AN EVALUATION OF ADMISSIONS PATHS AND THE ADMISSION PROCESS INTO HIGHER EDUCATION

A case study of the economics and business administration programme at Lappeenranta–Lahti University of Technology LUT

Lappeenranta–Lahti University of Technology LUT

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Larissa Riedler

Examiners: Associate Professor Jan Stoklasa

Professor Pasi Luukka

ABSTRACT

Lappeenranta–Lahti University of Technology LUT

LUT Business School

Business Administration

Larissa Riedler

An evaluation of admissions paths and the admission process into higher education

(A case study of the economics and business administration programme at Lappeenranta–Lahti University of Technology LUT)

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Keywords: Admissions process, admissions paths, admission into higher education, higher education, admissions evaluation, LUT University, Survivorship bias

The aim of this thesis was to evaluate the admissions process for the economics and business administration programme at Lappeenranta–Lahti University of Technology LUT (LUT University). Studies on admissions processes commonly have survivorship bias as students that have survived the admissions process are often used as data. LUT University provides a rare opportunity to lessen the burden of survivorship bias using the LUT Highway admission path to show how students that were not admitted through the primary admissions paths perform in higher education. The admissions process was evaluated on the performance of the individual admissions paths as well as on the equality of opportunity to use the different admissions paths. The equality of the admissions paths was evaluated based on the financial burden of the admissions path on the applicant, whereas the performance of the admissions paths was evaluated using grade point averages and graduation statistics.

The differences between admissions paths were found but only some of them are statistically significant. The two primary admissions paths show a statistically significant result of one admissions path outperforming the other while secondary admissions paths show competitive performance. The cost of the secondary admissions paths creates possible inequality in the availability of the paths to applicants. Overall, the admissions process was found to perform as desired in some aspects but there is room for improvement.

TIIVISTELMÄ

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Kauppatieteet

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Tämän pro gradu -tutkielman tavoitteena oli arvioida Lappeenrannan–Lahden teknillinen yliopisto LUT:n (LUT-yliopisto) kauppatieteiden koulutusohjelman valintaprosessia ja valintaperusteita. Tutkimukset, jotka käsittelevät valintaprosessia sisältävät usein dataa, jossa on selviytymisharhan vaikutus, koska datassa olevat opiskelijat ovat selviytyneet valintaprosessista. LUT-yliopistossa on harvinainen mahdollisuus tutkia valintaprosessia datan avulla, jossa on pienempi selviytymisharhan vaikutus. LUT-yliopiston LUT Highway väylä osoittaa kuinka opiskelijat, jotka eivät tulleet valituksi valintaprosessin ensisijaisia valintaperusteita hyödyntämällä suoriutuvat korkeakouluopinnoissa. Valinta prosessin aviointiin käytettiin sekä yksittäisten valintaperusteiden menestystä, että valintaperusteiden tasa-arvoisuutta käytettävyydessä. Valintaperusteiden tasa-arvoa arvioitiin valintaperusteiden muodostaman taloudellisen taakan avulla ja valintaperusteiden menestystä avioitiin opintosuoritusten keskiarvojen ja valmistumistilastojen avulla.

Valintaperusteiden välillä löydettiin eroja, joista vain osa oli tilastollisesti merkittäviä. Kahden ensisijaisen valintaperusteen välillä löytyi tilastollisesti merkittävä ero, jonka mukaan toinen valintaperusteista menestyy paremmin ja toissijaiset valintaperusteet näyttävät kilpailukykyiseltä. Toissijaisten valintaperusteiden kustannukset luovat mahdollista epätasa-arvoa hakijoiden mahdollisuuksissa käyttää toissijaisia väyliä. Kaiken kaikkiaan valintaprosessi näyttää toimivan tarkoitetun mukaisella tavalla joiltain osin, mutta toisaalta vielä on parantamisen varaa.

Abbreviations

ACT	American College Test
ANOVA	Analysis of Variance
ECTS	European Credit Transfer and Accumulation System
GMAT	Graduate Management Admission Test
GPA	Grade Point Average
Kela	Kansaneläkelaitos (the Social Insurance Institution of Finland)
LUT University	Lappeenranta-Lahti University of Technology LUT
MEC	the Finnish Ministry of Education and Culture
Tukey HSD	Tukey's Honestly Significant Difference

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1 Introduction

In Finland there are many different paths for someone to enter a university to study economics and business administration. This thesis is about evaluating the admissions process into an economics and business administration programme. This thesis is based on students entering the field of economics and business administration at Lappeenranta-Lahti University of Technology LUT (LUT University) between the years 2018 and 2021 and the paths they have taken to get there. According to Haltia, Isopahkala-Bouret and Jauhiainen (2019, p.276) within the 2010s there have been changes made to admissions processes to higher education in Finland. Many of these changes are based on goals created by the Finnish Ministry of Education and Culture (MEC, Opetus- ja Kulttuuriministeriö, OKM) in 2016 for the future development of the admissions process into higher education. In summary the main goal was to make the transition from secondary education to higher education faster and as a result make careers longer by transitioning graduated students into the workforce quicker (Opetus- ja kulttuuriministeriö, 2016, p.7). Another goal that was introduced for the development of the admissions processes was educational equality (Opetus- ja kulttuuriministeriö, 2016, p.30). As the admissions process has since been developed with these goals in mind it is of interest to look into how the current admissions process' performance is in regard to enabling quicker transitions and promoting educational equality. In addition to evaluating the performance of the admissions process the performance of the individual admissions paths into the LUT University economics and business administration programme will be evaluated.

When it comes to evaluating admissions processes or evaluating admissions criteria there is no clear consensus on an admissions criterion that performs best in all scenarios in prior literature. An admissions process could be seen as an attempt to predict which applicants will have high performance in their studies and should therefore be admitted. The variation in results and opinion in prior studies and literature can showcase the ambiguity of admissions process evaluation. Prior literature has looked at different higher education systems' admissions processes and varying definitions of success. A common admissions criterion found in previous studies is high performance in an entrance exam. For example, the SAT, which is an exam and a common admissions criterion, used to make admissions decisions in many higher education institutions in the United States of America (Kolby,

2005, p.14; Grodsky, Warren & Felts, 2008, p.396). Its prediction power and use as an admissions criterion has been studied in several previous studies (e.g., Cohn et al., 2004; Kobrin & Patterson, 2011; Rothstein, 2004). As an admissions criterion the SAT can be viewed as an entrance exam of sorts, and it shares some characteristics with the entrance exam used in the economics and business administration programmes admissions processes in Finland. Opinions of it as an admissions criterion are divided. Kolby (2005, p.11) says that the SAT is just slightly better at higher education performance prediction than chance would be. On the other hand, Cohn, Cohn, Balch and Bradley (2004, p.585) called the SAT an important predictor. Whereas Rothstein (2004) found that the prediction power of the SAT can be inflated due to its correlation to a student's background information, if background information itself is not used in a model. It can be seen here that even when looking at one admissions criterion the results are varying. There are prior studies that have found no meaningful relationship between an entrance exam and higher education performance in their case (e.g., Aburas & Nurunnabi, 2019, p.978) and studies that show admissions criteria to be relevant predictors of higher education performance, (e.g., Hu, Li, & Gan, 2014, p.181; Kuncel, Credé, and Thomas, 2007, p.59). There are also previous studies finding that an entrance exam might not predict high performance but could be seen as ruling out low performance (Stoklasa, Talášek and Viktorová, 2020, p.221) or finding admissions criteria to be significant in predicting higher education performance but having caveats to their results on when the criteria are significant (Sawyer, 2013, p.107; Hammond, Cook-Wallace, Moser & Harrigan, 2015, p.71). While many have found value in admissions processes there are also prior studies that have found admissions processes to be lacking.

The topics of success prediction and admissions process evaluation are not new. However a majority of previous studies have taken place outside of Finland and have therefore not specifically looked at the admissions process of a Finnish higher education institution. There are qualities to the Finnish higher education system that bring specific angles to the topic of admissions process evaluation. One such angle is the financial aspects of both the institutions as well as the students specifically in Finland. According to Ahola, Hedmo, Thomsen and Vabø (2014, p.39) there is a link between free education and equal opportunities. With MEC expressing that educational equality is a goal of the development of the admissions process into higher education (Opetus- ja kulttuuriministeriö, 2016, p.30) the admissions paths to become a degree student in the LUT University economics and

business administration programme can be evaluated from the viewpoint of educational equality. The admissions paths have differing levels of financial burden attached to them, which is why the equal opportunities of applicants to apply to higher education through all admissions paths could be brought into question. The financal aspects of individual admissions paths will be discussed in more detail later. Additionally, the goal of faster transitions from secondary education into higher education and further into the workforce (Opetus- ja kulttuuriministeriö, 2016, p.7) bring to light another aspect of the admissions process to evaluate. The key difference to most previous studies however is the opportunity that LUT University and its LUT Highway admissions path bring to this study.

Survivorship bias is a selection bias in which the end result of a study can be affected by the data being only based on individuals who have sruvived a selection process and not representeting individuals who did not survive the selection process (Elston, 2021, p.1; Lindwell, Holden & Butler, 2023, p.98). When it comes to studies evaluating admissions processes or predicting student's success, they are often based on students studying at higher education institutions meaning that they have survived the admissions process. Due to this the data seldom gives insight into applicants who were rejected in the admissions process as higher education institutions rarely have data on these applicants. This means that the data is possibly missing information which can negatively impact the significance of the results. In its first year of existence, in the academic year 2018-2019, the LUT Highway admissions path was only offered to students who were rejected by the entrance exam path (Tolpo, 2018). The LUT Highway path and the other open university paths give an opportunity to do a study evaluating an admissions process with data that includes students who were not admitted through the main admissions paths. This gives insight into how students who were rejected from the programme perform in the programme meaning that the admissions process can be evaluated not only based on the admissions decisions that it made but also the rejection decisions that it made.

The objective of this thesis is to evaluate the performance of the admissions process for the economics and business administration programme at LUT University using data with representation for rejected students lessening the burden of survivorship bias. The results of this study will give insight into how the admissions process performs in light of goals set for admissions processes by MEC. The relationship between individual admissions paths and students' success is explored and the different admissions paths are compared to

one another. Admissions into higher education in Finland are numerus clausus (Ahola et al., 2014, p. 36; Isopahkala-Bouret, 2019, p.3) meaning that one student being admitted means that another applicant will be rejected. Because of this higher education institutions need to choose what to base their admissions decisions on. Why the different parties involved in the admissions process should care about the performance of the admissions process and how each benefit from a successful admissions decision is further discussed later.

The research questions and subsequent sub-questions are as follows:

- How well does the admissions process for the LUT University economics and business administration programme perform?
    - Are there differences in the performance of individual admissions paths?
    - Does the admissions process support quick transitions from secondary education into higher education and further into the work force?
    - Does the admissions process promote equal opportunities amongst applicants and admissions paths?

There are limitations to this thesis one of which is, that it is only based on one Finnish University and further only on one higher education programme. While the LUT Highway path provides an opportunity to get insight into the performance of the admissions process with a lesser burden of survivorship bias, the path has not existed for long which limits the data available from it. At the time of data collection for this thesis only one starting year had passed the expected graduation. Since its creation the LUT Highway path has been expanded to more study programmes which will provide an opportunity recreate the study with more data. Another limitation to this study is the unavailability of information about students' socioeconomic status. In this study the potential financial inequalities that individual admissions paths present are discussed but there is no information in the data about students' financial background. Recreation of this study with socioeconomic status as another aspect of admissions process evaluation has been suggested for future studies.

As for the structure of this thesis, this introduction chapter will be followed by a chapter with a brief look into the Finnish higher education system. In this chapter features of the Finnish higher education system relevant to the admissions process into higher education

as well as funding for higher education institutions are looked at. The admissions paths into the LUT University economics and business administration programme will be discussed in further detail as well as student financial aid in Finland as it pertains to higher education students. This is followed by a literature review chapter, which takes a closer look at previous studies about predicting student's success in higher education and evaluating admissions processes and admissions criteria. After this there is a chapter on data that focuses on describing the characteristics of the data and talks about the processing of the data. The penultimate chapter in this thesis is the results chapter, which dissects and opens the results of the study. Lastly there is a conclusions chapter that looks at the thesis as a whole and discusses limitations in further detail and presents suggestions for future studies.

2 The Finnish higher education system

This chapter will discuss the Finnish higher education system and the admissions process into the field of economics and business administration at LUT University. For this thesis it is relevant to understand how student admissions into the field of economics and business administration at a Finnish university work and what kind of changes the admissions process has gone through in recent years. When discussing admission into a university, Finnish universities recognized by the Universities Act are meant (Yliopistolaki 558/2009, 2009). Funding models for universities are introduced in this chapter and looked at for LUT University. The admissions paths into the LUT University economics and business administration programme will be introduced and the student financial aid system will be discussed. The focus will be on LUT University because in addition to the most used paths to gain admission to study economics and business administration LUT University offers an alternative open university path called LUT Highway that provides the opportunity of looking at the performance of students that did not gain admission through the main admissions paths. This gives a chance to evaluate the admissions process while taking into consideration a common issue of admissions process evaluation studies, survivorship bias. This will be discussed in more detail in a later subchapter.

2.1 The Finnish higher education system in a nutshell

Ahola et al. (2014, p.39) say that education being free of charge is one of the most prominent characteristics of the Nordic education model. According to the Finnish Universities Act 558/2009 (Yliopistolaki 558/2009, 2009) education that leads to a higher education degree and any entrance exams related to said education must be free of charge unless otherwise mentioned in the Act (Yliopistolaki 558/2009, 2009). As someone gains a student place and a right to study as a degree student in the field of economics and business administration at a Finnish university they simultaneously gain these for the Bachelor of Science in Economics and Business Administration degree and the Master of Science in Economics and Business Administration degree, which means that there is no need to separately apply for the right to study for the master's degree after the bachelor's degree as

long as the student continues at the same university (Kauppatieteellinen ala: yhteisvalinta, 2023). As these student places and rights to study are for education leading to a higher education degree, there is no tuition attached to them for Finnish students and also no cost for the entrance exam. Though there is no tuition, students at LUT University have to register as attending or non-attending for each semester to uphold their right to study (LUT University, 2023l). When registering as attending students need to pay the student union membership fee, which is 74€ for the full academic year or 42€ for both the spring semester and the autumn semester respectively (LUT University, 2023l). All university students admitted to programmes leading to a bachelor's degree or a master's degree are members of the student union (Yliopistolaki 558/2009, 2009). When a student accepts a student place at an institution their right to study begins (Yliopistolaki 558/2009, 2009). The duration of the right to study is limited and determined by the Universities Act 558/2009 (Yliopistolaki 558/2009, 2009). For someone who has gotten a student place for a bachelor's degree and a master's degree combined the right to study is at most two years more than the target time to complete the degree that is set by the Universities Act 558/2009 (Yliopistolaki 558/2009, 2009). For the combined right to study for the bachelor's degree and master's degree in economics and business administration the right to study duration is 7 years (LUT University, 2023n). When a student registers as non-attending due to maternity leave, paternity leave, parental leave, conscription, or voluntary military or non-military service in accordance with the Act on Women's Voluntary Military Service (Laki naisten vapaaehtoisesta asepalveluksesta 285/2022, 2022) this time will not count toward the right to study duration (LUT University, 2023n) In addition a student can register as non-attending to their studies with at most two semester as non-attending being excluded from counting toward their right to study duration outside of the aforementioned exceptions (LUT University, 2023n). Students can register as non-attending for more than two semesters, but if it is not for one of the reasons listed prior, the time outside of two semester counts toward their right to study duration. When a student accepts a student place they cannot register as non-attending in their first year unless the student takes a leave of absence due to the birth or adoption of a child, there is an illness or injury that prevents the student from participating in their studies or the student partakes in voluntary military service or conscription (LUT University, 2023o).

2.1.1 General changes to higher education admissions processes in recent years

Haltia, Isopahkala-Bouret and Jauhiainen (2019, p.276) point out, the admissions process for students applying to higher education in Finland has been through many changes in the 2010s. In 2016 MEC presented an action plan for the development of admissions processes into higher education (Opetus- ja kulttuuriministeriö, 2016). This could make the topics of performance prediction and evaluation of admissions processes useful to evaluate the performance of the admissions process with regard to these changes.

The first change to the admissions process discussed here is the creation of a unified application process. Since 2014 MEC has run a service called opintopolku.fi where twice a year, once in spring and once in autumn, a joint admissions process is held where people can apply to universities and universities of applied sciences through one portal in the same admissions run (Opetus- ja kulttuuriministeriö, 2016, p.16). According to MEC before the implementation of the joint admissions process using the opintopolku.fi service, universities held their own joint admissions process and universities of applied sciences had four separate admissions processes each held on a different platform (Opetus- ja kulttuuriministeriö, 2016, p.16). The implementation of the joint admissions process using the opintopolku.fi service has simplified the application process by having everything on one platform and having cohesive application periods. To be able to study for a higher education degree in Finland one would need to get a student place and a right to study at a university or a university of applied sciences which can be accomplished through a few different paths. The main paths are reached through applying in the joint admissions process through the opintopolku.fi service. There is however a constraint, that an applicant can only apply to six student places in one application process and these choices are put in order of preference on the application (Opetus- ja kulttuuriministeriö, 2016, p.16), with for example applying to study economics and business administration at LUT University and the University of Vaasa counting as two out of the six student places that you can apply for in one admissions run. A student is also only allowed to accept one student place in a semester (Yliopistolaki 558/2009, 2009).

Another change that occurred in the admissions process in the last decade is that since 2014 Finnish universities have had the option to reserve a percentage of student places at a university as a so called ensikertalaiskiintiö (Opetus- ja kulttuuriministeriö, 2016, p.18),

which roughly translates to being a first-timers quota. These reserved student places are meant for people who do not have a previous higher education degree that is in accordance with the Finnish education system and who have not, for the autumn semester of 2014 or after that, accepted a student place that could lead to a higher education degree (Yliopistolaki 558/2009, 2009) and are therefore considered to be first-time students (first-timers). MEC points out that the reserving of student places has been possible for universities since 2014 but it only really started to happen after becoming mandatory in 2016, with each university having to reserve student places but having the right to decide the number of student places being reserved in their admissions process themselves (Opetus- ja kulttuuriministeriö, 2016, p.18). Though universities that are a part of the joint admissions process have to have a first-timers quota, there are some exceptions to having to reserve student places, such as the programme being in a foreign language or the number of students that are admitted being small enough where using a first-timers quota would create inequality between applicants (Yliopistolaki 558/2009, 2009). At LUT University the first-timers quota for 2023 is a minimum quota of 70% (LUT University, 2023a), but Kauppatieteellinen ala: yhteisvalinta (2023) points out that 70% being the minimum quota means that a greater amount of people that fit the first-timers criteria can be chosen. For example, in 2022 at LUT University 145 of the 158 students that were admitted to the economics and business administration programme were people that satisfied the criteria of being a first-timer, which means that almost 92% of the admitted students were first-timers. (Kauppatieteellinen ala: yhteisvalinta, 2022).

2.1.2 Goals and concerns

There are a few different themes that come up when reading about MEC's plans for the development of the admissions process. These themes could also be viewed as goals that are set for the development of the admissions processes and one of these goals could roughly be summed up as enabling longer careers. The way that this is approached is by trying to make the transition into higher education, and from there into the workforce, fast so that the longevity of careers can be increased through starting them earlier. The idea is, that if students would not take gap years between secondary education and higher education, they would graduate with their higher education degree sooner and move into the workforce quicker. One of the changes suggested by MEC aiming to encourage

students to apply to higher education straight out of secondary education is to increase the number of students that are admitted to a university based on their secondary education, more specifically the Finnish matriculation examination certificate. Another measure that could be seen as encouragement to apply into higher education more quickly is the first-timers quota. The first-timers quota could be seen as an encouragement for people with a first-timer status to apply, because it is meant to increase their chances of getting into higher education by prioritising the admission of students with no prior higher education degree. (Opetus- ja kulttuuriministeriö, 2016) With one of the goals for the changes being a faster transition into higher education there could be an argument made for the first-timers quota possibly being counterproductive. The first-timers quota is not as straight forward of a measure to encourage a swifter transition into higher education, because losing one's first-timer status has nothing to do with the amount of time that has passed from their secondary education graduation and is only affected by accepting a student place in an institution of higher education. As accepting a student place costs someone their first-timer status even if the student place and right to study does not result in a higher education degree, for example due to dropping out, it could be that students would not want to rush into accepting a student place but take their time in researching options and figuring out what programme and what institution would be best suited for them. As a result, students that are offered a student place as a degree student at for example their third or even sixth choice student place might not accept it if admission to a student place higher on their preference list was close enough to encourage them to rather try again next year and not give up their first-timer status. In this example we can see the first-timers quota possibly being counterproductive to the goal of making a student's transition from secondary education to higher education quicker.

Another goal that can be seen in MEC's action plan published in 2016 (Opetus- ja kulttuuriministeriö, 2016) is overall increasing the importance of upper secondary education in the admissions process for higher education. MEC suggested that the admission criteria should be mostly based on secondary education (Opetus- ja kulttuuriministeriö, 2016, p.11). In 2016 MEC also suggested that the number of admissions made based on certificates should be increased by the year 2020 so that a majority of admissions decisions are made based on secondary education certificates, mostly based on the Finnish matriculation examination certificate (Opetus- ja kulttuuriministeriö, 2016, p.11). Even though these suggestions are not a part of the

Universities Act (Yliopistolaki 558/2009, 2009) or in the individual contract that LUT University has with MEC (Opetus- ja Kulttuuriministeriö, 2020) it can be observed being fulfilled at LUT University in their economics and business administration programme. In 2023 at LUT University 60% of the students that get admitted through the joint admissions paths into the economics and business administration programme are admitted based on their Finnish matriculation examination certificate alone (LUT University, 2023b). The other 40% are admitted based on the entrance exam that is based on specific Finnish general upper secondary school courses (LUT University, 2023b; Kauppatieteellinen ala: yhteisvalinta, 2023b). All of the students that are admitted to the economics and business administration programme at LUT University based on their Finnish matriculation examination certificate alone must have their first-timers status to be eligible to be admitted through this path (LUT University, 2023b).

According to Haltia, Isopahkala-Bouret and Jauhiainen (2022, p.553) the European education policy highlights equality in education. Equal access to education could be seen as one of the themes that MEC brings forth. MEC states in their action plan that one of the reasons for these proposed changes is the equal right to education (Opetus- ja kulttuuriministeriö, 2016, p.30). They point out that Grubb, Jahr, Neumüller and Field (2005, p.27) in their review on equity in education in Finland for the OECD brought up the fact that there are preparatory classes for university entrance exams that cost money and therefore unequally favour applicants from higher-income families (Grubb, et al., 2005, p.27; Opetus- ja kulttuuriministeriö, 2016, p.30). Right now, on the preparatory courses market there are courses for the entrance exams of different higher education fields of study as well as courses aimed to prepare for the Finnish matriculation examination. MEC suggests that shifting the admissions process focus away from entrance exams and towards the Finnish secondary education system and more specifically the Finnish matriculation examination certificate could be better for equality amongst applicants (Opetus- ja kulttuuriministeriö, 2016, p.55). On the other hand, Jokila, Haltia, Kosunen, Zhang and Christensen (2021, p.597) mention that the preparatory courses market could just move to an earlier stage in the education system. Ahola, Asplund and Vanhala (2017, p.4) agree that the increase of focus on the matriculation examination certificate would not eliminate preparatory measures, but rather move them from preparing for an entrance exam to preparing for the matriculation examination. Ahola, Asplund and Vanhala (2017, p. 4) also argue that this could lead to students taking longer to graduate and lead to an increase in

inequality amongst students. If students were to start partaking in costly preparatory courses for the matriculation examination in hopes of securing a spot in higher education, this could increase the role of financial status in the admissions process. To give an idea of the price of a preparatory course in the field of economics and business administration, in 2017 the average price was 945€ (Jokila et al., 2021, p.606). According to the Eurostudent questionnaire published by MEC (Potila, Moisio, Ahti-Miettinen, Pyy-Martikainen & Virtanen, 2017, p.31) 41% of economics and business administration student took part in a preparatory course before their admission into university. It should be mentioned though that in 2017 the entrance exam was not yet based on specific Finnish general upper secondary school courses.

