GENDER BIAS IN THE FIELD OF ECONOMICS: AN ANALYSIS OF SOUTH AFRICAN ACADEMIA

A THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF COMMERCE

(ECONOMICS)

BY

SIOBHAN HITCHCOCK

G14H1039

DEPARTMENT OF ECONOMICS AND ECONOMIC HISTORY

RHODES UNIVERSITY

2019

SUPERVISOR: PROF. GAVIN KEETON

Declaration of original work

This page declares that the work produced in this thesis is my own and was conducted whilst completing the degree of Master of Economics whilst at Rhodes University. Any work that is not my own has been credited accordingly. This thesis has not been submitted to other universities, Technikons or colleges for degree purposes.

Siobhan Hitchcock

Signed: ……..

Date: …….

Abstract

In recent years there has been a growing focus internationally on the low participation of females in Economics, both in academia and business. While female enrolment in higher education, including other maths-based subjects, has grown substantially, this has not been the case for Economics. Economics, particularly as one progresses through postgraduate studies to doctoral degrees now stands out as an outlier. A number of reasons have been advanced for this, including the nature of the subject, the type of people it attracts and the lack of female role models.

Male and female enrolments in South African HEIs have grown between 2007 and 2017, but females have grown at a faster rate, thus increasing the female share of total enrolments to 59%. Female students are more successful and so make up an even greater proportion of South African graduates. Female enrolments and graduates are also higher than in the US. As in the US there is a significant drop off in female representation when progressing from undergraduate to postgraduate studies in South Africa.

When looking at Economics in South Africa in comparison to the broad CESM categories, female enrolment in Economics Bachelor degrees is significantly lower than in Business and Humanities, but on a par with STEM subjects. At the Doctoral level, there are sharp drop offs in female enrolments for all categories. Business and Economics are the laggards at the Doctoral level, below STEM and Humanities.

Furthermore, females make up a minority of academic staff in South African HEIs, with males dominating in especially the higher academic ranks. As one moves up the academic ladder, the female share decreases.

This research analyses gender compositions of staff and students at South African HEIs. National data are obtained from government publications and data relating to four specific South African universities was obtained directly from the universities.

Questionnaires were sent to a sample of academic staff and students who are in the field of economics to identify whether there is a role model effect for economics students and whether female academics experience the same forms of biases, discrimination, or treatment as that identified in international studies.

It was concluded that while there are drop offs in the overall female representation of students at the Masters and Doctoral levels in South Africa, this share is gradually increasing. Additionally, Economics

seems to perform better than what is depicted in the US, and in comparison to some STEM subjects in South Africa.

Furthermore, the environment within the field of academic economics for both female students and staff seems to be more positive than what the international literature depicts for the US. But there are nonetheless different levels of satisfaction between male and female academic economists.

While the student surveys revealed that female Economics students do not attach great importance to female role models, there is some evidence of correlation between the percentage of female professors and the percentage of female PhD students across a range of STEM subjects in South Africa.

Acknowledgements

This thesis could never have been possible without the help of some very important people in my life. Firstly, I need to thank my supervisor, Prof. Gavin Keeton, for all of his time, hard work and help throughout this journey. He always went the extra mile to help me when I got stuck or overwhelmed. I would also like to thank him for encouraging me to continue my Honours work at the Masters level. It has been an extremely long and challenging task, but I have thoroughly enjoyed and loved this experience and opportunity and I couldn't have done it without him. I would also like to thank Prof. Jen Snowball for all of her help with my qualitative analysis.

To all of the people who helped me by taking out the time to gather the statistics that I required from each university, I am immensely grateful.

I am grateful to Rhodes University, the Department of Economics and Economic History, and the RU Library for providing me with the environment and resources needed to write this thesis.

I would also like to thank all of my wonderful friends for their constant support and love over my whole university career, without whom I could not have made it this far. From joining me for early mornings and late nights in the library, and being there to make me laugh when I was very stressed, my friends have been a pillar of strength for me.

Last, but not least, I need to thank my family. Each has been an infinite source of support, love and encouragement. To my parents, in particular, Fiona and Bevan Hitchcock, there are no words to describe my gratitude. You both have provided me with not only the opportunity, but also the skills and resources to reach all my goals. Thank you for dealing with me when I have been very frantic and stressed and for always being able to calm me down and make me feel better. I would never have made it to where I am today without the two of you constantly in my corner. I could never have asked for better parents.

Table of Contents

List of Tables

List of Figures

Glossary

AEA – American Economic Association

BA – Bachelor of Arts

BComm – Bachelor of Commerce

BEcon – Bachelor of Economics

BMC – Biochemistry, Microbiology, Molecular and Cell Biology, and Biotechnology

BSc – Bachelor of Science

BSS – Bachelor of Social Science

BZE – Biology, Botany, Zoology, and Entomology

CE – Civil Engineering

CESM – Classification of Educational Subject Matter

CESM – Classification of Educational Subject Matter

CHE – Chemical Engineering

CM - Chemistry

CS – Computer Science

ECO – Economics

EE – Electrical and Electronic Engineering

EGG – Earth Science, Environmental Science, Geography, and Geology

ENG – Engineering

HEIs – Higher Education Institutions

IE – Industrial Engineering

IS – Information Systems

MAT – Mathematics and Applied Mathematics

ME – Mechanical and Mechatronic Engineering

NWU – North-West University

PHY – Physics

RU – Rhodes University

STA – Statistics

STEM – Science, Engineering, Technology, and Maths.

SU – Stellenbosch University

UCT – University of Cape Town

UFS – University of the Free State

UJ – University of Johannesburg

UKZN – University of Kwa-Zulu Natal

UP – University of Pretoria

UWC – University of the Western Cape

WITS – University of the Witwatersrand

Chapter 1: Introduction

1.1. Research Context

Arrow (1971: 1) states that "the fact that different groups of workers, be they skilled or unskilled, black and white, or male and female, receive different wages, invites the explanation that the different groups must differ according to some characteristic valued on the market". Standard economic theory would first attribute this to productivity differences. Arrow (1971) adds that differences in productivity can be caused by a number of factors, such the quantity and quality of education an individual receives, the size of one's family, and whether a household is headed by a man or a woman. This is reflected in Nussbaum (2003) who explains that aggregate growth measures cannot be seen as true reflections of quality of life as they fail to ask how those who are disadvantaged are doing. He adds that "women figure in the argument as people who are often unable to enjoy the fruits of a nation's general prosperity" (Nussbaum, 2003: 33). Such an outcome, by Arrow's (1971) logic may reflect different productivities, because particular groups, say blacks or women, have not had the opportunity to gain the same productive capabilities as those who are highly paid. Alternatively, the economics of discrimination suggests that these groups of workers are in fact perfect substitutes and thus different outcomes suggest that the market also values some personal characteristic other than productivity (Arrow, 1971). Taste-based or statistical discrimination is often debated as to which is a more appropriate depiction of this phenomenon. Taste-based discrimination theories explain how discriminatory actions against market participants are derived from individuals' tastes for discrimination in a market setting (Guryan and Charles, 2013). On the other hand, statistical discrimination theories demonstrate how imperfect information affects the way in which economic actors assess some characteristic of individuals (Guryan and Charles, 2013).

Kaas and Manger (2011) suggest that discrimination, be it racial, gender or religious, has a substantial bearing on labour market outcomes, affecting job opportunities, promotion decisions and wage rates. However, they note that the degree of discrimination in the labour force can be impacted by the supply of skilled workers. If there is a shortage of skilled labour then firms that discriminate "cannot survive the 'war for talents'" (Kaas and Manger, 2011: 14) and the market will push them out. However, if there is an excess supply of skilled labour the opportunities for discrimination become stronger as there is more choice (Kaas and Manger, 2011).

The topic of gender discrimination has become increasingly prominent in recent times. With growing and increasingly vocal Women's Rights movements across the world, it is important to shine a light on those areas of the economy where women face particularly strong biases against them. Hays and

Morrow (2013: 13) state that "much of the discrimination and inequality that women face when entering, maintaining, and progressing through the workforce is directly related to the hegemonic masculinity phenomenon". They emphasise that this hegemonic masculinity attempts to defend this discrimination with logic or justification and seeks to convince men and women that current outcomes are the norm. Hays and Morrow (2013) suggest that such defences of the status quo are more prevalent in some occupations and fields of study. They emphasise that women face a particularly thick glass ceiling when rising through the ranks in male-dominated occupations. Such outcomes are not just morally reprehensible they are also economically inefficient, because society is deprived of the products of its most talented members.

Kahn (2014: 283) found that the early analyses of the persistent low level of representation and relative wage for women in the US workforce were attributed to causes such as "productivity characteristics, employer discrimination, and the disparate effects of the overall wage structure". Kassenböhmer and Sinning (2010) analysed differences in the wage distribution of the gender pay gap in the US from 1993 to 2006. They found that the overall wage gap has fallen over time; however, the gap at the bottom of the wage distribution has decreased at a more rapid rate than at the top. The decrease in the wage gap at the bottom of the distribution can be explained by the increase in the share of college-educated women joining the workforce (Kassenböhmer and Sinning, 2010; Breede *et al.*, 2011).

Nonetheless, women in the US remain underrepresented in the fields of science, technology, engineering and maths (STEM) and tend to earn significantly less than their male counterparts, even when controlling for variables such as productivity, rank and children (Breede *et al.*, 2011; Ceci *et al.*, 2014).

Ceci *et al.* (2014), Dynan and Rouse (1997), Hale and Regev (2014), and Lundberg and Stearns (2019) found that female college students were particularly underrepresented in the STEM fields at both undergraduate and postgraduate levels. Several reasons have been put forth to justify this underrepresentation of women, such as women being inherently less interested in these subjects or being unwilling or unable to obtain the necessary maths skills to do well (Dynan and Rouse, 1997). Others believe that low female participation can be attributed to a lack of female role models in STEM fields, or that the classroom environment for STEM subjects is unappealing to women (Ceci *et al.*, 2014; Dynan and Rouse, 1997; Hale and Regev, 2014; Lundberg and Stearns, 2019).

If few women are studying in these fields the results should spill-over into the labour force. For Economics, studies show that in Europe and the US academic economists are predominately male and that women tend to get promoted at a slower rate than their equally skilled male counterparts

(McDowell *et al*., 1999; The Economist, 2017; Ceci *et al*., 2014; Nelson, 2016; Mixon and Treviño, 2005). There seems to be a persistent gender gap in promotion that cannot be fully attributed to differences in productivity, emphasising the existence of a glass ceiling for women. Furthermore, the glass ceiling tends to become thicker as one moves up the academic ranks (The Economist, 2017; Nelson, 2016; CSWEP, 2018).

Discriminatory attitudes have also been said to be a deterrent for women pursuing Economics as a profession. Nelson (2016: 1365) explains that "the [economics] discipline has been affected by not only a bias in perspective, but also a bias towards "hard"-seeming, masculine-associated definitions, assumptions and techniques". Gender stereotypes and negative attitudes pose a threat to the ability of women to perform and can be discouraging and have detrimental effects on the development of women's academic and professional careers (Ceci *et al*., 2014; Wu, 2017). It has been suggested that women tend to dislike the combative and belligerent culture prevalent within the economics profession. An example of this was reported by faculty members at Harvard when criticising former Harvard economics professor, Larry Summers, for consistently "humiliating faculty members in meetings, shutting down debate and dominating discussions" (Rimer, 2005: 1). Lundberg and Stearns (2019) suggest that similar behaviours are apparent in economics conferences or seminars which tend to be mostly hostile environments. Wu (2017) in an analysis of language used by professional economists on an anonymous blog, identified that male participants frequently refer to female economists in language that is degrading and sexual in nature.

A large amount of international literature highlights that Economics in particular has a significant gender problem that needs to be rectified. This thesis will attempt to identify whether similar gender patterns occur also in South African higher education and whether gender imbalances in Economics differ from other STEM disciplines in South. The literature on gender discrimination within the Economics discipline in South Africa is relatively small and therefore this research will make a significant contribution to the body of knowledge in gender economics.

1.2. Research Goals

This research seeks to analyse the role of gender within the field of economics in South African academia. It seeks to identify whether South Africa differs in comparison to international findings when it comes to gender imbalances within the field of economics, both at a student and academic staff level. The rationale behind the research is to highlight the issue of gender bias and encourage universities to take a proactive approach to being more inclusive of women, particularly in the fields that are currently very male-dominated. It is not the intention of this research to prove that Economics or economists intentionally discriminate against women, but rather to identify whether a problem

exists in South Africa as elsewhere and, if so, create awareness of this problem, and encourage debate regarding gender issues and how to make progress in addressing them. Hence, this research aims to answer the following three key questions:

- Are there significant gender imbalances in the compositions of staff and students in the STEM fields at South African universities?
- Does Economics lag behind in gender inclusion in comparison to other STEM disciplines?
- Has there been any progress in bringing more women into the field of Economics, particularly towards the higher ranks of academia?
- What are some of the possible reasons for low female representation in the field of Economics?

1.3. Data, Methods, and Techniques

This research is primarily broken up into two parts. The first part analyses student gender compositions in Economics, as well as various other STEM disciplines at South African higher education institutions (HEIs). Survey analysis is then used to provide some understanding of what influences students to pursue or not pursue Economics in their university studies. The second section analyses the gender compositions of academic staff members in Economics, as well as various other STEM disciplines, at South African HEIs. Survey analysis is then used to obtain information regarding opinions and experiences of those working as academic economist to identify possible gender differences.

The first section analyses gender compositions of students for undergraduate and postgraduate studies at a national level as well as a sample of South African universities. For the undergraduate analysis, the gender compositions of students is analysed by faculty, to avoid over-lapping registrations, and by department for postgraduate students. The data is analysed over a period of 6 years 201-19 to identify changes in the participation of women in these subjects. Trend analysis is used to identify patterns in the gender compositions of students. It examines Economics compared to other STEM subjects.

Furthermore, this research explores the reasons why students have chosen to pursue or not pursue Economics in their university careers. Here Rhodes University was used as a case study. Questionnaires were sent to students at Rhodes University who are taking Economics as a major in 2019 as well as those who took Economics as a major in 2018 who chose to further their studies either in Economics or another subject at the postgraduate level at Rhodes University. The aim here is to gain insight into why these students chose to pursue Economics as a major, and why some students chose to pursue Economics in postgraduate studies and others chose rather to pursue their other undergraduate

major. The questionnaire asked students about factors impacting their decision to continue/not continue with Economics, including the gender of their lecturers and tutors and whether that impacted their decision to take/not take Economics. This was to understand the importance of role models on students' decisions as this is identified as important in the literature.

The second section analyses the gender composition of staff members in each of the sampled departments at the chosen 4 South African universities at each academic rank, excluding administrative staff. The departments include Economics, Information Systems, Civil Engineering, Electrical Engineering, Mechanical Engineering, Industrial Engineering, Chemical Engineering, Biochemistry, Microbiology, Molecular and Cell Biology, Biotechnology, Botany, Biological Sciences, Zoology, Entomology, Chemistry, Earth Science, Environmental Science, Geography, Geology, Mathematics and Applied Mathematics, Computer Science, Statistics, and Physics. Gender compositions are tracked over a 6 year period to identify whether there has been progress in the participation of women. Trend analysis was used to reveal the extent and progress in reducing gender imbalances in STEM fields and whether Economics stands as an outlier in comparison.

In addition to this statistical analysis, the research makes use of surveys to identify the extent to which identified gender imbalances can be linked to gender bias or other factors. Online questionnaires were sent to a sample of male and female academic staff members working in the Economics departments of South African universities. Questions focused on personal opinions and experiences regarding gender within their department. The questionnaire is used to help identify whether gender discrimination or bias plays a role in the low proportion of women in Economics academia in South Africa, especially in the higher ranks.

1.4. Structure of Research

This research consists of 5 chapters. Chapter 1 introduces and gives context to the research, highlights some key theory and literature, as well as gives a brief overview of the research goals and methodology used. Chapter 2 provides a literature review that discusses discrimination, gender and gender discrimination in academia. Chapter 3 sets out the sources of data and the methods and techniques used in conducting this research. Chapter 4 discusses the findings and gives an interpretation of the results. Chapter 5 concludes the research and provides insight for future progression in gender-related issues in academia.

Chapter 2: Literature Review

2.1. Introduction

Although Economics is considered a part of the social sciences, its quantitative and mathematical nature has sparked debate on whether it should be re-categorised as a STEM discipline. Fourcade *et al*. (2015) suggests that economists tend to view themselves as being at the top of the social sciences pecking order because they are the most scientific in the nature of their discipline. Although Economics and other social sciences study human behaviour, economists use mathematical models and projections as analytical tools to present their findings (Gómez, 2018). The higher financial position of economists and their ability to use quantitative analysis and complex mathematics give economists a sense of superiority and entitlement over the less formal social sciences (Fourcade *et al*., 2015). Moreover, with mathematics and pragmatism as dominant aspects of economics, observing real-world problems and finding justified solutions is often conducted through the use of economic positivism (Gómez, 2018). According to data obtained from the Bureau of Labor Statistics (Fourcade *et al*., 2015), economists receive much higher compensation compared to other arts and science faculties in the USA, even when compared to physicists and mathematicians. Computer scientists and engineers were the only two occupations that received higher compensation for their work. Furthermore, Fourcade *et al.* (2015: 91) state that "Economics occupies a unique position among academic disciplines. It is characterised by far-reaching scientific claims linked to the use of formal methods; the tight management of the discipline from the top down; high market demand for services, particularly from powerful and wealthy parties; and high compensation".

Kaas and Manger (2011) suggest that discrimination, be it racial, gender or religious, has a substantial bearing on labour market outcomes, affecting job opportunities, promotion decisions and wage rates. Women's rights movements have gained traction in recent times, highlighting the many forms of discrimination that women face. The discrimination and inequality that women are faced with, particularly in the workplace, can be related to the hegemonic masculinity phenomenon that creates a glass ceiling when entering and progressing through the workforce (Hays and Morrow, 2013).

Research has found that academic economists in the US and Europe are predominately male and females face strong biases when it comes to promotion that cannot be fully attributed to productivity differences. These biases become stronger as one moves up the academic ranks (McDowell et al., 1999; The Economist, 2017; Ceci et al., 2014; Nelson, 2016; Mixon and Treviño, 2005; CSWEP, 2018). This scientific proclivity which is so characteristic of Economics can be broken down by the theory of

discrimination and how that explains the dynamics of women's roles in the labour market. This discrimination can deter women from pursuing a career in economics.

The remainder of this chapter explores the economic theories of discrimination, forms of discrimination found in the workplace, such as race and age, and then continues to narrow down on gender discrimination in the workforce and in education and academia.

2.2. Economic Theories of Discrimination

Stereotypes are often used to oversimplify and generalise a particular type of person or thing. Stereotypes are used to both include and exclude certain individuals or groups. They are pervasive and pertain to racial, political, and demographic groups, genders, and situations (Bordalo *et al*., 2016; Lukkezen, 2018). Broadly speaking, there are three approaches when analysing discrimination. An economic approach was put forth by Becker (1957) and Arrow (1971) whereby stereotypes are an expression of statistical or taste-based discrimination where rational expectations form the basis of stereotypes. On the other hand, a sociological approach looks at stereotypes in a manner that is only directed at particular social groups (Bordalo *et al*., 2016). This approach argues that stereotypes are a manifestation of an individual's underlying preconceptions leading to generalisations about groups that are essentially disparaging and incorrect (Adorno *et al*., 1950 cited in Bordalo *et al*., 2016). Historically, people who have experienced discrimination, such as racial and ethnic minorities, continue to be pigeonholed to their detriment. This is perhaps because the hegemonic groups want to perpetuate the prevailing fallacies about them (Glaeser, 2005, cited in Bordalo *et al*., 2016). The third approach analyses stereotypes from a social psychology point of view, referred to as the social cognition approach (Schneider, 2004, cited in Bordalo *et al*., 2016). Under this approach, social stereotypes are seen to be situations pertaining to cognitive models and theories that are based on perceptive conjectures that individuals adopt in their daily lives (Bordalo *et al*., 2016). Stereotypes stem from distinctive and identifiable differences between representative groups and therefore have some empirical grounding but are often exaggerations of these features. In other words people look for identifiers that are more common in one group compared to other groups. These identifiers are often amplified which lead to false judgements about individuals within the representative group even though these differences are often quite small (Bordalo *et al*., 2016). Stereotypes thus form the basis for discriminatory behaviour.

Szwajkowski and Larwood (1991) suggest that the three fields of social sciences that have extensively focused on theories of discrimination are human capital economics, sociology, and psychology. Discrimination plays a significant role in economic performance and is also an important factor pertaining to social equity (Szwajkowski and Larwood, 1991).

Becker (1957) describes discrimination as a situation where one individual's behaviour towards another is not driven by objective facts. Arrow (1971: 1) states that "the fact that different groups of workers, be they skilled or unskilled, black and white, or male and female, receives different wages, invites the explanation that the different groups must differ according to some characteristic valued on the market". Standard economic theory would first point to this difference as an attribution to productivity differences, which would include factors such as physical output or job performance (Aigner and Cain, 1977). However, employers might also discriminate against a certain group of workers if they doubt the economic efficiency of such a group. In such a case, employers may choose not to hire individuals within that group because of ignorance of their true productivity rather than personal prejudice. This false premise, however, may be rectified with greater knowledge. On the other hand if an employer is truly prejudiced, then the rectification of this is independent of knowledge (Becker, 1957).

Arrow (1971) adds that differences in productivity can be caused by a number of factors such as the quantity and quality of education an individual receives, the size of one's family, and whether a household is headed by a man or a woman. Such differential outcomes, by Arrow's (1971) logic, may reflect actual different productivities that are the consequence of particular groups, say blacks or women, not having the opportunity to gain the same productive capabilities as those who are highly paid.

Thus Aigner and Cain (1977) conclude that economic discrimination can be said to exist when workers who are equally productive do not receive equal payment. In Arrow's (1971) basic model, two groups of workers, for example blacks and whites, are perfect substitutes and in a perfect market system and general equilibrium is reached when there is full employment of both black and white workers. The wages of both groups of workers will adjust until the market clears. In this case any resultant differences in wages represent discriminatory tastes. In a setting where an employer discriminates, the employer sacrifices profits in order to hire more white workers and less black workers. Employers are prepared to pay higher wage premiums to a favoured group of workers in order to avoid the group of workers to whom they are averse (Becker, 1957; Riach and Rich, 1991). Restructuring production by substituting one factor of production for another can be considered as a process of evading discrimination, in which case the level of availability of substitutes will be determined by the production function (Becker, 1957). In other words, the employer makes non-profit maximising decisions to avoid a certain type of labour and thus seeks to maximise a utility function rather than profits (Arrow, 1971).

A discrimination coefficient can be used to describe other factors that influence the wage rate of the specific group of workers that do not pertain to the personal characteristics that are relevant to the

job description. In the above example, the discrimination coefficient is described as "the negative of the marginal rate of substitution of profits for black labour" (Arrow, 1971: 5) and acts as the link between money and net costs (Becker, 1957). The discrimination coefficient serves as an element of transactions that is not money related. This element can be considered to be good or bad which in turn determines whether the discrimination coefficient will be positive or negative (Becker, 1957). Considering that white labour is preferred to black labour, then the marginal utility of black labour is negative and the discrimination coefficient is positive. Discrimination is thus evident when the wage rate for white worker is more than the wage rate for black workers, and the discrimination coefficient for black workers is more than the discrimination coefficient for white workers (Arrow, 1971).

However, if a firm's tastes are heterogeneous then those without discriminatory tastes will have a competitive advantage over those that discriminate. In which case, Riach and Rich (1991: 247) argue, "the process of economic Darwinism should ensure the long-run elimination of labour market discrimination". When an individual exhibits discriminatory behaviour towards another, then interaction with the latter would be associated with disutility (Becker, 1957). In a case where firms in the market operate with different utility functions then those firms which are more discriminatory will have higher discrimination coefficients for black workers and higher ratios of white to black workers in their labour force (Arrow, 1971). Considering the discrimination coefficient is greater than zero, the coefficient will be a non-pecuniary cost of production for the employer (Becker, 1957). According to this model, those firms which are more discriminatory will have a higher marginal product for labour. However, when we consider diminishing marginal productivity of labour, then it could be said that firms that are less discriminatory will be larger because discrimination is a cost burden on the firm causing shifts in the demand curve towards more cost effective measures (Arrow, 1971). Thus, the market discrimination coefficient will be dependent on the level of competition and monopoly within the labour and product markets (Becker, 1957). An increase in competition will decrease the degree of discrimination within firms in the market. If firms want to be able to survive in a highly competitive market, particularly in the long run, they will have to minimise the costs of production, and since the wage rate for black workers is less than the wage rate for white workers, the firms will have to substitute white workers with black workers (Arrow, 1971). In this scenario capital is adjusted accordingly in relation to the size of the labour force. Thus, the more profitable firms that are less discriminatory will experience capital inflows and output becomes proportional to labour in the long run. This is, however, reliant on the assumption that the production function shows constant returns to labour and capital, in which case the marginal product of labour will be constant (Arrow, 1971).

The theory of "rational bias" seeks to explain why a manager's discriminatory behaviour may be 'rational' if he or she receives the impression that important superiors or clients would prefer to

interact with only a particular group of workers. In these circumstances, managers may analyse the risks if they choose to accept or ignore the preferences of those who hold power over their career. Even though it may be against the personal beliefs of the manager to discriminate, they may partake in discriminatory behaviour if they believe this would be preferred by their superiors or major clients (Szwajkowski and Larwood, 1991). Thus, while the rational bias theory is in no way advocating that discrimination can be justified, it instead suggests that "the theory points out the possibility that bias may be the unintended by-product of situation-specific perceptions applied to ordinary decision-making processes" (Szwajkowski and Larwood, 1991: 508). As an example of such behaviour, Larwood and Gattiker (1985, cited in Szwajkowski and Larwood, 1991) found that within management consulting firms the attitudes of clients promoted discrimination against management consultants who were female. This was because those working in the business sector tend to prefer working with males (Szwajkowski and Larwood, 1991). In such cases where the rational bias theory holds true, Szwajkowski and Larwood (1991) suggest that power relations project strong drivers for discrimination to which education, regulations, or even laws that require the enforcement of equal opportunities cannot easily be overcome.

2.3. Discrimination in the Labour Market

Given the theory above, it is said that discrimination will arise when two identical persons dealing with a firm are treated differently based on their race or gender, and where productivity is not directly affected by this observable characteristic (Heckman, 1998). Heckman (1998: 102) states that "discrimination is a causal effect defined by a hypothetical ceteris paribus conceptual experiment – varying race but keeping all else constant". Such discrimination is not always easily observable. When looking at the effect of race across the market, Heckman (1998) notes that one has to rather consider the firm(s) which the minority in question actually deal with. Discrimination therefore cannot be measured by the saturation of minority members within a whole market, but instead by looking at how much discrimination takes place within the firms actually chosen by the minority members (Heckman, 1998). Thus, it becomes difficult to estimate the degree and extent of discrimination at both the individual and the market level (Heckman, 1998). However many have used different methods and models to analyse discrimination in the labour market, whether it be according to race, age, or gender.

2.3.1. *Race and Age Discrimination in the Labour Force*

An experimental study conducted by Riach and Rich (1991) aimed to detect racial discrimination in hiring at firms in Victoria, Australia between 1984 and 1988. They responded to job advertisements in a daily newspaper with standardised applications and used names to indicate race (Riach and Rich,

1991). They compared the response rate of firms between Anglo-Celtic applicants to Greek applicants, and Anglo-Celtic applicants to Vietnamese applicants. If both applicants were invited for an interview the firm was considered to be non-discriminatory. If only one of the applicants were invited to interview this was considered as discriminatory. If neither applicant received an invitation for an interview then this was considered to be a non-observation (Riach and Rich, 1991). In both cases, Anglo-Celtic versus Greek and Anglo-Celtic versus Vietnamese applications, their study found significant evidence of discrimination against those with Greek or Vietnamese names in the labour market. Discrimination against those applicants with Vietnamese names, however, was more extensive than those with Greek names (Riach and Rich, 1991). Their findings revealed an 8.8 percent net rate of discrimination against those applicants with Greek names, and a 27.4 percent net rate against those with Vietnamese names, with significance levels at 0.01 and 0.001, respectively (Riach and Rich, 1991). This study analysed this phenomena within both the public and private sector and found virtually identical results indicating that a lack of competitiveness within the market is not a driving force of discrimination.

Discrimination, however, can go beyond the scope of race and ethnicity whereby labour market participants are also discriminated against due to their age. Butler and Lewis (1973, cited in Loretto *et al*., 2000: 280) describes ageism as "a process of systematic stereotyping of and discrimination against people because they are older, just as racism and sexism accomplish this for skin colour and gender". The presence of ageism can have many economic consequences including lower return on investment in human capital, thus not fully optimising human resources, not reaping the benefits of having a well-diversified workforce, as well as having limited access to variety in talents when recruiting potential employees (Loretto *et al*., 2000). Ageism within the labour market typically affects any age category and is said to be irrational in nature with regards to employment (Loretto *et al*., 2000). Evidence of ageism is found in Britain, where an increase in the amount of older workers exiting the labour force early during the 1990s sparked concern. To some degree, almost all Western economies have experienced an increase in the premature exit of older workers from the labour market which has led to significant economic changes (Rein and Jacobs, 1993: 53, cited in Loretto *et al*., 2000). Taylor and Walker (2003) note that labour market participation rates amongst older men have declined significantly throughout the 1990s but participation rates amongst older women increased. Between 1983 and 1995 the rate of older males who were economically active declined by 9.1 percentage points from 71.5 to 62.4 percent. On the other hand, labour market participation for older women increased from 38.7 to 42.6 percent between 1990 and 2000 (Taylor and Walker, 2003).

Loretto *et al*. (2000) and Taylor and Walker (2003) explain that Britain's economic activity rates have been affected by the early exit of older workers, including both males and females, from employment.

This early exit could be a result of a number of factors including "early retirement or voluntary redundancy, compulsory redundancy, dismissal, and retirement on grounds of ill-health" (Loretto *et al*., 2000: 281). Additionally, when certain industries in which older workers were over-represented experienced declining growth, older workers were more likely to encounter dismissal in the form of redundancy or early retirement packages (Walker, 1985, cited in Taylor and Walker, 2003). Between 1960 and 1995, the average retirement age in the United Kingdom decreased for men and women by 4 and 3 years, respectively (Taylor and Walker, 2003). The employment rate for men between the ages of 55 and 64 decreased from 64.3 percent to 59.8 percent between 1983 and 1995. In contrast, employment rates for women within the same age group between 1990 and 2000 increased from 36.7 to 41.1 percent (Taylor and Walker, 2003).

Justifications of this early exit phenomenon have tended more towards push factors rather than pull factors, whereby it is said to be driven by employment policies and economic conditions (Loretto *et al*., 2000). For example, there has been over-representation of older workers in those industries which are declining and under-representation in growing industries. Additionally labour force participation amongst older workers tends to fluctuate in tandem with economic growth and decline (Walker, 1985, cited in Taylor and Walker, 2003). The age structure of those participating in the labour force also tends to change during periods of economic recession. If firms aim to cut costs by recruiting fewer workers, then younger workers are affected the most (Lindley, Wilson and Villagomez, 1991, cited in Taylor and Walker, 2003). However, if firms have to cut costs by decreasing their workforce, then the older workers tend to be affected the most (Leppel and Heller Clain, 1995, cited in Taylor and Walker, 2003). Additionally, once these older workers have exited employment, it becomes extremely difficult to re-join the labour force as ageism has tended to affect both the public and private sectors of employment, as well as industries that are experiencing either growth or employment decline (Campbell, 1999: 39, Jacobs *et al*., 1991, cited in Loretto *et al*., 2000).

2.3.2. *Gender discrimination in the Labour Market*

In addition to race and age, gender discrimination is another form of labour market discrimination that is prevalent all over the world. Casale and Posel (2002; 2005) conducted studies on the feminisation of the South African labour market between 1995 and 1999, and 1995 and 2003 and found that a larger proportion of those entering the labour force during these time periods were women. Additionally, employment had also risen but not proportionally to the increase in labour supply, thus leading to an increase in unemployment for both men and women (Casale and Posel, 2002). However, a significant portion of the increased level of female employment was largely due to an increase in self-employment within the informal sector. These jobs are often highly correlated with

low pay and a lack of protection and job security (Casale and Posel, 2002). Furthermore, in spite of increases in employment being higher for women than for men, the labour market failed to absorb the increasing number of women entering the labour force. Casale and Posel (2002: 157) therefore explain that "the continued feminisation of the labour force in South Africa is associated with rising levels of female unemployment and a feminisation of low-paid insecure forms of employment". As a result, there was a significant gender gap in wages amongst the employed and an over-representation of women in low-paid and unstable work such as informal jobs, domestic work or subsistence farming. (Casale and Posel, 2005).

This feminisation of the labour force cannot necessarily be attributed to increased female mobility within the labour force. This then begs the question of why there is an increase in female labour market participation as this cannot be a consequence of increasing demand for female labour when the resultant effect is higher female unemployment or informal employment that is subject to low earnings and job insecurity (Casale and Posel, 2002). Possible reasons to then consider is that female labour market participation increased due to more women being educated, less women getting married, and a decreasing number of women living with men (Casale and Posel, 2002).

Casale and Posel, (2005) reported that between 1995 and 2003 female employment in South Africa increased by approximately 1.4 million, from 3 785 000 to 5 194 000 . Although this was not especially large in terms of annual increases, it was significant in comparison to the overall sluggish growth in employment in South Africa over this period. Women made up approximately 70 percent of the increased number of people who were employed during this period (Casale and Posel, 2005). Even though Casale and Posel (2005: 22) state that "women's increasing participation in the paid economy may signal an improvement in women's independent access to economic resources" there continues to be substantial gender imbalances in the South African labour force. Consequently women are more likely to be unemployed than men (Casale and Posel, 2005).

Another study of gender discrimination in the South African labour force was conducted by Mosomi (2019). She finds that there are still persistent gender inequalities in the labour market but evidence shows that the gender wage gap is reducing. Her results suggest that the reduction in the gender wage gap is a result of a "cohort replacement effect" (Mosomi, 2019: 3) within the labour market. In other words, the older female cohorts have been substituted by the younger cohorts who have had the opportunity to gain better human capital characteristics. She explains that there are increases in labour market participation between the ages of 25 and 40. Thereafter participation decreases. However, the decrease seems to be more drastic for females (Mosomi, 2019). One possibility for this observation – as a consequence of the high unemployment rate for women – adult women who are working in very low-paying jobs exit the labour market to look after family members, more so for their

grandchildren, so that the younger family members who have a greater possibility of getting a higher paid job can seek employment (Mosomi, 2019). Mosomi's (2019) study concurs with Casale and Posel's (2005) whereby she finds that the likelihood of employment at all ages is greater for men than for women.

The phenomenon of gender inequality in the workforce has gained traction in the global literature as well which has focused on underrepresentation of women in science, technology, engineering and maths (STEM) jobs. Breede *et al*. (2011: 2) note that according to the Economics and Statistics Administration (ESA), jobs that are included under STEM include "professional and technical support occupations in the field of computer science and mathematics, engineering, and life and physical sciences". Women make up approximately 48 percent of the workforce in the United States, but only 24 percent of workers in STEM jobs (Breede *et al*., 2011). Three STEM management occupations are also included in this calculation; however, education jobs and social scientists are excluded due to data availability.

Breede *et al*. (2011: 2) found that although there was an increase in the share of college-educated women joining the workforce in the 10 years preceding their study, the underrepresentation of women in STEM occupations hardly changed. Between 2000 and 2009 the share of college-educated women in the workforce increased by 3 percentage points, from 46 to 49 percent, but the share of women in STEM occupations remained at 24 percent. Furthermore, data going back to 1994 displayed virtually identical results (Breede *et al*., 2011).

Between 2000 and 2009, the share of women in the computer and maths workforce – the largest of the four components in STEM – had decreased by 3 percentage points to 27 percent (Breede *et al*., 2011). The second largest of the STEM components is engineering, in which the share of women participating is one out of seven (Breede *et al*., 2011). The smaller two STEM occupations – physical and life sciences and STEM managers – showed similar results. The former increased its share from 36 percent in 2000 to 40 percent in 2009 and the latter by only 2 percentage points from 23 to 25 percent (Breede *et al*., 2011). Not only is there a problem with female underrepresentation in the labour force but there is also a persistent wage gap between male and female participants in the labour market which are noticeable even when controlling for factors such as productivity.

2.4. Gender and wage

Standard economic theory proposes that differences in productivity and individual preferences would explain variations in earnings. Other factors that may contribute to these variations may be years of experience, employer characteristics, race, gender or marital status (Ginther, 2004). On average, marriage has a positive effect on the salaries of males but a negative effect on the salaries of females.

Private institutions often pay more than public institutions and higher academic ranks and tenure have a positive effect on salaries (Ginther, 2004). Jurajda (2005) explains that the gender wage gap is influenced by two main factors. The first is attributed to increases in wage dispersion which decreases women's relative wage position as women dominate the lower end of the wage distribution. Secondly, decreases in employment rates reduce the observed gender wage gap which predominantly affects the low wage workers who are mostly women.

Anti-discrimination policies focusing on equal pay and equal opportunities have been implemented across most post-communist economies which affects a portion of the gender wage gap. The equal pay clause is aimed at wage differences within groups of workers in the same job working in the same firm, while the equal opportunity clause aims to rectify the inequitable concentration of female workers in the low-paying occupations (Jurajda, 2005). Jurajda (2005) conducted a study on wage differences in the USA, Czech Republic, Slovak Republic, East Germany and West Germany. He used pooled regressions using data on males and females to estimate the "counterfactual non-discriminatory wage structure" (Jurajda, 2005: 601). A female dummy variable was added to account for the unexplained portion of the gap. His results reflect two main findings. Firstly, after controlling for gender segregation and worker and employer characteristics he finds that in all five economies a large portion of the wage gap was unexplained. East Germany was the worst out of the five whereby their female dummy variable was three times bigger than the overall wage gap. Secondly, in the USA, Czech Republic and Slovak Republic gender differences in wages were significantly influenced by gender segregation in occupation and industry (Jurajda, 2005).

A study on the gender wage gap in the South African post-apartheid labour market between 1993 and 2015 was conducted by Mosomi (2018). The aim was to investigate whether the unexplained portion of the wage gap, representing discrimination, has decreased over that time period. Mosomi (2018) found that the average gender wage gap has narrowed which can be attributed to an increase in wages at the bottom of the wage distribution which is influenced by legislation regarding minimum wages for the low income group. However, this narrowing of the gap lasted until 2007 and then stagnated thereafter. They associate this to be a result of the perpetual gender wage gap at the top of the wage distribution (Mosomi, 2018).

