

**Report to the ASA Board of Directors
by the
Individual Accreditation Proposal Review Group**

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Executive Summary

Background for this report can be found in President Sally Morton's President's Corner in the March 2009 issue of *Amstat News*. The Review Group was asked to examine a 2008 proposal by an ad hoc committee which recommended that the ASA introduce an optional accreditation program for its members. We were given a free hand to modify the proposed program, come up with a different program, or recommend that no program of any kind be started.

Our recommendation is that the ASA launch an *optional* program to accredit members as Professional Statisticians (PStat). We emphasize the optional aspect because participation would be completely voluntary. The focus would be on accrediting those who have established via their training, experience, and accomplishments in the *practice* of statistics that they are worthy of such a professional credential. The PStat program is very closely aligned with the PS program recommended by the ad hoc committee. That committee also proposed a Graduate Statistician program (GS) for statisticians with less experience which we are not recommending at this time.

It appears from our survey of the ASA membership that the demand for such a PStat program is substantial. We expect a large number of applicants—42% of survey respondents indicated they would apply. To be balanced, we note that some members oppose the idea. In our survey 53% viewed accreditation favorably, 35% were unsure about it, and 12% were opposed. However, the opposing minority was quite vociferous. (The survey results, including the comments, are summarized in this report.)

We have struggled with these findings and the pros and cons of accreditation ourselves. Our conclusion is that there is a sizable segment of the ASA for whom some form of credentialing beyond formal academic degrees would be beneficial and that the needs of these members deserve serving just as the ASA serves many other segments through a wide range of services. A well constructed and managed program that provides valuable services, such as opportunities for networking, could easily attract new members to the association from other disciplines and other countries.

While our recommendation to the ASA Board is unambiguous, we would also like to underscore a few of the challenges involved. The ASA will need

to invest resources to make sure that PStat accredited members receive value for their payments (\$85 per year is being proposed). If this does not happen the program is likely to be short lived and not reflect well on the ASA. The success of the program will also depend heavily on the effectiveness of the Accreditation Board, which will be responsible for deciding who receives the PStat designation. It is critical that it not act as, or be viewed as, a ‘rubber stamp’. It is also essential that it operate in an open and fair manner and provide constructive guidance for applicants who fall short of expectations.

High priority should be given to communicating with ASA members about all aspects of a PStat program. It is clearly not for everybody and some of our most cherished members might not even qualify for it. Members will need to appreciate how the program satisfies the needs of some members without in any way disadvantaging or disenfranchising others. Instead, *the PStat accreditation program should be viewed as one significant way of meeting the challenge articulated in the ASA Strategic Plan “to reach out to underserved groups while continuing to serve our traditional constituencies.”*

1. Introduction

“Voluntary individual accreditation is a subject of great importance to the American Statistical Association and the statistics discipline.” This is the opening line of Sally Morton’s President’s Corner in the March 2009 issue of *Amstat News*. She goes on to explain that accreditation equates to “peer recognition that an individual has statistical training/knowledge and experience in applying that expertise, maintains appropriate professional development, practices ethically, and has good oral and written communications” (quoting from “Questions About Accreditation Answered” in the December 2007 issue of *Amstat News*).

Accreditation is a form of credentialing one’s professionalism. It might be contrasted with more rigid certification or licensing programs that are based on formal examinations. The voluntary aspect deserves to be underscored—from the outset it is understood that accreditation, whatever its merits, is not for everyone.

Credentialing, in one form or another, has been a topic of sometimes heated discussion within the ASA for perhaps 15 years. In March 2007, the ASA

Board created an ad hoc committee to develop an approach to individual accreditation. The committee produced its report in November 2008 (Proposal for Introduction of Optional Professional Accreditation by the American Statistical Association). The Executive Committee of the ASA asked for a review of the proposal, which led to forming the Individual Accreditation Proposal Review Group. Our charge allowed us a full range of options from endorsing the proposal as is to recommending that no accreditation program be adopted by the ASA.

The ad hoc committee proposed two forms of accreditation, the Graduate Statistician (GS) for those with an advanced degree in statistics or a related field and the Professional Statistician (PS) for those who also have five years of practical experience. Our recommendation is that the ASA initiate a slight variation on the latter, which we will refer to as PStat so as not to confuse the two. We find the arguments for the GS version to be less compelling and therefore recommend that further consideration of it be deferred.

The PStat form of accreditation that we are proposing fits in nicely with the current ASA Strategic Plan. The report of the ad hoc committee documents in some detail why this is the case. We would just emphasize that it is well aligned with the plan's goal "to reach out to underserved groups while continuing to serve our traditional constituencies." As a bonus, if the PStat plan unfolds to meet its potential, then the ASA should grow as a result.

The Review Group began its work in late January and conducted its business via bi-weekly phone calls, email interchanges, and reaching out to various parties for input. We especially appreciate the information we received from Martin Dougherty of the Royal Statistical Society (RSS), David Binder of the Statistical Society of Canada (SSC), and Marie-Louise Rankin of the Statistical Society of Australia Inc (SSAI), as well as the Interagency Council for Statistical Policy (a council of the 14 "principal" statistical agencies), and the roughly 500 members of the ASA who responded to either an initial informal survey or a larger randomized survey that we conducted to get direct feedback on accreditation. Jay Clark of Westat provided statistical analysis of the survey data, and Hanyu Sun, a summer intern at Westat from the University of Michigan, assisted with tables.

2. Different Approaches to Credentialing

Wikipedia talks about professional certification in a way that overlaps with the concept of PStat accreditation: “Certifications are earned from a Professional society and, in general, must be renewed periodically, or may be valid for a specific period of time (e.g., the life-time of the product upon which the individual is certified). As a part of a complete renewal of an individual’s certification, it is common for the individual to show evidence of continued learning—often termed continuing education—or earning continuing education units (CEU).” Many examples are provided in fields such as accounting, aviation, and project management. Competence is assessed in a variety of ways ranging from evidence of on-the-job performance to formal examination. Although there is overlap with certification, PStat accreditation has neither a specific requirement for continuing education courses nor a formal examination.

While the PStat proposal would be a broad-brush profession-wide form of credentialing, the ASA might consider offering an alternative or additional form for specialized skills in statistics, such as survey sampling or forecasting, supported by the ASA’s strong continuing education program, with or without a testing component. It might be feasible to offer both general and specialized forms of credentialing even though this possibility is not part of the present recommendation. The Joint Program in Survey Methodology (JPSM) sponsored by the University of Maryland, the University of Michigan, and Westat is one of many such examples of an existing focused certification endeavor. JPSM offers certificate programs both in intermediate survey methodology and in survey statistics. Both require 18 credit hours.

3. Approaches of Peer Societies

The RSS, SSC, and SSAI all offer programs that are similar to ones proposed by the ad hoc committee.

The RSS awards Chartered Statistician status (CStat) to applicants with education and experience comparable to the PS or PStat requirements. They also offer Graduate Statistician status (GradStat) to those who satisfy only the academic requirements of CStat. Hence it is comparable to the GS category recommended by the ad hoc committee. Details about the requirements and process developed by the RSS may be found at

http://www.rss.org.uk/pdf/Prof_memb - CStatGradStat_notes_for_guidance_2006.pdf

and should be a useful source if the ASA decides to proceed with this additional level of a credentialing program.

The RSS is closest in size to the ASA with about 7,000 members. It has awarded CStat status to nearly 1,500 applicants since it began the program in the 1990's. About 150 apply each year for either CStat or GradStat approval. The RSS uses a Professional Affairs Committee to oversee matters and make decisions (analogous to the Accreditation Board described in the ad hoc committee's report and carried over into our proposal). The RSS also offers the option of meeting its educational requirement with a Graduate Diploma of the RSS or the Institute of Statisticians. It is for those who don't possess an advanced degree in statistics or a related field. The RSS also has a provision for awarding CStat status in rare circumstances to "applicants without the required qualifications [who] might have made a substantial and distinguished contribution to statistics" and also have ten years of experience in "substantial applications". Another way that CStat differs from PS or PStat is that there is no required renewal process, i.e., once a CStat always a CStat as long as RSS membership is maintained. CStat members pay an annual fee of about \$105 to keep their status. An impressive feature of the RSS program is that applicants who aren't quite ready receive help in developing a plan of professional development so they can be approved later.

