

**Exploring the Differences in Academic Performance Between National and International
Students**

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INFOMTADS: Thesis Applied Data Science

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Abstract

International students have been performing worse than Dutch students in recent years (Kristiana et al., 2022). The main causes for this are described as financial stress, a language barrier, and cultural differences. This paper utilizes STL decomposition and exploratory analysis to discover whether differences also persist between national and international students in Utrecht University. This research shows that there are in fact differences between national and international students within Utrecht University. International bachelor students have significantly lower grades but seem to perform better than Dutch students in terms of total study time and dropout rates. International master students perform worse in average grades and dropout rates. They do perform better than Dutch students in terms of total study time, however. This paper concludes that there is a difference between national and international students when it comes to academic performance. However, the international bachelor students in Utrecht University seem to be a contrast to current literature, concluding that they perform better in the most important measures of academic performance. International master students do adhere to the general consensus over international students, concluding that they perform worse than Dutch students in the most important measures of academic performance.

Introduction

“International students dropout more often than Dutch students” was the conclusion out of a factsheet published by the Dutch Ministry of Education, Culture, and Science in 2022. The factsheet listed multiple measures in which international students performed academically worse than Dutch students. International students have long been seen as worse performers compared to their national counterparts. Researchers claim that financial stress, a language barrier, and cultural differences could be the causes for this lesser performance (Banjong, D. N., 2015). Other researchers claim that international students make up for the lesser performance by showing higher levels of interest and motivation (Jung & Kim, 2017).

The department of International Marketing at Utrecht University found the conclusions made by the factsheet to be alarming. They wondered whether this would also be the case in their university, and to what degree there were differences in the academic performance between these national and international students. The department also inquired a special request to examine Greek students, since there were talks within the department about those students performing especially worse compared to other countries. Utrecht University lacks research on the area of outflow of students. This research paper will fill that knowledge gap by exploring the average grades, study time, dropout rates, and amount of ECTS attained by students in the years 2017 until 2022. It will give an outline of the general differences in academic performance measures between the regions: the Netherlands, the European Economic Area (EER), and non-EER. Thereby, providing the university with more research on the outflow of students. This research is therefore beneficial for both the university itself, and the international students who are actively studying at Utrecht University. It aims to highlight the groups that need most help, thereby

encouraging attempts at improving the academic performance of the students who are most in need.

This paper hypothesizes that the results for national and international students at Utrecht University will show the same conclusions as were made by the factsheet published by the Dutch Ministry of Education, Culture, and Science (2022) which concluded that international students performed worse than national students. They especially concluded that the international students suffer from higher dropout rates compared to national students. This research uses STL and exploratory analysis to determine whether this hypothesis can be accepted or rejected. These techniques are utilized to explore underlying trends and facts that might be interesting for the Department of International Marketing at Utrecht University. Ultimately, this research provides the answer to the question of what the differences are in academic performance between national and international students.

Literature Review

International students dropout more often than Dutch students. This phenomenon persists not only in the first year of a student's academic life, but also in the rest of its academic life. The factsheet published by the Dutch Ministry of Education, Culture, and Science (2022) did not find any clear causes for the lack of academic performance of international students. Current literature describes the main causes to be financial stress, language barriers, and cultural differences, however (Banjong, D. N., 2015). This research paper tries to find whether differences in academic performance between national and international students also exist within Utrecht University.

The financials of international students have a significant effect on the students' academic performance (Banjong, 2015). Dutch and EER students pay statutory tuition fees, which were

determined to be 2.209 euros for the academic year of 2022-2023. This statutory fee is determined by the government and is fixed. Non-EER students pay an institutional fee that depends on the study and the university. This institutional fee can range anywhere from 6.000 euro to 23.600 euro per study year (Ministerie van Onderwijs, Cultuur en Wetenschap, 2022). This higher tuition fee results in added financial pressure which adversely impacts the non-EER students' level of school performance. It also moderates their decision to quit school or persevere in their studies (Banjong, 2015). The factsheet shared in this consensus by concluding that non-EER students experienced higher dropout rates compared to EER and Dutch students. Jung and Kim (2017b) argue that students with higher tuition fees are unlikely to quit because of the large amount of money already invested into the study, however. Therefore, students who invested more money can be expected to have more motivation. They make up for the financial pressure by putting in more effort (Jung & Kim, 2017). The majority of literature shares the consensus that this added financial pressure has a negative effect on international students. Especially non-EER students experience this additional pressure, which would likely result in them being more effected by this phenomenon, which results in them suffering more extreme consequences. It is also important to note that Dutch students have easy access to a student financing loan in the Netherlands administered by Dienst Uitvoering Onderwijs (DUO). This loan is harder to obtain for EER, and especially non-EER students. This loan alleviates financial pressure for Dutch students. It is of importance to consider the financial factor when explaining differences in academic performance between regions.

Financial obstacles are not the only problem impacting international students. Studying abroad brings additional challenges to achieving high academic performance. These additional challenges are mainly attributed to cultural differences, which are proven to cause stress, and lead

to depression and low levels of happiness (Kristiana et al., 2022). These consequences of extra stress are larger when the cultural differences are larger. Therefore, EER students should not be affected as much as non-EER students (Rienties & Tempelaar, 2013). Perceived significance of learning success to family, English proficiency, and social communication are just some of the predictors of academic performance for international students (Gang Li et al., 2009). These three factors are not the only factors determining the academic performance of international students, however. The issue is far more complex. There are countless external factors influencing the students' academic life, which makes it extremely hard to make a model that sufficiently explains and predicts academic performance measures. An additional external factor that makes it hard to make inferences about student performance is the COVID-19 crisis in recent years. This crisis resulted in a change in the way exams were administered and in the social life of students. The problem becomes even more complex when considering that international students cannot be described as just "THE international students". There are significant differences between the groups within the international students that can be explored and explained. (Rienties & Tempelaar, 2013). Rienties and Tempelaar (2013) found that European students were most alike to Dutch students in terms of certain measures for academic performance. Their research divides international students into separate groups, which is standard practice among most other research when analyzing international student academic performance. This research paper follows that trend by splitting the international students into EER and non-EER internationals.

Next to cultural differences, international students also experience language barriers. The lack of English proficiency is a major problem faced by international students (Lee and Wesche, 2000). The problems protrude in the social life of the students, in turn having a negative effect on academic performance according to Lee and Wesche (2000). The lack of proficiency negatively

affects the students in following lectures, writing assignments, and making exams (Rienties et al., 2011). That study also found that when international student would make use of resources provided by the university, that it would have a positive outcome on their performance. Lee and Wesche (2000) also argues that international students who experience language barriers, sometimes make up for it in terms of study habits and self-help strategies. Therefore, increasing their academic performance and hiding the fact that there is a language barrier. The language barrier is an important factor to consider when discussing the results of this paper.

Research demonstrates the shared consensus that students perform better when longer exposed to culture characteristics of the host country such as: the way-of-life, learning style, and study approach (Rienties & Tempelaar, 2013). Rienties et al. (2011) agrees with that idea, stating that academic adjustment, personal-emotional adjustment, and attachment are positively correlated with academic performance over the years. Academic and cultural adjustment therefore seems to be one of the main factors when it comes to increasing academic performance over the years for international students. Therefore, it is crucial for this paper to also consider whether students start performing better over time. And whether there is a difference between national and international students in this performance measure over time.

The current literature focuses on financial stress, a language barrier, and cultural differences. The following step is to determine what to do if these hurdles are observed to be true on an individual university level. Gang Li et al. (2009) found that increasing the speed of cultural and academic adjustment could be achieved by universities taking initiatives to organize more welcoming socio-cultural events at the beginning of new academic years. Gang Li et al. (2009) also encourages the tutors to approach the students face-to-face in less formal environments. It will release students' stress and help in improving student confidence to continue the studies. Pre-

course language training seems to be more practical and more beneficial for international students. Ali et al. (2020) states that universities could help by providing English language learning classes for students and professors. Not all professors are fluent in English, making it even harder for the students to try to grasp what is being taught. Currently, Utrecht University only has English requirements in place for enrolling into studies. The aforementioned literature discussing language barriers showed that language barriers can also take place on a social level, however. This paper will also shortly discuss whether Utrecht University should offer additional help to international students to nullify the phenomenon of the language barrier.