Since 1991 Italy has also adopted legislation pertaining to gender discrimination and equal pay. Castagnetti and Rosti (2013) attempt to analyse the gender pay gap amongst Italian graduates. They look at variations in wage discrimination pertaining to the degree of prevalence of stereotyping. They use tournament theory to analyse the gender pay gap in the labour market. In situations where stereotyping is more prevalent, occupational tournaments will become more unfair and there will be greater levels of gender discrimination (Castagnetti and Rosti, 2013). Tournaments are used as

competitive tools to assess the performance of participants and rank them accordingly, thus the probability of winning diminishes with greater levels of stereotyping. The unexplained gender wage gap increases as women's probability of winning decreases as a result of gender stereotyping (Castagnetti and Rosti, 2013). They postulate that stereotypes, personal beliefs and expectations influence productivity assessments which in turn lead to unfair performance appraisals and promotion of discrimination in the workplace (Castagnetti and Rosti, 2013).

Ginther (2004) conducted a study in the US where she analysed male and female salary regressions over time as a function of possible influential factors. These included factors such as demographic characteristics, educational background, and employer characteristics. She uses the Oaxaca method to determine both the explained and unexplained portions of the salary gap. The explained portion consists of observable characteristics, whereas the unexplained portion consists of gender differences in the estimated coefficients of the regression. Thus, the total gender gap is made up of both the explained and unexplained portions (Ginther, 2004). In the case where there is no discrimination, the unexplained coefficient of the regression should equal zero. When the coefficient is larger than zero then this will be considered the effect of discrimination (Ginther, 2004). In her study she reveals that between 1973 and 2001 the gender pay gap in academic science is explained primarily by observable characteristic differences. Furthermore, the overall gender salary gap decreased between 1973 and 2001, even when accounting for academic rank. For example, male full professors in 1973 earned 20 percent more than their female counterparts. This figure dropped to 12 percent by 2001 (Ginther, 2004).

In looking at the relationship between STEM occupations, gender and income, Breede *et al*., (2011) found that both men and women working in STEM occupations earn significantly higher incomes than those in non-STEM occupations. However, women in STEM occupations earn significantly less than men, even after variables such as education and age are taken into account. Breede *et al*., (2011) showed that in STEM occupations, men earned an average of $36.34 and women $31.11 per hour. Similar results were found for non-STEM occupations, where men earn an average of $24.47 and women $19.26 per hour. This means that for STEM occupations, women earn approximately 14 percent less than what men earn, and in non-STEM occupations women earn approximately 21 percent less (Breede *et al*., 2011).

The American Association for the Advancement of Science (AAAS) conducted a survey on the salaries of life scientists and found that males within this field earned 23 percent more than their female counterparts. However, this can be a result of field choice and years of experience, although the study did find that there was a 14 percent gap in the salaries of academic full professors (Ginther, 2004).

Kahn (2014: 283) found that the early analyses of the persistent low level of representation and relative wage for women were attributed to causes such as “productivity characteristics, employer discrimination, and the disparate effects of the overall wage structure”. Kassenböhmer and Sinning (2008, cited in Kahn, 2014) analysed the gender pay gap in the US from 1993 to 2008. Their findings revealed that the overall gender gap has fallen over time; however, the gap at the bottom of the wage distribution has decreased at a more rapid rate than that at the top. This stands in contrast to the ever-increasing amount of female participation in educational attainment, but has only moderately impacted the gender pay gap at the top of the wage distribution. This is suggestive of a glass ceiling that restricts women’s wages at the top (Kahn, 2014).

Given that the female participation in educational attainment is increasing, Nordin (2019) attempts to investigate the relationship between education and the gender wage gap. She focuses particularly on changes in the gap at various levels of higher education. Her results indicate that there are significant differences between the mean incomes of males and females who obtained a postgraduate degree. She does, however, note that in a general sense, both gender and education are poor predicators of income; but education is a better predictor than gender. Furthermore, she found that GPA scores were a better predicator of income than the level of education obtained (Nordin, 2019).

2.5. Gender and education attainment

Within education attainment, especially in higher education, there is a growing female advantage whereby an increasing number of women are entering and graduating from higher education institutions (HEIs). In 2014, women comprised of 58 percent of bachelor’s degrees awarded across the 35 OECD countries. The European Union and South Africa exhibited slightly higher numbers of 60 and 61 percent, respectively (OECD, 2016: 71, cited in Van Broekhuizen and Spaull, 2017). A possible explanation for this increase in female participation in higher education could be that gender norms have been changing and more women are wanting to join the labour force (Goldin *et al*., 2006, cited in Van Broekhuizen and Spaull, 2017). However, Van Broekhuizen and Spaull (2017) add that while this may be the reason for increasing female participation in higher education, this cannot fully explain why this increase continues past the 50 percent mark. Therefore, four possible explanations for this phenomenon are put forth; “higher female post-secondary expectations” (Fortin *et al*., 2014; OECD, 2015, cited in Van Broekhuizen and Spaull, 2017: 2), “superior pre-university achievement” (Conger and Long, 2010; Ewert, 2010, cited in Van Broekhuizen and Spaull, 2017: 2), “different choices in fields of study between men and women” (Charles and Bradley, 2002; Alon and Gelbgiser, 2011, cited in Van Broekhuizen and Spaull, 2017: 2), and “females have more and/or better non-cognitive skills and thus

have lower 'total costs' for education, elsewhere referred to as 'psychic costs'" (Becker *et al*., 2010, cited in Van Broekhuizen and Spaull, 2017: 2).

Van Broekhuizen and Spaull (2017) analysed a group of South African students as they entered and progressed through university over a period of six years. Firstly, when looking at differences in achievement between males and females during their pre-university period, they found that at all grades of assessment, females tend to surpass males, i.e. grades 4, 5, 6, and 9, as well as in all of the assessed subjects, such as reading, maths, and science. For example, all cross-national assessments across South Africa since 2011 reveal that females outperform their male counterparts regardless of grade or subject, and these differences are both substantial and statistically significant at the primary school level for both reading and maths (Van Broekhuizen and Spaull, 2017). Failure and dropout rates are much lower for female students than for males consequently leading to a higher number of female students writing and passing their grade 12 final examinations (Van Broekhuizen and Spaull, 2017). Additionally, similar patterns are reflected when looking at higher education. Females comprise of the majority of university enrolments, and have a higher chance of graduating. Even at the university level, dropout rates are lower for females than for males in all fields, including the male dominated ones (Van Broekhuizen and Spaull, 2017).

2.5.1. Gender and education attainment in higher education

Van Broekhuizen and Spaull (2017) analysed 19 fields of study and found that women were less likely than men to enrol in only the fields of Engineering, Computer Science, Architectural Science, the Mathematical Sciences, and Agricultural Science. Of these 5 fields, males had higher completion rates for only Engineering and Computer Science, but they noted that this male advantage has decreased. Their study also found that within their 2008 NSC cohort, females had a 34 percent advantage over their male counterparts in accessing higher education. Furthermore, females had a 56 percent advantage in completing any undergraduate qualification, and a 66 percent advantage of completing an undergraduate degree (Van Broekhuizen and Spaull, 2017).

However, it was noted that although the data depicts a clear female advantage throughout university in terms of access, throughput, and completion, a possible explanation of this may be that males and females typically choose different fields of study. For example, if males are inclined to enrol in fields that are essentially more difficult and have higher failure rates, then this would account for some of the differences in male completion rates (Van Broekhuizen and Spaull, 2017). Thus, they conducted an analysis which explored whether there were gendered differences in the likelihood of enrolling in specific fields of study and found that there were significant differences between the traditionally male-dominated fields, which included "Engineering, Computer Science, Architectural Science,

Mathematical Science, and Agricultural Science", and the traditionally female-dominated fields, such as "Consumer Science, Psychology, Social Sciences, Communication, Education, Health Sciences, Linguistics, Arts, Public Management, Natural Sciences, and Law and Business Sciences" (Van Broekhuizen and Spaull, 2017: 24). Nevertheless, the gendered differences exhibited in the access to fields of study are not reflected in completion differences. Engineering and Computer Science are the only two fields where male students are significantly more inclined than females to finish their degree within 4 or 6 years. In Engineering, male students are 56 and 16 percent more likely to complete the degree in 4 and 6 years, respectively, in comparison to female students. On the other hand, when looking at the field of Health Science female students are 100 percent more likely than male students to complete this degree in 4 years, and 12 percent more likely to complete the degree in 6 years.

Griffith (2014) explains that the educational achievements of female students is significantly influenced by the presence of female role models. She notes that there are several possible reasons for the positive effect of female staff members on the number of female students showing interest in a particular subject. Firstly, in historically male-dominated fields a female staff member may serve as a role model by being an example to female students of how a woman may succeed in these fields. Secondly, female staff members may be more relatable to female students which may then have a positive impact on academic achievement and interest. Third, female students may receive somewhat different treatment from female staff members, particularly in the male-dominated fields, which may have a positive impact on their involvement in the subject (Griffith, 2014). In a test, Griffith (2014) found that female students achieve higher grades when being taught by a female lecturer in male-dominated subjects. Similarly, male students also achieve higher grades when being taught by a male lecturer in female-dominated subjects. In looking at students taking a class in a particular subject for the first time, Bettinger and Long (2005) analysed whether female lecturers had an effect on female students choosing to further pursue other classes in that subject. Their results showed that female lecturers had a positive influence in the subjects of geology, maths and statistics, psychology, sociology, journalism and communications, and education. On the other hand, female lecturers had a negative influence on student interests in the subjects of biology, physics, political science, and economics (Bettinger and Long, 2005).

In a similar study, Zafar (2013) analysed reasons for major choice between males and females in college. He argues that college major choice differences will have important economic and social effects. For example, Brown and Corcoran (1997) explain that 20 percent of the gender wage gap between college graduates who are employed is explained by gender differences in college majors. Several possible reasons have been put forth to understand the differences in college major choices between men and women. Firstly, the abilities of males and females may be inherently disparate

which may influence their choice to pursue different fields of study (Kimura, 1999, cited in Zafar, 2013). However, Xie and Shauman (2003, cited in Zafar, 2013: 547), and Goldin *et al* (2006, cited in Zafar, 2013: 547) state that "the gender gap in mathematics achievement and aptitude is small and declining, and the larger probability of males majoring in science or engineering cannot be fully attributed to gender differences in mathematical performance" (Turner and Bowen, 1999, and Xie and Shauman, 2003, cited in Zafar, 2013). Secondly, differences in preferences between males and females may explain the gender gap in college major choices (Zafar, 2013).

Differences in college major choice can also reflect differences in risk preferences and the way in which different individuals make decisions under uncertainty. Standard economic literature would therefore assume that an individual would compare their available choices and make a decision that would maximise their expected utility (Zafar, 2013). Various reasonings may be considered when making this decision, such as finding the coursework enjoyable, needing the course to get a specific desired job, or to gain the parents' approval (Zafar, 2013). Zafar (2013) found that the preferences between males and females at college were relatively similar, but there were significant differences in preferences concerning the workplace. Decisions based on money-related factors matter less to females than to males, whereby females are more concerned with factors such as enjoying their job and having a balanced work and family life (Zafar, 2013). However, women who enjoy and want to pursue fields that are more male-dominated are often faced with significant barriers that their male counterparts may not face.

2.5.2. Gender and education attainment in STEM

Belenky *et al*. (1997, cited in Kulturel-Konak *et al*., 2011) suggest that women are faced with social and educational barriers that limit their success in fields that are more technical and often male-dominated. They explain that "societal factors, such as stereotyping, traditional gender roles, inflexibility toward women with children, alienation and many other factors, are often mentioned as the context for injustice in occupational fields and contribute to why women stay away from majors perceived as male disciplines" (Belenky *et al*., 1997, cited in Kulturel-Konak *et al*., 2011: 9). The American Association of University Women (AAUW, 2000, cited in Kulturel-Konak *et al*., 2011) noted that it is not inability that women refrain from pursuing careers in information and computer sciences, but rather a lack of interest.

Ceci *et al*. (2014) break down the STEM fields into two categories, the first comprising geoscience, engineering, economics, mathematics/computer science, and physical science (GEEMP), and the second the life sciences, psychology and social science (LPS). In examining educational attainments of men and women in these fields, they noted that only 25 percent of bachelor degree holders in GEEMP

were women, which is 30 percentage points lower than that of the overall percentage of women in bachelor's degrees (Ceci *et al*., 2014). In contrast, 70 percent of bachelor degrees in the LPS fields were women, indicating an overrepresentation within this category (Ceci *et al*., 2014). Furthermore, the percentage of women proceeding from undergraduate major studies to PhDs in STEM subjects is smaller than that of their male counterparts in the GEEMP fields but fairly equal in the LPS fields. The percentage of PhDs granted to females in the LPS fields is thus significantly higher than those in the GEEMP fields. In 2011, women made up 57.9 percent of PhDs in the LPS fields, but only 26.3 percent of PhDs in the GEEMP fields (Ceci *et al*., 2014).

2.5.3. Gender and education attainment in Economics

Dynan and Rouse (1997) studied the representation of women in economics undergraduate and doctoral studies in American universities and found that between 1991 and 1992 the number of women obtaining bachelor's and doctoral degrees in economics was significantly lower than those in the social sciences, life sciences and humanities departments. Women comprised of 30 percent of economics bachelor's degree holders. They noted that these results were similar in the field of physical sciences and it was only in the fields of maths and engineering where there were fewer women than in economics (Dynan and Rouse, 1997). They also noted that there has been very little effort to change these numbers and many try to justify this underrepresentation of women by arguing that, inherently, women are less interested in the subject of economics or are unwilling or able to obtain the necessary maths skills to do well. Others believe that the underrepresentation of women participating in economics undergraduate studies is due to a lack of female role models in the department or that the classroom environment is unappealing to women (Dynan and Rouse, 1997). The effect of role models was also emphasised in Zafar (2013) when looking at differences in preferences between males and females when choosing a college major whereby female students' preferences and beliefs, especially towards the fields of science and engineering, may be altered when they are exposed to more female professors.

A more recent study conducted by Avilova and Goldin (2018) revealed that there are fewer females who take economics as a major in comparison to chemistry, mathematics and statistics. In which case, mathematics has managed to attract more females than economics between the previous study conducted by Dynan and Rouse (1997) and this study by Avilova and Goldin (2018), but engineering is still worse than economics. However, they state that even in engineering, where female majors are fewer, the percentage of female majors in engineering had increased over the previous decade, whereas the percentage of females majoring in economics had not changed whatsoever over the previous 3 decades. They put forth an additional reason for this phenomenon, suggesting that if

women do not receive a high grade in their initial economics course, the likelihood of them continuing their studies in economics decreases. Furthermore, this likelihood decreases more and more with every lower grade (Avilova and Goldin, 2018).

In their test of the relationship between the grade received in an initial course and the likelihood of continuing to major in that subject, they found that "the women who take Principles [of Economics] but do not eventually major in the subject are disproportionately among those who obtained a grade below an A- in the course" (Avilova and Goldin, 2018: 3). They further state that this is even the case with those who initially put down their intended major as economics. However, they found that this relationship did not hold for the males whereby the likelihood of males majoring in economics was unaffected by the grade they obtained in their Principles of Economics course (Avilova and Goldin, 2018). Their results showed that if a female were to receive a B+ in the course, the likelihood that she will major in economics is 27 percent, but if she receives an A, the likelihood increases to 42 percent. However, they found that with the male students, the likelihood of a male continuing to major in economics is 41 percent regardless of whether they obtained a B+ or an A in taking Principles of Economics (Avilova and Goldin, 2018).

Avilova and Goldin (2018) state that a possible reason for these differences is that females pursue subjects in which they excel, whereas males are more concerned with which subjects will benefit them in the future. Furthermore, stereotypes may play a role in this where if females are told they cannot do well in a particular subject or field, then when they do not excel their confidence decreases and they move away from that subject towards ones in which they will excel (Avilova and Goldin, 2018).

Hale and Regev's (2014) study on the top ten US economics PhD programs between 1983 and 2007 found that only 33 percent of graduating economics PhD students were women, and only 20 percent of faculty in the economics departments of the PhD granting institutions were female. They used econometric analyses to study the effect of gender diversity of faculty members on the share of female students in the PhD programs.

Their findings reveal that there is a positive correlation between the share of female faculty members in economics departments and the share of female graduate students (Hale and Regev, 2014). They reported that the amount of women in these departments may influence the number of female students in the program in four ways. Firstly, if there is a greater share of women faculty members, there is a greater likelihood that they will be a part of the admissions board and thus have a greater influence on the admissions of students into the program. Being aware of the lack of female participation in these courses, these female faculty members may advocate for the admission of more female students. Secondly, it is likely that prejudice against women will be reduced if there is a greater

share of women in the faculty and that might lead to a greater number of female students being admitted. Thirdly, female students may be more inclined to apply for the course if they expect there to be less discrimination and better mentoring under female teachers. Lastly, perceptions of low status may be associated with departments with a high share of female faculty members. If this is the case then those departments that have a greater share of female faculty members will tend to have a smaller share of female students (Hale and Regev, 2014). These four mechanisms were used as possible explanations for the relationship between the number of female faculty and number of female students in the course. This was analysed throughout their graduate career, from admittance through to completion. Hale and Regev (2014: 56) explain that "the joint effect of the four forces constitutes the influence of the share of female faculty in a certain year on the share of female PhD students accepted to the program that year and graduating six years later".

Similarly, Bayer and Rouse (2016) found that between 1995 and 2005, some progress was made in attracting women into economics, where females made up 30.5 percent of entering PhD students in the US in 1995 and 37.2 percent in 2005. However, that progress was lost by 2014 where the percentage of females had decreased back to 31.4 percent. Furthermore, the percentage of females obtaining their PhD in economics has remained idle while other fields in the social sciences, humanities, business and management, and STEM fields have all experienced increases in the amount of females obtaining their PhDs. Similar results were found for bachelor's degrees. In 2014, women made up only 28.4 percent of graduating students with bachelor's degrees. Moreover, STEM field at the bachelor degree level has experienced progress in this regard but business and management displayed a similar lack of progress to economics (Bayer and Rouse, 2016). The gender composition of students obtaining postgraduate degrees in the STEM fields, particularly PHDs, would thus be expected to have spill-over effects in the labour market, specifically with the gender compositions of academic staff members working at universities.

2.6. Gender discrimination in academic professions

2.6.1. Gender discrimination in academic STEM professions

Ginther and Kahn (2006) analysed the under-representation of female academics in the tenured ranks in the sciences at major research universities in America. Using the Survey of Doctorate Recipients over the period 1973 to 2001 they analysed the probability of obtaining a tenure track job, being promoted to tenure, and being promoted to full professor is influenced by gender differences. Their findings revealed that single women were more likely to obtain tenure track jobs, be promoted to tenure, and be promoted to full professor than their male counterparts (Ginther and Kahn, 2006). The results further indicate that there are no major differences between married men and women without

children at any of these stages. On the other hand, women with children are often at a significant disadvantage in obtaining a tenure track job, thus affecting the achievement of the latter two ranks (Ginther and Kahn, 2006).

Over the period 1974 to 2004 there have been continuous increases in the proportion of females receiving their PhDs in all fields of science. In the Life Sciences, the percentage of PhDs granted to females was less than 20 percent. This increased to almost 50 percent by 2004 (Ginther and Kahn, 2006). Within Engineering, women made up just over 1 percent of PhD receipts in 1974 which increased to almost 18 percent by 2004. Over this period women were less likely to obtain tenure track assistant professorship after receiving their PhDs in the Life Sciences. Furthermore, between 2000 and 2004 the proportion of females with assistant professorship decreased despite the increasing number of female PhDs (Ginther and Kahn, 2006). In the Physical Sciences, on the other hand, the percentage of female PhD receipts remained relatively equal to the percentage of female assistant professors. In engineering between 1990 and 1997, contrary to what one would expect, the percentage of female assistant professors exceeded that of female doctorates. However, after 1997 the percentage of females receiving their PhDs in Engineering surpassed the percentage of female assistant professors (Ginther and Kahn, 2006).

Ginther and Kahn (2006) also find that of those doctorates entering academia men have a 4 percentage point advantage over women in obtaining tenure track jobs within 5 years of receiving a PhD. Furthermore, after controlling for variable such as age at which PhD was received, cohort, race, origin, field, and PhD quality, they found significant gender differences in the likelihood of obtaining a tenure track job within 5 years of receiving the PhD. They note, however, that this difference is predominantly attributed to the Life Sciences where the difference is large and significant. The gender difference for Engineering and the Physical Sciences, on the other hand, is both small and insignificant (Ginther and Kahn, 2006).

Marriage and the presence of children also influence the gender gap in tenure track employment. In their analysis, Ginther and Kahn (2006) found that single women with no children, in comparison to single, childless men, were more likely to receive a tenure track job within 5 years after receiving their PhD in both the Life Sciences (11 percent) and the Physical Sciences (21 percent). They, however, found no significant difference in Engineering. For men, being married increases the likelihood of obtaining a tenure track job by 22 percent in the sciences as a whole and for each separate field. For women, the probability is only increased by 5 percent (Ginther and Kahn, 2006).

The presence of children also have an influence on the likelihood of obtaining a tenure track job for both men and women. For Science as a whole, this likelihood is decreased by 8.1 percent when a

women has a child that is below the age of 5. There is no effect on women who have children in the grade school years (Ginther and Kahn, 2006). The opposite appears for men, whereby there is no effect on this likelihood for men with children below the age of 5. Additionally, the likelihood of obtaining a tenure track job for men increases by 2.9 percent for each child above the age of 6 (Ginther and Kahn, 2006).

2.6.2. The role of gender in Economics

In order to understand the effects of biases and discrimination in academic Economics professions, it is important to first understand the role gender plays within this field. The absence of women in the field of Economics has become a global phenomenon. Fourcade *et al*. (2015: 90) states that "economics, like physics or philosophy but in sharp contrast to sociology is a very male-dominated field thus, cross-disciplinary relations are inevitably permeated by broader patterns of gender difference, stratification, and inequality". Fourcade *et al*. (2015) argue that even though in some way or another all disciplines can be ignorant of cultures, ideas and people foreign to personal experience, it seems to be a more prominent characteristic of economics (Fourcade *et al*., 2015).

Teunissen and Hogendoorn (2018) revealed that in a publication produced in the Netherlands regarding public budget policy, eleven esteemed economists gave their input regarding policy recommendation. All of the eleven esteemed economists were male. Additionally, in one of the Dutch newspapers, twenty notable economists were invited to participate in a survey which asked the participants to highlight the policies they thought should be prioritised given the formation of the new government. Of the twenty economists participating, two were female (Teunissen and Hogendoorn, 2018). Consequently, economic discussions regarding socio-economic policies are dominated by men.

May *et al*. (2014) conducted a survey of members of the American Economic Association (AEA) with doctoral degrees from a US institution to determine if there were differences between male and female economists' views on a variety of policy issues. To better understand these differences in opinions they controlled for factors such as whether the person worked at an academic institutions with or without graduate programmes, government institutions, for-profit institutions, and in which decade they received their PhD. Their aim was to answer the question: "Do male and female economists share the same views on underlying assumptions, methodological approaches, policy solutions, perceived problems in economics, and equal opportunity in society and the economics profession?" (May *et al*., 2014: 113). The survey is broken down into five separate sections pertaining to views on different types of issues. The first section involves questions pertaining to standard economic principles and economic methodology. The second, third and fourth sections involves questions pertaining to views on "market solutions and government intervention, government

spending, taxing, redistribution, and the environment" (May *et al*., 2014: 116). The fifth section involves questions pertaining to equal opportunities in society and gender equality in the economics profession.

Both male and female AEA members had similar views regarding core economic principles and methodologies. In this section, participants were asked questions regarding utility maximisation, human wants, economic methodology, such as the use of maths in economic modelling and whether economics should be studied using empirical or deductive approaches, household decision-making, and measurement of economic output (May *et al*., 2014). After controlling for the decade in which the PhD was received and place of employment, May *et al*. (2014) found that, on average, both the male and female economists concur that individuals are utility-maximisers and that humans have unlimited wants. Similarly, male and female views on economic modelling coincide on the perception that mathematical modelling is an essential component of economics and that "research on households should include intrahousehold decision making". In terms of views on measuring economic output, both males and females agree that GDP is an inadequate measurement of the overall performance of an economy (May *et al*., 2014).

Their study also revealed that, on average, the female economists were more in favour of government intervention when facing economic problems, whereas the male economists favoured free market solutions. However, there was one exception to this pertaining to government tax on unhealthy foods where both males and females expressed minimum support (May *et al*., 2014). The point in which the male and female respondents in their survey expressed the most disagreement was on the aspect of equal opportunity, not just about gender, but also society as a whole. For example, they state that females were 42 percentage points more likely than males to disagree or strongly disagree with the statement "Job opportunities for men and women in the United States are currently approximately equal" (May *et al*., 2014: 124)

It seems that male and female economists do not just have differing opinions on various policy issues but tend to pursue different topics within the field of Economics. Chari and Goldsmith-Pinkham (2017) analysed the percentage of female authors of papers that were to be presented at a major Economics conference between 2001 and 2016. They found that women made up 25.9 percent of authors in the subfield of microeconomics, but only 16.3 percent in macroeconomics, and 14.4 percent in finance. They stated that in the first week of the conference, which focused on finance and macroeconomics, women comprised of 17.5 percent of the authors on the presented papers. On the other hand, in the third week, which mainly focused on labour and public economics, women made up 30.5 percent of the authors on presented papers (Chari and Goldsmith-Pinkham, 2017).

Despite the found similarities in male and female economists' views, Nelson (2016: 1365) explains that "the [economics] discipline has been affected not only by a bias in perspective, but also a bias towards "hard"-seeming, masculine-associated definitions, assumptions and techniques". Stereotypes provide the means for easy classification and therefore lead to biases, exaggerations and inaccuracies (Bordalo *et al*., 2016). These biases are often shut down by economists who believe that the problem does not lie with the people in the profession but rather the women's drive or ability to participate in the discipline. Furthermore, Lukkezen (2018: 4) states that "Economics and business stands out as particularly high in features that are generally perceived to be more masculine, like self-confidence and competitiveness, and low in traits that are generally regarded as more feminine, like cooperativeness and modesty." It was also suggested that women tend to dislike the combative style of economics conferences (The Economist, 2017). An example of this was reported by faculty members at Harvard when criticising a former Harvard economics professor, Larry Summers, for consistently "humiliating faculty members in meetings, shutting down debate and dominating discussions" (Rimer, 2005). Although this is just one example, the reality is that most economics conferences are of a similar style.

Another factor that may contribute to the underrepresentation of women in economics could be that women working in the economics profession have been found to experience much lower job satisfaction than their male counterparts and women in other fields, including those who experience similar gender discrepancies (The Economist, 2017). It was reported that in the fields of maths, engineering, computer science and the physical sciences, there was no distinct differences in job satisfaction between women and men with tenure or in tenure track positions. However, the gap in economics is quite large and seems to be increasing (The Economist, 2017). This could be a possible contributor to the low representation of women in economics.

Furthermore, Ginther (cited in The Economist, 2017), proposed that people's behaviour can often be driven by biases of which they are unaware. Consequently, this behaviour can directly impact the process of promotion. She uses teaching evaluations as an example in a study conducted in 2017. It was found that students received similar grades when being taught by a male or female teacher. However, female teachers in economics and other business subjects received student evaluations that were systematically lower than their male counterparts. These poor evaluations ultimately affect promotion decisions and tenure considerations. She suggests that a possible explanation for understanding this pattern, and the problem as a whole, would be to consider the possibility that economics attracts those that are "particularly prone to sexism" (The Economist, 2017: 4).

Erin Hengel (in The Economist, 2017) found that there are gender disparities in economic publication. The review process for a top economic journal, Econometrica, takes six months longer for papers

submitted by women than for men. Furthermore, she found that between the time of submission and the final draft, the abstracts of the papers written by women improved significantly. First drafts of papers submitted by women also improved significantly as they progressed in their career. In contrast, she found that neither of these effects was seen in papers submitted by men. She suggests that these results imply that women are expected to perform at a higher standard, which may also explain why women's publication count, which is an important factor in promotion decisions, is lower than that of their male counterparts (The Economist, 2017).

Ceci *et al*. (2014) noted that gender stereotypes pose a threat in the ability of women to perform mathematically. The awareness that certain groups in society are expected to perform poorly in maths, even when some members of that group do not fit the profile, is enough to cause anxiety and lead to a poorer performance by those members (Spencer *et al*., 1999, cited in Ceci *et al*., 2014). Studies of test results in mathematical subjects showed that females who had to state their gender before completing the test performed worse than those who had to state their gender afterwards or not at all. The conclusion from these results was that the sensitization to gender before the test causes women to doubt their ability in maths and become anxious, leading to poorer performance (Danaher and Crandall, 2008; Beilock *et al*., 2007; Schmader and Johns, 2003, cited in Ceci *et al*., 2014).

Wu (2017) analysed an economics online platform that allows people to post anonymously about topics related to economics. The anonymity of the online forum allows users to speak freely without having to worry about social and political correctness (Wu, 2017). Although this online forum was designed for people to post about job vacancies and the work of fellow economists, some posts seem to stray towards other social discussions. Using text mining and other mathematical models, she found that conversations about women were more likely to contain less professional or academic terms than those about men. The conversations about women mostly revolved around "personal information and physical attributes" (Wu, 2017: 19). Some of the words that were mostly used in conversations about women included words such as "hot", "attractive", "pregnant", "gorgeous", "tits", "lesbian", "bang", "horny", "cute", "breasts", "sexy", etc. (Wu, 2017: 15). In contrast, the words in conversations about men tended towards more professional terms such as "philosopher", "motivated", "slides", "keen", "textbook", "adviser", etc. (Wu, 2017: 15). Wu (2017) concludes that the way in which gender is discussed on this online forum can be discouraging to women and have detrimental effects on both men's and women's development in their academic and professional economics careers.

Furthermore, Teunissen and Hogendoorn (2018) suggest that the low representation of women in the field of economics may negatively impact the quality of economic research as perceptions of economic issues may differ between genders. Evidence shows that diversity within groups increases the quality of their performance (Woolley *et al*., 2010, cited in Teunissen and Hogendoorn, 2018). Thus, socio-

economic policy may be negatively impacted by a lack of gender diversity among authoritative economists whose published works are often considered by policy-makers (Teunissen and Hogendoorn, 2018).

2.6.3. Gender discrimination in academic Economics

The proportion of females who completed their PhDs several decades ago should be considered a relatively good proxy for the amount of female professors today. However, this doesn't seem to be the case in Economics. Van der Heijden (1993, cited in Lukkezen, 2018) reported that 25 to 30 years ago, 18 percent of PhD students at Dutch universities were female, but Teunissen and Hogendoorn (2018) reveal that in 2016 only about 10 percent of Economics full professors were female. Van Dalen (2018) states that within Europe the Dutch universities have the lowest percentage of female professors. Furthermore, in the Netherlands, the 10 percent of professors in Economics who are women is the lowest out of all the scientific fields (Rathenau , 2017, cited in Van Dalen, 2018). However, Van Dalen (2018) and Teunissen and Hogendoorn (2018) noted that although this figure is still poor it is at least a step up from the percentage of female Economics professors a decade ago where it was half of today, and in the early nineties when it was only 2 percent. Teunissen and Hogendoorn (2018) also add that economics has made the least progress in acquiring more women than any of the other sciences. Furthermore, women are less likely to become a full professor in economics in comparison to the other scientific fields (Teunissen and Hogendoorn, 2018).

The Economist (2017) reported that in Europe and the US academic economists are predominantly male. In Europe, only about 20 percent of senior economists are female. In the US, only 15 percent of full professors are female. It was noted that the underrepresentation of women in academic professions is not only a problem in economics departments, but also in the departments of maths, engineering and physics. However, Donna Ginther, Professor of Economics at the University of Kansas, reported to The Economist (2017) that women are not only very scarce in economics, but tend also to face a thicker glass ceiling than in other professions. She stated that, starting in a tenure track position, men tend to achieve tenure at a rate 12 percentage points faster than women, even after adjusting for family circumstances and number of publications (The Economist, 2017). Furthermore, only 29 percent of women in Economics departments in US universities who achieve tenure are promoted to full professor within seven years - in comparison to 56 percent for men.

Evidence of a glass ceiling for women in the economics profession was also emphasised by McDowell *et al*. (1999) who used econometric testing to study gender differences in promotion in economics departments. Their results concluded that women tend to progress through the ranks at a slower rate than their equally skilled male counterparts, indicating the existence of a glass ceiling. However, they

note that their findings do not necessarily point to discrimination in promotion. Unlike Ginther (in the Economist, 2017) they indicate that a possible reason for this is that the publication count for women over their career tends to be lower than for men and that women tend to experience a decrease in academic productivity through the "child bearing" years (McDowell *et al*., 1999: 394). Furthermore, a study in the Netherlands by Van Dalen (2018: 12) found that women tended to be slightly less ambitious to progress to the top of the ranks. He states that when given the statement "Being cited and respected by other colleagues is the main motivation to my work" only 29 percent of the female economists, in comparison to 40 percent of males, at Dutch universities strongly agreed with this statement, indicating that women are less concerned than men about being cited or the ranking they hold.

In contrast to McDowell *et al*. (1999), a more recent study (Ceci *et al*., 2014, cited in Nelson, 2016) analysed the progression of women in academic science from tenure track to tenured status and found that economics is an outlier with a persistent gender gap in promotion that cannot be fully attributed to differences in productivity. Nelson (2016) emphasises that economics differs, to an extent, from other maths intensive subjects when it comes to gender, hiring and promotion. Economics departments tend to lag behind in terms of social considerations, such as providing female students with female role models, and thus also lag behind in gender diversification.

Ginther and Kahn (2004) conducted a study using longitudinal data from the early 1970s until the early 2000s in order to observe developments in the careers of individuals and the granting of tenure. They constructed two sets of longitudinal data on professors in economics and included variables pertaining to information on the professors and their respective employers. This allowed them to calculate whether gender differences in tenure attainment can be explained by observable factors (Ginther and Kahn, 2004). They concluded that women in economics were less likely to obtain tenure than their male counterparts and that the gender differences cannot be fully attributed to observable characteristics. Ginther and Kahn (2004) further state that the lower chance of women obtaining tenure in economics can only be partially explained by the gender differences in productivity and the impact of children on promotion. Although women in economics have a lower publishing rate than their male counterparts, this only explains roughly 30 percent of the promotion gap. Furthermore, in analysing the Survey of Doctoral Recipients, it is suggested that although women with children are just as productive as their male counterparts, they are still less likely to obtain tenure status (Ginther and Kahn, 2004).

Such evidence of possible discrimination was also reinforced in a study by Mixon and Treviño (2005) who used econometric models to examine the probability of holding a named professorship, with specific reference to economics departments in the US South. Named professorships are subject to

both market and non-market influences; insofar that both merit and discrimination may influence this probability (Mixon and Treviño, 2005). Using regression analysis and Blinder-Oaxaca decomposition tests, they find that there is evidence of gender discrimination in the process of named professorships that is particularly present in economics departments. They concluded that there is a 12.2 percentage point difference in the female-male probability of holding a named professorship. Of that 12.2 percentage point difference, approximately 7.6 percentage points were not attributed to merit factors relating to decisions of named professorships. In other words, women are at a 7.6 percentage point disadvantage to men with regards to the probability of holding a named professorship (Mixon and Treviño, 2005).

A more recent study conducted by the Committee on the Status of Women in the Economics Profession (CSWEP, 2018) analysed the progression of women in economics departments from recently acquired PhDs to full tenured professorships. The CSWEP promotes and monitors the progress of the careers of female economists and has been conducting annual surveys on US economics departments since 1972. Their studies have focused on the representation of women receiving economics PhDs as well as the positions women hold in economics departments. Their 2018 survey gathered data on 123 doctoral departments, as well as 105 non-doctoral departments. Their surveys found that there were significant changes in the representation of women in economics between 1972 and 1994. Their data revealed that between 1972 and 1994, the number of women entering PhDs in economics had increased by 22.8 percentage points from 7.6 to 30.4 percent (CSWEP, 2018). The number of female assistant professors in doctoral-granting economics departments increased by 16.1 percentage points from 8.8 to 24.9 percent; associate professors by 10.2 percentage points from 3.7 to 13.9 percent; and full professors by 4.5 percentage points from 6.9 to 2.4 percent (CSWEP, 2018). Between 1994 and 2018, there seems to be very little progress in the share of women in new PhDs and assistant professors but a significant increase in the share of women in positions of associate and full professors. The share of women entering economics PhDs over this time period increased by only 2.8 percentage points to 33.2 percent; and 3.4 percentage points to 28.3 percent for assistant professors. The share of women in positions of associate and full professor, on the other hand, increased by 12 percentage points to 25.9 percent, and 7.4 percentage points to 14.3 percent, respectively (CSWEP, 2018).

They further state that “women make up less than a quarter of all faculty in PhD-granting departments, and over a quarter of all female faculty in PhD-granting departments are in non-tenure track positions” (CSWEP, 2018: 12). Similar results are also found when analysing the top ten and top twenty economics departments. Amongst the top ten departments in 2018, women made up only 26.1 percent of students entering the PhD program and 23.6 percent of granted PhDs, which is the

lowest percentage they have recorded this century (CSWEP, 2018). This is problematic given that there is already a leaky pipeline with the representation of women falling as you move up the academic rank, and the hopes of increasing female representation in the economics profession relies on sustained growth in entry (CSWEP, 2018). They find that the pipeline has become leakier for younger women within the last decade, stating that the percentage share of women in positions of associate professor has consistently been about 5 percent lower than the share of women who were assistant professors in the previous 7 years. The 2018 CSWEP report concludes by stating that "there has been no progress in the representation of women either entering the economics profession or advancing from untenured assistant to tenured associate professor. If anything, we see stagnation or decline in women entering economics at both the undergraduate and graduate level and increasing attrition of women as assistant professors" (CSWEP, 2018: 14). They further explain that women constitute the majority share of total undergraduate majors; however, these figures for economics do not appear to approach parity or increase over time. The lack of progress is particularly disappointing given that the representation of women in various other STEM fields, as well as the overall college-going population has increased (CSWEP, 2018).

2.7. Conclusion

Despite women making up the majority share of undergraduate students, some subjects lag behind in gender diversity, with Economics being particularly bad. Male-dominated fields, such as STEM have exhibited progress in this matter, but Economics has remained unchanged in terms of female representation over the last three decades.

Various factors have been explored in the literature which may be influential in the low representation of females in STEM fields, particularly in the field of Economics. Such factors may include stereotypes which can be pervasive and used to exclude women in hiring or promotion decisions, the lack of female role models who may encourage female students to pursue economics as a subject or career, aggressive work environments where women may not feel intellectually acknowledged, or the knowledge of a glass ceiling which some women may not want to encounter.