We note that most applicants for RSS Chartered Statistician do not have to take an examination. Only those who are seeking to meet the education requirement through the RSS educational program take an exam as part of accreditation.

The SSC has had an accreditation program for five years. They currently offer both Associate Statistician (A.Stat.) and Professional Statistician (P.Stat.) categories which are similar in spirit to GS and PS (or PStat). There are differences that should be noted such as an educational requirement "of at least a major or honours degree in Statistics." There is no formal periodic renewal process. Of the

roughly 1,000 members about 100 have P.Stat. status and 30 have A.Stat. Details about the SSC program may be found at

http://www.ssc.ca/accreditation/documents/sscaccrreditation_e.pdf

which would also be a helpful resource to the ASA for setting up its own program. There is an application fee of \$100CAD for P.Stat. and a yearly dues fee of \$75CAD.

The SSAI is the smallest of the three sister societies with accreditation programs. The membership is about 650 and about 140 have been accredited in a manner that is analogous to PS or PStat. The cost is roughly \$220 to be accredited and \$30 for an annual maintenance fee. Full renewal is required every five years.

Based upon discussions with the executive directors of these societies, we have the sense that there is general satisfaction with these ventures. Clearly there is a need to provide adequate staff support and to make sure that those who are accredited receive real value for their money. We heard some evidence of outside demand for accreditation (e.g., lawyers calling to find out if a person is accredited) but our impression is that the driving force for most individuals to seek accreditation is the perception that the credentials would help their careers to progress for one reason or another. For the newer programs of the SSC and SSAI, it may be too soon to know how much outside demand will eventually materialize for accredited statisticians.

The American Society for Quality (ASQ) is another worthwhile reference point. ASQ offers certification in focused areas such as quality auditor, quality engineer, and six sigma black belt. It also provides training. The cost for certification is \$150-\$260 and \$100-\$200 to be recertified every three years. As mentioned in the last section, the ASA could run similarly focused programs in addition to a general one such as PStat.

Finally, we point out the ongoing discussion about credentialing within INFORMS, The Institute for Operations Research and the Management Sciences. INFORMS has many overlapping interests with the ASA and has been monitoring our accreditation debates.

The INFORMS Credentialing Study Group is pursuing three objectives: develop a framework establishing standards for OR practice, establish a credentialing process that evaluates individual practitioners against these standards, and prepare a business case analysis. Among the questions they are debating is whether it makes more sense to have a general or a focused credentialing program given the diversity of skills and topics in their discipline (which is similar to the diversity associated with modern statistics).

4. Ad Hoc Committee Proposal for GS and PS

The report of the ad hoc committee stands on its own as a serious proposal to the ASA Board. In this section of our report, we will comment on selected features of their recommendations to make clear why we have not completely endorsed all aspects.

We have debated the merits of GS accreditation and start with a reminder that both the RSS and the SSC have similar categories. One of the major components of the GS proposal is a mentoring program. Mentoring is a great concept and can be extremely beneficial under the right circumstances. However, we are very concerned that a blanket requirement for mentoring would be difficult to carry out for many candidates, and it could be a nightmare for the ASA to administer nationally. Still, it might be a useful option for some and if successful could be included as part of a package that demonstrates professional growth for a PStat candidate. The onus, however, would be on the candidate, not the ASA office, to make it work.

Our recommendation with respect to GS accreditation (or a modified GStat version of it) is that it be tabled at least until more data is available that would support it. We recommend this because we have reservations about the value of a GS credential for most ASA members. It might be of help for someone who does not have the advantage of mainstream training and degrees in statistics, but we don't see this as a high priority issue at the outset. This recommendation also reflects our concern that the ASA not take on too much at the beginning of any accreditation program it might launch. (A similar approach was taken by the SSC.)

The ad hoc committee proposal would require that a GS or PS statistician “possess an advanced degree in statistics from an accredited US academic institution or a degree in another quantitative field with sufficient concentration in [s]tatistics.” We feel that the Accreditation Board should have the authority to approve degrees obtained from non-US institutions and other quantitative fields on a case-by-case basis.

The proposal also anticipates that “the ASA Accreditation program would want to recognize equivalent elements of designations from other national statistical societies.” Since it is unlikely that there would be a large number of such applicants, we don’t see a need to do so automatically. The Accreditation Board could handle such applications as they arise.

Two letters of recommendation are called for in the PS plan to attest to the candidate’s professional competence and communication skills. Our feeling is that the letter writers themselves should be individuals of substantial stature with appropriate backgrounds (e.g., an ASA Fellow, a senior professor, or a renowned practitioner) in addition to being first-hand knowledgeable about the work and skills of the applicant. Generally, the requirements for these letters ought to be spelled out to a greater degree (although we have not gone further with this suggestion ourselves).

A delicate element of the proposal is the suggested fee structure for both GS and PS. The feedback we received from members suggested that these rates would be much too high for many people. This will be discussed at greater length in Sections 5 and 7.

5. Data Collection and Analysis

We first carried out an informal survey of applied statisticians who were suggested by members of the Review Group and several academic department heads as potential candidates for accreditation. We also solicited the leadership of the Section on Statistical Consulting and the Section on Quality and Productivity for additional names. We ended up with 87 contacts with valid email addresses.

These 87 were contacted via email and asked to respond to a set of questions about the proposed GS and PS accreditation programs. Replies came from 37 of those contacted. Two consistent themes emerged from the data: concern that the fees proposed in the ad hoc proposal were too high and that the review process for applicants might not be fair. Apart from these messages, which we took to heart, we felt that the data we had in hand were not comprehensive or reliable enough to be used for major decision making. This led us to consider a much more ambitious web-based survey of the ASA membership.

The web survey design was a systematic random sample drawn after sorting the ASA membership list by employment category and highest degree attained to insure a proportionate representation of these member characteristics. Approximately 1,000 members were sampled, with the expectation that as few as one fourth would respond to an email invitation and complete the web-survey. Some of the sampled members had either no email address or an out of date/non-working email address. In the end, 445 responses were received.

To try to compensate for the non-response and to provide estimated totals, survey weights were developed. The process started with a base weight (the reciprocal of the selection probability). These weights were raked to membership counts of employment category, highest degree attained, employment status, gender and race so that the survey estimates of these characteristics matched the known membership characteristics.

To estimate the sampling errors of the survey estimates, replicated sets of weights were produced using a jackknife procedure applied to the sorted sample.

See Appendix A for more information about the sample design, the survey itself, and the methodology used. (The survey was reviewed by the ASA Survey Review Committee and revised according to their suggestions.)

There are two main questions on the survey:

- *Would it be beneficial or not beneficial to ASA members if ASA offered the proposed accreditation program to members?*
- *If ASA offered accreditation, would you apply or would you not apply?*

The tables below provide estimates and standard errors of the number and percent of members who would fall in the different response categories according to three explanatory variables: highest college degree, employment sector, and ‘comment’. Comments were received from 191 of the 445 respondents and categorized as positive (29), negative (63) or neutral (99). Most (254) had no comments.

Tables 1 and 2 show the results broken down by degree.¹ Independent of degree level, 53% regard the PStat proposal as beneficial² while 42% indicate they would apply for PStat accreditation. The masters degree level is the highest at 52%.

