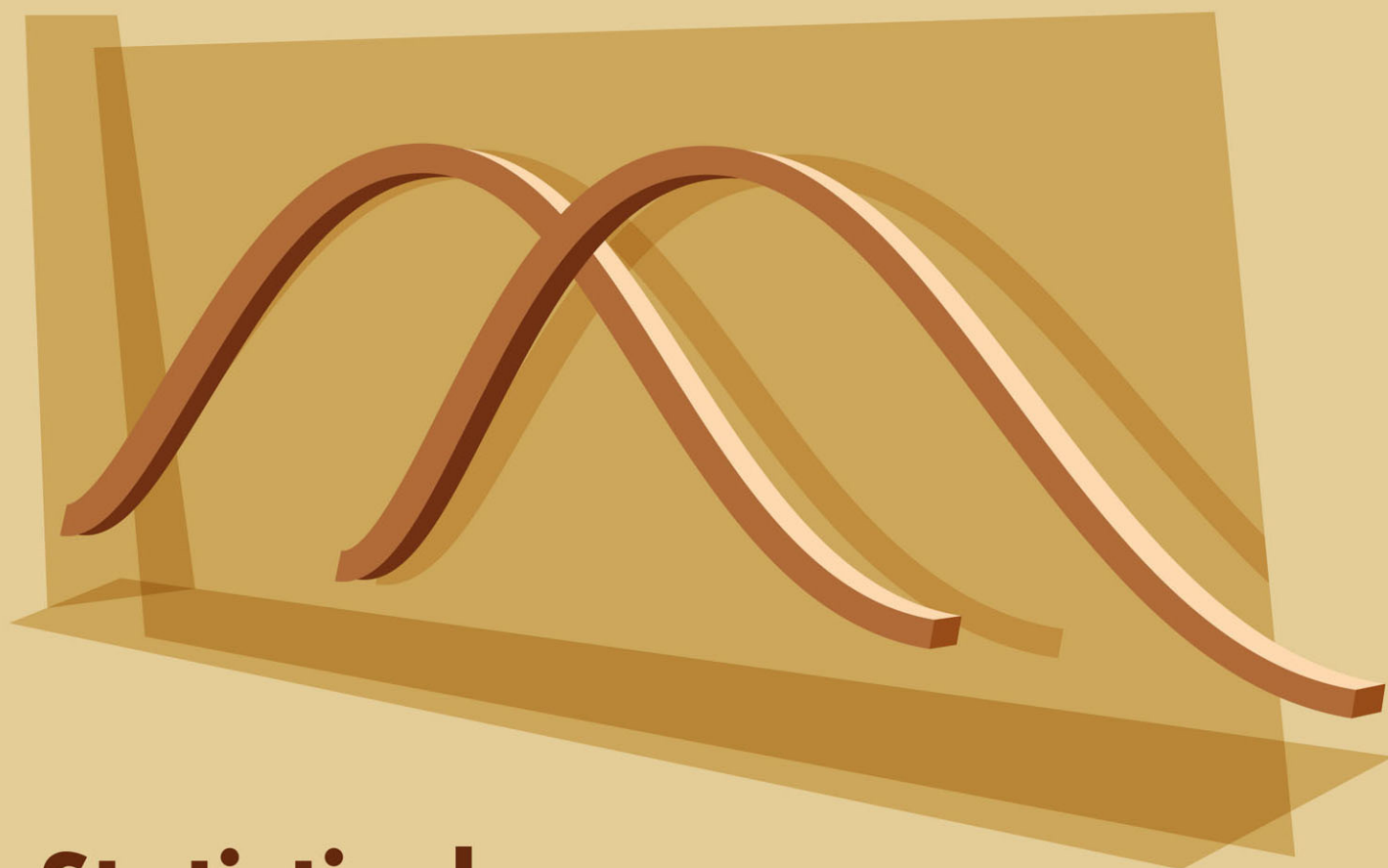




香港考試及評核局
Hong Kong
Examinations and
Assessment Authority



Statistical Moderation of School-based Assessment Scores

校本評核分數調整機制

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Introduction

簡介

Commencing with the 2007 HKCEE, Chinese Language and English Language examinations will include SBA as a component. The Hong Kong Examinations and Assessment Authority (HKEAA) will use statistical methods to moderate school-based assessment (SBA) scores submitted by schools.

It is intended that the moderation method will also be used to moderate SBA scores in most subjects to be offered under the new HKDSE, which will be examined for the first time in 2012. The exception will be practical subjects and subjects with small entries for which non-statistical moderation methods will be used.

The purpose of this booklet is to explain the rationale and key features of the moderation method, to describe the feedback to be provided to schools, and to give answers to some frequently-asked questions about the SBA moderation.

從2007年開始，香港中學會考中國語文科與英國語文科將引入校本評核，香港考試及評核局（簡稱考評局）會採用統計方法調整學校呈交的校本評核成績。

此統計調整方法亦將應用於2012年開始的香港中學文憑考試的大部分科目。至於有關實驗操作及較少考生報考的科目則會採用非統計的調整方法。

本小冊子簡介統計調整方法的原理、主要特點、給學校的報告並解答一些對分數調整的常見問題。

Why statistical moderation?

為什麼要進行統計調整？

The main reason for having statistical moderation is to ensure the fairness of school-based assessments (SBA).

Teachers know their students very well and thus are best placed to judge their performance. In consultation with their colleagues, they can reliably judge the performance of all students within the school in a given subject.

