UTFA Newsletter

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Salary, Benefits and Pensions
Information Report #3

Salary Structures, PTR, and Gender at U of T

Individual professors' salaries[1] depend on numerous factors. Not surprisingly, the resulting salary structures are complex at the University of Toronto. The purpose of this report is to describe and examine some aspects of that complexity. (This means showing charts: my apologies for doing so but I believe charts best describe and reveal the data.)

Each of the 1,777 professorial records we are working with is identified as belonging to one of 18 academic divisions or groupings. The following chart illustrates the average base salary, the average age and the faculty count for each of these 18 groupings.

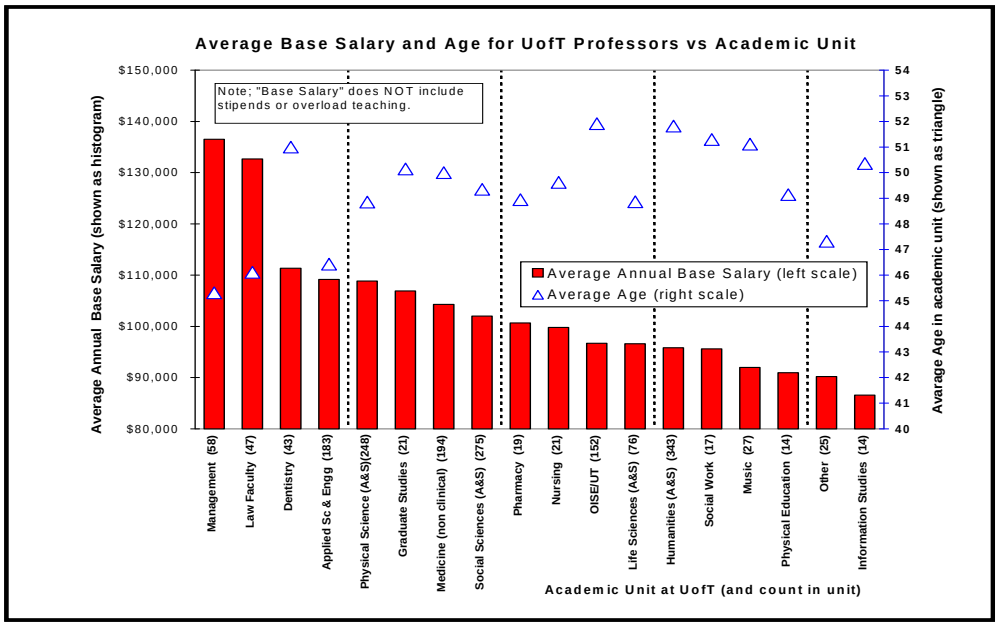

Figure 1

While figure 1 illustrates that average salaries can vary substantially by academic unit, it fails to show how salaries can also vary by age and by gender within the same academic unit. These added variations will be considered in this report.

The average base salary for all 1,777 professors at UofT is $103,662 and the total payroll is $184.2 million[2].

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[1] The data set comes courtesy of Human Resources at UofT in response to an "Information Request" by UTFA. The data is an Excel file with a record for each **1,777 tenure-stream and tenured professor** at UofT. The salaries are the "base salaries", as of October 1, 2001, and thus do not include stipends (extra interim salary for chairs, deans, etc), nor extra salary for overload teaching. The Excel file does not contain individual names or any personal information. Nor does it include departmental information. For example, my own anonymous entry is not grouped with "Physics" but rather as part of the larger "Physical Sciences (in A&S)" academic unit.
(To date, the corresponding data for Lecturers/Tutors and Librarians has not been provided by HR.)

[2] This payroll total is an essential number in costing any new across-the-board (ATB) professorial salary increase.

Individual Salaries versus Age

The following scatter plot attempts to illustrate the actual salary dispersion as a function of age for all 1,777 professors (as of October 1, 2001).