Furthermore, similar patterns are reflected when looking at academic staff, where males dominate the higher academic ranks across all STEM-based fields, as well as economics. In academia, women face heavy biases in terms of promotion and tenure, creating the idea of a glass ceiling. Furthermore, women are faced with stereotypes and discrimination within academia that pose a threat to their ability to perform and progress. Not only that, but it decreases their level of job satisfaction which is one of the reasons women may avoid working in academia, specifically in male-dominated fields.

The findings from the literature form the basis for this research which attempts to examine whether Economics in South Africa exhibits a similar environment. The following chapters will explain the methodology used to determine whether there are signs of gender bias in South African academia which focuses on STEM fields, particularly Economics. An examination of higher education in select faculties and departments, at both a student and staff level, is carried out and used for a comparative analysis. This is to determine whether Economics stands out as an outlier in gender diversity as is highlighted in the literature.

Chapter 3: Data, Methods and Techniques

3.1. Introduction

This chapter explains the process of data collection and the techniques used to conduct the research and how this data was used to satisfy the goals set out in Chapter 1. Section 3.2 analyses the data collection process of national statistics of students and staff at South African Higher Education Institutions (HEIs) and how this was analysed. Section 3.3 explains the data used in the quantitative research, how the data was identified and how it was obtained and analysed. Section 3.4 explains the data used in the qualitative analysis. This includes the data collection and analysis process and reasoning for the sample size and the targeted participants in the surveys.

3.2. Analysis of National Statistics

Statistics by gender on national student enrolments at South African Higher Education Institutions, success rates, degrees awarded and academic positions of staff were obtained from Government publications by Statistics South Africa and the Department of Higher Education and Training. The data collected pertained to first and second order CESM categories and the gender compositions under each. This was analysed at each qualification level, i.e. undergraduate, honours, masters, and doctorate.

For the staff analysis, gender statistics were obtained from Government publications by The Department of Higher Education and Training. This pertained to gender compositions of staff members at South African HEIs and the top 10 South African universities according to employment position, academic rank, and the qualifications they hold.

3.3. Quantitative Analysis

Statistical data was also obtained directly from 4 South African universities on the gender compositions of students and staff members. The reason why another analysis on these four universities was conducted was that this allowed a more up-to-date analysis (up to 2019) whereas the government data was only available up until 2017. Emails were sent to each of the universities to request the data for both students and staff and required gatekeeper approval was obtained. Initially, 6 universities were approached, but data was only able to be obtained from 4. This data focused on three faculties, namely Commerce, Engineering, and Science. Some of the universities classified these faculties as Economic and Management Sciences, Engineering and the Built Environment, and the

Natural and Agricultural Sciences, however for the purposes of this research and for simplicity reasons the faculties will be classified as Commerce, Engineering, and Science. Data was also collected for the academic departments within each of these faculties. Gendered statistics were collected for the years 2014 – 2019 to identify possible trends in the data. However some data are missing for some of the universities and where possible this was replaced with data for that university from the national statistical database.

In analysing the student data, the gender compositions of students in their undergraduate studies was obtained per faculty rather than subject to avoid any overlapping since students will have taken multiple subjects at a time. These three faculties were chosen because they are identified in the literature as being traditionally male-dominated fields of study. The given time period of six years made it possible to see whether there has been any changes, increases or decreases, in the proportion of females participating in these fields of study and whether some faculties are progressing faster than others towards greater gender parity in line with the national statistics for HEIs.

At the postgraduate level the gender statistics are broken down by department under each of the three faculties. Not every department from each faculty could be analysed. Those subjects that were typically found at all of the universities were analysed. However, one of the universities does not have an engineering faculty and so this analysis was conducted using only 3 of the 4 universities. Once data was obtained for all of the departments listed under the three faculties, it is possible to compare female enrolment in Economics and changes therein over time to the other traditionally male-dominated fields of study. It is also possible to examine whether female participation rates drop off in the postgraduate years as the literature suggests, and to identify where female enrolment decreases as one progresses from undergraduate to Honours and then to Masters and finally Doctoral studies.

The gender compositions of academic staff members at each of these universities was analysed for each of the departments used in the student analysis and at each academic rank. The international literature suggests that females tend to dominate the lower end of the academic ladder whereas men tend to dominate the higher end and that this difference is especially large in the traditionally male-dominated subjects. So statistics were gained from the 4 sampled universities to identify whether similar patterns exist in South Africa and whether there has been any progress in attracting a larger proportion of women at more senior levels into these traditionally male-dominated fields. The data is then used to compare the gender composition of Economics departments by academic rank with the other departments to establish whether Economics has had similar or slower progression rates (as has been noted in the literature) in female participation and to compare changes over the last six years.

3.4. Qualitative Analysis

The qualitative analysis was aimed at both students and staff members but focused solely on those within the field of Economics. Data were obtained by separate questionnaires for academics and staff (See copies of the questionnaires in Appendix D1, D2 and G1). All of the questionnaires were online, participation was entirely voluntary and respondents were completely anonymous to the researcher.

The qualitative analysis of staff consisted of questionnaires that were distributed to academic economists working at South African universities. Emails were sent to 200 academic Economists, both male and female, of which 47 replies were received. The email addresses of the staff members were obtained from attendees at the 2019 Biennial Conference of the Economics Society of South Africa, as well as from numerous university websites where staff email addresses were available. In this part of the research there was no specified sample size. Instead efforts were focused rather on trying to get as many responses as possible in the three weeks that was available to collect the data after long delays in obtaining ethical approval.

The questionnaires asked participants for their demographic information, including their gender, age, academic rank and focus area. Thereafter, participants were asked 19 questions (see Appendix G1) that focused on their opinions and experiences working as an academic in the field of Economics. Each question was analysed individually for observable differences between the answers of male and female participants. The majority of the questions were a 5 point Likert scale where the respondent was asked a question and given the options of “always”, “often”, “sometimes”, “never”, or “no comment”. For some of the questions, the respondents had to check as many options as were applicable. Most of the questions were based on questions asked in a similar survey conducted by the American Economic Association in their climate survey and others were generated by the researcher.

The qualitative analysis for students was conducted only at Rhodes University. Unfortunately, due to lengthy and unforeseen delays in obtaining ethical approval, it was too late for the researcher to apply to other universities for ethical approval and then send and collect the data. Thus, Rhodes University had to be used as a case study. Of course this creates limitations to the study as answers may differ significantly at other universities given the different sizes and dynamics of the student and staff populations.

The sample was broken down into three categories: (1) all students majoring in Economics in 2019, (2) all 2019 Economics Honours students, as well as (3) those who majored in Economics in 2018 but proceeded to move into Honours studies in 2019 in either Information Systems, Management, Statistics, or Politics. The emails with the links to the online questionnaires were sent to the students via the Rhodes Data Management Unit. The researcher was not permitted to send the emails to

students directly or ask students to answer hard copies in their classes as the Rhodes Ethics Committee rejected this request. The DMU also did not allow follow-up emails to be sent to students to encourage greater participation as they believed this to be "spamming". 234 emails were sent to students majoring in Economics, of which only 16 replied. The Economics Honours class consisted of 54 students, of which 28 replied. 21 students fell into the third category, of which only 2 responded, and thus this questionnaire had to be excluded from the study. Copies of the questionnaires can be found in Appendix C1 and C2.

The questionnaires for students in the first two categories focused on possible factors that influenced their decision to take Economics. Students in the third category were asked questions about possible influences on their decision not to continue studying Economics at a postgraduate level. All of the questionnaires consisted mainly of 5 point Likert scale questions. Students were given a list of possible actors that had influenced their decision which they had to rate on a scale of 1 to 5, where 1 = no influence and 5 = major influence. In other questions students were asked to agree/disagree.

The objective of these questionnaires was to determine which factors influence men and women in their decision to pursue Economics. The literature suggests that factors such as students' level of interest or aptitude in the subject, the presence of economic maths, graphs, or essays, and, importantly, the presence of female and male lecturers or tutors may have an impact on student subject choice. This helped establish whether a gender role model effect is important for students studying Economics in South African universities.

3.5. Ethical approval

Ethical approval was obtained from the Rhodes University Human Ethics Committee (see Appendix A1) to obtain the data from the 4 universities and to conduct the academic and student questionnaires. This was required because the research involves human subjects. Gatekeeper permission was obtained from each University and from the Registrar of Rhodes University to survey Rhodes students.

3.6. Conclusion

This chapter has set out the sources of data and methods used to analyse the question of whether female participation in Economics is as problematic in South Africa as has been suggested elsewhere in the international literature. Data of female participation in identified faculties and subjects as well as academic staff by rank were obtained from national databases as well as from 4 sampled universities. Possible reasons for lower female participation were then examined using questionnaires aimed at Economics staff at South African universities and students at one particular university.

Chapter 4: Findings and Interpretation of Results

4.1. Introduction

This chapter analyses the statistics on gender in Economics both nationally and for 4 selected South African universities. Results of the student and staff surveys are also presented and interpreted. Lastly, a correlation matrix is performed to identify whether the role model effect applies at the 4 selected universities.

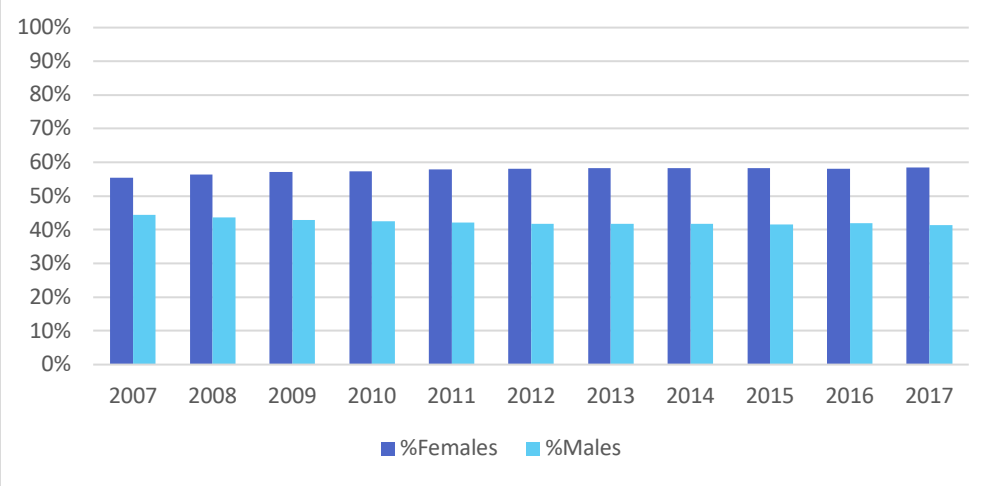
4.2. Analysis of University Students

In this section female participation in higher education and then Economics and other disciplines is examined for South Africa, first using national statistics of all higher education institutions (HEIs) and then for the chosen sample of 4 South African universities.

4.2.1. National Statistics on Students in South African HEIs

An analysis of South African national student enrolment data for HEIs between 2007 and 2017 shows that females average 57.9 percent of total enrolments (see Appendix B1). Both male and female enrolments grew in numbers over the 10 year period, however female enrolments grew faster than male, thus increasing female enrolments as a proportion of total student enrolments by an average of 0.3 percentage points annually over this period. The gradual increase in the percentage proportion of female student enrolments and gradual decrease for males can be seen in Figure 1.

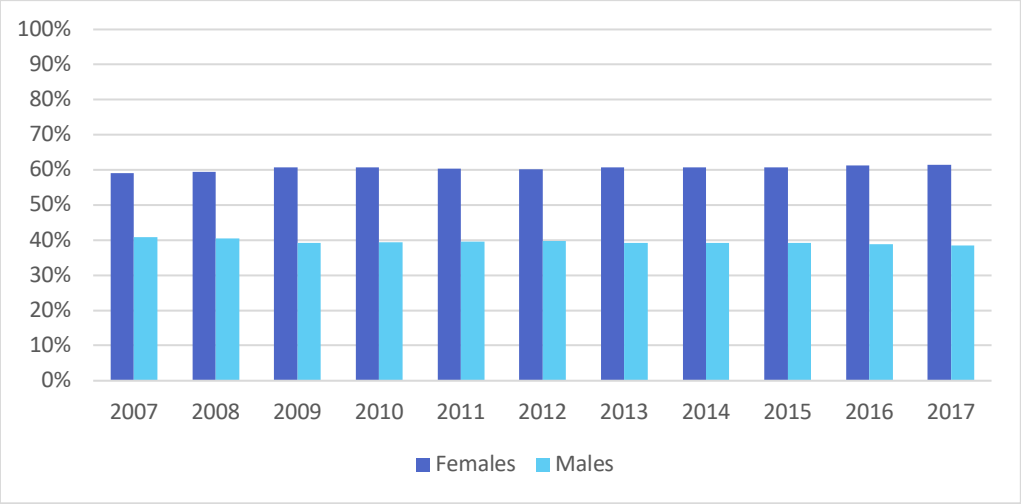
Figure* 1: *The percentage proportion of total student enrolments at South African HEIs by gender – all faculties; 2007 – 2017.



Source: **Council on Higher Education (2014, 2015, 2016, 2017, 2018, 2019).**

Furthermore, females represented an even higher proportion of graduating students at South African HEIs throughout the 10 year period and this percentage has also gradually increased (see Figure 2 and Appendix B2). In 2007, 59.1 percent of graduating students were female. In 2012, this rose to 60.2 percent and in 2017 to 61.5 percent. Thus females not only make up the majority of students at South African HEIs, their chances of graduating are also higher than those of males.

Figure* 2: *The percentage proportion of total graduates from South African HEIs by gender – all faculties; 2007 – 2017.



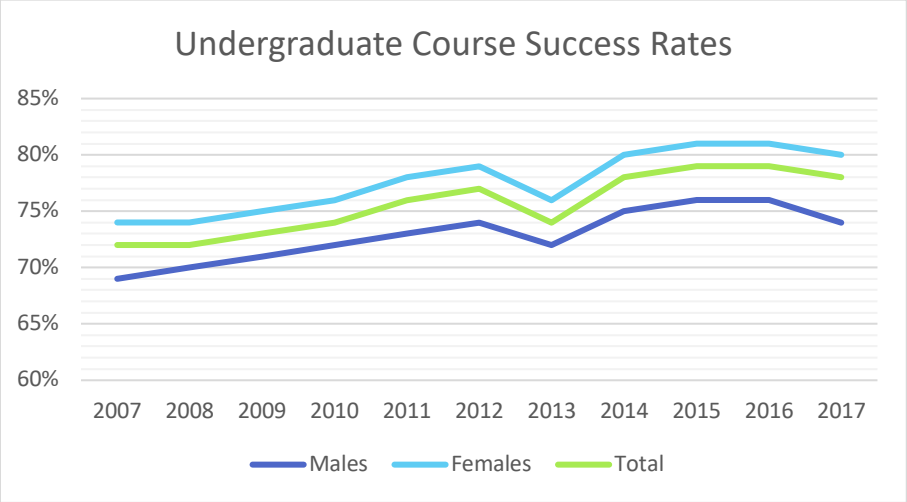
Source: **Council on Higher Education (2014, 2015, 2016, 2017, 2018, 2019).**

Females are the majority of undergraduate and Honours enrolments, but their share of enrolment numbers drops at the Masters and PhD levels (see Appendix B3). Over the 10 year period examined, females averaged 57.9 percent of undergraduate enrolments and 63.0 percent of postgraduate Honours enrolments. Female enrolments in Masters and PhD studies then drop to an average of 48.9 and 43.5 percent, respectively. Given that graduation rates are also in favour of females, females make up a substantial majority of those qualifying to proceed with further postgraduate study at the Bachelors and Honours levels. The decline in their share of enrolment to less than 50 percent at the Masters and Doctoral levels is could suggest of some form of gender bias that discourages or prevents women from continuing their studies at these levels. However, one cannot exclude the possibilities that there may be other influential factors, for example due to females often achieving higher results and having lower failure rates they may be more sought after for jobs in comparison to their male counterparts. Perhaps utility maximisation differs between males and females where females may not feel the need to further their studies. However, the proportion of females enrolled at all qualification levels experienced gradual increases from 2007 to 2017. Whether the reason for this is due to gender

biases reducing or due to other reasons, is unknown, but is a positive sign nonetheless towards eventual gender equality at the higher levels of academic study.

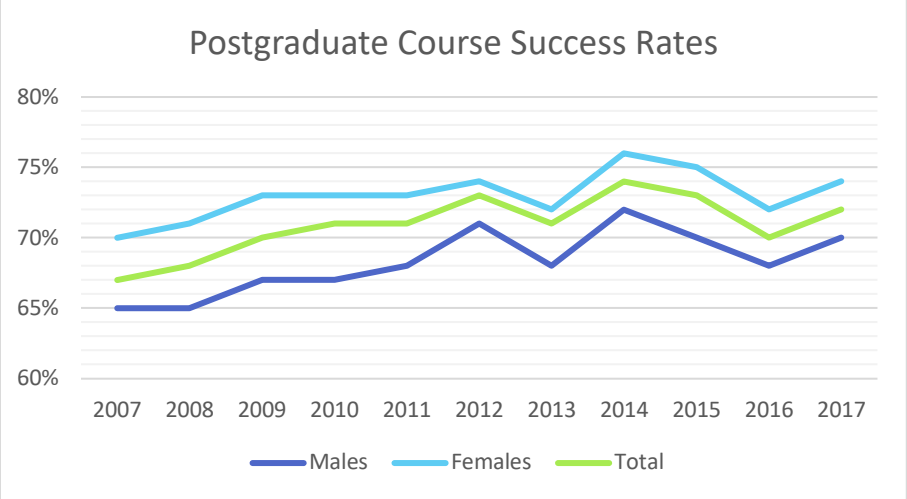
Not only are female enrolments in HEIs higher than males (at most qualification levels), but female course success rates at HEIs are significantly higher than for males at both an undergraduate and postgraduate level. Over the same 10 year period, depicted in Figures 3 and 4, the total average course success rate for undergraduate students was 76 percent. The average course success rate amongst undergraduate females was 78 percent, in comparison to 73 percent for males. Similarly, at a postgraduate level the total average course success rate was 71 percent overall, but 73 percent for females and 68 percent for males.

Figure 3*: Undergraduate *course success rates at South African HEIs by total and by gender; 2007 – 2017.



***Source:* Centre for Higher Education (2014; 2015; 2016; 2017; 2018; 2019)**

Figure 4*: Postgraduate *course success rates at South African HEIs by total and by gender; 2007 – 2017.



***Source:* Centre for Higher Education (2014; 2015; 2016; 2017; 2018; 2019)**

In 2013, the course success rates for both males and females fell. This could have been due to significant tragedy and political turmoil that took place in South Africa that year. South Africa endured many heart breaking events such as the passing of former president Nelson Mandela, the murders of Anene Booysen and Reeva Steenkamp, which sparked nation-wide outrage and protests against gender-based violence, the Pinetown crash, footage exposing police brutality, and public outrage after the Nkandla report (Petzer, 2013; enca.com, 2013). Another dip in course success rates for males and females, although only at the postgraduate level, occurred in 2016. This may have been influenced by the #FeesMustFall protests that took place at many South African universities.

4.2.1.1. National Statistics on Economics versus other CESM Categories in South African HEIs

Represented in Table 1 is the percentage of female students enrolled at South African HEIs according to the 1st and 2nd order CESM categories and the qualification type for 2013 and 2017. 2017 data was the most recent data available and 2013 data was used to provide a snapshot of change over a 5 year period. At an undergraduate and honours level, females make up the majority of student enrolments in Business, Economics and Management Studies, Life Sciences, and Physical Sciences. With the exception of Life Sciences, the proportion of females enrolled under all the other CESM categories all drops to the 40th percentile or below at a Masters and Doctoral level. In the case of the Life Sciences, females make up the majority at all qualification levels. Out of the 6 CESM categories analysed and in line with international experience, Engineering had the lowest proportion of female enrolments in both 2013 and 2017.

In looking at university enrolments for the 2nd order CESM category, Economics, in comparison to the 6 CESM categories, it can be seen that at the undergraduate level, in 2013, 49.9 percent of Economics students were female and this increased slightly to 50.5 percent in 2017. In 2013 and 2017 respectively, females made up 52.8 and 54.2 percent of Economics Honours students, 45.6 and 45.4 percent of Economics Masters students, and 31.1 and 35.8 percent of Economics Doctoral students. These shares are substantially below the female share of enrolments nationally in South African HEIs at all levels of study, providing evidence of gender bias. However, the female shares in South Africa are higher than the literature suggested for female participation in Economics internationally. This difference from the international evidence will be shown graphically in the conclusion to this analysis.

In South African HEIs Economics has a lower proportion of females than the Physical Sciences, Life Sciences, and the Business, Economics, and Management Studies, but more than Computer and Information Sciences, Engineering, and Mathematics and Statistics. In 2017, the percentage of female enrolments in undergraduate studies in Computer and Information Sciences, Engineering, and

Mathematics and Statistics were 37.4%, 25.2%, and 37.3%, respectively, in comparison to Economics which was 50.5 percent. Of these 4 subjects, Computer and Information Sciences had the biggest percentage point increase of 2.1 between 2013 and 2017, followed by Economics with a 0.6 percentage point increase. Both Engineering and Mathematics and Statistics experienced decreases in female share of enrolment over the period of 0.8 and 4.1 percentage points, respectively.

With these enrolment figures presented, it would be useful to see whether differences in matric results have an influence on enrolment figures in various subjects at university. Research conducted by van Broekhuizen and Spaull (2017) on gender differences in performance in matric exams of the 2008 NSC cohort, showed that of 18 subjects examined boys outperformed girls in only Agricultural Sciences, Geography, History, Mathematics and Mathematical Literacy. Girls outperformed boys in the remaining 13 subjects, namely Accounting, Afrikaans first additional language, Afrikaans home language, Business Studies, Economics, English first additional language, English home language, IsiXhosa home language, IsiZulu home language, Life Sciences, Physical Sciences, Sepedi home language and Tourism. Girls had a significant advantage in the language subjects. Furthermore, 27 percent more girls than boys achieving the bachelor passes necessary to proceed to university. In fact 34 percent more females accessed university in comparison to their male counterparts (van Broekhuizen and Spaull, 2017). It can be seen how these bachelor pass rates translate into enrolments in South African HEIs. Considering a higher proportion of females receive bachelor passes in matric, it is not surprising that females make up 57.9 percent of total enrolments in HEIs. Furthermore, females outperform males in Business Studies, Economics, Life Sciences and the Physical Sciences in matric which could explain the higher undergraduate enrolment figures in HEIs of females in Business, Economics and Management Studies, Life Sciences, and Physical Sciences. The fields of Engineering, Computer and Information Sciences and Mathematics and Statistics in HEIs are heavily maths-focused. The higher undergraduate enrolments in these fields for males thus would correspond with the higher matric achievements in mathematics.

To better gauge changes in Economics relative to similar subjects the CESM category Business, Economics, and Management Studies is broken down into 18 2nd order CESM categories (see Appendix B4). Although the percentage point improvement for female enrolment between 2013 and 2017 for Economics was only 0.6 percentage points at the undergraduate level, it is 1 of only 7 2nd order Business, Economics and Management categories that experienced an increase in female participation, as opposed to the other 11 which saw decreases between 2013 and 2017. Likewise, female participation in Economics at the Honours and Doctoral levels increased by 1.4 and 4.7 percentage points between 2013 and 2017, in comparison to 0.9 and 0.1 percentage points for the entire category of Business, Economics, and Management Studies. It is only at the Masters level where

female participation in Economics decreased by 0.2 percentage points, compared to Business, Economics, and Management Studies which increased by 5 percentage points.

In comparison to the other CESM categories, Economics at an undergraduate level had a lower percentage point increase from 2013 to 2017 than Computer and Information Sciences, Life Sciences, and Physical Sciences. Female participation in undergraduate Engineering and Mathematics and Statistics was lower in 2017 than in 2013.

It is difficult, however, to determine whether enrolment figures continued to increase after 2017 without data from 2018 and 2019 and thus, no definitive conclusions can yet be made about sustained improvement, stagnation or decline in female participation within these fields. Nevertheless, across all fields and evident in both years, there is a clear fall off of female participation when moving to Masters and Doctoral studies. It is unclear why this is the case for business, but it could be possible that there are negative factors at play that deter women from furthering their studies. However, one cannot dismiss that the falloff may be due to other factors, that may not necessarily be negative. For example, females may be more sought out and thus able to find attractive jobs without further study.

Table 1: Percentage of female enrolments according to the CESM categories and qualification type, including the 2nd order CESM category, Economics; 2013 & 2017.

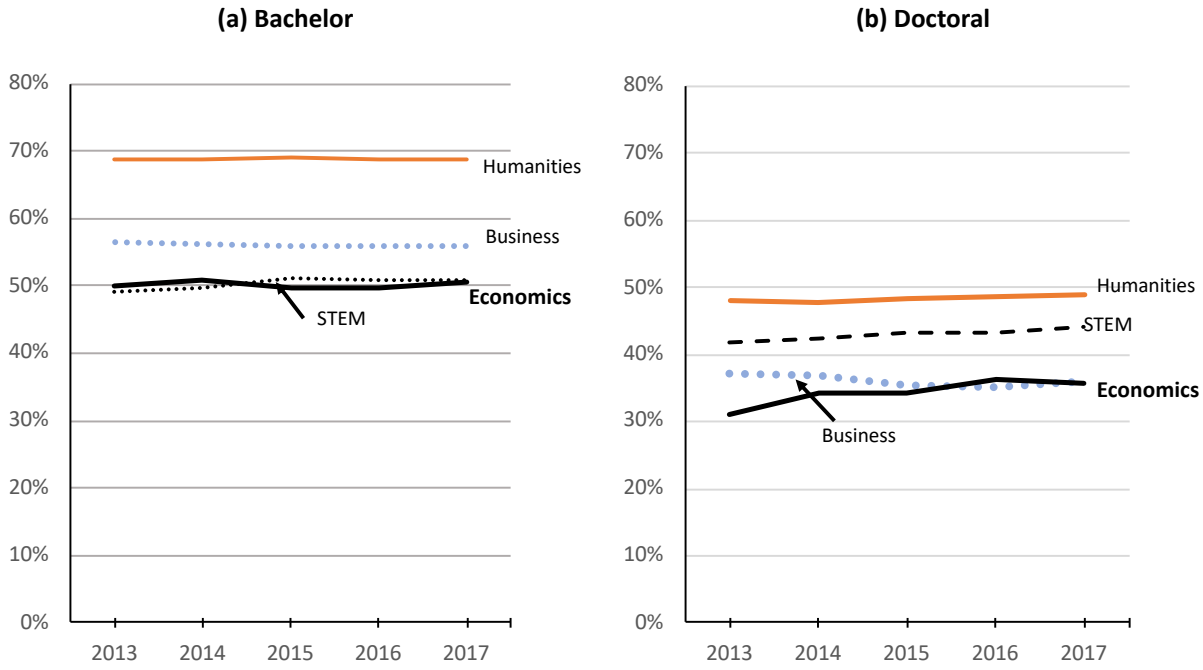
	2013	2017
BUSINESS, ECONOMICS, & MANAGEMENT STUDIES		
Undergraduate	55.7%	55.3%
Honours	54.0%	54.9%
Masters	41.3%	46.3%
Doctoral	35.8%	35.9%
COMPUTER & INFORMATION SCIENCES		
Undergraduate	35.3%	37.4%
Honours	33.7%	35.5%
Masters	34.8%	35.5%
Doctoral	29.4%	29.7%
ENGINEERING		
Undergraduate	26.0%	25.2%
Honours	31.6%	35.4%
Masters	21.8%	27.2%
Doctoral	19.1%	22.4%
LIFE SCIENCES		
Undergraduate	62.5%	63.6%
Honours	60.9%	67.2%
Masters	60.2%	62.9%
Doctoral	54.6%	57.0%
PHYSICAL SCIENCES		
Undergraduate	50.2%	51.3%
Honours	55.2%	56.8%
Masters	44.0%	48.6%
Doctoral	33.8%	37.9%
MATHEMATICS & STATISTICS		
Undergraduate	41.4%	37.3%
Honours	38.8%	39.8%
Masters	34.8%	36.5%
Doctoral	28.3%	26.3%
ECONOMICS		
Undergraduate	49.9%	50.5%
Honours	52.8%	54.2%
Masters	45.6%	45.4%
Doctoral	31.1%	35.8%

Source: **Department of Higher Education and Training (2013; 2017)**

The national data are illustrated in Figures 5a and 5b, which show from 2013-2017 the female share of enrolments in Bachelor and Doctoral degrees in South African HEIs according to broad CESM categories; Business, STEM, and Humanities, as well as the 2nd order CESM category, Economics. Data were obtained via Government publications issued by the Department of Higher Education and Training. The statistics for Business was recalculated to exclude Economics, and Humanities includes the Social Sciences and Education which may raise female participation.

Figure 5a shows that Humanities has the highest female enrolments in Bachelor degrees of just below 70 percent. Economics sits on a par with STEM at about 50 percent, but is worse than Business and a lot worse than Humanities. Furthermore, female enrolment figures remain fairly constant for each field from 2013 to 2017. There is a sharp fall-off of the share of female enrolments at the Doctoral level for all fields, where all lie below 50 percent (Figure 5b). At the Doctoral level, Business and Economics are the laggards, below STEM and Humanities. While STEM and Economics show some improvement, female participation in Business at the Doctoral level shows a downward trend.

Figure 5: Percentage share of female enrolments in South Africa for Bachelor and Doctoral Degrees



Source: **Department of Higher Education and Training (2013, 2014, 2015, 2016, 2017)**

4.2.2. Student Statistics at a Sample of South African Universities

In order to more fully understand the nature of female participation in traditionally male-dominated fields and determine whether there have been any significant changes over time, the gender compositions of students at four research-intensive South African universities were also analysed over the period 2013 to 2019. The names of the universities remain anonymous and therefore will be referred to as UNI1, UNI2, UNI3, and UNI4. Only three faculties have been analysed, Commerce, Science, and Engineering. The Humanities faculty was excluded from this section as this analysis solely focuses on STEM-based subjects. The Humanities faculty was only included in the national analysis to get a general overview of university enrolment figures in South Africa compared to figures reported in the international literature as Humanities was sometimes used in those analyses. However, this research is primarily focused on comparing Economics to STEM and thus no application for Humanities data was made. It should be noted, however, that UNI1 does not have an Engineering faculty[1] and therefore comparative studies for this faculty will be between the other three universities. Furthermore, 2013 data and data for Information Systems could not be obtained for UNI3, as well as 2013 and 2014 undergraduate data for UNI4[2]. At the undergraduate level, gender compositions have been analysed per faculty so as to avoid overlapping student registrations for inter-faculty subjects.

At the postgraduate level, gender compositions have been analysed per department. For simplicity purposes, only departments that appear at all four universities are analysed, with the exception of Information Systems at UNI3. Additionally, since some universities combine certain departments and others have them separate, departments of a similar nature have been combined. The following departments have been combined: Biochemistry + Microbiology + Molecular and Cell Biology + Biotechnology (BMC); Biology + Botany + Zoology + Entomology (BZE); Earth Science + Environmental Science + Geography + Geology (EGG); Mathematics + Applied Mathematics (MAT). The other departments that have been analysed are Economics (ECO); Information Systems (IS); Civil Engineering (CE); Electrical Engineering (EE); Mechanical Engineering (ME); Industrial Engineering (IE); Chemical Engineering (CHE); Chemistry (CM); Statistics (STA); Physics (PHY); and Computer Science (CS). It should also be noted that the postgraduate data for UNI4 could not be obtained direct from the university and therefore data has been supplemented with data obtained from a government

[1] It is unfortunate that UNI1 did not have an Engineering department but since only 4 universities were willing to provide the requested information it would have been nonsensical to exclude UNI1 from the analysis as the other departments could be used in the comparative analysis.
[2] Full information was requested from each university, however some of the universities were unable or unwilling to provide certain data.

publication issued by the Department of Higher Education and Training[3]. Furthermore this data is only available up to 2017 and therefore 2018 and 2019 data is missing for UNI4 at the postgraduate level. This data should be looked at with caution as the government publication depicts higher numbers than what would be expected[4], however, the calculations of male and female enrolments as a percentage of total enrolments all added up to 100.

4.2.2.1. Undergraduate

Table 2 shows the percentage of female students enrolled in undergraduate studies under the faculties of Commerce, Science, and Engineering for the sample of universities. Within the faculty of Commerce, females make up the majority of student enrolments at UNI1 and UNI4, sitting within the 50th percentile range throughout the time period. At UNI2 and UNI3, female share of enrolments in Commerce lie within the 40th percentile range. It is difficult to determine any clear trend in female share of enrolments. UNI1 and UNI3 have experienced steady increases in the proportion of females enrolled in the Commerce faculty, whereas UNI2 experienced decreases from 2014 to 2017 and increases thereafter. Female enrolments in Commerce at UNI4 have remained constant at 54 percent with the exception of a 1 percentage point drop in 2013. Only UNI1 has female enrolment in Commerce greater than the 55% female share for Business, Economics and Management Studies in 2013 and 2017 shown in the CESM data above (Table 1). The female share for Commerce at all 4 universities is lower than the national share of female undergraduate students at HEIs (Figure 1).

The data for undergraduate studies within the Science faculty also show no clear pattern with regards to the percentage of female student enrolments. At UNI1 and UNI4, the percentage of female students remain throughout in the high 40%. Likewise, female enrolments remain within the 40th percentile range at UNI2, with a 4 percentage drop occurring in 2017 and remaining at 44 percent in 2018 and 2019. On the other hand, at UNI3, the percentage of females in the Science faculty fluctuates from the mid- to high 50 percent.

UNI1 does not offer Engineering, and thus is represented with a '-'. Across the other three universities, Engineering has the lowest proportion of female enrolments in all the analysed years. The percentage

---

[3] Full publications can be found at http://www.dhet.gov.za/SitePages/UniversityEducation.aspx?RootFolder=%2FHEMIS%2FEnrolment&FolderCTID=0x0120001A2C7183BA3E3B44BFA35ECDA2510D0B&View=%7B9211ED6A%2D7620%2D4A8A%2D9941%2D84DE5DBE1BCB%7D

[4] It appears that the decimal place is incorrect in published data, but this should not impact female share of total registrations.

of females enrolled in the Engineering faculties at UNI2, UNI3, and UNI4, are between 20 and 40 percent throughout. UNI2 and UNI3 experienced 1 to 2 percentage point improvements in female enrolment in Engineering over the sample time period, but female enrolment fell by 1 percentage point in UNI4.

The lower proportion of female students enrolled in Science and Engineering corresponds with Van Broekhuizen and Spaull (2017)[5] who find that in South Africa women are less likely to enrol in the fields of Engineering, Computer Sciences, and Mathematical Sciences. They find that males are more inclined to enrol in fields that are perceived to be more difficult and have higher failure rates, which is in line with Jakobsson (2012)[6], who finds that women tend to be less confident in their academic abilities.

Further investigation would be required to investigate broader environmental factors that may influence these numbers as well as the continuation from graduation to academia or employment in the disciplines of Science and Engineering. However, this is not within the scope of this project as the focus is on female participation in Economics and factors influencing this.

At an undergraduate level the average percentage of female students enrolled in Business, Economics, and Management Studies nationally from 2007-17 was 55.3 percent (and for all subjects 57.9 percent). Average female enrolments in Commerce at UNI1, UNI2, UNI3, and UNI4 from 2013-19 was 53.4, 45.9, 47.5, and 53.8 percent, respectively. Thus, UNI1 and UNI4 seem to be roughly on par with the national level for Commerce of 55.3 percent, however, UNI2 and UNI3 lie below this. The average female enrolments in Commerce at all four universities lie below the national enrolment average for all subjects. The CESM categories of Computer and Information Sciences, Life Sciences, Physical Sciences, and Mathematics and Statistics all generally fall under the faculty of Science at the universities and therefore an average of the gender statistics for these CESM categories for 2017 is used to compare against the faculties of Science at each of the four universities. This national percentage for female enrolments in the sciences is 47.4 percent against which UNI1, UNI3, and UNI4 are all above with averages of 49.1, 57.7, and 47.9 percent, respectively. UNI2 has an average of 46.6 percent which is just slightly below the national statistic. Furthermore the average percentage of females enrolled in Engineering at UNI2 (27.6), UNI3 (25.2), and UNI4 (34.4) are on par with the national average of 25.2 percent.

[5] See page 18-19.
[6] This paper is discussed later on in the Chapter.

Table 2*: *Percentage of female students enrolled in undergraduate studies under the faculties of Commerce, Science, and Engineering; 2013 – 2019.

UNDERGRADUATE STUDENT DATA					
		UNI1	UNI2	UNI3	UNI4
2013	COMMERCE	50%	49%		
	SCIENCE	48%	49%		
	ENGINEERING	-	27%		
2014	COMMERCE	51%	47%	46%	
	SCIENCE	50%	49%	54%	
	ENGINEERING	-	27%	23%	
2015	COMMERCE	52%	45%	47%	54%
	SCIENCE	50%	48%	56%	48%
	ENGINEERING	-	27%	23%	35%
2016	COMMERCE	52%	43%	47%	54%
	SCIENCE	50%	48%	58%	48%
	ENGINEERING	-	27%	25%	34%
2017	COMMERCE	56%	44%	48%	53%
	SCIENCE	49%	44%	60%	49%
	ENGINEERING	-	27%	25%	34%
2018	COMMERCE	57%	46%	48%	54%
	SCIENCE	49%	44%	59%	47%
	ENGINEERING	-	29%	27%	34%
2019	COMMERCE	56%	47%	49%	54%
	SCIENCE	48%	44%	59%	48%
	ENGINEERING	-	29%	28%	34%
2013-19 (Average)	COMMERCE	53%	46%	48%	54%
	SCIENCE	49%	47%	58%	48%
	ENGINEERING	-	28%	25%	34%

Source: Obtained by author from the universities.

Thus at an undergraduate level the 4 universities largely confirm the national gender breakdowns for HEIs and suggest no substantial changes occurred between 2017 and 2019. However, for UNI1 and UNI2 female enrolment for Commerce is substantially below the national average. It is not possible to determine whether this below average female participation applies to Economics also, as Economics students may also be drawn from the Faculties of Humanities or Science. It would have been interesting to see the enrolment figures for students majoring in Economics as this information was not available. Most of the universities did not capture enrolment figures per department at the undergraduate level but only at a departmental level.

4.2.2.2. Honours

When looking at the postgraduate Honours data for all four universities (see Table 3 and Appendix C1), there are clear differences in female representation across universities and across years. Annual statistics are quite volatile in nature and don't seem to follow any specific trend. For UNI2 and UNI3, females consistently made up just less than half of student enrolments in ECO, while at UNI1 and UNI4 female enrolment for ECO jumped around within the 30th, 40th and 50th percentiles. However, the average female enrolments for ECO Honours (Table 3) is low compared to the national female enrolments in the 1st order CESM category Business, Economics and Management of 55.3 percent and the 2nd order CESM category Economics of 54.2 percent as seen in Table 1 and Appendix B1. This is also much lower than the 63% which females make up of all Honours students in all subjects nationally.