However, when making these judgments, they are not necessarily aware of the standards of performance across all other schools. Despite training in carrying out SBA, and even given that teachers will assess students on the same task and using the same assessment criteria, teachers in one school may be harsher or more lenient in their judgments than teachers in other schools. They may also tend to use a narrower or wider range of marks.

To address these potential problems, the HKEAA (like most other examination authorities) makes use of various methods for 'moderating' assessments submitted by different schools, each of which has its strengths and weaknesses. These include consensus moderation, expert moderation and statistical moderation.

Statistical moderation is particularly appropriate in situations in which there is another measure available that can be used to 'moderate' schools' assessments. Typically this other measure will be students' performance in the examination in that subject or on a test of general academic ability. The main advantages of the method are that it can be carried out quickly, impartially and without a large commitment of time and resources. The method is, however, reliant on the assumption that the measure used to moderate assessments is a valid measure of the overall level of performance of students in the moderating group. Generally, this is a valid assumption in the context of most academic subjects in public examinations.

統計調整成績最主要的目的是保證校本評核的公平性。

由於科任教師清楚了解其學生的能力，所以由他們進行校本評核是最適當的。通過教師的互相討論，他們能對校內就讀同一科目的所有學生作出可靠的評核。

可是在評核學生的過程中，教師未必了解其他學校學生的表現水平。儘管考評局已為教師提供了不少有關校本評核的訓練課程，亦相信教師會採用相同準則評核其所教的學生，仍然難以避免部份學校教師的評核過於寬鬆或過於嚴格。

為處理這些潛在問題，考評局跟大部分國家和地區的考試機構一樣，會利用多種方法調整不同學校所呈交的校本評核分數。當然，每一種方法都有長處與不足。調整方法包括：共識調整(consensus moderation)、專家調整(expert moderation)及統計調整(statistical moderation)。

當有其他量度學業表現的考試或測驗成績可作為參照的時候，以統計方法調整校本評核的成績最為合適。最常用的參照為同一科目的考試或一般學習能力測驗的成績。其好處是容易實施、公平、節省時間及資源。但統計方法需要依據一個假設：該考試或測驗能有效地量度一個調整組別內學生的整體表現。一般而言，大多數科目都以公開考試成績作為參照，因為公開考試能滿足上述假設。

The method in detail

統計調整詳情

There are essentially two ways in which differences in marking standards may affect SBA scores. First, teachers in a given school may be either harsher or more lenient than teachers in other schools. Second, they may tend to either overly bunch students' scores together or spread them apart too much.

The statistical moderation method to be introduced by the HKEAA addresses both of these potential problems. This is done by adjusting the average and the spread of SBA scores of students in a given school so that they are in alignment with the examination scores of the same group of students. What this means in practice is that the average or mean of the SBA scores may be moved up or down and the spread or standard deviation of scores stretched or compressed, in line with the mean and standard deviation of the examination scores of the same group of students.

While this ensures that SBA scores are comparable across schools, it does not, however, change the rank ordering of SBA scores within a school.

The statistical moderation method involves the following steps:

Step 1. Moderation group identification

Statistical moderation begins with identifying the moderation group for a subject. The group can be defined by:

1. school (all students studying a particular subject at a school);
2. teacher (all students studying a particular subject taught by the same teacher); or
3. teaching group (all students studying a particular subject in a teaching group).

Step 2. Conversion of the raw scores to a scale of 100 points

The second step is to convert the raw school scores and examination scores to a scale of 100 points, for the purpose of calculation and comparison.

從本質上說，對評分標準掌握不好，會在兩方面影響校本評核分數的有效性。一方面是某一學校的教師可能在評分時比其他學校的教師嚴格或寬鬆；另一方面，教師給所教學生的評分可能過於集中或者過於分散。

考评局的統計調整方法可以解決上述兩方面的問題。此方法以公開考試成績為參照，調整學校的校本評核平均成績及分布。換言之，即是參照公開考試成績將校本評核的平均分數調高或調低並將分布拉闊或收窄。

通過分數調整可使不同學校的校本評核分數有可比性。值得注意的是，調整後並不會改變學生的校本評核分數在調整組別內的次第。

統計調整方法包括以下步驟：

步驟一：確定調整組別

統計調整首先要確定一個科目的調整組別。調整組別可以是

- (1) ☐ 學校（一所學校所有參與該科目考試的學生）；
- (2) ☐ 教師（由同一老師評核的學生）；或
- (3) ☐ 學習群體（所有在同一群體中學習並參與該科目考試的學生）。

步驟二：將分數轉化為100分制

為了方便計算及比較，學校呈交的校本評核分數與公開考試分數將會轉換為100分制。

Step 3. Calculation of moderator variable

The third step is to calculate the weighted combination of examination scores in a given subject that best predicts SBA scores. The resulting score will be used as the moderating variable.

Step 4. Derivation of moderation formula

The fourth step is to derive a moderation formula by statistical methods. In this step, some outliers are temporarily excluded from the calculation; otherwise they may distort the moderation results. Outliers are students with exceptionally high or low scores.

Step 5. Calculation of moderated SBA scores

In the fifth step, a formula is applied to calculate moderated SBA scores. According to this formula, a candidate's moderated SBA score is a function of the predicted SBA score of the moderation group plus the difference between his/her original SBA score and the mean SBA score of the group, multiplied by a factor to take into account the relative spread of the SBA scores of the group in relation to the spread of scores on the examination (See Appendix).

Step 6. Conversion of initial moderated SBA scores to the original SBA metric

In the sixth step, all moderated SBA scores are converted back from a scale (from 1-100) to the original SBA metric.