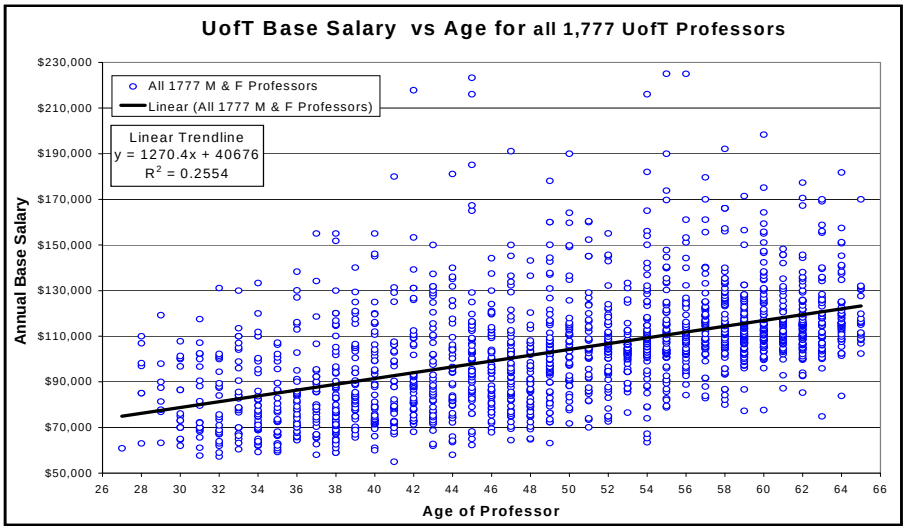

Figure 2

In figure 2 the overlaid linear "trendline" represents the "best" straight line fit to the data[3]. It indicates there is some correlation of salary with age[4]. A correlation of salary with age is a central feature of the UofT progress-through-the-ranks (PTR) compensation model.

Salary Caps, Thresholds and Parameters

There are certain salary limits, salary thresholds and salary parameters that apply to all professors, irrespective of age or academic unit. Ottawa sets the RPP pension limit. Others are determined in negotiations between UTFA and the Administration. None are automatically indexed to inflation.

(1) **Pensions**[5]. (a) The registered (regular) pension plan (RPP) has an effective salary cap of about $98,500, above which it does not provide any additional retirement benefit. About 62%, or 1100 professors, have salaries beyond this RPP cap. (b) The SRA[6] pension cap is set at $150,000. Above this SRA salary cap no pension benefits are currently available at UofT. In figure 2, about 4% of the total professorial salaries, or 76 individuals, are above the $150,000 salary line.

(2) **Senior salaries**. The senior salary threshold is presently set at $113,450. About 520 professors, or 29% of the total, are above this threshold. Senior salary awards are totally discretionary. There is no automatic inflationary across-the-board (ATB)[7] salary increase for senior salaries. This threshold is not indexed to inflation and so every year more and more individuals cross over into the senior salary category. If the problem is not corrected, one can imagine a time when every new hire will start out with a "senior salary".

The Provost, using assessments provided by the Dean, determines senior salary awards. The Senior Salary compensation program is approved by the Senior Salary Committee.

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[3] The same Excel linear trendline fit will have a greater significance later in the report when we compare male and female faculty salaries for various units. This fit is determined by minimizing the sum of the squares of the deviations of the 1,777 data points from the straight line. The resulting linear equation is y = 1270.4x + 40676. The R-squared value of the fit is 0.255. The R-squared measures the dispersion of the data or the "goodness of the fit" to the straight line. If all the salary points lined up perfectly on a straight line, R-squared would equal 1.0. And the opposite, if R-squared = 0.0 then it means that age variation (the x variable) tells us absolutely nothing about salary variation (the y variable).

[4] The "outlier" effect is not pursued in this report. But clearly the few very high salaries will have some influence on averages and on the best linear fit.

[5] I'm hoping that the next information report will revisit pension issues.

[6] SRA is the "Supplemental Retirement Arrangement" introduced in 1996 to provide pension benefits for salaries in excess of the Revenue Canada cap (about $98,500) set by federal tax legislation in 1976. The SRA is **not** governed by the Ontario "Pension Benefits Act".

