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Ranking (average marks of) students

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Ranking (average marks of) students

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Executive Summary

There are several reasons why ranking academic achievements of students within the same programme is of central importance. Students that return to their home university after having visited some other university within an exchange programme need to provide information on their rank in exams in order to fix a mark for the degree of the home university. When students apply for subsequent programmes or internships, their achievements are often described in letters of recommendation. In both cases, knowing the *distribution* of marks of fellow students is essential.

This raises the question of how to construct a distribution of marks. Transferring a grade from a foreign exam is simple. The ECTS offers a good guideline, which builds on the percentile of the grade of the student in the distribution of all grades in this exam.

Picking the appropriate distribution of marks is less obvious when the *average mark* of a student needs to be evaluated, e.g. for a letter of recommendation or for some selection procedure. The present study shows that distributions of grades on current transcripts of records systematically ascribe a rank to good students that is too low (and to bad students that is too high).

The study also shows that the appropriate distribution of marks needs to be constructed from *average marks* of fellow students, who have acquired *the same number of ECTS points* as the student who is to be ranked. The study presents a table, which should replace the current table on transcripts of records.

Zusammenfassung

Die Einordnung der universitären Leistungen von Studierenden im Vergleich zu ihren Kommilitonen im gleichen Studiengang ist in verschiedenen Zusammenhängen von entscheidender Bedeutung. Wenn Studierende Noten aus dem Ausland, etwa im Rahmen eines Erasmus-Programmes, an ihrer Heimatuniversität anerkennen lassen möchten, ist die Einordnung der Leistung im Ausland entscheidend für die an der Heimatuniversität zu vergebende Note. Auch wenn Studierende sich für Folgeprogramme oder Praktika bewerben, wird die universitäre Leistung in Empfehlungsschreiben häufig verglichen mit den Leistungen der Mitstudierenden. In beiden Fällen ist die Kenntnis der Noten*verteilung* der Mitstudierenden wichtig.

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Es stellt sich die Frage, wie eine solche Notenverteilung zu konstruieren ist. Bei der Übertragung von Einzelnoten aus ausländischen Prüfungen ist die Einordnung der Note eines Studierenden einfach. Das ECTS bietet dazu eine gut umsetzbare Anleitung, die auf dem Perzentil der Note des Studierenden in der Verteilung aller Noten in dieser Prüfung aufbaut.

Bei der Bewertung der *Durchschnittsnote* eines Studierenden, etwa zur Erstellung von Gutachten oder für die Berücksichtigung in Auswahlverfahren, ist die Bestimmung der angemessenen Notenverteilung der Mitstudierenden weniger offensichtlich. Die vorliegende Arbeit zeigt, dass mit den aktuell auf offiziellen Notenauszügen ("Leistungsübersicht") abgedruckten Notenverteilungen ("Notenverteilungsskala gemäß ECTS Leitfaden") gute Studierende systematisch zu schlecht dargestellt werden (und schlechte Studierende zu gut).

Die Arbeit zeigt auch, dass die angemessene Notenverteilung aus *Durchschnittsnoten* von Kommilitonen erstellt werden muss, welche die *gleiche Anzahl von ECTS Punkten* erreicht haben wie der zu bewertende Studierende. Die Arbeit beinhaltet eine Tabelle, welche die aktuelle Notenverteilungsskala auf der Leistungsübersicht ersetzen sollte.

Sommaire Exécutif

Il existe plusieurs raisons pour lesquelles être en mesure de classer les étudiants selon leur réussite académique est d'une importance cruciale. D'une part, les étudiants rentrant d'un ou plusieurs semestre(s) à l'étranger, par exemple dans le cadre d'un programme Erasmus, ont besoin de convertir leur résultats pour que leur université d'origine puisse leur attribuer une note. D'autre part, lorsqu'un étudiant souhaite postuler pour un nouveau diplôme ou pour un stage, sa performance est souvent jugée à l'aide d'une lettre de recommendation. Dans un cas comme dans l'autre, connaître la *distribution* des notes d'autres étudiants est essentiel.

Cela pose donc la question de savoir comment construire une distribution de notes. Lors du transfert de notes individuelles d'examens étrangers, il est facile de juger le résultat pour un seul étudiant. Le système ECTS nous sert de guide en se servant du rang centile de la note d'un étudiant parmi toutes les notes pour un examen donné.

Sélectionner une distribution adéquate est moins évident lorsqu'il s'agit d'évaluer la *moyenne* d'un étudiant, par exemple pour une lettre de recommendation ou pour quelqu'autre procédure de sélection. La présente étude sert à montrer que les distributions sur les relevés de notes actuels attribuent régulièrement un classement trop bas pour les meilleurs étudiants (et trop élevé pour les moins bons).

L'étude montre également que la distribution de notes à utiliser doit être construite à partir des *moyennes* d'autres étudiants qui ont complété le *même nombre de crédit ECTS* que l'étudiant en question. Cette étude présente un tableau qui a pour but de remplacer ceux actuellement en usage sur les relevés de notes.

Sommario

Le ragioni per cui e importante formulare un ranking dei risultati accademici degli studenti che frequentano lo stesso programma di studi sono molteplici. Gli studenti che ritornano alla loro Universit dopo aver trascorso un periodo di studi in un altro istituto universitario, grazie ad un programma di scambio, devono fornire informazioni relative alla propria posizione raggiunta in graduatoria affinch una valutazione equivalente venga fatta nella universit di appartenenza. Quando gli studenti fanno domanda per lammissione a successivi programmi di studio o esperienze lavorative, i loro risultati sono spesso inclusi nelle lettere di referenza. In entrambi questi

casi, la conoscenza della loro posizione nella graduatoria dellUniversit straniera estremamente importante. Questo solleva la questione di come vengano costruite le distribuzioni dei voti. Il

trasferimento di un voto ottenuto in un esame in unUniversit straniera non comporta alcuna difficolt. Il sistema ECTS fornisce delle linee guida, basate sul percentile del voto dello studente rispetto alla distribuzione di tutti i voti di un esame. La scelta della corretta distribuzione dei

voti meno ovvia quando occorre stabilire il voto medio dello studente, e.g. per una lettera di referenze richiesta in un concorso. Il presente lavoro mostra come le distribuzioni dei voti, cos come sono attualmente riportate nelle trascrizioni degli stessi, sistematicamente attribuiscono agli studenti pi bravi un posto in graduatoria che e troppo basso (e troppo alto per gli studenti meno bravi). Il presente lavoro mostra inoltre che una corretta distribuzione dei voti deve essere

costruita partendo da voti medi degli studenti che hanno ottenuto lo stesso punteggio ECTS. Il lavoro fornisce una tabella di riferimento che dovrebbe sostituire la scala attualmente in uso per la conversione dei voti.

Ranking (average marks of) students

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We discuss the principles behind the distribution of average marks of students. These principles need to be taken into account when computing the percentile of (an average mark of) a student. An informative percentile is obtained only if the average mark is compared to a distribution of averages of marks where the averages have been computed for the same number of credit points the student has obtained. We provide an empirical example from a university in Germany which shows that percentile information can differ considerably when based on different samples.

1 Introduction

The Bologna-process was one of the most influential processes in shaping the European university system. It started in 1999 (European Commission/EACEA/Eurydice 2015) and created the European Higher Education Area that covers many more countries than there are members of the European Union. One part of this process is the European Credit Transfer System (ECTS), a system which allows to employ courses passed successfully in one (guest) university as courses in one's home university - credits are transferred from one university to another.