Step 7. Post hoc checking

In this seventh step, post hoc checking is carried out to look for outliers after moderation using a statistical method. Any outliers will be identified for individual review and follow-up.

Step 8. Addition of the moderated SBA score to the total subject score

In this eighth step, the moderated SBA score is combined with the examination scores, with appropriate weightings, to form the total subject score for each candidate.

步驟三：計算調整變數

用公開考試各卷分數計算最恰當的合成分數作為校本評核分數的參照分數，這個合成分數稱為調整變數。

步驟四：推算調整公式

用統計方法推算出一個公式，用於計算校本評核調整分數。在這步驟中，一些異常的個案將被暫時排除在外，以免這些個案影響調整結果。異常的個案是指異常高或異常低的分數。

步驟五：計算校本評核調整分數

根據上一步驟推算的公式，考生的校本評核調整分數由其所屬組別在調整後的校本評核平均分數，加上其原來的校本評核分數及組別的校本評核平均分數之差，再乘以變化率。此變化率是通過比較考生所屬組別的校本評核分數的標準差與公開考試分數的標準差計算出來（詳見附錄）。

步驟六：將調整分數轉換回原來的單位

將校本評核調整分數（由1至100）轉換回校本評核分數的原始單位。

步驟七：調整後檢視

調整後檢視的目的是要用統計方法查出異常個案，以便再作個別的覆核及跟進。

步驟八：將調整後的校本評核分數加公開考試分數組成科目總成績

最後將已調整的分數和公開考試分數按公布的給分比重相加，合成考生的科目總成績。

Impact of the method

分數調整的影響

The impact of this methodology on the SBA scores of moderation groups and individual candidates is illustrated below with some artificial data.

Impact on moderation groups

Take English Language as an example. Each school is a moderation group. Let us consider the case of just two schools, School A and School B. The overall performance of their students in the examinations and in SBA is graphically illustrated in Figure 1.

Figure 1(a) shows that, overall, students' performance in the public examination in School B is much better than that in School A.

Figure 1(b) shows that the SBA scores of the students in School A and School B follow a similar distribution.

Figure 1(c) shows the impact of the statistical moderation process. The mean of the SBA scores of School B moves to the right while the mean of SBA scores of School A moves to the left to reflect the performance of the students in the examinations. In addition, the scores of students in both schools are spread out more, reflecting the greater spread of the same students in the examination.

以下用一些例子(包含模擬的數據)說明統計調整對調整組別及個別學生的校本評核分數的影響。

對調整組別的影響

以英國語文科為例，假設只有學校甲及學校乙兩所學校，每所學校只有一個教師任教英國語文科。一所學校就是一個調整組別。圖一展示兩所學校的學生分別在公開考試及校本評核中的整體表現。

圖一(甲)顯示學校乙在公開考試的整體表現比學校甲優勝。

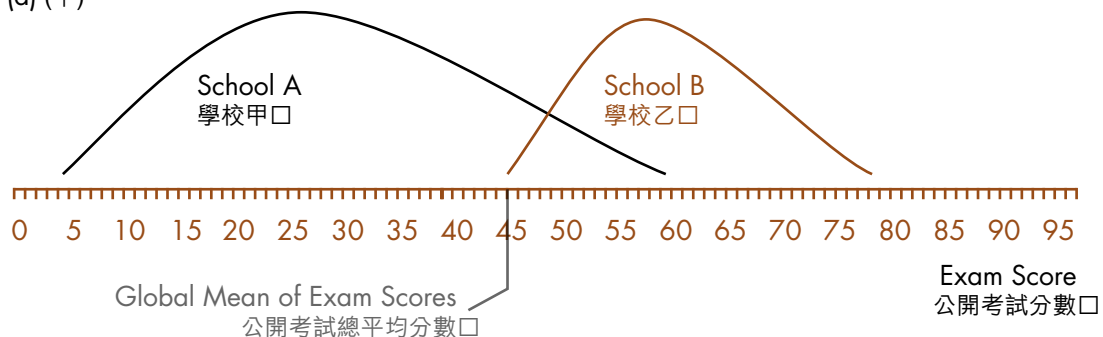
圖一(乙)顯示學校甲及學校乙在校本評核的成績相差不大。

圖一(丙)顯示統計調整對學校的影響。經調整後，學校乙的校本評核平均分數向右移(表示增加)，而學校甲的平均分數則向左移(表示減少)，以反映其公開考試的成績。至於分數的分布，兩所學校的成績分布均被拉闊，以反映其在公開考試較寬的成績分布。□

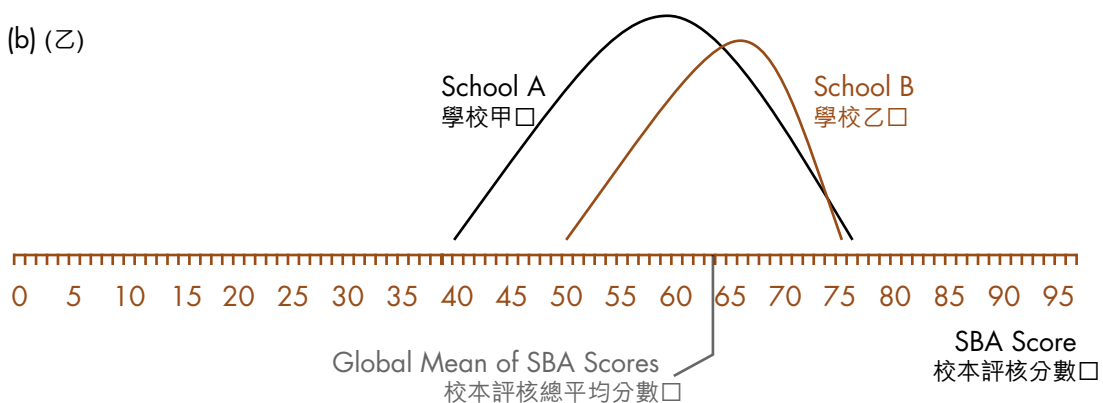
Figure 1: Moderation Impact (Comparison of Two Schools)