Looking at the admissions process from the angle of equality amongst applicants there are additional potential concerns with increasing the role of secondary education in the admissions process into higher education. Al-Hattami (2014, p.278) talks about how in Yemen many higher education institutions make admissions decisions based on the grade point average (GPA) of centralised tests given by the Yemeni Ministry of Education to 12th grade students. According to Al-Hattami (2014, p.278) this has been criticised for creating inequality due to it leading to some teachers not teaching the students the full curriculum but instead solely preparing them for the tests. If the focus of higher education admissions keeps shifting more toward the Finnish secondary education system and particularly the Finnish matriculation examination certificate this could potentially be seen as a risk. Another concern that could be taken into consideration when arguing for the increase of importance of the Finnish matriculation examination certificate to increase equality in admissions processes is its effect on vocational secondary school students. MEC does mention that in light of the Finnish matriculation examination certificates importance being increased other paths, so called secondary paths, into higher education need to be further developed as to not close the doors for people from avenues other than the Finnish general upper secondary school (Opetus- ja kulttuuriministeriö, 2016, p.11). Ahola, Asplund and Vanhala (2017 p.5) do comment on the fact that MEC does not really specify how it will be made sure that these doors are not closed. Haltia, Isopahkala-Bouret and Jauhiainen (2022) found that students with a vocational education background that have not completed the matriculation examination are a clear minority in Finnish higher education and especially in universities.

Lastly the financial aspects of the increased importance of secondary education in the admissions process are looked at. It is written in the Finnish Universities Act that entrance examinations that are used in the admissions process, with some exceptions, have to be free of charge (Yliopistolaki 558/2009, 2009). It could be argued that this could lessen the role of financial status in who can apply to get into higher education. The Finnish matriculation examination however is not entirely free of charge and its increased use in the admissions process could increase the role of financial inequality in the admissions process. In 2021 an extension to compulsory education was implemented raising the minimum school leaving age to 18 years old leading to students in the scope of extended compulsory education being entitled to receive their education free of charge (Opetus- ja Kulttuuriministeriö, 2023g). Students presented in the data of this study are not in the scope of extended compulsory education. Students outside of the scope of extended compulsory education have to pay for the Finnish matriculation examination, with each matriculation examination test and test retake costing the student separately (Ylioppilastutkintolautakunta, 2023a). For students within the scope of extended compulsory education the first five matriculation examinations are free of charge, but after that they also have to pay for tests (Ylioppilastutkintolautakunta, 2023b). Once a student has passed a matriculation examination test, they can retake the test an unlimited number of times to for example try and better their result, but they have to pay for these retakes (Ylioppilastutkintolautakunta, 2023c). Additionally, if they have passed the Finnish matriculation examination, they can retake failed tests an unlimited number of times (Ylioppilastutkintolautakunta, 2023c). If the student has not yet passed the Finnish matriculation examination and fails a matriculation examination test the number of retakes is limited to three times within the immediately following three times the test is held (Ylioppilastutkintolautakunta, 2023c). If the student is in the scope of extended compulsory education and fails a matriculation examination test that they are taking free of charge, they can retake it free of charge unless they failed due to not showing up to the test, not handing in the test or for cheating or due to causing a disturbance at the test (Ylioppilastutkintolautakunta, 2023b). This means that the extended compulsory education has partially made the Finnish matriculation examination free of charge, but additional tests outside of the first five as well as retakes are not free of charge.

2.1.3 University funding

In Finland the primary source of funding for higher education institutes, including universities, is MEC (Opetus- ja Kulttuuriministeriö, 2023a). In the mid-1990s, according to Jalava (2013, p.86), instead of earmarking funds for specific use for the university, MEC started steering universities into the desired direction using contracts that would determine the amount of funding that the university would get based on whether or not the goals outlined in the contract were met. In present time MEC makes a contract with each university individually with the length of the contract being four years at a time. Within this contract MEC and each university set goals for the university that impact the core funding that they will receive from MEC. The current contract is valid from 2021 to 2024 and the contracts for each university for this and two previous four-year periods are publicly available on MEC's website. (Opetus- ja Kulttuuriministeriö, 2023b) The way that the core funding provided by MEC to universities is dependent on the goals set is explained in the universities core funding model that is also publicly available on MEC's website. The goals in the core funding model are divided into three, where education related goals hold 42% of the core funding, research related goals hold 34% and other education and science policy considerations hold 24% of the core funding (Table 1). (Opetus- ja Kulttuuriministeriö, 2021) Of these three the education related goals, which are the requirement behind the largest portion of the funding, are of most interest in this thesis. The funding criteria have been further split into subsections within the section of education. Of the funding that MEC provides to universities based on education related goals, 30% is tied to meeting the goals set for the number of bachelor's and master's degrees awarded at the university (Table 1) (Opetus- ja Kulttuuriministeriö, 2021).

Table 1. LUT University's core funding model comparison (Opetus- ja Kulttuuriministeriö, 2017; Opetus- ja Kulttuuriministeriö, 2021)

	Percentage of funding based on Education	Percentage of funding based on Research	Percentage of funding based on other policy considerations	Percentage of funding based on Number of degrees
Core funding model 2017-2020	39%	33%	28%	19%
Core funding model 2021-2024	42%	34%	24%	30%

In the context of this thesis the previous contract between LUT University and MEC and the previous funding model, both valid from 2017 to 2020, are also relevant as the data used in this thesis is collected from 2018 to 2021. Like the current funding model, the previous funding model from 2017 to 2020 is also divided into three sections: education 39%, research 33%, and other education and science consideration policies 28% (Table 1) (Opetus- ja Kulttuuriministeriö, 2017). The education portion, the largest of the three in this funding model, is the most relevant to this thesis. In the funding models it can be seen that the portion of funding being tied to the degrees that a university is able to produce has increased from this previous model to the current model. The percentage of funding tied to bachelor's degrees nearly doubled from 6% in 2017 to 11% in 2021 and the percentage of funding being tied to master's degrees went from being 13% in 2017 to 19% in 2021. (Opetus- ja Kulttuuriministeriö, 2017; Opetus- ja Kulttuuriministeriö, 2021) The bigger difference between these two funding models is the introduction of coefficients into the funding tied to degrees produced by universities. In the current universities core funding model that has been in use since 2021 the funding tied to degrees produced by a university has coefficients related to graduation times, multiple similar degrees, and fields of education (Opetus- ja Kulttuuriministeriö, 2021). This means that a university could have an increased interest in selecting and admitting students to their programmes that not only successfully graduate with a degree but do so in a timely manner as the university could possibly gain from it financially. The universities core funding model from 2021 provided by MEC does not specifically go into how large these coefficients are or what for example a student's graduation time would need to be to qualify for the coefficient or if a shorter graduation time than the target time set by the Universities Act 558/2009 would lead to a

bigger coefficient. Since the change in Finnish Universities' legal status in 2009, with them becoming either independent legal entities or private foundations (Ahola et al., 2014, p.33; Jalava, 2013, p.88), they are encouraged to seek additional funding outside of the base funding from MEC (Jalava, 2013, p.88). With the change in legal status comes an increased need for universities to care about their financing as a university can now technically go bankrupt (Jalava, 2013, p.88).

2.1.4 Paths into LUT University for economics and business administration

There are different ways to gain a student place and right to study and become a degree student in the LUT university economics and business administration programme. The admissions paths can be divided into three categories: the joint admissions paths through opintopolku.fi, the open university paths and the transfer student path.

In the joint admissions process through opintopolku.fi, LUT University takes part in one, the spring admissions process, of the two available admissions processes a year (LUT University, 2023c). Applying through the joint admissions process is the most traditional path into a university (LUT University, 2023c). At the time of data collection, all bachelor's degree programmes in the field of economics and business administration at LUT University were offered in Finnish which means that they all take part in the same joint admissions process held in spring. As a result, all students aiming for a student place and a right to study in the economics and business administration programme will have to take part in this once yearly joint admissions process if this is the path they wish to gain admission through. (LUT University, 2023c) The joint admissions paths can be divided further into two admissions paths with 60% of the admitted students being chosen based on their Finnish matriculation examination certificate (the certificate choice path) and 40% being chosen based on the entrance exam (the entrance exam path) (LUT University, 2023b). All students admitted through the certificate choice path have to qualify to be in the first-timers quota, otherwise you can only be admitted through the entrance exam path when looking at gaining admission through the joint admissions process (LUT University, 2023b). The size of the first-timers quota in all programmes at LUT University is at least 70%, which means that a part of the entrance exam choices will also need to be first-timers

(LUT University, 2023a). If an applicant is offered admission at a lower preference study right through the certificate choice path, they can try to gain admissions to a higher preference study right by participating in the entrance exam (Kauppatieteellinen ala: yhteisvalinta, 2023b).

The second set of paths into LUT University is through The Open University of LUT University. Studying at the Open University of LUT University offers a secondary set of admissions paths when looking to study economics and business administration at LUT University. To take a closer look at how studying at The Open University of LUT University or other open universities can become a path into LUT University, the three open university paths need to be introduced. The first one being the open university studies path, the second the summer university path and the third being the LUT Highway path. First the open university studies path will be introduced. At The Open University of LUT University courses are available for anyone to enrol in regardless of education background (LUT University, 2023h). There are however a limited number of available spots in each course for open university students (LUT University, 2023e). Studying at The Open University of LUT University becomes an admissions path, the open university studies path, when the student decides to apply to become a degree student after fulfilling the necessary requirements to apply. To be eligible to apply for a student place as a degree student through the open university studies path there is a set of requirements that must be satisfied. Firstly, one must successfully complete 60 European Credit Transfer and Accumulation System (ECTS) credits worth of courses from a provided list of courses with a weighted GPA of at least 3.00 (on a scale from 1 to 5) and some specifications on what courses or course types are mandatory have to also be satisfied. If the applicant has a Bachelor of Science in Economics and Business Administration degree that has been done less than 5 years ago, they can get credit for some of the courses but still need to fulfil the 60 ECTS credit requirement by completing other relevant courses. Lastly the rest of the completed studies have to also be suitable for the degree in economics and business administration. (LUT University, 2023f) In addition it needs to be taken into consideration that the ECTS credits cannot have been obtained more than five years ago, the courses cannot be already a part of another degree, the courses cannot have been done while having a right to study as a degree student at the university, one cannot apply through the open university studies path if they already have a right to study as a degree student at any university, the studies necessary for the open university studies path must be at student

services at a specific time and one must have proficient enough linguistic skills to be able to study in the applicable language (LUT University, 2023f). Once these requirements are fulfilled you can apply for a student place as a degree student at LUT University during the application period for open university paths that is offered once a year (LUT University, 2023f). Through the open university studies path, a student place is not necessarily guaranteed even if the applicant satisfies the requirements and applies, but LUT University (2023f) does state that mainly all applicants that satisfy the requirements are admitted. In case all applicants cannot be admitted they are ranked according to their success in their studies and the relevance of the courses for the degree programme that they are applying for (LUT University, 2023f). In addition, LUT University (2023f) does mention that they prioritise applicants that have completed the required courses at the Open University of LUT University. The way that open university courses are mostly offered at LUT University is that a portion of study places on bachelor's level courses are taken aside for open university students (LUT University, 2023d). Unlike courses for degree students, open university studies are not free of charge. Students enrol to open university courses through the LUT online shop where the study places on these courses will be given out in order of enrolment. (LUT University, 2023e) The cost of open university studies is based on the number of ECTS credits that the course that one enrolled in offers (LUT University, 2022a; LUT University, 2023e). Each course at LUT University costs 15€ per ECTS credit, which is the maximum allowed cost per ECTS credit (LUT University, 2023e; Opetus- ja Kulttuuriministeriö, 2023c). Some of the benefits of the open university studies path as an admissions path are that you can do the courses at your own convenience, with the limitation of when the courses are offered, and can become a degree student with a student place at the university at the end of the path. The total cost of the open university studies path at LUT University (2023e;2023f) is at least 900€ to fulfil the requirements. In addition, although likely the admission to become a degree student with a student place at LUT University (2023f) is not guaranteed at the end of the path even if the requirements are met.

The second open university path into becoming a degree student with a student place at LUT University is through summer university. LUT University has a summer university path in cooperation with Etelä-Karjalan kesäyliopisto (The summer university of South Karelia) and Päijät-Hämeen kesäyliopisto (the summer university of Päijät-Häme) (LUT University, 2022b; LUT University, 2023g). Summer universities offer higher education

courses that are available for anyone, and the courses have to be paid for similarly to open university courses (Opintopolku, 2023). Although similar, there are some distinct differences between the open university studies path and the summer university path. One of these differences is that unlike the open university studies path, the summer university path has a time limit for the completion of courses (Etelä-Karjalan kesäyliopisto, 2022). In the currently ongoing summer university path students have to complete the required 60 ECTS credits with a weighted GPA of at least 3.00 (on a scale from 1 to 5) by participating in the courses provided by the summer universities within the time frame of September 2022 to May 2024 to be able to apply for a student place as a degree student at LUT University using the application period for open university paths that is offered once a year. (Etelä-Karjalan kesäyliopisto, 2022) Another notable difference between the open university studies path and the summer university path is who the path is targeted for. In the open university studies path the courses are the same courses that degree students participate in, meaning that lectures and exams can be during the working day, whereas the courses in the summer university path are more so intended to be doable in addition to for example fulltime employment as they are more focused on evenings and weekends in the wintertime and otherwise available more as intensive courses in the summertime (Opintopolku, 2023). The courses in the summer university path are also mostly online (Opintopolku, 2023). There is also a price difference in the two paths as the cost for 60 ECTS credits in summer university is 1950€ (Etelä-Karjalan kesäyliopisto, 2022). Furthermore, unlike in the open university studies path, the summer university path has a capacity for how many students get into the path and another capacity for how many students can gain a student place and a right to study as a degree student after successfully completing the requirements to apply for a student place through the open university paths application process (Etelä-Karjalan kesäyliopisto, 2022). For one application period where you can apply for the summer university path that gives you a study right for two academic years in the summer university in total a maximum of 60 students will be admitted to the path, with a maximum of 30 students being admitted to Etelä-Karjalan Kesäyliopisto and another maximum of 30 students being admitted to Päijät-Hämeen Kesäyliopisto. Out of these 60 students only 30 in total can get a student place and right to study as a degree student at LUT University at the end of this path (Etelä-Karjalan kesäyliopisto, 2022). This means that if out of the total pool of 60 students more than 30 are able to successfully complete 60 ECTS credits worth of courses with a weighted GPA of at least 3.00 within

the time limit of two academic years, only the 30 students with the highest weighted GPA will gain a student place as a degree student at LUT University (Etelä-Karjalan kesäyliopisto, 2022).

The third and final open university path discussed in this thesis is the LUT Highway path. The LUT Highway path was created in 2018 as an alternative path and second chance for applicants who were rejected by the entrance exam (Tolpo, 2018). Applicants that had applied to LUT University to study but were not offered a student place as a degree student based on the entrance exam due to not meeting the admission threshold were contacted via email and offered LUT Highway as an alternative second chance path that in 2018 had study spots for 40 students available in the field of economics and business administration (Tolpo, 2018). This was organised in a way where the first 40 applicants to enrol got admitted to the path (Tolpo, 2018). In its first year LUT Highway was free of charge for the students that managed to enrol (Tolpo, 2018). Since the creation of the LUT Highway path there have been some changes to the concept, with the basic idea of the path remaining the same. The idea is that the LUT Highway path is a more effective version of the traditional open university studies path (Tolpo, 2018). LUT Highway students have one academic year to fulfil the required criteria and after the academic year they can apply for a student place as a degree student through the open university admissions process (LUT University, 2023i). Unlike in the open university studies path as long as the criteria is fulfilled, students that apply through LUT Highway are guaranteed a student place as a degree student at LUT University at the end of the path (LUT University, 2023f) starting their studies as degree students at the beginning of the next academic year (LUT University, 2023i). The criteria for the LUT Highway path at this time are the same as for the open university path, meaning one would have to complete 60 ECTS credits worth of courses, with some specifications to which courses are mandatory and at the end of the year have a minimum weighted GPA set by the programme (LUT University, 2023c; (LUT University, 2023i). In 2023 the weighted GPA threshold for being able to apply for a student place as a degree student at the end of the LUT Highway path was 3.00 for the field of economics and business administration (LUT University, 2023c). All additional specifications about the application criteria that hold true for the open university studies path also holds true for the LUT Highway path as LUT Highway is technically an open university path just with slight modifications and additional criteria. Some of the key differences between the LUT Highway path and the open university studies path are the

time limitations set for the paths, the costs of the paths and how to get enrolled in the paths. For the open university studies path there is no set schedule other than the limitations set for the application requirements, the cost of the open university studies path depends on the number of ECTS credits that are acquired during the path, with a minimum cost of 900€ if applying for a student place as a degree student in the field of economics and business administration, and anyone is able to start studying through the open university studies path but a student spot as a degree student is not guaranteed at the end of the path even with enrolment criteria being fulfilled (LUT University, 2023e; LUT University, 2023f). LUT Highway has a time limit of one academic year, the enrolled students have to participate in the orientation week at LUT University at the beginning of the academic year and after that study fulltime along with the degree students to gain the ability to apply for a student place as a degree student at the end of the path during the open university application process (LUT University, 2023i). When the LUT Highway path was first established it was free of charge for the students that managed to enrol (Tolpo, 2018). Since then, the LUT Highway path has changed from being free of charge to implementing a study pass that costs 100€ per semester, which means that the study pass costs 200€ for the full academic year with the price of the path not being tied to the number of ECTS credits a student completes, but students still needing at least 60 ECTS credits to be able to apply for a student place as a degree student in the field of economics and business administration at the end of the path (LUT University, 2023i). LUT University (2023c) does mention though that the price for the LUT Highway path in the academic year 2023-2024 has not been confirmed yet, which means that there is a chance for this price to change. The cost was added to the path to encourage someone to only accept enrolment in the path if they are committed to work on it as to not take a spot away from someone that has a higher motivation but was not offered admission due to the path having a limited number of available starting spots in a year (Lappeenrannan uutiset, 2019). When the LUT Highway path was first introduced there were 40 starting spots in the path for applicants aiming for a student place as a degree student in the field of economics and business administration (Tolpo, 2018). For the academic year 2023-2024 the number of spots in the LUT Highway path that LUT University offers in the field of economics and business administration has dropped to 30 (LUT University, 2023i). Another change to the LUT Highway path since its establishing in 2018 is the enrolment method. In 2018 the applicants that had been rejected from the entrance exam path were contacted via email to

offer a second chance through LUT Highway, with the 40 spots offered being filled within hours (Tolpo, 2018). Since then, LUT University has opted for an enrolment period in which the interested parties can apply and at the end of which the spots in the LUT Highway path for the more popular fields of study, which include the field of economics and business administration, being raffled off between applicants (LUT University, 2023i) and there is no more mention about the students having to have tried to gain admission through the entrance exam to be able to apply for the LUT Highway path. At least one of the reasons behind this decision to alter the enrolment process in this way is to increase equality, so that outside factors, for example internet speed, would not play a role in who can get a spot in the LUT Highway path (LUT University, 2019). The enrolment period for LUT Highway is offered at the earliest in July after the results of the joint admissions paths are out (LUT University, 2023c), which could be seen as LUT Highway being more of a second chance path rather than being intended to be the primary path into university. To be eligible to apply for the LUT Highway path one cannot have an active right to study or student place at any university and in addition cannot have a previous higher education degree (LUT University, 2022b). There is also only one chance to gain admission through the LUT Highway path, meaning you can only apply to the LUT Highway path if you have not previously taken part in the LUT Highway path (LUT University, 2023i).

Even though the LUT Highway path as an admissions path is not commonly offered as an admissions path type, it is also no longer completely unique. The University of Vaasa first offered Vaasa Gateway as an admissions path option in the academic year 2019-2020 (University of Vaasa, 2019; University of Vaasa, 2021). There are many commonalities between LUT Highway and Vaasa Gateway. For example, Vaasa Gateway also has an enrolment period during which it is possible to apply to the path and after which the limited starting spots (which in the academic year 2022-2023 were limited to 30) will be raffled off between applicants (University of Vaasa, 2022). In addition, similarly to LUT Highway, Vaasa Gateway has limitations on who can apply, which is people who do not have a previous higher education degree, also do not have a student place and right to study at any institution of higher education and have not previously taken part in the Vaasa Gateway path (University of Vaasa, 2022). Although similar, there are some differences that can be found when comparing LUT Highway and Vaasa Gateway. For instance the price of Vaasa Gateway is 600€ for the 60 ECTS credits that everyone does during the academic year in the Vaasa Gateway path, compared to the price of the study pass for one

academic year for LUT Highway being 200€ (LUT University, 2023i; University of Vaasa, 2022). Also, Vaasa Gateway students study a fixed set of courses worth 60 ECTS credits during the path with no studies being replaced or previous studies being recognised (University of Vaasa, 2022).

The open university paths all have the minimum requirement of 60 ECTS credits to be eligible to apply to become a degree student through these paths. Isopahkala-Bouret, et al. (2018, p.147) mention that the ECTS credits the students have completed during their path studies count toward their degree once they become degree students. This means that students coming through the open university paths become degree students with about a third of their bachelor's degree already completed at the start of their study right.

The last path into LUT University to study economics and business administration that will be discussed here is the transfer student path. The transfer student path is mainly meant for students transferring from other universities into LUT University (LUT University, 2023j). At LUT University the transfer student path is also used for students that want to transfer within the university from the field of engineering to the field of economics and business administration or vice versa (LUT University, 2023j). Transfer students apply through opintopolku.fi in a nationwide transfer application process that is held yearly in May and is open for about two weeks (LUT University, 2021; LUT University, 2023j). The transfer student path is a very narrow path with only five students being admitted to the field of economics and business administration each year through it (LUT University, 2023j). To apply through the transfer student path, a student has to have attained at least 60 ECTS credits that are relevant to the programme that they are applying for, with at least 54 ECTS credits out of the 60 ECTS credits being suited for the core and subject studies of the programme (LUT University, 2023k). The applying student must have also attained at least 60 ECTS credits in the academic year prior to the application process and their weighted GPA for all of their studies must be at least 3.00 (LUT University, 2023k). In addition, the student's remaining right to study must be seen as an adequate amount of time to complete the bachelor's and master's degree. Lastly, as a part of the application process the student must provide a motivation letter to explain why they are looking to transfer (LUT University, 2023k). In case there are more than five applicants that satisfy the requirements, the applicants will be ranked based on points that are given to them for the motivation letter and for prior success in studies (LUT University, 2023k). Once a student

is accepted through the transfer student path and gains a right to study and a student place as a degree student at LUT University for economics and business administration, their prior right to study and student place elsewhere, based on which they applied for a transfer, ceases to exist (LUT University, 2021).

2.1.5 Student financial aid and financial inequality

When it comes to equal access to higher education for all applicants, the role of financial inequality among admissions paths is considered. This includes the differences among admissions paths for when students entering through the different admissions paths qualify for student financial aid. In this chapter student financial aid available to Finnish students will be discussed as it pertains to higher education students. In Finland MEC oversees the student financial aid system and its development (Opetus- ja Kulttuuriministeriö , 2023d). The execution of the student financial aid system is done by Kansaneläkelaitos (the Social Insurance Institution of Finland, Kela) in cooperation with the education providers (Opetus- ja Kulttuuriministeriö, 2023d). Who can receive student financial aid and what the student financial aid comprises of is regulated in the Act of Student Financial Aid (Opintotukilaki) (Opetus- ja Kulttuuriministeriö, 2023e). Student financial aid is mainly available for Finnish citizens (Opetus- ja Kulttuuriministeriö, 2023f). Studies that qualify a student for student financial aid include but are not limited to a higher or lower university degree (Opintotukilaki 65/1994, 1994). There are many stipulations for getting student financial aid, but the main criteria to qualify for student financial aid as a Finnish higher education student can be divided into three categories. These three stipulations are, that the student needs to be a fulltime student, the studies have to progress, and there has to be a need for financial aid (Opetus- ja Kulttuuriministeriö, 2023d). According to the Act of Student Financial Aid a student's studies are considered fulltime when the aim of the higher education studies is to complete a higher education degree with the additional mention that otherwise higher education studies are considered fulltime if on average a minimum of 5 ECTS credits per study month are attained (Opintotukilaki 65/1994, 1994). Studies are seen as progressing sufficiently when the time used for the studies will not in a substantial amount go over the time the aid is planned for (Opintotukilaki 65/1994, 1994). The progression of the studies is being looked at throughout the studies and a student can lose their right to the study grant and the government guarantee for a student loan if the

studies do not progress in a sufficient manner unless the student has an acceptable reason for the studies not progressing in a sufficient manner in which case they may still be entitled to the aid (Opintotukilaki 65/1994, 1994). In evaluating the need for student financial aid in the case of higher education students only the student's own finances are taken into consideration and there are limits to the amount of income a student is allowed to have to still be eligible for student financial aid (Opintotukilaki 65/1994, 1994). A higher education student's parents' financial situation can only increase the amount of aid a student is eligible for in the case of the smaller study grants (Kela, 2023a). For a university student the financial aid system consists of the study grant, a government guarantee for a student loan, student loan compensation and meal subsidies (Opetus- ja Kulttuuriministeriö , 2023d; Opetus- ja Kulttuuriministeriö, 2023f). The study grant is a set amount of money, that is determined by for example the students age and living situation, that a student gets for each study month (Kela, 2023a). A student eligible for a study grant from Kela is also eligible for a government guarantee for a student loan that the student applies for at a bank of their choice, which means that the student does not need any other securities for the student loan (Kela, 2023b). The amount of the student loan guarantee is set, and in the case of a university student studying in Finland it is 650€ per month (Kela, 2023c). As a part of the student financial aid system the government subsidises student's meals at student restaurants to keep the cost low (Opetus- ja Kulttuuriministeriö , 2023d). The final part of the student financial aid system examined in this thesis is the student loan compensation. If a student graduates with a higher education degree within the target time set by the Act of Student Financial Aid, the student can be eligible for a student loan compensation (Kela, 2023e). Kela will pay for 40% of the student loan that exceeds 2 500€ but is under the maximum amount of student loan eligible for compensation, which for a degree programme of 300 ECTS credits is 18 000€, meaning the maximum student loan compensation, that Kela will pay for, in this case is 6 200€ (Kela, 2023f). Finnish university students can also be eligible for other forms of financial aid from Kela such as general housing allowance (Kela, 2023d). In addition to the student financial aid and other forms of financial aid from Kela, degree students that are registered as attending can also get a studentcard which gives them access to a lot of discounts for example in stores, restaurants and for train tickets (LUT University, 2023m).