One issue in this transfer is the conversion of grades obtained in the guest university. Countries differ in their grading scales and, even within one country or within one university, they differ in how they apply them (European Commission 2015, chapters 4.3 and 4.4) Transferring grades therefore requires to understand, inter alia, the distribution of grades. Once the distribution is constructed, the rank of a student's mark can be provided.

Ranking of students is not only important for transferring credits but also for writing letters of recommendation. Think of Bachelor students applying for a Master's programme or Master's students applying for advanced programmes like a PhD programme. As marks across universities are hardly comparable, it is common practice to provide the rank of a student. The idea is to provide information on how good the student is relative to his fellow students at their university of origin. If one assumed that students possess similar average skills across universities, this rank would allow to compare students across universities.

Providing a rank also requires computing the percentile of a student's mark. This is slightly but crucially different from the typical ECTS situation where one mark needs to be transferred. Providing a rank is in fact trivial for a special case. When we look at final marks on diplomas of all graduates in a given year, the percentile simply requires to order them by their marks and compute the share of graduates that are better. If, say, 8% of students have a final mark equal to or better than the mark of the student to be ranked, the student belongs to the top 8%.

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Computing the percentile is less obvious when a student has not passed all exams. In this case, ranking a student differs from the ECTS case. One rather needs to compare an average mark based on a certain number of exams or credit points. To which distribution of marks should the average mark of a student be compared who obtained, as an example, 60 out of 180 credit points? Applications by students who have only partially completed their studies is rather the norm, however, and not an exception. This is true for students applying for subsequent programmes and also for students applying for competitive internships.

Typically, one of of the following two methods is applied to provide a rank of a student. First, one can compare the student's average mark to the distribution of single marks for all courses in the student's programme. Second, one can compare the student's average mark to the distribution of final marks. Both approaches introduce a bias compared to the "true rank". These biases can potentially be large.

The "true rank" of a student is obtained by comparing the student's average mark to the distribution of *average* marks of other students that have obtained the *same* (or a similiar) number of credit points. The true rank within a programme is easily visible if programmes provide a table with percentiles grouped by credit points. Printing such a table on the transcript of records would demonstrate that this standard is followed. This would ensure that ranks are unbiased (to a first approximation) and comparable across programmes.

The next section shows that biases exist and that they can be quantitatively large, based on simulating distributions of marks. Section 3 confirms the finding of section 2 using observed data. Section 4 advocates for a 'gold standard' to be employed by all universities. The final section concludes.

2 The bias inherent in existing methods

Imagine a student who has successfully passed the first eight exams. This is the number of exams required to obtain the first 60 credit points in a typical Bachelor programme in Germany. This is usually achieved after the first year. As of this point, students might start thinking and applying for subsequent Master programmes. Imagine further one would like to know the rank of the student among fellow students in this programme.

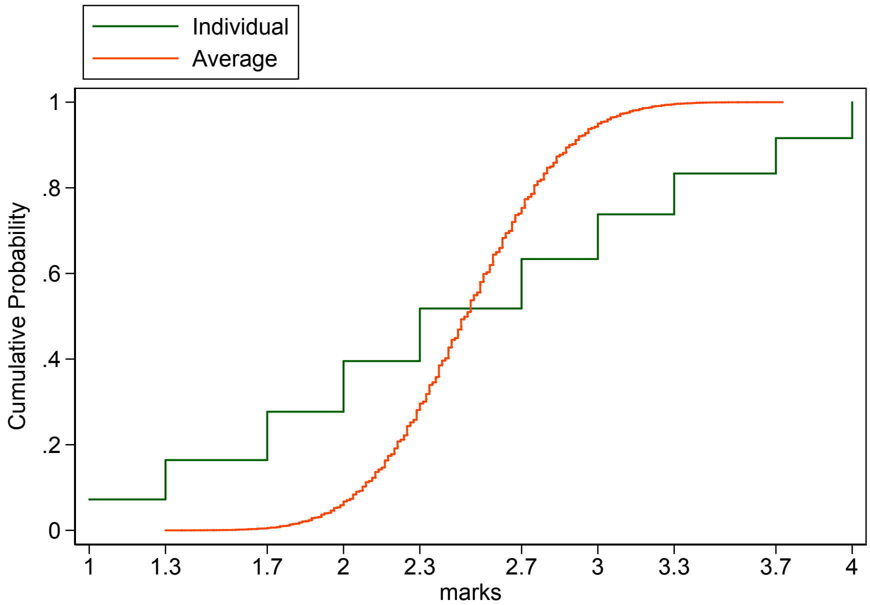
2.1 The rank based on a distribution of single marks

Let us first look at the effect of comparing a student's average mark to the distribution of single marks in a programme. Assume all exam marks are drawn from the same discrete distribution with mean μ and variance σ^2. If marks which students achieve in one exam are uncorrelated with the marks in another exam, then the distribution of the average per student would be distributed with mean μ and variance σ^2/J, where J denotes the number of exams (see Anderson et al. (2014, chapter 7.5)) Obviously, the variance of the average mark is (much) lower than the variance of single marks.[3]

As an example, consider the empirical distribution of single marks from a Bachelor in *Wirtschaftswissenschaften* (business administration & economics) at a large German university. Taking into account only exams passed successfully (i.e. marks between 1.0 and 4.0), this is the line in the form of the staircase in Figure 1. The mean is equal to $\mu = 2.48$, the variance is equal to $\sigma^2 = 0.8$. The figure also contains the simulated distribution of the average over eight

[3] If the numbers of credit points differ between exams, the average mark would have to be calculated as a weighted average. The weight ω_j for a particular exam would equal the credit points obtained for that exam divided by the credit points summed over all J exams. The mean of the weighted average is still μ and the variance becomes $\sigma^2[\omega_1^2 + \omega_2^2 + ... + \omega_J^2]$ (Hamilton 1994, A.5). The principles layed out in this note also apply for a weighted average.

Figure 1: Distribution of single marks (staircase) and of average marks after 8 exams (continuous line)



exams, $J = 8$, yielding 60 credit points, i.e. the same number of credit points as our student of whom we would like to know their rank.

While the median is the same for individual and average marks, it is evident that the distribution of the average marks is much more compressed. If our student had an average mark of 1.8 (as drawn in Figure 1) and we compare this average mark with the distribution of single marks, we would conclude that the percentile of the student is at 28%, i.e. the student belongs to the top 30% of all students. If we look at the distribution of average marks of all students who have obtained 60 credit points, we see that the student belongs to the top 2%. The bias not only exists, but is also quantitatively enormous.

One could argue that this finding is artificial as a correlation coefficient of zero was assumed between exams. This is at odds with the empirical evidence: a student who obtained a good (bad) mark in one exam is more likely to obtain a good (bad) mark in another exam. Therefore, now we again simulate a distribution of marks as above ($\mu = 2.48$, $\sigma^2 = 0.8$ and $J = 8$), but we allow marks of a student to exhibit a correlation of of approx. 0.3.[4]

Illustrating the findings of the previous figure in the histogram of Figure 3 shows the strong differences in percentiles.[5] While there are much fewer students with very good or very bad *average* marks (grey bars), there are many more students with good and bad individual marks (transparent bars). Obviously, the shares for the marks 1, 1.3, 1.7 up to 4 add up to 1.