Tables 3 and 4 provide the results by employment category. Academics are the most enthusiastic (56%) although only 34% of them would apply. Consultants and self-employed individuals see PStat as less beneficial (31%) but are relatively more likely to apply (44%). Half of those in business and industry regard the accreditation proposal as beneficial and the same percent would apply.

Forty percent of the respondents made comments about the PStat proposal. These were independently coded at Westat by statisticians not involved in this committee into three comment categories, *positive*, *negative*, and *neutral*. Those respondents who made no comments were placed in a fourth category, labeled *none*. Tables 5 and 6 show how the answers to the two main survey questions break down according to these four categories. Of those who made positive comments, 87%, which corresponds to an estimated 907 ASA members, checked the beneficial box and 58% said they would apply. By contrast, only 19% of those who made negative comments believe that accreditation is beneficial although 24% of this group indicated that they would apply for it anyway. (See Appendix B for

¹ The survey categories for types of degrees and employment status differ slightly from those the ASA uses. The data in Tables 1-4 are all based on the ASA versions.

² Before rounding the percentages vary from 52.7 to 53.1. Without weighting they vary from 50.0 to 54.3.

an aggregate summary of the major themes that recur in the comments.)

One might argue—as we have among ourselves—that there could be a sizeable gap between the number who say they would apply for PStat and the number who will ultimately do so. However, it is hard not to draw the conclusion, no matter how one processes these results, that a sizeable fraction of ASA members may jump aboard. In Section 7, we attempt to cautiously translate these results into a business case for PStat.

Table 1: Degree by Accreditation Beneficial

| Degree Category | Accreditation Beneficial | | | | | | Total |
|------------------------|--------------------------|--------------|-------------------|--------------|---------------------|--------------|--------|
| | Beneficial | | Not Beneficial | | Not Sure/Don't Know | | |
| | \bar{N} (SE) | % (SE) | \bar{N} (SE) | % (SE) | \bar{N} (SE) | % (SE) | |
| Doctoral Degree | 4,354 (172) | 53 (2.10) | 1,023 (104) | 13 (1.27) | 2,804 (179) | 34 (2.19) | 8,182 |
| Masters Degree | 2,494 (204) | 53 (4.34) | 499 (142) | 11 (3.03) | 1,704 (223) | 36 (4.75) | 4,697 |
| Other | 744 (123) | 53 (8.74) | 123 (73) | 9 (5.18) | 544 (127) | 39 (8.98) | 1,412 |
| Unknown | 1,184 (118) | 53 (5.27) | 268 (94) | 12 (4.21) | 792 (109) | 35 (4.85) | 2,244 |
| Total | 8,776 (351) | 53 (2.12) | 1,914 (185) | 12 (1.12) | 5,845 (284) | 35 (1.72) | 16,535 |

\bar{N} is the estimated number in the population.

Table 2: Degree by Would Apply

| Degree Category | Would Apply | | | | | | Total |
|------------------------|-------------------|--------------|-------------------|--------------|-------------------|---------------|--------|
| | Would Apply | | Would Not Apply | | Don't Know | | |
| | \bar{N} (SE) | % (SE) | \bar{N} (SE) | % (SE) | \bar{N} (SE) | % (SE) | |
| Doctoral Degree | 3,056 (256) | 37 (3.13) | 2,855 (263) | 35 (3.21) | 2,270 (268) | 28 (3.27) | 8,182 |
| Masters Degree | 2,421 (211) | 52 (4.49) | 1,002 (189) | 21 (4.03) | 1,274 (189) | 27 (4.02) | 4,697 |
| Other | 451 (123) | 32 (8.73) | 354 (139) | 25 (9.83) | 606 (174) | 43 (12.33) | 1,412 |
| Unknown | 828 (158) | 37 (7.05) | 617 (151) | 28 (6.72) | 799 (169) | 36 (7.52) | 2,244 |
| Total | 6,757 (398) | 41 (2.41) | 4,829 (362) | 29 (2.19) | 4,949 (377) | 30 (2.28) | 16,535 |

Table 3: Employment Category by Accreditation Beneficial

| Employment Category | Accreditation Beneficial | | | | | | Total |
|------------------------------------|--------------------------|---------------|-------------------|--------------|---------------------|---------------|--------|
| | Beneficial | | Not Beneficial | | Not Sure/Don't Know | | |
| | \bar{N} (SE) | % (SE) | \bar{N} (SE) | % (SE) | \bar{N} (SE) | % (SE) | |
| Academic (Not Student) | 3,028 (190) | 56 (3.53) | 586 (157) | 11 (2.91) | 1,770 (150) | 33 (2.78) | 5,384 |
| Business and Industry | 1,959 (166) | 50 (4.26) | 660 (133) | 17 (3.41) | 1,268 (155) | 33 (3.99) | 3,887 |
| Government | 716 (111) | 47 (7.30) | 264 (84) | 17 (5.52) | 536 (105) | 35 (6.94) | 1,516 |
| Consultant or Self Employed | 230 (83) | 31 (11.26) | 25 (26) | 3 (3.55) | 482 (84) | 65 (11.46) | 737 |
| Other | 860 (139) | 67 (10.78) | 57 (59) | 4 (4.55) | 369 (126) | 29 (9.77) | 1,286 |
| Unknown | 1,983 (198) | 53 (5.32) | 321 (107) | 9 (2.86) | 1,420 (178) | 38 (4.78) | 3,725 |
| Total | 8,776 (351) | 53 (2.12) | 1,914 (185) | 12 (1.12) | 5,845 (284) | 35 (1.72) | 16,535 |

Table 4: Employment Category by Would Apply

| Employment Category | Would Apply | | | | | | Total |
|------------------------------------|-------------------|---------------|-------------------|---------------|-------------------|---------------|--------|
| | Would Apply | | Would Not Apply | | Don't Know | | |
| | \bar{N} (SE) | % (SE) | \bar{N} (SE) | % (SE) | \bar{N} (SE) | % (SE) | |
| Academic (Not Student) | 1,832 (211) | 34 (3.92) | 1,871 (200) | 35 (3.72) | 1,681 (211) | 31 (3.92) | 5,384 |
| Business and Industry | 1,929 (190) | 50 (4.88) | 1,100 (160) | 28 (4.12) | 858 (181) | 22 (4.65) | 3,887 |
| Government | 604 (88) | 40 (5.79) | 428 (102) | 28 (6.74) | 484 (91) | 32 (6.03) | 1,516 |
| Consultant or Self Employed | 321 (91) | 44 (12.37) | 143 (97) | 19 (13.18) | 274 (108) | 37 (14.68) | 737 |
| Other | 484 (134) | 38 (10.44) | 467 (125) | 36 (9.73) | 335 (101) | 26 (7.86) | 1,286 |
| Unknown | 1,587 (237) | 43 (6.38) | 820 (170) | 22 (4.57) | 1,318 (221) | 35 (5.94) | 3,725 |
| Total | 6,757 (398) | 41 (2.41) | 4,829 (362) | 29 (2.19) | 4,949 (377) | 30 (2.28) | 16,535 |

Table 5: Comment by Accreditation Beneficial

| Comment Category | Accreditation Beneficial | | | | | | Total |
|------------------|--------------------------|--------------|-------------------|--------------|---------------------|--------------|--------|
| | Beneficial | | Not Beneficial | | Not Sure/Don't Know | | |
| | \bar{N} (SE) | % (SE) | \bar{N} (SE) | % (SE) | \bar{N} (SE) | % (SE) | |
| Positive | 907 (207) | 87 (9.25) | . | . | 139 (107) | 13 (9.25) | 1,046 |
| Negative | 406 (171) | 19 (7.04) | 869 (160) | 41 (6.71) | 842 (168) | 40 (6.11) | 2,117 |
| Neutral | 2,061 (248) | 60 (5.05) | 199 (78) | 6 (2.20) | 1,201 (200) | 35 (4.96) | 3,461 |
| None | 5,402 (477) | 55 (3.86) | 846 (172) | 9 (1.70) | 3,663 (356) | 37 (3.20) | 9,911 |
| Total | 8,776 (351) | 53 (2.12) | 1,914 (185) | 12 (1.12) | 5,845 (284) | 35 (1.72) | 16,535 |