With free education being closely related to equal opportunities (Ahola et al., 2014) the differences in financial aid that the different paths entitle a student to is something that

should be taken into consideration when evaluating the admissions system. Getting admitted through the joint admissions paths means that a student has a student place with a right to study as a degree student, which entitles them to be a part of the student financial aid system. On the other hand, the students gaining admissions through open university paths are not entitled to student financial aid while they are in the path before they get admitted as degree students (LUT University, 2023h; LUT University, 2023i). This means, that students coming through the open university paths have to pay for their courses during the path, with the amount depending on the path, and need to find other ways to financially support themselves throughout their path studies. Once they gain a student place and a right to study as a degree student, they can be eligible for student financial aid. Although open university paths offer an alternative way to enter a university, they do not necessarily offer an equal opportunity to admission. The financial burden that open university paths present could be seen unfairly favouring applicants from a more affluent background.

3 Literature review

In this chapter there will be an argument made for why the topics of predicting a student's success and evaluating admissions processes are relevant and who all benefits from making correct admissions decisions. There will also be a subchapter about previous studies on the topic of predicting success and evaluating admissions processes including discussion about the different definitions of success in previous studies and the different approaches taken to predicting success. The last subchapter will discuss the new perspectives this thesis can offer the topic.

3.1 Why predicting success and the admissions process matter

Wambugu and Emeke (2013, p.1) say that the quality of a university's graduates determines its worth. In the context of Finnish higher education there are many reasons for the different parties involved in the admissions process to be interested in finding out how to identify and admit the best students from a pool of applicants. This includes the Finnish government through MEC who sets rules and goals for the admissions process, the Finnish universities that execute the admissions process and the individuals applying and being admitted to the universities, all of which could benefit from an admissions process that leads to a successful student choice. In a way the admissions process could be looked at as an attempt to predict which students from the applicant pool would be most successful in their studies and giving them a student place. One reason for why a university could be interested in using student success prediction in their admissions process is presented by Stoklasa, Talášek and Viktorová (2020, p.215) who bring up the need for universities to choose their students correctly from the start, as otherwise their decision could lead to the universities' resources being wasted. In addition to this, Stoklasa, Talášek and Viktorová (2020, p.216) point out that a wrongly chosen student that is unsuccessful in their studies not only wastes the universities' resources, but also takes away the student place from other applicants that could have been successful in their studies had they been chosen to be admitted. This is important, because in Finland admission into higher education are numerus clausus, meaning that there is a limited number of student places available in the

admissions process (Ahola et al., 2014, p. 36; Isopahkala-Bouret, 2019, p.3). Therefore, the admissions process is a zero-sum game, with one applicant gaining a student place meaning another will not.

It also needs to be noted that a Finnish university's main source of funding is MEC and that a portion of that funding is based on the amount of degrees that a university can produce (Opetus- ja Kulttuuriministeriö, 2017; Opetus- ja Kulttuuriministeriö, 2021; Opetus- ja Kulttuuriministeriö, 2023a). It could be argued that a portion of the funding provided to a university by the main source of funding is based on making good choices in the admissions process. This can be seen as a motive for both the universities and MEC to have interest in an optimal admissions process. Another reason for the universities and MEC to be interested in admitting the most likely successful students is the combination of the focus that MEC has shifted towards making transitions from secondary education to higher education faster (Opetus- ja kulttuuriministeriö, 2016) and the concept of matriculation backlog (Ahola et al., 2014, p.37). Ahola et al. (2014, p.37) describe matriculation backlog as a phenomenon where each year there are more applicants than last year due to the fact that simultaneously there are more applicants than there are student places available leading to some of this year's applicants to apply again next year and new applicants become eligible to apply each year leading to a growing pool of applicants. With MEC wanting faster transitions and a part of universities main source of funding being attached to the successful admission of students that will graduate with a higher education degree in time (Opetus- ja kulttuuriministeriö, 2016; Opetus- ja Kulttuuriministeriö, 2017; Opetus- ja Kulttuuriministeriö, 2021; Opetus- ja Kulttuuriministeriö, 2023a) the matriculation backlog presents an ever growing pool of applicants from which to make admissions decisions.

From the viewpoint of the student, Stoklasa, Talášek and Viktorová (2020, p.215) argue that a university being able to correctly choose a student for a student place that they are suitable for is in the student's best interest. In the context of the Finnish higher education system the use of the first-timers quota increases the value of a student's first-timer status as the quota could make it harder for a student that has lost their first-timer status to gain a different or new student place. Due to the value of the first-timer status it could be seen as beneficial for a student that they do not gain a student place and right to study that they cannot successfully turn into a higher education degree. As a result, it could be argued that

the correct prediction of a student's success in the admissions process and therefore a correct denial of student place could also be for the benefit of the student.

With the role of the Finnish matriculation examination growing in the higher education admissions process it should be evaluated if it is a good predictor of success. As the admissions process shifts weight to the Finnish matriculation examination, it also shifts weight to a young person's decision-making process regarding secondary education. These decisions range from before getting into secondary education, with the question of whether to go the vocational route or the general upper secondary school route, to being in secondary education when students choose what subjects to study at general upper secondary school. As a part of the proposed changes in 2016 MEC has argued that changes to the admissions process should be implemented slow enough for Finnish general upper secondary school students to know what admissions criteria universities are using when they graduate from secondary school so that students can make choices in school accordingly (Opetus- ja kulttuuriministeriö, 2016, p.11).

The admissions process and entrance exam went through significant changes in 2018. According to Ahola and Spoof (2019, pp.1-2) some of the changes made to the admissions process are that the number of students being admitted based on the Finnish matriculation examination was increased to 60% and overall point selection (yhteispistevalinta) was removed from the joint admissions path. Before 2018 the joint admissions paths consisted of three different ways a student could be admitted. The first being selected based on the Finnish matriculation examination certificate, the second being based on the entrance exam and the third being based on the combined points scored in the entrance exam and from the Finnish matriculation examination certificate together. Ahola and Spoof (2019, p.1) also mention that in 2018 the entrance exam was changed to being based on Finnish general upper secondary school courses. Whereas before this change it was based on separate entrance exam materials chosen yearly. This is another example of the role of general upper secondary school growing in the admissions process into higher education. With the admissions process undergoing such significant changes fairly recently and with the joint admissions paths still being the main path into higher education it could be in the best interest of both the universities and MEC to care about if the joint admissions paths work as intended.

Haltia (2015, p.262) talks about students coming through the open university path having proven to be motivated and capable by pursuing the open university path and getting into university through it. This would mean that the joint admissions paths have possibly missed out on these motivated and capable students and that alternative paths, such as the open university paths, serve a purpose. Cimetta, D'Agostino and Levin (2010, p.11) speculate that having to only focus on one set of exams that a student needs to graduate secondary education, instead of additionally partaking in a separate entrance exam could be a welcome change from the point of view of the student. As students have to partake in coursework and the matriculation examination in order to graduate Finnish general upper secondary school, using these efforts in the admissions process could be seen as a way to make the admissions process easier on the applicants.

Most studies done on higher education admissions processes and students' success are done using data that is collected from higher education institutes. In general, there is one issue that most data used in studies on this topic have in common, which is survivorship bias. Survivorship bias is a selection bias where false conclusions can be drawn from data due to the data not taking into account cases that did not survive a selection process and only being based on cases that survived a selection process or elimination process (Elston, 2021, p.1; Lindwell, Holden & Butler, 2023, p.98). As students go through an admission process to enter higher education and with the selection process being numerus clausus (Ahola et al., 2014, p.36; Isopahkala-Bouret, 2019, p.3) there are always students that wanted to get into higher education, but were not selected to be admitted and are now not represented in the data that is being used to assess admissions processes or predict students' performance in higher education. This means that studies done on the effectiveness or performance of an admissions process are skewed from the start due to survivorship bias. There is no way of knowing how these candidates that were not admitted to higher education would have done in their studies because the necessary data for these candidates does not exist as they have been denied the opportunity to partake in the studies. In Finland the open university paths could be seen as a possibility to reduce the issue of survivorship bias in data, but the path is comparatively narrow and not very unified. This is where LUT University offers an opportunity to reduce the issue of survivorship bias in data related to studying the admissions process. In its first year of existence the LUT Highway path consisted purely of students that were rejected by the entrance exam path but that were given a second chance (Tolpo, 2018). Since then, it represents students who did not

enter higher education through the main admissions path, in this case the joint admission path, and offers uniform open university path data that can be compared to the primary admissions paths. The key difference between the open university studies path and the LUT Highway path is that LUT Highway students have the same set curriculum that first-year degree students have which gives us the opportunity to have comparable data from students that the admission process chose to admit and from students that were not admitted through it. This means that there is an opportunity to take a critical look at the admissions process with data that is not inherently skewed by survivorship bias.

3.2 Previous studies on admissions process and criterion evaluation

This subchapter will focus on previous studies on the topic of success prediction and evaluation of admissions processes in higher education. Interest in predicting performance and evaluating admissions processes is not new as for example Zwick (2013) points out that in 1939 Theodore Sarbin had done a study comparing higher education performance predictions made using regression to ones made by counsellors (Sarbin, 1943). It can also be seen that the interest in the subject has not disappeared as for example Wittman (2022) published a study in 2022 suggesting that GPA is not the best predictor to use in a university's admission process. Though many of the previous studies on the subject are based in the United States of America (e.g., Cimetta, D'Agostino & Levin, 2010; Koretz, Yu, Mbekeani, Langi, Dhaliwal & Braslow, 2016; Rothstein, 2004) there is also international interest around the topic (e.g., Al-Hattami, 2014; Hu, Li, & Gan, 2014; Stoklasa, Talášek & Viktorová, 2020).

3.2.1 Different approaches to admissions process evaluation

There are many ways to approach the subjects of predicting higher education performance and evaluating admissions processes. For example, we can look at the different variables higher education institutions use to predict students' success and thereby base admissions decisions on. Among the most commonly used variables in previous studies are entrance exam scores (e.g., Bridgeman, McCamley-Jenkins & Ervin, 2000; Kuncel, Credé & Thomas, 2007; Verostek, Miller & Zwickl, 2021; Zwick, 2013) and a student's prior

grades or GPA (e.g., Al-Hattami, 2014; Sawyer, 2013; Schewach, Shen, Sackett & Kuncel, 2017). Studies using entrance exams scores as a variable can be further split into studies using SAT scores (e.g., Cohn et al., 2004; Kobrin & Patterson, 2011; Rothstein, 2004; Zwick & Sklar, 2005) and other entrance exam scores (e.g., Aburas & Nurunnabi, 2019; Hu, Li, & Gan, 2014; Koretz et al., 2016; Loucopoulos, Gutierrez & Hofler, 2007). Though some studies only look at one variable (e.g., Bridgeman, McCamley-Jenkins & Ervin, 2000; Rothstein, 2004; Setiawan & Margono, 2015), most tend to use at least two of the variables mentioned (e.g., Martin, Montgomery & Saphian, 2006; Schewach et al., 2017).

Using the SAT as a predictor is of interest in this thesis, because it is a well-researched admissions criterion and a better comparison to the admissions methods used in Finland than GPA. The SAT is a standardised test broadly used for university admissions (Buchmann, Condron & Roscigno, 2010, p.435; Grodsky, Warren & Felts, 2008, p.387; Kolby, 2005, p.11, p.14) that has been researched as a predictor of higher education performance. Much like the SAT being a standardised test used for higher education admissions decisions, the Finnish matriculation examination is also standardised with the Act on the Organisation of the Matriculation Examination stating that all schools providing general upper secondary education organise matriculation examination tests simultaneously twice a year (Laki Ylioppilastutkinnosta 502/2019, 2019). Like the SAT the Finnish matriculation examination is also being used in admissions decisions, with its role in higher education admissions having increased in 2018 (Ahola & Spoof, 2019). In 2023 the majority (60%) of students admitted to the economics and business administration field at LUT University through the joint admissions paths are being admitted based on the Finnish matriculation examination certificate (LUT University, 2023b). The other 40% admitted through the joint admissions paths at LUT University are admitted based on the entrance exam which in Finland is also a standardised test with all student's applying to a degree programme in economics and business administration at any Finnish university in a given year taking the same entrance exam (Suomen Ekonomit, 2023; LUT University, 2023b). With the majority of students being admitted through the joint admissions paths the similar attributes of the SAT to both the entrance exam and the Finnish matriculation examination, it could give validity to comparisons made between them.

When looking at these different approaches taken in previous studies it should be noted that in Finland secondary education GPA is not used as an admissions criterion as the

primary admissions paths are based on the entrance exam and end of secondary education exams in the form of the matriculation examination. Though the matriculation examination is supposed to be based on all of the knowledge a student has gained throughout their secondary education, it is not an overview in the same way as secondary education GPA could be as it is still a singular set of exams. This is noted here because many of the previous studies that evaluate admissions processes are comparing secondary education GPA and SAT or entrance exam scores as admissions criteria and come to the conclusion that GPA is the best predictor of a student's grades in higher education (Zwick, 2013, p.1).

Defining success is not simple. A student being successful or an admissions decision being successful does not have a clear-cut definition that is widely agreed upon, which is why many different approaches to defining success can be found in previous studies. When looking at previous studies that predict the success of a student based on admissions criterion the variable that is being predicted can be seen as the definition of success. One of the most commonly used definitions of success that can be found in previous studies are students' grades or GPAs in higher education. First-year, or so-called freshman year GPA is a variable that many previous studies are looking to predict (e.g. Kobrin & Patterson, 2011; Koretz et al., 2016; Schewach et al., 2017). Koretz et al. (2016, p.2) call freshman year GPA the most frequently predicted variable in the literature. Zwick and Sklar (2005, p.441) talk about the use of first-year GPA as the predicted success definition as a drawback of many traditional studies on the subject of higher education admissions criteria. Zwick and Sklar (2005, p.441) recognise that the popularity of using first-year GPA as the definition of success has its reasons, like the students' curriculum being more uniform in the first year of their studies, and there being larger quantities of first-year GPA being available as students might drop out of their studies or transfer after the first year. The latter reason for its popularity also points out a limitation of using first-year GPA as the definition of success, as it does not really tell us anything about a student's long-term success in higher education (Zwick & Sklar, 2005, p.441). There are studies that have taken this into consideration by separately defining short-term success and long-term success, with first-year GPA and 4-year cumulative GPA representing the two respectively (Aburas & Nurunnabi, 2019; Al-Hattami, 2014). Long term success that is represented as GPA throughout higher education alone as the definition of success is also an approach taken by some, for example Martin, Montgomery and Saphian (2006) who used the Hogan Personality Inventory to predict students GPA throughout their four years of studies.

Though the use of grades or GPAs is popular in defining success, there are also other approaches. Completion of a higher education degree for example is another definition of success that can be found in previous studies. In addition to using first-year GPA as a success definition Zwick and Sklar (2005, p.454) also used survival analysis to predict whether or not a student would graduate, because according to them many educators find the completion of a bachelor's degree to be the ultimate success criterion in college. Here it does need to be noted, that Ahola et al. (2014, p.44) point out that in Finland the bachelor's degree is not necessarily viewed as a complete degree but more so as a stepping stone toward a master's degree.

Interest toward predicting other higher education degrees can also be found in previous studies as for example Verostek, Miller and Zwickl (2021) predict Ph.D. completion instead of bachelor's degree completion. Using the completion of a master's degree in Finland could be a better approach to defining success, but there would be limitations that need to be taken into consideration, such as difficulty in collecting complete data. Zwick & Sklar (2005, p.441) point out that studies predicting degree completion often only take into account degrees that have been completed within a fixed interval and therefore have no way of separating between students that graduated later. A solution to this could be to define success as graduating with a degree within the target graduation time set by the Universities Act (Yliopistolaki 558/2009, 2009) but this would still not take into consideration for example students that transfer to another school or programme and complete their studies there.

3.2.2 Prior findings

As much as there is variation to the approaches taken in previous studies, there is equally as much variation in their conclusions. The results of course are not necessarily comparable as the studies use different variables and different methods and making comparisons is not the goal here, but looking at the results all together does give an overall understanding about if predicting a student's performance using admissions criterion can be possible and useful in an admissions process. Some of the previous studies and prior literature have come to the conclusion that the predictors used in admissions processes are not ideal. For example, Kolby (2005, p.11) states that the SAT is only slightly better than

chance at predicting someone's success in higher education. Rothstein (2004) studies SAT scores as a predictor and argues that the SAT's predictive power is in actuality not as great as many believe, because SAT scores correlate with a student's background information, meaning if background information itself is not used in the prediction model using the SAT brings some of it into the model. There are also studies that look at SAT scores as a predictor and also take a student's background information into consideration. For example, Zwick (2013) looked into SAT scores, in addition to high school GPA, as predictors while also taking socioeconomic status (SES) into consideration and Zwick and Green (2007) looked at the relationship between SES and high school GPA and SAT scores. Schewach et al. (2017) also looked into SAT and secondary education grades as predictors but with the student's first language and race taken into consideration with the result being that for different subgroups the result of how accurate the predictors are may vary by language. Aburas and Nurunnabi (2019, p.978) found no meaningful relationship between the entrance exam in their study and students' performance in higher education.

Though there are previous studies coming to the conclusion that common admissions criteria are not ideal predictors when seeking to predict higher education performance, there are many studies that see the benefits of using entrance exams and GPA as predictors. When it comes to predicting performance in higher education Hu, Li and Gan (2014, p181) found entrance exam scores to be significant as a predictor and Cohn et al. (2004, p.585) called the SAT an important predictor. Cohn et al. (2004, p.585) did mention that though SAT is an important predictor due to its predicting power, using it as an admissions criterion affects other than white students' eligibility for scholarships. Other standardised tests have also been studied with Kuncel, Credé, and Thomas (2007, p.59) coming to the conclusion that the Graduate Management Admission Test (GMAT) is a valid predictor of performance in higher education. Kobrin and Patterson (2011) found that both high school GPA and SAT scores can be used as predictors, but that there are institution level factors that may lead to variation in the predictive power of the variables. Koretz et al. (2016, p.11) looked at the predictive power of three different admissions criteria and came to the conclusion that using secondary education GPA alone is a better predictor than using SAT or secondary education tests alone as predictors. Koretz et al. (2016, p.2) also bring up concern about differing ways that students prepare for summative secondary education exams and entrance exams possibly leading to score inflation. Koretz et al. (2016, p.2) explain that the preparation process for entrance exams is often intensive put shorter

whereas preparation for an end of secondary education summative test is often more wide-spread and this difference in preparation could lead to upward bias in scores and lessen their value as predictors.

With these varying results it can be seen that predicting higher education performance and evaluating admissions processes is not always straight forward. There are previous studies with conclusions illustrating the ambiguity of this topic. For example, Stoklasa, Talášek and Viktorová (2020) found that the entrance exam that is used in the admissions process that they studied does not necessarily predict high performance in higher education, but it does rule out low performance. Cimetta, D'Agostino and Levin (2010, p.10) found that secondary education achievement tests (the Arizona Instrument to measure Standards, AIMS) could be used in place of an entrance exam (SAT) but that it would not necessarily be a better predictor just on par with entrance exams. There are also results that show a positive correlation between predictors and higher education success but have a caveat to the results. Sawyer (2013, p.107) found that both secondary education GPA and standardised tests (American College Test, ACT) can be used as higher education predictors, but that their performance as predictors depends based on the chosen cutoff point and level of success. Also, Hammond et al. (2015, p.71) found GMAT scores and undergraduate GPA to be significant higher education success predictors, but with the caveat that the results show low r-squared values, which would indicate that there are explanatory variables that are missing from the model. Similar results were found by Wambugu and Emeke (2013, p.14) with their results indicating that the relationship between admissions criteria and higher education performance is statistically significant but low r-squared values indicating that there are explanatory variables missing.

3.3 What sets this study apart from previous studies

The Finnish education system has many qualities that set it apart from other educational systems that prior studies have largely focused on. With the United States of America being the focus of many prior studies a key difference in their higher education system in comparison to the Finnish higher education system is the financial aspect (Isopahkala-Bouret et al., 2018, p.149). At first glance it could be argued that the Finnish financial aid system for higher education students mitigates the effect that financial status has on

opportunities to take part in higher education in Finland. There are however other factors that need to be taken into consideration when talking about financial equality in Finnish higher education. As previous studies have mostly taken place elsewhere in the world, they looked at the performance of admissions criteria as higher education performance predictors and evaluated admissions processes in other countries. As educational equality is desired from the admissions process (Opetus- ja kulttuuriministeriö, 2016, p.30) there is a possibility to additionally consider the equal opportunity to access higher education as an angle to evaluation. It can be examined how the development of the admissions process of Finnish economics and business administration programmes could have affected financial equality amongst applicants.

What probably sets this study most apart from previous studies is the concept of survivorship bias. Data collected in higher education institutions about higher education institutions and their students is inherently affected by survivorship bias, as the data is only based on the students that have gone through an admission process and survived it. Yet most previous studies do not even mention the issue of survivorship bias and as a result make no effort to address the issue. There are exceptions, like for example Stoklasa, Talášek and Viktorová (2020) who do acknowledge the issue of survivorship bias and take it into consideration when choosing their method of study, but this does not eliminate the existence of the issue. This is where LUT University and the LUT Highway admissions path offer a unique opportunity to evaluate a higher education admissions process into an economics and business administration programme with a lesser burden of survivorship bias in the data.

4 Data and analysis

In this chapter the data used in this thesis will be introduced. The origin of the data will be discussed as well as features of the data will be explained. Any changes made to the original data will be described in this chapter and the data will be visualised when useful. First the variables will be introduced, and observations with missing values will be removed. Additional changes made to the data will be discussed. Once students with missing values have been removed from the data descriptive statistics will be presented.