Let us now again look at our student with an average mark of 1.8 after 8 exams. If one naively uses the share of single marks in Figure 3 (the transparent bars), one would classify the student as belonging to the $7.17\% + 9.23\% + 11.35 = 27.75\%$ percentile. One would say they belong to the top 28% of all students. This is again misleading and strongly biased. Using the correct distribution of the averages (grey bars in the histogram), one would conclude that the

[4]This data generating process results in a correlation of 0.88 between a student's average after 1 semester (i.e. after having obtained 4 marks) and a student's average after 3 semesters (i.e. after having obtained 12 marks). This is very close to what we observe in the our data set.

[5]For ease of comparison, we have binned the average marks into the following categories: [1.0, 1.15) into 1.0; [1.15, 1.5) into 1.3; [1.5, 1.85) into 1.7; [1.85, 2.15) into 2.0; [2.15, 2.5) into 2.3; [2.5, 2.85) into 2.7; [2.85, 3.15) into 3.0; [3.15, 3.5) into 3.3; [3.5, 3.85) into 2.7; [3.85, 4.0] into 4.0.

Figure 2: Distribution of single marks (staircase, unchanged to figure above) and of average marks after 8 exams with a correlation of 0.3 (continuous line)

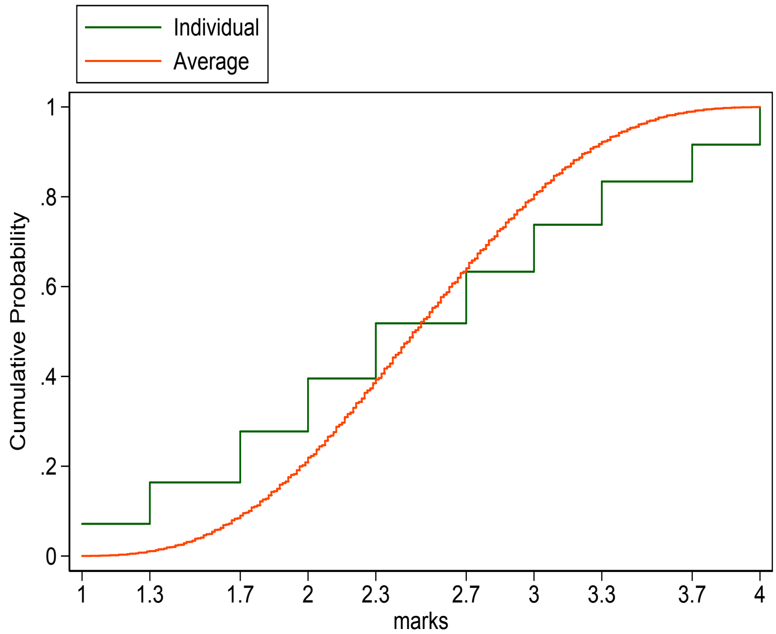
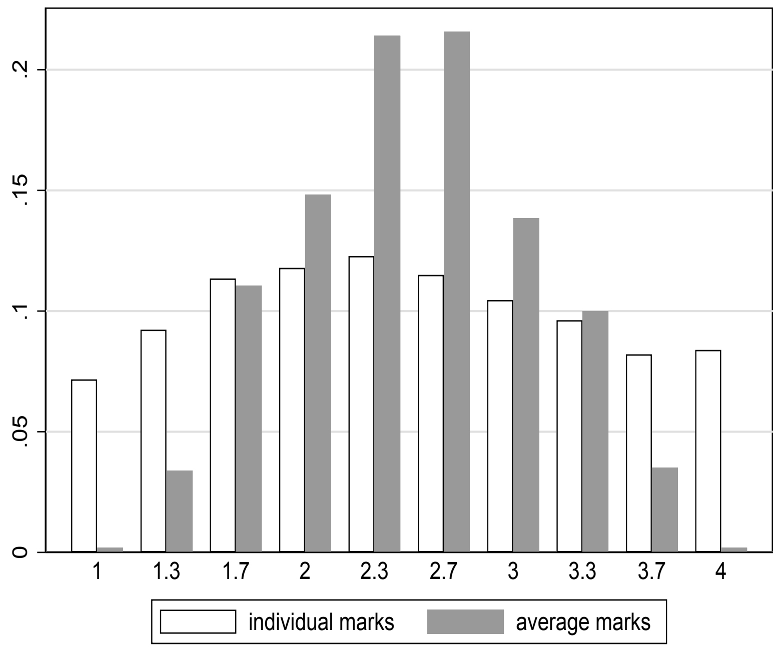


Figure 3: Relative frequency of single marks and of average marks after 8 exams



student belongs to the top 0.22% + 3.43% + 10.78% = 14.43%. He would belong to the top 14% percentile, which is quite some difference.

Generally speaking, top students are presented not as good as they are. The better they are, the more they lose. Note that the cumulative distributions in Figure 2 overlap at a mark of 2.5 and thereafter the single-mark distribution provides a percentile which is too low. The share of individual marks with a 3.7 or worse is 16.5%. However, a student who achieved a 3.7 on average belongs to the bottom 4%. Obviously, the smaller the correlation between student achievements in individual exams, the larger the gap between the distribution of the average marks and the distribution of the individual marks.

2.2 The rank based on a distribution of final marks

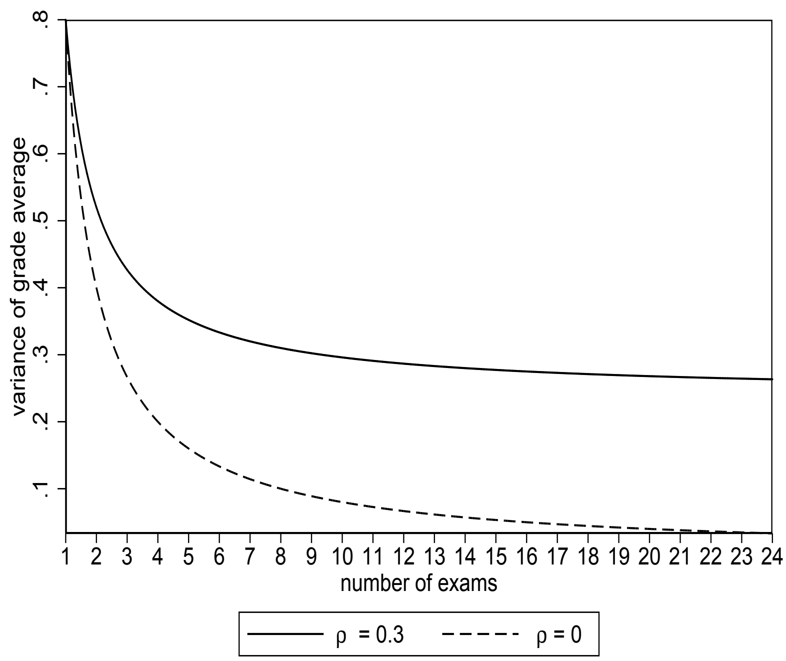
Let us now return to our second question: Is there a bias and how strong is it when we go to the other extreme and compare the student's average mark to the distribution of final marks? As we saw from the analysis of our first question, the bias results from the reduction in the variance of average marks as the number J of exams increases. As we can expect, also from the analysis of the first question, the bias will depend on the correlation between marks for a given student across exams. When the correlation is zero, the variance is σ^2/J and the distribution of the average is more compressed, the larger the number of exams. When the correlation is positive, the variance of the average $\bar{x}_k$ of student k is given by (see the appendix for a derivation)

$$\operatorname{var}(\bar{x}_k) = \frac{\sigma^2}{J} + \left[1 - \frac{1}{J}\right] \rho\sigma^2,$$

where ρ is the correlation coefficient. Obviously, the variance converges to $\rho\sigma^2$ when the number J of exams becomes large.

