Report for the Dean on the Scholarship Allocation Process
November 16, 2015

Background

This report was commissioned by the present Dean of FGS, Dr. Marty Leonard circa April 30, 2015. The motivation for this report was to review the 2014 decision by the former Dean that the First Round Allocation percentage applied to thesis programs be reduced from 80% to 50%. Our information gathering activities included interviews with former Dean Dr. Bernie Boudreau, Associate Dean Dr. Dieter Pelzer, current Dean Dr. Marty Leonard, VP and Provost Dr. Carolyn Watters and Scholarship Coordinator Judie Pepper. We read the 2006 Report on this topic (see below); we reviewed Faculty Council Minutes for the last few years and Annual reports of the Faculty for information about the allocation process. We obtained historical data on allocations.

Some Pertinent History

The allocation system goes back at least to 1981 when, under Dean Leffek, the first round allocation was 85%. In the early 1990's this was changed, under the leadership of Dean Fingard, to 80% where it has remained constant until 2013 when some changes were made using a weighted scheme.[1] In 2014, the first round allocation was reduced to 50%.

In 2005 a committee (Chaired by Klein) was struck by Dean Kwak with the mandate to report to Faculty Council on the Allocation System. The immediate impetus was to report on the impact of the conversion of undergraduate professional programs in Occupational and Physical Therapy into professional graduate programs upon the allocation system and to make appropriate recommendations. The full 2006 report provides excellent explanation of the scholarship system for FGS decision-makers, and because the report remains pertinent today a summary is included with this report as Appendix 1.

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[1] In 2013-4, "Department allocations were reduced (initially) this year because of the cut in Killam spending. The same formula as normal was used to set first estimate of the allocation (i.e., points per student with a GPA ≥3.7) then that amount was reduced using a weighted scheme. FGS scaled the cuts to the total amount received by a particular department, so that small programs that received less than $20K were subject to no cut; cuts then scaled linearly to 10% at $100K in allocation and to 15% above $200K. The logic was that small programs would be immediately devastated by even a 10% cut, while large programs could find some economies to absorb the cut. If the returns on the endowments prove to be better than anticipated, and we receive more money than hoped for, then we will forward increases on to the units. The total FGS scholarship funds available vary (slightly) from year to year depending on the "auxiliary funding" available as a result of variations in actual spending vs. budget in previous years. This auxiliary funding is added to the funding total and distributed proportionally after the second round allocation has been determined." (*FGS Annual Report*, 2014)

It is noteworthy that such a committee was struck about a decade ago to study and make recommendations whereas in 2014, the former Dean made a dramatic change to the allocation formula with no such study or reference to the 2006 report. In 2005-6, all chairs and graduate coordinators were surveyed. According to the 2006 report this survey revealed: "...near unanimous support for the system in general, and for the 20% withheld for redistribution. The combination of stability and flexibility that characterizes the system was praised by several respondents."

Actual Factors Impacting the Allocation System

In 2013, there were fiscal pressures (most notably a progressive decrease in the percentage of endowed funds that could be spent) that were likely to decrease the total amount of funds in the scholarship budget. Throwing a bit of a monkey wrench into the accounting process, a substantial portion of the endowed funds are earmarked for trainees in science, medicine and engineering. For thesis programs to benefit equally without violating trust instructions, funds from other sources are essential. Growth in graduate programs, particularly those that attract excellent students, entails increased sharing of what would seem to be a fixed if not decreasing budget pie.

Stated Reason for the Change

When we interviewed the former Dean, he was very explicit that the rationale for the change to 50% was not the threat of a shrinking budget but rather his conclusion that this change was needed "to help small programs." We were told that "the way the system works, in the long run, large programs would eventually get all the money." The former Dean referred to projections that led to this conclusion. These were provided to us and are presented in Appendix 2. They do not support the decision.

Poor communication about the change

Although the change was reported to Faculty Council by the former Dean, the details of the change in the allocation formula do not appear in any FC minutes and the change was not explicitly communicated to all Graduate Coordinators who are at the nexus of graduate admissions and scholarship decisions.