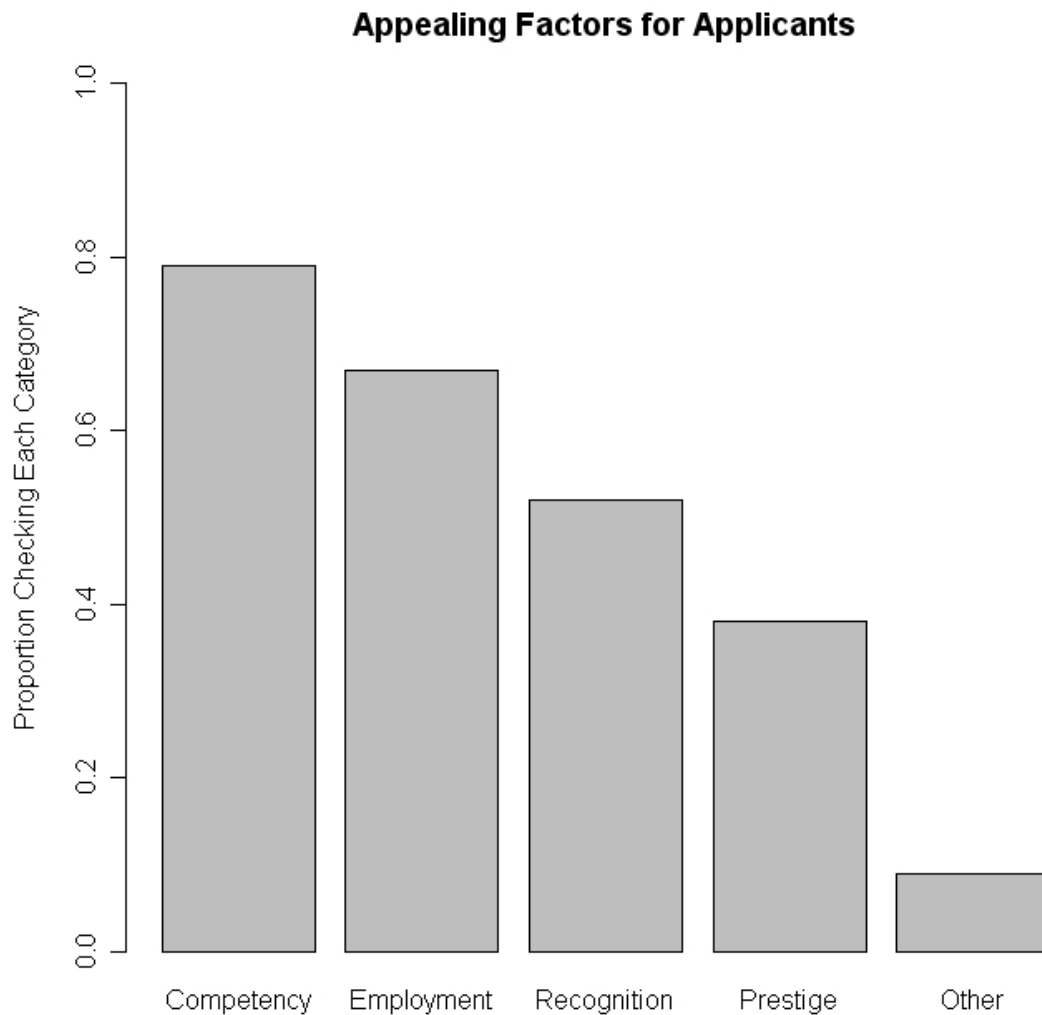
Table 6: Comment by Would Apply

| Comment Category | Would Apply | | | | | | Total |
|------------------|-------------------|--------------|-------------------|---------------|-------------------|---------------|--------|
| | Would Apply | | Would Not Apply | | Don't Know | | |
| | \bar{N} (SE) | % (SE) | \bar{N} (SE) | % (SE) | \bar{N} (SE) | % (SE) | |
| Positive | 606 (149) | 58 (9.74) | 174 (107) | 17 (10.17) | 267 (140) | 25 (10.68) | 1,046 |
| Negative | 507 (141) | 24 (6.44) | 1055 (184) | 50 (6.57) | 554 (172) | 26 (6.39) | 2,117 |
| Neutral | 1,600 (235) | 46 (4.96) | 720 (150) | 21 (4.56) | 1,141 (209) | 33 (5.03) | 3,461 |
| None | 4,044 (461) | 41 (3.76) | 2,880 (293) | 29 (2.89) | 2,987 (352) | 30 (3.39) | 9,911 |
| Total | 6,757 (398) | 41 (2.41) | 4,829 (362) | 29 (2.19) | 4,949 (377) | 30 (2.28) | 16,535 |

Question 3 of the survey asked which of the following factors about the accreditation proposal were most appealing:

- Recognition of Accomplishments
- Associated Prestige
- Evidence of Competency
- Credential for Employment
- Other

The figure below shows the percent of those who said they would apply for accreditation who checked each of these factors. Evidence of Competency (79% with s.e. of 4%) and Credential for Employment (67% with s.e. of 3%) were the two most popular ones.



6. Our PStat Proposal

Our PStat proposal has the same overarching goal as the one articulated in the ad hoc committee's PS proposal (which we quote): "Accreditation as a Professional Statistician is based on a combination of formal qualification in statistics, relevant practical experience, and demonstration of professional competence." Participation would be entirely voluntary. The goal is to provide a useful credential for individuals who are well qualified to engage in the *practice* of statistics.

Section 6 of the ad hoc committee report lays out the requirements for PS accreditation. Ours are essentially the same and we record them here for completeness with only minor changes:

- *ASA membership.* An applicant must be a member, or become a member, to apply for PStat status and must maintain membership to keep it. *Advanced degree.* An applicant must possess an advanced degree in statistics or a related quantitative field with sufficient concentration in statistics. (See also the role of Accreditation Board for handling exceptional cases.)
- *Ethical standards.* An applicant must agree to uphold the ASA's "Ethical Guidelines for Statistical Practice". (<http://www.amstat.org/committees/ethics/index.html>)
- *Experience.* An applicant must have at least five years of documented experience in the practice of statistics.
- *Competence.* An applicant must provide evidence that his or her work as an applied statistician is of high quality.
- *Communication skills.* An applicant must show evidence of strong oral and written communication skills.
- *Growth.* An applicant must have an ongoing record of professional growth.

Two supporting letters from persons of substantial stature and first-hand knowledge of the work and skills of the applicant are required. These letters should address the issues of experience, competence, communications skills, professional growth, and any other relevant topics.

An Accreditation Board would oversee the entire process, make all decisions about accreditation, and provide constructive feedback to applicants who are not approved. (There should be a path for appeal of negative decisions.) The Board should have the flexibility to deal on a case-by-case basis with unusual situations such as an applicant who lacks formal training credentials but otherwise is obviously well qualified for PStat status. Likewise the Board may want to give special consideration to an applicant who has already been comparably credentialed by another statistical society.

Accreditation would be for a five-year period after which renewal would be necessary. This would involve a full review of what has transpired in the interim with respect to the requirements listed above. (We do not endorse the first three elements under PS maintenance in the ad hoc committee proposal in order to simplify the process.)

There are two major concerns that pertain to the Accreditation Board. First it must develop a reputation for openness and fairness to assure that members of the ASA are comfortable with the process. Second it must set a reasonably high bar so that it is not seen as ‘rubber stamping’ any and all applicants. Establishing a set of standards to guide the approval process may be a good way to deal with both of these concerns.