[7] "Inflation and Salary ATB", September 27, 2001 UTFA Newsletter. To better appreciate what follows the reader may wish to re-read this earlier report. It is also available on the web at http://www.utfa.utoronto.ca/html/newsbul/html/sep2701.htm

(3) **Progress-Through-the-Ranks (PTR).** The UofT PTR salary compensation model has a number of parameters: these are: (i) starting salary, (ii) breakpoint salary, (iii) endpoint salary, (iv) PTR_B, the annual average $ increase below the breakpoint, and (v) PTR_A, the annual average $ increase above the breakpoint. The five PTR parameters are illustrated in figure 3.

These five PTR parameters are adjusted each year by the ATB settlement for that year – and not by the actual inflation number for that year. Of the five parameters, the reader may be indirectly aware of only one, either PTR_B or PTR_A via the individual PTR award received each year. The "breakpoint" salary parameter is also important in that it determines whether one falls into the higher or lesser PTR funding pool.

The PTR Model at UofT and its Parameters

Figure 3 approximates the current salary profile of the professorial[8] PTR model at UofT.

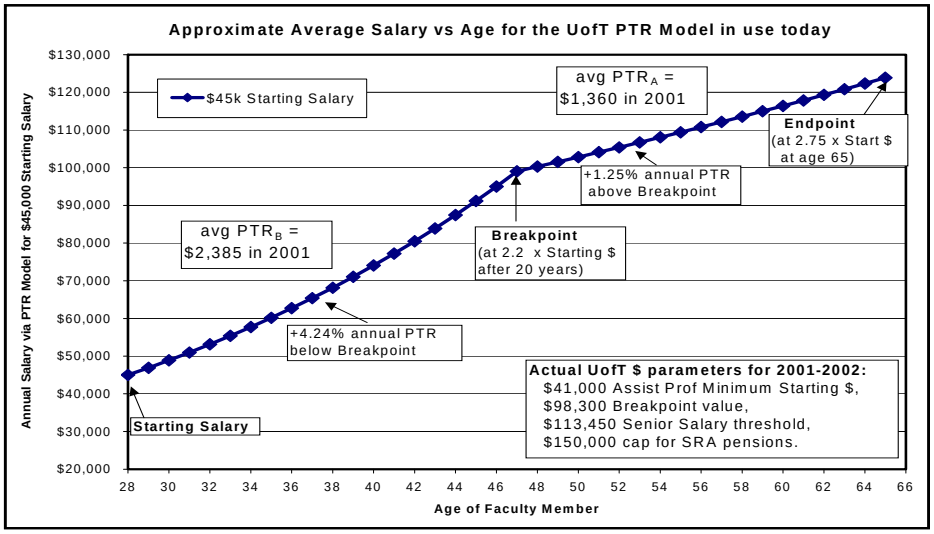

Figure 3

In late 1972, when the PTR model was first approved by Governing Council, it was premised on a starting salary of $12,000 (at age 28) translating into an average career exit salary of $33,000 (at age 65), with a mid-career breakpoint of $26,400 (at age 48). All three dollar amounts are in constant dollars. This means that after the first 20 years, the average salary would have increased by 2.2 in purchasing power and by age 65 the average salary at retirement would have increased by 2.75 relative to the starting salary. (The reality of actual salaries in 2001 as shown in figure 2 does not measure up to these expectations.)

In 2001-02 the PTR parameters, as used by the Administration, are as follows: (i) $41,000 or $43,000 for the starting salary[9], (ii) $98,300 for the breakpoint, (iil) $118,266 for the endpoint, (iv) $2,385 average for PTR_B, and (v) $1,360 average for PTR_A. (In our discussion here we will ignore the special merit pool involving 5% of PTR monies.)