Methodology

Data and Definitions

This research paper made use of an Osiris time series dataset provided by Utrecht University. The dataset contains data on all students that were enrolled at Utrecht University within the years 2017 until 2022. This range is relatively short when compared to the average study time of a student. Only the students that started between 2017 and 2019 could be used when looking at the full academic life cycle. This lack of life cycle data was dealt with by mainly focusing on first year students. The data is on an individual student level but was mainly aggregated to a regional level to make more meaningful conclusions about differences between national and international students. The students were split into the regions: the Netherlands, European Economic Area (EER), and non-EER. The EER countries exist out of the countries in the European Union plus Liechtenstein, Norway, and Iceland. Non-EER countries are all the countries that are not a part of the aforementioned EER countries. This research paper made use of that data to analyze the difference in academic performance between national and international

students. The analysis made use of a variety of variables contained within the Osiris dataset.

Following are the explanations of the most important variables:

- Student number: Unique number that works in combination with *Academic year* and *Test period* to form the primary key. The actual student number of the student has been randomized and therefore makes this dataset anonymous.
- Academic year: The academic year in which the entry was recorded on an individual student level. Works in combination with *Student number* and *Test period* to create the primary key.
- Test period: The test period for which the entry was recorded. This variable ranges from the first quarter to the fourth quarter of an academic year. Works in combination with *Student number* and *Academic year* to create the primary key.
- Student region: Categorical variable that contains “EER”, “not-EER”, and “NL” as classes. This variable corresponds with the birth region of the student.
- Origin country: The country where the student has enjoyed their highest level of education.
- Program type: Shows whether the student is doing a bachelor or a master.
- Average grade: The average grade on an individual student level per *test period*.
- ECTS points: Shows the number of European Credit Transfer and Accumulation System (ECTS) points a student has attained within the academic year. One ECTS point is equal to 28 hours of study. Only available for bachelor students.
- Study time: Measures how long a student takes to complete their study. This variable is measured in nominal study time plus the number of years extra that a student needs to

finish their study. The nominal study time is the minimum study time possible to finish the study.

- Reason to stop study: Categorical variable with the following classes:
 - Graduated: Student has graduated.
 - Active: Student is active in a study and has not graduated or quit yet.
 - February quitter: Quit in the first year of the study before the end of the second quarter (February) of the first academic year.
 - Quit after February year 1: Quit before the end of the first academic year, but after the end of the second quarter.
 - Quit after year 1: Quit after the end of the first academic year.

This paper also divides students into bachelor and master students. The reason for this is that the programs differ too much in nature to compare. Bachelor studies typically have a nominal study time of three years, while master studies typically have a nominal study time of one or two years. The previous education level of the students participating in master studies is also higher than those of bachelor students. Therefore, resulting in a different population of students, meaning that the context of the study programs is too different to compare.

Data Analysis Methods

This research paper tests the differences between regions by determining if there is a statistical significance between these regions. The tests considered were the two-sample t-test, and the Mann-Whitney U test. The two-sample t-test tests if there is a significant difference in means between the two groups being compared. The null hypothesis of this test is that there are no significant differences between groups, while the alternative hypothesis states that there are statistically significant differences between the groups. It requires the data to adhere to the

following assumptions: normality, independence, and equal variances. Independence is hard to achieve in time series data but was still tested. The Mann-Whitney U test is a non-parametric method, meaning that it does not have to adhere to such restrictive assumptions. It is not as strong as the two-sample t-test when it comes to making conclusions based on the outcomes of the tests, however. The null hypothesis of the Mann-Whitney U test states that there is no difference between the underlying distribution generator between two groups, therefore meaning that the groups come from the same population and that there are no significant differences between the groups. The alternative hypothesis states that the underlying populations are different between groups. Assumption tests were used to determine which test was appropriate to use. The Shapiro-Wilk test tested for normality, and the Levene's test tested for equal variances between groups. The independence assumption was checked by using AutoCorrelation Function (ACF) plots. This plot shows whether future lags are autocorrelated with the observation at the original lag.

The ACF plot was also used to determine whether seasonality was present. When seasonality was found, the time series could be deconstructed into several components by utilizing a Seasonal-Trend decomposition using LOESS (STL). This decomposition allows for an investigation into the difference between time series components of international students from EER and non-EER regions, and native Dutch students. STL is a non-parametric regression technique that decomposes time series data into its underlying components: trend, seasonal, and residual. It assumes that a time series is either additive or multiplicative. The additive model assumes that the time series is a sum of the three components, while the multiplicative model assumes that it is a multiplication of the three components. LOESS stands for Locally Weighted Scatterplot Smoothing. It performs a local weighted polynomial regression by fitting multiple

regression models to subsets of the data. The appropriate model and its parameters will be determined in the results section of this research paper.

STL can handle small time series, but it does negatively affect the legitimacy of the results of the decomposition. Therefore, STL could only be used on the average grades of students, which had a total of 24 time series observations. This is because average grades get recorded quarterly while the rest of the performance measures get recorded yearly or semi-yearly. Therefore, it only made sense to decompose the average grade time series. The factsheet published by the Dutch Ministry of Education, Culture, and Science (2022) only focused on aggregated results when it came to dropout rates, they did not consider the dropout rates over the years. This research will therefore also only consider the aggregated result and will compare these results with conclusions from previous literature.

Results

Bachelor

Assumptions for Average Grades

In order for STL to be performed on the average grades time series, first the normality, equal variances, and independence assumptions needed to be tested. The outcomes of these tests determined whether the two-sample t-test or the Mann-Whitney U test was appropriate to use to conclude whether there were significant differences between groups.

The normality of the average grades time series for bachelor students were tested with the Shapiro-Wilk test. As mentioned before, the null hypothesis of this test is that the sample has been generated by a normal distribution. The alternative hypothesis states that the sample has not been generated by a normal distribution. The average grades time series had a p-value over 0.05,

therefore not rejecting the null hypothesis and suggesting that the underlying distribution is normal. It must be noted that the sample size only consists out of 24 observations however, making it more for the normality assumption to hold. A sample size of above 30 is strongly advised for normality tests to have strong results. Therefore, the result of the Shapiro-Wilk test must not be seen as a strong indication of normality.

Then, the Levene's test was used for equal variances between groups. As mentioned before, the null hypothesis of this test states that the variance among groups is equal. The alternative hypothesis is that the variance is different among groups. For the average grades of bachelor students, the Levene's test determined a p-value close to zero. Therefore, the null hypothesis gets rejected and it can be inferred that the variance is different among groups. This is a violation of the assumptions of the two-sample t-test, which assumes equal variances between groups.

Lastly, the independence of observations between groups was evaluated using an ACF plot. The ACF plot for Dutch students showed no significant lags. The ACF plot for EER and non-EER students did show a significant lag at 4 lags, however (See Appendix A). This could be a sign for seasonality, making it meaningful to decompose the average grades time series and examine the seasonal component. Finding this autocorrelation does violate the independence assumption of the two-sample t-test.

Both the assumption of equal variances and independence were violated. Therefore, a non-parametric test to test the significance of differences between regions was more appropriate. The Mann-Whitney U test was used.

Average Grades

The average grades of students were aggregated on a regional level and ordered in a time series. This time series contains the average grades of students between the years 2017 and the last quarter of 2022. The grades are measured per quarter, which increases the sample size compared to other academic performance measures which are measured per year. An additive STL model was used since the seasonality and residuals seem to be stationary and not exponentially increasing over time. Furthermore, a seasonal smoothing of 5 was used when running the model. This is the lowest amount of smoothing allowed, resulting in a decomposition that accentuates the seasonality of the current time series. This value was tested to have the lowest Mean Squared Error (MSE) when compared to the raw time series. It also makes theoretical sense to set this parameter value as low as possible as this research paper is interested in the current trends, not so much in predicting future trends.