圖一：分數調整的影響(兩所學校的比較)

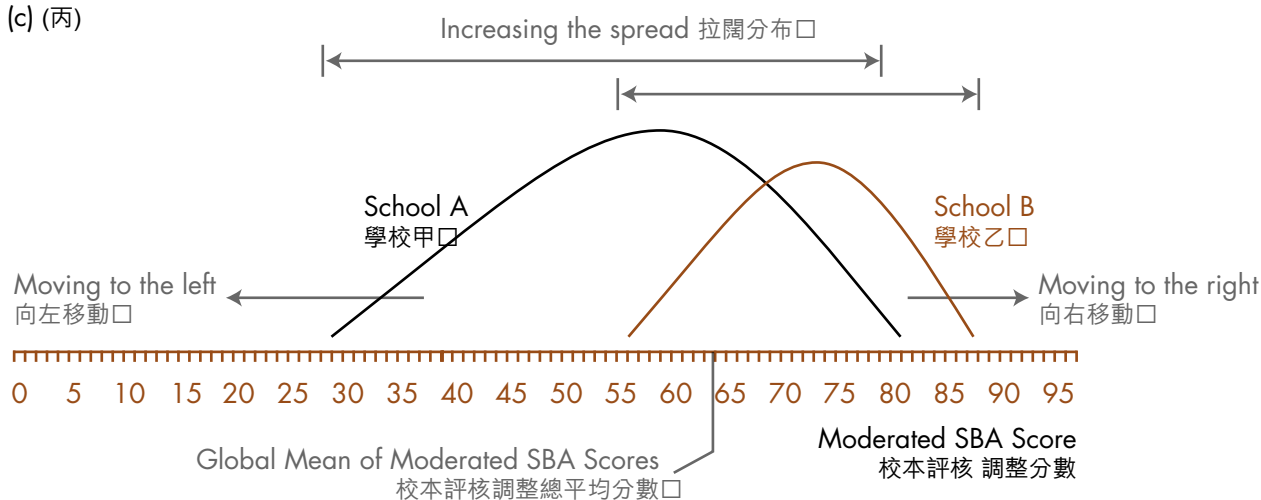
(a) (甲)



(b) (乙)



(c) (丙)



Impact on individual candidates

Suppose there are 26 candidates (A to Z) in a group and their performance is as shown graphically in Figure 2.

By looking at the relationship between the examination scores and the SBA scores (Figures 2a and 2b), we can see that there is a big difference between the two sets of scores for this group. Suppose that we knew the group mean of the SBA scores is much higher than that expected for groups with a similar performance in the examination, the SBA scores of the group need to be adjusted downwards. After statistical moderation, this is what happens, as can be seen from Figure 2c.

Now, let's track two individual candidates to see what happens to their SBA scores. Candidate B scored the top mark in his group in the public examination, and Student H got the lowest mark. However, Candidate B was not the highest-scoring and Candidate H not the lowest-scoring student when it came to SBA. Comparatively speaking, Candidate B did less well in the SBA than in the public examination while Candidate H did much better in the SBA than in the public examination.

After moderation, although school scores have been adjusted, the rank order of the students remains the same. As can be seen from Figure 2c, the rank order of Candidates B and H has not been affected at all. In other words, individual candidates' SBA scores are not directly affected by how well they performed as individuals in the exams. For example, Candidates D, C and B have the same SBA scores before moderation although they each performed differently in the exam. After moderation, they will have the same moderated SBA scores.

Figure 2d shows the total subject score for each candidate after the moderated SBA score is added to the examination score. It can be seen that candidates getting high marks in the SBA will benefit from doing so, even after statistical moderation.

對個別學生的影響

假設一個調整組別只有26名學生(A至Z)。圖二顯示他們在公開考試及校本評核的表現。

通過檢視公開考試成績與校本評核成績的關係後[圖二(甲)及二(乙)]，發現此組別的兩組成績有很大差別。假設已知其組別的校本評核平均分數明顯高於公開考試成績相若的其他組別，因此需要調低該組的分數。[圖二(丙)]展示調整後的校本評核分數。

現在觀察一下此組別其中兩位學生在調整後的校本評核分數。學生B在公開考試中獲得最高分數，而學生H則獲得最低分數。但這並不代表在校本評核中，學生B同樣可獲得最高分數或學生H會獲得最低分數。相對而言，學生B在校本評核的表現不及他在公開考試的表現，而學生H則在校本評核中取得比公開考試較佳的成績。