4.1 Data introduction and modification

The data used in this thesis was provided by LUT University. The data consists of economics and business administration students at LUT University starting as degree students in the academic years 2018-2019 to 2022-2023. The data has been anonymised by assigning each student in the data a random number to represent them. Before making any kind of changes to the data it consisted of 23 variables for 666 individual students with the first variable being “Student” which is the randomised identification number. The next variable is “Gender” which in this data has been presented as a binary and therefore this thesis will also have to represent gender as a binary with female and male being the only options within this variable. The next variable introduced here is the age variable for this data, which is the age of a student at the beginning of their study right. The next variable is the student’s current phase of studies, with values of “Master” and “Bachelor” representing whether a student is currently in their master’s phase of studies or in their bachelor’s phase of studies. None of the aforementioned variables are missing any values and therefore they do not require removals. For convenience a new variable is introduced into the data at this point. The new variable, “StudyLevel”, presents the current phase of studies in a numeric form with “0” representing bachelor’s level studies and “1” representing master’s level studies. The next two variables will be discussed as a pair as they relate to one another. These variables represent the starting year of each student’s study right and the starting month, and therefore the starting semester, of each student’s study right. The starting year is the year that the student was admitted to the LUT

university economics and business administration programme as a degree student. There were nine students found in the data that were missing their starting year as well as their starting semester and were therefore removed from the data. It was verified that the values were missing from the same nine students for both variables. The starting month for all students remaining in the data is August, meaning that all students have started their studies as degree students in the autumn semester. Furthermore, there were 20 students with the starting year 2022. The data was collected in June 2022 meaning that some students starting in the autumn semester of 2022 were already in the data but did not actually have any values for most of the variables in the data, which is why they were removed from the data at this point in time. These changes bring the total data to having 24 variables and representing 637 students. It should be noted here that the starting year for a student is the year that they have become a degree student in the LUT university economics and business administration programme and not the starting year in an admissions path. For example, if a student being admitted through the LUT Highway path would start the LUT Highway path in the autumn semester of 2018, do their yearlong path studies and become a degree student in the autumn semester of 2019 their starting year in the data would be 2019 when they became a degree student and not 2018 when they entered the admissions path. The next two variables that will be discussed as a pair are "AcceptancePath" and "OpenUniversityPath" which tell us the admissions path that a student took to enter the programme. As this information was divided between the two variables a new variable "EntranceMethod" was created to consolidate the information into one variable and transform it into numeric form. There was one student found in the data with no information about their admissions path into higher education and they were therefore removed leaving the data at 25 variables for 636 students. The next variable describes the state of each student's study right at the time of data collection, with all students in the data having a value for this variable. There were however 44 students with the status of their study right not being either active or graduated. Here the choice was made to remove all students that did not have an active or graduated study right status, because there is no way of knowing why there is a change in status or for how long there is a change in status. This could make it difficult to create graduation statistics for on time or early graduation which is why these students are removed. This brings the number of students currently represented in the data to 592. The next four variables discussed are GPA and ECTS credit related. There are individual variables for a student's GPA and

number of ECTS credits in their current study right as well as individual variables for a student's GPA and number of ECTS credits including all their studies. There were 5 students that were missing all four of these variables resulting in their removal from the data and the data now representing 587 students. There is also a variable for open university path students indicating their GPA in their open university studies, which had no missing values and warranted no further action. After this there are variables indicating the starting year and semester of the master's phase of a student and the GPA for a student's bachelor's degree. Both variables were presented for each student that had graduated with their bachelor's degree and no removals were necessary. At this point an additional variable was created to numerically represent the time at which a student graduated with their bachelor's degree, using the variable representing the beginning time of their master's phase. Each combination of graduation year and semester was represented by a different number in this new variable. This new variable was further used to create another variable in which a numeric value represents whether a student has graduated with their bachelor's degree on time, early or late/not at all. With these two new additional variables the data is now featuring 27 variables for 587 students.

Additionally, there are variables that are only available for the students that have come through the joint admissions paths, meaning they have either been admitted based on the entrance exam or based on the Finnish matriculation examination certificate. The first of these variables depicts whether the student is registered as attending or non-attending in their first year of studies. There are no joint admissions paths students in the data that are missing this variable. There are however 65 students that are not registered as attending for the entirety of their first year of studies. Though there are a limited number of reasons for which a student is allowed to register as non-attending in their first year of studies we do not know why these students are non-attending and therefore cannot know if they have returned to their studies after being absent for the first year. This makes calculating graduation statistics unreliable which is why they are removed from the data. This brings the data to 522 students and 27 variables. Additionally for the joint admissions paths students there is a variable informing us if they had their first-timer status when they were admitted. There is one student that has gained their student place through the joint admissions paths but does not have information about their first-timer status and they were therefore removed from the data. For the joint admissions paths students, we also have a variable showing us the position of the economics and business administration programme

at LUT University on the students' joint admissions application, with no missing values in the data. There is also a variable indicating the entrance exam score of a student that has participated in the entrance exam and no student admitted based on the entrance exam is missing this variable so no further action is taken here. Another variable is the "Accepted_StandbyAcceptance" variable which tells us if a student was admitted after being initially waitlisted or if they were admitted without a wait. There were no missing values in this variable. Lastly there were variables showcasing the amount of expired ECTS credits that a student has as well as a variable for the application period that a student partook in. After the changes have been made to the data there are 521 students represented in the data and there are 27 variables available for these students.

Subsets of the original data were created. The first data subset is called "primary" and consists of all students that have been admitted to the programme through the primary admissions paths. The joint admissions paths, meaning all certificate choices and entrance exam choices are in the "primary" subset of data. The next subset created is called "secondary" and it has all students admitted through the secondary admissions paths in it. The open university studies path, the LUT Highway path, the summer university path and the transfer student path are considered secondary paths in this thesis. Next four subset were created in reference to the four starting years represented in the data. Each student starting in 2018 was put into subset "first", students starting in 2019 were in the subset "second" and student starting in 2020 and 2021 were in "third" and "fourth" respectively. As the LUT Highway path is time restricted and requires students to successfully complete 60 ECTS credits to be able to apply to be a degree student at the end of the year, there were also subsets created in which LUT Highway path students were adjusted to be in the same subset with joint admissions paths students that have started their degree student studies in the same year that the LUT Highway students started their path studies. The subset "firsthighway" represented entrance exam choices and certificate choices who started in 2018 and LUT Highway students who started as degree students in 2019 meaning that they started their path studies in 2018. The subsets "secondhighway" and "thirdhighway" were created with this same logic. Lastly subsets were created for each individual admissions path with the subsets being named "entrance", "certificate", "open", "summer", "highway" and "transfer".

4.2 Data statistics

Figure 1 shows the number of students admitted as degree students through each admissions path throughout the data. Figure 2 shows the percentage of admissions from each admissions path. Figure 1 and Figure 2 showcase why joint admissions paths are considered primary admissions paths and why the open university paths and transfer student path are considered secondary admissions paths in this thesis. Figure 1 shows how the 521 students represented in the data are divided between admissions paths. The biggest individual path is the certificate choice path with 220 students being admitted through it. The entrance exam path has admitted the second most students with 154. The open university path, the summer university path, the LUT Highway path and the transfer student path admitted 71, 13, 60 and 3 students respectively. (Figure 1)

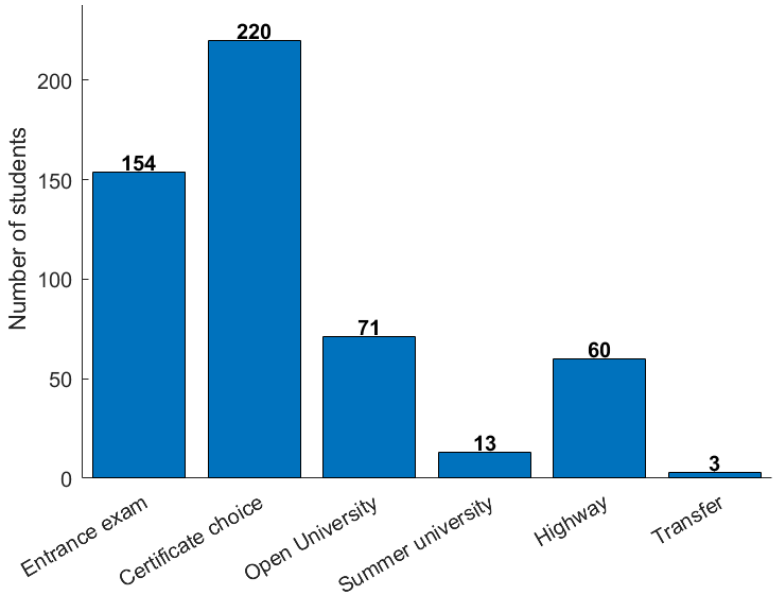

Figure 1. Total number of students admitted as degree students from each path

Although only two of the six admissions paths are considered primary Figure 2 shows that a majority (72%) of admitted students are admitted through the primary admissions paths. The entrance exam path (30%) and the certificate choice path (42%) make up the majority of admissions and the minority (28%) are admitted through the open university studies path (14%), the summer university path (2%), the LUT Highway path (12%) and the

transfer student path (< 1%). Within the secondary paths the open university studies path is the biggest path with having 14% of all students in the data admitted through it. In second place is the LUT Highway path with 12% and the two smallest paths are the summer university path with 2% of students and the transfer student path with < 1% of students (Figure 2).

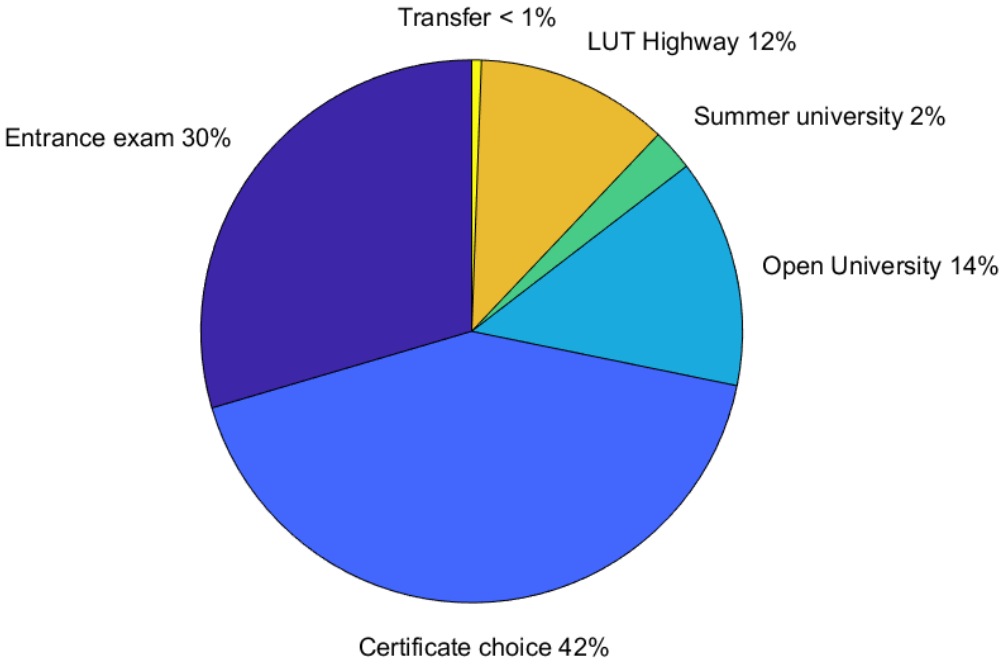

Figure 2. Pie chart of admissions paths

The age of a student at the beginning of their study right as a degree student is looked at when evaluating the time it takes to transition from secondary education into higher education. An overall view of the variable representing a student's age at the beginning of their right to study shows that the starting ages of students are mostly around 20 years old (Figure 3). There is a clear drop off in the number of students with starting ages of 24 and older, with none of these starting ages having over 20 students in the data (Figure 3).

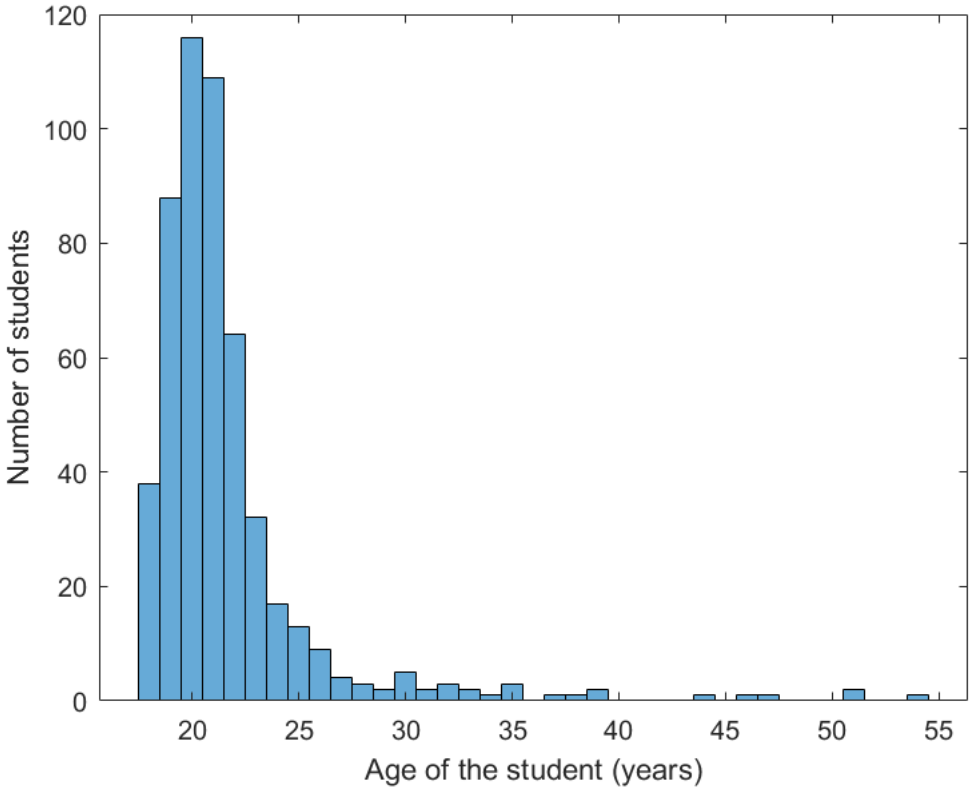

Figure 3. Ages at the beginning of the study right

For the variable of students' ages at the beginning of their study right as degree students minimum values, maximum values, mean values, and mode values for the main data as well as subsets of the data are reported in Table 2. The minimum age of a student at the beginning of their study right was 18 years old and the maximum age found in the data was 54 years old. The average starting age in the data was 21.66 years and the most common starting age was 20. When looking at the subsets primary and secondary we can see that the primary admissions path students are on average younger than the secondary admissions path students at the beginning of their study right as degree students. The minimum starting ages for primary and secondary path students are close to one another with them being 18 years old and 19 years old respectively. With 20.87 years being the average starting age for the primary subset, it is lower than the average starting age of 23.68 for the secondary subset. The mode ages for the primary and secondary subsets are 20 and 22 respectively. With all of the other paths having a mean stating age in the twenties the summer university path stands out with an average starting age of 38.30 years.

For comparison the second highest average starting age for a path is 22.32 years for the LUT Highway path. The summer university path additionally has the highest mode starting age with both 32 and 51 being modes for the path. The second highest mode is 22 years of age for the open university studies path. The certificate choice path has the lowest mode starting age at 19 years old.

Table 2. Age statistics for all data and subsets of data

	Minimum age [years]	Maximum age [years]	Average age [years]	Mode age [years]	Median age [years]
All data	18	54	21.66	20	21
Primary paths	18	47	20.87	20	20
Secondary paths	19	54	23.68	22	22
Entrance exam path	18	39	21.50	21	21
Certificate choice path	18	47	20.42	19	20
Open university studies path	19	28	22.28	22	22
Summer university path	22	54	38.30	32/51	38
LUT Highway path	19	30	22.32	21	22
Transfer student path	20	22	20.67	20	20

Figure 4 shows that many of the higher starting ages in the primary admissions paths are outliers. There are additionally some outliers in the open university studies path and the LUT Highway path. The outliers for these paths are also the maximum values. The summer university path however does not seem to have outliers according to Figure 4 but does have a higher median starting age than the other admissions paths. The median starting age of the summer university path is 38 years and the second highest median starting age in the data is that of either the open university studies path or the LUT Highway path, which both have median starting ages of 22 years (Table 2). Figure 4 and Table 2 both show that the individual primary admissions paths, have lower median starting ages than the open university paths. The transfer student path shares the lowest median starting age with the certificate choice path, but it should be noted here that the transfer student path only consists of three students.

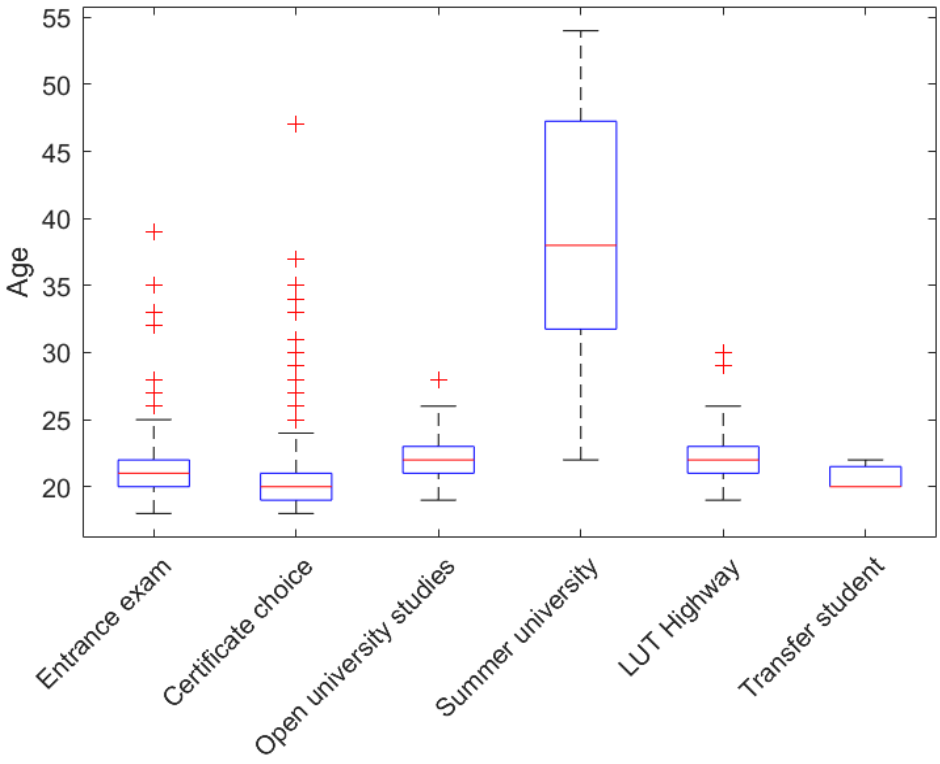

Figure 4. Student ages at beginning of study right by admissions path

Of the 521 students represented in the data 283 (54.32%) were identified as female and the remaining 238 (45.68%) were identified as male. In the primary path subset 197 (52.67%) of the 374 students were identified as female and 177 (47.33%) were identified as male. In the subset of secondary admissions paths 86 (58.50%) of the 147 students in the subset were identified as female and 61 (41.50%) were identified as male.

In Table 3 the number of degree students admitted through each admissions path is presented by starting year. In the academic years from 2018-2019 to 2021-2022 most of the students admitted to the LUT University economics and business administration programme each year were admitted through the certificate choice path (Table 3). Of the remaining paths, the entrance exam path is consistently the second largest path in the data. As for the secondary paths, the LUT Highway path is slightly bigger than the open university studies path each year except for the academic year 2021-2022 when the open university studies path admitted 25 students compared to the LUT Highway path's 16 admitted students. Taking a closer look at the LUT Highway path we can see that we have data for LUT Highway students who became degree students in 2019, 2020 and 2021

(Table 3) after participating in the admissions path in the academic years 2018-2019, 2019-2020 and 2020-2021 respectively. All summer university path students and transfer student path students found in the data have started as degree students in the academic year 2021-2022 (Table 3).

Table 3. Number of degree students admitted by admissions path and starting year

	Entrance exam	Certificate choice	Open university studies	Summer university	LUT Highway	Transfer student
Starting 2018	36	47	10	-	-	-
Starting 2019	36	45	15	-	21	-
Starting 2020	29	71	21	-	23	-
Starting 2021	53	57	25	13	17	3

For the joint admissions paths there is information about whether a student admitted to the programme was admitted while having their first-timers status or not. Table 4 shows that 75.13% (281 students) were admitted through the joint admissions paths with their first-timers status and the other 24.87% (93 students) were admitted to the programme without a first-timer status.

Table 4. Number of students admitted as first-timers and admitted as other than first-timers

	In primary admissions paths
First-timers	281 (75.13%)
Other than first-timers	93 (24.87%)

In the joint admissions process students applying to higher education can apply to up to six different degree student study rights in one application process with the application being in order of preference (Opetus- ja kulttuuriministeriö, 2016, p.16). A student can only accept one study right in one semester (Yliopistolaki 558/2009, 2009). For the students in the data that were admitted through the primary paths, we have information about where

the LUT economics and business administration programme was on the application. For the students in the data, it was most common to have the LUT economics and business administration programme as the fourth preferred option in their joint admissions application, with 29% (110 students) being admitted between 2018-2021 having it in fourth place. Second most common was having the LUT economics and business administration programme as the third option on the joint admissions application, with 22% (84 students) being admitted this way and third most common was having it in first place on the application, with 22% (83 students). Additionally, 19% (70 students) of admitted students had this programme as their second option on the application. The LUT economics and business administration programme was applied to as a fifth and sixth option by 5% (18 students) and 2% (9 students) of the admitted students respectively. (Figure 5)

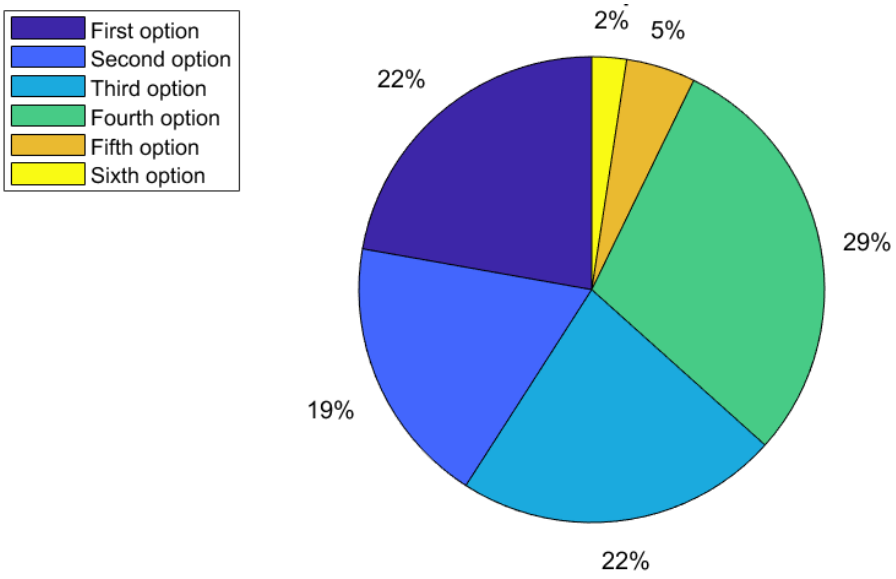

Figure 5. Position of the programme on the joint admissions application

All statistics presented in this chapter are based on the modified data with students with missing values having been removed from the data. As a result, though this data is of degree students starting in the LUT University economics and business administration programme between the years 2018 and 2021, these statistics are not representative of all

students admitted into the LUT University economics and business administration programme over the four-year period in question.

4.3 Statistical testing for GPA variables

There are four different GPA variables discussed in this study. The first GPA is a student's GPA in their current study right. The second GPA variable is a student's GPA for all of their studies including studies outside of the current study right. The penultimate variable presented here is the bachelor's degree GPA, which is only available for students who have graduated with their bachelor's degree. Bachelor's degree GPA is the GPA for all studies completed during the bachelor's degree. The last GPA variable is the open university GPA which is the GPA that a student coming through one of the open university paths has applied to become a degree student with. Grades are given on a scale of 1 to 5 with 1 being the lowest grade and 5 being the highest grade available.

When looking at GPA as a measure of success the different GPA variables are grouped by admissions path. The one-way Analysis of Variance (ANOVA) test was chosen to look at whether there are statistically significant differences in mean between admissions path groups for each of the GPA variables. According to Ross & Willson (2017, p.21) one-way ANOVA needs to be used when there are more than two groups in a study. Janczyk & Pfister (2023, p.100) present assumptions for the one-way ANOVA as the following: the dependent variable needs to be interval, it needs to be normally distributed and the populations should have homogenous variance. Janczyk & Pfister (2023, p.119) state that the ANOVA is robust when it comes to violations of the assumption that the dependant variable is normally distributed. The assumption of homoscedasticity is tested with the Levene test, as suggested by Janczyk & Pfister (2023, p.54) for each GPA variable separately. Janczyk and Pfister (2023, pp. 119-120) present the Kruskal-Wallis one-way ANOVA as a non-parametric alternative for the one-way ANOVA. If the Levene test shows that the homoscedasticity assumption is violated for a variable the Kruskal-Wallis one-way ANOVA is used to look at the statistical significance of differences in mean between admissions paths. For all tests presented in this chapter the values of the variable "EntranceMethod" were used to group the data. The numbers corresponding to the admissions paths can be found in Table 5. Tukey's honestly significant difference (Tukey

HSD) is used as a post hoc test for significant results of one-way ANOVA and Kruskal-Wallis one-way ANOVA.

Table 5. Numbers corresponding to admissions paths for the variable “EntranceMethod”

Group	Admissions path
1	Entrance exam path
2	Certificate choice path
3	Open university studies path
4	Summer university path
5	LUT Highway path
6	Transfer student path

The first variable to be tested with the Levene test is the current study right GPA. Table 6 shows the result for the Levene test for the current study right GPA variable grouped by admissions paths. The null hypothesis for the Levene test is that the variances are equal across all groups. As the p-value for the Levene test result in Table 6 is 0.2393 the null hypothesis is not rejected and therefore the one-way ANOVA is used for the current study right GPA variable.