How the system actually works

The process and mathematics of the system, which was described in the 2006 report, are rather straightforward. Here we focus solely on the allocation formula for non-

professional programs and this description initially assumes that the first round is 80% as had been the case for ~20 years.

Each year each eligible unit receives a first round allocation that is 80% of the last year's allocation. The 20% that is withheld from all programs is distributed in a second round allocation using a system in which points are awarded for each A- or better student admitted to a program in the last admissions cycle (with different points for masters, PhD and conversion to PhD without earning the master's degree). Although there will be some variance in total allocations from year to year, primarily because of variability in the number of points a program "earns", on the assumption that everything will remain roughly the same, coordinators can estimate the steady state allocation that their program will approach using this formula.

[with 80% first round]:
Steady State Allocation = (average # of points/year) * M_{80} * (V_{80})
where V_{80} = the point value for the 2nd round (with an 80% 1st round)
and M_{80} = 100/(2nd round %) = 5

In the long run, the actual percentage for the first round has NO effect on steady state allocations that any program will receive, assuming that i) that a program is relatively stable in the numbers of A- or better students they admit and ii) that the budget available for allocation and the total number of A- or better students both remain unchanged. This is because the change from 80% to 50% changes M from 5 to 2 and increases the value of a point by 5/2.

[with 50%]:
Steady State Allocation = (average # of points/year) * M_{50} * (V_{50})
where V_{50} = the point value for the 2nd round with a 50% 1st round [$V_{50} = V_{80} * 5/2$]
and M_{50} = 100/(2nd round %) = 2

Programs of different sizes are affected equally in the long run whether the first round percentage is 80% or 50%.

In the real world, wherein the number of points earned by a program will vary from year to year, there are two mathematically certain effects upon the allocations that programs will receive under the 80% vs 50% regimes. The effect that particularly concerns us is that there will be **more variability** from year to year in the allocation received by a program with 50%. An untoward consequence of this variability was experienced in this year's allocations (based on the 50% formula): there were 3 programs that suffered a

decrease that was greater than 30%. Contrary to the expressed rationale for the change to 50%, all 3 of these programs are among the smaller half of thesis-based programs.

The other effect, is that for programs whose current allocation is either larger or smaller than it should be based on projected number of points earned in the long run, the aforementioned steady state (or asymptote) will be approached more rapidly when the 2nd round percentage is larger. Later, we will refer to such programs as "over-funded" and "under-funded" respectively, putting these terms in quotations to highlight that this usage is not about the need for funds (we recognize that all programs would prefer to have more funds).

The increased variability is illustrated in Figure 1 for a medium-sized program whose initial allocation is at the appropriate level for its expected average number of points earned/year. In this and subsequent figures it is assumed: that there is $3.2M in the allocation system, that all programs earn in total 600 points, and that there is a typical amount of year-to-year variability in the number of points earned. The patterns illustrated in these figures are not dependent on these precise values.

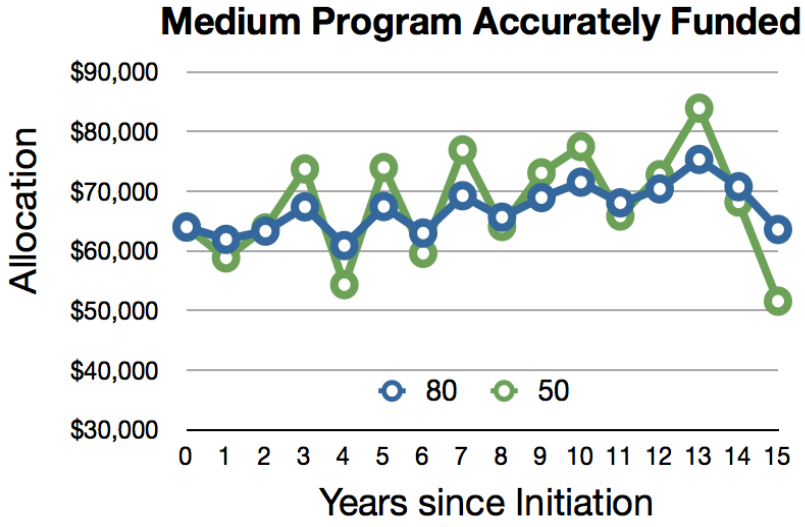


Figure 1. Year-to-year projections for a program whose initial allocation is $64,000 and which earns on average 12 points/year (with random variation from year to year).