In the departments of IS, MAT, STA, CS, and PHY, there is a much lower percentage of female Honours students than in Economics, with CS and PHY being the lowest. Consistently, across all four universities and throughout the time period analysed males have dominated enrolment in the fields of Computer Science and Physics. For UNI1, UNI2, UNI3, and UNI4, the average proportion of females enrolled in postgraduate Honours studies in Physics was 29.6, 26.8, 28.9, and 23.6 percent, respectively. Similarly, in Computer Science, females averaged 26.6, 16.5, 16.2, and 21.0 percent, respectively. However, Honours classes in subjects like Physics and Statistics tend to be very small at all 4 universities – with the exception of Statistics at UNI3 where their numbers tend to be quite high – and thus small changes in the number of students can result in large changes in the share of females. This is, however, not necessarily the case for Computer Science where it seems that CS generally seems not to attract female students (see Appendix C2). It is only in the departments of BMC, BZE, CM, and EGG that there are a larger proportion of females than in ECO. If the benchmark for female participation is 63 percent (the national average at the Honours level), then BMC and BZE are the only two departments that exceed that benchmark, and CM and EGG follow just slightly behind. The departments under the faculties of Engineering at UNI2, UNI3, and UNI4 were left out of the honours analysis as there was very little data at this academic level. This may be because the engineering undergraduate degrees are 4-year degrees and thus the honours is technically 'included' as part of the undergraduate degree.

Table 3: Average percentage of female students between 2013 and 2019 enrolled in postgraduate Honours studies at the four universities.

HONOURS			
UNI1	UNI2	UNI3	UNI4
ECO			
48.5%	41.9%	42.0%	47.4%
IS			
39.3%	31.5%		43.4%
BMC			
58.5%	60.1%	64.7%	70.2%
BZE			
56.3%	67.4%	70.1%	72.1%
CM			
43.7%	63.9%	52.1%	54.0%
EGG			
59.4%	59.6%	39.3%	64.8%
MAT			
40.2%	32.1%	37.2%	37.3%
STA			
56.0%	32.9%	43.0%	43.7%
CS			
26.6%	16.5%	16.2%	21.0%
PHY			
29.6%	26.8%	28.9%	23.6%

Source: Obtained by author from the universities.

4.2.2.3. Masters

At the Masters level, there are big differences between the 4 universities. Some departments at some universities experienced drop-offs in female participation when going from the Honours to the Masters level, while others experienced increases (see Table 4 and Appendix C3). The two departments that experienced the largest drop-offs were BMC and BZE where UNI2, UNI3, and UNI4 all experienced a significant decrease in female participation going from an Honours to Masters level. Only at UNI1 did the proportion of females for these subjects increase from Honours to Masters. Only at UNI1 does the share of females studying Economics drop sharply from Honours to Masters (from 48.1 to 41.7 percent). At UNI 3 the share was virtually unchanged (from 42.0 to 41.6 percent) while at UNI2 (41.9 to 48.1 percent) and UNI4 (47.4 to 51.2 percent) the female share rose at Masters level.

When comparing the Masters percentages to the national statistics in Table 1, the proportion of females in Economics at UNI1 and UNI3 are below the national Economics benchmark of 45.4 percent and the 48.9 percent which females make up of Masters students in all subjects nationally. However, the female share of Economics at the Masters level across the 4 universities is still better than Maths, Statistics, Computer Science, and Physics, as well as all departments under Engineering. In a general sense, those subjects that do "well" in attracting females at the Honours level continue to do so at the Masters level. Those who did badly at the Honours level, continue to do badly, and in some cases actually get worse.

In comparison to national enrolment figures by qualification level (see Appendix B3), the only two STEM departments at the 4 universities that have a higher proportion of females than the national benchmark of 52.6 percent for female enrolments in Masters studies are BMC, and BZE. This is calculated using the averages across universities and time. The remaining 13 departments have averages below this benchmark which suggests that females feature highly in the faculties not analysed in order to get the national figure to 52.6 percent.

Table 4: Average percentage of female students between 2013 and 2019 enrolled in postgraduate Masters studies at the four universities.

MASTERS			
UNI1	UNI2	UNI3	UNI4
ECO			
41.7%	48.1%	41.6%	51.2%
IS			
42.7%	44.3%		38.5%
BMC			
58.8%	57.3%	53.7%	61.2%
BZE			
57.7%	62.8%	63.9%	49.7%
CM			
42.7%	50.4%	51.6%	51.4%
EGG			
38.0%	57.3%	45.0%	53.1%
MAT			
17.7%	34.1%	38.2%	27.2%
STA			
38.1%	29.9%	36.4%	49.7%
CS			
11.2%	21.6%	0.0%	27.5%
PHY			
26.1%	40.0%	28.8%	20.2%
CE			
	33.4%	21.9%	26.1%
EE			
	15.5%	13.7%	14.5%
ME			
	26.9%	12.4%	14.9%
IE			
		33.1%	33.8%
CHE			
	45.0%		38.3%

Source: Obtained by author from the universities.

4.2.2.4. Doctorate

Table 5: Average percentage of female students between 2013 and 2019 enrolled in postgraduate Doctoral studies at the four universities.

DOCTORATE			
UNI1	UNI2	UNI3	UNI4
ECO			
37.9%	39.1%	31.8%	30.2%
IS			
45.6%	37.5%		21.8%
BMC			
53.8%	64.1%	56.8%	61.3%
BZE			
53.2%	53.0%	60.4%	50.0%
CM			
46.7%	48.6%	40.7%	43.1%
EGG			
53.5%	50.7%	31.4%	45.3%
MAT			
12.5%	28.5%	34.2%	29.8%
STA			
	25.6%	51.6%	39.1%
CS			
14.4%	26.4%	22.8%	19.2%
PHY			
25.5%	23.4%	25.8%	14.5%
CE			
	28.0%	23.1%	14.8%
EE			
	14.8%	15.1%	15.6%
ME			
	34.1%	7.0%	22.7%
IE			
		23.3%	
CHE			
	38.4%		27.0%

Source: Obtained by author from the universities.

The more significant drop-off of female enrolments within the analysed departments happens at the Doctorate level, with the exception of the Life Sciences (BMC, BZE, and EGG). Generally, BMC and BZE still remain within the 50th and 60th percentiles for female enrolments in Doctoral studies across all

four universities (see Appendix C4). Table 5 shows that the average proportion of females enrolled in Economics in the four universities drops from the 40th and 50th percentiles at the Masters levels to the 30th percentile range for Doctoral students. If the averages are taken across all universities and time, it can be seen that ECO and IS experienced the most significant drop-offs at the Doctorate level. ECO dropped from an average of 45.7 percent to 34.7 percent, and IS dropped from an average of 41.8 percent to 35.0 percent. In this regard, both ECO and IS are now worse in terms of share of females than STA but are still better than MAT, CS, PHY, and all Engineering departments.

If the 2017 enrolment figure for the percentage of females in Doctoral studies nationally represented in Appendix B3 is taken as a benchmark (45.0 percent), then the only departments at the 4 universities that rank above or on par with this are BMC, BZE, and EGG.

4.2.3. Qualitative Analysis of Student Surveys

The following section is set out as follows; 4.2.3.1 gives a brief summary of the methodology and data collection process (see Section 3.4 for full description), as well as the sample size, demographic information of respondents, and response rate. Section 4.2.3.2 analyses the findings of the first survey and Section 4.2.3.3 analyses the findings of the second survey. These surveys responses are represented in the form of tables, graphs and analysis. For this section, Rhodes University was used as a case study and only Rhodes students were invited to answer the questionnaires.

4.2.3.1. Methodology, sample size, demographic information, and response rate

Questionnaires were set up on an online platform, Google Forms, to ensure respondents remain anonymous. The online URL link was emailed to the students via the Rhodes Data Management Unit. Three different questionnaires were set up to target three different groups of students. Questionnaires were sent to (1) Rhodes students who were currently majoring in Economics in their undergraduate studies, (2) Economics Honours students, and (3) students who majored in Economics but proceeded to do Honours in another subject. The third group, however, had to be excluded from the analysis as only 2 students responded out of the 21 that were emailed. For the Economics 3 students, 234 students were emailed, of whom 16 responded, and 54 Economics Honours students were emailed, of whom 28 responded. Both questionnaires can be found in Appendices C1 and C2.

Respondents had to first check a consent box before they could proceed to the questions. Respondents were asked to state whether they identified as male, female, or they prefer not to say, as well as their degree, for example, Bachelor of Commerce, Bachelor of Arts, etc. Of the 16 Economics 3 respondents 7 were female, 8 were male, and 1 preferred not to state their gender. Of these respondents, 5 were in BComm, 0 in BA, 3 in BSc, 6 in BSS, and 2 in BEcon. Of the 28 Economics

Honours students, 12 were female and 16 were male. The respondents consisted of 16 BComm students, 2 BA, 4 BSc, 5 BSS, and 1 BEcon. The questions focused on influences on their choice to pursue Economics and, more importantly whether or not role models, either female or male, made a significant impact on this choice.

4.2.3.2. Review of the Economics 3 student survey responses

Table 6 shows the percentage of respondents that rated the question "To what extent was your choice to major in economics influenced by the following factors?" on a scale of 1 to 5, whereby 1 = no influence, 2 = minor influence, 3 = somewhat minor influence, 4 = somewhat major influence, and 5 = major influence. The two most significant influences for the respondents' choice to major in economics was their interest in the subject and the potential job opportunities from having done economics. The next most important options were aptitude in the subject and potential for career advancement.

In comparing the answers of the male and female respondents, represented in Table 7, it can be seen that females give greater weight to lecturers, having a certain level of skill in the subject, and potential job opportunities, but parental influence does not seem to be very important for either males or females.

What is interesting is that the factor that had the least influence on the students' choice to major in economics was the presence of strong female role models, which is contrary to what is suggested by the international literature. If the answers are broken down by gender, as depicted in Table 7, 57.1 percent of females and 75.0 percent of males said that the presence of strong female/male role models had no influence on their decision to take economics as a major. This stands in stark contrast to the multiple papers published in international journals that advocate how influential strong female role models can be in attracting female students into a particular course[7]. Furthermore, 28.6 percent of females stated that strong male role models in the department had a somewhat major influence on their decision to take economics as a major, but only 14.3 percent stated that strong female role models in the department had a somewhat major influence on their decision. Thus, with this group of students, male lecturers have more of an impact on both female and male students' decisions to pursue economics than do female lecturers. In terms of the male respondents, 0 percent felt that strong female role models influenced their decision to pursue economics as a major but 37.5 percent of male students said that strong male role models influenced their decision to pursue economics, whereas only 14.3 percent of female students said the same about female role models.

[7] See Griffith (2014); Zafar (2013); Hale and Regev (2014) in Chapter 2.5.

These findings are demonstrated graphically in Figures 6 and 7. What is interesting to see in in these graphs is that strong male role models have a greater influence on female students' decision to major in economics than strong female role models. Additionally, while male role models are of some importance to female students, female role models have no influence over the male students. In both cases, neither gender attaches great importance to same-gender role models, but males attach a slightly greater importance than females.

The fact that this finding is contrary to the literature could be explained in several ways. Firstly, the findings are for undergraduate students only where students may not yet view themselves as "economists". Role models may be more important for decisions to pursue postgraduate study than for a 3rd year major. Secondly, if females do not have female role models (as shown by the analysis of academics by gender) but are majoring in a traditionally male-dominated subject then by definition female role models can't be hugely important to them. It is also possible that female students for whom female role models are important majored in subjects other than economics. Lastly, differential weightings of students' perceptions of key characteristics of 'role models' may influence their answer. Unfortunately this research attempted to test these possibilities but was unable due to a lack of responses from the third survey, however , this would be interesting to test in future research. Finally, the results of this survey are from a fairly small sample at a small university, and outcomes might differ if the sample was increased and included students from different South African universities.

Table 6: The percentage of respondents that rated the question "To what extent was your choice to major in economics influenced by the following factors?" on a scale of 1 to 5.

Sample:	All				
Rank:	1	2	3	4	5
To what extent was your choice to major in economics influenced by the following factors?					
Interest in the subject	0.0%	6.3%	18.8%	50.0%	25.0%
Aptitude (skill) in the subject	0.0%	6.3%	37.5%	37.5%	18.8%
Parent/guardian	50.0%	25.0%	12.5%	12.5%	0.0%
Lecturers	43.8%	0.0%	43.8%	6.3%	6.3%
Potential job opportunities	0.0%	31.3%	6.3%	50.0%	12.5%
Potential for career advancement	0.0%	25.0%	25.0%	31.3%	18.8%
Level of compensation (pay) in this field	25.0%	18.8%	25.0%	31.3%	0.0%
Strong female role models in the department	68.8%	12.5%	12.5%	6.3%	0.0%
Strong male role models in the department	50.0%	12.5%	6.3%	31.3%	0.0%
Friends	37.5%	25.0%	12.5%	18.8%	6.3%

**1 = no influence, 2 = minor influence, 3 = somewhat minor influence, 4 = somewhat major influence, and 5 = major influence.*

Source: Tabulation by author of survey results.

Table 7: The percentage of female and male respondents that rated the question "To what extent was your choice to major in economics influenced by the following factors?" on a scale of 1 to 5.

Sample	Female					Male				
Rank:	1	2	3	4	5	1	2	3	4	5
To what extent was your choice to major in economics influenced by the following factors?										
Interest in the subject	0.0%	14.3%	14.3%	28.6%	42.9%	0.0%	0.0%	28.6%	85.7%	0.0%
Aptitude (skill) in the subject	0.0%	14.3%	14.3%	57.1%	14.3%	0.0%	0.0%	62.5%	25.0%	12.5%
Parent/guardian	42.9%	28.6%	14.3%	14.3%	0.0%	50.0%	25.0%	12.5%	12.5%	0.0%
Lecturers	28.6%	0.0%	42.9%	14.3%	14.3%	50.0%	0.0%	50.0%	0.0%	0.0%
Potential job opportunities	0.0%	14.3%	14.3%	71.4%	0.0%	0.0%	37.5%	0.0%	37.5%	25.0%
Potential for career advancement	0.0%	14.3%	28.6%	42.9%	14.3%	0.0%	37.5%	12.5%	25.0%	25.0%
Level of compensation (pay) in this field	28.6%	14.3%	28.6%	28.6%	0.0%	12.5%	25.0%	25.0%	37.5%	0.0%
Strong female role models in the department	57.1%	14.3%	14.3%	14.3%	0.0%	75.0%	12.5%	12.5%	0.0%	0.0%
Strong male role models in the department	42.9%	14.3%	14.3%	28.6%	0.0%	50.0%	12.5%	0.0%	37.5%	0.0%
Friends	28.6%	28.6%	14.3%	14.3%	14.3%	37.5%	25.0%	12.5%	25.0%	0.0%

**1 = no influence, 2 = minor influence, 3 = somewhat minor influence, 4 = somewhat major influence, and 5 = major influence.*

Source: Tabulation by author of survey results.

Figure 6: The percentage of respondents who rated the question below from no influence to major influence, by gender.

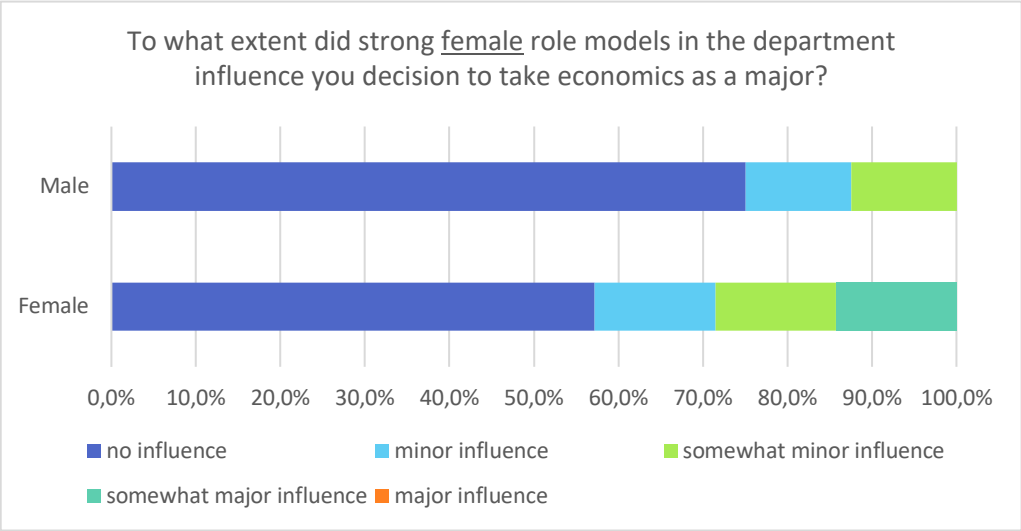
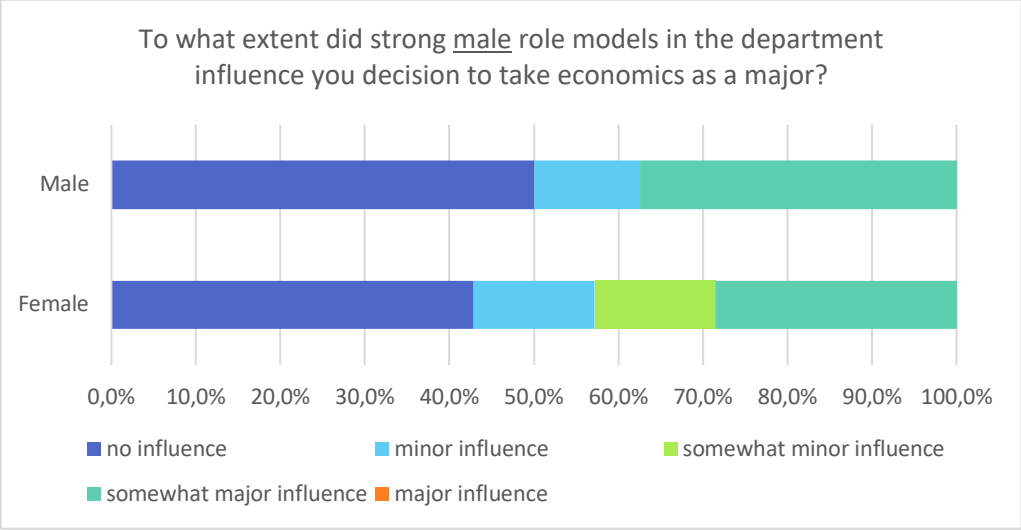


Figure 7: The percentage of respondents who rated the question below from no influence to major influence, by gender.



In the second part of the questionnaire, the respondents were given four statements to which they had to state whether they "strongly disagree", "disagree", "neutral", "agree", or "strongly agree". The answers are represented in Tables 8 and 9. Given the statement "I chose to major in economics because I feel it will be a valuable skill to have", 93.8 percent of respondents agreed, while 6.3 percent were neutral. Similarly, 62.5 percent of respondents agreed with the statement "I chose to major in economics because I am good at it", 31.3 percent were neutral, while 6.3 percent disagreed. When these answers are broken down by gender, 100 percent of males agreed with the statement "I chose to major in economics because I feel it will be a valuable skill to have", in comparison to 85.7 percent

of females. On the other hand, only 62.5 percent of males agreed with the statement “I chose to major in economics because I am good at it”, in comparison to 71.4 percent of females. The finding that males attach a greater importance than females to the skills gained from taking economics as a major, and females attach a greater importance to how good they are at economics can also be seen in Figures 8 and 9. A greater proportion of males are neutral to whether they are good at economics but 100 percent agreed that taking economics would provide them with valuable skills. Females, in comparison to males, attach a greater importance on being good at economics, however they still value the skills they will obtain over how good they are at the subject.

This finding that good grades are more important in females’ decisions to study economics than males’ supports the findings of Avilova and Goldin (2018) in which females are more likely to pursue a major in a subject in which they excel whereas males pursue a major in which they feel will benefit them in the future, regardless of what grades they achieve in the subject.

Table 8: The percentage of respondents who agreed, disagreed or were neutral to the listed statements.

Sample:	All				
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I chose to major in economics because I feel it will be a valuable skill to have	0.0%	0.0%	6.3%	37.5%	56.3%
I chose to major in economics because I am good at it	0.0%	6.3%	31.3%	43.8%	18.8%
I chose to major in economics because it requires less effort than my other subject options	31.3%	31.3%	31.3%	6.3%	0.0%
I chose to major in economics because my friends were going to major in economics	43.8%	50.0%	6.3%	0.0%	0.0%

Source: **Tabulation by author of survey results.**

Table 9: The percentage of respondents who agreed, disagreed or were neutral to the listed statements broken down by gender.

Sample:	Female					Male				
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I chose to major in economics because I feel it will be a valuable skill to have	0.0%	0.0%	14.3%	42.9%	42.9%	0.0%	0.0%	0.0%	37.5%	62.5%
I chose to major in economics because I am good at it	0.0%	14.3%	14.3%	42.9%	28.6%	0.0%	0.0%	37.5%	50.0%	12.5%
I chose to major in economics because it requires less effort than my other subject options	28.6%	42.9%	28.6%	0.0%	0.0%	25.0%	25.0%	37.5%	12.5%	0.0%
I chose to major in economics because my friends were going to major in economics	57.1%	42.9%	0.0%	0.0%	0.0%	25.0%	62.5%	12.5%	0.0%	0.0%

Source: **Tabulation by author of survey results.**

Figure 8: The percentage of respondents who agreed or disagreed with the following statement, by gender.

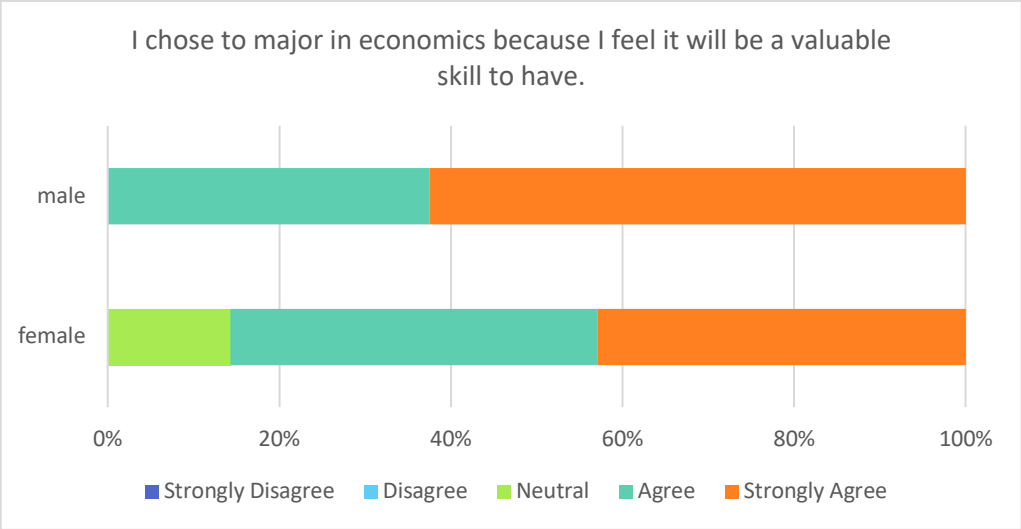
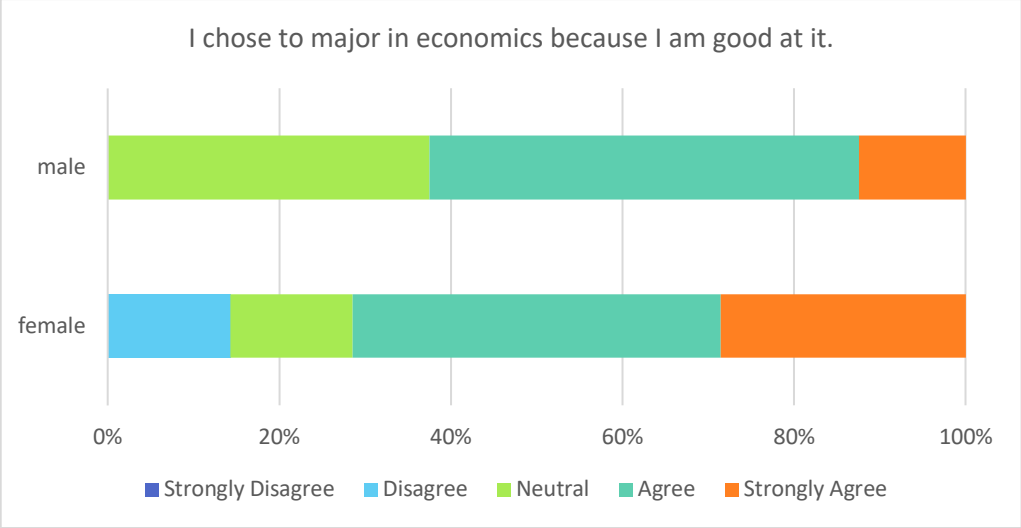


Figure 9: The percentage of respondents who agreed or disagreed with the following statement, by gender.



The majority of respondents (62.5 percent) disagreed with the statements "I chose to major in economics because it requires less effort than my other subject options" and "I chose to major in economics because my friends were going to major in economics" (93.8 percent). When looking at the responses to these statements by the female and male respondents (as depicted in Figures 10 and 11) 71.4 percent of females disagreed with the statement that economics required less effort than their other subject options, in comparison to 50 percent of males. This suggests females are more likely than males to consider economics as being difficult compared with other subject choices. However, if we consider Van Broekhuizen and Spaull's (2017) analysis of enrolments and completion rates of various fields of study for male and female university students where male students may be inclined

to enrol in fields that are essentially more difficult, then the lower percentage of male students expressing that economics requires less effort than their other major choice may be because their other choice was more challenging than economics. 100 percent of females disagreed with the statement that they chose to take economics because their friends were taking it, in comparison to 87.5 percent of males. 12.5 percent of males were neutral in this regard.

Figure 10: The percentage of respondents who agreed or disagreed with the following statement, by gender.

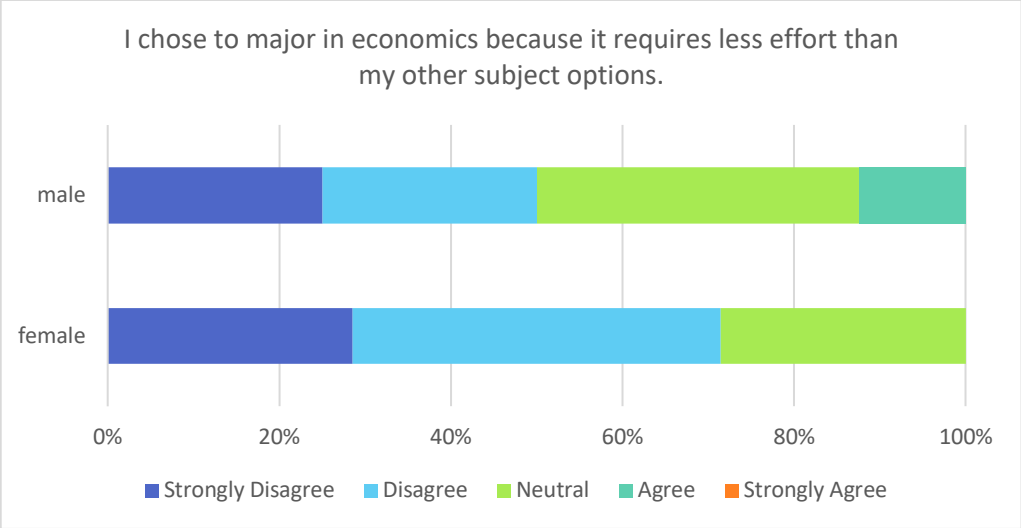
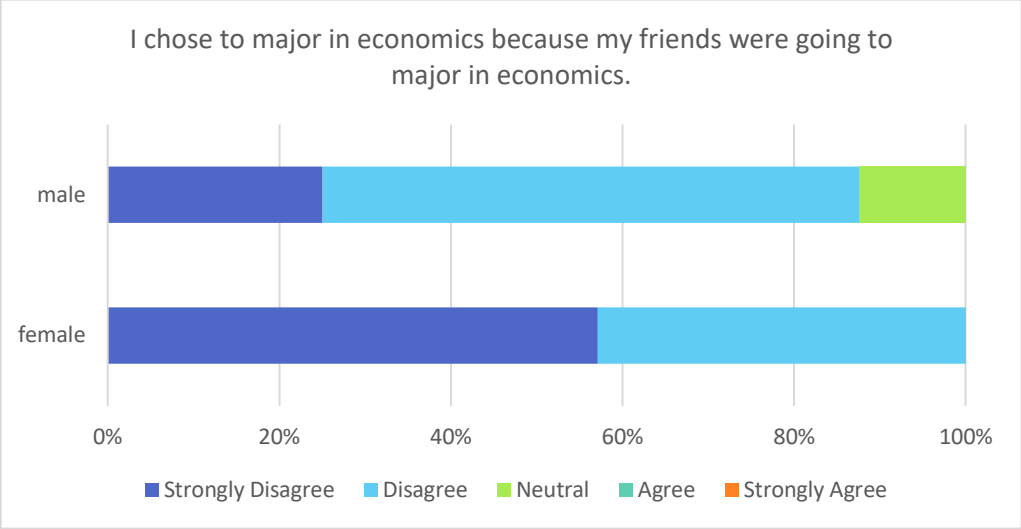


Figure 11 The percentage of respondents who agreed or disagreed with the following statement, by gender.



The third part of the questionnaire focused on aspects of economics that may have influenced students to pursue economics as a major. In other words what are the aspects of their economics course work that they enjoy which may have influenced them to take economics as a major instead

of their other subject options? The respondents were asked to rate five factors; maths, essays, application to real world scenarios, graphs, and problem solving on a scale of 1 to 5, whereby 1 = no influence, 2 = minor influence, 3 = somewhat minor influence, 4 = somewhat major influence, and 5 = major influence. The respondents were also given the option to add any other factor they felt had an influence on their decision to take economics. Table 10 shows the percentage of all respondents' answers to the question "to what extent was your choice to major in economics influenced by the following factors?"

The factors which had the most influence on the respondents' decision to pursue economics were applications to real world scenarios and problem solving. The majority of respondents mentioned maths and essays having no influence, and use of graphs having a minor influence. The answers broken down by gender are represented in Table 11. It can be seen that fewer males (0 percent) regard maths as having no influence on their decision to take economics than females (28.6 percent). Furthermore, a higher proportion of females regard applications to real world scenarios as having a major influence. Only one of the respondents commented on what other factors influenced their decision to take economics, stating that "*dealing with complex issues"* was a positive factor. The fact that so many of the respondents felt that applications to real world scenarios and problem solving are positive influences suggests female and male students are very much concerned with better understanding the environment in which they live and want to understand the way in which the real world works from an economic perspective. There is a great interest in being able to solve economic problems of and think about ways in which those problems can be resolved.

The last section of the questionnaire focuses on the gender of the respondents' lecturers and tutors and whether or not that had any influence on their decision to take economics as a major (see Appendix D3). The respondents were first asked if they felt that men and women are treated in a like manner in their economics courses. The respondents were given five options to answer this question, which were; always, often, sometimes, never, or no comment.

Table 10: The percentage of respondents that rated the question "To what extent was your choice to major in economics influenced by the following factors?" from no influence to major influence.

Sample	All				
	no influence	minor influence	somewhat minor influence	somewhat major influence	major influence
To what extent was your choice to major in economics influenced by the following factors?					
Maths	37.5%	18.8%	12.5%	18.8%	12.5%
Essays	25.0%	18.8%	12.5%	37.5%	6.3%
Application to real world scenarios	0.0%	6.3%	25.0%	31.3%	37.5%
Graphs	12.5%	12.5%	50.0%	18.8%	6.3%
Problem solving	6.3%	0.0%	31.3%	37.5%	25.0%

Source: **Tabulation by author of survey results.**

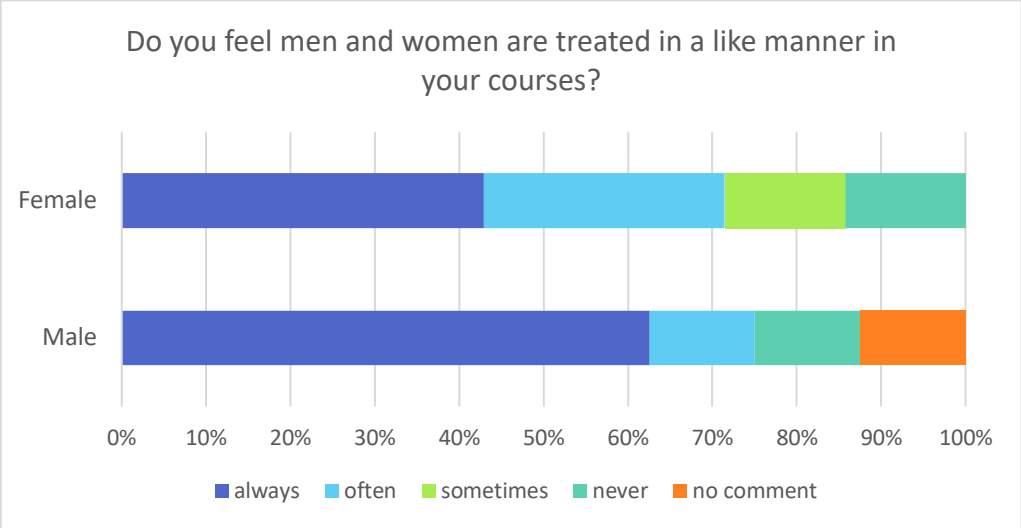
Table 11: The percentage of female and male respondents that rated the question "To what extent was your choice to major in economics influenced by the following factors?" from no influence to major influence.

Sample	no influence		minor influence		somewhat minor influence		somewhat major influence		major influence	
	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
To what extent was your choice to major in economics influenced by the following factors?										
Maths	42.9%	25.0%	14.3%	25.0%	0.0%	25.0%	14.3%	25.0%	28.6%	0.0%
Essays	28.6%	25.0%	14.3%	25.0%	14.3%	12.5%	28.6%	37.5%	14.3%	0.0%
Application to real world scenarios	0.0%	0.0%	0.0%	12.5%	42.9%	12.5%	14.3%	50.0%	42.9%	25.0%
Graphs	14.3%	0.0%	14.3%	12.5%	42.9%	62.5%	28.6%	12.5%	0.0%	12.5%
Problem solving	0.0%	12.5%	0.0%	0.0%	28.6%	37.5%	42.9%	37.5%	28.6%	12.5%

Source: **Tabulation by author of survey results.**

The different answers can be seen graphically in Figure 12 where the answers are broken down by gender. A much greater proportion of males believe that males and females in their courses are treated in a like manner, with 62.5 percent of males responding “always” in comparison to 42.9 percent of females. Thus, it can be concluded that 57.1 percent of females have experienced men and women being treated differently in their courses, whether direct or indirectly, whereas only 37.5 percent have men have experienced this. Of these 28.6 percent of females responded “sometimes” or “never” to men and women being treated in like manner in comparison 12.5 percent of males.

Figure 12: The percentage of female and male respondents that answered the question with “always”, “often”, “sometimes”, “never”, or “no comment”.



The respondents were then asked whether their lecturers were mostly people who identified as male or female and whether or not that had an influence on their decision to major in economics, to which 94 percent of the respondents stated that they were mostly taught by male lecturers. The respondents were then asked whether that influenced their decision to major in economics. The results can be seen in Figure 13 which shows that both male and female student do not attach great importance to the gender of their lecturers. But the gender of the lecturers has more of an influence on female students than on males. 87.5 percent of males reported no influence, in comparison to 71.4 percent of females. The other 12.5 percent of males and 28.6 percent of females reported the gender of their lecturers having a minor/somewhat minor influence of their decision to pursue economics. However, this finding may not be so surprising if the majority of students in their first and second year economics classes were mainly taught by male lecturers.

Figure 13: The percentage of female and male respondent who rated the level of influence lecturer gender had on their decision to major in economics from no influence to major influence.

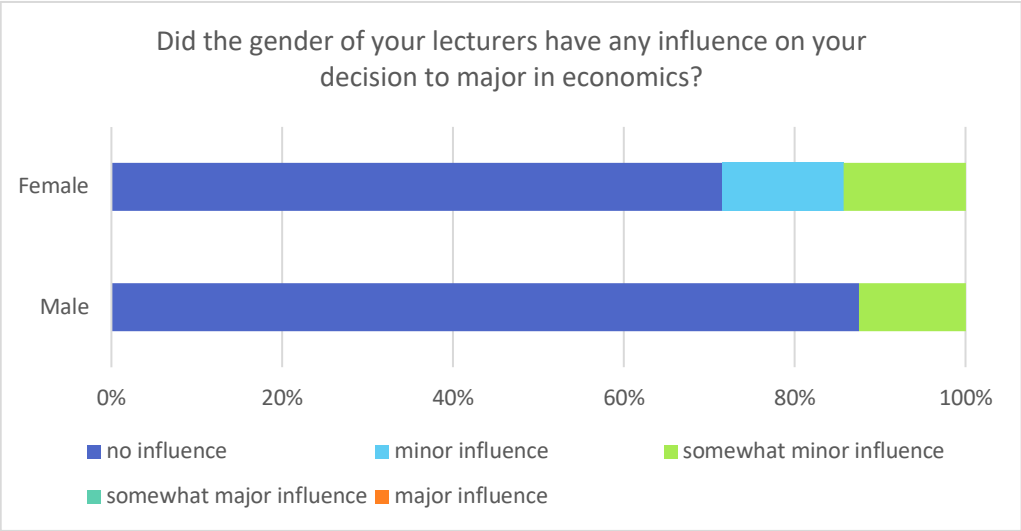
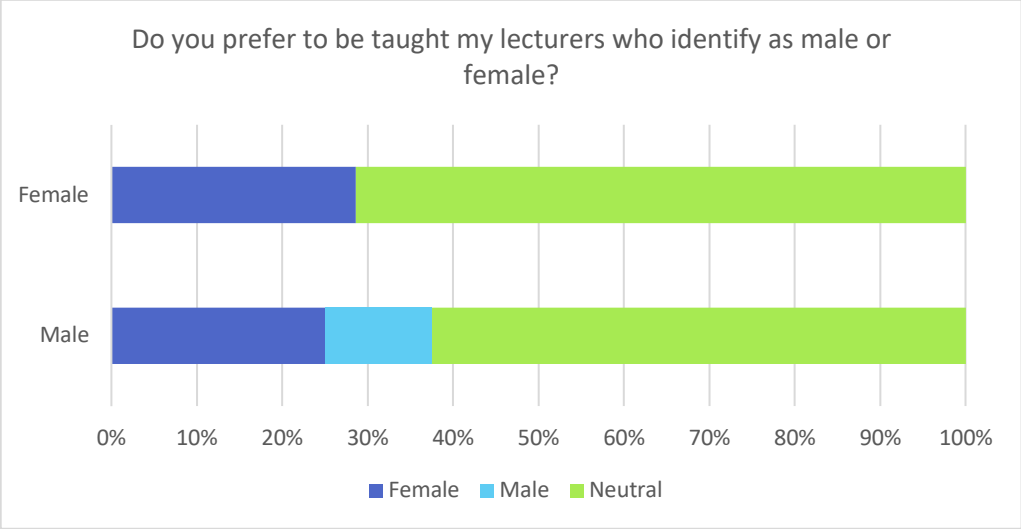


Figure 14: The percentage of female and male respondents who preferred being taught by male or female lecturers, or were neutral in preference.