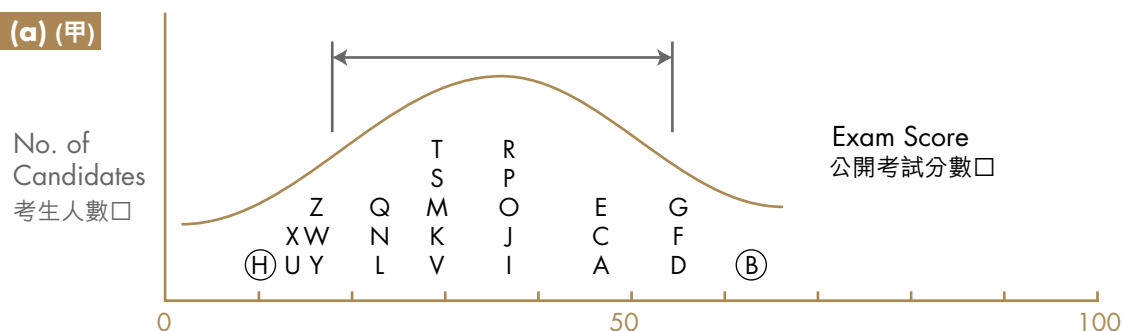
經統計調整後，雖然校本評核分數有所改變，但是學生的次第仍然保持不變。從圖二(丙)中可以看到，學生B及學生H的校本評核分數次第並沒有因調整而改變。換言之，學生的校本評核調整分數不會直接受其在公開考試的表現所影響。例如，學生D、C及B有不同的公開考試成績，但其校本評核的分數卻是一樣的；經調整後，他們的評核分數仍然相同。

圖二(丁)表示調整後的校本評核分數與公開考試分數相加後的科目總分數。學生如果在校本評核表現良好，即使經過調整，仍然有所得益。□

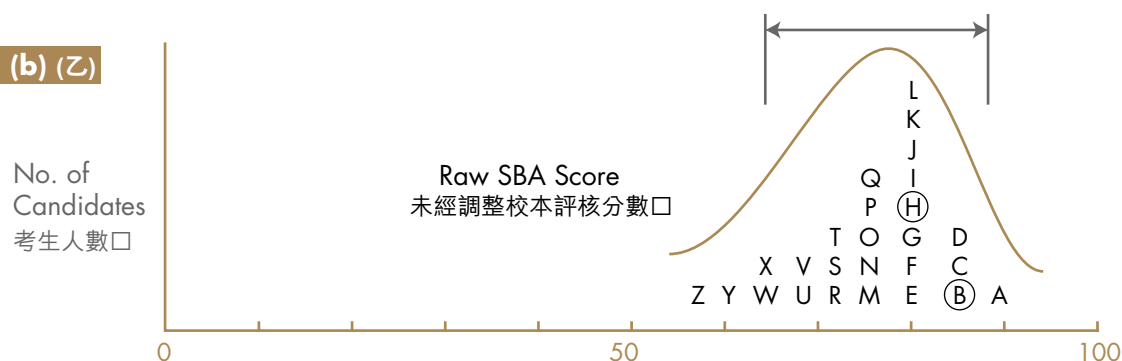
Figure 2: Moderation Outcomes of Individual Candidates

圖二：分數調整對個別學生的影響

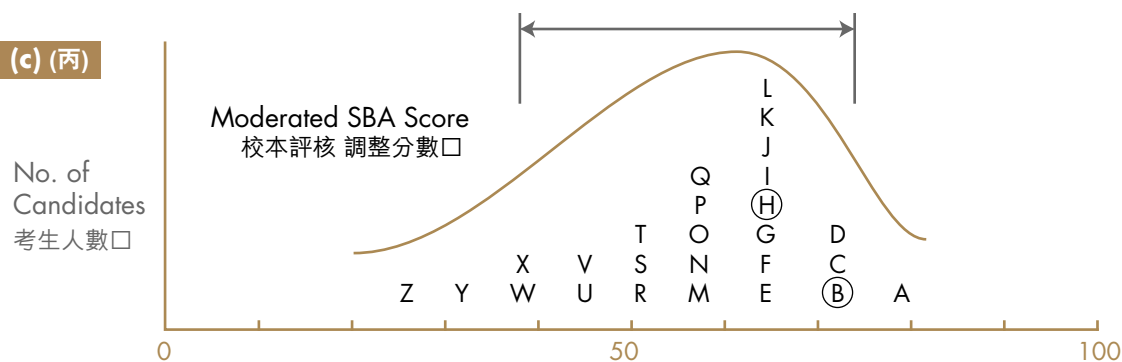
(a) (甲)



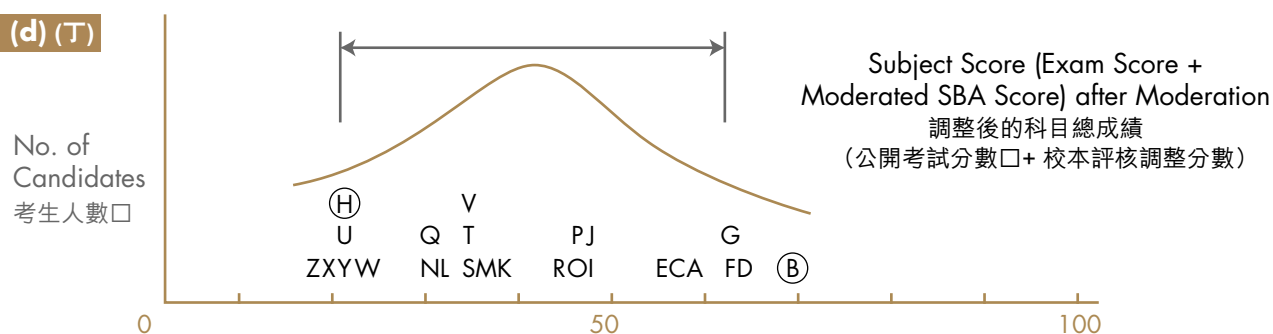
(b) (乙)