The relationship between the variance of the average and the number of exams is depicted in Figure 4. We again assume a variance of individual marks in each exam of 0.8 and a correlation of 0 and 0.3, respectively. As is easily visible, initially the variance drops substantially but the difference between the variance of the average marks after 8 exams and 24 exams is only modest (0.31 versus 0.26 for $\rho = 0.3$).

Figure 4: The variance of the average mark as a function of the number of exams and the correlation ρ across marks



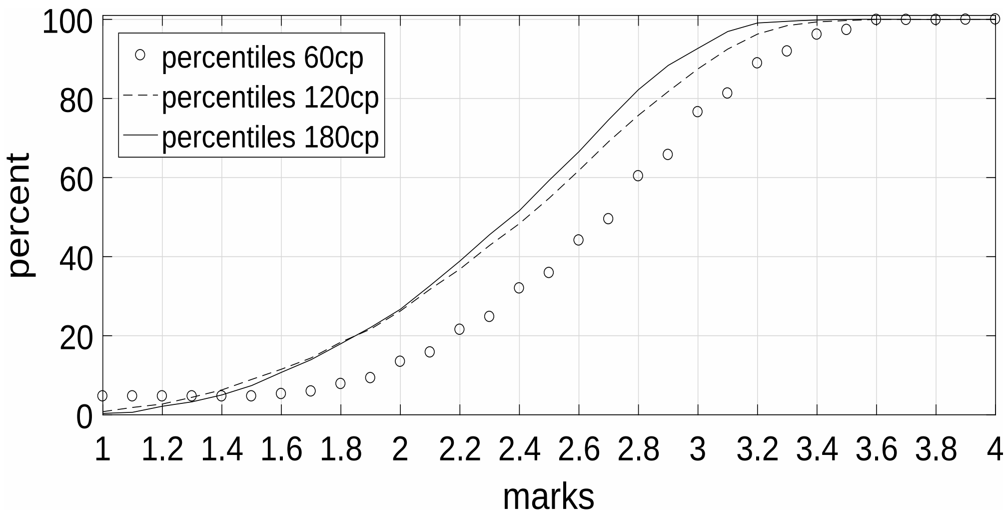
For our second question on comparing average marks with the distribution of final marks, this is actually good news. The distribution function drawn for $J = 8$ in Figure 2 would not change much if it was drawn for $J = 24$. Neither would it make a huge difference if average marks of students with a different number of credit points are compared. Take again our student with an average mark of 1.8. Comparing him to the ranking after 8 exams puts them in the 14.4% percentile, while he ends up in the 12.7% percentile if the ranking after 24 exams is used.

3 From simulated to observed distributions of average marks

So far, we have worked with simulated distributions of average marks. For our second question, it turned out that the rank of a student does not vary a lot depending on whether we employ distributions of final marks or distributions of earlier average marks. Yet, we are aware that the analyses so far built on three assumptions: marks for each single exam are drawn from an identical underlying distribution (implying inter alia the same variance and the same mean) and the covariance between any two marks is the same. While these assumptions are not crucial for our main points, they are somewhat simplistic. Moreover, as students proceed in their studies the distributions may change in a non-random way: First, self-selection of students takes place, i.e. some students with bad marks drop out. As a consequence, remaining students find themselves in a lower percentile and the average mark of the remaining students increases. Second, this increase in the average quality of students should imply that marks become better, the more credit points a student has achieved.[6] Rising student quality over semesters spent at university should therefore lead to rising average marks over semesters. Third, students may perform better as they reach higher semesters as (a) they can select into courses which suit them (better match) and (b) they have acquired certain learning skills (learning effect). The average marks should increase but but the ranking effects would be ambiguous.

To assess these assumptions, we now turn to observed distributions to evaluate the answer to our second question. Figure 5 tells us how strongly the percentile statements based on average marks can differ depending on which empirical distribution one looks at. This figure is based on the actual average mark from students in our dataset.

Figure 5: The distribution of average marks from students who are enrolled in respectively who have just graduated in the Bachelor of Science in *Wirtschaftswissenschaften* and who have achieved at least 60, 120 or 180 credit points (May 2016



The figure shows three distributions of average marks. The "standard" distribution is the one for final marks. It is based on the average marks once the student has completed a three-year programme, i.e. once a student has achieved 180 credit points. This is the solid line in the above figure. As one can see, more than 20% have a mark of 2.0 or better and less than 20% have a mark of 1.8 or better. The median is at about 2.4, i.e. 50% have obtained a mark of 2.4 or better and 50% have obtained a mark of 2.4 or worse. Almost exactly 80% have a mark of 2.8 or better.

[6]This might be counter-balanced by teaching staff that apply marking schemes which aim at identical shares of students with marks of 1.0, 1.3, etc.

When we look at those who have obtained 60 credits (according to the curriculum, this should be the case after one year) which are indicated by the asterisks, now 80% have a mark of 3.1 or better while the median is at 2.7. Apparently, the average marks corresponding to these percentiles have improved as students obtain more credits. Accordingly, the circles which indicated the average marks for those who have obtained 120 credit points are located, eg for the 50th and the 80th percentile, between the solid curve and the asterisks.

This real-data analysis shows that our second question is actually not so much of a big concern. The percentile statement for students with marks below 2.0 does not change a lot whether based on the distribution of final marks or on distributions based on fewer credit points. It does make a considerable difference however for students with marks 2.0, 2.1 or higher.

Table 1: Percentiles of marks by credit points to be reported on each transcript of records.

	credit points					
average mark	**1-30**	**31-60**	**61-90**	**91-120**	**121-150**	**151-180**
1.0	0.0	1.1	0.0	0.6	0.4	0.4
1.1	0.0	1.1	1.0	1.7	0.4	0.4
1.2	0.0	1.9	1.6	3.9	1.3	0.4
1.3	1.2	4.1	2.3	6.1	5.7	1.1
1.4	1.2	5.5	3.9	8.3	7.0	2.1
1.5	1.8	7.5	6.2	10.0	9.6	3.2
1.6	1.8	9.9	9.4	11.7	11.0	7.8
1.7	2.4	13.8	12.4	13.9	13.2	11.4
1.8	4.8	18.0	16.6	16.1	15.4	15.7
1.9	5.5	21.0	20.8	20.0	18.4	19.6
2.0	7.3	24.3	23.1	23.3	22.8	25.6
2.1	9.7	29.3	25.7	26.7	27.2	31.7
2.2	10.9	33.4	30.9	30.6	34.2	39.9
2.3	13.3	38.1	36.2	36.1	40.8	44.8
2.4	16.4	42.3	41.7	42.8	46.5	50.2
2.5	19.4	45.9	46.6	47.8	53.9	55.5
2.6	23.6	53.6	54.4	56.1	63.2	63.3
2.7	33.9	58.8	61.2	64.4	69.3	73.0
2.8	38.2	66.3	69.1	71.1	76.8	81.5
2.9	41.8	71.5	75.9	78.3	83.8	88.3
3.0	48.5	77.1	80.5	85.6	89.0	92.2
3.1	53.9	81.8	87.9	92.8	92.1	95.4
3.2	59.4	89.2	93.2	95.0	96.5	97.5
3.3	69.1	91.2	96.4	96.7	99.1	99.6
3.4	73.3	95.6	98.7	98.3	99.6	99.6
3.5	80.6	98.1	99.7	99.4	100.0	100.0
3.6	84.8	99.2	100.0	100.0	100.0	100.0
3.7	89.7	99.4	100.0	100.0	100.0	100.0
3.8	92.7	100.0	100.0	100.0	100.0	100.0
4.0	100.0	100.0	100.0	100.0	100.0	100.0
Observations	165	362	307	180	228	281

Data recorded at the end of the winter term 2015/16 at a large German university.