Figure 2 shows the actual salary distributions as a function of age. The trendline in figure 2 suggests the real starting salary currently is about $76,000 at age 28 (not the assumed $45,000 in figure 3) and the exit salary is about $123,000 at age 65. The ratio of the two salary numbers is 1.62, and not the 2.75 ratio the PTR salary model at UofT prescribes. Why are they so far apart?

The nub of the "PTR problem" is that the current PTR scheme is now 30 years old and its determining parameters have not kept pace with inflation. It would have made more sense in 1972 to couple the PTR parameters to Toronto CPI, the inflation index, rather than the ATB

[8] Analogous PTR models exist for the Lecturer/Tutor stream and for the Librarians. All our discussion here will be specific to the professorial stream.

[9] $41,000 is the official minimum starting salary for an Assistant Professor, while $43,006 is the calculated base for the PTR calculation.

settlement. Our earlier Report #1[7] documents how we have lost a cumulative 27% to inflation alone since 1972 through the annual across-the-board (ATB) salary settlements.

In addition, some of the PTR numbers no longer scale back exactly to the 1972 ratios because of a few ad-hoc changes to the breakpoint number along the way. Thus figure 3 can only approximate the UofT PTR model as it is applied today.

Reduced PTR Compensation

Figure 3 indicates that the annual salary should increase by about +4.24%[10] per year below the breakpoint in the PTR model. Similarly, the rate is +1.25% above the breakpoint to finish at the indicated x2.75 at age 65.

If, instead, one assumes a single annual rate of +2.78%[11] over the whole 37-year career, one arrives at the same factor of x2.75 by age 65.

In dollars, in 2001-02 the average PTR_A increase above the breakpoint was $1,360 and below the breakpoint, it was $2,385. About 1,100, or 62% (more than half), of the professorial salaries are above the $98,300 PTR breakpoint and thus receive the lesser PTR_A increase.

To simplify our discussion, the equivalent (in terms of cost) one-PTR number for everybody in 2001 computes to be $1,750 for every faculty member -- or 1.7% with respect to the $103,662 average salary.

Why is there a difference between the 1.7% (the actual average PTR received) and the above 2.78% (the average PTR model prediction)? There are two contributing factors. First there is the skewing of the PTR model because its parameters have not kept pace with inflation. The second factor would result from a non-uniform age distribution. Or put simply, the UofT may be top heavy with aging faculty.

This difference represents a substantial annual PTR compensation loss. This difference is a 40% loss of the average PTR that the University of Toronto PTR model presumes. The 40% derives from: (2.78 – 1.7) / 2.78 . *This PTR compensation loss is on top of the additional and significant ATB compensation loss to inflation.*

Tendency to Salary Inversion

For the PTR parameters to keep up with inflation, the current PTR model requires that the annual ATB increases match inflation. This has not happened. The effect is a tendency towards “salary inversion” – where the salaries of new hires can eclipse those of older faculty in the same academic division. *In short, while starting salaries do keep pace with inflation, the UofT PTR scheme and ATB do not.* This tendency to flattened salaries is already visible in figure 2.

The PTR problems resulting from “salary inversion” are demonstrated dramatically by the following example. In 2001 four new faculty hires (from four different academic units), ages 28 to 30, averaged an initial salary of more than $100,000 (as can be seen in figure 2). This average starting salary is above the present PTR breakpoint of $98,300. This means that these four new hires will be competing for their annual PTR increments in the smaller dollar pool ”above the breakpoint” with faculty who are 30 years their senior. This smaller dollar PTR_A pool above the breakpoint was intended for those in the latter half of their academic career, not for those starting out. If these four “young stars” are to receive a respectable PTR award by PTR_B standards, *it must be done at the considerable expense of their older colleagues in the lesser PTR_A pool.*

[10] This is the compound rate at which one gains the factor of 2.2 over the first 20 years.

[11] For interest the 37 data points in figure 3 were “fitted” with one straight line (via the linear “trendline” in Excel) and arrived at an R-squared of 0.973. This indicates that for our purposes, assuming that the PTR model is linear throughout the age spectrum is a fair first approximation.