The ad hoc committee report goes into more detail on some of these topics. The Review Group has not delved into all of them, even though they are important and will need to be sorted out.

7. The PStat Business Model

A business model was created to estimate the expenses and net income from the proposed accreditation program. The model was created using staff input from Steve Porzio and Ron Wasserstein as well as input from panel members. The process began with extensive discussion of the proposed fee structure as well as on the enrollment counts that might be expected from the membership. The fees used by other statistical societies (as described in Section 3) who support accreditation provided some useful guidance on

possible fees. Similarly, the results of the two surveys of the membership (described in Section 5) helped in estimating an expected response to the program.

The discussion on fees ranged across many topics. These included whether or not to charge annual renewal fees or only a single larger fee, and the time period of the initial accreditation and the fees for re-accreditation. The Review Group ultimately decided to recommend a constant annual fee since it was decided that this would be easiest to process and promote.

In order to make a business case, a model was created that provided an estimate of the expenses and revenues to support an accreditation program within the ASA. The revenue and expense considerations included the following items:

REVENUE

- Annual Fee
- Initial Enrollment
- Retention Rate
- Growth Rate

EXPENSES

- Start-up costs (more in first year)
- Annual growth rate in expenses
- Telephone
- Printing and copying
- Supplies
- Travel (for Accreditation Board to evaluate applications)
- Staff (1-2 fulltime equivalent employees)
- Advertising
- Website development and maintenance (for online submissions of applications)

We've allowed for the possibility that the Accreditation Board may need to be expanded to help manage an initial surge. Also, the panel discussed the fact that a steady-state condition would eventually be reached due to limits in the number of members seeking accreditation. It was decided that it was premature to estimate the effects of such an event until the program has been in place for a few years. Though the model may not have captured all costs,

the panel believes it provides a reasonable estimate given the information currently available.

We initially chose 600 applicants as an estimate for the number of first-year (or first wave) applicants, followed by a 10% increase in subsequent years. However, this was an estimate based on our perception of the number of initial applicants for the accreditation programs in other countries, and how these results might translate to the proposed ASA accreditation program. Later, after obtaining the sample data described in Section 5, the initial applicant count was increased to include an initial wave of 1000, 2000, or 3000 members. A "large initial wave followed by steady future applications" approach seems to describe the experience of the societies in other countries having an accreditation program for statisticians.

In Appendix C there are four examples of the final model used for the revenue and expenses anticipated for different applicant number scenarios (600, 1000, 2000, and 3000) assuming the accreditation fee will be \$85 per year. We used the model as is and simply changed certain revenue numbers (price for initial accreditation or renewal, number of initial people applying, annual renewal rate, or annual retention rate) to determine what happens to the net revenue on the bottom line. The business model in Appendix C uses the following assumptions:

- An \$85/year flat fee for accreditation.
- An initial surge of applicants, regulated (by some yet to be determined method) over first three years, followed by a fixed percentage growth (10%) in new applicants, and a fixed annual retention (95% renewal rate) of currently accredited members until reaching an equilibrium point.
- A 3% annual increase for most expenses, but no increase in renewal fees.
- At most 10 volunteers attend 2 two-day meetings each year to evaluate applications at an estimated average cost per person per meeting of \$1000; assumes 20 people for meetings in years 1-3 for larger estimated numbers of applicants.
- One new staff position (or equivalent in temporary help) on an ongoing basis, and more or less help at the outset depending on the size of the initial surge.

- Internal ASA advertising during the first year with expanded advertising to non-members as the program develops; professionally-guided communications with members about the new program.
- Modifications to the ASA website to facilitate on-line submission of materials, plus additional ongoing website maintenance costs for the program.

Referring to the third example in Appendix C, an assumption is made for the group with 2000 initial applicants. We assume a method will be devised to regulate enrollment so that 1000 of them join in year one, and 1000 more in year two. We also assume that we will lose 5% of the year one members in year 2, so the table shows a count of 1950 members in that year. Subsequent years assume a 10% growth rate and 5% attrition. Similarly, in the third example, when the initial surge is 3000, it is assumed the application flow will be regulated such that there will be 1000 new applicants in each of the first three years.

For the expenses for the 2000-sized initial group, we include two years of higher printing, salary and travel expenses, for example, and then the expenses reduce in size to previous levels. The 3000-sized group has similar increase in expenses over the first three years, as well as the need for a permanent fulltime employee dedicated to this area.

As noted, we assumed for the sake of constructing these models that we might face a large surge of applicants at the outset and might need to manage enrollment so as not to overwhelm our volunteers and staff. The details associated with this are left to those who would be responsible for implementation (see the next section of this report).

With an initial surge of only 600 applicants, the business model predicts a net loss of \$40,500 in the first year of operations but estimates positive net revenue thereafter. At this lower rate of applications, it will take over five years to recover these costs. In contrast, with an initial surge of 3000 applicants, the business model predicts a net loss of \$67,000 in the first year of operation but estimates a recovery of costs by the end of the third year of the program, and a net income of over \$137,000 by the end of the fifth year.

8. Implementation Suggestions

We have focused on the strategic implications of an accreditation program rather than the details of how to get such a program up and running. Should the Board decide to proceed with accreditation, these start-up details will become immediately important. The intent in this section is simply to call attention to a few of the issues that will require follow up work by others.

The formation of the first Accreditation Board will in many ways be the key to success. Initial appointees should represent the highest caliber of statistical practitioners and reflect the broad spectrum of such work. Practitioners at the MS educational level should be represented. Among its tasks, this first board will need to iron out details that put substance around the need for the review process to be open and fair.

The response to our survey of members suggests that the number of applications could be substantial at the outset. An effective way to manage the number of applications being simultaneously processed may be needed, e.g., stagger applications according to seniority of membership to allow the most seasoned professionals the first crack at accreditation. Some system that allows people the opportunity to indicate intent to apply may be helpful.

Another critical element will be software to automate as much of the application process as possible. This includes the need for a database to manage all the information about applicants and their status.

We believe an accreditation program must provide meaningful value beyond credentialing to practitioners to assure its long-term success. The search for effective ways to accomplish this should be part of the start-up discussion. Ideas might include display of the names of accredited members on the ASA website and facilitation of networking among these members. The latter idea might be especially beneficial to applied statisticians who work in isolated settings. As the cadre of accredited statisticians grows, they can be surveyed to determine other beneficial services.

Finally we mention (again) the importance of effective communication to members of the ASA about the program. The need is much more than simply informing members about the creation of the program and how to apply for accreditation. While the survey shows that dissenters are a clear minority, their comments indicate that they hold strong feelings. The challenge for the ASA will be to help these folks understand why an

accreditation program is being created and to encourage at least their understanding if not their active support.

9. Closing Thoughts

The Review Group began its study with lots of questions about the need for any type of accreditation program as well as the specifics of the one recommended by the ad hoc committee. We don't claim to have answered all of them but have gradually become convinced that it would be in the best interests of the ASA to launch what we have labeled the PStat version. What convinced us most of all was the surprisingly strong indication in our randomized survey that a sizable segment of ASA members want this to happen and would apply. If these results are any indication of the number of applicants to expect, it is clear that the service would be much appreciated by many members, if not by everyone, and that there is a satisfactory business case to support it.

It is harder to say how PStat would be received by employers and it will take time to know. Discussion with representatives of large government agencies suggested that such a program would not solve any of their current hiring problems. We also anticipate that PStat would not make a big splash with large corporations in the private sector. All of these large employers already have their own ways of assessing statistical talent. Having said that, the usefulness to small government organizations or private sector employers could be considerable since they often lack the resources to do their own assessments.

