	-0.0493	0.0289	0.0905	-0.0511	0.0229	0.0274
SUM7	-0.0037	0.0261	0.8868	-0.0492	0.0290	0.0911	-0.0511	0.0229	0.0274

Models include years in rank.

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