Figure 1

Raw Time Series of Average Grades per Region (Bachelor Students)

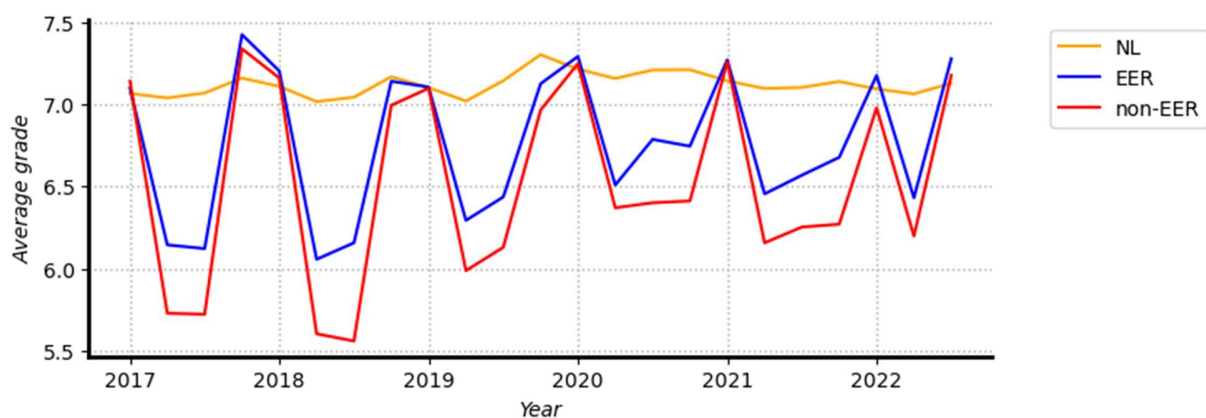
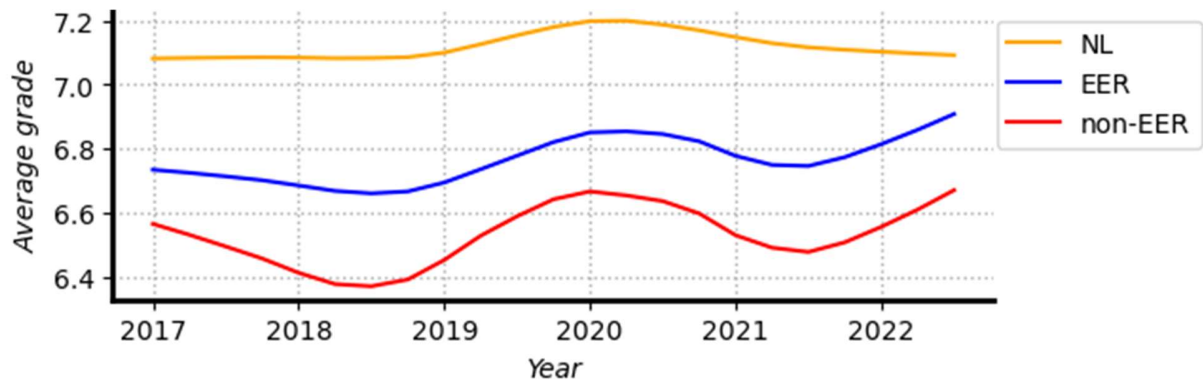


Figure 2

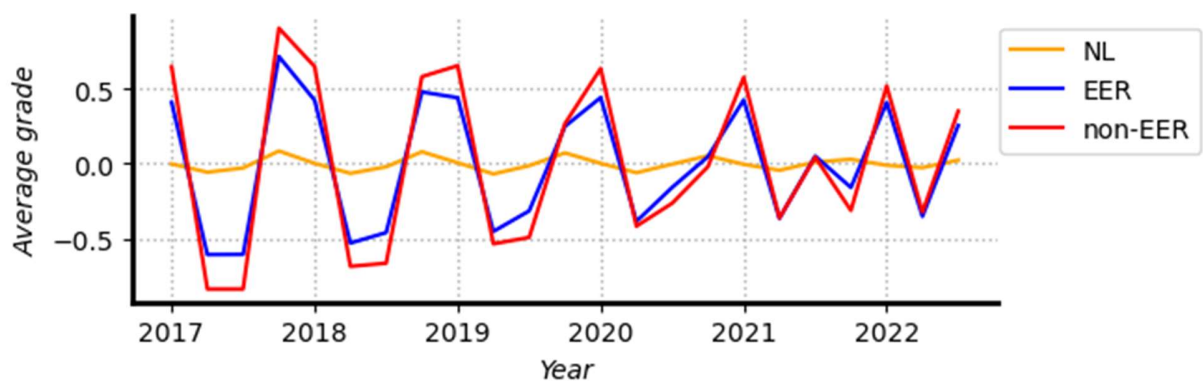
Decomposed Trend of Average Grades per Region (Bachelor Students)



The Mann-Whitney U test determined that there was a significant difference in the underlying population between all groups. Dutch students performed significantly better than international students (Figure 2). Where EER students performed better than non-EER students. All trends see an increase in average grades from 2019 to 2021. Then, after a small decrease in 2021, they increase again between the years 2021 and 2022. The Dutch trend is slightly more nuanced than the international trends, seeing less variance over the years.

Figure 3

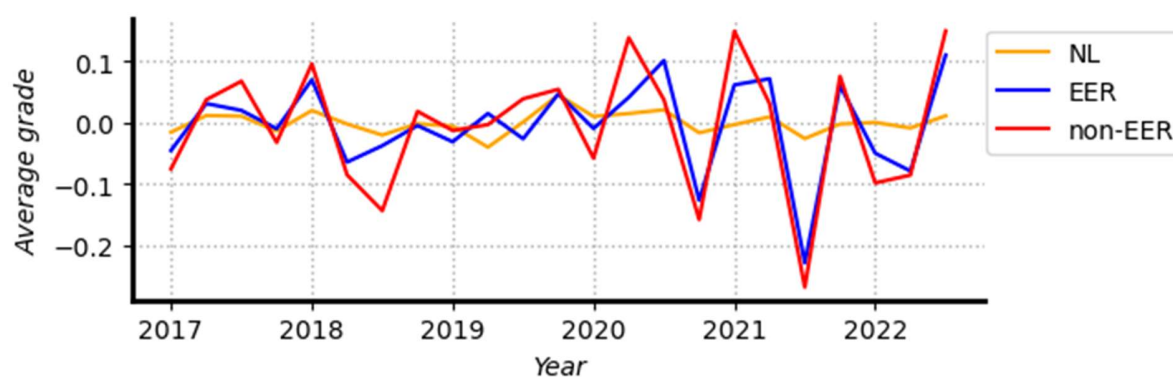
Decomposed Seasonality of Average Grades per Region (Bachelor Students)



The seasonality and variation of the average grades of bachelor students uncover some interesting insights into the data. The seasonal component of the STL indeed shows a clear recurring quarterly seasonal pattern, with peaks consistently appearing every three months between 2017 and 2021 (Figure 3). International students seem to have much more extreme peaks than national students. These international students perform above average in the first quarter of the year, then perform below average in the next two quarters, and end up performing better than average again in the last quarter. There seems to be a small difference among the international students, with non-EER students having slightly more extreme seasonality between 2017 and 2021. This difference fades away over the years, however (Figure 3). Similar to the range of seasonality which steadily diminishes over the years. From 2021 international students also seem to not follow the clear quarterly pattern that was seen in the foregoing years. This will be further discussed in the next paragraph when the residual component is analyzed. It is important to note that Dutch students also see a seasonal quarterly pattern. This pattern is much less extreme when compared to the international students, however. The range of this pattern appears to diminish over time.