Table 6. Levene test for GPA of current study right admissions path groups

Group	Count	Mean	Std Dev
1	154	3.4214	0.56783
2	220	3.64552	0.53104
3	71	3.54973	0.46244
4	13	3.76738	0.5114
5	60	3.5381	0.42137
6	3	3.81821	0.39162
Pooled	521	3.55789	0.52135

Levene's statistic (absolute)	1.3564
Degrees of freedom	5, 515
p-value	0.2393

The results for the one-way ANOVA performed on the current study right GPA variable can be seen in Table 7. For the one-way ANOVA the null hypothesis is that there is no significant difference between the means of the groups. Table 7 shows that for the current study right GPA variable the null hypothesis is rejected based on the p-value (P = .0016) for the one-way ANOVA. This means that there is a significant difference in means for at least one pair of admissions paths.

Table 7. ANOVA table for current study right GPA by admissions path

Source	SS	df	MS	F	Prob>F
Groups	5.36	5	1.07209	3.94	0.0016
Error	139.982	515	0.27181		
Total	145.342	520			

Tukey HSD was used as a post hoc test to see which admissions paths had a statistically significant difference in mean. The results are presented in a table in Appendix 1. In Appendix 1 it can be seen that the only statistically significant difference in group mean with a significance level of 0.05 is between group 1, which is the entrance exam path and group 2, which is the certificate choice path, as they have a p-value of 0.0006. All other pairs of admissions paths for the current study right GPA show no statistically significant difference in mean with the significance level of 0.05.

As there is variance in the sample sizes an independent samples t-test is done to see if the sample size is affecting the results of the one-way ANOVA. The t-test is chosen as the Levene test for the variable shows homogeneity in variance. According to MacFarland and Yates (2021, p.141) the independent samples t-test is often used to test for the difference between two groups. MacFarland and Yates (2021, p.141) also state that although the independent samples t-test can be seen used on langer samples it is well suited for testing for differences in mean between small samples of 30 or less. As the t-test is used for testing two groups the test was performed on each pair of admissions paths. The results of this can be found in Appendix 2. The null hypothesis for the independent samples t-test is that there is no statistically significant difference between the means of the two groups. For the current study right GPA variable there were two admissions path pairs found to have a statistically significant difference in mean which is in line with the result of the one-way

ANOVA (Table 7; Appendix 2). The first admissions path pair with a statistically significant difference in mean was the entrance exam path and the certificate choice path (p = .0001), which supports the result of the Tukey HSD (Appendix 1; Appendix 2). The t-test however found an additional admissions pair to have a statistically significant difference in mean, which was the entrance exam path and the open university studies path (p = .0351) (Appendix 2).

The Levene test was performed on the variable of GPA including all studies. Table 8 shows that the null hypothesis was rejected as the p-value is 0.0051 which is less than the significance level of 0.05.

Table 8. Levene test for GPA including all studies by admissions path

Group	Count	Mean	Std Dev
1	154	3.42081	0.56788
2	220	3.64744	0.52753
3	71	3.50364	0.39205
4	13	3.6547	0.42768
5	60	3.58402	0.38273
6	3	3.83238	0.38156
Pooled	521	3.5548	0.5066

Levene's statistic (absolute)	3.382
Degrees of freedom	5, 515
p-value	0.0051

Because the Levene test shows a violation of the homoscedasticity assumption the Kruskal-Wallis one-way ANOVA is performed on the variable representing GPA of all studies. The results of this test are presented in Table 9. The p-value of 0.0015 shows that there is a statistically significant difference in the means of at least one pair of admissions paths, which means that post hoc analysis will be performed.

Table 9. Kruskal-Wallis ANOVA table for all studies GPA by admissions path groups

Source	SS	df	MS	Chi-sq	Prob>Chi-sq
Groups	442594.9	5	88519	19.53	0.0015
Error	11342394.1	515	22024.1		
Total	11784989	520			

The Tukey HSD results for the GPA including all studies variable are presented in Appendix 3. The results show that the only pair of admissions paths with a statistically significant difference in means is group 1, the entrance exam path with group 2, the certificate choice path. This pair of admissions paths had a p-value of 0.0005. All other pairs of admissions paths showed no statistically significant difference in mean with p-values > 0.05.

To make sure that the Kruskal-Wallis one-way ANOVA results are not only a result of varying sample sizes additional testing is used. As the Levene test results for GPA of all studies show a violation of the assumption that variance is equal across groups (Table 8) the Mann-Whitney U test is used instead of the independent sample t-test. MacFarland and Yates (2021, p. 200) state that the Mann-Whitney U test can be seen as the non-parametric counterpart to the independent samples t-test. The results of the Mann-Whitney U test for GPA including all studies can be found in Appendix 4. Similarly to the independent samples t-test results for the current study right GPA, the Mann-Whitney U test seems to confirm the statistically significant difference in mean (p = .0001) between group 1, entrance exam path and group two, certificate choice path found in the Kruskal-Wallis one-way ANOVA. The Mann-Whitney U test also found a statistically significant difference in mean (p = .0160) between group 2, the certificate choice and group 3, the open university studies path. No other admissions path pairs had a statistically significant difference in mean found when the significance level is set at 0.05.

The next variable tested is the bachelor's degree GPA. The Levene test results show that the assumption of equal variance is violated as the p-value for the Levene test is lower than the chosen significance level of 0.05 (p = .0414) (Table 10). The Levene test shows, that there are no values for group 4, which is the summer university path and for group 6, which is the transfer student path. (Table 10)

Table 10. Levene test for bachelor's degree GPA

Group	Count	Mean	Std Dev
1	43	3.37333	0.46996
2	65	3.71015	0.43797
3	30	3.38776	0.26159
5	29	3.55738	0.41008
Pooled	167	3.53898	0.41628

Levene's statistic (absolute)	2.8071
Degrees of freedom	3, 163
p-value	0.0414

As the assumption of equal variance was violated the Kruskal-Wallis one-way ANOVA was chosen for the bachelor's degree GPA variable. The results of the test are presented in Table 11. The Kruskal-Wallis one-way ANOVA shows that for the bachelor's degree GPA there is at least one pair of admissions paths with a statistically significant difference in means (p = .0003).

Table 11. Kruskal-Wallis one-way ANOVA table for bachelor's degree GPA

Source	SS	df	MS	Chi-sq	Prob>Chi-sq
Groups	43792.4	3	14597.5	18.73	0.0003
Error	344313.6	163	2112.4		
Total	388106	166			

The results for the post hoc testing are presented in Appendix 5. The Tukey HSD results show that there are two pairs of admissions paths with a statistically significant difference in means. The first one is the pairing of group 1, the entrance exam path and group 2, the certificate choice path, which had a p-value of 0.0030. The second admissions path pair with a statistically significant difference in mean is the pairing of group 2, the certificate choice and group 3 the open university studies path (p = .0015). No other admissions path pairing had a statistically significant difference in mean for the bachelor's degree GPA variable.

The Mann-Whitney U test was used to verify these results. The results of the Mann-Whitney U test for the bachelor's degree GPA can be found in Appendix 6. The results show that there is a statistically significant difference in mean between two admissions path pairs. The first pair is group 1, the entrance exam path with group 2, the certificate choice path (p = .0005) and the second pair consist of group 2, the certificate choice path and group 3, the open university studies path (p = .0003) (Appendix 6) which is in line with the results of the Kruskal-Wallis one-way ANOVA and Tukey HSD.

Lastly the open university GPA variable was tested with the Levene test. This variable is only available for group 3, the open university studies path, group 4, the summer university path and group 5, the LUT Highway path. The equality of variance assumption is not violated as the Levene test p-value for open university GPA is 0.1586. (Table 12) As a result, for the open university GPA variable the one-way ANOVA test is chosen to test for statistically significant differences in means between admissions paths.

Table 12. Levene test for open university GPA by admissions path

Group	Count	Mean	Std Dev
3	71	3.6307	0.37122
4	13	3.55923	0.48719
5	60	3.7055	0.37401
Pooled	144	3.65542	0.3836

Levene's statistic (absolute)	1.8657
Degrees of freedom	2, 141
p-value	0.1586

The one-way ANOVA results for the open university GPA variable are presented in Table 13. The results show that there are no statistically significant differences in means between admissions paths for the open university GPA variable as the one-way ANOVA p-value (p = .3467) is higher than the significance level of 0.05.

Table 13. ANOVA table open university GPA by admissions path

Source	SS	df	MS	F	Prob>F
Groups	0.3141	2	0.15707	1.07	0.3467
Error	20.7478	141	0.14715		
Total	21.062	143			

The independent samples t-test is performed on the open university GPA variable and the results (Appendix 7) are in line with the results of the one-way ANOVA showing no statistically significant differences in means between groups.

In summary, when looking at the Tukey HSD results the only pair of admissions paths with a statistically significant difference in means are the entrance exam path and the certificate choice path. Independent samples t-test and Mann-Whitney U test were used to see if the sample sizes had any effect on the results. The additional t-test and Mann-Whitney U test found the same result as the Tukey test but did find some additional admissions path pairs with a statistically significant difference in mean. The entrance exam path and certificate choice path were found to have a statistically significant difference (p-value < 0.05) by all measure used here. The certificate choice path and open university studies path were found to have a statistically significantly difference in mean by the Mann-Whitney U tests performed on the all studies GPA variable (p = .0160) and the bachelor's degree GPA variable (p = .0003) (Appendix 4; Appendix 6). Additionally, the independent samples t-test found a statistically significant difference in mean between the certificate choice path and the summer university path (p = 0.0351) (Appendix 2).

5 Results

In this chapter the different admissions paths' performance is discussed in regard to different definitions of success. First different types of student GPA are looked at as a measure of success. For the different admissions paths minimum GPAs, maximum GPAs and average GPAs are discussed with higher GPA being an indication of higher success for the admissions path. A boxplot of each GPA variable divided into admissions paths is also presented. The second definition off success discussed in this chapter is graduation with a bachelor's degree. For graduation variables both graduation at any point during the data collection time and graduation on time or early are discussed for variables when relevant. When looking at timely graduation as success students starting as degree students in the academic year 2018-2019 and 2019-2020 can be looked at, as there are three years of data available in the data for these students meaning that we can evaluate whether students have graduated on time or not. It should be taken into consideration that all results discussed in this chapter are based on students remaining in the data after students with missing values were removed. All statistics will be rounded up to two decimal places. Here it should be noted that the graduation statistics are calculated based on the starting years of the bachelor's degree and the master's degree. In the data there is information about if a student is currently non-attending or has been non-attending in their first year of studies. These students were removed as the calculation of graduation statistics without knowing exactly how long the student is non-attending for could lead to errors. There is no information in the data about whether a student has been non-attending at any other point in their studies. The removal of known non-attending students means that each student that is presented to have graduated on time or early has done so, but there could be additional students who graduated on time or early who are not taken into consideration due to not having data on attendance outside of the first year and the time of data collection.

5.1 Results for the GPA variables

The results for all admissions paths for all GPA variables available are presented in this chapter. When looking at the results presented here for GPA as a measure of success it

should be noted that not all admissions paths have been found to have a statistically significant difference in mean. For this reason, the admissions path pairs found to have statistically significant difference in mean are looked at, but broader trend observations are also discussed. At the end of this chapter the students admitted in the first year of the LUT Highway paths existence are separately looked at and compared to the students admitted through the primary paths in the same admissions run.

The current study right GPA is available for all admissions paths in the data. Minimum values, maximum values and average values for the current study right GPA were calculated for each admissions path (Table 14). The entrance exam admissions path has the lowest minimum current study right GPA (1.33) with the transfer student path having the highest minimum current study right GPA (3.56). For the maximum GPA values in the data the opposite is true. The entrance exam path has the highest maximum GPA (4.90) whereas the transfer student path has the lowest maximum GPA (4.27). Figure 6 shows that the minimum and maximum values for the entrance exam path in this variable are outlier values but the same result seems to hold true even when excluding outliers from observation. The highest average GPA (3.82) was obtained by students admitted through the transfer student path whereas the lowest average GPA (3.42) was obtained by students admitted through the entrance exam path.

Table 14. Current study right GPA by admissions path

	Entrance exam	Certificate choice	LUT Highway	Open university studies	Summer university	Transfer students
Minimum GPA	1.33	2.00	2.66	2.42	2.63	3.56
Maximum GPA	4.90	4.78	4.48	4.44	4.50	4.27
Mean GPA	3.42	3.65	3.54	3.55	3.77	3.82

According to figure 6 the minimum values for the certificate choice path and the summer university path are outliers. Figure 6 also shows that the summer university path has the highest median current study right GPA when it comes to the admissions paths. Out of the admissions path pairs that were found to be statistically significantly different from one

another, the entrance exam path seems to be outperformed by both the certificate choice path and the summer university path in terms of mean GPA (Table 14) and median GPA (Figure 6).

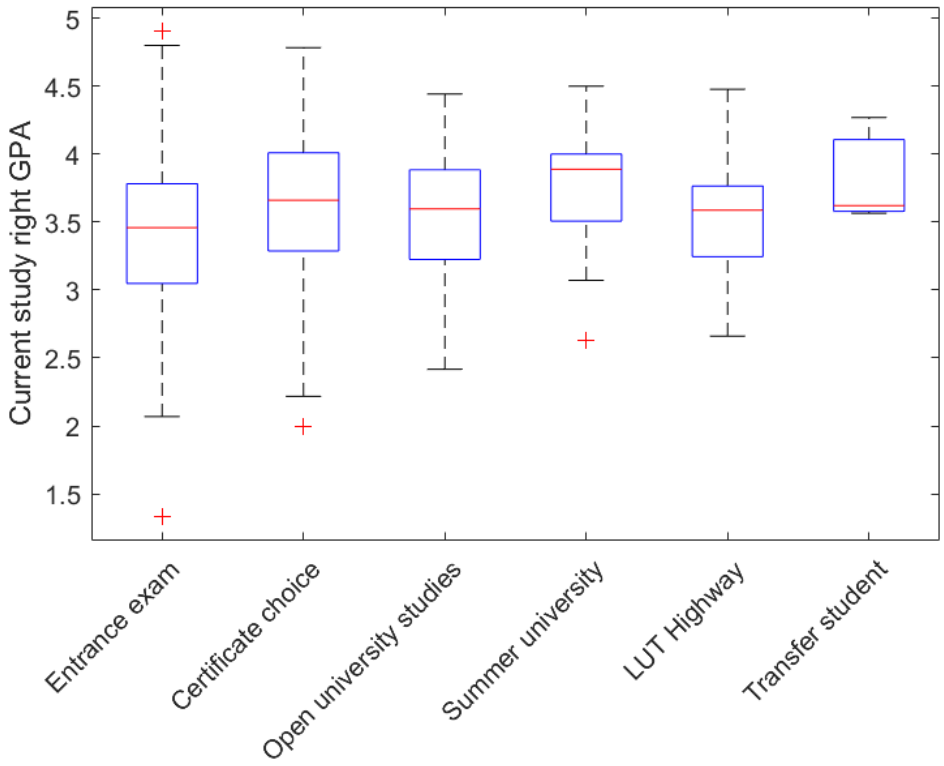

Figure 6. GPA of current study right by admissions path

For the GPA including all studies the statistics are presented in Table 15. For students admitted through the entrance exam path the statistics for GPA including all studies (Table 15) are the same as for the GPA of their current study right (Table 14). There is a minute difference in average GPA between the two variables, but as it is < 0.01 it cannot be seen in the tables presenting the statistics here. For certificate choices the GPA statistics are very similar between the two variables as well. The minimum GPA is slightly higher for the GPA of all studies (2.13) than it is for the GPA of the current study right (2.00). For the LUT Highway path the GPA of all studies minimum value (2.90) and maximum value (4.62) are higher for all studies GPA than for the current study right and even the average GPA (3.58) is slightly higher. The minimum GPA value of the open university studies path is slightly higher for all studies (2.48) than for the current study right (2.48). Whereas the

maximum GPA value and average GPA value are slightly lower for all studies (4.42 and 3.50 respectively) than for the current study right (4.44 and 3.55 respectively). Although the entrance exam path has the highest maximum GPA value (4.90) it also has the lowest minimum GPA value (1.33) by far and the lowest average all studies GPA (3.42) of all the paths. The minimum and maximum values of the entrance exam path for the GPA including all studies are outliers (Figure 7) but even when excluding outliers, the path has the lowest minimum GPA. The transfer student path has the highest minimum GPA (3.56) and the highest average GPA (3.83). When it comes to all studies GPA the lowest maximum value (4.26) goes to the summer university path with a value that is nearly a quarter of a grade lower than its counterpart for the current study right GPA (4.50). (Table 14; Table 15)

Table 15. All studies GPA by admissions path

	Entrance exam	Certificate choice	LUT Highway	Open university studies	Summer university	Transfer students
Minimum GPA	1.33	2.13	2.90	2.48	3.00	3.56
Maximum GPA	4.90	4.78	4.62	4.42	4.26	4.27
Mean GPA	3.42	3.65	3.58	3.50	3.65	3.83

Figure 7 shows that the minimum and maximum GPA values for the entrance exam path are outliers. The highest median values according to Figure 7 are attained by the certificate choice path and the transfer student path. The maximum GPA of the LUT Highway path and the minimum GPA of the certificate choice path were also outliers. When removing outliers from consideration the primary admissions paths seem to have high maximum GPA values but the secondary admissions paths present competitive median GPA values (Figure 7). The admissions path pairs with statistically significant difference in mean for this variable were the certificate choice path with the entrance exam path and the certificate choice path with the open university studies path. The certificate choice path outperforms the entrance exam path as well as the open university studies path when it comes to the average GPA (Table 15) and median GPA (Figure 7)

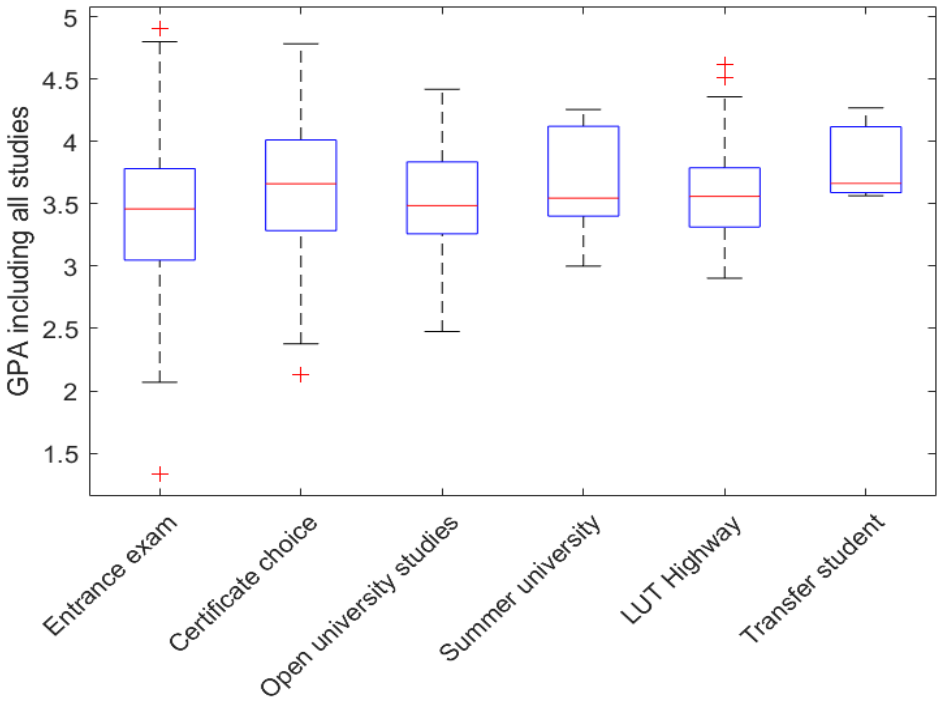

Figure 7. Boxplot of GPA including all studies by admissions path

The third GPA variable considered is the bachelor's degree GPA. This variable is available for four out of the six admissions paths in the data. As there are no summer university path students or transfer student path students that have graduated with their bachelor's degree in the data there are also no bachelor's degree GPAs for these paths. The results are presented in Table 16. The entrance exam path has the lowest minimum GPA (2.28) whereas LUT Highway path has the highest minimum GPA (2.92). Although the entrance exam minimum GPA is an outlier the statement seems to hold true even if outliers are excluded from analysis (Figure 8). Furthermore, the open university studies path has the lowest maximum GPA (3.81), and the certificate choice path has the highest maximum GPA (4.67). As for the average bachelor's degree GPA the certificate choice path has the highest value (3.71), and the entrance exam path has the lowest average GPA (3.37). The admissions path pairs that were found to have a statistically significant difference in mean by prior testing were the certificate choice path with the entrance exam path and the certificate choice path with the open university studies path for the bachelor's degree GPA variable. The certificate choice path has a higher average GPA than both the entrance exam path and the open university studies path (Table 16).

Table 16. Bachelor's degree GPA statistics by admissions path

	Entrance exam	Certificate choice	LUT Highway	Open university studies
Minimum GPA	2.28	2.62	2.92	2.85
Maximum GPA	4.58	4.67	4.52	3.81
Mean GPA	3.37	3.71	3.56	3.39

Figure 8 shows that there are no bachelor's degree GPA values for the summer university path or the transfer student path. The minimum and maximum GPA values for the entrance exam path are outliers as well as the maximum GPA value for the LUT Highway path. The certificate choice path has the highest median bachelor's degree GPA and highest maximum GPA value out of all of the admissions paths. (Figure 8)

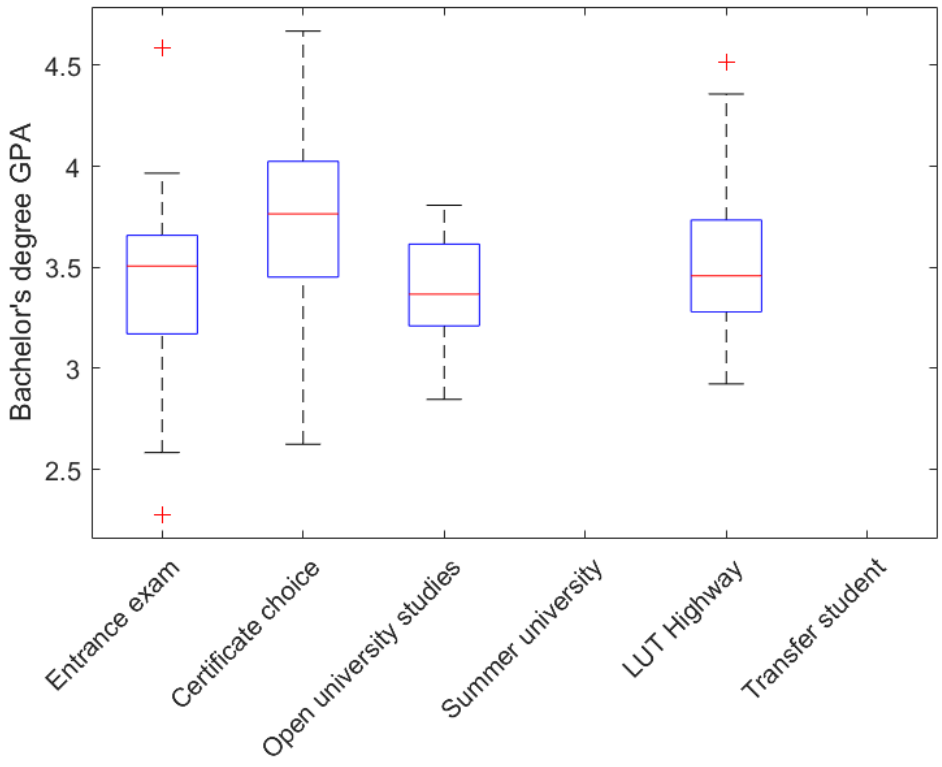

Figure 8. Bachelor's degree GPA by admissions path

The final GPA variable discussed as a measure of success is the open university GPA. This variable is available for all three open university paths. Open university GPA is the GPA of the students' path studies with which they apply to become degree students at the end of the admissions path. Open university GPA statistics can be found in Table 17. When looking at open university GPA it should be noted that for all of the open university paths a requirement for applying to become a degree student is a minimum GPA of 3.00. When measuring success by open university GPA the LUT Highway path seems to have the highest performance. The LUT Highway path has the highest minimum GPA (3.07), the highest maximum GPA (4.80) and the highest average GPA (3.71) of this variable. The highest maximum GPA values however are outliers and when excluded the LUT Highway path has the lowest maximum GPA value of the paths (Figure 9). Although the open university studies path has both the lowest minimum GPA (3.00) and lowest maximum GPA (4.41) when not excluding outliers, the lowest average GPA is not the open university studies path (3.63) but the summer university path (3.56). The open university studies path is the only open university path that has admitted students with the minimum requirement GPA of 3.00. (Table 17) With the open university GPA variable it should be noted that there were no statistically significant differences in mean found between the admissions paths pairs.