Again, this finding that the gender of the lecturers of the students in this sample does not seem to matter when choosing a major stands in contrast to international findings. However, the respondents were then asked whether they prefer to be taught by lecturers who identify as male or female and the female respondents were more neutral than the males. This can be seen in Figure 14 where 71.4 percent of females responded that they were neutral to the issue, but only 62.5 percent of males were. The remaining 28.6 percent of females responded that they prefer to be taught by female lecturers and none of the females had a preference for male lecturers. What is interesting is that a higher proportion of male respondents for whom lecturer gender was important preferred to be taught by female lecturers (25.0 percent) rather than male lecturers (12.5 percent). This is an

intriguing response since 87.5 percent of the male respondents reported that the gender of their lecturers had no influence, but only 62.5 percent were neutral in their preference. A possible conclusion is that for these male students interest in the subject and the possible job opportunities that economics brings, as represented in the beginning of the questionnaire, is a much stronger driving force so that preference of lecturer gender becomes irrelevant in their decision to choose a major.

Since the students work more closely with their tutors than their lecturers, the same set of questions were asked focusing on the gender of their tutors and whether that had any influence on them. 50 percent of the respondents reported that their tutors were mainly female, 44 percent reported having mostly male tutors, while 6 percent were unsure if their tutors were mostly male or female. Figure 15 shows that a greater proportion of males reported that the gender of their tutors had an influence on their decision to major in economics, but this influence was only minor/somewhat minor. In comparing the influence of lecturer gender to tutor gender on the respondents' decision to major in economics, the gender of tutors had less of an influence than the gender of lecturers for the female respondents. 71.4 percent of females said that the gender of their lecturers had no influence on their decision, in comparison to 85.7 percent for tutor gender. On the other hand, 87.5 percent of males reported that the gender of their lecturers had no influence on their decision to major in economics, but only 75.0 percent stated this for the gender of their tutors.

When asked about gender preferences for tutors, the same proportion of female respondents were neutral in tutor preference as for lecturer preference. A significantly larger proportion of females (71.4 percent) than males (37.5 percent) were neutral in their preference of tutor gender. This is graphically represented by Figure 16. Interestingly, 50 percent of the male respondents preferred to be taught be female tutors and only 12.5 percent preferred male tutors. None of the female respondents preferred male tutors and 28.6 percent preferred female tutors.

Figure 15: The percentage of female and male respondents who rated the level of influence tutor gender had on their decision to major in economics from no influence to major influence.

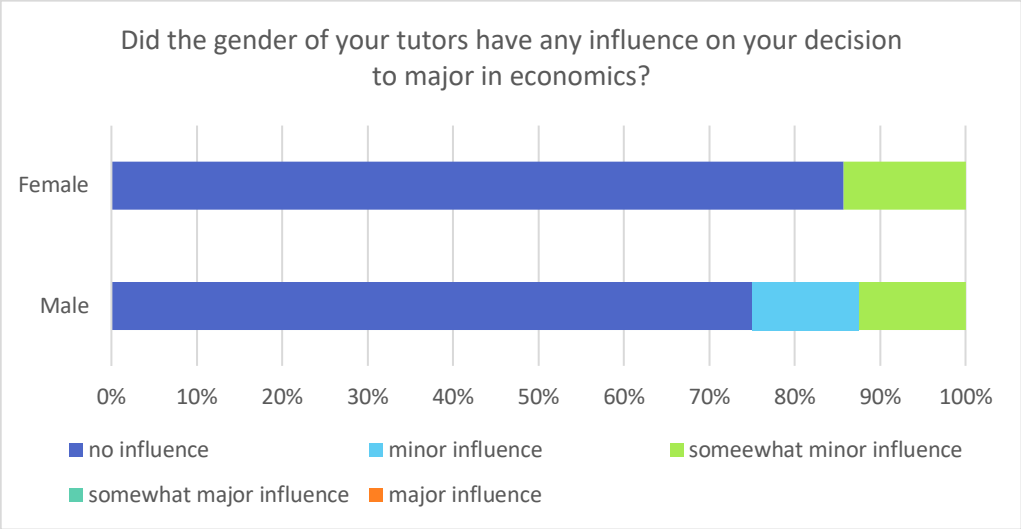
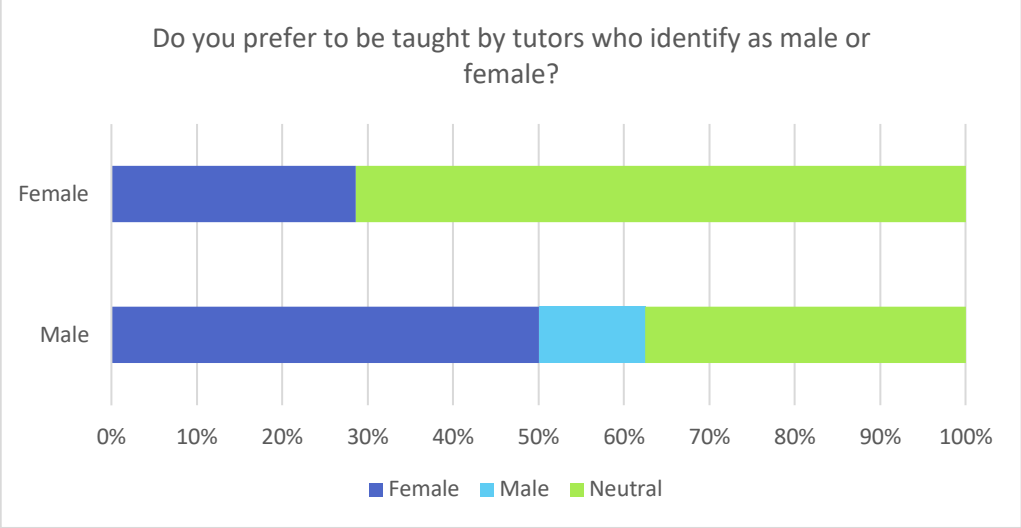


Figure 16: The percentage of female and male respondents who preferred being taught by male or female tutors, or were neutral in preference.



The last question in the questionnaire asked the respondents if they have ever felt that their opinions were not taken seriously by other students in their economics tutor groups. They were given the option to respond "always", "often", "sometimes", "never", or "no comment" (Table 12)**.** 42.9 percent of female respondents, responded "never", meaning that 57.1 percent experienced other students not taking their opinions seriously. An even larger proportion of the male respondents reporting having this experience since only 37.5 percent responded "never". The rest of the answers (42.9 percent of females and 50 percent of males) were mostly "sometimes". Only 1 male (12.5 percent)

responded with “often” and 1 female (14.3 percent) responded with “always”. Although these are very small percentages, the sample is quite small. While this type of experience could act as a deterrent for any student wanting to proceed to postgraduate studies in economics, the answers do not suggest a gender bias against females. These percentages are similar to those reflected in Figure 11, which suggests that one of the ways in which respondents feel that males and females do not get treated in a like manner is the way in which their opinions are respected.

Table 12: Represented is the percentage proportion of female and male respondents and their response to the given question.

Have you ever felt that your opinions were not taken seriously by other students in your Economics tutor groups?	always	often	sometimes	never	no comment
Females	14.3%	0.0%	42.9%	42.9%	0.0%
Males	0.0%	12.5%	50.0%	37.5%	0.0%

Source: **Tabulation by author of survey results.**

4.2.3.3. Review of the Economics Honours student survey responses

Table 13 shows the percentage of respondents who rated the question “To what extent was your choice to take economics at the postgraduate level influenced by the following factors?” on a scale of 1 to 5, whereby 1 = no influence, 2 = minor influence, 3 = somewhat minor influence, 4 = somewhat major influence, and 5 = major influence. The two factors that had the most influence on the students’ decision to pursue economics at the postgraduate Honours level was their interest in the subject and their aptitude. The potential for job opportunities and career advancement also had a significant influence on their decision. The two factors in which the majority felt had little to no influence was strong male and female role models in the department.

Represented in Table 14 are the differences in responses to this question between the male and female respondents. The results from these questions show that males and females have very similar opinions about what has swayed them to pursue economics. Interest and aptitude is a major influence for both genders, but females regard these two factors as much more of an influence than for males. Similarly, although potential job opportunities, career advancement, and level of compensation in the field is a significant influence for males and females, females still attach a greater importance to these factors. While parents/guardians and friends had a minor influence on both genders, they had a greater influence on the male respondents than on the females.

Table 13: The percentage of respondents that rated the question "To what extent was your choice to take economics at the postgraduate level influenced by the following factors?" on a scale of 1 to 5.

Sample	All				
To what extent was your choice to take economics at the postgraduate level influenced by the following factors?	1	2	3	4	5
Interest in the subject	0.0%	0.0%	17.9%	50.0%	32.1%
Aptitude (skill) in the subject	3.6%	0.0%	25.0%	46.4%	25.0%
Parent/guardian	39.3%	25.0%	14.3%	10.7%	10.7%
Lecturers	32.1%	10.7%	14.3%	35.7%	7.1%
Potential job opportunities	3.6%	10.7%	28.6%	14.3%	42.9%
Potential for career advancement	0.0%	14.3%	25.0%	17.9%	42.9%
Level of compensation (pay) in this field	7.1%	10.7%	28.6%	28.6%	25.0%
Strong female role models in the department	42.9%	21.4%	21.4%	3.6%	10.7%
Strong male role models in the department	50.0%	14.3%	17.9%	17.9%	0.0%
Friends	32.1%	10.7%	28.6%	25.0%	3.6%

**1 = no influence, 2 = minor influence, 3 = somewhat minor influence, 4 = somewhat major influence, and 5 = major influence.*

Source: **Tabulation by author of survey results.**

Table 14: The percentage of female and male respondents that rated the question "To what extent was your choice to take economics at the postgraduate level influenced by the following factors?" on a scale of 1 to 5.

Sample	Female					Male				
To what extent was your choice to take economics at the postgraduate level influenced by the following factors?	1	2	3	4	5	1	2	3	4	5
Interest in the subject	0.0%	0.0%	0.0%	50.0%	50.0%	0.0%	0.0%	31.3%	50.0%	18.8%
Aptitude (skill) in the subject	0.0%	0.0%	25.0%	33.3%	41.7%	6.3%	0.0%	25.0%	56.3%	12.5%
Parent/guardian	66.7%	8.3%	8.3%	8.3%	8.3%	18.8%	37.5%	18.8%	12.5%	12.5%
Lecturers	41.7%	0.0%	16.7%	33.3%	8.3%	25.0%	18.8%	12.5%	37.5%	6.3%
Potential job opportunities	0.0%	0.0%	41.7%	16.7%	41.7%	6.3%	18.8%	18.8%	12.5%	43.8%
Potential for career advancement	0.0%	8.3%	25.0%	16.7%	50.0%	0.0%	18.8%	25.0%	18.8%	37.5%
Level of compensation (pay) in this field	0.0%	0.0%	41.7%	33.3%	25.0%	12.5%	18.8%	18.8%	25.0%	25.0%
Strong female role models in the department	33.3%	16.7%	25.0%	8.3%	16.7%	50.0%	25.0%	18.8%	0.0%	6.3%
Strong male role models in the department	50.0%	16.7%	16.7%	16.7%	0.0%	50.0%	12.5%	18.8%	18.8%	0.0%
Friends	33.3%	25.0%	25.0%	16.7%	0.0%	31.3%	0.0%	31.3%	31.3%	6.3%

**1 = no influence, 2 = minor influence, 3 = somewhat minor influence, 4 = somewhat major influence, and 5 = major influence.*

Source: **Tabulation by author of survey result**

While role models played a small part in influencing students to pursue economics, they did have a bigger impact on the Honours students than on the Economics 3 students, but this impact is still very minor. Thus it would seem that even at the postgraduate level, role models don't have a significant impact on the students as would be expected. However, as has been mentioned, it is possible that the students to which role models do have an impact may have chosen to pursue subjects in which there are more female lecturers and thus the result of this questionnaire would technically be biased and somewhat not too surprising. Therefore one would need cross-subject data to evaluate why students chose to major in economics but continued to postgraduate studies in another subject. This was attempted, however only two students answered the questionnaire rendering the response rate too small. Further, due to ethical restrictions, follow-up emails were not allowed to be sent to the students as the Rhodes DMU considered this to be spamming students.

To better understand the impact of same-gender and opposite-gender role models on the respondents, the results have been graphically represented in Figures 17 and 18. Figure 17 displays the female respondents' answers to the questions "To what extent was your choice to take economics at the postgraduate level influenced by role models?" Female attach a greater importance to female role models than males do to male role models. Female role models had a somewhat major to major influence on the female respondents whereas only 18.8 percent of males felt that male role models had only a somewhat major influence.

Figure 17: The percentage of respondents who ranked the question below from no influence to major influence, by gender.

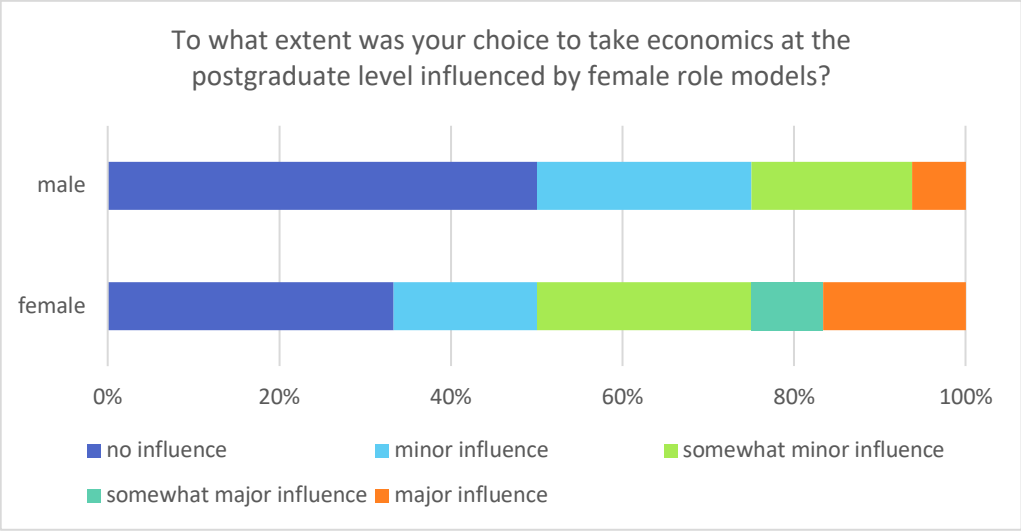
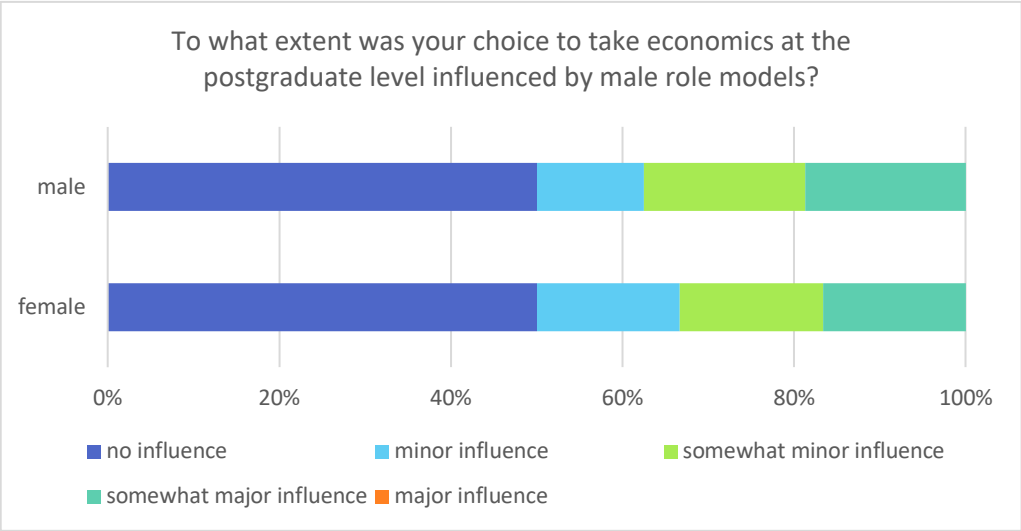


Figure 18: The percentage of respondents who ranked the question below from no influence to major influence.



In terms of opposite-gender role models, male role models had a greater influence on females than female role models had on males. While only 16.7 percent of females felt influenced by male role models, female role models had a significantly lower (6.3 percent) influence over the male respondents.

Table 15 exhibits the four statements which were presented to the respondents to which they had to respond with whether they strongly disagreed, disagreed, were neutral, agreed, or strongly agreed. The results were similar to that of the Economics 3 surveys. The statement to which resonated the most with the respondents was “I chose to pursue Honours in Economics because I felt it would be a valuable skill to have”. None of the respondents disagreed with this statement and 92.9 percent agreed/strongly agreed. The majority of the respondents were either neutral (28.6 percent) or agreed (64.3 percent) with the statement “I chose to pursue Honours in Economics because I am good at it”. Furthermore, the majority of the respondents disagreed with the statements “I chose to pursue Honours in Economics because it requires less effort than my other subject options” and “I chose to pursue Honours in Economics because my friends were going to pursue Honours in Economics”.

Looking at the responses broken down by gender, depicted in Table 16, 100 percent of females agreed that they continued to take economics at the Honours level because it would provide them with valuable skills whereas only 87.5 percent of males agreed. However, when looking at the responses to this statement graphically in Figure 19, it can be seen that males are much more likely to strongly agree whereas females are more inclined to just agree, while only a very small proportion of males are neutral to the fact.

Table 15: The percentage of respondents who agreed, disagreed or were neutral to the listed statements.

Sample:	All				
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I chose to pursue Honours in Economics because I feel that it would be a valuable skill to have	0.0%	0.0%	7.1%	46.4%	46.4%
I chose to pursue Honours in Economics because I am good at it	3.6%	3.6%	28.6%	42.9%	21.4%
I chose to pursue Honours in Economics because it requires less effort than my other subject options	25.0%	35.7%	28.6%	10.7%	0.0%
I chose to pursue Honours in Economics because my friends were going to pursue Honours in Economics	42.9%	25.0%	21.4%	10.7%	0.0%

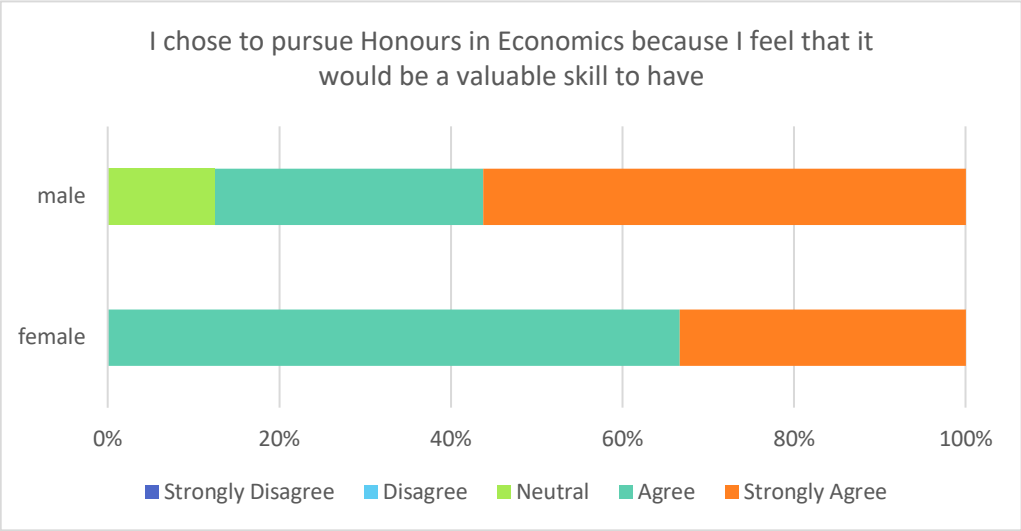
Source: Tabulation by author of survey results.

Table 16: The percentage of respondents who agreed, disagreed or were neutral to the listed statements broken down by gender.

Sample:	Female					Male				
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I chose to pursue Honours in Economics because I feel that it would be a valuable skill to have	0.0%	0.0%	0.0%	66.7%	33.3%	0.0%	0.0%	12.5%	31.3%	56.3%
I chose to pursue Honours in Economics because I am good at it	8.3%	0.0%	25.0%	41.7%	25.0%	0.0%	6.3%	31.3%	43.8%	18.8%
I chose to pursue Honours in Economics because it requires less effort than my other subject options	33.3%	16.7%	41.7%	8.3%	0.0%	18.8%	50.0%	18.8%	12.5%	0.0%
I chose to pursue Honours in Economics because my friends were going to pursue Honours in Economics	58.3%	8.3%	25.0%	8.3%	0.0%	31.3%	37.5%	18.8%	12.5%	0.0%

Source: Tabulation by author of survey results.

Figure 19: The percentage of male and female respondents which agreed/disagreed to the statement below.



A higher proportion of females agreed to the statement "I chose to pursue Honours in Economics because I am good at it", suggesting that females are more interested in doing well when choosing to continue a subject at the postgraduate level. Represented in Figure 20 is a graphical depiction of the responses to this statement. One can see that more females agree with the statement, and more males are neutral.

Figure 20: The percentage of male and female respondents which agreed/disagreed to the statement below.

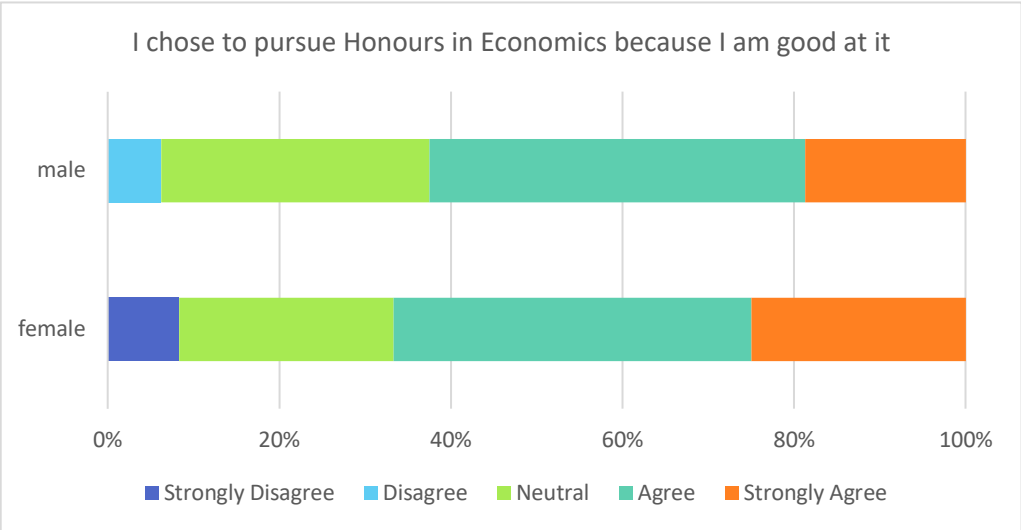


Table 16 also shows the answers to the statements "I chose to pursue Honours in Economics because it requires less effort than my subject options" and "I chose to pursue Honours in Economics because

my friends were going to pursue Honours in Economics". Only 50 percent of the female respondents disagreed with the former statement, in comparison to 68.8 percent of males, but a much greater proportion of females were felt neutral to the statement whereas a greater proportion of the males agreed in comparison to the females. Similarly, more male respondents disagreed with the latter statement than the females, but this margin of difference is significantly small (2.1 percentage points). Again, the proportion of male respondents who agreed with the statement was greater than the proportion of females who agreed.

The third section asks the students about the aspects of economics in which they enjoyed/influenced their decision to take economics at the Honours level. The respondents were given the same five aspects which were given to the economic 3 students in their questionnaire, i.e. maths, essays, application to real life scenarios, graphs, and problem solving. The respondents rated each aspect on a scale of 1 to 5 where 1 = no influence, 2 = minor influence, 3 = somewhat minor influence, 4 = somewhat major influence, and 5 = major influence. Additionally, they were given the option to list any other influences they thought influenced this decision.

Tables 17 and 18 show the responses by all respondents and broken down by gender. The aspects in which had the least influence on the respondents were maths and essays. The respondents rather preferred the aspects of applications to real world scenarios and problem solving as those had the most influence on their decision to take economics at the postgraduate level.

Table 17: The percentage of respondents which ranked each aspect of economics from no influence to major influence on their decision to take economics at the postgraduate level.

Sample	All				
	no influence	minor influence	somewhat minor influence	somewhat major influence	major influence
To what extent did the following factors influence your decision to pursue Honours in economics?					
Maths	39.3%	7.1%	17.9%	28.6%	7.1%
Essays	39.3%	21.4%	21.4%	14.3%	3.6%
Application to real world scenarios	3.6%	3.6%	28.6%	25.0%	39.3%
Graphs	14.3%	14.3%	35.7%	25.0%	10.7%
Problem solving	0.0%	3.6%	21.4%	46.4%	28.6%

Source: Tabulation by author of survey results.

Table 18: The percentage of respondents which ranked each aspect of economics from no influence to major influence on their decision to take economics at the postgraduate level, by gender.

Sample	no influence		minor influence		somewhat minor influence		somewhat major influence		major influence	
	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
To what extent did the following factors influence your decision to pursue Honours in economics?										
Maths	42.9%	25.0%	14.3%	25.0%	0.0%	25.0%	14.3%	25.0%	28.6%	0.0%
Essays	28.6%	25.0%	14.3%	25.0%	14.3%	12.5%	28.6%	37.5%	14.3%	0.0%
Application to real world scenarios	0.0%	0.0%	0.0%	12.5%	42.9%	12.5%	14.3%	50.0%	42.9%	25.0%
Graphs	14.3%	0.0%	14.3%	12.5%	42.9%	62.5%	28.6%	12.5%	0.0%	12.5%
Problem solving	0.0%	12.5%	0.0%	0.0%	28.6%	37.5%	42.9%	37.5%	28.6%	12.5%

Source: Tabulation by author of survey results.

Broken down by gender, a greater proportion of females rated maths as having no influence on their decision to take economics at the postgraduate level in comparison to males. At the same time, more females than males also rated maths as having a major influence. The male respondents predominately rated maths as having a minor to somewhat major influence on their decision. Furthermore, a greater proportion of females than males also reported essays as having a somewhat major to major influence. The male respondents (75 percent) reported that application to real world scenarios had a somewhat major to major influence on their decision in comparison to only 57.1 percent of females. On the other hand, the female respondents (71.4 percent) felt that problem solving had a somewhat major to major influence on them in comparison to only 50 percent of males. Although both genders attached similar influence to the given factors, the level of influence differs significantly between males and females.

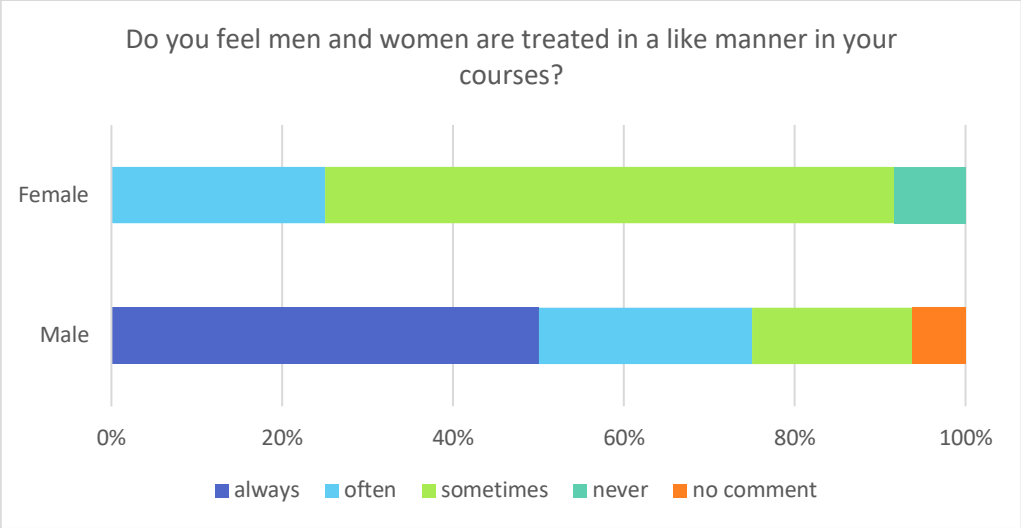
When faced with the question, "Do you feel men and women are treated in a like manner in your courses?", the answers differ substantially between males and females. Represented in Table 19 and Figure 21, it can be seen that the male respondents (50 percent) mainly feel that genders are always or often treated in a like manner, whereas no females responded "always" and only 25 percent responded "often". The majority of females (66.7 percent) reported feeling that males and females are treated equally only sometimes. Additionally, while only 8.3 percent of females felt that men and women are never treated the same, none of the male respondents felt this way.

Table 19: The percentage of respondents who responded to the question below, on a scale of always to never, by gender.

Do you feel men and women are treated in a like manner in your courses?	always	often	sometimes	never	no comment
Male	50.0%	25.0%	18.8%	0.0%	6.3%
Female	0.0%	25.0%	66.7%	8.3%	0.0%

Source: Tabulation by author of survey results.

Figure 21: The percentage of respondents who answered the question below on a scale of always to never, but gender.



Given the question "In your undergraduate years were your economics lecturers mostly male or female?", to which 18 responded that their lecturers were mostly male, 3 said female, and 7 did not know. The respondents were then asked whether or not this had any influence on their decision to take economics at the postgraduate level to which the majority of both male and female respondents reported this as having no influence (see Table 20).However, a greater proportion of females felt that lecturer gender had no influence on their decision, in comparison to only 75 percent of males. The remainder of the females (6.3 percent) felt that the gender of their lecturers had a somewhat major influence, whereas 8.3 percent of males felt this had a somewhat major influence, and 16.7 percent felt this had a minor influence. However, when asked whether they preferred to be taught by male or female lecturers, 100 percent of males were neutral, in comparison to 91.7 percent of females (see Table 21). The remaining 8.3 percent of females preferred female lecturers. Considering the responses to lecturer gender influence and preference, it seems that gender does not have a big impact on the students. This is an interesting finding considering the emphasis on role models emerging as one of the main influences on female participation in Economics that has presented in many international papers.

Table 20: The percentage of respondents that rated the influence of lecturer gender from no influence to major influence.

Did the gender of your lecturers have any influence on your decision to pursue economics at the postgraduate level?	no influence	minor influence	somewhat minor influence	somewhat major influence	major influence
Male	75.0%	16.7%	0.0%	8.3%	0.0%
Female	93.8%	0.0%	0.0%	6.3%	0.0%

Table 21: The percentage of respondents who prefer to be taught by male or female lecturers, or remain neutral to either.

Do you prefer to be taught by lecturers who identify as male or female?	Female	Male	Neutral
Male	0.0%	0.0%	100.0%
Female	8.3%	0.0%	91.7%

The respondents were then posed with similar questions but this time they focused on the gender of their tutors. In this case, 11 respondents reported being taught mostly by male tutors, 3 by females, and 7 did not know. Whereas the gender of the lecturers had some influence over the males in deciding to take economics at the postgraduate level, the gender of tutors had no influence whatsoever. On the other hand, while 93.8 percent of females felt that lecturer gender had no influence on their decision, only 66.7 percent felt this way about the gender of their tutors. These responses are represented in Table 22. Of the female respondents 25 percent felt that the gender of their tutors had a minor to somewhat minor influence on them and only 8.3 percent reported a somewhat major influence. Still, the gender of both lecturers and tutors had no major influence over neither the male or female respondents and they predominantly felt that the gender of those who taught them had very little significance in their decision to pursue economics.

Table 22: The percentage of respondents that rated the influence of lecturer gender from no influence to major influence.

Did the gender of your tutors have any influence on your decision to pursue economics at the postgraduate level?	no influence	minor influence	somewhat minor influence	somewhat major influence	major influence
Male	100.0%	0.0%	0.0%	0.0%	0.0%
Female	66.7%	16.7%	8.3%	8.3%	0.0%

Lastly, the respondents were posed with the questions “Have you ever felt that your opinions were not taken seriously by other students when doing group work in Economics?” and “Have you ever felt that your opinions were not taken as seriously as that of other students by your lecturers in Economics?” to which the Reponses are presented in Tables 23 and 24. An equal proportion (25 percent) of male and female respondents never felt that their opinions were not taken seriously by other students during group work, but a higher proportion of females felt that this happened sometimes (66.7 percent) or always (8.3 percent). Regardless, the same proportion of males and females have experienced this phenomenon, but when asked what they thought the reason for this treatment was, five of the females stated that the reason was their gender, in comparison to 1 male.

The other reasons that were mentioned were race and ethnicity but these, again, were only from the female respondents. The rest of the males did not express the reasoning behind their response.

Table 23: The percentage of respondents who answered the question below ranking from always to never, by gender.

Have you ever felt that your opinions were not taken seriously by other students when doing group work in Economics?	always	often	sometimes	never	no comment
Females	8.3%	0.0%	66.7%	25.0%	0.0%
Males	6.3%	18.8%	50.0%	25.0%	0.0%

In terms of the latter question, the majority of both male and female respondents indicated that they never felt as though their opinions were not taken as seriously as that of other students by their economics lecturers. While this is so, there were still 41.7 percent of females who did, and 43.8 percent of males. This percentage of males indicated that this was the case sometimes, while 33.3 percent of females indicated “sometimes” and 8.3 percent indicated “often”. When asked to state what they thought was the reason their opinions were not taken as seriously as other students, 3 of the female respondents, in comparison to 1 male, mentioned gender as being the reason. Race was another reason mentioned by 1 female and 1 male, and another female mentioned ethnicity. The remainder of the respondents did not mention any reason.

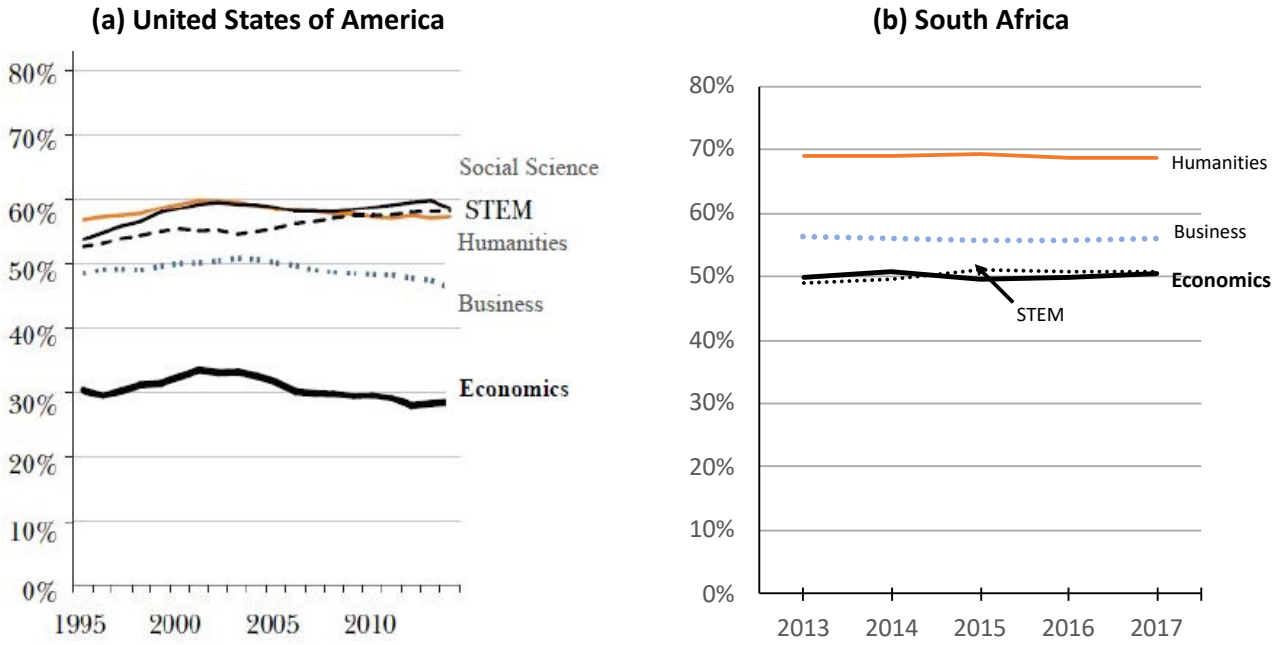
Table 24: The percentage of respondents who answered the question below ranking from always to never, by gender.

Have you ever felt that your opinions were not taken as seriously as that of other students by your lecturers in Economics?	always	often	sometimes	never	no comment
Females	0.0%	8.3%	33.3%	58.3%	0.0%
Males	0.0%	0.0%	43.8%	56.3%	0.0%

4.2.4. Conclusion of Section 4.2.

While national female enrolments and graduates in South African HEIs is substantially higher than in the US, South Africa displays the same trend of drop offs in female participation from undergraduate to postgraduate studies. However, this is mainly reflected in progression to Masters and Doctoral studies, whereas females in South Africa tend to make up the majority share of undergraduate and Honours enrolments. Female enrolment in economics is substantially higher than in the US, both nationally and within the four analysed universities.

Figure 22: The percentage share of female of Bachelor degrees awarded in the USA and enrolments in Bachelor degrees in SA.