Is there a real net "cost" to PTR?

In theory, the PTR salary increases should, on average and over time, be cost-neutral to the University as it recycles the relatively higher salaries of senior professors when they retire for the lower salaries of replacement incoming junior professors. This, of course, is not true if the incoming junior professors receive salaries comparable to those who are retiring or if the number of new hires is larger than the number of retirements.

Figure 4 shows the current professorial age spectrum. (This is the same age spectrum as is implicit in the earlier figure 2 scatter plot.)

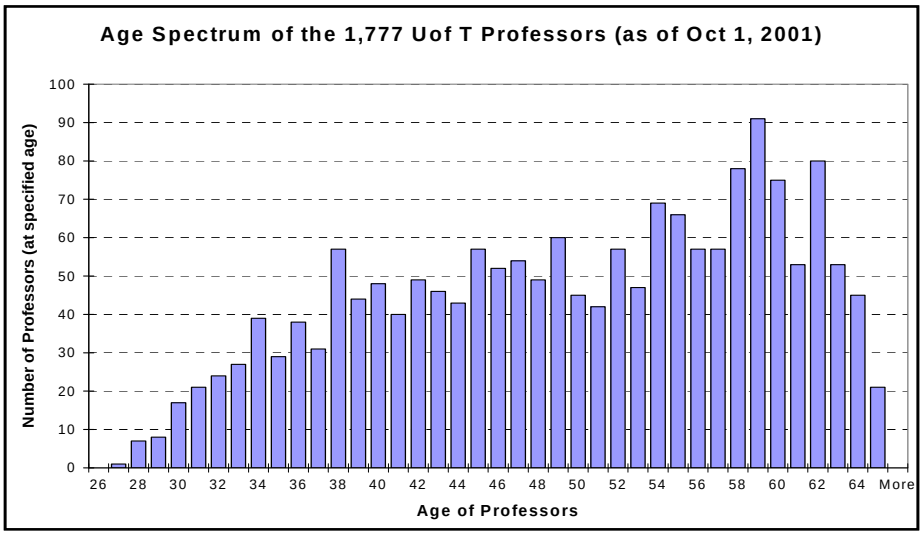

Figure 4

The age spectrum is not flat, as it ideally might be. If it were flat, there would be 47 professors in each of the 38 age bins from age 28 to 65. And in a steady state, 47 new young professors would be replacing the 47 retiring every year. That is currently not true. At present, double this number are being hired. And they are not all young professors with minimum starting salaries, either.

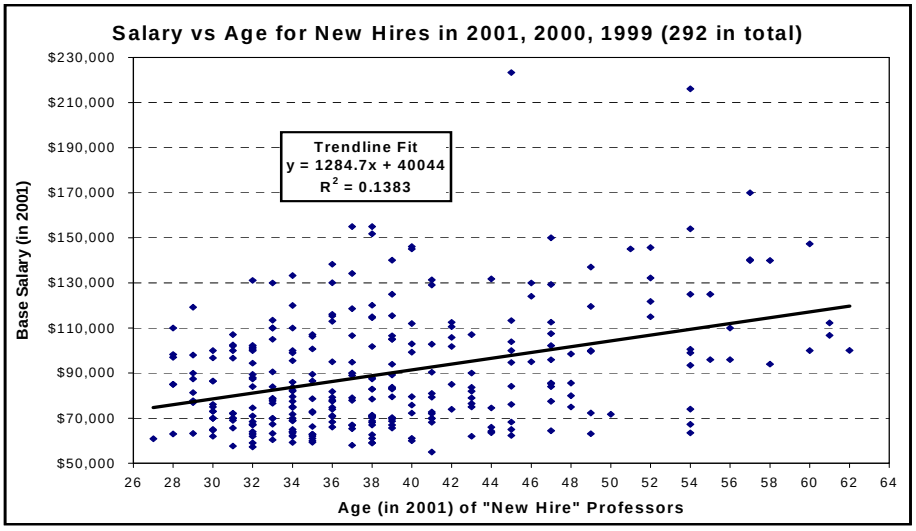

Figure 5

Figure 5 shows the current age vs. salary scatter plot of all new hires from the past three years. There are 292 in all. The average age is 39 and the average salary is $90,000. The total payroll for the 292 recent hires is $26.2 million. The trendline in figure 5 (for the 292 new professors) has a slope and intercept that are quite similar to the trendline in figure 2 (for all 1,777 professors). (The R-squared[3] is lower here, indicating broader salary dispersion and a weaker linear correlation of