The effects of 80% versus 50% First Round Allocations for small, medium and large programs that begin with allocations that are initially (year zero) too large ("overfunded") or too small ("underfunded") given the expected number of points/year earned are illustrated in Figure 2. As already noted, whereas it is clear that many programs are unable to provide students with sufficient levels of funding, we use the term "underfunded" here to mean that at the start of the simulation, the program is receiving an allocation smaller than it should for its size (or the average number of points earned); conversely for "overfunded": at the start of the simulation, the program is receiving an allocation larger than it should for its size (or the average number of points earned).

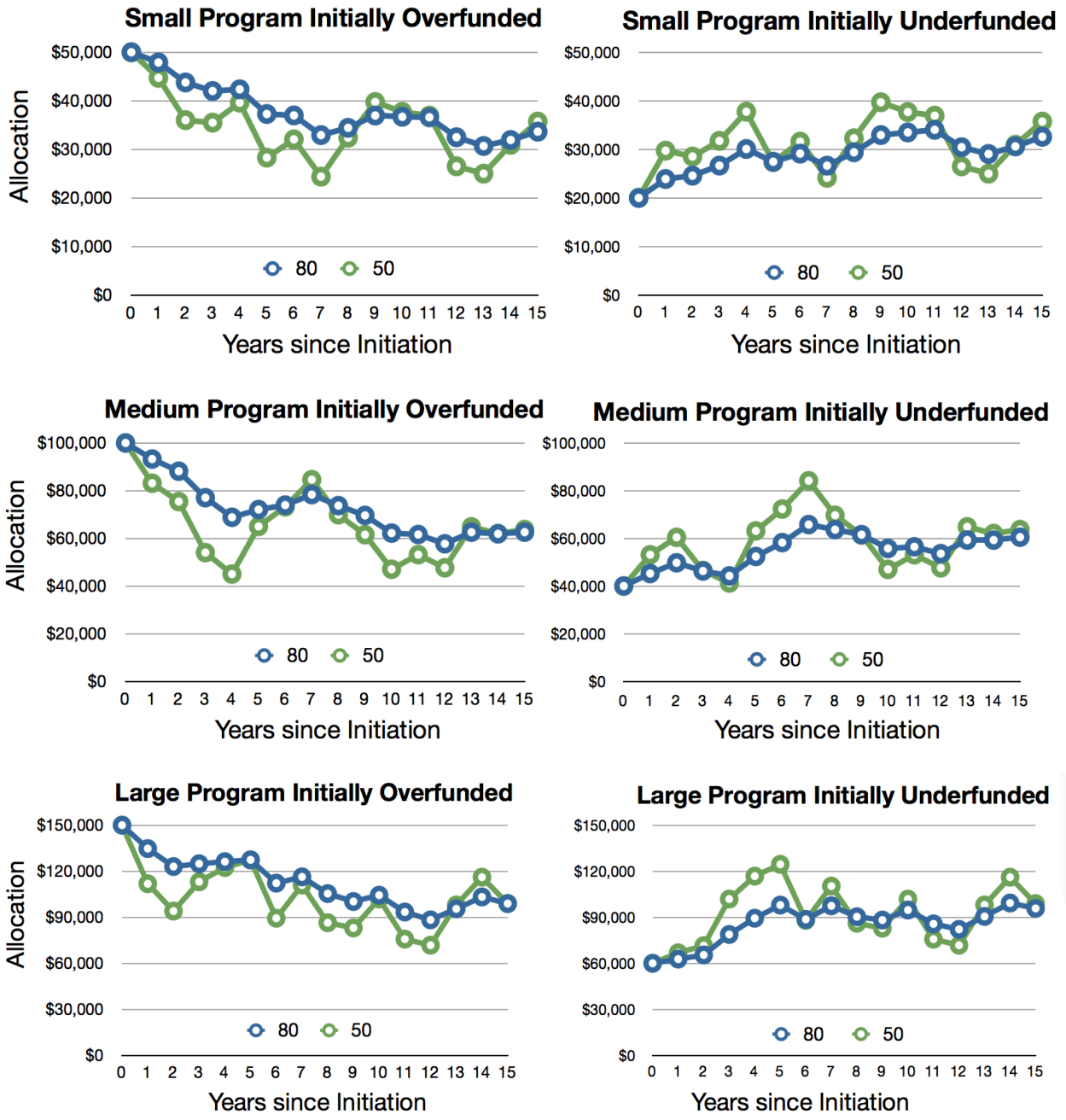


Figure 2. Year-to-year projections for small, medium and large programs that begin with an initial allocation that is large (left column) or small (right column) for its projected average number of points (6, 12 and 18, respectively). Regardless of the percentage applied to the first round allocation, the total allocations for these small, medium and large converge, in the long run on their steady state values ($32K, $64K and $96K, respectively).

Why 80% is better than 50%

An 80% First Round Allocation is preferable to 50% because it offers a balance between stability and flexibility. It keeps volatility to a minimum which enables departments and graduate coordinators to plan more effectively. Some stability is critical when programs are making admissions decisions. When graduate coordinators or admissions committees have to worry about the kind of volatility associated with the 50% first-round (illustrated in Figures 1 and 2) it will make them much more conservative. The consequence of such admissions conservatism will be a downward spiral since fewer admissions almost certainly means fewer points.

The 50% formula is more volatile. We looked at the allocation history over the last 9 years, and computed the percentage change from one year to the next. Under the 50% formula for the first round allocation (which generated this year's allocations), the standard deviation of percentage changes (from the preceding year) across programs was 26.2%. For the preceding 7 years (all based on the 80% formula) the average standard deviation was 15.7%. Another way to make this point is to look at the maximum and minimum percentage changes. Under the 50% first round allocation formula, these were -50% and +92%. In contrast, over the previous 7 years the average minima and maxima were -25% and +50%.