Figure 4

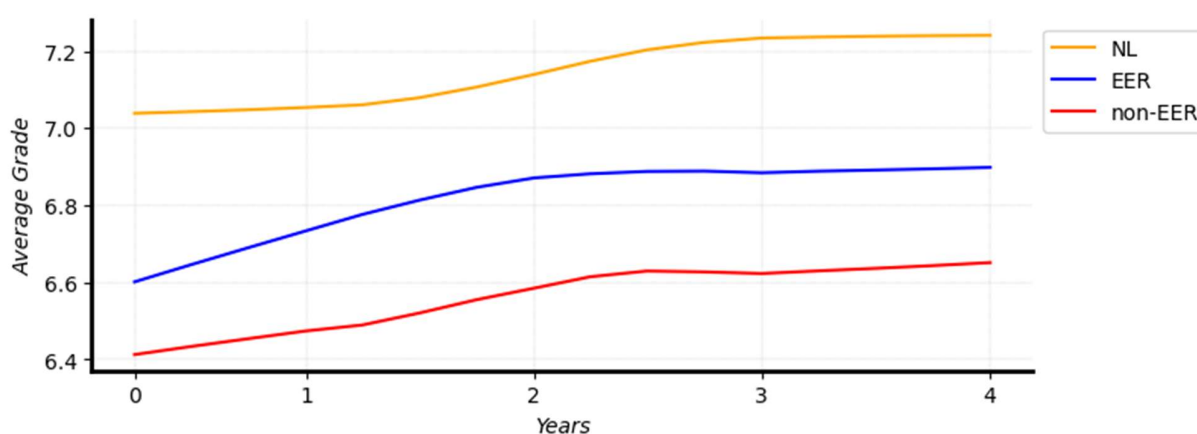
Decomposed Variation of Average Grades per Region (Bachelor Students)



The variation of average grades of Bachelor students also sees the international students having more extreme fluctuations. For this component, the range appears to increase over time for the international students (Figure 4). From the year 2020 we see large peaks going both ways. This increase in variation in combination with the decrease in seasonality can suggest that the repeating patterns present in the data seem to become weaker. The residuals show unexplained variation in the data. The residuals are proportionally high when considering that the average grades range from 1 to 10.

Figure 5

Decomposed Trend of Average Grades Over Time per Region (Bachelor Students)



Note. This graph considers the number of years that an individual student studies at Utrecht University. The years are divided into quarterly average grades.

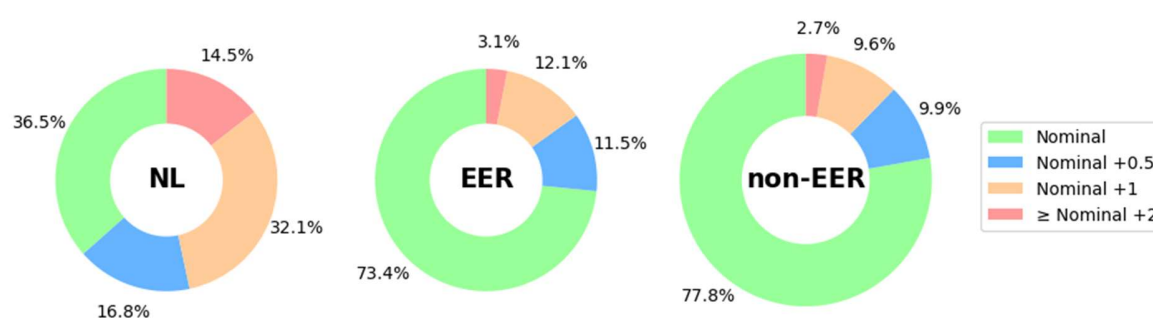
STL decomposition was also used on the average grades over the years of individual students. Here the focus lies on if students improve with the number of years that they study in the Netherlands. There is an increase in the trend of average grades for all regions (Figure 5).

Study Time

The study time is measured as the nominal study time to finish the study plus the number of years extra it took to finish the study. Nominal study time is the minimal time it takes to finish a particular study.

Figure 6

Study Time per Region (Bachelor Students)



Note. Nominals study time is the minimal time necessary to complete a study.

Dutch bachelor students have the lowest percentage of students that finish their studies with a nominal study time. International students substantially outperform national students in this measure of academic performance (Figure 6). The average Dutch bachelor student finishes their study with at least half a year of delay. The average international student finishes their study in the nominal study time. Non-EER students seem to be the best students when it comes to study time.

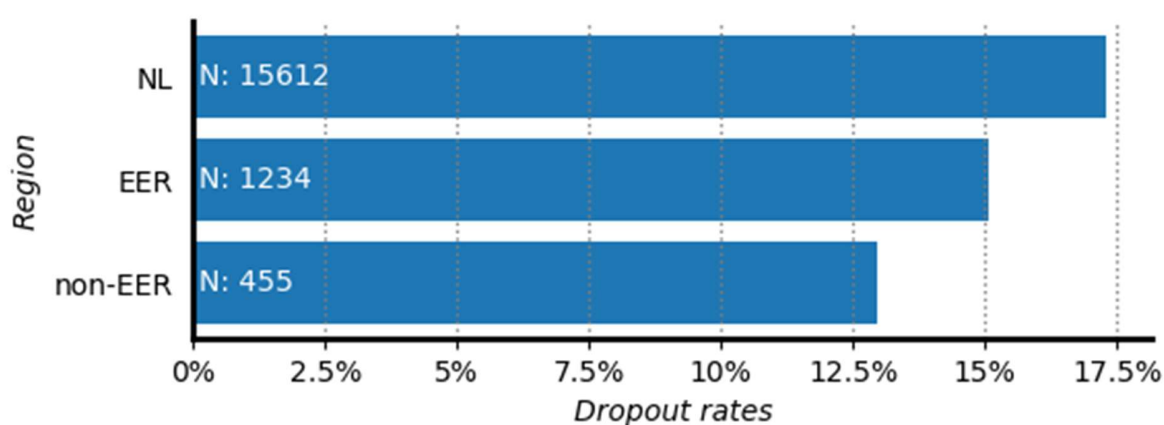
Dropout Rates

Only first year students were considered when determining the dropout rates per region. The reason for this is that the time series data only spanned from 2017 to 2022. This is relatively short compared to the academic life cycle of a student which can even exceed five years. By only

considering the first year students, the amount of time trends data gets increased to students from every year in the dataset.

Figure 7

Dropout Rates per Region (First Year Bachelor Students)



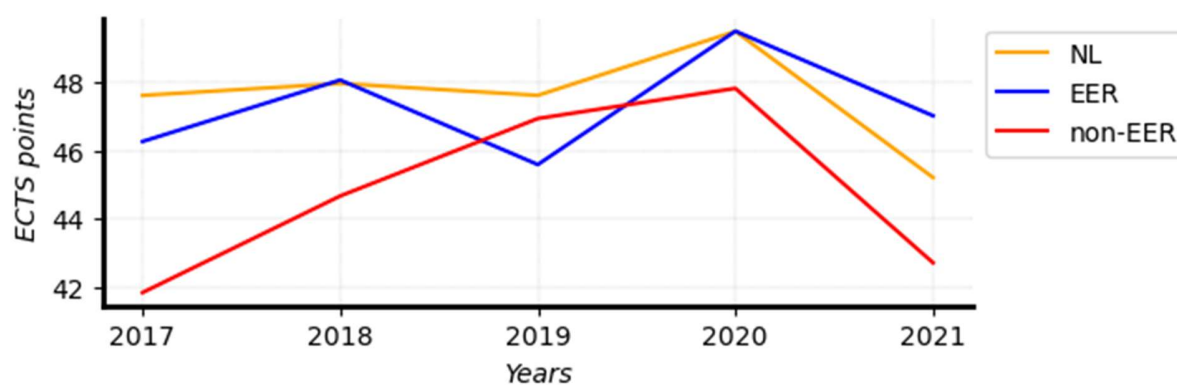
Note. The “N” stands for total amount of students who either graduated or quit their studies.

The dropout rates of Dutch student are relatively high when compared to international students. This is in contrast with what the factsheet published by the Ministry of Education, Culture, and Science (2022) stated. Again, non-EER students outperform the rest in this measure of academic performance (Figure 7).