salary with age.) This would suggest that to a first approximation the salary vs age profile is independent of years of service. (This bears on figure 7 in the later discussion on gender.)

What is surprising is that the University has hired an average of 97 new professors (not the 47 a steady state would require) in each of the last three years[12]. Given that the new hires are not all junior professors with minimal starting salaries, the current PTR compensation will produce at a net cost to the University, rather than the "no cost" it should produce.

What goes around comes around. By holding past ATB salary increases down to less than inflation, the University has in effect deferred some of the inflation cost into the future (when they must hire new replacement professors).

Another point that may be worth noting is that every "older" new hire and/or every "high-salary" new hire will come to UofT with a substantial monetary demand on our defined benefit pension plan and its surplus. **Given the recent pension contribution holidays, these new hires are, in effect, being subsidized by the past contributions of older pension plan[5] members**.

Furthermore, much of the pension plan surplus (and corresponding reduced pensions) can be attributed to the general flattening of salaries that results from compensation losses via the ATB and PTR losses over the past 30 years.

Salary Comparisons by Gender

The current salary data suggest an overall gender bias in favour of male professors.

If one repeats figure 1 but with the average salary per academic unit divided into two parts, part (a) showing the average male salary and part (b) showing the average female salary, one obtains the following histogram.

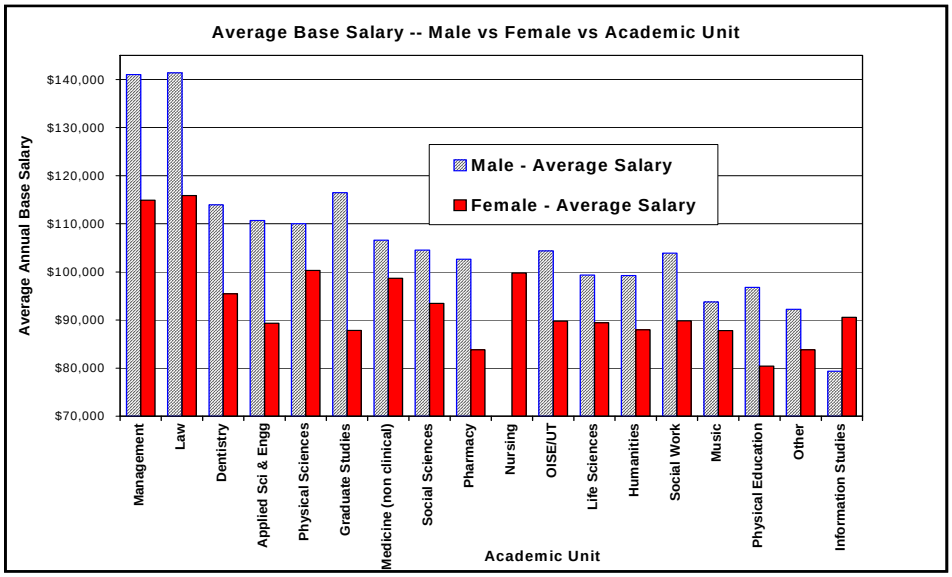

Figure 6

With the exception of *Information Studies* (and *Nursing,* which has no male professors), every academic unit shows a higher salary in favour of male professors. Some of these differences can be accounted for by age differences between male and female professors but not all.

The following table gives a similar summary by academic division and an overall average.