(c) (丙)



(d) (丁)



Feedback to schools

給學校的報告

SBA Moderation Reports will be sent to schools for their reference. A sample is shown below:
校本評核分數調整報告將發送各學校，以供參考。報告的範本如下：

1/1

2007年香港中學會考

2007 Hong Kong Certificate of Education Examination

校本評核分數調整報告

SBA Moderation Report

學校名稱：□

School Name :

科目：□

Subject:

調整組別：□

Moderation Group :

調整組別代號：□

Moderation Group ID :

學校甲乙丙□

ABC School

中國語文□

Chinese Language

教師□

Teacher

1234 5678

調整組別的統計數據：□

Statistics of the moderation group:

校本評核的平均分：□

Mean of SBA Scores : 65.94

校本評核分數的標準差：□

Standard Deviation of SBA Scores : 12.97

調整後校本評核的平均分：□

Mean of Moderated SBA Scores : 69.12

調整後校本評核分數的標準差：□

Standard Deviation of Moderated SBA Scores: 11.58

調整組別的人數□

No. of Candidates in the Moderation Group 20

評語：□

Comments:

校本評核的平均分合乎預期範圍。

(其他評語: 校本評核的平均分明顯高於□/ 高於□/ 略高於□/ 略低於□/ 低於□/ 明顯低於預期)

The mean of the SBA scores is **within the expected range**.

(much higher / higher / slightly higher / slightly lower / lower / much lower than expected)

校本評核分數的分布合乎預期範圍。

(其他評語: 校本評核分數的分布比預期闊□/ 稍闊□/ 稍窄□/ 窄)

The spread of the SBA scores is **within the expected range**.

(wider / slightly wider / slightly narrower / narrower than expected)

*** 完 ***

*** End ***

Frequently-asked questions

常見問題

1. Will it be advantageous/disadvantageous to students if teachers' judgments are more lenient/harsher than those in other schools? ☐

No. All students assessed by different teachers will receive comparable scores after statistical moderation. The SBA scores are moderated against the public examination scores. Groups with lower SBA scores than the other groups with similar public examination results will have their marks adjusted upwards whereas groups with higher SBA scores than the other groups with similar examination results will have their marks adjusted downwards.

2. Will a student get the highest/lowest moderated SBA score if he/she gets the highest/lowest examination score? ☐

No. A student with the highest/lowest examination score will not necessarily get the highest/lowest moderated SBA score. Individual examination scores will have little effect on individual moderated SBA scores. Moderation makes adjustments to the students' performance in the public examination as a group instead of individuals.

3. Will a student get the highest/lowest moderated SBA score if he/she gets the highest/lowest SBA score? ☐

Yes. A student with the highest/lowest SBA score will receive the highest/lowest moderated SBA score in the same moderation group, irrespective of his/her examination score.

4. Will the rank order of SBA scores of students be changed after statistical moderation? ☐

No. For each moderation group, the rank order of SBA scores of students remains unchanged after statistical moderation.

5. Will the scores of all the students participating in SBA be moderated? ☐

Yes. All students participating in SBA will receive moderated SBA scores. Those who are excluded from the moderation group, for example outliers, will still have their SBA scores moderated based on the information from the rest of the group.

1. 如果教師的評分比其他學校的教師過於寬鬆/嚴格，會不會對其學生有利/不利？

不會。校本評核分數參考公開考試的成績而調整。調整後，即使學生的校本評核表現是由不同老師所評核，他們的分數是可以比較的。如一個組別的校本評核分數低於其他公開考試成績相若的組別，該組別的分數會被調高；相反，如高於其他組別，則會被調低。調整後，在公開考試成績相若的所有組別會有相若的校本評核分數。

2. 如學生獲得最高/最低的公開考試分數，是否代表該學生一定取得最高/最低的校本評核調整分數？

不一定。學生獲取最高/最低的公開考試分數並不表示該學生能同樣取得最高/最低的校本評核調整分數。學生的公開考試分數對其校本評核的調整分數沒有直接的影響。除了學生本人的校本評核分數外，分數調整只會受組別的整体公開考試表現的影響。

3. 如學生獲得最高/最低的校本評核分數，是否代表該學生一定獲得最高/最低的校本評核調整分數？

是。在同一個調整組別內，學生如在校本評核獲得最高/最低分數，即使其公開考試分數不是最高/最低，調整後的校本評核分數在其所屬組別內亦一定是最高/最低的。

4. 分數調整後，考生的分數次第會不會改變？

不會。每一調整組別內，考生的分數次第在調整後仍然維持不變。

5. 每一個參加校本評核的學生是否都有調整分數？

是。所有參加校本評核的學生都有調整分數。對在調整過程中被排除在外的學生，如得分異常高/低的學生，仍然會根據其校本評核分數以及所屬組別的其他同學的數據調整其校本評核分數。☐

6. If SBA scores are moderated using public exam scores, does it mean that SBA scores are less reliable than examination scores? ☐

No. Teachers within a given school are known to be highly reliable in assessing their students. However, they are not familiar with different standards across schools. Statistical moderation adjusts for any such differences to ensure comparability of school-based assessments across schools.

7. If a high-performing student studies in a low-banding school and his/her classmates did very poorly in the public exam, will his/her SBA scores be adversely affected? ☐

In this scenario, the score of the high-performing student in the public examination is expected to be much higher than those of his/her classmates. This will lead to a greater spread in the public examination scores of the group. In addition, the high-performing student is also likely to have a higher SBA score than his/her classmates. There will thus be a gap between this student and his/her classmates, that will remain after statistical moderation. As a result, the SBA score of the student will not necessarily be adversely affected, even though the mean of the moderated SBA scores of the class may be lower than the average of the raw SBA scores of the class.