Table 17. Open university GPA by admissions path

	LUT Highway	Open university studies	Summer university
Minimum GPA	3.07	3.00	3.05
Maximum GPA	4.80	4.41	4.58
Mean GPA	3.71	3.63	3.56

Figure 9 shows that the maximum GPA value for the LUT highway path is an outlier. The highest median GPA for the open university GPA variable is attained by the LUT Highway path. There are no open university GPA values for the entrance exam path, the certificate choice path or the transfer student path. (Figure 9)

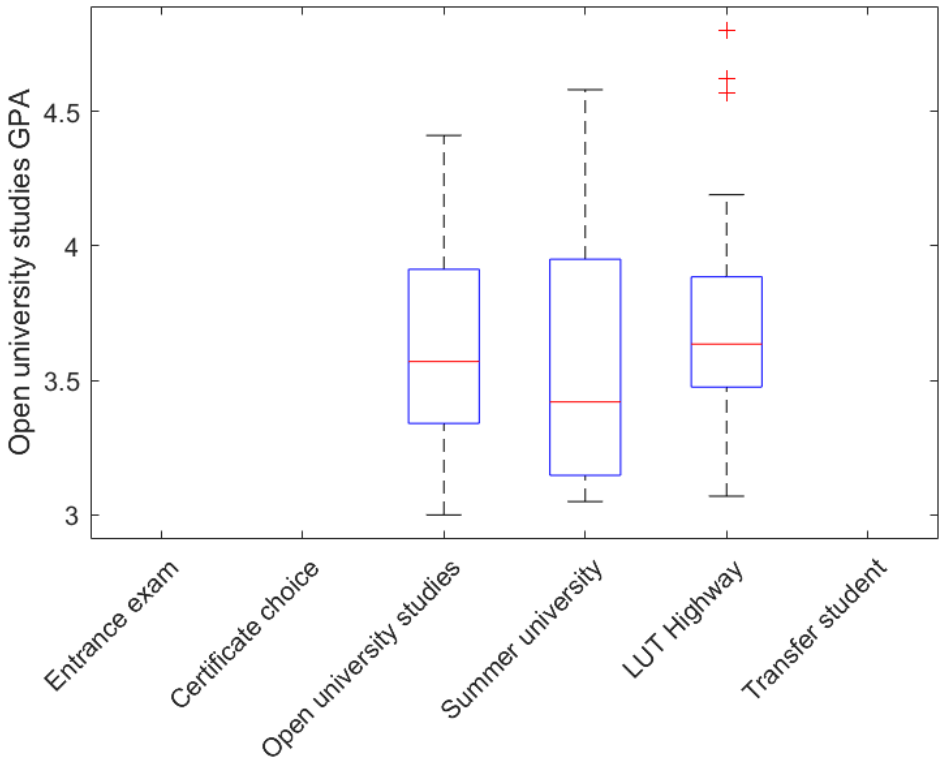

Figure 9. Open university GPA by admissions path

When looking at the different GPA variables as the measure of success the certificate choice path shows overall strong performance while the entrance exam path seems to be outperformed or on par with the secondary admissions paths on many occasions. Of the admissions path pairs found to have a statistically significant difference in mean that the certificate choice path was a part of, it outperformed the compared path every time for each GPA variable in both average GPA and median GPA. Whereas the entrance exam path was outperformed by each admissions path with a statistically significantly difference in mean that it was compared to in terms of average GPA and median GPA. The LUT Highway path consistently outperforms the entrance exam path when it comes to average GPA values but gets outperformed by the certificate choice path. When it comes to the median values the LUT Highway path has higher values than the entrance exam path for both the current study right GPA and the GPA including all studies. It does however have a lower median GPA than the entrance exam path in the bachelor's degree GPA variable and the certificate choice path in current study right GPA, GPA including all studies and bachelor's degree GPA. When compared to the other secondary admissions paths, the LUT

Highway path does not have the lowest median GPA for any of the measured GPA variables. It should be noted again that there was no statistically significant difference between the mean of the LUT Highway path and other admissions paths. The summer university path has the highest current study right GPA median value and the highest median value of the open university paths for the GPA including all studies. The transfer student path performs fairly well when it comes to median values for GPA variables, but it should be stressed that the sample size is only three students and no statistically significant differences in mean were found between the transfers student path with any other admissions path.

5.1.1 Results for the first year of the LUT Highway path

The 2018 admissions process serves a unique perspective into the performance of the primary admissions paths and the admissions process overall. In 2018 applicants who were rejected from the entrance exam path were offered the LUT Highway path as an alternative path into higher education (Tolpo, 2018). These students are represented in the "firsthighway" subset created from the main data.

Table 18 shows the minimum GPA, maximum GPA and mean GPA values for the entrance exam path, the certificate choice path and the LUT Highway path students. The data presented is for the primary path students starting in 2018 and LUT Highway students starting as degree students in 2019. Here we can see that the entrance exam path seems to have the lowest performance of the admissions paths when it comes to the current study right GPA. The entrance exam path has the lowest values for all three statistics for the current study right GPA variable. The LUT Highway path has the highest minimum GPA value (2.66) and the certificate choice path has the highest maximum GPA (4.44) and average GPA (3.65) when it comes to the current study right GPA variable. For the "firsthighway" subset the certificate choice path seems to be the highest performing path with two highest values. (Table 18)

Table 18. Current study right GPA for the “firsthighway” subset by admissions path

	Entrance exam	Certificate choice	LUT Highway
Minimum GPA	2.07	2.46	2.66
Maximum GPA	4.05	4.44	4.38
Mean GPA	3.20	3.65	3.44

Figure 10 shows that there are no outliers for the current study right GPA variable in the “firsthighway” subset. The certificate choice path has the highest median current study right GPA, and the entrance exam path has the lowest median current study right GPA. When looking at both mean GPA (Table 18) and median GPA (Figure 10) the LUT Highway path outperforms the entrance exam path.

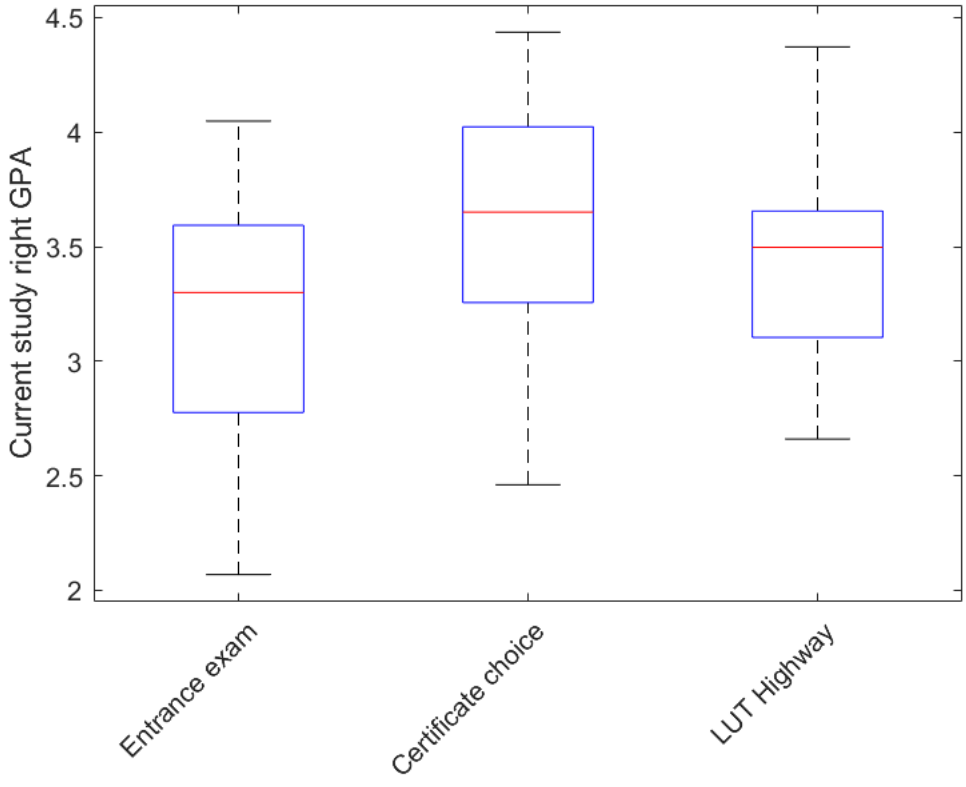

Figure 10. Current study right GPA by admissions path for the "firsthighway" subset

Table 19 shows that if GPA of all studies is chosen as the measure of success, the entrance exam path is the lowest performing admissions path when it comes to the primary paths

and the LUT Highway path in the “firsthighway” subset. The entrance exam path has the lowest minimum GPA (2.07), the lowest maximum GPA (4.05) and the lowest average GPA (3.20). The certificate choice path has both the highest maximum GPA (4.44) and the highest mean GPA (3.65). The highest minimum GPA (2.90) was attained by students admitted through the LUT Highway path. The outcome of evaluating the admissions paths performance based on the all studies GPA is the same as for the current study right GPA.

Table 19. All studies GPA for the “firsthighway” subset by admissions path

	Entrance exam	Certificate choice	LUT Highway
Minimum GPA	2.07	2.46	2.90
Maximum GPA	4.05	4.44	4.28
Mean GPA	3.20	3.65	3.45

Figure 11 shows that there are no outliers in the GPA including all studies variable of the “firsthighway” subset. Similarly to the current study right GPA (Figure 10) the GPA including all studies shows the certificate choice path to perform well as it has the highest median value, highest mean value and highest maximum value (Figure 11; Table 19). The LUT Highway outperforms the entrance exam path with a higher minimum value, higher maximum value, higher mean and higher median (Table19; Figure 11).

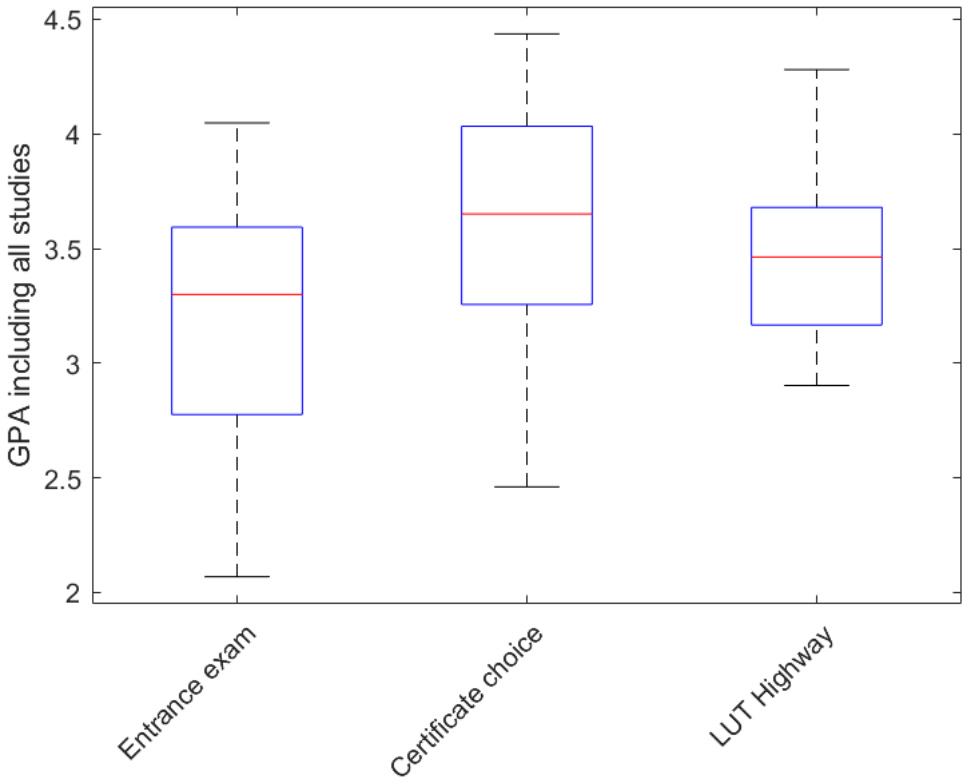

Figure 11. GPA including all studies by admissions path for the "firsthighway" subset

The bachelor's degree GPA statistics for the "firsthighway" subset are presented in Table 20. When it comes to the "firsthighway" subset the results for the bachelor's degree GPA are very similar to the GPA for all studies and GPA for current study right variables. The entrance exam path has the lowest performance of the admissions paths. The entrance exam path has the lowest minimum GPA (2.28), the lowest maximum GPA (3.95) and the lowest average GPA (3.23). The LUT Highway path has the highest minimum GPA (2.92) which is slightly higher than the corresponding value for the GPA of all studies (2.90). The certificate choice path has the highest maximum GPA (4.42) and average GPA (3.58) which are both lower than their counterparts in the all studies GPA.

Table 20. Bachelor's degree GPA for the "firsthighway" subset by admissions path

	Entrance exam	Certificate choice	LUT Highway
Minimum GPA	2.28	2.62	2.92
Maximum GPA	3.95	4.42	4.25
Mean GPA	3.23	3.58	3.43

Figure 12 presents the bachelor's degree GPA variable for the "firsthighway" subset. The same trend of performance by the paths prevails for the bachelor's degree GPA as has been seen previously for the current study right GPA and GPA including all studies. The certificate choice path has the highest median GPA and the LUT Highway path outperforms the entrance exam path when looking at median values. There are no outliers found in the bachelor's degree GPA for the "firsthighway" subset. (Figure 12)

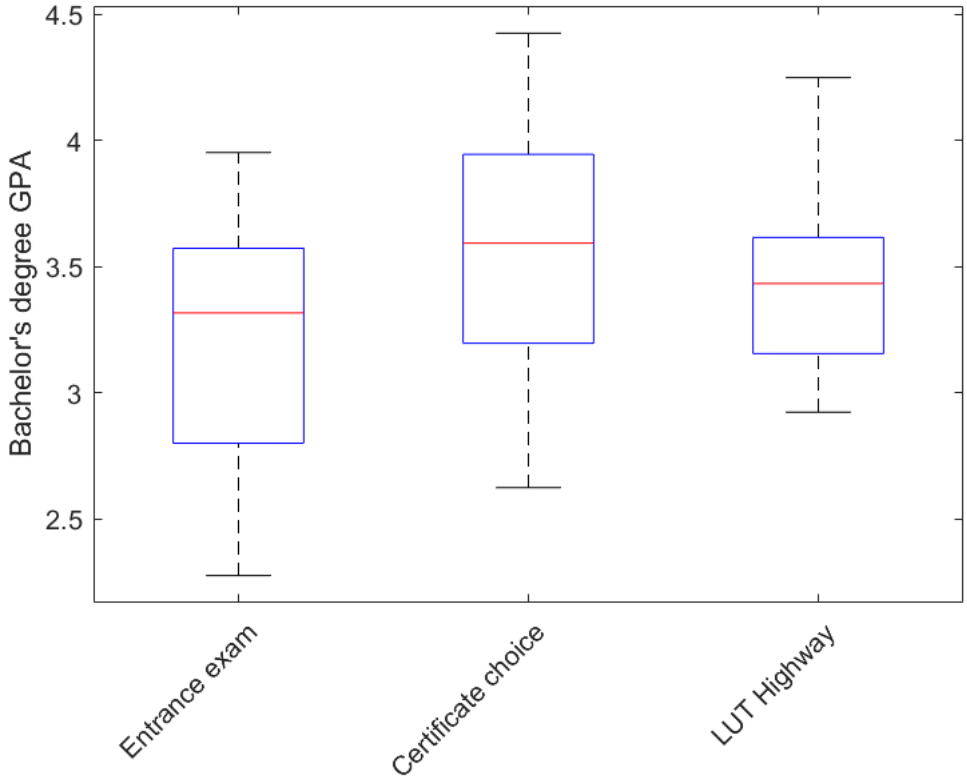

Figure 12. Bachelor's degree GPA by admissions path for the "firsthighway" subset

For the "firsthighway" subset the entrance exam path is the least successful admissions path when GPA variables are considered the definition of success as it has the lowest values for all GPA variables in terms of mean GPA and median GPA. The certificate choice path shows high performance when looking at GPA as the measure of success as it has the highest mean values and median values for all GPA variables. The key information to note here, is that the LUT Highway path outperforms the entrance exam path in all statistics for all three variables presented here. This means that students who managed to

gain admission through the LUT Highway path after being rejected by the entrance exam path outperform the students admitted through the entrance exam path.

5.2 Graduation with a bachelor's degree as a measure of success

In this chapter graduation rates and admissions statistics are discussed. Four out of the six admissions paths in the data have students that have graduated. For these four admissions paths it is looked at how well they perform as admissions paths based on graduation rates being the measure of success. When looking at graduation as a measure of success the volume at which a path produces graduates is seen as their ability to predict students' success and admit successful students. Graduation statistics are presented for each admissions path and each starting class separately. For the open university studies path and the primary admissions paths both timely graduation statistics as well as graduation at any point statistics are presented. Timely graduation being of higher value when it comes to evaluating the admissions paths due to its weight in the university's funding model.

Admissions statistics as well as graduation statistics for students admitted through the primary admissions paths are presented in Table 21. In Table 21 we can see that in general more students were admitted through the certificate choice path than the entrance exam path each year, which is in line with the information previously presented in this thesis. Two graduation statistics are presented for each starting year and admissions path in Table 21. The first one shows the number of students that have graduated at any point before the data was collected not taking into consideration their starting year. The second graduation statistic shows the number of students that have graduated on time or early, which is within three years of their starting year. Overall students admitted through the certificate choice path have higher graduation rates than students admitted through the entrance exam path. The academic year 2018-2019 is the only starting year represented in the data that has time outside of timely graduation represented in the data meaning that for all other starting years a student graduating at any point within the data has graduated on time or early. When looking at the number of students that graduated at any point during data collection 42 (89.36%) of the 47 students that were admitted through the certificate choice path in the academic year 2018-2019 graduated at some point before the data was collected. For the entrance exam path, it was 31 (86.11%) out of 36 admitted students. But if we look at

timely graduation, there is a clear difference in success rate, with the number of graduating students dropping to 32 (68.09%) and 21 (58.33%) respectively. With financing coefficients tied to graduation time being a part of the university's funding model (Opetus- ja Kulttuuriministeriö, 2021) timely graduation could be of value to the university. While 73 (87.95%) of the 83 students admitted through the primary paths eventually graduated, only 53 (63.86%) did so on time or early. For the academic year 2019-2020 the timely graduation rates dropped for both primary paths. From the 36 students admitted through the entrance exam path only 11 (30.56%) had graduated on time or early. Similarly for the certificate choice path students out of 45 admitted 21 (46.67%) graduated on time or early. When looking at students starting in the academic year 2018-2019 and 2019-2020 we can see that there were 15 and 24 certificate choices respectively and 15 and 25 entrance exam choices respectively who did no graduate on time or early.

Table 21. Statistics for certificate choices and entrance exam choices

	Students admitted through the path	Graduated within data collection time	Graduated on time or early
Certificate choice starting 2018	47	42 (89.36%)	32 (68.09%)
Certificate choice starting 2019	45	21 (46.67%)	21 (46.67%)
Certificate choice starting 2020	71	2 (2.82%)	2 (2.82%)
Certificate choice starting 2021	57	0 (0%)	0 (0%)
All certificate choices	220	65 (29.55%)	55 (25.00%)
Entrance exam choice starting 2018	36	31 (86.11%)	21 (58.33%)
Entrance exam choice starting 2019	36	11 (30.56%)	11 (30.56%)
Entrance exam choice starting 2020	29	1 (3.45%)	1 (3.45%)
Entrance exam choice starting 2021	53	0 (0%)	0 (0%)
All entrance exam choices	154	43 (27.92%)	33 (21.43%)

Table 22 shows LUT Highway path students' admissions statistics and graduation statistics. The data is presented in a way where it shows the year that a student was admitted to the LUT Highway path and not the year that they became degree students, which is one year later than the admittance to the LUT Highway path. Though the data generally has values for students starting in the academic year 2021-2022, there is no data for the students who started in the LUT Highway path in 2021 as only degree students are represented in the data and students are in the path for a year before being able to apply to become degree students. This means that students starting in the LUT Highway path in the academic year 2021-2022 can apply to become degree students in the academic year 2022-2023 and are therefore not represented in the data. In Table 22 we can see that for the academic year 2018-2019 there were 40 students admitted to the LUT Highway path (Tolpo, 2018). In the academic years 2019-2020 and 2020-2021 the number of students admitted to the path was decreased to 30 students each year (Lappeenrannan uutiset, 2019; LUT University, 2019). Of the 40 students participating in the LUT Highway path in the academic year 2018-2019 at the end of the path 21 (52.50%) were admitted as degree students for the academic year 2019-2020. For the LUT Highway path in the academic year 2019-2020 the number of admitted students at the end of the path to become degree students was 23 (76.67%) students and for the path in the academic year 2020-2021 the number of students that were admitted as degree students at the end of the path was 17 (56.67 %) students. This means that consistently a majority of students admitted to the LUT Highway path fulfil the requirements to become degree students each year. Two graduation statistics are presented in Table 22. The first graduations statistics shows the number of degree students that have graduated on time or early, meaning within three years of becoming degree students. In the second statistic the expected graduation time for the LUT Highway student has been adjusted in a way that on time graduation is defined as three years from the time when they started in the LUT Highway path and not three years from when they became degree students. This has been done because the LUT Highway path is a year-long admissions path which requires students to complete one year worth of ECTS credits with a set GPA to become degree students, meaning that LUT Highway students could be seen as becoming degree students with a head start of one year in their studies. The admitted degree students were used as basis for calculating the graduation percentages in Table 22 because the study right time only starts after being admitted as a degree student. It should be noted that anyone entering the LUT Highway path in 2019 or

after that becomes a degree student at the earlies in the autumn semester of 2020 meaning that if they have graduated at all within the data collection time they have graduated on time or early even with the adjusted graduation time. Due to this, the adjusted graduation time is mostly relevant for students starting in the LUT Highway path in the academic year 2018-2019. The adjusted graduation statistics are done so that a comparison can be drawn between primary paths and the LUT Highway path students, but it should be clarified that the time spent in the LUT Highway path does not count toward a student's study right time once they become degree students.

For the LUT Highway path we only really have one year of students who have all necessary information in this data as students spend one year in the path before becoming degree students. This leads to students starting in the path in the academic year 2019-2020 becoming degree students in the academic year 2020-2021 and having until the spring semester 2023 to graduate on time which is outside of the scope of this study. For this reason, the focus will be on the students starting in the LUT Highway path in the academic year 2018-2019. Students starting in the LUT Highway path in the academic year 2018-2019 are of particular interest because in its first year of existence the LUT Highway path was only offered to students who had participated in the entrance exam and were not admitted through it (Tolpo, 2018). These applicants that had been rejected were sent an email informing them of the new admissions path and the first 40 students to enrol were admitted to the path (Tolpo, 2018). Out of the 40 students admitted to the path 21 became degree students at LUT University, meaning that the path had a success rate of 52.50%. Out of the 21 students that became degree students at the end of their path studies 18 (85.71%) graduated early or on time meaning within three years of being admitted as degree students. An adjusted graduation time was calculated for comparison with 15 (71.43%) of the admitted 21 students graduating on time or early if their expected graduation time is adjusted to be for the starting year of 2018. These graduation statistics show that the entrance exam has rejected students that were capable of graduating on time or early with their degree. When taken into consideration that the admissions process into the LUT Highway path was just a matter of speed and luck, the LUT Highway path seems to successfully admit students as degree students who do mostly graduate on time or early.