[12] Without additional information on past retirements and departures (which we do not have) we cannot comment on why this is so.

Base Salaries and Ages, for Male & Female Professors, vs Academic Unit						
Division/Grouping	Male Professors			Female Professors		
	Average Salary	Average Age	Total Count	Average Salary	Average Age	Total Count
Management	$ 141,005	46.6	48	$ 114,921	39.0	10
Law	$ 141,386	47.9	31	$ 115,870	42.6	16
Dentistry	$ 113,941	52.1	37	$ 95,453	44.0	6
Applied Sci & Engg	$ 110,683	47.1	170	$ 89,317	37.8	13
Physical Sciences	$ 109,990	49.6	219	$ 100,298	43.0	29
Graduate Studies	$ 116,464	50.2	14	$ 87,840	50.0	7
Medicine (non clinical)	$ 106,582	50.2	138	$ 98,669	49.4	56
Social Sciences	$ 104,539	50.1	212	$ 93,448	47.0	63
Pharmacy	$ 102,637	49.8	13	$ 83,831	44.2	6
Nursing			0	$ 99,763	49.6	21
OISE/UT	$ 104,367	54.8	72	$ 89,754	49.3	80
Life Sciences	$ 99,345	49.1	55	$ 89,459	48.3	21
Humanities	$ 99,246	53.1	239	$ 87,968	48.9	104
Social Work	$ 103,895	52.9	7	$ 89,817	50.2	10
Music	$ 93,737	52.9	19	$ 87,829	46.9	8
Physical Education	$ 96,795	52.8	9	$ 80,423	42.6	5
Other	$ 92,208	48.3	19	$ 83,831	44.2	6
Information Studies	$ 79,373	47.4	5	$ 90,569	52.0	9
Overall Averages	**$ 107,430**	**50.3**	1307	**$93,154**	**47.4**	470

The overall median salaries (as opposed to average salaries) are quite similar: $107,116 for the males and $91,617 for the females.

Because salaries have an age dependency (as shown earlier in figure 2 and expected via the PTR model of figure 3), we include a variation of figure 2 showing salary versus age for both the male salaries and the female salaries on the same scatter plot as two different data sets using different symbols. In figure 7 the open circles are the male professors and the solid diamonds are the female professors. The data is jammed together but I trust the reader can see the qualitative difference between the two.