Recommendations

Our recommendations relate to the allocation system itself (1), the decision-making process regarding allocations (2), and issues for further study (3).

<u>1) The allocation system:</u>

a) The formula should be returned to 80%
b) The allocations should be adjusted as if the year of 50% never happened
c) A small portion of the budget should be reserved for a Dean's Discretionary fund. The Dean can: i) allocate this based on her/his judgement of need; ii) return it to programs in a 3rd round as if this were available in the first round; or iii) simply not spend this amount from the endowment, allowing it to grow faster.

2) Decision-making

Council and/or the Scholarship committee should be consulted about potential changes to the allocation system. Changes should only be made after careful study. Any changes to the system should be communicated to all graduate coordinators as soon as they are made.

3) Issues for further consideration:

Due to severe pressures on the graduate funding system, we recommend a review similar to the one conducted in 2005-6. In particular, the following issues should be explored:

a) Strategies to increase funding for graduate scholarships.
Increased funding for scholarships was identified as critical in the 2006 report (and in the VP's later commission). Since then, tuition and the cost of living have increased but the scholarship budget has not. Consequently, students can no longer manage on the typical scholarships offered at Dalhousie. The university's mission to "attract and support excellent graduate students" cannot be met with current funding levels. A very substantial increase in funds from the University's operating budget is both needed and warranted (see Appendix 3). Fundraising aimed at increasing endowed funds for graduate scholarships should also be pursued (e.g., FGS might propose a graduate scholarship fund in honour of Dalhousie's 200th anniversary).

b) The impact of the conversion of undergraduate to graduate professional programs anticipated by the 2006 committee.

c) The impact of students entering a thesis program (generating points) who then transfer to a non-thesis program. Is a strategy needed to address such situations?

d) As recommended by the 2006 report, a Provincial Graduate Scholarship program was established. However, because the programs of FGS do not have equal access to these Nova Scotia Graduate Scholarships (NSGS), a review could consider if steps should be taken to help those non-professional programs whose students are not eligible (or less likely to be eligible) for an NSGS.