ECTS

Figure 8

ECTS Over Time per Region (First Year Bachelor Students)



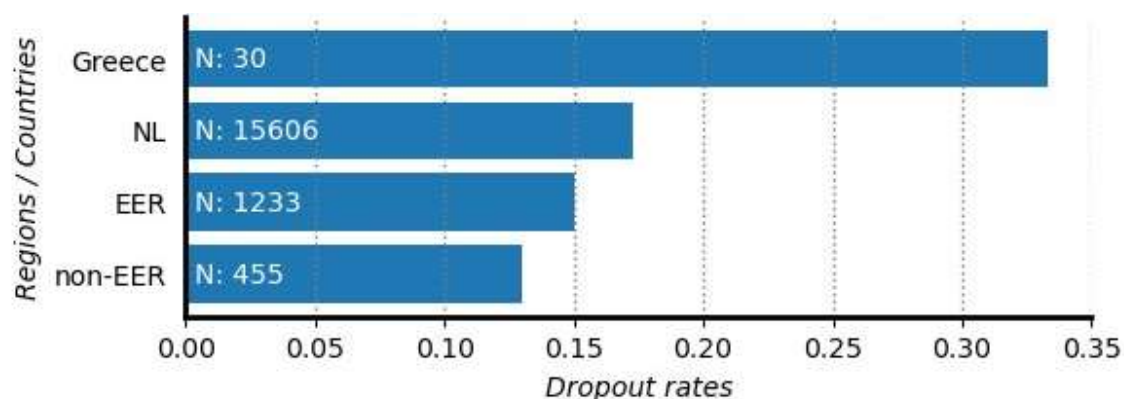
For ECTS points, the differences between regions seem to be smaller. This is especially the case between Dutch and EER students. Non-EER students are the worst performers in terms of attaining ECTS points but have improved over the years. All regions saw a decrease from year 2020 to 2021, however (Figure 8).

Greek Students

Utrecht University inquired a special request to explore the academic performance of Greek students. The dropout rates were especially of great interest. The dropout rates for Greek bachelor students equaled 33% (Figure 9).

Figure 9

Dropout Rates per Region/Country (First year Bachelor Students)



Note. The “N” stands for total amount of students who either graduated or quit their studies.

The dropout rates are therefore substantially higher than those of any of the other regions which were analyzed in this paper. The number of Greek students is low however, resulting in the fact that it becomes harder to make strong conclusions about this student group. The significance of differences between Greece and the main regions discussed in this paper can therefore not accurately be determined.

Master

Assumptions for Average Grades

For master students, the normality and equal variance assumptions held. The independence assumption was violated for EER and Dutch average grades, however (see Appendix B). Therefore, the Mann-Whitney U test was used to determine if there was a significant difference between regions. Again, a significant lag could be seen at 4 lags for both the Dutch and EER regions (see Appendix B). A STL decomposition is therefore appropriate to investigate the underlying components of the average grades time series for master students separately.

Average Grades

An additive STL model was also the appropriate method to uncover the underlying trend and seasonality for master students. Furthermore, a seasonal smoothing of 5 was also used when running this model. This makes the most theoretical sense as discussed before. This value also produced the model with the lowest MSE.

Figure 10

Raw Time Series of Average Grades per Region (Master Students)

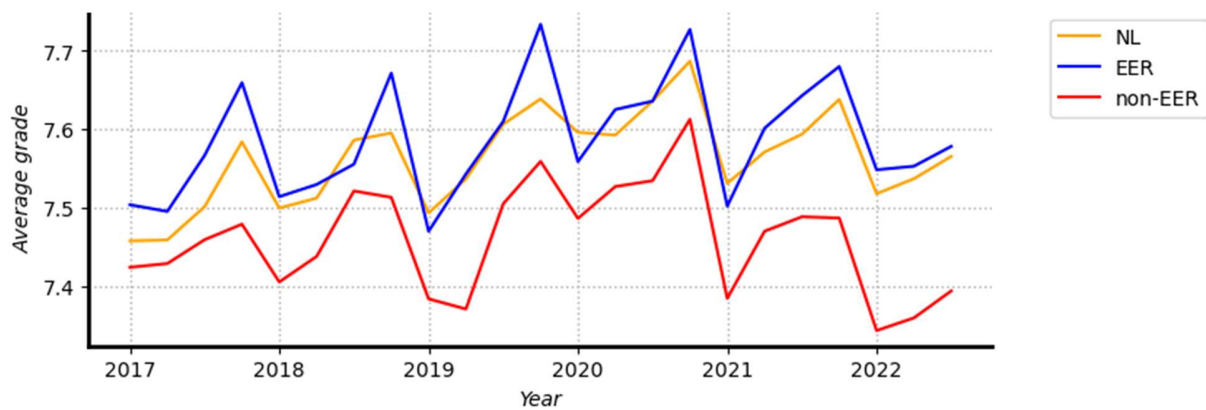
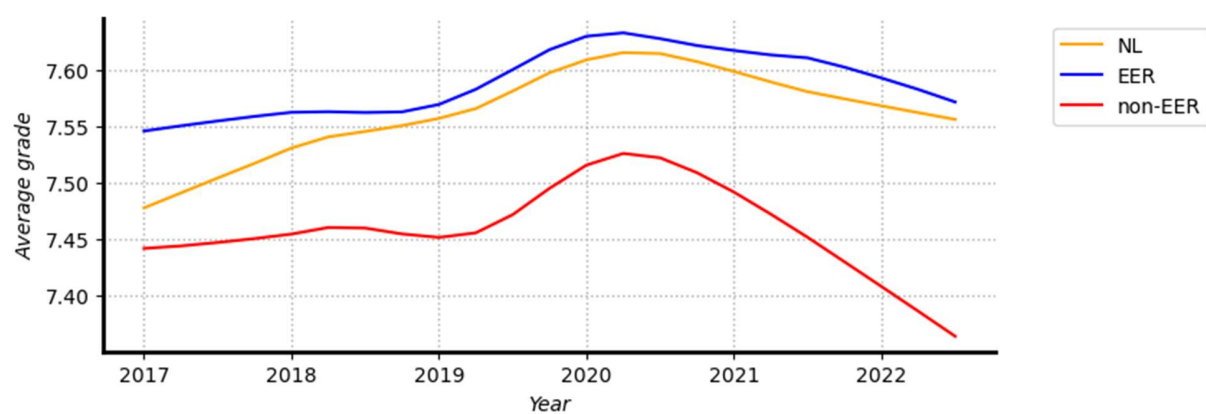


Figure 11

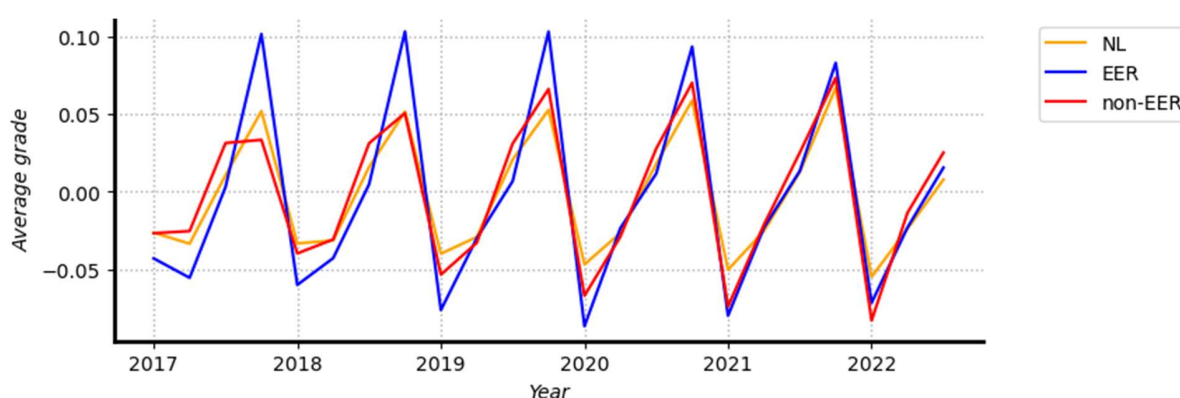
Decomposed Trend of Average Grades per Region (Master Students)



The master students see some regions with significant differences in trends. The Dutch and EER students do not significantly differ in terms of average grades. The non-EER students do significantly differ from both the Dutch and EER students however. They perform significantly worse, with little improvement over time (Figure 11). The only increase they saw was between 2019 and 2020, but this was followed by a quick decrease to the lowest average grade recorder over the total 6 years. Here, EER students have an overall higher grade than dutch students at every year, but this difference is not significant, which means that we cannot make any conclusions about this difference in level. They do not see this sharp decline in average grades that non-EER students saw in the last two years.