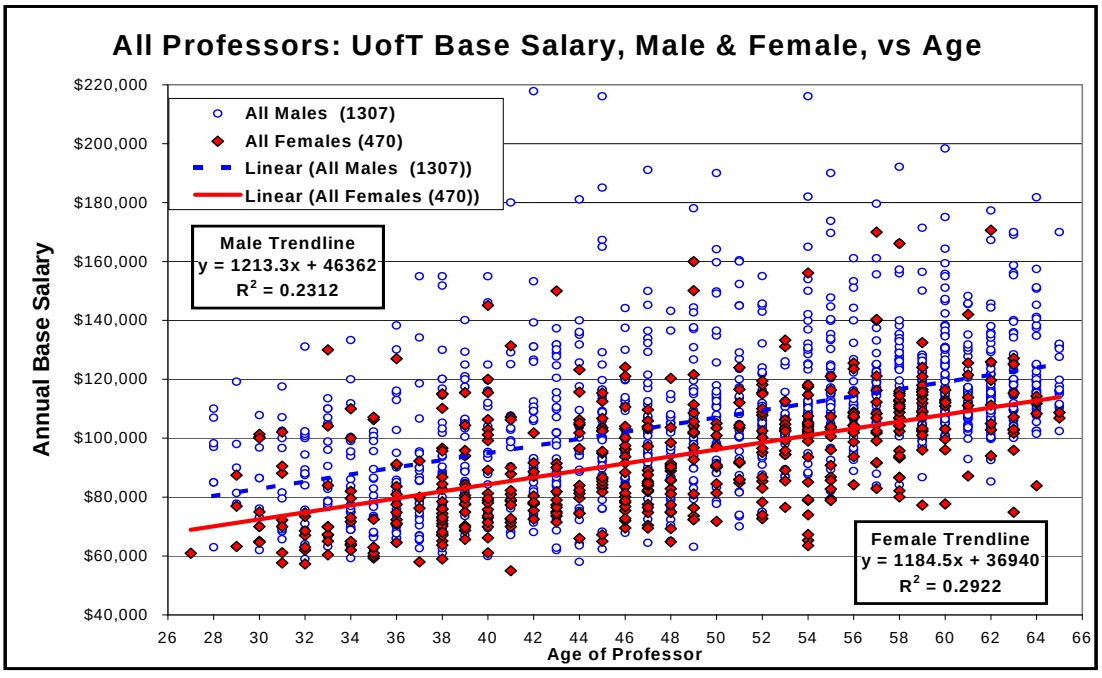

Figure 7

Superimposed are the two linear trendlines fits. The higher dashed line represents the male data set trendline and the lower solid line is the female data set trendline. The slopes are not quite the

same. At age 28, the difference between the two trendlines lines is about $10,200 in favour of the male salary and at age 65 the difference is about $11,300 in favour of the male salary. This is less than what the summary table on page 7 claims (since it does not fold in differing age spectrums). I have also looked at a similar scatter plot of salary versus "years of service" at UofT (rather than age as in figure 7). It too shows a higher salary trendline for males.

While figure 7 clearly shows that the same age male and female professors receive substantially different salaries, one should not generalize the figure 7 salary difference as being universal across all academic divisions. In fact they can be strikingly different. Similar scatter plots to figure 7 but by academic division (rather than all divisions taken together) show substantial differences in the male versus female linear trendlines. Some diverge, some are parallel, and some overlap (indicating no difference). (Due to concern by some that the reader may be able to identify individuals on these smaller data sets, we are not including these scatter plots in this Newsletter.)

To illustrate, in the Humanities the two salary trendlines overlap at the lower ages but diverge at older ages, indicating that older male professors in the Humanities do have salaries higher than the same older age group of female professors. At age 65, the difference between the two lines is about $8,000 in favour of the male salary. In the Physical Sciences however, the two trendlines overlap for all ages, indicating no salary differences between male and female professors when the differing age profiles are taken into account (contrary to what figure 6 might suggest).

Conclusions

This report has tried to describe some aspects of existing salary structures and our PTR compensation model with a minimum of personal comment. While my conclusions are based on these facts, they are more subjective.

It seems obvious that if UofT is to attract the best minds in the future and so maintain its high academic standing, its compensation must be peer-competitive and it must be fair and equitable. This report does not treat the issue of "peer-competitiveness" but a future report should examine this matter. *This report does speak to the issue of fairness and equity in our compensation and the data suggest we must do better.*

Our across-the-board salary settlements have trailed inflation *in each of the past eight years* and most years before that. This has a three-fold effect on our total compensation.

(i) It, of course, directly affects and reduces our salaries.
(ii) It also reduces our PTR compensation (as we have seen in this report).
(iii) It eventually affects and reduces our pensions, because our pensions are based on our highest salary levels.

The present PTR model has other problems, such as the "salary inversion" for new hires relative to the breakpoint and older colleagues. The University's past failure to have ATB match inflation means the PTR model is a net cost to the University today (whereas in theory it should not be).

Gender pay inequity is a long-standing issue at UofT and even after two prior attempts[13] to fix it, it still seems to be with us today.

Please feel free to contact me, should you have any questions or comments.

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[13] In the early 1970's, as a result of Vice President J. K. Conway's efforts, Professor Meincke chaired the "Committee on Employment Conditions for Full-Time Women Faculty" and recommendations on salary anomalies relating to women faculty members were made. Then again in 1989, following the new "Pay Equity Act", another review took place at UofT and resulted in about 200 female academics receiving pay increases in excess of $5,000 (on average). Today, in 2002, there is still the unresolved grievance of the pre-1991 retired female professors.