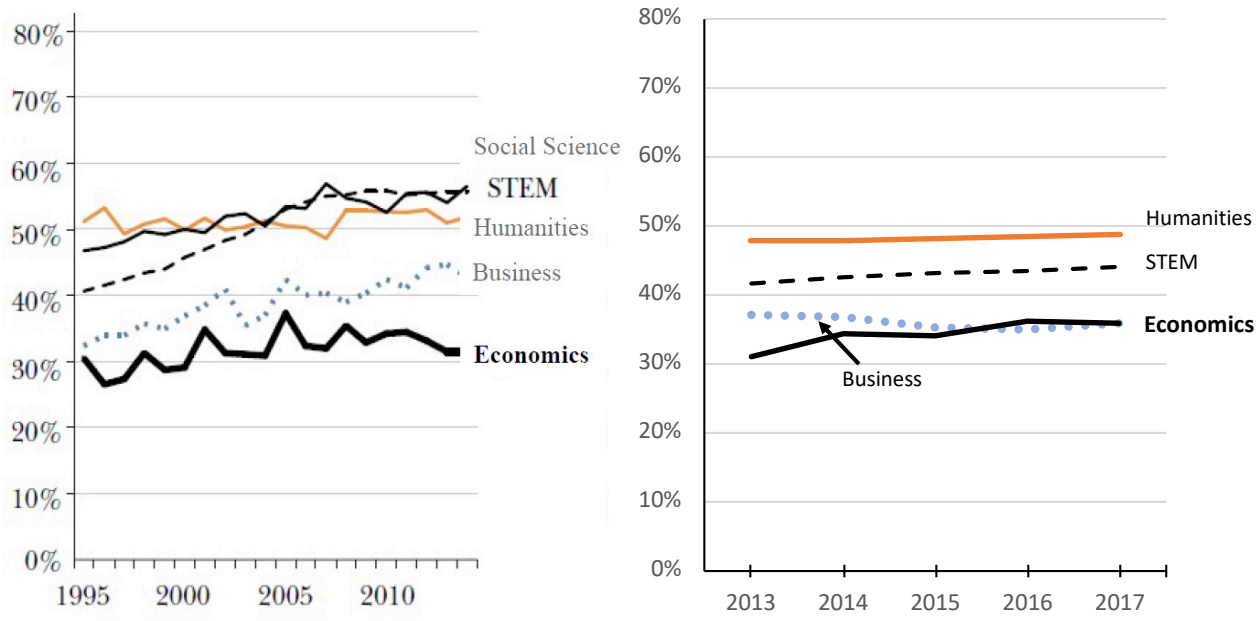
Source: **Bayer and Rouse (2016: 224); The Department of Higher Education and Training (2013, 2014, 2015, 2016, 2017)**

This is seen graphically in Figures 22a and 22b which look at Bachelor degrees in the US versus SA. The graph depicting the US statistics represent Bachelor degrees awarded, whereas the statistics for SA are enrolment. Considering female graduation rates in SA are better than males, the female share of degrees awarded may be slightly higher than shown here. Humanities, Business, and Economics in SA are all better than in the US, but STEM is worse. Thus, more women avoid STEM in SA and are more inclined to enrol in Business, Economics, and Humanities.

At the Doctoral level, depicted in Figures 23a and 23b, female figures in Humanities for SA are only slightly below that of the US, but Business and STEM are substantially lower. Business and STEM in the US have experience sharp increases in female degrees awarded, but in SA, female participation in STEM is improving, but at a very slow rate, and Business is on a downward trend. However, while Economics in SA is only slightly better than in the US, there are signs of improvement in SA, unlike in the US.

Figure 23: The percentage share of female of Doctoral degrees awarded in the USA and enrolments in Doctoral degrees in SA.

(a) United States of America **(b) South Africa**



Source: **Bayer and Rouse (2016: 224); The Department of Higher Education and Training (2013, 2014, 2015, 2016, 2017)**

Results from the students surveys show that role models had little to no influence on either the female or male respondents, both for the Economics 3 students and the Honours students. The two main factors which influenced the respondents decisions to pursue economics were potential job opportunities and possible career advancement.

Furthermore, the female respondents were more concerned with being good at economics, whereas males attached a greater importance to obtaining the skills that studying economics provides. This was expressed in both the Economics 3 and Honours surveys. This reflects the basis of Avilova and Goldin's (2018) paper which concludes that women are more likely to pursue a subject in which they

excel whereas men are more likely to pursue that in which provides them with the skills to benefit them in the future. Both groups also emphasised that problem solving and applications to real world scenarios was a major influence on their decision to pursue economics.

Additionally, when stating their opinion on whether they feel males and females are treated in a like manner in their courses, a significantly higher percentage proportion of males in both Economics 3 and Honours selected “Always” in comparison to their female counterparts. There were also significant differences between the answers of the Economics 3 students and the Honours students. Regarding the male students who selected “always”, there were 62.5 percent in Economics 3 and 50 percent in Honours. When comparing the answers of the female students, there is a much more consequential drop in the percentage proportion of those who answered “always” between the Economics 3 and Honours students, notably 42.9 percent of Economics 3 students and 0 percent of the Honours students. An exact reason for this is not certain but this could be influenced by the difference in class size. The Honours classes are substantially smaller and more intimate than the Economics 3 classes. The way other students are treated in class will considerably more noticeable in small classes.

Notably, the small sample size and the sample pertaining to only one university poses limitations on the analysis and therefore cannot be interpreted as a standard across South African universities.

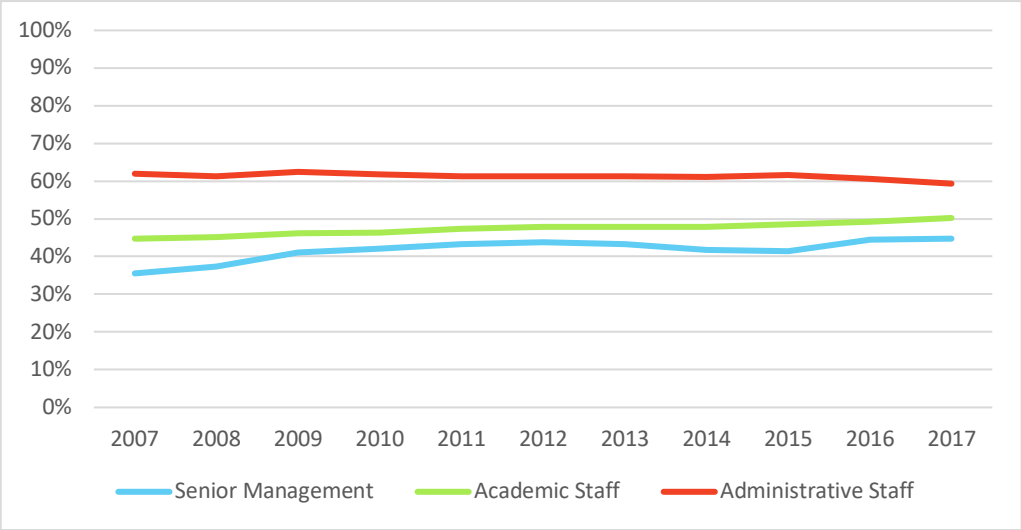
4.3. Analysis of Academic Staff

While the analysis at the student level nationally provides little evidence of serious gender bias in South Africa in terms of overall student numbers across all faculties, staff statistics paint a very different picture. Gender differences for academic staff are shown on a national basis and for the sample of universities for which data were obtained in the following sections.

4.3.1. National Statistics on Staff working in South African HEIs

National data between 2007 and 2017 on academic and administrative staff members at all South African HEIs indicate that women make up the majority of administrative staff, while men make up the majority of academic staff and senior management (see Appendix E1). The proportion of female administrative staff in South African HEIs over this period averages 61.3 percent, whereas the average proportion of females for academic staff and senior management were 47.4 and 41.7 percent, respectively. However, while the female proportion of administrative staff remained fairly constant over the ten year period, there is evidence of improvement in the female proportion of academic staff and senior management, as represented in Figure 24. Between 2007 and 2017 the percentage of total female academic staff increased by 5.5 percentage points, and of senior management by 9.3 percentage points.

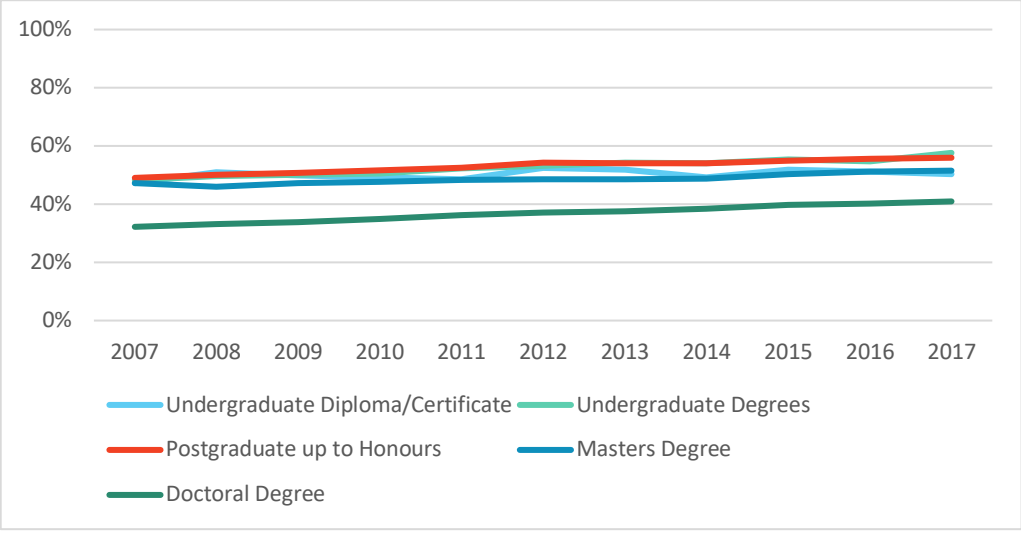
Figure 24: The percentage of females at South African HEIs by employment position; 2007 – 2017.



Source: **Council on Higher Education (2014; 2015; 2016; 2017; 2018; 2019).**

An examination of academic staff members at South African HEIs and their qualifications (see Appendix E2), reveals that the percentage of women academics holding Doctoral degrees (40.9 percent) is substantially lower than men (59.1 percent). As one moves up the degree "ladder" from undergraduate degrees to doctoral degrees, the proportion of women holding such degrees and working in South African HEIs decreases, with a drastic drop from Masters to Doctoral degrees, as illustrated in Figure 25.

Figure 25*: *The percentage of academic staff members working at South African HEIs according to gender and the qualification they hold; 2007 – 2017.



Source: **Council on Higher Education (2014; 2015; 2016; 2017; 2018; 2019)**

At a national level and in looking at 10 South African universities[8], the proportion of females decreases as you move up the academic ladder (Appendix E3). At a national level, females make up 64.6 percent of academic staff members that are below the junior lecturer level. Of the 10 South African universities, Stellenbosch University, the University of Kwa-Zulu Natal, and the University of the Free State have positions below junior lecturer, of which females occupy 53.7, 67.1, and 70.6 percent, respectively, of these positions. With the exception of the University of Pretoria (45.5 percent), females make up the majority of junior lecturers at all the other 9 universities, the highest proportions being at Stellenbosch University and the University of Cape Town at 80 percent. Females also make up the majority of lecturers at a national level and at each of the 10 universities.

However, males overwhelmingly dominate the positions of associate professors and professors. Nationally and at the 10 universities, the proportion of females are between 30-40 percent for associate professor and between 10-30 percent for professors.

6 of the 10 universities are below the national average of 29 percent for the proportion of females holding full professorship. Rhodes University has the lowest percentage of female professors at 18.6 percent. Thereafter are University of Kwa-Zulu Natal (24.3 percent), University of the Free State (24.8 percent), Stellenbosch University (25.9 percent), North-West University (27.2 percent) and the University of the Witwatersrand (27.9 percent). The University of Cape Town (30.6 percent), University of Pretoria (31.2 percent), University of the Western Cape (31.5 percent) and University of Johannesburg (33.1 percent) are above the national average for female professors.

These statistics indicate that men are in some way advantaged for the positions of associate professor and professor, nationally and within all 10 South African universities. The difference can only partly be explained by gender differentials in qualifications. In 2017, 40.9 percent of academic staff members working in South African HEIs holding Doctoral degrees were female (up from 32.2 percent in 2007). The 29 percent full professors and 41.2 percent of associate professors being female (see Appendix E3) can therefore only partly be explained by fewer women working in South African HEIs holding Doctoral degrees.

4.3.2. Staff Statistics at a Sample of South African Universities

The gender compositions of academic staff members at the sampled 4 universities was obtained to identify whether there are indications of gender biases in this sample of SA academia. The focus was on traditionally male-dominated fields within the faculties of Commerce, Engineering, and Science.

[8] These universities are UCT, WITS, UP, SU, UJ, UKZN, RU, UWC, NWU, and UFS.

Although economics may sit within a school with other subjects, these statistics provided are confirmed for the discipline of economics only. The subjects present the statistics for each individual discipline and not whole schools. Not all of the data for some of the universities could be obtained. The 2019 data is missing from UNI1 and UNI3, the 2018 and 2019 data is missing from UNI2, and the 2013 data is missing from UNI3. However, there is adequate data spanning from 5-6 years for each university that allows for sufficient analysis. The gender compositions are analysed for each of the departments that were analysed in the student analysis and at each academic rank, i.e. Junior Lecturer, Lecturer, Senior Lecturer, Associate Professor, and Professor. Furthermore, the departments under the faculty of Engineering are combined for simplicity purposes, represented as "ENG".

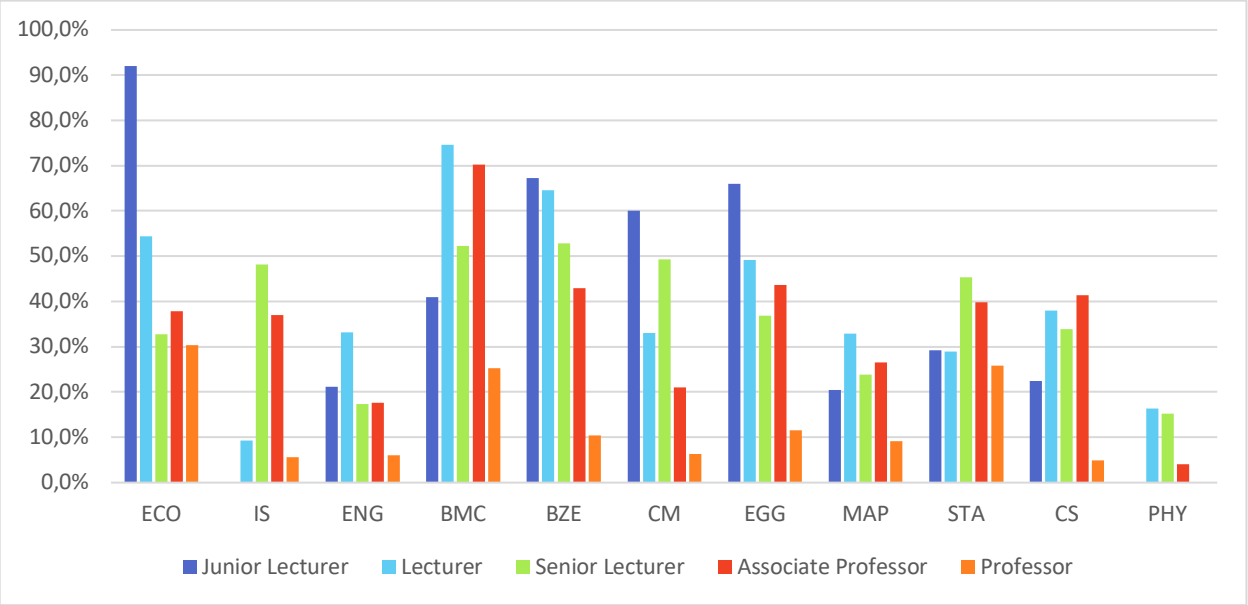
Represented in Appendix F1, F2, F3, and F4 are the percentages of female academic staff working in each of the analysed departments for each academic rank and year for each university. Represented in Table 25 are percentages of female academic staff members displayed as combined averages for all four universities across the time period 2013 to 2019, broken down by subject and academic rank. The shaded cells show where there are 50 percent or more females working in that department and rank. The international literature suggests that females dominate the lower ranks even in predominantly male-dominated fields. But this does not seem to be the case here, since males seem to dominate all ranks in most of the identified fields. It is only in the fields of ECO, BMC, BZE, CM, and EGG where some of the academic ranks are majority female. Even still, except for BMC, these are all the lower ranks of junior lecturer and lecturer. BMC and BZE are the best in terms of female representation, but even here at the professor level, females only make up 25.2 and 10.5 percent, respectively. There is a clear drop off of female participation as one moves up the academic ladder. In none of the fields do females make up even one-third of professors. The field which has the highest female representation at the professor level is ECO which is only 30.4 percent.

Table 25: The average percentage of female staff members across all four universities and time, by field and academic rank; 2013-2019.

	Junior Lecturer	Lecturer	Senior Lecturer	Associate Professor	Professor
ECO	92.1%	54.4%	32.8%	37.9%	30.4%
IS		9.3%	48.2%	37.0%	5.6%
ENG	21.2%	33.2%	17.4%	17.6%	6.0%
BMC	40.9%	74.7%	52.3%	70.2%	25.2%
BZE	67.3%	64.6%	52.9%	42.9%	10.5%
CM	60.0%	33.0%	49.4%	21.0%	6.3%
EGG	66.0%	49.2%	36.8%	43.6%	11.5%
MAT	20.5%	33.0%	23.9%	26.6%	9.1%
STA	29.2%	29.0%	45.4%	39.8%	25.8%
CS	22.5%	38.1%	33.9%	41.5%	4.9%
PHY	0.0%	16.4%	15.3%	4.0%	0.0%

Source: **Obtained by author from universities.**

Figure 26: The average percentage of female staff members across all four universities and time, by field and academic rank.



Furthermore, if one compares the average percentage of females in the various fields and academic ranks in Table 25, to the national proportions of female academic staff members as a whole, per rank (Appendix E3), ECO is the only department in which has a higher percentage of female professors than the national average (29 percent).

The percentage of female professors in Economics is high in comparison to international standards, since CSWEP (2018) found that in 2018, females made up 14.3 percent of Economics full professors in

their study of 228 departments in US universities. However, considering the small sample size, this figure cannot be taken as a representation of Female Professors in Economics across South Africa as a whole, but it does show that these four particular universities seem to be better than those in the US.

Looking at this data graphically in Figure 26, there are significant drops from associate professor to professor within all fields. ENG and PHY are by far the lowest, having very little female representation at all academic ranks and the lowest share of professors. These two fields are closely followed by IS and MAT. In general, the Life Sciences tend to be better than the Physical Sciences, Engineering and Commerce.

Focusing on Economics only, the average proportion of female staff working in the Economics departments at all four university per academic rank are represented in Table 26. There are no Junior Lecturers in Economics at UNI1 and UNI2, but females make up 100 percent of Junior Lecturers at UNI3 and 68.3 percent at UNI4. At the Lecturer level, females make up 64.2 and 78.0 percent at UNI1 and UNI2, respectively; but only 27.2 and 47.8 percent at UNI3 and UNI4. There are significant drop offs from Lecturer to Senior Lecturer level, with the exception of UNI3 where there is actually an increase of 5.9 percentage points. This can be seen better graphically in Figure 27. There is a greater proportion of females at the Associate Professor level than at the Senior Lecturer level at UNI1 and UNI2, but drop offs for UNI3 and UNI4, nonetheless females still represent the minority share. At the Professor level, female representation drops significantly at UNI1, UNI2, and UNI4. The proportion of female Professors at UNI3 (45 percent) is surprisingly high compared to the other fields and universities. Female representation at the Professor level is particularly bad at UNI2 and UNI4, where females make up 19.5 and 5.0 percent of professors, respectively.

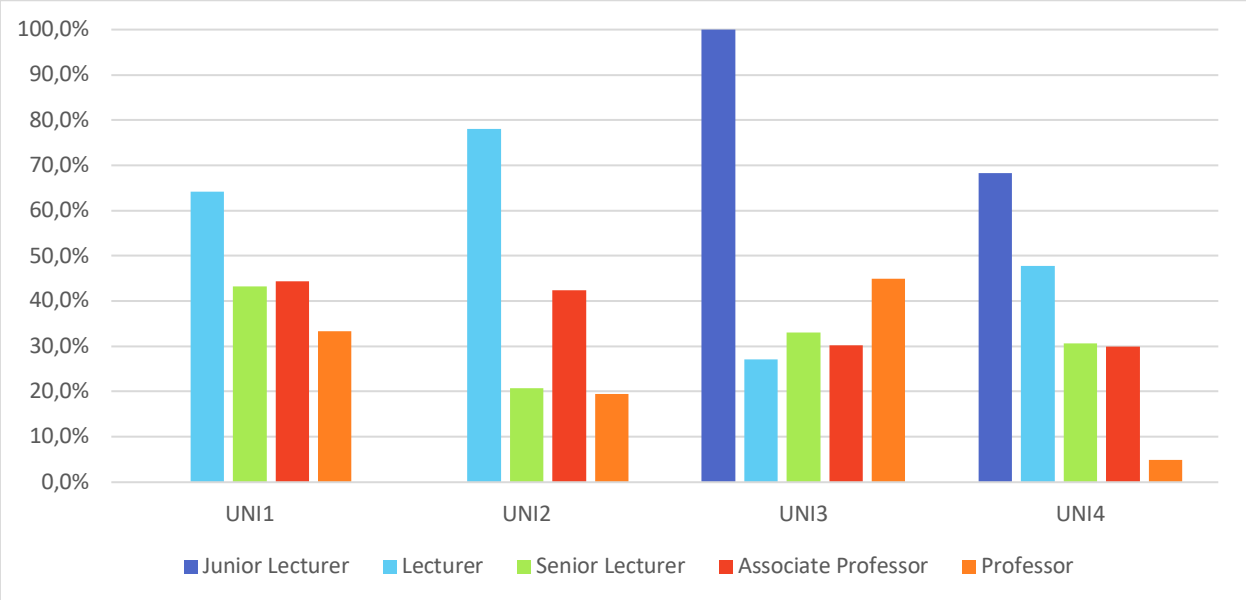
Table 26: The average percentage of female academic staff members in the Economics departments of the four universities, per academic rank.

	UNI1	UNI2	UNI3	UNI4
Junior Lecturer			100.0%	68.3%
Lecturer	64.2%	78.0%	27.2%	47.8%
Senior Lecturer	43.3%	20.7%	33.1%	30.7%
Associate Professor	44.4%	42.4%	30.3%	29.9%
Professor	33.3%	19.5%	45.0%	5.0%

Source: **Obtained by author from universities.**

With the exception of Junior Lecturer at UNI3 and UNI4, and Lecturers at UNI1 and UNI2, the percentage of females at the four universities in the remaining ranks are all below the national percentage of female academic staff members, of 50.3 percent (See Appendix E1). However, when comparing these statistics to the national data on female academic staff members per academic rank (Appendix E3), UNI3 and UNI4 are higher than the national average for female Junior Lecturers (56.6 percent), but lower than the national average for Lecturer (53.4 percent), Senior Lecturer (46.2 percent) and Associate Professor (41.2 percent) levels. Females at UNI1 and UNI2 make up a greater proportion than the national averages for Lecturers and Associate Professors, but are below the national average for Senior Lecturers. At the Professor level, females at UNI1 and UNI3 are 4.3 and 16 percentage points, respectively, higher than the national average of 29 percent. However, UNI2 and UNI4 are significantly lower at 19.5 and 5.0 percent, respectively.

Figure 27: The average percentage of female academic staff members at the four universities, per academic rank.



In summary, the data for the 4 universities confirm the national drop off in the proportion of females as one progresses up the ranks of academia. The international literature suggests this is problematic not just in terms of fairness and efficiency (a minority of male undergraduates producing the majority of senior academics) but also because of the resultant lack of female role models for female students. With minor exceptions, the fields of Commerce, Science and Engineering perform worse than the national averages for female share of academics. Females make up the majority of staff for only a few subjects at mainly junior levels. Economics has the highest share of full professors for the subjects examined, but the proportion is still less than one-third.

Possible reasons for the low share of females in Economics at more senior levels of academia were examined in a survey, the results of which are discussed in the following section.

4.3.3. Analysis of Academic Staff Survey

The following section is set out as follows; 4.3.3.1 gives a brief summary of the methodology and data collection process (see Section 3.4 for full description), as well as the sample size, demographic information of respondents, and response rate. Section 4.3.3.2 analyses the findings of the survey in the form of tables, graphs and analysis. Additionally, comments and examples provided by respondents are included to give greater depth and understanding to the discussion.

4.3.3.1. Methodology, sample size, demographic information and response rate

The questionnaire was set up on the online platform, Google Forms, to ensure total anonymity of respondents. Some of the questions used were adapted from a similar survey done by the AEA[9] on AEA members, and the other questions were drafted by the researcher. Potential respondents who were identified by their attendance at the Biennial Conference of the Economic Society of South Africa in Johannesburg in August 2019 were sent an email which included the URL link to the online questionnaire. Potential respondents were also identified via South African university websites where staff email addresses were displayed. A consent box had to be checked before proceeding to the questions. A copy of the questionnaire is included in Appendix G1.

Questionnaires were sent to 200 academic Economists working at South African universities, of which 47 responded. However, 7 of the questionnaires had to be discarded as the respondents fell outside of the sampling criteria of academic staff members and some responses were from Masters of PhD students. Thus, there were 40 usable answered questionnaires. From the respondents, 62.5 percent

[9] For the full AEA survey and results, see https://www.aeaweb.org/resources/member-docs/final-climate-survey-results-sept-2019.

were male and 37.5 percent were female. This gender difference is unsurprising given the dominance of males amongst academic economists. The academic rank and age groups of the respondents are shown below in Figures 28 and 29. The majority of respondents falls within the 30-49 age group.

Figure 28: Academic Rank of all respondents.

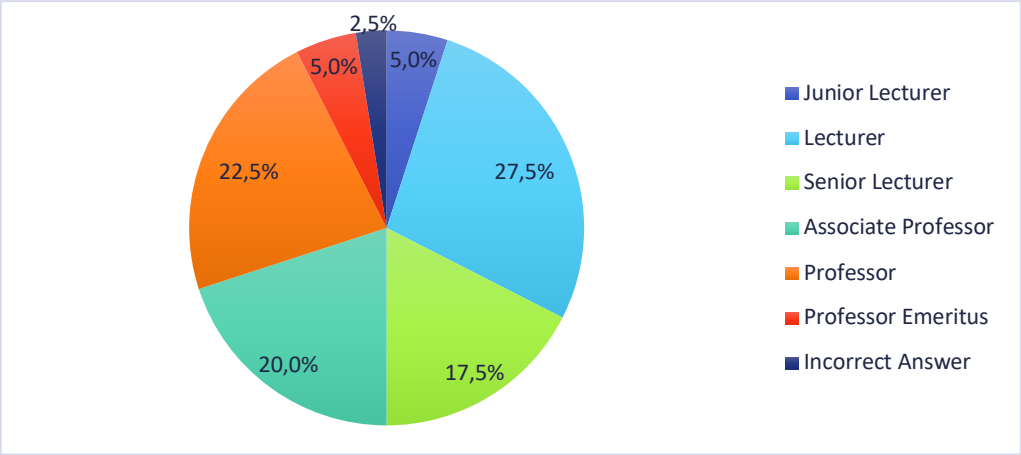
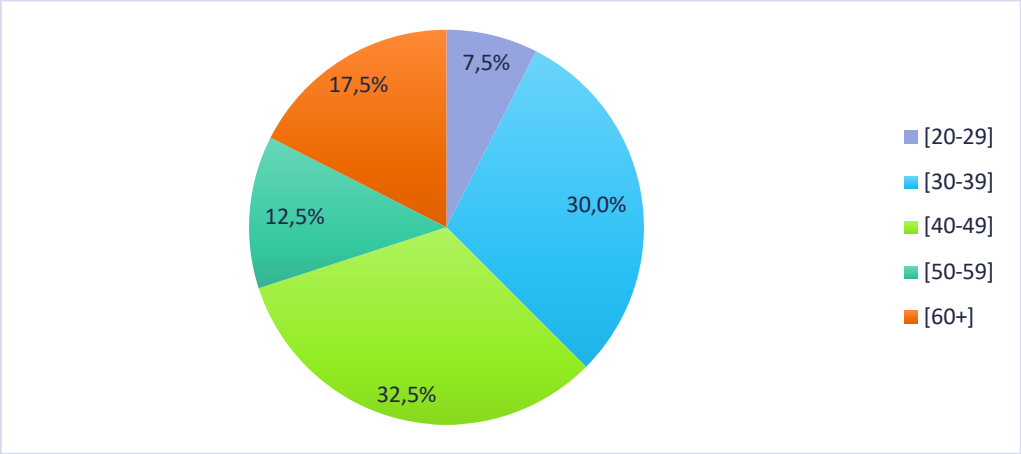


Figure 29: Age Groups of Respondents.



4.3.3.2. Review of Survey Responses

Tables 27 and 28 provide a summary of the answers to the questions about the general climate of the respondents' experience while working as academics in the field of Economics in South Africa. Overall results are exhibited as well as results by gender. Respondents had to answer each question with either "Always", "Often", "Sometimes", or "Never". Respondents were also given the option to check "No Comment" should they not wish to answer that particular question.

According to respondents the overall working environment tends generally to be positive. For questions reflecting a negative theme the overwhelming majority of respondents answered "never"

or “sometimes”. To those with a positive theme they mostly answered “always” or “often”. Most of the respondents have indicated that they feel valued and respected in their field and that their places of work and conferences tend not to exhibit the same hostile and belligerent environment that has been reported in international literature[10]. Interestingly, for the questions on being interrupted by colleagues, social exclusion and work not being taken as seriously as colleagues have featured prominently as being especially problematic in Economics in the international literature the largest number of responses was “sometimes”. This is in contrast with the other negatively themed questions where the most common response was “never” and the positively themed questions where the most common response was “often”.

Table 27: The share of respondents who answered “Always”, “Often”, “Sometimes”, “Never”, or “No Comment” to the following questions about the general environment in the field of Economics.

Sample:	All				
	Always	Often	Sometimes	Never	No Comment
When you started working in your department did you ever feel as though certain co-workers felt uncomfortable being around you?	2.5%	2.5%	22.5%	70.0%	2.5%
Are you often interrupted by other colleagues when stating your opinion?		10.0%	57.5%	32.5%	
Do you feel valued at your institute/place of employment?	27.5%	40.0%	22.5%	5.0%	2.5%
Do you feel included intellectually within your department?	32.5%	50.0%	17.5%		
Have you ever felt socially excluded at a meeting or even in your field?		10.0%	50.0%	40.0%	
Have you ever felt disrespected by your economist colleagues?		7.5%	30.0%	60.0%	2.5%
Have you ever felt that your work was not taken as seriously as that of your economist colleagues?		7.5%	55.0%	37.5%	
Do you feel that the environment in your departmental meetings are aggressive or hostile?		5.0%	25.0%	60.0%	10.0%
Do you feel that the economics conferences you have attended exhibit a hostile and/or belligerent culture/environment?	5.0%	7.5%	35.0%	52.5%	

Source: Tabulation by author of survey results.

[10] See Rimer (2005), and Lundberg & Stearns (2019)

Table 28: The share of female and male respondents who answered "Always", "Often", "Sometimes", "Never", or "No Comment" to the following questions about the general environment working in the field of Economics.

Sample:	Female					Male				
	Always	Often	Sometimes	Never	No Comment	Always	Often	Sometimes	Never	No Comment
When you started working in your department did you ever feel as though certain co-workers felt uncomfortable being around you?			26.7%	73.3%		4.0%	4.0%	20.0%	68.0%	4.0%
Are you often interrupted by other colleagues when stating your opinion?		20.0%	40.0%	40.0%			4.0%	68.0%	28.0%	
Do you feel valued at your institute/place of employment?	6.7%	40.0%	46.7%		6.7%	44.0%	40.0%	8.0%	8.0%	
Do you feel included intellectually within your department?	13.3%	53.3%	33.3%			44.0%	48.0%	8.0%		
Have you ever felt socially excluded at a meeting or even in your field?		13.3%	46.7%	40.0%			8.0%	52.0%	40.0%	
Have you ever felt disrespected by your economist colleagues?		20.0%	46.7%	26.7%	6.7%			20.0%	80.0%	
Have you ever felt that your work was not taken as seriously as that of your economist colleagues?		20.0%	46.7%	33.3%				60.0%	40.0%	
Do you feel that the environment in your departmental meetings are aggressive or hostile?		6.7%	33.3%	53.3%	6.7%		4.0%	20.0%	64.0%	12.0%
Do you feel that the economics conferences you have attended exhibit a hostile and/or belligerent culture/environment?	6.7%	20.0%	20.0%	53.3%		4.0%		44.0%	52.0%	

Source: Tabulation by author of survey results.

The answers tend to be similar between the male and female respondents, with two exceptions; the results show that women tend to feel less valued than males at their workplace, and a higher proportion of females in comparison to males have reported feeling disrespected by other economist colleagues. When answering the question "Do you feel valued at your institute/place of employment?" 44 percent of males responded with "Always", as opposed to 7 percent of females. Similarly, given the question "Have you ever felt disrespected by your economist colleagues?", 80 percent of males responded with "Never", as opposed to 27 percent of females.

Although the majority of both males and females responded "Sometimes" or "Never" to the questions "Are you often interrupted by colleagues when stating your opinion?", "Have you ever felt socially excluded at a meeting or even in your field?", and "Have you ever felt that your work was not taken as seriously as that of your economist colleagues?", the proportion of males was higher than that of the females. Moreover, the responses by males were more likely to be "Never" than was the case for females. This difference is responses is shown graphically in Figures 30 – 32. These figures demonstrate visually that male respondents are more likely to respond "Sometimes" or "Never", whereas a lot more of the female respondents are also responding with "Often". This would indicate that although the responses do not show as strong a bias against females as some of the literature suggested, females are generally less positive about their work experience than men. This is most obvious for the question "Have you ever felt that your work was not taken as seriously as that of your economist colleagues?" Females were also more likely to reply "often" to the questions about being interrupted and socially excluded.

Figure 30: The percentage of respondents who responded to the question below from always to never, by gender.

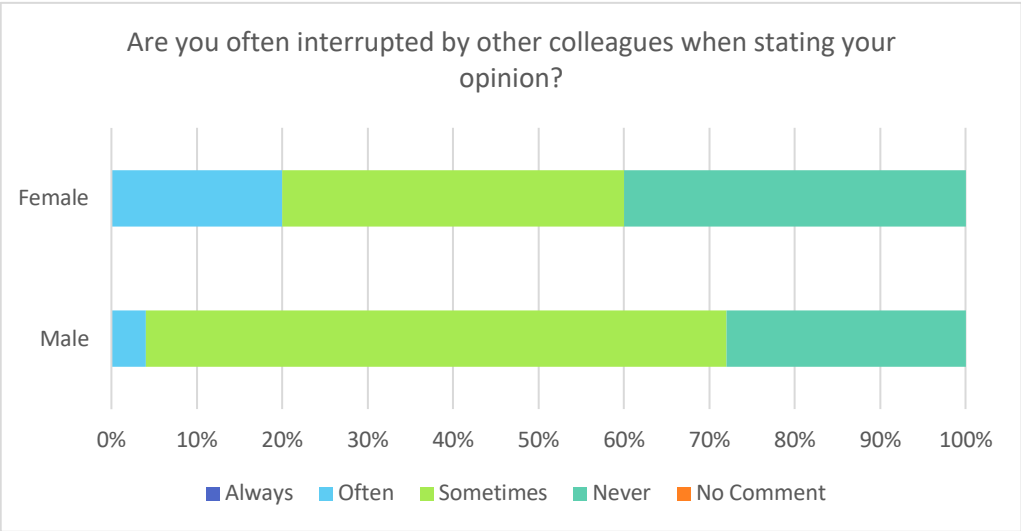


Figure 31: The percentage of respondents who answers the question below from always to never, by gender.

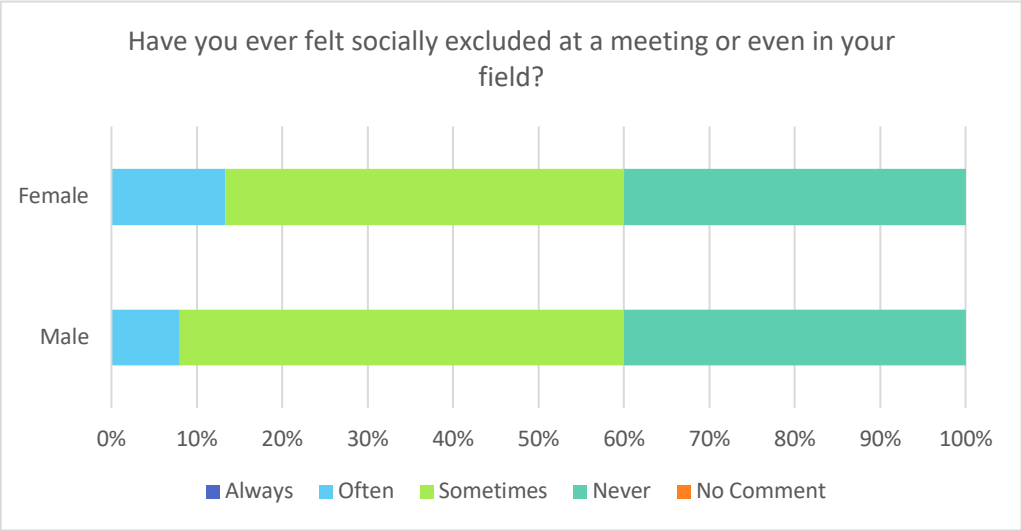
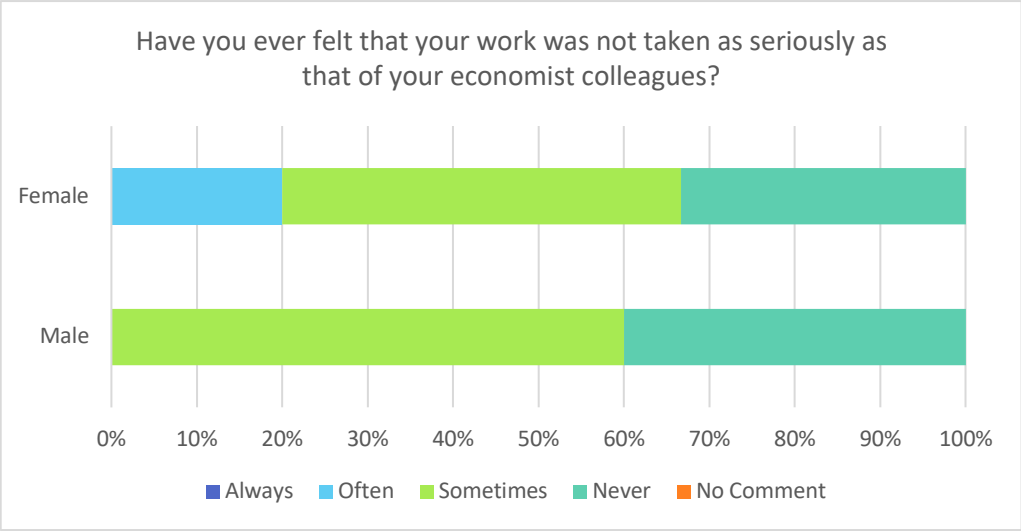


Figure 32: The percentage of respondents who answered the question below from always to never, by gender.



Similar results were found in the AEA Climate Survey (Allgood *et al*., 2019). When given the statement "I always feel included socially at my institution/place of employment", 67 percent of males agreed, whereas only 52 percent of females did. Although over half of the females feel socially included, there is still a gender gap in US economics where men tend to feel more included than women (Allgood *et al*., 2019).