8. If a student did badly in the public exam, will his/her SBA score be reduced after statistical moderation? ☐

No. An individual's examination score will not directly affect that individual's moderated SBA score. Whether a student will have his/her SBA score reduced or not depends on the raw individual's SBA score as well as the group's performance in the public examination. If the group mean of the SBA scores is high but the performance of that group in the public examination is poor, the students in that group will be likely to have their SBA scores reduced after the statistical moderation.

6. 如果校本評核的分數是參考公開考試的成績而調整，這是否表示公開考試的分數有較高的可靠性？

不是。教師對他們校內學生的評核是非常可靠的。可是，他們往往未能知悉其他學校的不同評分準則。統計調整則能調節這些評分準則的差別，使不同學校的校本評核分數有可比性。

7. 如果一位優秀的學生就讀於一所組別較低的學校，而其他同學在公開考試的表現又欠佳，會不會對該學生的校本評核分數構成不良影響？

就這例子而言，該學生在公開考試的分數預計會比其他的同學高，這會拉闊其所屬調整組別的公開考試分數的分布。此外，該學生亦會比其他同學獲得較高的校本評核分數。此調整前的分數差距，在調整後仍會維持。這說明，即使調整後的校本評核組別平均分數低於原來的校本評核組別平均分數，該學生的調整分數不一定會受到不良的影響。

8. 如果某一學生在公開考試中表現欠佳，其校本評核分數會不會因此而被調低？

不會。學生的公開考試成績不會直接影響其校本評核調整分數。學生的校本評核分數被調低與否取決於組別原來的校本評核分數及其在公開考試的整體表現。倘若組別的校本評核平均分數偏高，但在公開考試的整體成績欠佳，該組別內的學生的校本評核分數可能因此而被調低。□

Appendix : The statistical moderation formula

附錄□：統計調整公式□

The formula used to statistically moderate SBA scores may be expressed in words as follows:

The moderated SBA score of a candidate = the group mean of the moderated SBA scores + difference within group

The group mean of the moderated SBA scores = the global mean of the SBA scores + difference between groups

Difference between groups = (the group mean of examination scores – the global mean of examination scores) \times inter-group change rate

Difference within group = (the SBA score of a candidate – the group mean of SBA scores) \times intra-group change rate

where:

the inter-group change rate is the pooled within-group slope, which ranges from 0 to 1, and is invariant across groups.

the intra-group change rate is derived from comparing the group standard deviation of the examination scores with the group standard deviation of the SBA scores. As a result, the group standard deviation of the moderated SBA scores is equal to the average of the group standard deviation of the examination scores and the group standard deviation of the SBA scores. If the group standard deviation of the examination scores is equal to (smaller/larger than) the group standard deviation of the SBA scores, the intra-group change rate will then be equal to (smaller/larger than) 1.

計算校本評核調整分數方法描述如下：

考生的校本評核調整分數□= 考生所屬組別調整後的校本評核平均分數 + 考生的組內差

考生所屬組別調整後的校本評核平均分數□= 全港校本評核總平均分數 + 考生所屬組別的組間差

考生所屬組別的組間差□= (考生所屬組別的公開考試平均分數 – 全港公開考試平均分數) \times 組間變化率

考生的組內差□= (考生的校本評核分數 – 考生所屬組別的校本評核平均分數) \times 組內變化率

其中：

組間變化率是從多層次分析(學生是第一層，組別是第二層)計算得到的斜率，是一個介乎0和1之間的數，不隨組別變化。

組內變化率通過比較考生所屬組別的公開考試分數的標準差與校本評核分數的標準差計算得到，使得調整後的校本評核分數的標準差等於公開考試分數的標準差與校本評核分數的標準差的平均值。如果考生所屬組別的公開考試分數的標準差等於(小於/大於)校本評核分數的標準差，則組內變化率等於(小於/大於) 1。□

More precisely, the formula used to moderate candidates' SBA scores is as follows:

$$F(x) = x_{\text{mean}} + \beta(\bar{z} - z_{\text{mean}}) + (x - \bar{x}) \frac{s_p}{s_x}$$

where:

- x = the SBA score of a candidate,
- x_{mean} = the global mean of the SBA scores,
- z_{mean} = the global mean of the moderator variable (exam) scores,
- \bar{x} = the group mean of the SBA scores,
- \bar{z} = the group mean of the moderator variable (exam) scores,
- s_x = the group standard deviation of the SBA scores,
- s_z = the group standard deviation of the moderator variable (exam) scores,
- $s_p = \sqrt{(s_x^2 + s_z^2)/2}$ or the mixed group standard deviation, and
- β = the slope calculated from regressing SBA scores on moderator variable scores, taking into account the nesting of candidates within groups.