The ASA will need to invest to make the program work well. Doing accreditation on the cheap would be a huge mistake! These investments will include staff and the development of databases and website information. The ASA will also need to successfully communicate the value of the program to disinterested or antagonistic segments of the membership as well as to employers who are unaware of it. This communication effort may benefit from guidance by outside experts and surely won't be amenable to a quick fix.

Ultimately the PStat members of the ASA will determine the success of the program. If it provides real value to them, it should thrive and grow.

A surge of interest from nonmembers in the U.S. and internationally may develop. Frustrated practitioners who lack advanced degrees in statistics may finally have a way to achieve credentials. New opportunities for the ASA's continuing education program may sprout as applied statisticians work on their professional growth.

For instance, we can envisage attracting practitioners from industry with substantial data analytic experience and a strong record of continuing education to the PStat program. Hopefully in five years time it will be clear that jumping into the accreditation business was a wise strategic move because of the value it provides to current members and the potential it offers for drawing in new ones from different fields and different parts of the world.

We have one final suggestion for the ASA Board. Because of the long history of discussion within the organization, and all the previous debates on the pros and cons of accreditation, the time has come to make a decision—either launch a program, such as the one we are suggesting, or say definitively that this is not for us. It's time to move on!

Appendix A: Accreditation Survey and Methodology

Dear <member name>,

The American Statistical Association is considering an optional program of individual accreditation. We have selected you at random from the membership of the ASA to review a summary of the program under consideration and to respond to a six question survey that will take less than five minutes to complete. The summary of the program is below the signature on this message. After you've read it, please go to <url provided> to take the very brief survey.

Your participation in the survey is completely voluntary. Responses will be kept strictly confidential. Results will be reported only in aggregate form.

Thank you. Your participation will help the association as it considers this important matter.

Sincerely,

Jon Kettenring, Chair, Accreditation Proposal Review Panel

Ron Wasserstein, Executive Director

Main features of a proposal to provide individual professional accreditation:

The objective is to implement an *optional* program of professional accreditation that will:

- provide a valuable credential for experienced applied statisticians (for example, increased demand for services, added prestige when seeking employment, and better recognition by peers in other fields)
- provide employers and contractors with assurance that statisticians they hire are professionals (for example, they possess a sound statistical education, engage in continuous self-improvement, and adhere to a code of ethics)
- enhance the public image of statistics and statisticians in the eyes of the public
- attract new members to the ASA from the community of applied statisticians working in university, government, business, industry, private-practice, and not-for-profit sectors; and
- encourage students to pursue careers in statistics because of its professionalism.

Professional Statistician (PStat)

| | |
|---|---|
| Criteria for <u>PStat</u> accreditation | <ul style="list-style-type: none">• Advanced degree in statistics or another quantitative field with sufficient concentration in statistics (or equivalent experience)• 5 years of documented statistical practice• Evidence of ongoing professional development• Evidence of general professional competence and good communication |
|---|---|

| | |
|--------------------------------------|---|
| | skills <ul style="list-style-type: none"> • Agreement to uphold ethical guidelines of ASA • Approval by Accreditation Board |
| Length of <u>PStat</u> accreditation | <ul style="list-style-type: none"> • 5 years with possible re-accreditation at the end of each five year period |
| Application/approval process | <ul style="list-style-type: none"> • Formal application • Evidence of statistical practice • Names of references • Review by members of Accreditation Board • Appeal procedure |
| Re-accreditation process | <ul style="list-style-type: none"> • Updated information on statistical practice and professional development • Reaffirmation to uphold ASA ethical guidelines • Approval by Accreditation Board |
| Cost | <ul style="list-style-type: none"> • \$85/year |

The survey:

1. Would it be beneficial or not beneficial to ASA members if ASA offered the proposed accreditation program to members? (pick one)
 - a. Beneficial
 - b. Not beneficial
 - c. Not sure/don't know

2. If ASA offered accreditation, would you apply or would you not apply? (pick one)
 - a. Would apply
 - b. Would not apply
 - c. Don't know

3. **If you answered "yes" to question 2:** What, if anything, appeals to you about accreditation? (check all that apply)
 - a. Recognition of accomplishments
 - b. Associated prestige
 - c. Evidence of competency
 - d. Credential for employment
 - e. Other (please specify) _____
 - f. None of the above

4. Please share any information regarding the accreditation proposal with ASA. No response is required.

5. Please check the level of your highest college-level degree.
 - a. None
 - b. BS
 - c. MS
 - d. PhD or other doctoral degree
 - e. Other (please specify)_____

6. Please check the one sector you most closely identify with.
 - a. Private Sector
 - b. Academia
 - c. Government
 - d. Other (please specify)_____

Date: July 22, 2009
To: Ron Wasserstein
From: Jay Clark
Subject: Weighting Calculations for ASA Accreditation Survey

Sample Design

As you described it to us, the 16,535 members of ASA were sorted by employment category (including unknown) and highest degree attained (including unknown). A random start point was selected between 1 and 16,535, and then every 20th record was selected for the sample. When the end of the sorted list was reached, the sample selection wrapped around to the beginning of the list, and sample selection continued, past the random starting point, resulting in 1,029 records being selected for the sample. Of these, 33 sampled records did not have a usable email address, and 445 sampled members responded to the survey.

Had the sampling interval been 16 = 16,535/1,029 (since it was 20, this caused the ‘wrapping’ around), this sample selection method would give approximately the same percentages of members in each employment and degree category in the sample as are in the overall membership. Due to both the larger interval, 20, and sampling error from the random start, the characteristics of the sample percentages differed by category, as seen in Table 1. Also, due to differential response rates, the characteristics of the respondents also differ somewhat from the membership. In general, members with unknown employment category or unknown highest degree were less likely to respond to this survey.

Table 1. Membership, Sample, and Respondent Percentages by Employment Type and Degree

| Category | Membership | | Sample Percentage | Respondent Percentage |
|-------------------------------------|------------|------------|-------------------|-----------------------|
| | Count | Percentage | | |
| Academic (not student) | 5,384 | 32.6% | 29.5% | 32.4% |
| Business and Industry | 3,887 | 23.5% | 22.8% | 27.2% |
| Federal/National Government | 1,238 | 7.5% | 6.6% | 9.9% |
| Other | 1,286 | 7.8% | 7.4% | 7.0% |
| Private Consultant/Self Employed | 737 | 4.5% | 3.6% | 4.3% |
| State, Provincial, Local Government | 278 | 1.7% | 1.5% | 1.3% |
| Unknown | 3,725 | 22.5% | 28.6% | 18.0% |

Table 1 (continued). Membership, Sample, and Respondent Percentages by Employment Type and Degree

| Category | Membership | | Sample Percentage | Respondent Percentage |
|------------------|---------------|------------|-------------------|-----------------------|
| | Count | Percentage | | |
| Associate Degree | 47 | 0.3% | 0.2% | 0.2% |
| Bachelors Degree | 1,190 | 7.2% | 7.0% | 5.4% |
| Doctoral Degree | 8,183 | 49.5% | 44.5% | 52.8% |
| Masters Degree | 4,698 | 28.4% | 27.2% | 30.6% |
| Other | 175 | 1.1% | 0.9% | 0.7% |
| Unknown | 2,242 | 13.6% | 20.2% | 10.3% |
| Total | 16,535 | | | |

Weighting Methodology

Base Weights

Since the membership was sampled systematically from a sorted list, the initial weight assigned to each respondent was the average final weight, $16,535/445 = 37.2$.

Replicate Weights

To estimate standard errors, replicate weights were created using the jackknife (JK1) method. The respondents were sorted in the order used for sampling. They were then systematically numbered from 1 to 30, creating 30 groups of about 15 records each. The first replicate weight was created by setting the weights of one group to 0 and multiplying the weights of the other groups by $30/29$ so that the sum is an estimate of the membership total. The second replicate weight was created in similar fashion, setting a different group to 0, and the process continued until 30 replicate weights were created.