4 The 'gold standard' for percentiles

Before concluding, we would like to propose a table of percentiles each programme should print on transcripts of records. When a student applies to another programme and submits the transcript of records, the presence of such a table makes clear that the percentile of the student is computed in a way that makes percentiles credible.

Table 1 (on the previous page) shows such a table for marks obtained for our university. The first column shows possible average marks, the first row shows the number of credit points used to compute the percentiles. The second column shows the distribution of average marks that result from exams that amount to anything between 1 and 30 credit points. The third column includes 31 to 60 credit points and so on.

When a student has an average mark of, say, 2.2 resulting from exams that amount to 84 credit points, then this student belongs to the top 30.9% of students. A student with an average mark of 1.6 amounting to 132 credit points belongs to the top 11.0% of students.

5 Conclusion

Ranking students according to their marks has become increasingly important. This is true for applications to Master or PhD programmes but also for applications for internships. As easy as it might seem, providing a rank or the percentile of a student among students from the same university is not obvious, however. This is due to the fact that students require percentiles before they have completed all exams. The average mark of a student is therefore a priori not comparable to distributions e.g. of final marks or of individual marks.

We have shown that comparing the average mark of a student who is, say, half through his programme to distributions of final or individual marks is theoretically biased and often quantitatively grossly wrong. An informative percentile is obtained only if the average mark of a student is compared to a distribution of average marks where the averages have been computed for students who have obtained the same (or a similar) number of credit points. We propose a "gold standard" in the form of a table which every programme should report. This would signal that percentile information provided by programmes are credible. If this is not possible, the percentile of a student should be provided relative to the distribution of final marks.

We are aware that there are many shortcomings of the proposed approach and we discuss some of them in the appendix. Given data and time availability in university administrations, however, the approach suggested here seems to be the most efficient approach. If all universities throughout Europe adopted the same system, student exchanges and recommendations would be based on a much better foundation than they currently are.

References

Anderson, D. R., Sweeney, D. J., Williams, T. A., Camm, J. D. & Cochran, J. J. (2014), *Statistics for Business and Economics*, 12th edn, Cengage Learning.

European Commission (2015), ECTS Users' Guide, Available at http://ec.europa.eu/education/ects/users-guide/index_en.htm.

European Commission/EACEA/Eurydice (2015), The European Higher Education Area in 2015: Bologna Process. Implementation Report, Luxembourg: Publications Office of the European Union, Available at https://eacea.ec.europa.eu/sites/eacea-site/files/european_higher_education_area_bologna_process_implementation_report.pdf.

Hamilton, J. D. (1994), *Time series analysis*, Princeton university press Princeton, NJ.

Wackerly, D., Mendenhall, W. & Scheaffer, R. L. (2008), *Mathematical Statistics with Applications*, 7th edn, Cengage Learning, Belmont, USA.

A Appendix

A.1 The variance of average marks under correlation

Figure 1 plots two distributions. The graph with steps illustrates the distribution of individual marks $m_i \in \{1.0, 1.3, 1.7, 2.0, ..., 3.7, 4.0\}$ with probabilities p_i, where $i = 1, \ldots, 10$. The probabilities are set equal to the shares of marks in our sample ranging over 5 academic years from 2009 to 2014 (all semesters within these 5 years). Hence the picture plots p_1, $p_1 + p_2, \Sigma_{i=1}^{3} p_i, ..., \Sigma_{i=1}^{10} p_i = 1$.

The figure also plots the distribution for average marks. The average mark for student k after J exams is defined as

$$\bar{x}_k \equiv \frac{\Sigma_{j=1}^{J} x_{jk}}{J},$$

where x_{jk} is the (random) mark in exam j for student k. The mean of this average mark is

$$E\bar{x}_k = \frac{\Sigma_{j=1}^{J} E x_{jk}}{J}.$$

When we assume that the mark x_{jk} is drawn from the same distribution with a mean μ for all students and exams, the expected average mark for student k is the same for all students and given by

$$E\bar{x}_k = \mu.$$

A.2 Variance

The variance of the average mark is given by

$$\begin{aligned}
\operatorname{var}(\bar{x}_k) &= \frac{\operatorname{var}\left(\Sigma_{j=1}^{J} x_{jk}\right)}{J^2} = \frac{E\left[\left(\Sigma_{j=1}^{J} x_{jk}\right)^2\right] - \left(E\left[\Sigma_{j=1}^{J} x_{jk}\right]\right)^2}{J^2} \\
&= \frac{E\left[\Sigma_{j=1}^{J}\Sigma_{l=1}^{J} x_{jk}x_{lk}\right] - \left(\Sigma_{j=1}^{J} E x_{jk}\right)^2}{J^2} = \frac{\Sigma_{j=1}^{J}\Sigma_{l=1}^{J} E\left[x_{jk}x_{lk}\right] - \Sigma_{j=1}^{J}\Sigma_{l=1}^{J} E x_{jk} E x_{lk}}{J^2} \\
&= \frac{\Sigma_{j=1}^{J}\Sigma_{l=1}^{J}\left(E\left[x_{jk}x_{lk}\right] - E x_{jk} E x_{lk}\right)}{J^2} = \frac{\Sigma_{j=1}^{J}\Sigma_{l=1}^{J}\operatorname{cov}\left(x_{jk}, x_{lk}\right)}{J^2} \qquad \text{(A.1)}
\end{aligned}$$

Note that

$$\operatorname{cov}(x_{jk}, x_{lk}) = \rho_{jl}\sigma_j\sigma_l$$

by definition of the correlation coefficient ρ_{jl} (see Wackerly et al. (2008, p. 265)) and of the standard deviations σ_j and σ_l. As the correlation is the same for all exams j and l, $\rho_{jl} = \rho$ and the standard deviation as well, $\sigma_j = \sigma_l = \sigma$ we get

$$\operatorname{cov}(x_{jk}, x_{lk}) = \left\{\begin{array}{c}\sigma^2 \\ \rho\sigma^2\end{array}\right\} \text{for} \left\{\begin{array}{c} i = j \\ i \neq j\end{array}\right\}.$$

Hence, the above equation simplifies to

$$\begin{aligned}
\operatorname{var}(\bar{x}_k) &= \frac{\Sigma_{j=1}^{J}\Sigma_{l=1}^{J}\operatorname{cov}(x_{jk}, x_{lk})}{J^2} = \frac{J\sigma^2 + J\left[J-1\right]\rho\sigma^2}{J^2} \qquad \text{(A.2)} \\
&= \frac{\sigma^2}{J} + \left[1 - \frac{1}{J}\right]\rho\sigma^2
\end{aligned}$$

The interesting aspect is that the variance of the average marks $\bar{x}_k$, does not approach zero when the number J of exams rises, as long as $\rho > 0$. We rather have

$$\lim_{J\to\infty} \operatorname{var}(\bar{x}_k) = \rho\sigma^2.$$

Of course, for a correlation of zero, the variance approaches zero as displayed in Figure 4.