The same pattern is seen in the AEA Survey's statement: "The work that I do is valued at my institution/place of work". Over half of the male (65%) and female (56%) respondents agreed with this

statement, with a 9 percentage point difference showing that work done by men seems to be somewhat more appreciated (Allgood *et al.*, 2019).

When shown graphically in Figures 33 and 34 the positively phrased questions in this survey reveal similar results. Overall it seems that the male and female respondents feel valued and included intellectually within their workplace, but there are still gender differences in the degree of satisfaction. When given the question "Do you feel valued at your institute/place of employment?" only a small proportion of females said "Always" and are much more likely to respond "Often" and "Sometimes". In contrast males are overwhelmingly likely to have responded "Always" and "Often". However, one cannot assume that this difference is solely a gender related issue, and it is possible that academic seniority has an influence on the respondents' answers. In looking at the table in Appendix G2 we see that the only female to answer "Always" to the question on whether they feel valued is a Professor. From Associate Professor downwards is a combination of "Often" and "Sometimes". Looking at the male responses, only 2 out of the 25 replied "Sometimes", and another 2 replied "Never". These 4 respondents hold less seniority as they were Lecturers and Junior Lecturers. From Senior Lecturer upwards, the answers were all either "Often" or "Always". On the other hand, when looking at the common answers amongst the Senior Lecturers and Associate Professors, their level of feeling valued is still skewed in favour of males. For the male Senior Lecturers, ½ replied "Always" and ½ replied "Often. For the females, ⅓ replied "Often" and ⅔ replied "Sometimes". A similar pattern is found amongst the Associate Professors where ⅔ of the males replied "Always" and ⅓ replied "Often", in comparison with ⅗ of the females replied "Often" and ⅖ replied "Sometimes". Thus gender as well as seniority are important determinants of feeling valued.

Figure 33: The percentage of male and female respondents who rated the question below from always to never.

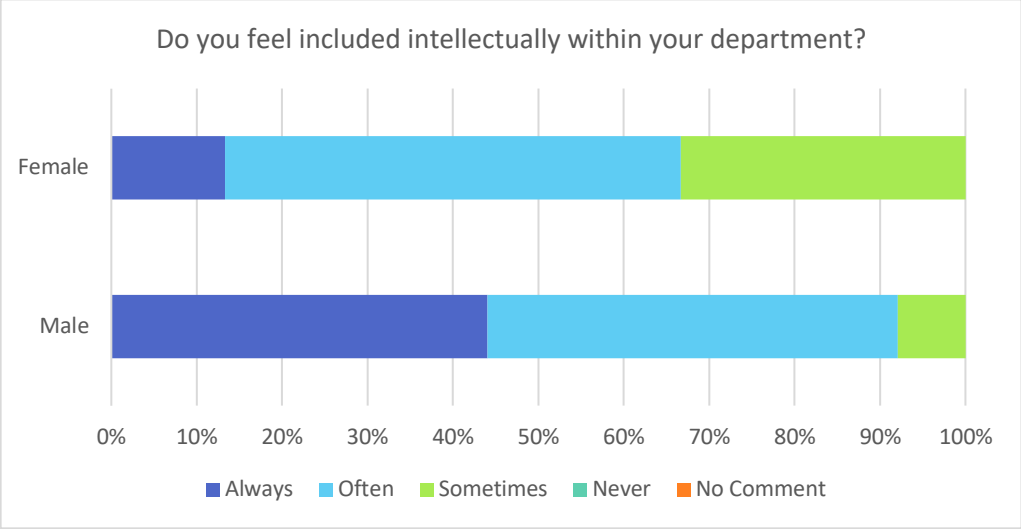
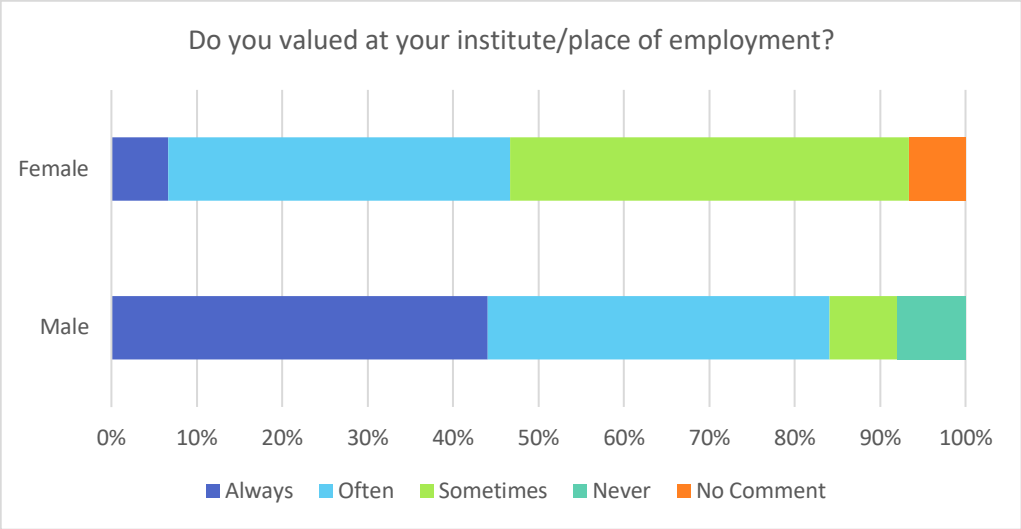


Figure 34: The percentage of male and female respondents who rated the question below from always to never.



Similarly, the AEA gave their respondents the statements "I feel valued at my institution/place of work" and "I always feel included intellectually at my institution/place of work". The majority of both males and females agreed with both these statements. However, there was still a higher proportion of males to agree to the statements than there were for females. 67 percent of males agreed to the former statement and 69 percent for the latter, in comparison to 54 and 53 percent for females (Allgood *et al.*, 2019).

Interestingly, in the same AEA survey, when respondents were given similar statements but the focus was on whether they felt valued and included intellectually within the field of economics as a whole, the proportion of both male and female respondents who agreed to those statements decreased drastically. For the statement "I feel valued within the field of economics" only 46 percent of males and 25 percent of females agreed (Allgood *et al.*, 2019). Likewise, given the statement "I feel included intellectually within the field of economics" only 48 percent of males and 27 percent of females agreed (Allgood *et al.*, 2019). That means there is between a 20 to 30 percentage point drop between how valued and intellectually included these economists feel within their workplace and within the field of economics as a whole. The setup of the questionnaire in this research did not explore the reasons for these differences in experiences within the place of work and the field of economics as a whole but this would make for interesting future research.

This research did not ask questions about the field of economics as a whole. It did, however, investigate whether there are differences in the overall environments of departmental meetings and economics conferences. Respondents were asked "Do you feel that the environment in your

departmental meetings are aggressive or hostile?" and "Do you feel that the economics conferences you have attended exhibit a hostile and/or belligerent culture/environment?" to which the answers can be seen in Table 89 and 90 and Figures 35 and 36 below. There is a similar pattern in Figure 35 above where the majority of both men and women have answered "Never" but the proportion of men with this response is much larger, and the proportion of women answering "Sometimes" and "Often" is notably larger than the proportion of men.

Figure 35: The percentage of respondents who rated the question below from always to never, by gender.

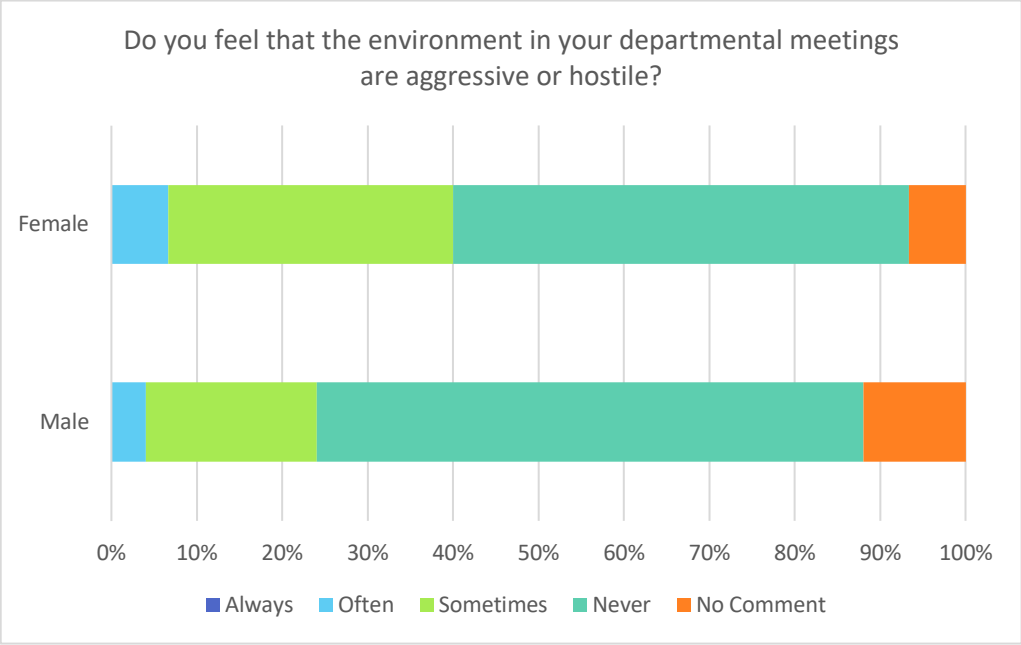
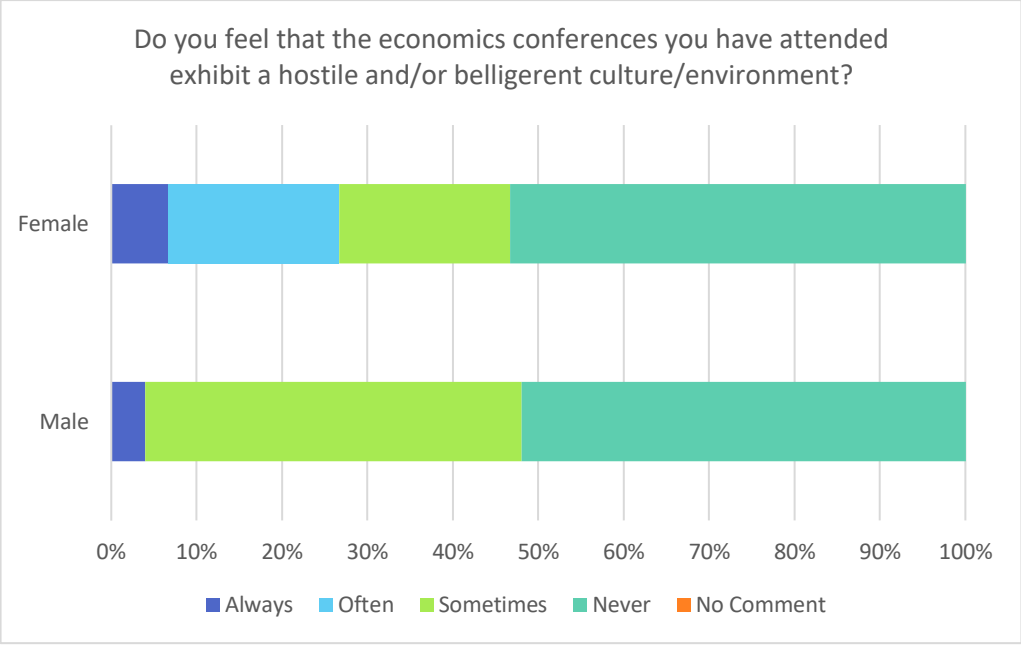


Figure 36: The percentage of respondents who rated the question below from always to never, by gender.



Likewise, a significant proportion of females feel that economics conferences "always" or "often" exhibit an aggressive or belligerent environment, but the proportion of men with these replies is much lower. The respondents were given the option of elaborating on their answers to those two questions.

Some of the comments to the question "Do you feel that the environment in your departmental meetings are aggressive or hostile?" are shown below.

"As someone who often runs meetings, and who is responsible for communicating with colleagues around information or matters which they are unhappy about, it is often the case that meetings are aggressive/hostile. This is not specifically a gender issue, though." – Female respondent

"The department has a good working environment" – Female respondent

"Our departmental meetings are extremely collegial, any can comment on any topic, and typically, almost everyone does." – Male respondent

"I should note that I have had different experiences in the 3 different departments I have worked in, so if this question is about current department, then no. But in a previous department, I had some unhappy experiences." – Female respondent

"The meetings are always very welcoming." – Male respondent

"The environment at meetings is strongly influenced by the person/s chairing the meeting and in decision-making positions. I find that meetings are often less confrontational when they are chaired by women." – Female respondent

"Our department is peaceful and respects each other. Always take each other's benefit into regard." – Male respondent

"We have an inclusive meetings where each member are given opportune time to give their opinions." – Female respondent

"Our departmental meetings, with the presence of our HOD are always respectfully conducted. He manages strong opinions with wisdom and authority. Meetings with smaller groups have not always been as positive. My direct macro group/ colleagues have been extremely condescending on a few occasions. I have found that I have had to put on a very tough face. This tough exterior together with my promotion to Associate Prof and my decision to address the issue with one colleague in particular have made a substantial difference to the dynamic. But this process took its toll on my confidence and enjoyment of my job at a time when I really needed to be very focused." – Female respondent

"Management often makes unrealistic demands on us which sometimes results in robust discussion" – Male respondent

More male respondents gave positive affirmations of experiences in meetings. However, this would need to be quantified before determining an actual conclusion. One female respondent could not determine whether hostility or aggression in meetings were as a result of gender issues and one female respondent mentioned that where a male authority figure was there to chair a meeting, male interaction with female colleagues was kept respectful. However, when this male authority figure was not present, there was instances of male condescension towards this female. Once the female addressed this situation personally and also, was rewarded with a promotion, the male colleagues became more respectful. This seems to indicate that a woman has to work harder for respect rather than be accepted at face value.

Respondents could also elaborate on their answer to the question "Do you feel that the economics conferences you have attended exhibit a hostile and/or belligerent culture/environment?" to which some of the comments were:

"[Never]. This is just my personal experience, potentially skewed due to being a white male" – Male respondent

"Economists are mostly friendly people." – Male respondent

"Some economists criticize you for not doing what they would have done instead of accepting what you chose to do and judge your findings on that." – Male respondent

"Very occasionally someone gets onto a 'high horse'" - Male respondent

"Economics conferences are renowned the world over for being tough to present at." – Female respondent

"It does sometimes feel that those academics with higher rank are superior" – Female respondent

"I typically (and especially in more recent years) choose to attend conferences that I know will have an inclusive and welcoming environment. These conferences usually tend to have a greater proportion of women participants (e.g. Feminist Economics). I am also fortunate in that the research areas that I work in tend to have a more equal gender balance than some other economics fields (such as macroeconomics)." – Female respondent

"The conferences attend have typically been attended by many colleagues - if there has been a hostile/belligerent culture/environment, it is not one which I have experienced (but perhaps that is because I choose with whom to spend my time at conferences, and which sessions to attend, etc.)" – Female respondent

The respondents, both male and female, indicated that economics conferences tended to be an environment where higher ranked economists often assumed a superior attitude and tended to be

biased or intolerant of alternate views. This, by its very nature, would imply an environment which would suit tough, aggressive attendees.

However, the female respondents did acknowledge that economics conferences were tough to present at and some respondents indicated that they were naturally inclined to attend conferences where the environment was more inclusive and welcoming, seeming to indicate a conference that was more accepting of female economists. This would seem to imply that economics conferences were not always 'inclusive and welcoming' to female economists and their views.

Tables 29 and 30 represent the number of respondents who have personally experienced some form of discrimination or unfair treatment. Respondents were given the question "Have you personally experienced discrimination or unfair treatment with regard to…" and then given a list of factors to which they could check any or all that applied. As represented in Table 29 just over 67 percent of respondents checked "Not Applicable", indicating that they had never personally experienced discrimination or unfair treatment with regards to those specific factors. When breaking that down by gender, 53 percent of the female respondents checked "Not Applicable" to that question, as opposed to 76 percent of males. Additionally, a significantly larger amount of women reported experiencing discrimination or unfair treatment with regards to promotion decisions and funding decisions. There is a 15 percentage point difference in the proportion of males and females who reported experiencing discrimination or unfair treatment with regards to promotion decisions and an 18 percentage point difference with regards to funding decisions.

Table 29: The proportion of respondents that personally experienced discrimination or unfair treatment with regards to the following factors; total and by gender.

Sample:	Total	Gender	
		Female	Male
Have you personally experienced discrimination or unfair treatment with regard to: (Choose as many options that apply)			
Promotion decisions	17.5%	26.7%	12.0%
Compensation	7.5%	13.3%	4.0%
Teaching Assignments	10.0%	6.7%	12.0%
Access to time and funding to attend conferences and seminars	2.5%		4.0%
Publishing decisions	5.0%		8.0%
Funding decisions	10.0%	20.0%	4.0%
Sabbatical time	15.0%	20.0%	12.0%
N/A	67.5%	53.3%	76.0%

Source: Tabulation by author of survey results.

The areas in which the proportion of males was larger than that of the females in experiences of discrimination were teaching assignments, access to time and funding to attend conferences and seminars, and publishing decisions. However, this is only by a small margin.

Represented in Table 30 is the breakdown of the answers to the same question but by academic rank. No definitive analysis can be made on the junior lecturers as there are only two in the sample, however, the one junior lecturer that had experienced discrimination or unfair treatment with regards to promotion decisions, compensation, and funding decisions was female, whereas the one which checked “N/A” was male.

The majority of the lecturers, senior lecturers, associate professors, and professors reported having never experienced discrimination or unfair treatment with regards to those factors (i.e. 7 out of 11, 6 out of 7, 6 out of 8, and 5 out of 9, respectively). Across the board the two factors that are checked the most are promotion decisions and sabbatical time.

Table 30: The proportion of respondents that personally experienced discrimination or unfair treatment with regards to the listed factors; total and by academic rank.

Sample:	Total	Academic Rank					
Have you personally experienced discrimination or unfair treatment with regard to: (Choose as many options that apply)		Junior Lecturer	Lecturer	Senior Lecturer	Associate Professor	Professor	Professor Emeritus
Promotion decisions	17.5%	50.0%	27.3%		12.5%	22.2%	
Compensation	7.5%	50.0%			12.5%	11.1%	
Teaching Assignments	10.0%		18.2%			11.1%	50.0%
Access to time and funding to attend conferences and seminars	2.5%		9.1%				
Publishing decisions	5.0%		9.1%			11.1%	
Funding decisions	10.0%	50.0%	18.2%		12.5%		
Sabbatical time	15.0%		27.3%	14.3%		22.2%	
N/A	67.5%	50.0%	63.6%	85.7%	75.0%	55.6%	50.0%

Source: Tabulation by author of survey results.

**Each cell is calculated as the percentage of the total 40 respondents, 2 junior lecturers, 11 lecturers, 7 senior lecturers, 8 associate professors, 9 professors and 2 professor emeritus.*

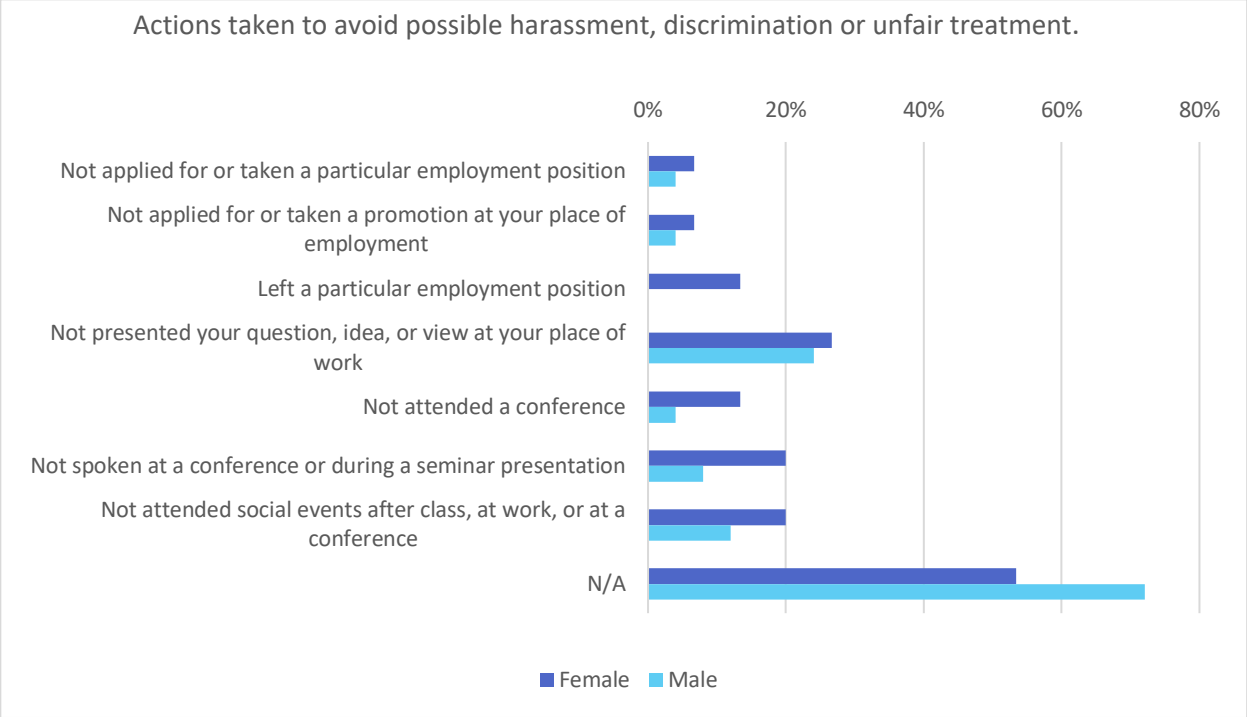
Table 31: The proportion of respondents that have done the listed actions to avoid possible harassment, discrimination, or unfair or disrespectful treatment; total and by gender.

Sample:	Total	Gender	
		Female	Male
Have you ever done any of the following to avoid possible harassment, discrimination, or unfair or disrespectful treatment:			
Not applied for or taken a particular employment position	5.0%	6.7%	4.0%
Not applied for or taken a promotion at your place of employment	5.0%	6.7%	4.0%
Left a particular employment position	5.0%	13.3%	
Not presented your question, idea, or view at your place of work	25.0%	26.7%	24.0%
Not attended a conference	7.5%	13.3%	4.0%
Not spoken at a conference or during a seminar presentation	12.5%	20.0%	8.0%
Not attended social events after class, at work, or at a conference	15.0%	20.0%	12.0%
N/A	65.0%	53.3%	72.0%

Source: Tabulation by author of survey results.

Represented in Table 31 is the proportion of respondents who have done any of the listed actions to avoid possible harassment or discrimination. The majority of respondents, both male and female, checked "N/A" which paints a positive image for the economics environment in South African academia. There are still gendered differences, however, as there is a 19 percentage point difference in favour of men whereby 72 percent of men reported "N/A" in comparison to 53 percent of females. The most common action taken by both males and females to avoid harassment, discrimination or unfair treatment is not presenting their question, idea, or view at their place of work. This could be reflective of those who find their departmental meetings to exhibit forms of hostility or aggressiveness. None of the male respondents, in comparison to 13 percent of females, reported leaving a particular employment position in this regard. Besides not presenting a question, idea or view in the workplace, the other two actions which stand out are not speaking at a conference or during a seminar, and not attending social events after class, at work, or at a conference, whereby 20 percent of females reported having done these in comparison to 8 and 12 percent, respectively, of the male respondents. The responses to the questions have been graphically depicted in Figure 37. Here it can be seen that the response rates for each action taken to avoid possible harassment, discrimination or unfair treatment has been higher for the females than the males.

Figure 37: The proportion of respondents that have done the listed actions to avoid possible harassment, discrimination, or unfair or disrespectful treatment, by gender.



However, the response rates for the majority of the actions were very low which should be commended. In a perfect society every respondent would have checked "N/A" but it is unrealistic to expect that to become a reality. The goal, however, should be to get as close to that perfect society as possible. The question now stands whether results would reflect in a similar manner if the sample size was significantly larger.

Before moving on to the section which asked the respondents about whether they have experienced some form of sexual harassment while working in the field of economics, the respondents were asked whether they have ever been called by a 'pet' name or by some unprofessional/demeaning name by their co-workers or other people in their field (see Q12 in Appendix G1). All of the respondents replied "no". One of the respondents (a male) wrote:

> *"Given my age and seniority, I am known as Mkhulu, which is a name of respect"*

This reflects a more positive and respectful environment which hasn't always been reflected in the international literature. However, this seems to stand in contrast to the responses to the questions revolving around sexual harassment. One would expect the two to be symbiotic.

Table 32: The proportion of respondents who have experienced some form of sexual harassment while working as an academic in the field of economics.

Sample:	All				
	Always	Often	Sometimes	Never	No Comment
Have you ever experienced another colleague make offensive sexual remarks, either directed at you or overheard, including jokes or sexual stories?		2.5%	22.5%	75.0%	
Have you ever experienced another colleague make remarks about your appearance, body, or sexual activities that made you uncomfortable?			17.5%	80.0%	2.5%
Have you ever experienced another colleague make gestures or used body language of a sexual nature which embarrassed or offended you?			15.0%	85.0%	
Have you ever experienced another colleague make unwanted attempts to establish a dating, romantic, or sexual relationship with you despite your efforts to discourage it?			7.5%	92.5%	

Source: Tabulation by author of survey results.

While the majority of respondents have never experienced the listed forms of sexual harassment, as depicted in Tables 32 and 33, it is still cause for concern that some people, both male and female, have, and particularly the one person who has often had colleagues make offensive sexual remarks to or about her. This woman is a professor in the 40-49 age group (see Appendix G3). This suggests that this may have been a common occurrence throughout her career. What's interesting is the number of male respondents who have experienced other colleagues making sexual remarks/jokes to or about them (7 out of 25) which is not just characteristic of one particular age group or academic rank. A serious concern is that 3 females reported having a colleague make unwanted attempts to establish a

Table 33: The proportion of respondents who have experienced some form of sexual harassment while working as an academic in the field of economics, by gender.

Sample:	Female					Male				
	Always	Often	Sometimes	Never	No Comment	Always	Often	Sometimes	Never	No Comment
Have you ever experienced another colleague make offensive sexual remarks, either directed at you or overheard, including jokes or sexual stories?		6.7%	13.3%	80.0%				28.0%	72.0%	
Have you ever experienced another colleague make remarks about your appearance, body, or sexual activities that made you uncomfortable?			33.3%	66.7%				8.0%	88.0%	4.0%
Have you ever experienced another colleague make gestures or used body language of a sexual nature which embarrassed or offended you?			20.0%	80.0%				12.0%	88.0%	
Have you ever experienced another colleague make unwanted attempts to establish a dating, romantic, or sexual relationship with you despite your efforts to discourage it?			20.0%	80.0%					100.0%	

Source: Tabulation by author of survey results.

dating, romantic, or sexual relationship with them despite their efforts to discourage it. This type of behaviour makes a person's working environment uncomfortable and may have a serious impact on the level of their job satisfaction. This would also be a deterrent for women who want to work or are currently working in the field of economics which would be a contributing factor to the lower levels of female academic economists.

At the end of the questionnaire the respondents were asked to give their opinion on which factors they think are the main contributors to the underrepresentation of women in economics. They were given a list of factors as well as the option to write any additional thoughts they may have. The factors were drawn from common themes that appeared in the literature. There is a general consensus that one of the biggest factors influencing the underrepresentation of women in economics is that there is a lack of female role models in the field. These answers are represented in Table 34.

There are noticeable gender differences in the answers, however. Second to there being a lack of female role models, the other major factors are that women dislike the combative and belligerent culture prevalent within the economics profession, and that women avoid the field of economics because of possible barriers to progression and promotion. On the other hand, the second most influential factor reported by the male respondents is that women are just less interested in the subject of economics.

Some of the respondents further elaborated on what they believe is a deterring factor for women in the economics profession.

"Sometimes the methods women might like to use to answer the questions (policy ones in particular) are less typical of the field. I have been told before that my approach is 'unusual' or that my approach is not typical of economics. My answer is that I am interested in the question and I believe sometimes the typical economics approach is insufficient." – Female

"I would say childcare is a real issue. Getting ahead in Economics and in academia in general requires long hours and many women with children work a 'double shift' already. Confidence is also required to last in academia and women may have less confidence in their abilities than men." – Female

"Women are more than capable of performing on par with (or better) than men in the field of Economics and in other fields/occupations. It is the latter which is the issue - capable women are highly sought after in the work place." – Female

"In South Africa economics as a career for women became an interesting pursuit later than some other professions, but is catching up fast." – Male

Table 34: The proportion of respondents who consider the listed factors to be contributors to the underrepresentation of women in the field of economics, total and by gender.

Sample:	Total		Female		Male	
	Count	Percentage	Count	Percentage	Count	Percentage
Studies have shown that there is a substantial underrepresentation of women in the field of Economics. Many reasons have been theorised to explain this underrepresentation. Please select which factors you think are the most responsible for low female representation in Economics:						
Women are less interested in the subject of economics	13	32.5%	4	26.7%	9	36.0%
Women are unwilling or able to obtain the necessary maths skills to do well	6	15.0%	2	13.3%	4	16.0%
Women tend to dislike the combative and belligerent culture prevalent within the economics profession	10	25.0%	6	40.0%	4	16.0%
Lack of female role models	26	65.0%	9	60.0%	17	68.0%
Women avoid the field of economics to avoid possible discrimination	6	15.0%	3	20.0%	3	12.0%
Women avoid the field of economics because of possible barriers to progression and promotion	9	22.5%	6	40.0%	3	12.0%

Source: Tabulation by author of survey results.

"Academic progress requires years of uninterrupted research. Women, who often have to leave work for maternity leave, sacrifice a number of productive years, resulting in greater challenges for promotion." – Male

"Women may experience the field to be male dominated from early ages that might discourage specialization, without any of the severe issues listed above." – Male

"I have checked the option "Women are less interested in the field of economics" but my opinion requires clarification. I think women are less interested in the type of economics which dominates many departments. Women have a particular experience of the world and I think this plays an important part of their research interests. Currently departments are not only male dominated but also are often lacking focus on social issues related to gender. Considering economics is a social science, I believe that many women who would opt for economics would do so with an interest in social issues, particularly around gender. This is of course a very generalised opinion." – Male

"Family arrangements make it hard for women to progress during the 30s when men advance rapidly to the professoriate." – Male

"Lots of women in Economics, therefore it is unclear what is meant by underrepresentation." – Male

"Social conditioning from early age discourage many women from taking up STEM-based occupations, including Economics. In addition, to succeed as an academic one needs a PhD, and in South Africa students complete PhDs in their late 20s and early 30s, which are also child-bearing years. Universities do not have the necessary support structures in place to support women throughout these years to allow them to start families and obtain their PhD. This is a general problem that undermines female progress in their careers in all disciplines at university." – Male

"The questionnaire was difficult to complete since my experience was over such a long period during which there have been significant changes, e.g. the number of women staff members; individuals, including HoDs, and their temperaments, which have coloured my experience." – Male

A general note that has been highlighted frequently within the comments, as well as the literature[11], is how the presence of children affects a woman's career, particularly in academia. As stated by Belenky et al. (1997, cited in Kulturel-Konak et al., 2011) traditional gender roles and the lack of flexibility towards women with children contributes to why women tend to stray away from fields that are typically perceived to be male dominated.

[11] See Ginther and Kahn (2004, 2006).

One of the female respondents mentioned that confidence in one's abilities is an important factor in succeeding in academia and that women tend to be less confident in their abilities. This theory was tested by Jakobsson (2012) whereby he asked a sample of Swedish university students what grade they thought they were going to get for their macroeconomics exam 1 week after they wrote. He then compared the students' perceived grades to their actual grades. He found no evidence of overconfidence among the male students but he did find that the female students were underconfident in their exam performance (Jakobsson, 2012). Possible reasons for this, however, were not explored in the paper. However, this could be attributed to gender perceptions and stereotypes that children are exposed to from an early age. As one of the male respondents said "Social conditioning from early age discourage many women from taking up STEM-based occupations, including Economics." This was also expressed by Ceci *et al*. (2014)[12] where the role of gender stereotypes was proven to pose a threat to the abilities of women to perform mathematically.

One of the female respondents wrote about capable women being highly sought after in the workplace makes for an interesting discussion. According to Statistics South Africa (2018) the South African labour market is still dominated by men and women are more likely to be in unpaid jobs or informal employment such as domestic work. At the end of the second quarter of 2018, the unemployment rate (according to the expanded definition) was 41.2 percent for women in comparison to 33.7 percent for men. This stands as an intriguing contradiction to the higher education enrolment statistics whereby the majority of enrolments and qualifications awarded are female. Furthermore, they state that "the labour market position of women hasn't changed much over the last decade; in fact, it has deteriorated in some respects" (Statistics South Africa, 2018). Additionally, if it is taken into consideration that roughly 60 percent of university students are female, and academic achievement is higher for females than for males, this does not seem to reflect in the labour force, suggesting that although capable women may be sought out in the workplace, the labour force still favours men.

One of the male respondents wrote "lots of women in Economics, therefore it is unclear what is meant by underrepresentation". It is interesting that he would have this opinion when it can be clearly in the statistical analysis of the staff at the four universities that there are significantly fewer women than men working in academia within the field of Economics.

[12] See Chapter 1, page 28

4.3.4. Conclusion of Section 4.3.

Nationally, females represent the majority share of administrative staff within South African HEIs, while men dominate the positions of academic staff and senior management. Furthermore, females tend to dominate the lower academic ranks of Junior Lecturer and Lecturer on a national level and within the 10 research-intensive universities.

A similar outlook appears at the four analysed universities where males tend to dominate most of the academic ranks within the majority of departments. Although the female share of professors at all four universities within the Economics departments is substantially low, these percentages are still above those in the US.

The survey shows that most of the economists feel that the environment within the field they work is relatively positive, although there are still marked differences in the level of satisfaction between males and females.

However, it would seem that the male economists that took part in this survey are acutely aware of the many factors that may contribute to the underrepresentation of females in the field of Economics, particularly at the higher ranks. This is a positive sign as awareness is often the first step to creating change.

4.4. Testing for the importance of role models

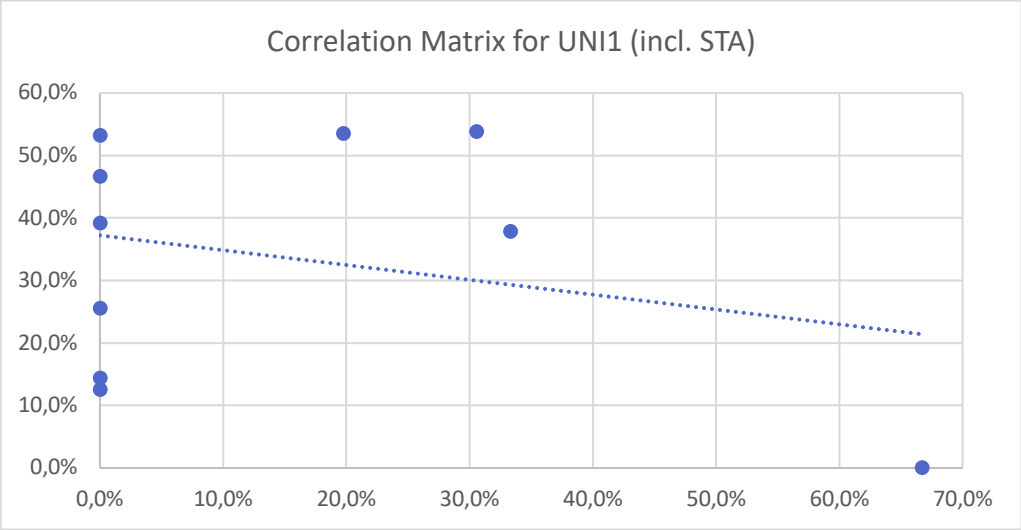
The data on female enrolment in PhDs and female share of Professors in Science, Commerce and Engineering at the four universities are combined in this section to test for correlation. The purpose is to provide a simple test of whether female role models may be important in encouraging female students to study at the higher levels of postgraduate study. It should be noted that correlation does not prove causation, but it can provide a counterpoint to the finding in the student surveys that role models were unimportant.

Looking at UNI1, two correlation tests were done. The first one includes STA and the second excludes STA. The reason for this being that the 100 percent representation of female professors in STA from 2013 to 2016 distorts the data since there was only one professor in the department who was female. In Table 35a, the correlation matrix for UNI1 (including STA) shows a very weak and negative relationship between the percentage of female professors and female PhD students, across all departments. It can be seen in the graph (Figure 38a) that the data points are scattered sporadically indicating a weak linear trend.

Table 35a: Correlation test for the relationship between the percentage of female professors and female PhD students for UNI1 (including the department of Statistics).

Correlation Matrix for UNI1 (incl. STA)		
	%Prof	*%PhD*
%Prof	1	
%PhD	-0,2758909	1

Figure 38a: Scatter plot showing the correlation between the percentage of female professors and female PhD students for UNI1 (including the department of Statistics).

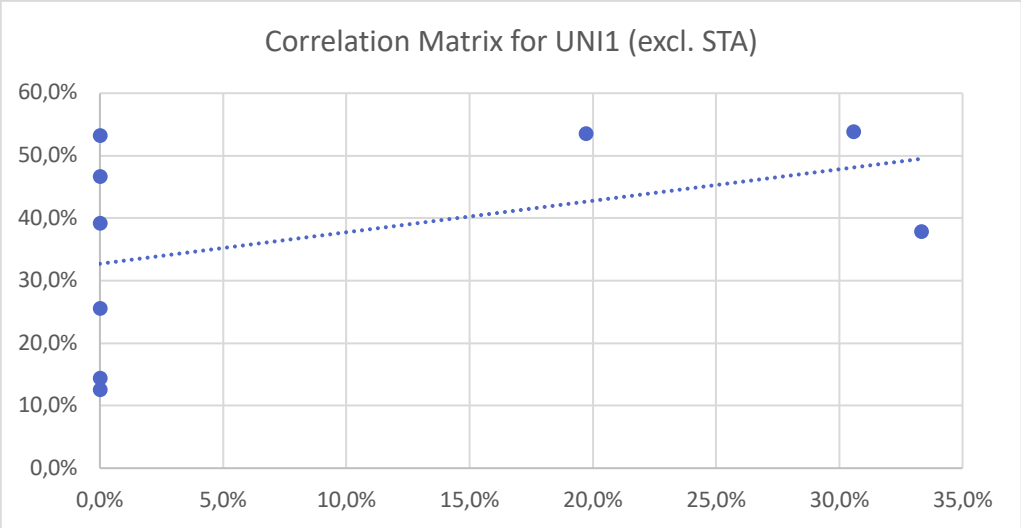


When STA is removed from the dataset the correlation between the percentage of female professors and female PhD students becomes positive and can be interpreted as a weak to moderate relationship (Table 35b). It can be seen in the graph (Figure 38b) where the data points are still scattered widely around the trend line but follow slightly more of a linear trend than in Figure 38a.