Figure 12

Decomposed Seasonality of Average Grades per Region (Master Students)

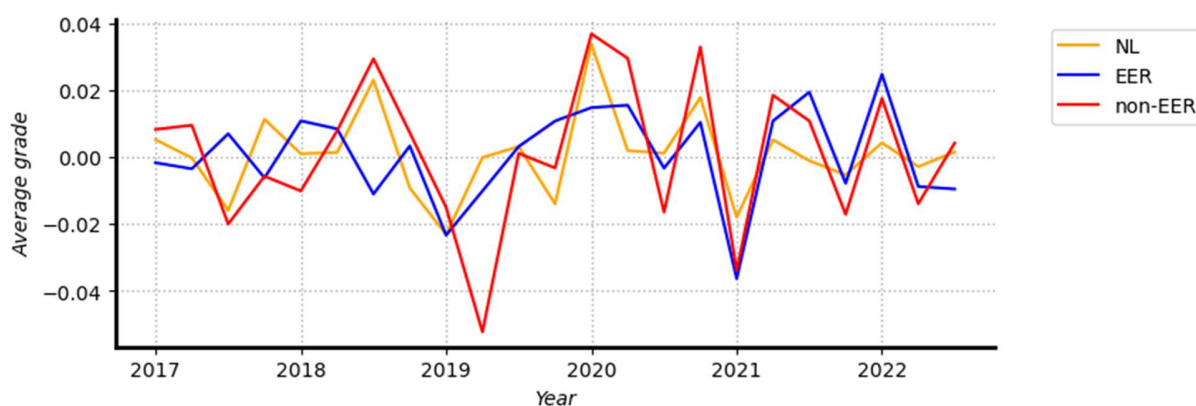


There appears to be a clear seasonal pattern of quarterly periods for the master students (Figure 12). EER students have the most extreme range for the seasonal pattern. This pattern again diminishes over time, resulting in all regions having a similar seasonal component. The Dutch students do compare relatively well to the other regions for the master students. The seasonal pattern is relatively small when comparing it to the bachelor students. The difference

with the master pattern compared to the seasonal pattern of the bachelor students is that the master students mainly perform above average in the third quarter, while bachelor students performed well in the first and last quarter.

Figure 13

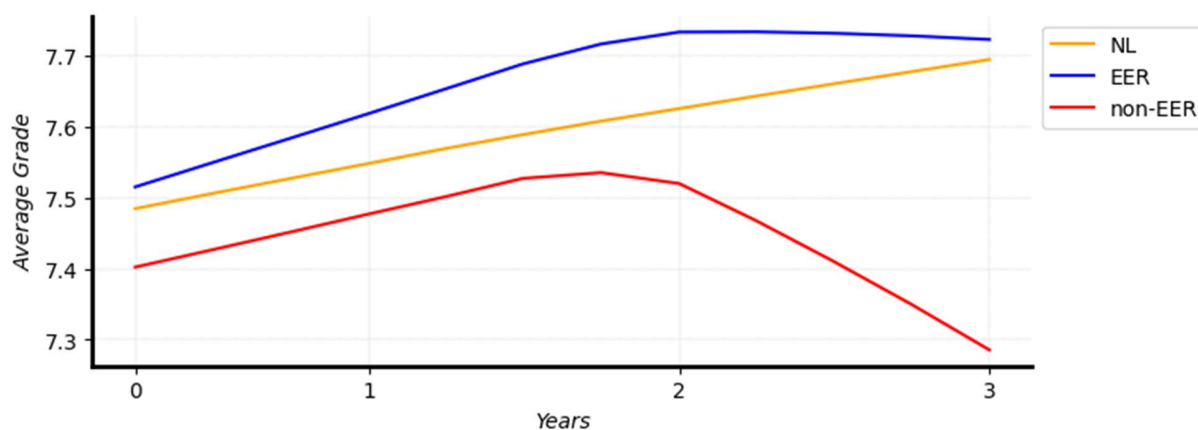
Decomposed Variation in Average Grades per Region (Master Students)



The residual component for master students appears to be more random compared to that of the bachelor students. Large spikes can especially be seen for the non-EER students (Figure 13). These spikes can be explained by random noise, or uncaptured patterns. It is important to note that the residuals are small when considering the average grade variable itself. Therefore, it can be concluded that the seasonal pattern and trend remain strong over the years.

Figure 14

Decomposed Trend of Average Grades Over Time per Region (Master Students)



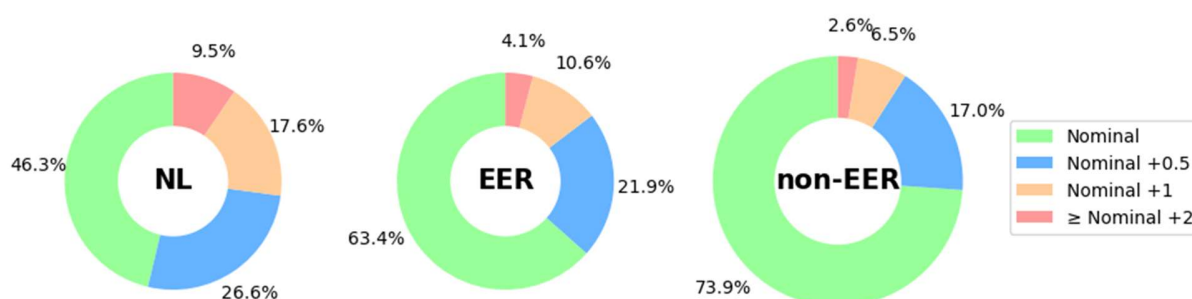
Note. This graph considers the number of years that an individual student studies at Utrecht University. The years are divided into quarterly average grades.

There does seem to be an increase in the average grades for master students with the number of years completed at their study. Non-EER students see a decrease in year three, which is the academic year with either a study delay of one or two years (Figure 14).

Study Time

Figure 15

Study Time per Region (Master Students)



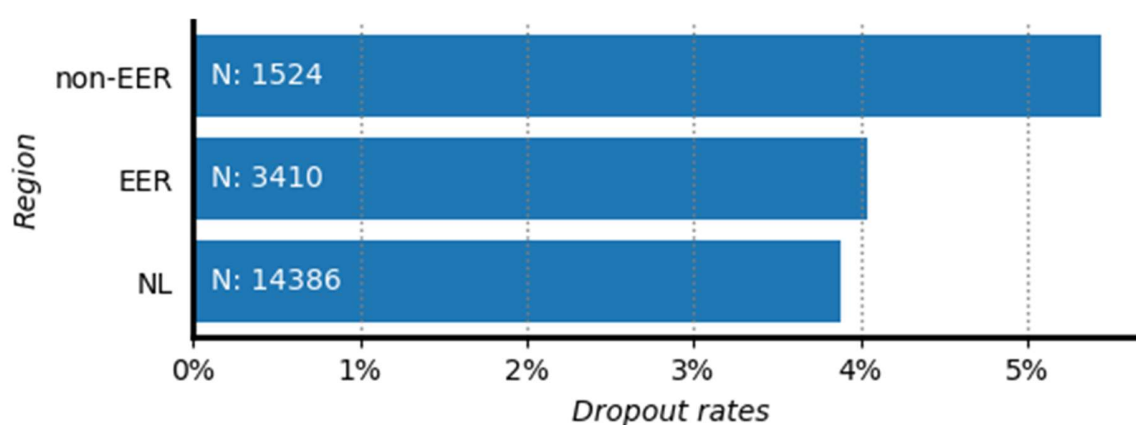
Note. Nominal study time is the minimal time necessary to complete a study.

The Study time for master students also differs slightly from bachelor students. Dutch students still rank last on this measure of academic performance, however. There is now a bigger gap between the international students. Non-EER students perform the best, while EER students see a decrease in performance compared to EER bachelor students.

Dropout Rates

Figure 16

Dropout Rates per Region (First Year Master)



Note. The “N” stands for total amount of students who either graduated or quit their studies.

The dropout rates for the first year master students are much lower compared to the first year bachelor students. The dynamics for the master students are completely the opposite, however. Here, the non-EER students rank the worst, while Dutch and EER students are relatively similar.