A.3 How to improve the proposed approach

Clearly, there remain shortcomings even when comparing students with the same number of credit points.

- Universities differ in quality. Even if students were located randomly across universities, the quality of courses might differ. Hence, students who are ranked at the same percentile at two different universities may differ in their knowledge.
- Students are not allocated randomly across universities. High ability students join a University A, low ability students join University B. If, at the extreme, the distribution of marks would be the same in both universities, then clearly students at University A obtain (on average) a mark which is too low compared to their ability. Even worse, irrespective of whether or not marks are adjusted, the indication of the percentile will always disadvantage a student from University A.
- Within a university only students with the same number of exams *and* the same number of credit points should be compared. As an extreme example, assume student A has obtained 60 credits by taking 5 exams and student B has obtained 60 credits by taking 10 exams. Assume also that both students obtained an average mark of 1.8. Assuming everything else to be equal, then the distribution characterizing the average of B is obviously more compressed: within the students who have taken the 10 exams, a mark of 1.8 refers to a lower percentile than within the students who have taken only 5 exams.

There is also a plus, however: It does not matter if two universities have different standards for what is needed for a 1.0, a 1.3 etc. because the position of a particular student should be unaffected. This is also the reason why ranks can be compared between countries, even if the grading system is different.

A.4 Transcripts of records

The 'ECTS has been adopted by most of the countries in the European Higher Education Area (EHEA), and is increasingly used elsewhere' (see https://ec.europa.eu/education/resources/european-credit-transfer-accumulation-system).

A list of members can be found at http://www.ehea.info/pid34249/members.html. It includes basically all European countries, including Switzerland and the UK, and also many (semi-) Asian countries like Russia, Turkey or Kazakhstan.

We provide here a (non-representative) sample of 'transcript of records' to show the huge variety (and thereby inconsistency) in information provided to rank students among their fellow-students. We have obtained examples from Universities in Coimbra, Cologne, UC Dublin, Gent, Hamburg, London (QMU), Lund, Madrid (CEMFI), Mainz (economics and maths), Toulouse and Salento.

Some universities provide percentiles of single marks as a benchmark for average marks. Many universities provide percentiles of final marks. Still other universities offer percentiles within single exams – which avoids the problem of ranking average marks altogether. In the same vein, some offer the mean and standard deviation for each individual exam. (This allows to compute the percentile in principle but one would have to make a distributional assumption and computing integrals of densities our of one's head is somewhat challenging.) Finally, some universities do not provide percentiles at all.[7]

When reported, percentiles are very detailed with step length 1/10 (as in our table above), or according to the ECTS grading scheme or with full marks only.

Most universities offer percentiles relative to previous years while some offer the ranking within a class. We did not find a single example of a University that avoids the bias we are emphasizing in our note.

The UK seems to be moving towards a unified system for all higher education institutions. There is a "Higher Education Achievement Report (HEAR)" provided by https://gradintel.com/. This is a digital transcript system that around half of UK higher education institutes seem to be using (estimate for early 2019).

Figure 6: Parts of a diploma transcript University of Cologne

Diploma Supplement page 2 of 4

4.4 Grading Scheme

The transcript of grades refers to graduates of the same study programm in the previous year.

Grade	1,0	1,1	1,2	1,3	1,4	1,5	1,6	1,7	1,8	1,9	2,0	2,1	2,2	2,3	2,4	2,5
number	1	0	0	2	6	3	12	8	12	14	11	9	7	10	2	5
per cent	1	0	0	1,9	5,7	2,9	11	7,6	11	13	10	8,6	6,7	9,5	1,9	4,8

Grade	2,6	2,7	2,8	2,9	3,0	3,1	3,2	3,3	3,4	3,5	3,6	3,7	3,8	3,9	4,0	total
number	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	105
per cent	1,9	1	0	0	0	0	0	0	0	0	0	0	0	0	0	100

sehr gut (very good) up to 1,5
gut (good) more than 1,5 up to 2,5
befriedigend (satisfactory) more than 2,5 up to 3,5
ausreichend (sufficient) more than 3,5 up to 4,0
nicht ausreichend (not sufficient, fail) more than 4,0

[7] We also saw two pages from a university that offers an overview for marks from all faculties of this university over an unspecified number of years.

Figure 7: Parts of a Bachelor diploma transcript University College Dublin

UCD Registry
Administrative Services
-Student Desk & Records

Tierney Building
University College Dublin,
Belfield, Dublin 4, Ireland
T +353 1 716 1555
F +353 1 716 1284

Clárlann UCD
Seirbhísí Riaracháin
-Deasc na Mac Léinn & Taifid

Áras Uí Thiarnaigh
An Coláiste Ollscoile, Baile Átha Cliath,
Belfield, Baile Átha Cliath 4, Éire
http://www.ucd.ie/studentdesk/contact
www.ucd.ie/studentdesk

Sue deNym 012345678 ....Continued...... 26 November 2013

2007/2008 Academic Session

Semester 2		Credits Attempted	Credits Earned	Grade	Grade Point
HIS 10010	The Making of Europe: The High Middle Ages, 1000 - 1500	5.00	5.00	A-	3.8
HIS 10040	Ireland: Union and Disunion, 1800 - 1920	5.00	5.00	B+	3.6
LANG 10230	Spanish for General Purposes (ab initio)	5.00	5.00	A-	3.8
MST 10020	Calculus II	5.00	5.00	A+	4.2
MST 10030	Linear Algebra I	5.00	5.00	A+	4.2
SOC 10030	Contemporary Irish Culture and Society	5.00	5.00	C	2.8
				Semester GPA:	3.73

Semester 1		Credits Attempted	Credits Earned	Grade	Grade Point
ECON 10010	Principles of Microeconomics	5.00	5.00	B+	3.6
ECON 10020	Principles of Macroeconomics	5.00	5.00	A+	4.2
HIS 10020	Barbarism and Christianity	5.00	5.00	A-	3.8
MST 10010	Calculus I	5.00	5.00	A-	3.8
MST 10040	Combinatorics & Number Theory	5.00	5.00	A	4.0
SOC 10010	Foundations of Sociological Thought	5.00	5.00	B-	3.2
				Semester GPA:	3.77

Stage Grade Point Averages

Stage	GPA	Credits
Stage 2	3.52	120
Stage 1	3.75	60

Scholarships, Awards and Prizes

University Scholarships

Bachelor of Arts Stage 2 Scholarship	Awarded for work in the 2007/2008 Academic Session
Bachelor of Arts Stage 3 Scholarship (Mathematical Studies)	Awarded for work in the 2008/2009 Academic Session
Patrick Semple Medal (Mathematical Studies)	Awarded for work in the 2008/2009 Academic Session

Mark Rogers
Acting Registrar/Deputy President

Date: November 26, 2013

This document is printed on security paper which includes the following features: customised hologram, watermark, toner secure protection, numismatic design. Please see www.ucd.ie/studentdesk for further details.