Table 22. LUT Highway path statistics

	Students admitted to the path	Degree students admitted from path	Graduated on time or early	Graduated on time or early, adjusted
Admitted to LUT Highway 2018	40	21 (52.50%)	18 (85.71%)	15 (71.43%)
Admitted to LUT Highway 2019	30	23 (76.67%)	11 (47.83%)	11 (47.83%)
Admitted to LUT Highway 2020	30	17 (56.67 %)	0 (0%)	0 (0%)

Admissions statistics and graduation statistics were also calculated for the open university studies path, the summer university path and the transfer student path. There are no transfer student path or summer university path students in the data for the starting years of 2018 to 2020. For this reason, the open university studies path will be examined separately for all four years in Table 23 and the 2021 summer university path and transfer student path statistics will be in Table 24. Like with the primary admissions paths two graduation statistics are presented for the open university studies path students as well. For the open university studies path however there are no students in the data who graduated late but within the data collection time, meaning all students that graduated before the data was collected graduated either on time or early. Overall, the open university studies path has a high success rate when looking at the graduation statistics from it. This combined with the knowledge that there are primary path students admitted who do not graduate on time or early, an argument could be made for the primary paths not being optimal in making admissions decisions or for alternative admissions paths being necessary. In the academic year 2018-2019 there were 10 applicants admitted as degree students through the open university studies path. In Table 23 we can see that all 10 (100%) of the admitted students graduated early or on time. This statistic supports the claim made by Haltia (2015, p.262) that open university students could be seen as proven to be motivated and capable due to them coming through the open university studies path. The open university studies path is a financial investment and a time commitment made by the applicant without a guaranteed degree student spot at the end of the path. The academic year 2018-2019 is not an anomaly either, with the academic year 2019-2020 having 15 students admitted as degree student through the open university studies path and 14 (93.33%) students graduating on time or

early. These are the only two starting years in the data that have the full three years of data showing us if someone has graduated within the three years or not and only one student admitted through the open university studies path did not graduate within the allotted time. (Table 23)

Table 23. Open university studies path admissions and graduations

	Students admitted through the path	Graduated within data collection time	Graduated on time or early
Open university studies path starting 2018	10	10 (100%)	10 (100%)
Open university studies path starting 2019	15	14 (93.33%)	14 (93.33%)
Open university studies path starting 2020	21	6 (28.57%)	6 (28.57%)
Open university studies path starting 2021	25	0 (0%)	0 (0%)

There were no summer university path students or transfer student path students in the data who graduated within the data collection time. All transfers student path and summer university path students admitted as degree students were admitted in the academic year 2021-2022. Here we can see how narrow these alternative paths into higher education are. In four academic years only 13 students were admitted as degree students through the summer university path and 3 students were admitted as degree students through the transfer student path. For comparison, in those four academic years 220 students were admitted through the certificate choice path, 154 through the entrance exam path, 71 through the open university studies path and 60 through the LUT Highway path. All admissions from these paths within the four academic years represented in the data were in the academic year 2021-2022 meaning there were no consistent admission made through these paths each academic year based on the data.

Table 24. Summer university and transfer student path admissions and graduations

	Students admitted through the path	Graduated on time or early
Summer university path starting 2021	13	0
Transfer student path starting 2021	3	0

The performance of the summer university path could not be really looked at due to the admissions to become degree students through this path only happening in the last starting year of the data and therefore there not being any students from this admissions path who graduated within the data collection time. The age variable does however show that the summer university path possibly works as intended by being an alternative admissions path into higher education. The summer university path provides a possibility to study open university courses alongside fulltime work or other studies because summer university courses are usually being provided during evenings and weekends or as daytime intensives (Opintopolku, 2023). Additionally, the summer university path is the most expensive of the admissions paths presented in this thesis with the cost of 60 ECTS credits being 1950€ (Etelä-Karjalan kesäyliopisto, 2022). If the intension is to provide an alternative admissions path for someone who is already in the workforce, the studies being mostly outside of office hours would support that. The price of the admissions path would possibly also be easier to handle for someone with fulltime employment. When it comes to secondary paths into higher education the mean and mode ages of the summer university path show that students coming from secondary education may not be the target demographic for this admissions path (Table 2; Figure 4).

When it comes to the first-timers status and graduation the statistics can be found in Table 25. These statistics are only available for students admitted through the primary paths. All together 281 (75.13%) of all students admitted through the primary admissions paths had their first-timers status when admitted with the remaining 93 (24.87%) students being admitted without a first-timer status. In Table 25 it is shown that a majority of the first-timers, 198 (70.46%) students, are admitted through the certificate choice path. The first-timers admitted through the entrance exam path however have a higher timely graduation rate (32.53%) than the certificate choice first-timers (26.77%). The majority of other than

first-timers, 71 (76.34%) are admitted through the entrance exam path. In 2023 LUT University (2023b) mentioned that to be eligible to be admitted through the certificate choice path the applicant must have their first-timers status. In the data we can see that there are admissions from the certificate choice path without a first-timer status, but these students were all admitted in the academic year 2020-2021. Students without their first-timer status admitted through the certificate choice path had a higher graduation rate (9.09%) than the students without a first-timer status who were admitted through the entrance exam path (8.45%). Overall students admitted with a first-timers status had much higher graduation rates than students without a first-timer status.

Table 25. First-timers graduation statistics

	Admitted as degree students	Graduated on time or early
Entrance exam first-timers	83	27
Entrance exam other than first-timers	71	6
Certificate choice first-timers	198	53
Certificate choice other than first-timers	22	2

In table 26 the graduation statistics for students of different preferred option values are presented. This variable describes where on an applicant's joint admissions application the LUT University economics and business administration programme was. Most commonly students who were admitted through the primary paths had the LUT University economics and business administration programme as their fourth option (29.41%) on the joint admissions application. The second and third most common application position was to have the programme as either the third option (22.46%) on the application or the first option (22.19%) on the application. Having the LUT University economics and business administration programme as the second option (18.72%) on the application was still common compared to the fifth option (4.81%) on the application and the sixth option (2.41%) on the application. There were 9 students who were admitted to LUT University as their sixth option and none (0%) of these students graduated on time or early within data collection. For the students who had the LUT University economics and business

administration programme as their first through fifth option the graduation rates were all somewhere between 20% and 30%. Students who had the programme as their first option on their application have the highest graduation rate (27.71%). The second highest graduation rate is for students who had the programme as their third option on the application (26.19%). After this comes the most common application position, fourth on the application, with a graduation rate of 22.73%, closely followed by fifth on the application with a graduation rate of 22.22%. Students with the LUT University economics and business administration programme as their second option on the joint admissions application had a graduation rate of 20.00%. The preferred option graduation rates seem to show that although most commonly a student is admitted to the LUT University economics and business administration programme as their fourth option on the joint admissions application, the highest graduation rate is attained by the students who had placed the programme as their first option on the application. The lowest graduation rates are for students who had the programme as their sixth option.

Table 26. Preferred option graduation statistics

	Admitted as degree students	Graduated on time or early
Joint admissions option 1	83 (22.19%)	23 (27.71%)
Joint admissions option 2	70 (18.72%)	14 (20.00%)
Joint admissions option 3	84 (22.46%)	22 (26.19%)
Joint admissions option 4	110 (29.41%)	25 (22.73%)
Joint admissions option 5	18 (4.81%)	4 (22.22%)
Joint admissions option 6	9 (2.41%)	0 (0%)

The first-timers graduation statistics and preferred option graduation statistics represent all students admitted through the joint admissions paths in the data, which means that there are all starting years between 2018 to 2021 in these statistics. There are only two starting

years with an expected graduation time that has passed by the time the data was collected, which likely lowers the graduation rates presented in Table 25 and in Table 26.

5.3 Results summary

Overall, when it comes to graduation as the definition of success the primary admissions paths have competitive results when looking at graduation at any point in time, but the secondary admissions paths perform at a higher level when it comes to admitting students who will graduate on time or early. The certificate choice path shows overall high performance when looking at the GPA variables and the entrance exam path is often outperformed by secondary admissions paths. When both measurements of success are taken into consideration the certificate choice path and the LUT highway path seem to be the two highest performing admissions paths into the LUT University economics and business administration programme. When looking at graduation as the definition of success the open university studies path shows high performance as only one student admitted in the starting years that have three years of data available did not graduate on time or early. The LUT Highway path seems to slightly outperform the certificate choice path when looking at graduation as a measure of success. The certificate choice path can compete with the LUT Highway path when looking at students graduating at any point in the time before data collection, but when it comes to timely graduation the LUT Highway path outperforms the certificate choice path.

When looking at the starting years 2018 and 2019, which have three years of data and therefore give insight into timely graduation, there were 79 students admitted through primary admissions paths who did not graduate on time or early. In contrast there were 39 students admitted through the secondary admissions paths that did graduate on time or early. These 39 students were admitted as degree students through the open university studies path in 2018 and 2019 (Table 23) and the LUT Highway path in 2019 (Tabel 22).

The results for the LUT Highway path tell us about the admissions paths success in admitting student into higher education. When looking at Table 22 we can see that the percentage of students that got admitted as degree students through the LUT highway path increased from being 21 (52.50%) out of 40 for students starting in the path in 2018 to 23 (76.67%) out of 30 for students starting in the path in 2019. The same trend does not

extend to the paths starting year of 2020, where the admissions percentage returns to the first year's level with 17 (56.67%) of the 30 students in the path being admitted as degree students. Consistently more than half of the students participating in the LUT Highway path are admitted as degree students. This could mean that for example in the first year of the LUT Highway path over half of the students chosen to participate in the path by luck were admitted as degree students of which 85.71% went on to graduate on time or early.

The first-timers graduation statistics would suggest that the first-timers quota in the admissions process could be beneficial to achieving quicker transitions into the workforce with a higher education degree. Students admitted with first-timer status outperform students admitted without first-timer status. For the data this holds true for both students admitted through the certificate choice path and students admitted through the entrance exam path. It should be noted here, that being admitted through the certificate choice path without a first-timer status is no longer possible (LUT University, 2023b).

5.3.1 Results summary for first year of LUT Highway

When looking at the performance of LUT University's admissions process for their economics and business administration programme the admissions process for the academic year 2018-2019 gives an interesting insight because of the LUT Highway path. The open university studies path was the narrowest path used in that admissions process, with only 10 students being admitted through it. In the same admissions process 47 students were admitted through the certificate choice path and 36 students were admitted through the entrance exam path. From the students rejected by the entrance exam path 40 were admitted to the LUT Highway path out of which 21 were eventually admitted as degree students in the LUT University economics and business administration programme a year later. These students admitted through the LUT Highway path give the opportunity to see how students rejected in the admissions process perform in the studies they were rejected from. Graduation rates as a measure of success were examined for each starting year individually. The highest performing admissions path in the academic year 2018-2019 is the open university studies path with a 100% graduation rate. When looking at the students admitted to the LUT Highway path in 2018 and admitted as degree students at LUT University in 2019, the LUT Highway path outperformed the primary admissions

paths when it comes to timely graduation. This means that both open university paths with graduation data available outperform the primary admissions paths in timely graduation statistics.

6 Conclusions

There are many admissions paths into the LUT University economics and business administration programme and the goal of this thesis was to evaluate the higher education admissions process with an alleviated burden of survivorship bias. Most studies surrounding higher education admissions processes inherently suffer from survivorship bias as there is rarely performance data available for applicants who were rejected in the admissions process. The LUT Highway path gives an opportunity to lessen the effect of survivorship bias in evaluating the admissions process into the LUT University economics and business administration programme. Additionally, the secondary paths give another angle at trying to deal with survivorship bias as these paths also admit students who were not admitted based on the primary admissions paths. In this study the admissions paths were evaluated based on how well they perform at admitting successful students and how accessible they are.

The admissions process into the LUT University economics and business administration programme has two primary paths and four secondary paths. In recent years the certificate choice path has gained importance in the admissions process. The growing emphasis on the certificate choice path is being partially based on the desire to make transition into higher education quicker for students and through that make the transition into the workforce with a higher education degree faster (Opetus- ja kulttuuriministeriö, 2016). Based on the statistics shown in Table 2 it could be argued that the transition from secondary education to higher education is faster for students admitted through the certificate choice path as the certificate choice path students have the lowest average starting age of all the admissions paths. In addition, the overall primary path average starting age (20.87) is lower than the overall secondary path average starting age (23.68), which could indicate that the primary paths are working as intended in making the transition into higher education faster. It should be noted that the starting age is at the beginning of their studies as a degree student, meaning that the time spent in the admissions path for students coming through the secondary paths is not taken into consideration and makes the starting age higher for students coming through secondary admissions paths. Table 2 shows that the mode starting

age for students is at 20 years old and the minimum starting age is at 18 years old which could suggest that the transition from secondary education to higher education is not yet as quick as it can be.

Another goal for the development of admissions processes was making the transition out of higher education into the workforce with a higher education degree faster. This could be measured with on time or early graduation rates. Both the open university studies path (Table 23) and the LUT Highway path (Table 22) have higher on time or early graduation rates than the certificate choice path (Table 21) and the entrance exam path (Table 21). There is financial incentive for universities to be interested in making correct admissions decisions and admitting students who will graduate on time or early with their degree. When it comes to graduation statistics the secondary admissions paths that have graduation data seem to perform better at admitting students who graduate in a timely fashion than the primary admissions paths do. There are two ways to interpret this phenomenon. The first being that the primary paths are rejecting high performance students who choose to pursue higher education admission through secondary paths. Here it could be seen as the most motivated individuals from the rejected applicants, instead of waiting another year for a chance to reapply, choosing to make a financial investment to pursue higher education through the secondary admissions paths. If this were the case the university could possibly benefit from either re-evaluating their primary admissions paths or widening their secondary admissions paths so that more motivated and capable students could gain admission. An argument for this idea could be made based on the results of this thesis. For the first year of the LUT Highway path 40 students who were rejected from the entrance exam admissions path were given another chance in the form of the LUT highway path (Tolpo, 2018). Of these 40 students 21 (52.50%) went on to be admitted as degree students at the end of the path (Table 22). From 36 students who were admitted through the entrance exam path in the academic year 2018-2019 there were 31 (86.11%) students who went on to graduate eventually within the four years represented in the data (Table 21). However, when we look at timely graduation, only 21 (58.33%) of the students admitted based on their entrance exam were able to graduate on time or early (Table 21). Comparatively of the student who were rejected based on the entrance exam and admitted as degree students through the LUT Highway path 18 (85.71%) of the 21 students admitted as degree students were able to graduate on time or early (Table 22). Even if we were to adjust timely graduation for students starting in the LUT Highway path in 2018-2019 to be

in line with student who were admitted through the primary admissions paths as degree students in the academic year 2018-2019 there were 15 (71.43%) of 21 degree students admitted through the LUT Highway path who graduated on time or early (Table 22). This means that not only were there 15 students admitted through the entrance exam path that did not graduate on time or early with their bachelor's degree, but there were also 15 students that were rejected from the entrance exam path that were admitted through the LUT Highway path and graduated on time or early even with adjusted expected graduation time. Without making an adjustment to the expected graduation time 18 (85.71%) of 21 degree students graduated on time or early (Table 22). Based on this it could be argued that the entrance exam path has made incorrect admissions decisions for at least 15 (41.67%) of the 36 admissions decisions that it made.

Another way to look at the secondary admissions paths outperforming the primary admissions paths is that the students coming through the secondary admissions paths are not the same individuals who have applied to gain admissions through the primary admissions paths but instead the secondary admissions paths offer a more flexible admissions path into higher education. This explanation would however exclude the LUT Highway path as is does not offer more flexibility than becoming a degree student through the primary admissions paths. This could be seen as the secondary admissions paths being valuable to the university in their own right, but it could also mean that the university would likely not be able to affect the number of students that come through the secondary admissions paths as easily. The summer university path could be seen as an example of this idea. Based on the summer university path being the most expensive admissions path and being mostly offered outside of office hours it could be argued that it is more catered toward applicants who are currently in the workforce. Additionally, the starting ages of the students admitted through the summer university path could suggest that the summer university path has a different demographic than the primary admissions paths do (Table 2; Figure 4).

With the results of this study, it could be argued that the certificate choice path is performing as desired, with a low starting age suggesting that the path facilitates quick transition from secondary education into higher education. Additionally, the certificate choice path consistently shows that it admits students with high performance in their higher education studies even with different measures of success taken into consideration.

The same cannot be said for the entrance exam path. Although the entrance exam path also seems to enable a quick transition into higher education based on the starting ages presented in Table 2 the entrance exam path is consistently outperformed by the LUT Highway path and the certificate choice path when it comes to both GPA and graduation rates being looked at as a measure of success. Here it needs to be noted that a statistically significant difference in means was only found between the entrance exam path and the certificate choice path while the difference in mean between entrance exam path and LUT Highway was not found to be statistically significant. There was however a consistent pattern of performance to be seen in both measure of success where the LUT Highway path outperformed the entrance exam path.

It could be argued that the primary admissions paths are more equally accessible paths as the paths themselves have no additional financial burden attached to them. However, there are preparatory courses that could give applicants from a more affluent background an advantage in gaining admission through the primary admissions paths. Creating an admissions process that always makes correct admissions decisions or is equal to all applicants could prove to be difficult. Some of the recent implementation into the admissions process, like the first-timers quota look to be successful in the light of the results of this study. But there are also concerns that arise from the results. With many successful students coming through the secondary admissions paths the financial inequality between the primary paths and secondary paths pose the question of how many motivated and capable students the primary paths reject that cannot afford to or do not want to pay to apply through the secondary paths. The primary admissions paths and open university admissions paths have completely different financial burdens attached to them with the open university paths not making an applicant eligible for financial aid until they become a degree student. The results showing that when looking at timely graduation as the measure of success the open university studies path and the LUT Highway path, which are secondary admissions paths, admit degree students with a higher rate of success than the entrance exam path, shows that there is room for improvement in creating an admissions process that is equally accessible and performs well.

6.1 Limitations

The size of this study could be seen as a limitation. This study looks at one university's one study programme which does give a possible indication of the performance of the admissions process and individual admissions paths but to be able to make wider conclusion from this the time of data collection and the study programmes taken into consideration should be widened. With the LUT Highway path being a condensed open university path, it could present an opportunity to evaluate the primary admissions paths performance. This could be done through comparison due to the LUT Highway path standardising the time spent in the path. Due to the LUT Highway path only having started in the academic year 2018-2019 this study was not yet able to have multiple starting years of LUT Highway path participants with their expected graduation time having passed represented in the study. The LUT Highway path has since its creation been expanded to other study programmes at LUT University and a similar admissions path has been created at the University of Vaasa which gives future studies the opportunity to repeat the study with more data.

Additionally, when it comes to humans being the subject of a study there will always be unpredictability involved. Ahola, Asplund and Vanhala (2018, p.55) mention that there are many different aspects of a student's personal life that will affect the progress a student makes in their studies.

Another limitation that remains in this study is survivorship bias. The data still has survivorship bias although especially for the students starting in the academic year 2018-2019 the LUT Highway path gives a rare chance to reduce its effects by seeing how students who were rejected would do in their studies had they been admitted. It should be noted that the number of students chosen into the LUT Highway path from the rejected students of the entrance exam path was still limited. Overall, the secondary paths and especially the LUT Highway path help with survivorship bias as these are all students who were not admitted through the primary paths, but survivorship bias cannot be fully eliminated unless everyone who was rejected in the admissions process still proceeds to partake in the studies just to see how they would do had they been admitted.

The financial inequality of the open university paths compared to the primary admissions paths, or the transfer student path could be seen as a limitation to this study. Not having

socioeconomic status available in the data limits this study from looking at the effects of financial status on the admissions process. Additionally, it could be argued that the financial burden of participating in the open university paths could deter some from pursuing these alternative paths and therefore create more survivorship bias in the data as we do not know how well these applicants that did not get admitted through the primary admissions paths but cannot afford to or do not want to go through the secondary admissions paths would do in their studies if they were to be admitted. It seems like the LUT Highway path aims to tackle this issue by making the path itself more affordable and limited in time, but the issue remains in students not being degree students while in the path which leaves them without financial aid.

Another limitation to the study is that there is a margin for error when it comes to the success based on graduation statistics as there is no information available about whether a student has at some point other than their first year or their current year been non-attending. This would lead to students' timely graduation estimates being off by the amount of time that they have been non-attending if they have had an acceptable reason which does not use their study right time. Here the implication is that all students that are presented as having graduated on time or early have done so, but there could be additional student who have been able to graduate in a timely fashion who now present as graduating late or not all as the period of being non-attending at some point in their studies has not been able to be taken into account.

6.2 Suggestions for future actions

I believe this thesis is a scratch on the surface of the Finnish higher education system and how students are admitted into higher education. It could be beneficial to recreate the study in a different Finnish university. This could for example be the University of Vaasa, where it could be useful to see, if the findings of this thesis hold true at another university that has a similar admissions programme to the LUT Highway path. In addition, I believe it could be beneficial to also repeat the study at LUT University with more study programmes for example in the engineering field of study. As LUT University has over the years broadened the LUT Highway path to more degree programmes it could be useful to recreate the study in different fields of study.

In future studies it could additionally be of value to take socioeconomic status into consideration to see how big of a role financial status plays in having access to higher education in Finland. Although there are financial safety nets in place for higher education students in Finland, there are big differences in the costs of the different paths into higher education because of the differences in student status that comes with different admissions paths. Being admitted through a primary admission path gives the student access to student financial aid whereas the secondary admission paths force students to financially support themselves in other ways through their path studies before being admitted as degree students who are in the reach of student financial aid. Both Isopahkala-Bouret (2019, p.8) and Jokila, et al. (2021, p.594) allude to the Finnish higher education admissions process being based on a meritocratic system. This would mean that financial status should not be the factor determining someone's chances at getting into higher education. Right now, however every path into higher education has a financial factor to it. Although the entrance exam itself is free for applicants to participate in there are preparatory courses that applicants can take to try and better their chances at being admitted. For the certificate choice path there are similarly preparatory courses that one can partake in to increase their chances of doing well in the exams as well as the retaking of the matriculation examination costing money meaning that someone with higher financial status could possibly have more chances to try and increase their grades and therefore their chance at admissions into higher education. The secondary paths all have financial aspects to them that make it so that someone with a more affluent background could more easily look at the secondary admissions paths into higher education as an option whereas for some they would not be an attainable option. For these reasons it could be useful to try and see how much socioeconomic status affects students' abilities to get into higher education.

References

Aburas, R. & Nurunnabi, M., 2019. The relationship between admission exam and students' performance on an undergraduate interior design program. *International Journal of Technology and Design Education,* 29(4), pp. 961-986.

Ahola, S., Asplund, R. & Vanhala, P., 2017. Pääseekö yliopistoon, jos käy valmennuskurssin? - alustavia havaintoja. *Tiedepolitiikka*, pp. 58-61.

Ahola, S., Asplund, R. & Vanhala, P., 2018. Opiskelijavalinnat ja korkeakouluopintojen nopeuttaminen. *Valtioneuvoston selvitys- ja tutkimustoiminnan julkaisusarja,* Volume 25.

Ahola, S., Hedmo, T., Thomsen, J.-P. & Vabø, 2014. Organisational features of higher education; Denmark, Finland, Norway & Sweden. *NIFU,* Issue Working Paper 14/2014.

Ahola, S. & Spoof, J., 2019. Todistusvalinnat ja opintojen nopeuttamispolitiikka – tapaus kauppatiede. *Tiedepolitiikka,* 44(1), pp. 7-22.

Al-Hattami, A., 2014. Short- and Long-Term Validity of High School GPA for Admission to Colleges outside the United States. *Journal of college student retention: Research, theory & practise,* 16(2), pp. 277-291.

Bridgeman, B., McCamley-Jenkins, L. & Ervin, N., 2000. *Predictions of Freshman Grade-Point Average From the Revised and Recentered SAT® I: Reasoning Test,* New York: ETS RR 00-1 College Entrance Examination Board.

Buchmann, C., Condron, D. J. & Roscigno, V. J., 2010. Shadow Education, American Style: Test Preparation, the SAT and College Enrollment. *Social Forces,* 89(2), pp. 435-462.

Cimetta, A. D., D'Agostino, J. V. & Levin, J. R., 2010. Can High School Achievement Tests Serve to Select College Students?. *Educational Measurement: Issues and Practise,* 29(2), pp. 3-12.

Cohn, E., Cohn, S., Balch, D. C. & Bradley, J. J., 2004. Determinants of undergraduate GPAs: SAT scores, high-school GPA and high school rank. *Economics of education review,* 23(6), pp. 577-586.

Elston, D. M., 2021. Survivorship bias. *Journal of the American Academy of Dermatology,* pp. 1-2.

Etelä-Karjalan kesäyliopisto, 2022. *VERKOSSA Kesäyliopiston LUT-Kauppakorkeakoulun väyläopinnot 60 op 2022-2024.* [Online]
Available at: https://kesyli.net/kurssit/kesayliopiston-lut-kauppakorkeakoulun-vaylaopinnot-60-op-2022-2024/
[Accessed 6 April 2023].

Grodsky, E., Warren, J. R. & Felts, E., 2008. Testing and Social Stratification in American Education. *Annual Review of Sociology,* 34(1), pp. 385-404.

Grubb, N., Jahr, H. M., Neumüller, J. & Field, S., 2005. *OECD: Equity in Education Thematic Review Finland.* [Online]
Available at: https://www.oecd.org/finland/36376641.pdf
[Accessed 5 April 2023].