Nonresponse Adjustment

Given that we have membership totals for use in adjusting weights, a separate weighting step to address nonresponse was not used. Instead, raking adjustments were made so that weighted totals matched the membership totals.

Raking

Control totals showing membership counts by five different variables were provided and used to adjust the weights (both full-sample and replicate weights). The value of each variable was also provided for the 445 respondents. To be sure that the raking process converged, categories with fewer than 10 respondents were collapsed together. Table 2 shows the raking variables, collapsed categories, and counts for both the membership and survey respondents, as well as the ratio of respondents to overall membership.

After raking, the weighted totals were very close to the membership counts for each category of each of the five raking variables. The final weights ranged from 17.5, for members with a doctoral degree, employed in business or industry, and with unknown race and gender, to

115.9, for members with a masters degree, retired or unemployed from business or industry, and Asian males. This variation reflects both sampling variability and differential response rates for various subgroups.

Table 2. Counts for Each Raking Variable

| Raking Variables | Membership Count | Respondent Count | Ratio |
|--------------------------|-------------------------|-------------------------|--------------|
| Highest Degree | | | |
| Doctoral | 8,183 | 235 | 0.029 |
| Masters | 4,698 | 136 | 0.029 |
| Other | 1,412 | 28 | 0.020 |
| Unknown | 2,242 | 46 | 0.021 |
| Employment Type | | | |
| Academic | 5,384 | 144 | 0.027 |
| Business/Industry | 3,887 | 121 | 0.031 |
| Government | 1,516 | 50 | 0.033 |
| Other | 1,286 | 31 | 0.024 |
| Private | 737 | 19 | 0.026 |
| Unknown | 3,725 | 80 | 0.021 |
| Employment Status | | | |
| Employed | 10,777 | 335 | 0.031 |
| Other | 937 | 11 | 0.012 |
| Student | 2,850 | 60 | 0.021 |
| Unknown | 1,971 | 39 | 0.020 |
| Gender | | | |
| Female | 4,678 | 127 | 0.027 |
| Male | 9,769 | 267 | 0.027 |
| Unknown | 2,088 | 51 | 0.024 |
| Race | | | |
| Asian | 3,700 | 84 | 0.023 |
| Other | 817 | 18 | 0.022 |
| Unknown | 2,840 | 73 | 0.026 |
| White | 9,178 | 270 | 0.029 |

Standard Errors

Standard errors are calculated using the JK1 replicate weights. The idea behind replication is to calculate the estimate of interest using the full sample weights as well as each set of replicate weights. The variation between the replicate estimates and the full-sample estimate is then used to estimate the variance for the full sample. The standard error is the square root of the variance. Suppose that $\hat{\theta}$ is the full-sample estimate of some population parameter θ . The variance estimator, $v(\hat{\theta})$, generally takes the form

$$v(\hat{\theta}) = c \sum_{g=1}^G (\hat{\theta}_{(g)} - \hat{\theta})^2,$$

where

- $\hat{\theta}_{(g)}$ is the estimate of θ based on the observations included in the g -th replicate,
- G is the total number of replicates formed (in this case, $G = 30$), and
- c is a constant that depends on the replication method (in this case, $c = 29/30$).

Output Tables

After raking the full-sample and replicate weights, tables were created showing the weighted estimates of whether accreditation would be beneficial, by degree, employment type, and tone of comment (positive, negative, or neutral). Additional tables were created showing whether the respondent would apply for accreditation, again by degree, employment type, and tone of comment. An additional table was included showing what was appealing about accreditation for those respondents who would apply. Each estimate has an associated standard error, calculated as described above.

Note that the percentage estimate for members who believe accreditation is beneficial is 53%, and the estimate is the same for each of the categories for highest degree. Although suspicious, this result was reviewed and found to be accurate. The unweighted results by degree show a range of 50%-54%, and after raking, the weighted estimate range narrowed to 52.7%-53.2%.

Appendix B: Main Themes of Survey Comments

About 40% of the survey respondents provided comments and about 33% of those comments were deemed negative, a much higher percentage than the 12% opposed to accreditation in the survey. Some of the negative comments clearly came from those who were unsure about accreditation.

1. For some employers/clients who do not have strong statistical expertise, accreditation designations will help them separate competent practicing statisticians from those “armed only with a statistical software package”. (The increasing demand for statistical expertise is enlarging this category.) It might be useful for those in private consulting practice or for those who are more junior in the field or for those testifying in legal proceedings.

2. It offers less benefit for some career paths: (1) in academia, degrees and publications are better indicators of competency than accreditation; (2) employers (e.g. large government agencies, pharmaceutical companies) with strong statistical expertise are able to judge competency without the aid of accreditation.

3. Some fear consequences if pressure grows for everyone to become accredited: (1) some fear it may adversely affect statistics curricula or may devalue advanced degrees in statistics; (2) some fear that competent experienced statisticians without degrees or degrees of the right type may be at a disadvantage; (3) some highly experienced statisticians would resent being judged for competency.

4. It can be beneficial to those competent practicing statisticians whose original degrees were not in statistics but in related quantitative fields.

5. “The cost is too high” or “ASA is just using this as a fundraiser” and to “bulk up membership”. But members who do not qualify may leave ASA.

6. ASA will join the ranks of other professional societies who are successfully doing this.

7. This leads to more red tape.

8. Many suggestions were made on how to carry out accreditation.

Appendix C: Four Sample Business Models

Each model assumes \$85 annual accreditation fee.

Example 1: Assume 600 initial participants (see note 1, below)

| | Year 1 | | Year 2 | | Year 3 | | Year 4 | | Year 5 | |
|----------------------------|--------------------------|-------------|------------------------|-------------|------------------------|-------------|------------------------|-------------|------------------------|-------------|
| Revenue | <u>\$</u> | <u>qty.</u> | <u>\$</u> | <u>qty.</u> | <u>\$</u> | <u>qty.</u> | <u>\$</u> | <u>qty.</u> | <u>\$</u> | <u>qty.</u> |
| P-Stat annual fee | \$ 51,000 | 600 | \$ 53,550 | 630 | \$ 56,200 | 662 | \$ 59,000 | 695 | \$ 62,000 | 729 |
| Expense² | | | | | | | | | | |
| Telephone | \$ 500 | | \$ 520 | | \$ 540 | | \$ 560 | | \$ 580 | |
| Printing/ copying | 2,500 | | 1,290 | | 1,330 | | 1,370 | | 1,410 | |
| Supplies | 1,000 | | 1,030 | | 1,060 | | 1,090 | | 1,120 | |
| Travel ³ | 20,000 | | 10,300 | | 10,610 | | 10,930 | | 11,260 | |
| Staff S&B ⁴ | 37,500 | | 19,310 | | 19,890 | | 20,490 | | 21,100 | |
| Advertising ⁵ | 10,000 | | 15,000 | | 15,450 | | 15,910 | | 16,390 | |
| Website dev ⁶ | 20,000 | | 2,000 | | 2,060 | | 2,120 | | 2,180 | |
| total expense | \$ 91,500 | | \$ 49,450 | | \$ 50,940 | | \$ 52,470 | | \$ 54,040 | |
| Net Income | <u><u>\$(40,500)</u></u> | | <u><u>\$ 4,100</u></u> | | <u><u>\$ 5,260</u></u> | | <u><u>\$ 6,530</u></u> | | <u><u>\$ 7,960</u></u> | |

¹ assumes an initial surge of 600 applicants, followed by a fixed annual percentage growth rate of 10% in new applicants, fixed annual retention rate of 95% for currently accredited members

² 3% annual increase for most expenses. NOTE: No increase in fees included in this model

³ 10 people for 2 two-day meetings (\$1000 estimated average cost per person per meeting)

⁴ Assume we need .5 FTE new position (or equivalent in temporary help) for year one, .25 time subsequently