Figure 8: Parts of a Master diploma transcript Ghent University

PUNTENLIJST

ACADEMIEJAAR 2017-2018

Eerstesemesterexamenperiode
Bekendmaking 09/02/2018

Master of Science in Business Engineering
Afstudeerrichting Operations Management
Programma niet afgewerkt.

DELIBERATIEPAKKET 1 - GESLAAGD (PROCLAMATIE 06/07/2017) TOTAALSCORE: 753/1000

SP	OPLEIDINGSONDERDELEN		PERCENTIEL	CODE	SCORE
4	F000551	Bedrijfskundige vaardigheden	67(18)15	C161	15/20
4	F000700	Dienstenmanagement	67(18)15	C161	15/20
6	F000676	Econometrie: tijdreeksanalyse	83(6)11	C161	16/20
6	F000699	Industriële marketing	88(8)4	C161	17/20
6	F000708	Integrale kwaliteitszorg	59(17)24	C161	14/20
6	F000361	Milieutechnologie	40(19)41	C161	13/20
5	F000671	Personeelsbeleid	96(3)1	C161	17/20
6	F000706	Productiestrategie	84(10)6	C161	16/20
6	F000707	Projectmanagement	23(17)60	C161	13/20
6	F000442	Strategisch management	55(21)24	C161	14/20
5	F000124	Systeemdynamica	66(16)18	C161	16/20

DELIBERATIEPAKKET 2 - GEEN UITSPRAAK BESCHIKBAAR

SP	OPLEIDINGSONDERDELEN		PERCENTIEL	CODE	SCORE
4	F000778	Bedrijfsprocesbeheer			
4	F000704	Financiering van groeigerichte ondernemingen	49(17)34	C171	14/20
4	F000701	ICT-management	67(17)16	C171	15/20
3	F000892	Innovatiemanagement			
24	F000612	MASTERPROEF			
4	F000891	Ondernemen met technologie	73(13)14	C171	16/20
5	F000530	Rechtseconomie			
6	F000710	Supply chain management			
6	F000836	Toegepaste besliskunde voor bedrijfsbeheer	27(27)46	C171	14/20

Wie vragen heeft in verband met de studieresultaten of het studietraject kan terecht bij professoren en assistenten voor feedback of bij het monitoraat voor een gesprek over studievoortgang en / of studieaanpak.

BEREKENINGSWIJZE

De totaalscore die is weergegeven bij een volledig deliberatiepakket, is het gewogen gemiddelde van de examenresultaten waarbij de studiepunten als gewicht worden gehanteerd.
De berekening van de graad van verdienste voor de opleiding gebeurt volgens de bepalingen van de faculteit.
Zie www.ugent.be/nl/onderwijs/administratie/regelgeving/aanvullendreglement.htm

INTERN BEROEP

Indien je gerede twijfel hebt bij de examenbeslissingen van de afgelopen examensessie, je verdere inschrijving wordt geweigerd of je krijgt een bindende voorwaarde opgelegd, dan kan je hiertegen in beroep gaan via een aangetekend en ondertekend schrijven aan de rector van de UGent (Sint-Pietersnieuwstraat 25, 9000 Gent) ten laatste op de zevende kalenderdag na de proclamatie (examenbeslissingen) of na de kennisgeving (weigering en bindende voorwaarden).
Gelieve het beroepschrift ook te mailen naar ombuds@ugent.be.
Interne beroepsprocedure: artikel 100 van het Onderwijs- en examenreglement, zie www.ugent.be/oer.

CODES

C = Creditbewijs behaald
G = Getolereerd maar géén creditbewijs
_XX_ verwijst naar het academiejaar, vb. 09 betekent academiejaar 2009- 2010
_ _ _X verwijst naar de examenkans (1 of 2)
PASS = geslaagd
FAIL = niet geslaagd
ZIEK = ziek
AFWE = afwezig
BDRG = bedrog
ONBK = examencijfer onbekend
VRST = vrijstelling
STOP = inschrijving stopgezet

Percentiel A(B)C = fractie van geslaagde studenten die
A: strikt lager scoren dan jezelf
B: dezelfde score behalen
C: strikt hoger scoren
-: Er is onvoldoende data om het percentiel te berekenen.
Meer info over hoe je resultaat zich verhoudt tot de resultaten van je medestudenten, vind je op http://oasis.ugent.be. Klik in het linkermenu op "Mijn cursussen".

Figure 9: Parts of a Bachelor diploma transcript Hamburg University

ECTS-Einstufungstabelle Gesamtnote

Fach/ Abschluss	sehr gut	gut	befriedigend	ausreichend
Volkswirtschaftslehre/ Bachelor	6,11% /11/6,11%	37,78%/68/43,89%	56,11% /101/100,00%	0,00% /0/100,00%

Die Mindestanzahl an Absolventinnen und Absolventen innerhalb einer Kohorte beträgt in der Regel 50 Personen; Unterschreitungen sind ggf. kenntlich gemacht. Eine Kohorte der Referenzgruppe setzt sich aus zwei akademischen Jahren zusammen. Grundlage für die Ausweisung des Prozentranges sind die Gesamtnoten der Fach-Abschluss-Kombinationen, die für die amtliche Statistik erfasst werden. Ausgegeben werden der Prozentanteil, der absolute Wert sowie die kumulierte Häufigkeit.

Bewertungssystem Teilleistungen: 1,0 / 1,3: sehr gut; 1,7 / 2,0 / 2,3: gut; 2,7 / 3,0 / 3,3: befriedigend; 3,7 / 4,0: ausreichend
Bewertungssystem Gesamtnote: 1,0 bis 1,50: sehr gut; 1,51 bis 2,50: gut; 2,51 bis 3,50: befriedigend; 3,51 bis 4,0: ausreichend

Figure 10: Part of a diploma transcript Lund University

LUND
UNIVERSITY

Grades at Lund University

At Lund University there are five different grading scales. Which grading scale to be used for which course is decided by the relevant faculty board. This means that one degree or transcript might include courses with different grading scales.

All grades at Lund University are criterion-referenced, i.e. awarded in relation to the student's performance relative to the learning objectives set out in the course syllabus. They do not grade how well the student performs in relation to other student, but how well he or she fulfils the objectives of the course.

The grade distribution within the different grading scales is shown below. Grades are listed in order from the highest grade to the lowest. In the grade distribution tables only passing grades are shown, in accordance with the recommendations from the EU project Egracons. The tables are not normative, but based on accumulated statistics from the grades awarded at the university as a whole during the two most recent academic years

Godkänd – Underkänd (Pass – Fail). Mainly used in the Faculty of Medicine and the Faculty of Performing Arts and some related study programmes like social work and psychology, architecture and industrial design. It is also often used for vocational training and distance education.

Väl godkänd – Godkänd – Underkänd (Pass with Distinction – Pass – Fail). The traditional grading scale at Swedish universities, still the most common at the faculties of Science, Social Science, Humanities and Theology.

Grade distribution

Grade	*Number of awarded grades*	%
Väl godkänd/*Pass with Distinction* (VG)	22,679	43 %
Godkänd/*Pass* (G)	29,467	57 %

Med beröm godkänd – Icke utan beröm godkänd – Godkänd – Underkänd (Pass with Distinction – Pass with Credit – Pass – Fail). Used at the Master of Laws programme. Commonly used by law faculties in Sweden.