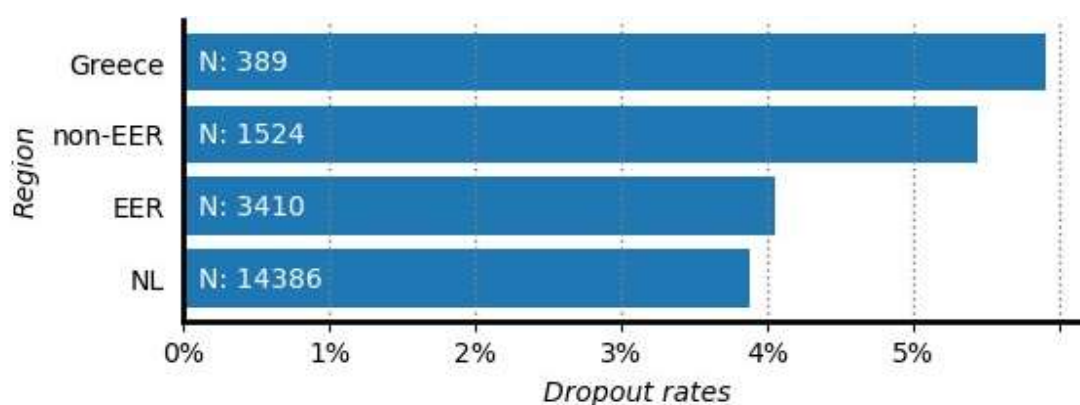
Greek Students

There are substantially more Greek students who are enrolled into a master study compared to bachelor studies. Therefore, the sample size is bigger, which results in stronger

conclusions about differences between Greece and the main regions discussed in this research paper.

Figure 17

Dropout Rates per Region (First Year Master)



Note. The “N” stands for total amount of students who either graduated or quit their studies.

Greek master students seem to perform worse than the average dropout rates of Dutch and other international students. A difference in dropout rates is seen when comparing Greek students to other EER students especially. They perform one percent point worse than the average of all EER countries. The worse performance is still nuanced when analyzing the dropout rates on country level, however. The comparison on that level determines that Greece is fairly average when it comes to EER dropout rates.

Discussion

The main finding in this research paper was that international bachelor students perform worse in terms of average grades but have a better performance when it comes to dropout rate and study time. These last two measures are the measures which the International Marketing Department of Utrecht University found to be the most important. The lower dropout rates for

both international student regions are in direct combat with the conclusions out of the factsheet that was published by the Dutch Ministry of Education, Culture, and Science (2022). In that factsheet it was concluded that international students perform worse in terms of dropout rates compared to Dutch students. The Ministry of Education, Culture, and Science did not find a cause for this worse performance. Other literature found the reason for performing worse to be financial stress, a language barrier, and cultural differences (Banjong, D. N., 2015). The results from this research paper thus imply that these factors are not as significant for international bachelor students at Utrecht University as for students at other universities. There might be other external factors influencing the better academic performance of international students like higher levels of motivation or university size.

Another important finding from this research is that both international bachelor and master students have lower study times overall. Non-EER students perform the best in this academic performance measure. The reason for these non-EER students finishing their studies so fast is that they experience greater financial pressure due to the high institutional tuition fees. These higher fees make the students more inclined to graduate in a shorter time than other regions (Kristiana et al., 2022). EER students also have a lower overall study time compared to Dutch students. EER students also experience the financial pressure that non-EER students experience, since living in another country brings extra costs, but at a lower scale. These EER students cannot make use of the student financing loan provided by DUO, except under certain circumstances. Which is also the case for non-EER students. This easy access to loans to fund the student life could be one of the reasons why Dutch students are significantly slower at finishing their studies. Not only do they have the lowest financial burden, but they also enjoy the comfort of studying in their own country. They are less likely to take on additional stress that comes with

studying in another country (Kristiana et al., 2022). Therefore, experiencing less pressure to finish their studies as fast as possible. This might be the explanation for why the average Dutch bachelor students finishes their studies with at least half a year of delay.

The STL decomposition of average grades and results of the ECTS analysis of bachelor students give us another interesting insight into the differences in study performance between regions. Conflicting conclusions can be made when comparing the results of these average grades and ECTS with the results of the study time and dropout rates. International students perform worse than Dutch students when it comes to grades and ECTS but perform better when it comes to study time and dropout rates. This situation can be explained when considering the seasonality and residuals of the average grades of bachelor students. As stated previously, the international students seem to have more extreme seasonality and residuals compared to Dutch students. This research was done with data from the time frame where COVID-19 was a prominent factor in education. This was an external factor that changed the way exams were made and relaxed the rules for passing the academic year. This has undoubtedly had an influence on academic performance measures, especially for international students. This could also be the reason for increased residuals and diminishing seasonality in the decomposed average grades time series. Such symptoms mainly occur when external factors influence the data for which the STL method cannot account for.

International students seem to perform better by the number of years that they enjoy a study at Utrecht University in terms of average grades. Current literature agrees with this result, concluding that cultural and academic adjustment takes time, but will eventually take place (Rienties et al., 2011). The increase in average grades for individual students over time also applies to national students however, making any conclusions about this finding weak. It suggests

that this increase in average grades is not because of cultural adjustment, but rather because of other external factors that influence both national and international students.

The factsheet published by the Dutch ministry of Education, Culture, and Science (2022) only considered bachelor students in their research. The Department of International Marketing at Utrecht University was also interested in differences in academic performance between national and international master students, however. Under the master students there was no significant difference between Dutch and EER students in terms of grade. Non-EER students were significantly worse than those other two regions, however. The interesting finding for master students was that their studies have a shorter nominal study time compared to bachelor studies. Therefore, the students get less time to adjust culturally, which results in non-EER students performing the worst. Non-EER students take more time to adjust than EER students, which is why there is no significant difference between Dutch and EER students, but there is with non-EER students. The master students saw less extreme seasonality and variability in their grades, which could be explained by the short nature of master studies, therefore not allowing for much variation and seasonal effects. Master students have also typically already finished a bachelor study and are thus more used to the academic mindset and study methods needed to succeed.

The dropout rates of international master students are higher than the Dutch students. Especially non-EER students perform the worst at this measure. This is in line with the factsheet published by the Dutch ministry of Education, Culture, and Science (2022). The factsheet only considers bachelor students, however, as mentioned before. Therefore, the comparison is weak. The fact that master studies have shorter nominal study times, results in master students having much less money invested, which results in less will and need to stay and finish their studies.

Finally, the Greek bachelor students did not have a significantly large sample size to make conclusions about the dropout rates. The master students did, however. They scored worse than the three main regions discussed in this paper in terms of dropout rates. The difference is nuanced however, making it unsensible for the Department of International Marketing at Utrecht University to take action in trying to lessen the dropout rates of Greek students. If anything, the results of this study have shown that more focus needs to be on the national students than international students. International students might perform worse in master programs, but not in bachelor programs. If Utrecht University wants to adequately target these bad performing master students, they should act and offer more help with English lessons or organizing opportunities for international students to be more social. These social events will help with cultural adjustment and will help avoid mental health problems such as loneliness and depression (Ali et al., 2020). It should also not only think about bettering the English proficiency of its students, but also of its teachers.

This research also encountered some limitations. The sample sizes were relatively small for doing an extensive trend analysis. Only one variable, average grades, had a large enough sample size to achieve somewhat strong results. A student's academic life cycle has a minimum of a multiple years, meaning that even longer time series are required for this type of research. Furthermore, many values were missing, which could also have influenced the outcomes of this research. The data provided by Utrecht University was questionable, since some statistics did not make theoretical sense. This research paper still tried its best to give as much information as was possible to the Department of International marketing.

Conclusion

The main aim of this research paper was to determine whether there were differences in academic performance between national and international students. It hypothesized that the results would be similar to the factsheet published by the Dutch Ministry of Education, Culture, and Science (2022). The conclusion of that factsheet was that international students performed worse than their national counterpart in terms of academic performance. The results of this research paper conflicted with that hypothesis, however. The results showed significant differences between national and international students but concluded that international bachelor students performed better in terms of dropout rates and study time compared to national students. Master students did follow the hypothesis however, seeing higher dropout rates for international students. Initiatives could be sprung into life to improve the academic and cultural adjustment of international students. This research gives the university more insight into its own students and fills a knowledge gap that existed for the outflow of students. Further research could explore the underlying reasons for the difference in academic performance between regions. This paper was successful in finding the differences in academic performance between national and international students. It is in the hands of Utrecht University to decide on whether these differences in academic performance are significantly large enough to take action.