⁵ Advertising cost assumes we will advertise internally only during the first year

⁶ For modifications needed to website to facilitate on-line submission of materials (rough estimate), plus on-going maintenance

Example 2: Assume 1000 initial participants (see note 1, below)

| | Year 1 | | Year 2 | | Year 3 | | Year 4 | | Year 5 | |
|-----------------------------|-------------------|-------------|-----------------|-------------|------------------|-------------|------------------|-------------|------------------|-------------|
| Revenue | <u>\$</u> | <u>qty.</u> | <u>\$</u> | <u>qty.</u> | <u>\$</u> | <u>qty.</u> | <u>\$</u> | <u>qty.</u> | <u>\$</u> | <u>qty.</u> |
| P-Stat annual fee | \$ 85,000 | 1000 | \$ 89,250 | 1050 | \$ 93,700 | 1103 | \$ 98,400 | 1158 | \$ 103,300 | 1216 |
| Expense ² | | | | | | | | | | |
| Telephone | \$ 500 | | \$ 520 | | \$ 540 | | \$ 560 | | \$ 580 | |
| Printing/copying | 4,500 | | 2,320 | | 2,390 | | 2,460 | | 2,530 | |
| Supplies | 2,000 | | 2,060 | | 2,120 | | 2,180 | | 2,250 | |
| Travel ³ | 40,000 | | 20,600 | | 21,220 | | 21,860 | | 22,520 | |
| Staff S&B ⁴ | 75,000 | | 38,630 | | 39,790 | | 40,980 | | 42,210 | |
| Advertising ⁵ | 10,000 | | 15,000 | | 15,450 | | 15,910 | | 16,390 | |
| Website dev ⁶ | 20,000 | | 2,000 | | 2,060 | | 2,120 | | 2,180 | |
| total expense | \$152,000 | | \$ 81,130 | | \$ 83,570 | | \$ 86,070 | | \$ 88,660 | |
| Net Income | <u>\$(67,000)</u> | | <u>\$ 8,120</u> | | <u>\$ 10,130</u> | | <u>\$ 12,330</u> | | <u>\$ 14,640</u> | |

¹ assumes an initial surge of 1000 applicants, followed by a fixed annual percentage growth rate of 10% in new applicants, fixed annual retention rate of 95% for currently accredited members

² 3% annual increase for most expenses. NOTE: No increase in fees included in this model

³ 10 people for 2 two-day meetings (\$1000 estimated average cost per person per meeting), assume 20 people for year one

⁴ Assume we need one new position (or equivalent in temporary help) for year one, .50 time subsequently

⁵ Advertising cost assumes we will advertise internally only during the first year

⁶ For modifications needed to website to facilitate on-line submission of materials (rough estimate), plus on-going maintenance

Example 3: Assume 2000 initial participants (see note 1, below)

| | Year 1 | | Year 2 | | Year 3 | | Year 4 | | Year 5 | |
|-----------------------------|-------------------|-------------|------------------|-------------|------------------|-------------|------------------|-------------|-------------------|-------------|
| Revenue | <u>\$</u> | <u>qty.</u> | <u>\$</u> | <u>qty.</u> | <u>\$</u> | <u>qty.</u> | <u>\$</u> | <u>qty.</u> | <u>\$</u> | <u>qty.</u> |
| P-Stat annual fee | \$ 85,000 | 1000 | \$165,750 | 1950 | \$174,000 | 2048 | \$ 182,700 | 2150 | \$ 191,900 | 2257 |
| Expense ² | | | | | | | | | | |
| Telephone | \$ 500 | | \$ 520 | | \$ 540 | | \$ 560 | | \$ 580 | |
| Printing/ copying | 4,500 | | 4,640 | | 2,390 | | 2,460 | | 2,530 | |
| Supplies | 2,000 | | 2,060 | | 2,120 | | 2,180 | | 2,250 | |
| Travel ³ | 40,000 | | 41,200 | | 21,220 | | 21,860 | | 22,520 | |
| Staff S&B ⁴ | 75,000 | | 77,250 | | 39,780 | | 40,970 | | 42,200 | |
| Advertising ⁵ | 10,000 | | 15,000 | | 15,450 | | 15,910 | | 16,390 | |
| Website dev ⁶ | 20,000 | | 2,000 | | 2,060 | | 2,120 | | 2,180 | |
| total expense | \$152,000 | | \$142,670 | | \$ 83,560 | | \$ 86,060 | | \$ 88,650 | |
| Net Income | <u>\$(67,000)</u> | | <u>\$ 23,080</u> | | <u>\$ 90,440</u> | | <u>\$ 96,640</u> | | <u>\$ 103,250</u> | |

¹ assumes an initial surge of 2000 applicants, somehow regulated over first two years followed by a fixed annual percentage growth rate of 10% in new applicants, fixed annual retention rate of 95% for currently accredited members

² 3% annual increase for most expenses. NOTE: No increase in fees included in this model

³ 10 people for 2 two-day meetings (\$1000 estimated average cost per person per meeting), assume 20 people for years one and two

⁴ Assume we need one new position (or equivalent in temporary help) for years one and two, .50 time subsequently

⁵ Advertising cost assumes we will advertise internally only during the first year

⁶ For modifications needed to website to facilitate on-line submission of materials (rough estimate), plus on-going maintenance

Example 4: Assumes 3000 initial applicants (see note 1, below)

| | Year 1 | | Year 2 | | Year 3 | | Year 4 | | Year 5 | |
|----------------------------|-------------------|-------------|------------------|-------------|------------------|-------------|-------------------|-------------|-------------------|-------------|
| Revenue | <u>\$</u> | <u>qty.</u> | <u>\$</u> | <u>qty.</u> | <u>\$</u> | <u>qty.</u> | <u>\$</u> | <u>qty.</u> | <u>\$</u> | <u>qty.</u> |
| P-Stat annual fee | \$ 85,000 | 1000 | \$165,750 | 1950 | \$242,500 | 2853 | \$ 254,600 | 2995 | \$ 267,300 | 3145 |
| Expense² | | | | | | | | | | |
| Telephone | \$ 500 | | \$ 520 | | \$ 540 | | \$ 560 | | \$ 580 | |
| Printing/ copying | 4,500 | | 4,640 | | 4,780 | | 2,460 | | 2,530 | |
| Supplies | 2,000 | | 2,060 | | 2,120 | | 2,180 | | 2,250 | |
| Travel ³ | 40,000 | | 41,200 | | 42,440 | | 21,860 | | 22,520 | |
| Staff S&B ⁴ | 75,000 | | 77,250 | | 79,570 | | 81,960 | | 84,420 | |
| Advertising ⁵ | 10,000 | | 15,000 | | 15,450 | | 15,910 | | 16,390 | |
| Website dev ⁶ | 20,000 | | 2,000 | | 2,060 | | 2,120 | | 2,180 | |
| total expense | \$152,000 | | \$142,670 | | \$146,960 | | \$ 127,050 | | \$ 130,870 | |
| Net Income | <u>\$(67,000)</u> | | <u>\$ 23,080</u> | | <u>\$ 95,540</u> | | <u>\$ 127,550</u> | | <u>\$ 136,430</u> | |

¹ assumes an initial surge of 3000 applicants, somehow regulated over first three years followed by a fixed annual percentage growth rate of 10% in new applicants, fixed annual retention rate of 95% for currently accredited members

² 3% annual increase for most expenses. NOTE: No increase in fees included in this model

³ 10 people for 2 two-day meetings (\$1000 estimated average cost per person per meeting), assume 20 people for years 1-3

⁴ Assume we need one new position (or equivalent in temporary help) on an on-going basis

⁵ Advertising cost assumes we will advertise internally only during the first year

⁶ For modifications needed to website to facilitate on-line submission of materials (rough estimate), plus on-going maintenance