Grade distribution

Grade	*Number of awarded grades*	%
Med beröm godkänd/*Pass with Distinction* (AB)	4,861	49 %
Icke utan beröm godkänd/*Pass with Credit* (Ba)	3,520	37 %
Godkänd/*Pass* (B)	1,433	14 %

Figure 11: Second part of a diploma transcript Lund University

6(6)

LUND
UNIVERSITY

Fem – Fyra – Tre – Underkänd (Five – Four – Three – Fail). Used for most programmes at the Faculty of Engineering. Commonly used by engineering faculties in Sweden.

Grade distribution

Grade	*Number of awarded grades*	%
Fem/*Five* (5)	17,056	25 %
Fyra/*Four* (4)	26,646	39 %
Tre/*Three* (3)	25,584	36 %

A – B – C – D – E Underkänd (A – B – C – D – E – Fail). Introduced at Lund University 2011. Dominates at the School of Economics and Management, common in Master programmes at other faculties.

Grade distribution

Grade	*Number of awarded grades*	%
A	5,931	17 %
B	10,385	30 %
C	10,100	29 %
D	5,966	17 %
E	2,181	6 %

Figure 12: Parts of a transcript Center for Monetary and Financial Studies Madrid

CEMFI
Casado del Alisal, 5
28014 Madrid Spain

Unofficial Transcript

Name:
Program: Master in Economics and Finance

		Grade	Course average	Standard deviation	ECTS
SUMMER 2017					
101108	Introductory Mathematics	74	74	14	2
101109	Introductory Statistics	89	88	9	1
FALL 2017					
101110	Mathematics	81	78	11	6
101111	Microeconomics	66	72	12	6
101112	Statistical Methods in Econometrics	64	75	15	6
WINTER 2018					
101113	Uncertainty and Information	73	72	11	6
101114	Macroeconomics I	76	71	16	6
101115	Econometrics	63	69	13	6
SPRING 2018					
101116	Industrial Economics	64	69	12	6
101118	Macroeconomics II	77	80	6	6
101121	Corporate Finance	69	74	9	6
101140	Applied Economics Workshop	83	80	7	3

******* NO ENTRIES BEYOND THIS POINT *******

Figure 13: Parts of a transcript of records in the Bachelor programme in business administration and economics at JGU Mainz (the same structure is used in the mathematics programme)

Leistungsübersicht

über ausschließlich erfolgreich absolvierte Prüfungsleistungen

(Fehlversuche werden nicht ausgewiesen)

JOHANNES GUTENBERG UNIVERSITÄT MAINZ

Max Mustermann

Geburtsdatum: ----- Geburtsort: ----- Geschlecht: -----

Angestrebter Abschluss: Bachelor of Science

Studienfach: **Wirtschaftswissenschaften**

Fachsemester: **6**

Regelstudienzeit: **6 Semester**

Johannes Gutenberg-Universität Mainz

Studienbüro Rechts- und Wirtschaftswissenschaften
Fachbereich Rechts- und Wirtschaftswissenschaften

55099 Mainz

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•
•

(***) Bewertungssystem:

1,0 / 1,3 = sehr gut, 1,7 / 2,0 / 2,3 = gut, 2,7 / 3,0 / 3,3 = befriedigend, 3,7 / 4,0 = ausreichend
Die Art der Berechnung zur Ermittlung der Gesamtbewertung und der Teilleistungsbewertungen wird in den fachspezifischen Bestimmungen des Faches geregelt.
be = bestanden (unbenotet)
k.B. = Die Prüfungsbewertung liegt noch nicht vor bzw. die Leistungspunkte wurden noch nicht erbracht.
LP = Leistungspunkte / ECTS-Credits
Bewertungen, die in Klammern ausgegeben werden, gehen nicht in die Modulnote ein.
Leistungspunkte, die in Klammern stehen, haben reinen Informationscharakter.

Notenverteilungsskala (Ebene Prüfungsleistungen) gemäß ECTS-Leitfaden

Die Notenverteilungsskala weist aus, wie häufig die einzelnen als bestanden geltenden Notenwerte in dem unten genannten Studienfach prozentual vergeben wurden. In die Berechnung wurden die Noten aller Prüfungsleistungen, mit Ausnahme der Abschlussarbeit und ggf. der mündlichen Abschlussprüfung, einbezogen, die zwischen dem WiSe 2010/11 und dem SoSe 2016 erbracht wurden. Der untere Zellenwert zeigt die kumulierte relative Häufigkeit an. Diese Notenverteilungsskala kann zur Notenumrechnung gemäß ECTS-Leitfaden (ECTS Users' Guide) verwendet werden (siehe www.uni-mainz.de/studlehr/6139.php).

Studienfach	Anzahl der Prüfungen	1,0	1,3	1,7	2,0	2,3	2,7	3,0	3,3	3,7	4,0
Wirtschaftswissenschaften	48.201	7,62% 7,62%*	9,50% 17,11%*	11,49% 28,60%*	12,08% 40,68%*	12,40% 53,09%*	11,42% 64,50%*	10,26% 74,76%*	9,47% 84,23%*	8,03% 92,26%*	7,74% 100,00%*

* Kumulierte Häufigkeit

Figure 14: Parts of a Bachelor diploma transcript Toulouse

TO WHOM IT MAY CONCERN

This is to certify that our student

STUDENT'S FIRST NAME SURNAME
Student number: 00000000
Born: (date of birth) in (birthplace (COUNTRY)

is enrolled as a full time student in third year of the *"Undergraduate degree in Economics & Law"*, at the Toulouse School of Economics, for the academic year 2017/2018 and obtained the following results.

Semester 5

Topic	Grade	Credits
Microeconomics 5	5.9/20	5
Topics in Macroeconomics 1	11.95/20	5
Econometric Modelling & Data Analysis	13.1/20	4
Labour Law	14.5/20	5
Organisation & Society Law 1	10.75/20	5
Material European Law	10.5/20	3
Professional Training Project	15.44/20	3
Average grade for semester 5	**11.524/20**	**30**

Semester 6

Topic	Grade	Credits
Industrial Economics	11.25/20	5
Topics in Macroeconomics 2	6.3/20	5
Mathematics	13/20	3
Civil Law	10/20	5
Private Judicial Law	9.5/20	4
Organisation & Society Law 2	10.75/20	5
Economics English	14.5/20	3
Bonus	14/20	
Average grade for semester 6	**10.664/20**	**30**

Average grade of the year: 11.094/20 – Passed – Magna cum laude – Ranked 34th among 45 students

**Grades are quite tough at T.S.E. – the scale is actually from 1 (minimum) to 20 (maximum) – passing grade is 10, and grades may compensate each other if the average grade is equal or greater than 10*
TSE does not transcribe the grades into GPA system as a notation out of 20 is more precise.

Figure 15: Parts of a transcript University of Salento

UNIVERSITÀ DEL SALENTO

Università del Salento

Mark	ECTS evaluation	Percentage of students who obtained this mark [Study Course]
30 - 30 cum laude	A	12
27 - 29	B	23
24 - 26	C	31
19 - 23	D	26
18	E	8

Academic years considered: 2011/2012 - 2013/2014

Total marks: 5138