Submitted by Raymond Klein and Elizabeth Fitting

Appendix 1. [Summary] FGS ad hoc committee on scholarship funding 5/2/2006

On behalf of the AD HOC COMMITTEE to REVIEW the SCHOLARSHIP ALLOCATION SYSTEM Ray Klein gave a summary of the committee's report.

Background
The committee was constituted by Faculty Council to study the system used to allocate scholarship funds to units and programs. We discovered a crisis that has begun to hamper, and has the potential to cripple, the contribution made by FGS to Dalhousie's reputation as a center for research and scholarship.

The System
Presently FGS allocates over $3 million dollars to graduate programmes for the financial support of graduate students through scholarships. Each year each eligible unit receives a first round allocation that is 80% of the last year's allocation. The 20% that is withheld from all programmes (over $600,000 in 2005-6) is distributed in a second round allocation using a system in which points are awarded for each new A- or better student. The number of points awarded to a unit for each A- or better student depends on the programme classification (Master's=1, PhD=3, M->PhD conversion=2). This system ties the allocation of funds to programmes' successes in attracting first-class students. On the assumption that the value/point and typical number of points will remain the same a program can estimate what its allocation will be in the long run:

Asymptotic Allocation = (# points) * 5 * (value of a point)
Although it is the number and classification of high quality students that determines each unit's second round allocation, scholarship funds are awarded to students (within FGS guidelines) at the discretion of the programme.

Objectives
FGS, through the scholarship allocation system, encourages programmes to admit the highest quality students, assists programmes to recruit graduate students and, at the discretion of programmes, provides a source of financial support to graduate students.

The Problem
Relative to the cost of their education, the scholarship funds/student have declined precipitiously since the last review from 80% of typical tuition to just 20% of typical tuition. Council's concern that the conversion into graduate students of large numbers of undergraduates in professional programmes will cause further erosion is justified.

Recommendations
Our projections, however, when combined with our belief that all graduate programmes should be included in the "excellence-encouraging" reallocation system, strongly suggest that increasing the funds available for allocation will be a more effective strategy than fiddling with the point values to distinguish between students in different kinds of programs. In addition to seeking a larger Scholarship Allocation budget we recommend that FGS and the administration institute a system of entrance scholarships awarded on the basis of the A- or better judgment and offered at the time of admission as a top up (possibly via tuition remission).

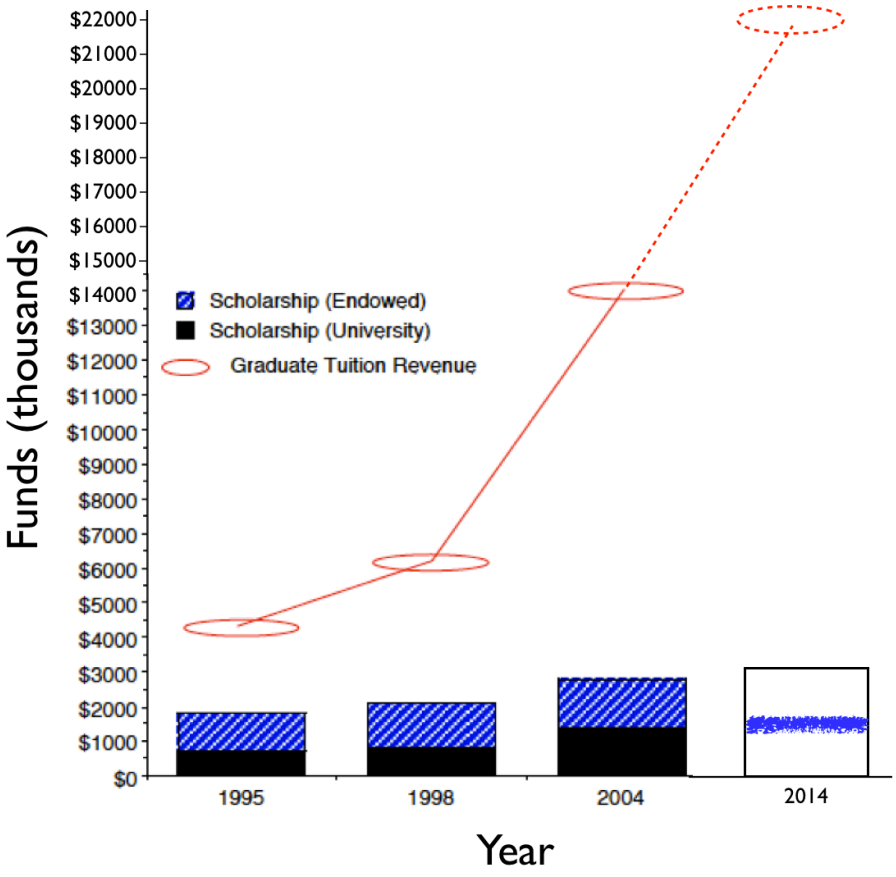
Appendix 2. Projections upon which we are told the change to 50% were based.