計算校本評核調整分數的公式如下：

$$F(x) = x_{\text{mean}} + \beta(\bar{z} - z_{\text{mean}}) + (x - \bar{x}) \frac{s_p}{s_x}$$

其中：

- x = 考生的校本評核分數
- x_{mean} = 全港的校本評核總平均分數
- z_{mean} = 全港的調整變數(公開考試)總平均分數
- \bar{x} = 考生所屬組別的校本評核平均分數
- \bar{z} = 考生所屬組別的調整變數(公開考試)平均分數
- s_x = 考生所屬組別的校本評核分數的標準差
- s_z = 考生所屬組別的調整變數(公開考試)分數的標準差
- $s_p = \sqrt{(s_x^2 + s_z^2)/2}$ 是考生所屬組別的校本評核分數的標準差與公開考試分數的標準差的一種平均，稱為考生所屬組別的混合標準差
- β = 從多層次分析計算得到的斜率(第一層次是考生，第二層次是組別)，不隨組別變化

The above results in initial moderated school scores for all candidates are made up of the following 3 components:

1. The global mean of the SBA scores of all candidates;
2. A common adjustment for each group: if the group mean of the examination scores is 1 unit higher (or lower) than the global mean of the examination scores, then the group mean of the moderated SBA scores will be β unit higher (or lower) than the global mean of moderated scores. β is the slope called inter-group change rate which ranges from 0 to 1. In other words, for all candidates within a given group, this component is equal to the product of the slope β and the difference between the group mean and the global mean of the moderator variable.

An adjustment for each candidate within the group: if the SBA score of a candidate is 1 unit higher (or lower) than the group mean of the SBA scores, his/her moderated SBA score will be $\frac{S_p}{S_x}$ unit higher (or lower) than the group mean of the SBA scores. $\frac{S_p}{S_x}$ is called the intra-group change rate which is the ratio of the mixed group standard deviation to the group standard deviation of the SBA scores. In other words, for any particular candidate within the group, his/her SBA score is adjusted by the difference between his/her original SBA score and the mean SBA score of the group, multiplied by a factor to take into account the relative spread of the SBA scores of the group in relation to the spread of scores on the moderating variable (exam).

The mean of the adjusted SBA scores of the group is the sum of the first and second components. The third component reflects the performance of the candidate and the spread of scores of the group on both the SBA and the examination.

由以上調整公式計算出來的校本評核調整分數包含以下三個部分：

1. 全港校本評核總平均分數。
2. 每一組別的調整：如果一個組別的公開考試平均分數高於(或低於)全港的公開考試總平均分數1分，調整後該組別的校本評核平均分數將比全港的校本評核總平均分數高(或低)
3. β 分。 β 斜率是一個介乎0和1之間的數，稱為組間變化率。就是說，調整後校本評核分數的組別之間差異，是根據公開考試分數的組別之間差異和斜率 β 計算出來的。

組別內每一考生的調整：如果一個考生的校本評核分數高於(或低於)其所屬組別的校本評核平均分數1分，調整後該考生的校本評核分數將比所屬組別的校本平均分數高(或低) $\frac{S_p}{S_x}$ 分。 $\frac{S_p}{S_x}$ 是該考生所屬組別的混合標準差與校本評核分數的標準差的比率，稱為組內變化率。如果該考生所屬組別的公開考試分數的標準差等於/小於/大於校本評核分數的標準差，則組內變化率等於/小於/大於1。就是說，調整後該考生與所屬組別的校本平均分數的差異，是根據原來的差異和組內變化率計算出來的。

調整後，組別的校本評核平均分數等於第一□□□□□及第二部分相加之和。第三部分則反映考生的表現及其組別在校本評核及公開考試的分數分布情況。□

Take Chinese Language as an example. The full mark of the SBA is 90. Both the SBA score and the examination score are converted to a scale of 100 points. The moderation group is defined by teachers. Suppose Candidate White got a SBA score of 75, his teacher is Miss Yellow of School A, and

the global mean of the SBA scores (x_{mean}) is 63,

the global mean of the moderator variable (exam) scores (z_{mean}) is 50,

the mean of the SBA scores of Yellow Group of School A (\bar{x}) is 65,

the mean of the moderator variable (exam) scores of Yellow Group of School A (\bar{z}) is 58,

the standard deviation of the SBA scores of Yellow Group of School A (s_x) is 7.0,

the standard deviation of the moderator variable (exam) scores of Yellow Group of School A (s_z) is 12.0,

the inter-group change rate β is 0.4,

the mixed group standard deviation (s_p) is $\sqrt{(7^2 + 12^2)/2} = 9.8$

and the intra-group change rate is $9.8/7 = 1.4$.

The moderated SBA score of Candidate White is thus:

$$F(75) = 63 + 0.4 \times (58 - 50) + (75 - 65) \times 1.4 = 80.2$$

The mean of the moderated SBA scores of Yellow Group of School A is $63 + 0.4 \times (58 - 50) = 66.2$.

以中國語文科為例，校本評核滿分為90分。

在進行調整時，校本評核與公開考試分數都轉換為100分制，調整組別是教師。假設考生白同學的校本評核分數是75分，他的老師是甲校黃老師，而且

全港的校本評核總平均分數 (x_{mean}) 是63分

全港的公開考試總平均分數 (z_{mean}) 是50分

甲校黃老師組別的校本評核平均分數 (\bar{x}) 是65分

甲校黃老師組別的公開考試平均分數 (\bar{z}) 是58分

甲校黃老師組別的校本評核分數的標準差 (s_x) 是7.0

甲校黃老師組別的公開考試分數的標準差 (s_z) 是12.0

斜率 β 是0.4

容易算得混合標準差是 $s_p = \sqrt{(7^2 + 12^2)/2} = 9.8$
組內變化率是 $\square 9.8/7 = 1.4$ 。

所以，白同學的校本評核分數調整為
 $F(75) = 63 + 0.4 \times (58 - 50) + (75 - 65) \times 1.4 = 80.2$ (分)

而調整後甲校黃老師組別的校本評核平均分數是 $63 + 0.4 \times (58 - 50) = 66.2$ 分。

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