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Appendix A

PCA Plots Average Grades Bachelor Students

Figure 18

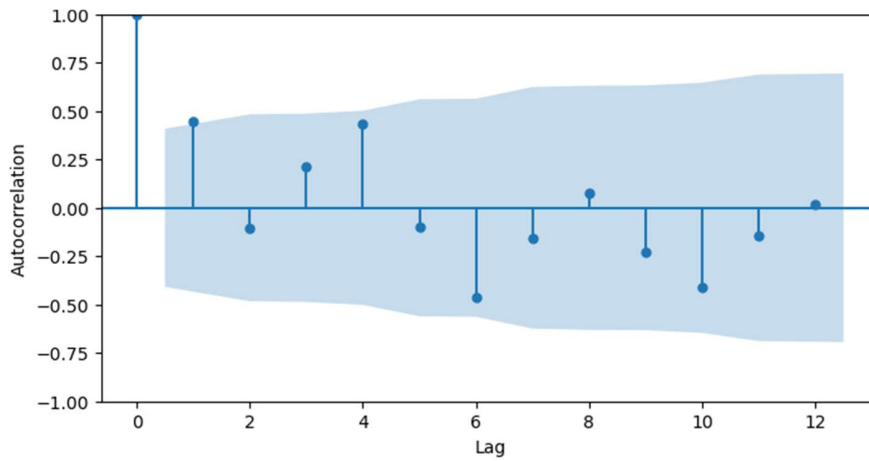
AutoCorrelation Function (ACF) Dutch Bachelors (Average Grades)

Figure 19

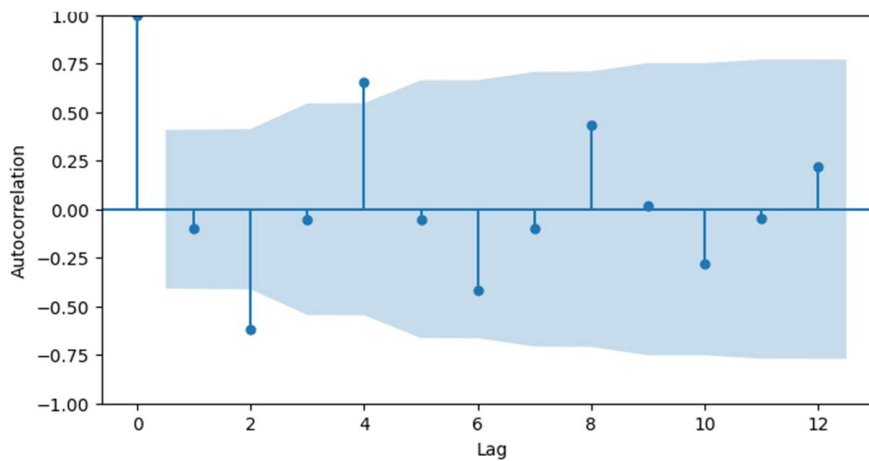
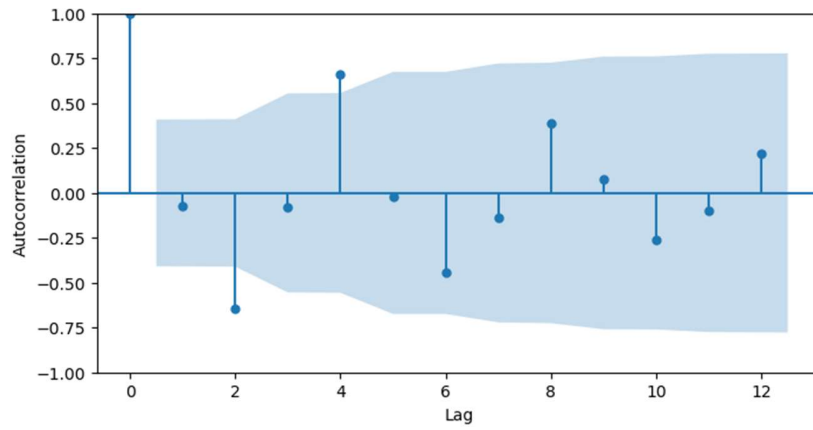
AutoCorrelation Function (ACF) EER Bachelors (Average Grades)

Figure 20

AutoCorrelation Function (ACF) non-EER Bachelors (Average Grades)



Appendix B

PCA Plots Average Grades Master Students

Figure 21

AutoCorrelation Function (ACF) Dutch Masters (Average Grades)

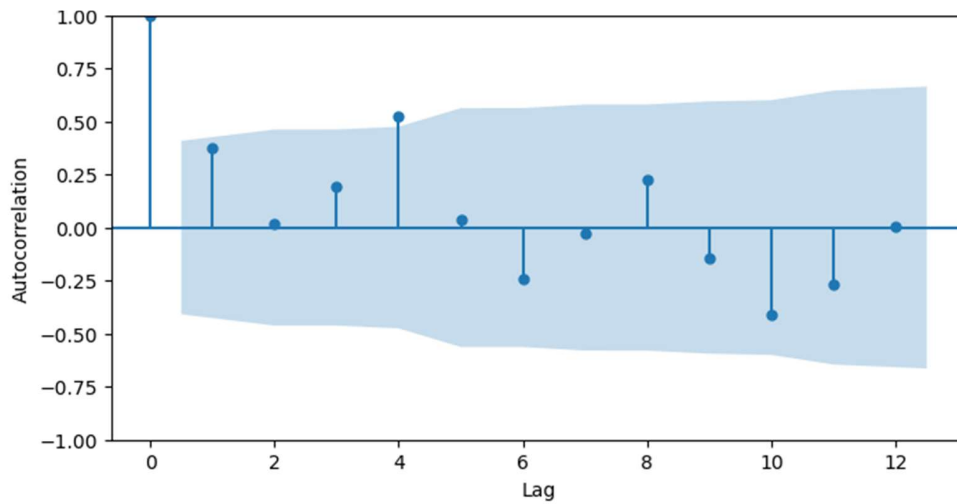


Figure 22

AutoCorrelation Function (ACF) EER Masters (Average Grades)

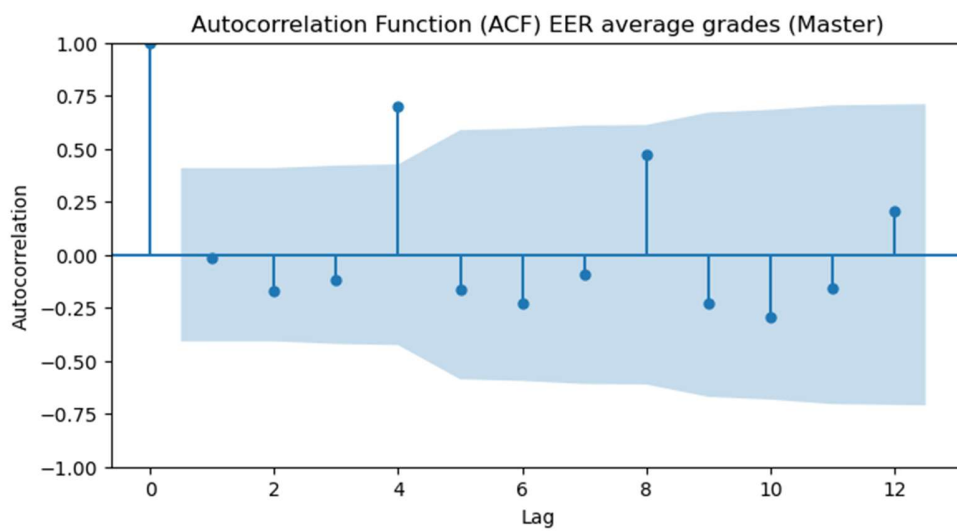


Figure 23

AutoCorrelation Function (ACF) non-EER Masters (Average Grades)