Note that regardless of program size and 1st round percentage, the total allocations for all 4 scenarios decrease regularly from year to year. This is because the initial allocations are large relative to steady states given the numbers of points/year assumed to be earned by the different sized programs. Point values for the two 1st round percentage scenarios were intuited rather than calculated (if $2,840 were the point value for 50%, then the point value for 80% ought to have been $1,136). In the long run (not reached in the 5 year scenarios explored here) this discrepancy would generate an illusory advantage for 50% regardless of program size. Regardless, a benefit for small programs cannot be inferred from the projections shown here.

Large Dept							
Year	Total	***80%***	Points	Point Total	**Grand Total**		Point Value
2014	$183,496	$146,797	25	25900	**$172,697**		***1036***
2015	$172,697	$138,157	25	25900	**$164,057**		
2016	$164,057	$131,246	25	25900	**$157,146**		
2017	$157,146	$125,717	25	25900	**$151,617**		
2018	$151,617	$121,293	25	25900	**$147,193**		
Small Dept	Total	***80%***	Points	Point Total	**Grand Total**		Point Value
2014	$43,299	$34,639	5	5180	**$39,819**		***1036***
2015	$36,711	$29,369	5	5180	**$34,549**		
2016	$32,476	$25,981	5	5180	**$31,161**		
2017	$31,160	$24,928	5	5180	**$30,108**		
2018	$31,144	$24,915	5	5180	**$30,095**		
Large Dept							
Year	Total	***50%***	Points	Point Total	**Grand Total**		Point Value
2014	$183,496	$91,748	25	71000	**$162,748**		***2840***
2015	$162,748	$81,374	25	71000	**$152,374**		
2016	$152,374	$76,187	25	71000	**$147,187**		
2017	$147,187	$73,594	25	71000	**$144,594**		
2018	$144,594	$72,297	25	71000	**$143,297**		
Small Dept	Total	***50%***	Points	Point Total	**Grand Total**		Point Value
2014	$43,299	$21,650	5	14200	**$35,850**		***2840***
2015	$36,711	$18,356	5	14200	**$32,556**		
2016	$32,476	$16,238	5	14200	**$30,438**		
2017	$31,160	$15,580	5	14200	**$29,780**		
2018	$31,144	$15,572	5	14200	**$29,772**		

Appendix 3. Draft revision of the chart from the 2006 report showing sources of support for the Scholarship Allocation relative to gross tuition revenues generated by all of Dalhousie's graduate students.

[We are awaiting more precise figures about tuition revenue and the University contribution to the Scholarship budget. Our estimates are denoted by dashed and fuzzy lines. Regardless how these come out, what was true in 2004 remains at least as true now: A substantially increased contribution from the University operating budget to the Scholarship Allocation Budget is not only sorely needed, it is warranted.]



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