Haltia, N., 2015. Avoimen yliopiston tutkintoväylä koulutuspoliittisessa keskustelussa. *Aikuiskasvatus,* 35(4), pp. 254-265.

Haltia, N., Isopahkala-Bouret, U. & Jauhiainen, A., 2019. Korkeakoulujen opiskelijavalintauudistus ja aikuisopiskelijan opiskelumahdollisuudet. *Aikuiskasvatus,* 39(4), pp. 276-289.

Haltia, N., Isopahkala-Bouret, U. & Jauhiainen, A., 2022. The vocational route to higher education in Finland: Students' backgrounds, choices and study experiences. *European Educational Research Journal,* 21(3), pp. 541-558.

Hammond, K. L., Cook-Wallace, M. K., Moser, E. R. & Harrigan, R. L., 2015. Traditional MBA admissions criteria and graduate school success: The importance of GMAT scores and undergraduate GPA as predictors of graduate business school performance. *Academy of Educational Leadership Journal,* 19(2), pp. 67-75.

Hu, W., Li, F. & Gan, L., 2014. Does China's National College Entrance Exam Effectively Evaluate Applicants. *Frontiers of economics in China,* Volume 2, pp. 174-182.

Isopahkala-Bouret, U., 2019. Troublesome Access: Non-Admission Experiences in the Competitive Finnish Higher Education. *Social sciences,* 8(11).

Isopahkala-Bouret, U., Börjesson, M., Beach, D., Haltia, N., Jónasson, J., Jauhiainen, A., Jauhiainen, A.; Kosunen, S.; Nori, H.& Vabø, A., 2018. Access and stratification in Nordic higher education. A review of cross-cutting research themes and issues. *Education Inquiry,* 9(1), pp. 142-154.

Jalava, M., 2013. The Finnish Model of Higher Education Access: Does Egalitarianism Square With Excellence?. In: H. Meyer, E. P. St. John, M. Chankseliani & L. Uribe, eds. *Fairness in Access to Higher Education in a Global Perspective: Reconciling Excellence, Efficiency, and Justice.* Rotterdam: Sense Publisher, pp. 79-94.

Janczyk, M. & Pfister, R., 2023. *Understanding Inferential Statistics: From a for Significance Test to Z for Confidence Interval.* 3rd ed. Berlin: Springer.

Jokila, S., Haltia, N., Kosunen, S., Zhang, W. & Christensen, S., 2021. Market-Making Practices of Private Tutoring in Finland: Commercialization of Exam Preparation for Admission to Higher Education. *ECNU review of education,* 4(3), pp. 590-614.

Kauppatieteellinen ala: yhteisvalinta, 2022. *Tilasto hakijamääristä / hyväksytyistä / ensikertalaisista.* [Online]
Available at: https://www.kauppatieteet.fi/wp-content/uploads/Hakijatilasto-2022-2.pdf
[Accessed 6 April 2023].

Kauppatieteellinen ala: yhteisvalinta, 2023a. *Hakukohteet.* [Online]
Available at: https://www.kauppatieteet.fi/hakeminen/hakukohteet/
[Accessed 4 April 2023].

Kauppatieteellinen ala: yhteisvalinta, 2023b. *Valintaperusteet kauppatieteelliselle alalle.* [Online]
Available at: https://www.kauppatieteet.fi/hakeminen/valintaperusteet/
[Accessed 5 April 2023].

Kauppatieteellinen ala: yhteisvalinta, 2023. *Opiskelu.* [Online]
Available at: https://www.kauppatieteet.fi/opiskelu/
[Accessed 19 April 2023].

Kela, 2023a. *Study grant.* [Online]
Available at: https://www.kela.fi/financial-aid-for-students-study-grant
[Accessed 20 April 2023].

Kela, 2023b. *Student loan.* [Online]
Available at: https://www.kela.fi/financial-aid-for-students-student-loan
[Accessed 20 April 2023].

Kela, 2023c. *Amount of the student loan.* [Online]
Available at: https://www.kela.fi/student-loan-amount-and-payment
[Accessed 20 April 2023].

Kela, 2023d. *Who can get general housing allowance?.* [Online]
Available at: https://www.kela.fi/general-housing-allowance-eligibility
[Accessed 20 April 2023].

Kela, 2023e. *Student loan compensation.* [Online]
Available at: https://www.kela.fi/student-loan-compensation
[Accessed 20 April 2023].

Kela, 2023f. *Amount and payment of student loan compensation.* [Online]
Available at: https://www.kela.fi/student-loan-compensation-amount-and-payment
[Accessed 20 April 2023].

Kobrin, J. L. & Patterson, B. F., 2011. Contextual Factors Associated With the Validity of SAT Scores and High School GPA for Predicting First-Year College Grades. *Educational Assessment,* 16(4), pp. 207-226.

Kolby, J., 2005. *SAT prep course,* Los Angeles: Nova Press.

Koretz, D., Yu, C., Mbekeani, P. P., Langi, M., Dhaliwal, T. & Braslow, D., 2016. Predicting Freshman Grade Point Average From College Admissions Test Scores and State High School Test Scores. *AERA Open,* 2(4), pp. 1-13.

Kuncel, N. R., Credé, M. & Thomas, L. L., 2007. A Meta-Analysis of the Predictive Validity of the Graduate Management Admission Test (GMAT) and Undergraduate Grade Point Average (UGPA) for Graduate Student Academic Performance. *Academy of Management learning & education,* 6(1), pp. 51-68.

Laki naisten vapaaehtoisesta asepalveluksesta 285/2022, 2022. *Laki naisten vapaaehtoisesta asepalveluksesta 285/2022.* s.l.:s.n.

Laki Ylioppilastutkinnosta 502/2019, 2019. *Laki Ylioppilastutkinnosta 502/2019.* s.l.:s.n.

Lappeenrannan uutiset, 2019. *Lappeenrannan uutiset.* [Online]
Available at: https://www.lappeenrannanuutiset.fi/paikalliset/1276075
[Accessed 1 November 2023].

Lappeenrannan uutiset, 2019. *LUT Highway joustavana väylänä yliopistoon: "vuoden mittainen pääsykoe".* [Online]
Available at: https://www.lappeenrannanuutiset.fi/paikalliset/1276075
[Accessed 17 April 2023].

Lindwell, W., Holden, K. & Butler, J., 2023. *Universal Principles of Design, Updated and Expanded Third Edition: 200 Ways to Increase Appeal, Enhance Usability, Influence Perception, and Make Better Design Decisions.* 3 ed. Minneapolis: Quatro Publishing Group USA.

Loucopoulos, C., Gutierrez, C. F. & Hofler, D., 2007. Reassessment of the relative weights of GPA and GMAT in the MBA admission decision process. *Academy of Information and Management Sciences Journal,* 10(2), pp. 91-97.

LUT University, 2019. *LUT tarjoaa jälleen Highway-ohjelman kandidaattiopintoihin.* [Online]
Available at: https://www.lut.fi/fi/uutiset/lut-tarjoaa-jalleen-highway-ohjelman-kandidaattiopintoihin
[Accessed 17 April 2023].

LUT University, 2019. *LUT tarjoaa jälleen Highway-ohjelman kandidaattiopintoihin.* [Online]
Available at: https://www.lut.fi/fi/uutiset/lut-tarjoaa-jalleen-highway-ohjelman-kandidaattiopintoihin
[Accessed 1 November 2023].

LUT University, 2021. *Voiko koulutusohjelmaa vaihtaa kesken opintojen?.* [Online]
Available at: https://blogs.lut.fi/abitiimi/voiko-koulutusohjelmaa-vaihtaa-kesken-opintojen/
[Accessed 18 April 2023].

LUT University, 2022a. *What are ECTS credits?.* [Online]
Available at: https://blogs.lut.fi/newcomers/applying-to-lut-ects-credits/
[Accessed 6 April 2023].

LUT University, 2022b. *Väylien kautta tutkinto-opiskelijaksi yliopistoon.* [Online]
Available at: https://blogs.lut.fi/abitiimi/vaylien-kautta-tutkinto-opiskelijaksi-yliopistoon/
[Accessed 6 April 2023].

LUT University, 2023a. *Yliopistoon hakevan useimmin kysytyt kysymykset.* [Online]
Available at: https://blogs.lut.fi/abitiimi/yliopistoon-hakevan-useimmin-kysytyt-kysymykset/
[Accessed 4 April 2023].

LUT University, 2023b. *Todistusvalinta – mitä se tarkoittaa LUT-yliopiston koulutusohjelmissa?.* [Online]
Available at: https://blogs.lut.fi/abitiimi/todistusvalinta-mita-se-tarkoittaa-kauppatieteiden-ja-tekniikan-aloilla/
[Accessed 5 April 2023].

LUT University, 2023c. *Reitit yliopistoon – case LUT.* [Online]
Available at: https://blogs.lut.fi/abitiimi/reitit-yliopistoon-case-lut/
[Accessed 6 April 2023].

LUT University, 2023d. *Open university: Studying at Open University.* [Online]
Available at: https://www.lut.fi/en/studies/open-university/studying-open-university
[Accessed 6 April 2023].

LUT University, 2023e. *Open university: Registration and study fees.* [Online]
Available at: https://www.lut.fi/en/studies/open-university/registration-and-study-fees
[Accessed 6 April 2023].

LUT University, 2023f. *Kauppatieteiden väylähaku kandidaatin opintoihin.* [Online]
Available at: https://www.lut.fi/fi/opiskelu/hae-yliopistoon/avoimen-vaylan-haku/kauppatieteiden-vaylahaku-kandidaatin-opintoihin
[Accessed 6 April 2023].

LUT University, 2023g. *Kesäyliopiston kauppatieteiden väylähaku kandidaatin opintoihin.* [Online]
Available at: https://www.lut.fi/fi/kesayliopiston-kauppatieteiden-vaylahaku-kandidaatin-opintoihin
[Accessed 6 April 2023].

LUT University, 2023h. *Avoin yliopisto.* [Online]
Available at: https://www.lut.fi/fi/opiskelu/avoin-yliopisto
[Accessed 11 April 2023].

LUT University, 2023i. *LUT Kandidaatti Highway.* [Online]
Available at: https://www.lut.fi/fi/opiskelu/avoin-yliopisto/lut-highway/lut-kandidaatti-highway
[Accessed 17 April 2023].

LUT University, 2023j. *Siirtohaku.* [Online]
Available at: https://www.lut.fi/fi/opiskelu/hae-yliopistoon/siirtohaku
[Accessed 18 April 2023].

LUT University, 2023k. *Siirtohaku kauppatieteissä.* [Online]
Available at: https://www.lut.fi/fi/opiskelu/hae-yliopistoon/siirtohaku/siirtohaku-kauppatieteissa
[Accessed 18 April 2023].

LUT University, 2023l. *Registration for the Academic year.* [Online]
Available at: https://elut.lut.fi/en/completing-studies/planning-your-studies/enrolments/registration-academic-year
[Accessed 20 April 2023].

LUT University, 2023m. *Opiskelijakortti ja jäsenpalvelut - LTKY.* [Online]
Available at: https://elut.lut.fi/fi/opiskelijaelama/ylioppilaskunta-ltky/opiskelijakortti-ja-jasenpalvelut-ltky
[Accessed 20 April 2023].

LUT University, 2023n. *Study rights.* [Online]
Available at: https://elut.lut.fi/en/completing-studies/planning-your-studies/study-rights
[Accessed 29 October 2023].

LUT University, 2023o. *Enrolment for the Academic Year for new students.* [Online]
Available at: https://elut.lut.fi/en/completing-studies/planning-your-studies/enrolments/enrolment-academic-year-new-students
[Accessed 29 October 2023].

MacFarland, T. W. & Yates, J. M., 2021. *Using R for Biostatistics.* Cham: Springer Nature Switzerland AG.

Martin, J. H., Montgomery, R. L. & Saphian, D., 2006. Personality, achievement test scores, and high school percentile as predictors of academic performance across four years of coursework. *Journal of Research in Personality,* 40(4), pp. 424-431.

Opetus- ja Kulttuuriministeriö , 2023d. *Opintotukijärjestelmä.* [Online]
Available at: https://okm.fi/opintotukijarjestelma
[Accessed 19 April 2023].

Opetus- ja kulttuuriministeriö, 2016. *Valmiina valintoihin: Ylioppilastutkinnon parempi hyödyntäminen korkeakoulujen opiskelijavalinnoissa,* s.l.: Opetus- ja Kulttuuriministeriö.

Opetus- ja Kulttuuriministeriö, 2017. *Opetus- ja Kulttuuriministeriö: Universities, core funding model from 2017.* [Online]
Available at:
https://okm.fi/documents/1410845/4392480/Universities_funding_2017.pdf/abc0974d-b8d5-4486-a12a-aa141d54b66f/Universities_funding_2017.pdf?t=1496418613000
[Accessed 11 April 2023].

Opetus- ja Kulttuuriministeriö, 2020. *Yliopistojen sopimukset.* [Online]
Available at:
https://okm.fi/documents/1410845/3992814/Lappeenrannan+teknillinen+yliopisto+sopimus+2021-2024.pdf/fcd553da-a005-2986-1067-6ef11a94bb44/Lappeenrannan+teknillinen+yliopisto+sopimus+2021-2024.pdf?version=1.1&t=1611841175096
[Accessed 5 April 2023].

Opetus- ja Kulttuuriministeriö, 2021. *Opetus- ja Kulttuuriministeriö: Universities, Core Funding from 2021.* [Online]
Available at:
https://okm.fi/documents/1410845/4392480/UNI_core_funding_2021.pdf/a9a65de5-bd76-e4ff-ea94-9b318af2f1bc/UNI_core_funding_2021.pdf?t=1608637262540
[Accessed 5 April 2023].

Opetus- ja Kulttuuriministeriö, 2023a. *Opetus- ja Kulttuuriministeriö: Korkeakoulujen ja tiedelaitosten ohjaus, rahoitus ja sopimukset.* [Online]
Available at: https://okm.fi/en/steering-financing-and-agreements
[Accessed 5 April 2023].

Opetus- ja Kulttuuriministeriö, 2023b. *Opetus- ja Kulttuuriministeriö: Yliopistojen sopimukset.* [Online]
Available at: https://okm.fi/yliopistot-sopimukset
[Accessed 5 April 2023].

Opetus- ja Kulttuuriministeriö, 2023c. *Higher education and degrees.* [Online]
Available at: https://okm.fi/en/higher-education-and-degrees
[Accessed 7 April 2023].

Opetus- ja Kulttuuriministeriö, 2023e. *Lainsäädäntö: Opintotuki.* [Online]
Available at: https://okm.fi/opintotuki/lainsaadanto
[Accessed 20 April 2023].

Opetus- ja Kulttuuriministeriö, 2023f. *Student Financial Aid in Finland.* [Online]
Available at: https://okm.fi/en/student-financial-aid-system
[Accessed 20 April 2023].

Opetus- ja Kulttuuriministeriö, 2023g. *Questions and answers related to compulsory education.* [Online]
Available at: https://okm.fi/en/faq-about-the-extension-of-compulsory-education
[Accessed 15 November 2023].

Opintopolku, 2023. *Opiskelu kesäyliopistossa.* [Online]
Available at: https://opintopolku.fi/konfo/fi/sivu/opiskelu-kesayliopistossa
[Accessed 6 April 2023].

Opintotukilaki 65/1994, 1994. *Opintotukilaki 65/1994.* s.l.:s.n.

Potila, A.-K., Moisio, J., Ahti-Miettinen, O., Pyy-Martikainen, M. & Virtanen, V., 2017. *Opiskelijatutkimus 2017: EUROSTUDENT VI -tutkimuksen keskeiset tulokset,* Helsinki: Opetus- ja Kulttuuriministeriö.

Ross, A. & Willson, V. L., 2017. *Basic and Advanced Statistical Tests Writing Results Sections and Creating Tables and Figures..* 1st ed. Rotterdam: SensePublisher.

Rothstein, J. M., 2004. College performance predictions and the SAT. *Journal of econometrics,* 121(1), pp. 297-317.

Sarbin, T. R., 1943. A Contribution to the Study of Actuarial and Individual Methods of Prediction. *American Journal of Sociology,* 48(5), pp. 593-602.

Sawyer, R., 2013. Beyond Correlations: Usefulness of High School GPA and Test Scores in Making College Admissions Decisions. *Applied Measurement in Education,* 26(2), pp. 89-112.

Schewach, O. R., Shen, W., Sackett, P. R. & Kuncel, N. R., 2017. Differential Prediction in the Use of the SAT and High School Grades in Predicting College Performance: Joint Effects of Race and Language. *Educational Measurement: Issues and Practice,* 36(3), pp. 46-57.

Setiawan, A. & Margono, K. S., 2015. Predicting Success Study Using Students GPA Category. *The Asian Journal of Technology Management,* 8(1), pp. 68-74.

Stoklasa, J., Talášek, T. & Viktorová, L., 2020. *Do we have crystal balls? A case study of the possibility of predicting academic success using fsQCA.* Olomouc, Palacký University Olomouc.

Suomen Ekonomit, 2023. *Kauppatieteiden opiskelu ja kauppatieteilijöiden työllistyminen.* [Online]
Available at: https://www.ekonomit.fi/tyoelaman-tietopankki/tietoa-kauppatieteista/#576183c5
[Accessed 5 September 2023].

Tolpo, A., 2018. *Yle: Pääsykokeissa mokannut hakija pääsee sittenkin aloittamaan opinnot yliopistossa - 100 nopeinta pääsi yliopiston ilmaiseen erikoisohjelmaan.* [Online]
Available at: https://yle.fi/a/3-10379001
[Accessed 15 April 2023].

University of Vaasa, 2019. *Uusi lukuvuosi alkaa: Ennätys määrä myös tekniikan opiskelijoita.* [Online]
Available at: https://www.uwasa.fi/fi/news/uudetopiskelijat
[Accessed 19 April 2023].

University of Vaasa, 2021. *Vaasa Gateway saa rinnalleen Tekniikan Gateway-väylän.* [Online]
Available at: https://www.uwasa.fi/fi/uutishuone/uutiset/vaasa-gateway-saa-rinnalleen-

tekniikan-gateway-vaylan
[Accessed 17 April 2023].

University of Vaasa, 2022. *Vaasa Gateway.* [Online]
Available at: https://www.uwasa.fi/fi/koulutus/avoin/tavoitteena-tutkinto/gateway
[Accessed 17 April 2023].

Verostek, M., Miller, C. W. & Zwickl, B., 2021. Analyzing admissions metrics as predictors of graduate GPA and whether graduate GPA mediates Ph.D. completion. *Physical Review Physics Education Research,* 17(2).

Wambugu, L. & Emeke, A., 2013. *Relationship between Entry Qualification and Academic Performance in Undergraduate Science Courses at the University of Nairobi, Kenya.* Abuja, Commonwealth of Learning, pp. 1-16.

Wittman, D., 2022. Average Rank and Adjusted Rank Are Better Measures of College Student Success than GPA. *Educational measurement, issues and practise,* 41(4), pp. 23-34.

Yliopistolaki 558/2009, 2009. *Yliopistolaki 558/2009.* s.l.:s.n.

Ylioppilastutkintolautakunta, 2023a. *TUTKINTOMAKSUT.* [Online]
Available at: https://www.ylioppilastutkinto.fi/fi/tutkinnon-suorittaminen/ilmoittautuminen/tutkintomaksut
[Accessed 15 November 2023].

Ylioppilastutkintolautakunta, 2023b. *TUTKINNON RAKENNE.* [Online]
Available at: https://www.ylioppilastutkinto.fi/fi/tutkinnon-suorittaminen/tutkinnon-rakenne
[Accessed 15 November 2023].

Ylioppilastutkintolautakunta, 2023c. *KOKEIDEN UUSIMINEN.* [Online]
Available at: https://www.ylioppilastutkinto.fi/fi/tutkinnon-suorittaminen/ilmoittautuminen/kokeiden-uusiminen
[Accessed 15 November 2023].

Zwick, R., 2013. Disentangling the Role of High School Grades, SAT® Scores, and SES in Predicting College Achievement. *ETS research report series,* 2013(1), pp. 1-20.

Zwick, R. & Sklar, J. C., 2005. Predicting College Grades and Degree Completion Using High School Grades and SAT Scores: The Role of Student Ethnicity and First Language. *American Educational Research Journal,* 42(3), pp. 439-464.

Appendix 1. Tukey's honestly significant difference results for current study right GPA

Group 1	Group 2	Lower Limit	Group 1 -Group 2	Upper limit	P-value
1	2	-0.3802	-0.2241	-0.0680	0.0006
1	3	-0.3415	-0.1283	0.0848	0.5211
1	4	-0.7751	-0.3460	0.0831	0.1948
1	5	-0.3428	-0.1167	0.1094	0.6830
1	6	-1.2629	-0.3968	0.4693	0.7821
2	3	-0.1070	0.0958	0.2986	0.7591
2	4	-0.5459	-0.1219	0.3022	0.9642
2	5	-0.1090	0.1074	0.3238	0.7182
2	6	-1.0363	-0.1727	0.6909	0.9930
3	4	-0.6659	-0.2177	0.2305	0.7369
3	5	-0.2489	0.0116	0.2722	1.0000
3	6	-1.1442	-0.2685	0.6072	0.9528
4	5	-0.2252	0.2293	0.6838	0.7040
4	6	-1.0024	-0.0508	0.9008	1.0000
5	6	-1.1591	-0.2801	0.5988	0.9446

Appendix 2. Independent samples t-test results for the current study right GPA variable

Group 1	Group 2	P-value	Is null hypothesis rejected [logical]
1	2	0.00011256	1
1	3	0.0971	0
1	4	0.0351	1
1	5	0.1503	0
1	6	0.2309	0
2	3	0.1743	0
2	4	0.4214	0
2	5	0.1491	0
2	6	0.5756	0
3	4	0.1286	0
3	5	0.8816	0
3	6	0.3260	0
4	5	0.0913	0
4	6	0.8752	0
5	6	0.2645	0

Appendix 3. Tukey's honestly significant difference results for GPA including all studies

Group 1	Group 2	Lower Limit	Group 1 -Group 2	Upper limit	P-value
1	2	-110.3043	-65.2302	-20.1561	0.0005
1	3	-79.1359	-17.5949	43.9461	0.9649
1	4	-184.3239	-60.4188	63.4862	0.7334
1	5	-102.2319	-36.9438	28.3442	0.5902
1	6	-374.1728	-124.0855	126.0019	0.7186
2	3	-10.9204	47.6353	106.1910	0.1866
2	4	-117.6384	4.8114	127.2611	1.0000
2	5	-34.1956	28.2864	90.7684	0.7907
2	6	-308.2248	-58.8553	190.5142	0.9850
3	4	-172.2440	-42.8239	86.5961	0.9353
3	5	-94.5794	-19.3489	55.s8815	0.9779
3	6	-359.3557	-106.4906	146.3745	0.8370
4	5	-107.7683	23.4750	154.7183	0.9958
4	6	-338.4501	-63.6667	211.1168	0.9862
5	6	-340.9448	-87.1417	166.6614	0.9249

Appendix 4. Results for Mann-Whitney U test for the variable GPA including all studies

Group 1	Group 2	P-value	Is null hypothesis rejected [logical]
1	2	0.00007874	1
1	3	0.3139	0
1	4	0.1458	0
1	5	0.0691	0
1	6	0.1845	0
2	3	0.0160	1
2	4	0.8805	0
2	5	0.1412	0
2	6	0.5612	0
3	4	0.2819	0
3	5	0.4282	0
3	6	0.1883	0
4	5	0.7239	0
4	6	0.2964	0
5	6	0.2388	0

Appendix 5. Tukey's honestly significant difference results for the bachelor's degree GPA

Group 1	Group 2	Lower Limit	Group 1 - Group 2	Upper limit	P-value
1	2	-57.3324	-32.9143	-8.4962	0.0030
1	3	-23.5271	6.0229	35.5728	0.9534
1	4	-42.1228	-12.2743	17.5743	0.7161
2	3	11.5192	38.9372	66.3551	0.0015
2	4	-7.0995	20.6401	48.3796	0.2231
3	4	-50.6458	-18.2971	14.0516	0.4662

Appendix 6. Results for the Mann-Whitney U test for bachelor's degree GPA

Group 1	Group 2	P-value	Is null hypothesis rejected [logical]
1	2	0.0004954	1
1	3	0.6417	0
1	5	0.3465	0
2	3	0.0002532	1
2	5	0.0655	0
3	5	0.1434	0

Appendix 7. Results for the independent samples t-test for the open university GPA

Group 1	Group 2	P-value	Is null hypothesis rejected [logical]
3	4	0.5456	0
3	5	0.2543	0
4	5	0.2306	0