Table 35b: Correlation test for the relationship between the percentage of female professors and female PhD students for UNI1 (excluding the department of Statistics).

Correlation Matrix for UNI1 (excl. STA)		
	%Prof	*%PhD*
%Prof	1	
%PhD	0,44151063	1

Figure 38b: Scatter plot showing the correlation between the percentage of female professors and female PhD students for UNI1 (excluding the department of Statistics).

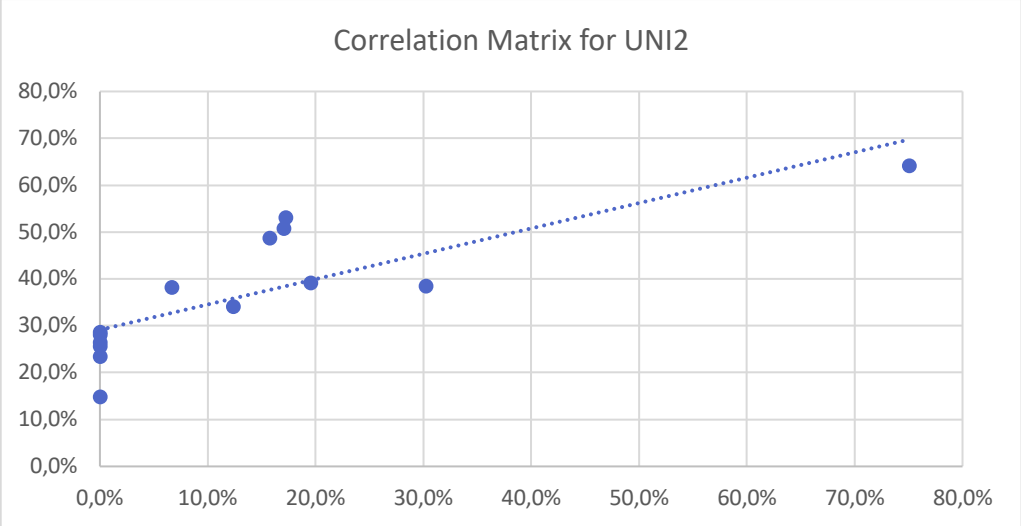


The correlation test for UNI2 shows a much stronger correlation (0.8) between female professors and female PhD students (Table 36). The scatter plot (Figure 39) shows a positive linear trend with data points within close proximity to the trend line.

Table 36: Correlation test for the relationship between the percentage of female professors and female PhD students for UNI2.

Correlation Matrix for UNI2		
	%Prof	*%PhD*
%Prof	1	
%PhD	0,80142746	1

Figure 39: Scatter plot showing the correlation between the percentage of female professors and female PhD students for UNI2.

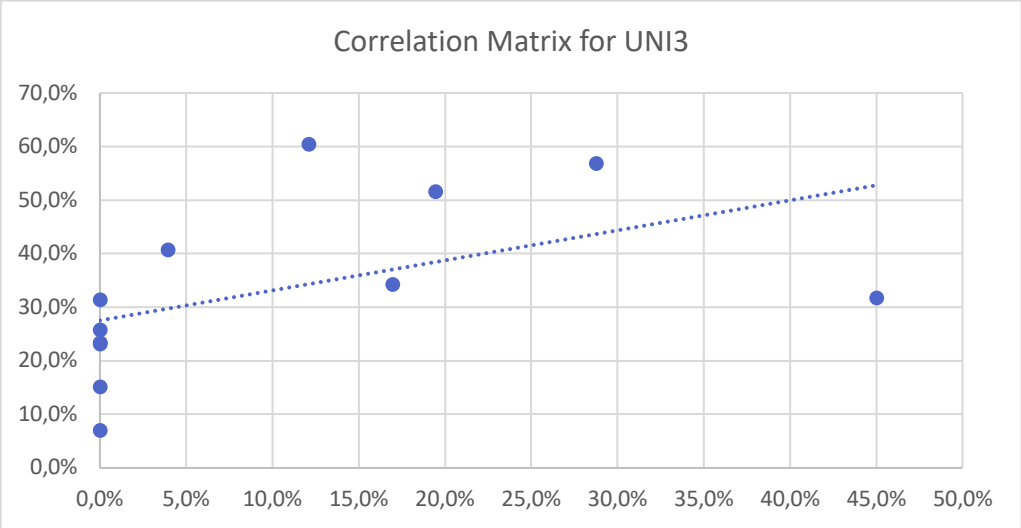


UNI3 shows similar results to UNI1 exhibiting a positive relationship between female professors and PhD students, however this relationship is moderate with the correlation just below 0.5 (Table 37). The scatter plot shows the data points in a positive trend but the data points are often quite divergent from the trend line (Figure 40).

Table 37: Correlation test for the relationship between the percentage of female professors and female PhD students for UNI3.

Correlation Matrix for UNI3		
	%Prof	*%PhD*
%Prof	1	
%PhD	0,49939624	1

Figure 40: Scatter plot showing the correlation between the percentage of female professors and female PhD students for UNI3.

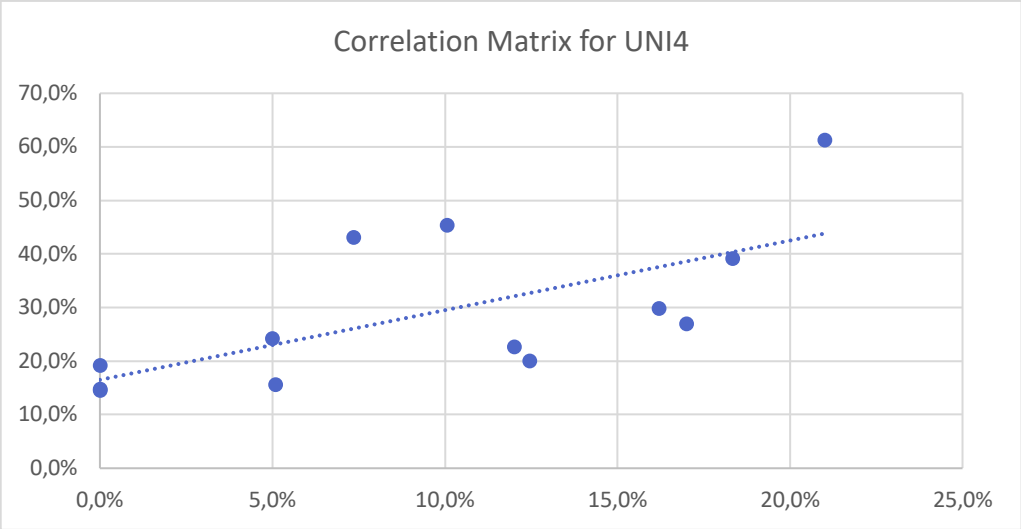


Looking at the correlation test for UNI4 in Table 38, there is a relatively strong relationship between female professors and female PhD students with a correlation > 0.6. Figure 41 shows the data points in an upward trend in fairly close proximity to the trend line.

Table 38: Correlation test for the relationship between the percentage of female professors and female PhD students for UNI4.

Correlation Matrix for UNI4		
	%Prof	*%PhD*
%Prof	1	
%PhD	0,66609602	1

Figure 41: Scatter plot showing the correlation between the percentage of female professors and female PhD students for UNI4.



The correlation tests for UNI2 and UNI4 depict positive and significant relationships between the percentage of female professors and the percentage of female PhD students within the departments under Science, Commerce and Engineering. On the other hand, UNI1 and UNI3 show positive but insignificant relationships between these two variables. It is interesting considering that UNI2 and UNI4 are large universities whereas UNI1 and UNI3 are relatively small. A much larger sample would be needed to test whether the size of the university plays to the role model theory as in Hale and Regev (2014)[13]. Overall their findings depicted a positive and statistically significant correlation between the proportion of female faculty and the proportion of female students within the top 10 PhD programs in economics. However when adding the department size in their regression they their results to not be significant. Noted, the results are correlations and do not provide evidence of causation, however they may suggest that the importance of female role models is greater than the student survey suggested. Alternatively, it is possible that females are more dominant in some subjects at both the student and senior academic levels for some other reason. Further investigation is needed.

4.4 Conclusion to chapter 4

While national data for female enrolments in South African HEIs is high, there are clear and significant drop offs at the Masters and Doctoral levels. This is particularly evident in the STEM-based fields

[13] See Chapter 2, Section 2.5.3.

nationally and within the four analysed universities. Even though Economics has low female representation at the higher levels of academic study, the numbers are still higher than in the US.

Female representation of academic staff on a national level show that females dominate the lower academic ranks while males dominate the higher ranks of Senior Lecturers, Associate Professors and Professors. However, within the analysed departments that are categorised under STEM, males tend to dominate all academic ranks in most departments.

Furthermore, female Economics students do not seem to attach great importance to female role models, but correlation tests find that there may be a significant relationship between the percentage of female Professors and the percentage of female PhD students.

Chapter 5: Conclusion

5.1 Summary of the findings

Male and female enrolments in South African HEIs have grown between 2007 and 2017, but females have grown at a faster rate, thus increasing the female share of total enrolments. Female students have a higher pass rate and so make up an even greater proportion of graduates. The proportion of female enrolments and graduates in South Africa is greater than in the US and OECD, but similar patterns are presented when looking at US statistics regarding progression through academic levels. Notably, a significant drop off is observed in female representation when progressing from undergraduate to postgraduate studies. However, in South Africa, this decline applies only at the Masters and Doctoral levels, and females make up the majority share of not only undergraduates but Honours students as well. Moreover, it is evident that across South Africa, there have been gradual increases in the share of female enrolments at all qualification levels, which is a positive indication of development towards eventual gender equality at higher levels of academic study.

When looking at Economics in comparison to the broad CESM categories, female enrolments in Bachelor degrees is significantly lower than Business and Humanities, but relatively on par with STEM. At the Doctoral level, there are sharp drop offs in female enrolments for all categories. Business and Economics are the laggards at the Doctoral level, below that of STEM and Humanities. At a national level, and at all qualification levels for 1st order CESM categories, economics has a smaller share of female students than the physical sciences, life sciences and business, but is better than computer and information sciences, engineering, and mathematics and statistics.

Of the four analysed universities, female enrolments in Commerce and Science at the undergraduate level are similar, while Engineering is significantly lower. At the honours level there are clear differences in female representation across universities, departments under the three faculties, and years. The annual statistics are sporadic in nature and do not seem to follow any specific trend. In general, though, Information Systems, Mathematics, Statistics, Computer Science and Physics have much lower female representation than Economics. The results are very similar in relative terms at the Masters and Doctorate levels, but female representation is significantly lower at these two levels in comparison to Honours. This drop off is reflected across all departments, but Economics and Information Systems experience the most significant drop offs at the Doctoral level.

Considering female students make up the majority share of the lower levels of academic study and males the majority of the higher levels of academic study, there is a similar presentation when looking at academic staff members in South African HEIs. Nationally, females make up the majority share of administrative staff, while males make up the majority of academic staff and senior management. Represented in the national data for academic staff per ranking, females occupy the majority of Below Junior Lecturer, Junior Lecturer, and Lecturer positions. Males on the other hand are overrepresented in the positions of Senior Lecturer, Associate Professor, and Professor. This male advantage at the higher ranks can only partly be explained by gender differentials in higher qualifications.

The South African pattern is similar to that revealed in the international literature where female academic staff dominate the lower ranks, nationally, even in the traditionally male-dominated fields. But when looking at the four analysed South African universities, it can be seen that males dominate all ranks within most departments under the faculties of Science, Engineering and Commerce. Furthermore, there are clear drop offs as one moves up the academic ranks, within all departments. Out of all of the analysed departments under these faculties, Economics has the highest average share of female professors, but this is only 30.4 percent. At the same time, this percentage is still higher than in the US.

International publications have suggested that the lower proportion of senior female academics may be an issue, both in terms of equality and efficiency (a minority of male undergraduates producing the majority of senior academics), but also the consequential lack of female role models for female students.

The idea that a lack of female role models is a significant contributor to low female students in male-dominated fields, especially Economics, was expressed in the academic staff survey. However, the student surveys revealed that role models (male or female) had little to no influence on students' decisions to pursue Economics. There are two possible reasons for this response. Firstly, it may be that those female students who are influenced by female role models decided to pursue a subject other than Economics which had a higher representation of senior female staff. Alternatively, it may be that the influence of female role models on female students may be subliminal and so is not reflected in student answers to the survey.

With the latter reason in mind, a correlation matrix was also performed to test whether there is a correlation between the percentage of female professors and the percentage of female PhD students at each of the four universities across the Science, Commerce and Engineering subjects investigated. Some evidence of positive correlations was found and while this does not prove that a higher

proportion of female professors causes a higher proportion of female PhD students it does provide food for thought and highlights the need for further investigation.

5.2 Future research

Most of the results in this study were for only 4 South African universities and the sample sizes in the student and staff surveys were relatively small. Further studies are needed to test for gender bias at all South African universities and in faculties other than Science, Commerce and Engineering. Comparisons of outcomes between large and small and historically-advantaged and historically-disadvantaged HEIs as well as research-intensive and more teaching focused institutions should provide interesting results.

Larger student and staff surveys are needed to test more accurately for both student and staff responses. In particular, the surveys should embrace faculties other than STEM to account for the fact that gender bias or lack of role models may be forcing those females for whom this is especially important into other areas of study, which cannot be captured in surveys of only those who have continued with Economics and other STEM subjects. The student surveys in particular could also provide interesting findings if the samples were broadened to include multiple universities. This would allow for a broader perspective on student experiences and opinions as economics students.

Finally, it should be noted that the high proportion of females in South African higher education occurs against a backdrop of a weak national secondary education system. High female enrolments are not so much the result of the successes of higher education in encouraging female enrolment, but rather the exceptionally high drop out and failure of males in secondary schooling.

While it is clear that Economics in South Africa is more attractive to females than the international literature suggested, the high drop off at especially PhD level is concerning. Yet the performance of different universities in this regard is uneven. Reasons for this need further investigation and measures to rectify the problem need to be implemented.

References

AIGNER, D. J. and CAIN, G. G. (1977). Statistical Theories of Discrimination in Labor Markets. *ILR Review*. 30(2): 175-187.

ALLGOOD, S., BADGETT, L., BAYER, A., BERTRAND, M., BLACK, S. E., BLOOM, N. and COOK, L. D. (2019). *AEA Professional Climate Survey: Final Report*. [Online]. American Economic Association. Available: https://www.aeaweb.org/resources/member-docs/final-climate-survey-results-sept-2019. [Accessed 1 October 2019].

ARROW, K. J. (1971). *The Theory of Discrimination*. Working Paper No. 30A. Conference on Discrimination in Labour Markets, Oct. 1971. Princeton University.

AVILOVA, T. and GOLDIN, C. (2018). *What can UWE do for Economics?*: NBER Working Paper 24189. National Bureau of Economic Research Working Paper Series: Cambridge Massachusetts, Unites States.

BAYER, A. and ROUSE, C.E. (2016). Diversity in the Economics Profession: A New Attack on an Old Problem. *Journal of Economic Perspectives*. 30(4): 221-242.

BECKER, G. S. (1957). *The Economics of Discrimination*. Chicago: The University of Chicago Press.

BETTINGER, E. P. and LONG, B. T. (2005). Do Faculty Serve as Role Models? The Impact of Instructor Gender on Female Students. *American Economic Review: Papers and Proceedings*. 95(2): 152-157.

BORDALO, P., COFFMAN, K., GENNAIOLI, N and SHLEIFER, A. (2016). Stereotypes. *The Quarterly Journal of Economics*. 1753-1794.

BREEDE, D., JULIAN, T., LANGDON, D., MCKITTRICK, G., KHAN, B. and DOMS, M. (2011). *Women in STEM: A Gender Gap to Innovation*. U.S. Department of Commerce: Economics and Statistics Administration. Available: http://www.esa.doc.gov/sites/default/files/womeninstemagaptoinnovation8311.pdf. [Accessed 3 March 2018].

BROWN, C. and CORCORAN, M. (1997). Sex-Based Differences in School Content and the Male-Female Wage Gap. *Journal of Labour Economics*. 15(3): 431-465.

CASALE, D and POSEL, D. (2005). Women and the Economy: how far have we come? *Agenda*. 19(64): 21-29.

CASALE, D. and POSEL, D. (2002). The Continued Feminisation of the Labour Force in South Africa: An Analysis of Recent Data and Trends. *The South African Journal of Economics*. 70(1): 156-184.

CASTAGNETT, C. and ROSTI, L. (2013). Unfair Tournaments: Gender Stereotyping and Wage Discrimination among Italian Graduates. *Gender and Society*. 27(5): 630-658.

CECI, S. J., GINTHER, D. K., KAHN, S. and WILLIAMS, W. M. (2014). Women in Academic Science: A Changing Landscape. *Psychological Science in the Public Interest*. 15(3): 75-141.

CHARI, A. and GOLDSMITH-PINKHAM, P. (2017). *Gender Representation in Economics across Topics and Time: Evidence from the NBER Summer Institute*. NBER Working Paper 23953. National Bureau of Economic Research Working Paper Series: Cambridge Massachusetts, Unites States.

COUNCIL ON HIGHER EDUCATION. (2014-2019). *CHE VitalStats.* CHE. Available: https://www.usaf.ac.za/?s=CHE+VitalStats. [Accessed 5 March 2019].

CSWEP. (2018). Report of the Committee on the Status of Women in the Economics Profession (CSWEP). *American Economic Review: Papers and Proceedings*. 108: 704-721.

DEPARTMENT OF HIGHER EDUCATION AND TRAINING. (2007-2017). *HEMIS Resources.* DHET. Available: http://www.dhet.gov.za/SitePages/UniversityEducation.aspx. [Accessed 1 June 2019].

DYNAN, K. E. and ROUSE, C. E. (1997). The Underrepresentation of Women in Economics: A Study of Undergraduate Economics Students. *The Journal of Economic Education*. 28(4): 350-368.

ENCA.COM. (2013). *10 stories that made headlines in 2013*. ENCA. Available: https://www.enca.com/south-africa/10-stories-made-headlines-2013. [Accessed 20 November 2019].

FOURCADE, M., OLLION, E. and ALGAN, Y. (2015). The Superiority of Economists. *Journal of Economic Perspectives*. 29(1): 89-114.

GINTHER, D. (2004). Why Women Earn Less: Economic Explanations for the Gender Salary Gap in Science. *AWIS Magazine*. 33(1).

GINTHER, D. K. and KAHN, S. (2004). Women in Economics: Moving Up of Falling Off the Academic Career Ladder? *Journal of Economic Perspectives*. 18(3): 193-214.

GINTHER, D. K. and KAHN, S. (2006). *Does Science Promote Women? Evidence from Academia 1973-2001*. NBER Working Paper No. 12691. Cambridge.

GÓMEZ, P. (2018). *5 Reasons Why Economics Deserves STEM Recognition*. American Institute for Economic Research. [Online]. Available: https://www.aier.org/article/5-reasons-why-economics-deserves-stem-recognition. [Accessed 19 June 2019].

GRIFFITH, A. L. (2014). Faculty Gender in the College Classroom: Does it Matter for Achievement and Major Choice? *Southern Economic Journal*. 81(1): 211-231.

GURYAN, J. and CHARLES, K. K. (2013). Taste-Based or Statistical Discrimination: The Economics of Discrimination Returns to its Roots. *The Economic Journal*. 123(572): F417-F432.

HALE, G. and REGEV, T. (2014). Gender ratios at top PhD programs in economics. *Economics of Education Review*. 41: 55-70.

HAYS, N. and MORROW, K. (2013). *Gender Discrimination in the Workforce*. Unpublished senior thesis. California, Department of Social Sciences: California Polytechnic State University, San Luis Obispo.

HECKMAN, J. J. (1998). Detecting Discrimination. *Journal of Economic Perspectives*. 12(2): 101-116.

JAKOBSSON, N. (2012). Gender and Confidence: Are Women Underconfident? *Applied Economics Letters*. 19(11): 1057-1059.

JURAJDA, Š. (2005). Gender Segregation and Wage Gap: An East-West Comparison. *Journal of the European Economic Association*. 3(2/3): 598-607.

KAAS, L. and MANGER, C. (2011). Ethnic Discrimination in Germany's Labour Market: A Field Experiment. *German Economic Review*. 13(1): 1-20.

KAHN, L. M. (2014). New Evidence on Gender and the Labour Market: A Symposium. *ILR Review*. 67(2): 283-286.

KASSENBÖHMER, S. and SINNING, M. (2010). *Distributional Changes in the Gender Wage Gap*. IZA Discussion Paper No. 5303. Forschungsinstitut zur Zukunft der Arbeit (Institute for the Study of Labor) Discussion Paper Series: Germany.

KULTUREL-KONAK, S., D'ALLEGRO, M. L. and DICKINSON, S. (2011). Review of Gender Differences in Learning Styles: Suggestions for STEM Education. *Contemporary Issues in Education Research*. 4(3): 9-18.

LORETTO, W., DUNCAN, C. and WHITE, P.J. (2000). Ageism and employment: controversies, ambiguities and younger people's perceptions. *Ageing and Society*. 20: 279-302.

LUKKEZEN, J. (2018). Being a good sport. *Economisch Statistische Berichten Dossier: Women in Economics*. 103(4767S): 4-5.

LUNDBERG, S. and STEARNS, J. (2019). Women in Economics: Stalled Progress. *Journal of Economic Perspectives*. 33(1): 3-22.

MAY, A. M., MCGARVEY, M. G. and WHALPES, R. (2014). Are Disagreements Between Male and Female Economists Marginal at Best?: A Survey of AEA Members and Their Views on Economics and Economic Policy. *Contemporary Economic Policy*. 32(1): 111-132.

MCDOWELL, J. M., SINGELL, L. D., JR and ZILIAK, J. P. (1999). Cracks in the Glass Ceiling: Gender and Promotion in the Economics Profession. *The American Economic Review*. 89(2): 392-396.

MIXON, F. G. and TREVIÑO, L. J. (2005). Is there gender discrimination in named professorships? An econometric analysis of economics departments in the US South. *Applied Economics*. 37: 849-854.

MOSOMI, J. (2019). An empirical analysis of trends in female labour force participation and the gender wage gap in South Africa. *Agenda*. 33(4): 29-43.

MOSOMI, J. N. (2018). *Distributional Changes in the Gender Wage Gap in the Post-Apartheid South African Labour Market*. Unpublished senior thesis. South Africa, Department of Philosophy, in the School of Economics: Cape Town University, Cape Town.

NELSON, J. A. (2016). Male is a Gender, Too: A Review of *Why Gender Matters in Economics* by Mukesh Eswaran. *Journal of Economic Literature*. 54(4): 1362-1376.

NORDIN, B. (2019). *The gender wage gap and education*. Unpublished thesis. Oregon, Department of Science: Oregon State University.

NUSSBAUM, M. C. (2003). Capabilities as Fundamental Entitlements: Sen and Social Justice. *Feminist Economics*. 9(2-3): 33-59.

PETZER, B. (2013). *The year in headlines: top ten South African news stories of 2013*. The South African. [Online]. Available: https://www.thesouthafrican.com/news/the-year-in-headlines-top-ten-south-african-news-stories-of-2013/. [Accessed 20 November 2019].

RIACH, P. A. and RICH, J. (1991). Testing for Racial Discrimination in the Labour Market. *Cambridge Journal of Economics*. 15(3): 239-256.

RIMER, S. (2005). *At Harvard, the Bigger Concern of the Faculty Is the President's Management Style.* The New York Times. [Online]. Available: http://www.morassociates.com/itlp/itlp-readings/2005Jan26NYTimesSummers.pdf. [Accessed: 10 April 2018].

SOUTH AFRICA. (2018). VitalStats: Public Higher Education, 2016. *Council on Higher Education*. Available: http://www.che.ac.za/media_and_publications/monitoring-and-evaluation/vitalstats-public-higher-education-2016. [Accessed 30 July 2018].

STATISTICS SOUTH AFRICA. (2018). *How do women fare in the South African labour market?* StatsSA. [Online]. Available: http://www.statssa.gov.za/?p=11375. [Accessed: 2 November 2019].

SZWAJKOWSKI, E. and LARWOOD, L. (1991). Rational decision processes and sex discrimination: testing 'rational' bias theory. *Journal of Organisational Behavior*. 12(6): 507-527.

TAYLOR, P. and WALKER, A. (2003). Age Discrimination in the Labour Market and Policy Responses: The Situation in the United Kingdom. *The Geneva Papers on Risk and Insurance*. 28(4): 612-624.

TEUNISSEN, S. and HOGENDOORN, C. (2018). Too few women in the economics debate. *Economisch Statistische Berichten Dossier: Women in Economics*. 103(4767S): 6-9.

THE ECONOMIST. (2017). *Inefficient Equilibrium: Women and Economics*. The Economist. [Online]. Available: https://www.economist.com/christmas-specials/2017/12/19/women-and-economics. [Accessed: 9 April 2018].

VAN BROEKHUIZEN, H. and SPAULL, N. (2017). *The 'Martha Effect': The compounding female advantage in South African higher education*. Stellenbosch Economic Working Papers: WP14/2017. Department of Economics: University of Stellenbosch. South Africa.

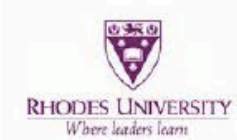
VAN DALEN, H. (2018). Invisible Barriers to the Top of Female Economists. *Economisch Statistische Berichten Dossier: Women in Economics*. 103(4767S): 11-15.

WU, A. H. (2017). *Gender Stereotyping in Academia: Evidence from Economics Job Market Rumors Forum*. Unpublished senior thesis. California, Department of Economics: Berkeley, University of California.

ZAFAR, B. (2013). College Major Choice and the Gender Gap. *The Journal of Human Resources*. 48(3): 545-595.

Appendices

Appendix A1



Human Ethics subcommittee
Rhodes University Ethical Standards Committee
PO Box 94, Grahamstown, 6140, South Africa
t: +27 (0) 46 603 8056
f: +27 (0) 46 603 8822
e: ethics-committee@ru.ac.za

www.ru.ac.za/research/research/ethics
NHREC Registration no. REC-241114-045

25 September 2019

Siobhan Hitchcock

Review Reference: 2019-0696-911

Email: g14H1039@campus.ru.ac.za

Dear siobhan hitchcock

Re: Gender Bias in the Field of Economics: An Analysis of South African Academia

Principal Investigator: Prof. Gavin Keeton

Collaborators: Ms. Siobhan Hitchcock

This letter confirms that the above research proposal has been reviewed and **APPROVED** by the Rhodes University Ethical Standards Committee (RUESC) – Human Ethics (HE) sub-committee.

Approval has been granted for 1 year. An annual progress report will be required in order to renew approval for an additional period. You will receive an email notifying when the annual report is due.

Please ensure that the ethical standards committee is notified should any substantive change(s) be made, for whatever reason, during the research process. This includes changes in investigators. Please also ensure that a brief report is submitted to the ethics committee on completion of the research. The purpose of this report is to indicate whether the research was conducted successfully, if any aspects could not be completed, or if any problems arose that the ethical standards committee should be aware of. If a thesis or dissertation arising from this research is submitted to the library's electronic theses and dissertations (ETD) repository, please notify the committee of the date of submission and/or any reference or cataloging number allocated.

Sincerely

Prof Joanna Dames

Chair: Human Ethics sub-committee, RUESC- HE

Appendix B1

Enrolments in Higher Education	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Total Enrolments											
Males	338549	348814	359580	380353	395116	398368	409988	404365	410523	408697	430065
Females	422535	450651	478175	512570	542997	554840	573698	564784	574677	567119	606898
Total	761090	799490	837779	892943	938200	953373	983698	969154	985212	975837	1036984
%Females	**55,5%**	**56,4%**	**57,1%**	**57,4%**	**57,9%**	**58,2%**	**58,3%**	**58,3%**	**58,3%**	**58,1%**	**58,5%**

Appendix B2

Graduates	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Males	51768	53915	56758	60429	63669	66042	70844	72746	75117	78764	81241
Females	74862	79316	88014	93224	96952	99943	109979	112627	116405	124302	129681
Total	126630	133231	144772	153653	160624	165993	180823	185373	191524	203076	210931
%Males	40,9%	40,5%	39,2%	39,3%	39,6%	39,8%	39,2%	39,2%	39,2%	38,8%	38,5%
%Females	**59,1%**	**59,5%**	**60,8%**	**60,7%**	**60,4%**	**60,2%**	**60,8%**	**60,8%**	**60,8%**	**61,2%**	**61,5%**

Appendix B3

Enrolments in Undergraduate Studies	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Males	277333	284612	292480	308726	320613	324262	331797	327631	330002	329672	347316
Females	347665	368788	391983	419698	445989	457387	469155	463266	468228	461222	493850
%Females	**55,6%**	**56,4%**	**57,3%**	**57,6%**	**58,2%**	**58,5%**	**58,6%**	**58,6%**	**58,7%**	**58,3%**	**58,7%**
Enrolments in Postgraduate Honours Studies											
Males	23125	25132	27470	29561	31463	31324	33530	31151	31056	32010	33852
Females	36050	41766	46971	50687	54748	54090	57762	53790	53447	54301	58768
%Females	**60,9%**	**62,4%**	**63,1%**	**63,2%**	**63,5%**	**63,3%**	**63,3%**	**63,3%**	**63,2%**	**62,9%**	**63,5%**
Enrolments in Postgraduate Masters Studies											
Males	22077	22278	23182	24309	25207	25488	26479	26941	27467	27704	28023
Females	19099	19432	20537	22288	23284	24071	25738	26733	28077	29584	31127
%Females	**46,4%**	**46,6%**	**47,0%**	**47,8%**	**48,0%**	**48,6%**	**49,3%**	**49,8%**	**50,5%**	**51,6%**	**52,6%**
Enrolments in Postgraduate Doctoral Studies											
Males	5803	5726	6041	6757	7535	7848	9025	10055	10862	11963	12412
Females	4249	4266	4486	4944	5747	6113	7011	7885	8649	9573	10159
%Females	**42,3%**	**42,7%**	**42,6%**	**42,3%**	**43,3%**	**43,8%**	**43,7%**	**44,0%**	**44,3%**	**44,5%**	**45,0%**

Appendix B4

Percentage of female enrolments at the undergraduate level according to 2nd order CESM categories; 2013 & 2017.

2ND ORDER CESM CATEGORY	2013 %Female	2017 %Female
BUSINESS, ECONOMICS AND MANAGEMENT STUDIES	**55,7%**	**55,3%**
Business Administration, Management And Operations	54,9%	54,2%
Accounting And Related Services	56,9%	56,8%
Business/Corporate Communications	70,9%	61,6%
Economics	49,9%	50,5%
Entrepreneurial And Small Business Operations	53,6%	47,4%
Finance And Financial Management Services	52,3%	47,7%
Hospitality Administration/Management	66,8%	66,4%
Human Resource Management And Services	67,7%	68,1%
International Business	51,1%	45,3%
Management Sciences And Quantitative Methods	44,1%	39,7%
Marketing	57,5%	57,3%
Real Estate	24,7%	36,0%
Taxation	53,7%	54,2%
Insurance	52,2%	52,0%
General Sales, Merchandising And Related Marketing Operations	51,6%	71,4%
Specialised Sales, Merchandising And Marketing Operations	56,8%	58,7%
Parks, Recreation And Leisure Facilities Management	47,1%	56,3%
Business, Economics And Management Studies, Other	54,2%	54,1%

Appendix C1

The percentage of female students enrolled in Honours studies under each department at each university; 2013-2019.

*Note: Where there are blank spaces, this means that the data was not provided, and a '-' means that, that particular course was not offered.

**Descriptions of abbreviations can be found in the glossary on page ix.

POSTGRADUATE STUDENT DATA AT HONOURS LEVEL					
		UNI1	UNI2	UNI3	UNI4
2013	ECO	53.7%	41.5%		52.4%
	IS	33.3%	28.1%		52.4%
	CE	-	-		-
	EE	-	-		-
	ME	-	42.9%		-
	IE	-	-		-
	CHE	-	-		-
	BMC	30.8%	63.2%		72.7%
	BZE	54.8%	65.4%		60.0%
	CM	52.6%	77.8%		64.7%
	EGG	59.0%	41.4%		70.4%
	MAT	56.3%	33.3%		39.5%
	STA	54.5%	33.3%		47.4%
	CS	28.6%	20.0%		13.9%
	PHY	12.5%	40.0%		16.7%
2014	ECO	45.7%	44.9%	43.4%	46.0%
	IS	39.4%	32.9%	-	41.4%
	CE	-	-	10%	-
	EE	-	0%	-	-
	ME	-	66.7%	54.5%	-
	IE	-	-	33.3%	-
	CHE	-	-	-	-
	BMC	75.0%	47.6%	65.4%	67.6%
	BZE	55.6%	53.9%	76.9%	72.7%
	CM	55.6%	61.1%	38.1%	47.8%
	EGG	61.9%	72.0%	24.0%	59.8%
	MAT	37.5%	33.3%	35.3%	41.3%

	STA	42.9%	0.0%	41.8%	50.0%
	CS	28.6%	20.0%	-	16.7%
	PHY	37.1%	20.0%	18.2%	33.3%
	ECO	39.3%	40.9%	42.9%	45.5%
	IS	42.4%	20.3%	-	42.9%
	CE	-	-	28.6%	-
	EE	-	0.0%	-	-
	ME	-	60.0%	13.3%	-
	IE	-	-	25.0%	-
	CHE	-	-	-	-
2015	BMC	58.3%	47.4%	52.4%	62.1%
	BZE	45.0%	54.6%	84.2%	81.4%
	CM	37.5%	56.3%	55.6%	21.1%
	EGG	58.1%	68.6%	25.9%	67.9%
	MAT	46.2%	18.2%	58.3%	45.5%
	STA	60.0%	50.0%	50.6%	60.0%
	CS	20.0%	19.6%	0.0%	25.5%
	PHY	25.0%	22.2%	33.3%	12.5%
	ECO	50.0%	39.6%	47.2%	47.2%
	IS	25.0%	32.9%	-	45.8%
	CE	-	-	28.6%	-
	EE	-	18.2%	-	-
	ME	-	42.9%	9.1%	-
	IE	-	-	-	-
	CHE	-	-	-	-
2016	BMC	50.0%	69.2%	59.5%	70.4%
	BZE	42.9%	62.1%	68.4%	78.4%
	CM	55.6%	69.2%	50.0%	65.4%
	EGG	50.0%	71.4%	41.7%	63.0%
	MAT	21.4%	26.3%	25.0%	32.1%
	STA	72.0%	0.0%	40.3%	31.3%
	CS	19.4%	5.9%	7.4%	28.3%
	PHY	36.4%	33.3%	22.2%	26.7%
	ECO	59.0%	42.6%	39.6%	45.7%
2017	IS	45.2%	34.3%	-	34.5%
	CE	-	-	26.7%	-

	EE	-	15.4	-	33.3%
	ME	-	50%	26.9%	30.8%
	IE	-	-	-	44.0%
	CHE	-	-	-	45.5%
	BMC	63.6%	70.8%	71.4%	78.3%
	BZE	73.3%	84.9%	56.3%	67.9%
	CM	31.3%	42.9%	39.1%	70.8%
	EGG	60.4%	56.0%	44.4%	62.9%
	MAT	46.7%	30.8%	26.7%	27.9%
	STA	62.5%	57.1%	45.8%	30.0%
	CS	24.0%	24.1%	10.7%	20.4%
	PHY	25.8%	38.5%	35.7%	28.6%
	ECO	45.9%	40.7%	35.6%	
	IS	38.7%	35.8%	-	
	CE	-	-	51.7%	
	EE	-	20.0%	-	
	ME	-	41.7%	25%	
	IE	-	-	-	
	CHE	-	-	-	
2018	BMC	60.0%	66.7%	70.0%	
	BZE	52.6%	75.0%	50.0%	
	CM	33.3%	70.0%	80%	
	EGG	63.4%	50.0%	54.2%	
	MAT	33.3%	13.0%	35.0%	
	STA	66.7%	50.0%	41.1%	
	CS	30.6%	17.8%	17.4%	
	PHY	35.3%	25.0%	18.2%	
	ECO	45.8%	43.4%	43.3%	
	IS	51.4%	36.1%	-	
	CE	-	-	33.3%	
	EE	-	40%	-	
2019	ME	-	50%	46.2%	
	IE	-	-	-	
	CHE	-	-	-	
	BMC	71.9%	55.6%	69.7%	
	BZE	70.0%	75.9%	84.6%	

CM	40.0%	70.0%	42.9%
EGG	63.0%	57.9%	45.5%
MAT	35.0%	20.8%	33.3%
STA	33.3%	40.0%	38.6%
CS	28.2%	10.0%	20.7%
PHY	35.3%	8.3%	45.5%

Appendix C2

Absolute numbers of student enrolments in Physics, Statistics and Computer Science; 2013-2017.

	UNI1		UNI2		UNI3	
	Female	Total	Female	Total	Female	Total
2013						
Physics	2	7	2	5	-	-
Statistics	4	8	1	3	-	-
Computer Science	0	9	9	45	-	-
2014						
Physics	1	3	1	5	2	11
Statistics	3	8	0	3	28	67
Computer Science	4	20	7	35	0	0
2015						
Physics	2	5	2	9	2	6
Statistics	2	5	1	2	39	77
Computer Science	1	12	9	46	0	13
2016						
Physics	2	4	2	6	2	9
Statistics	1	6	0	1	29	72
Computer Science	5	19	3	51	2	27
2017						
Physics	1	5	5	13	5	14
Statistics	4	6	4	7	38	83
Computer Science	2	16	13	54	3	28
2018						
Physics	2	4	2	8	2	11
Statistics	4	5	6	12	39	95
Computer Science	4	18	8	45	4	23
2019						
Physics	0	2	1	12	5	11
Statistics	3	9	4	10	34	88
Computer Science	4	19	6	60	6	29

**note: data for UNI4 was excluded in this table as postgraduate figures for UNI4 were only available from government publications where the numbers seemed unusually high but the percentages still added to 100 and therefore were only used in a statistical analysis.*

Appendix C3

The percentage of female students enrolled in Masters studies under each department at each university; 2013-2019.

*Note: Where there are blank spaces, this means that the data was not provided, and a '-' means that, that particular course was not offered.

**Descriptions of abbreviations can be found in the glossary on page ix.

POSTGRADUATE STUDENT DATA AT A MASTERS LEVEL					
		UNI1	UNI2	UNI3	UNI4
2013	ECO	47.6%	53.7%	-	36,1%
	IS	50.0%	35.3%	-	28,6%
	CE	-	32.0%	-	20,2%
	EE	-	16.8%	-	13,9%
	ME	-	18.4%	-	12,6%
	IE	-	-	-	23,6%
	CHE	-	44.1%	-	34,4%
	BMC	55,1%	56.5%	-	62,3%
	BZE	62,1%	60.4%	-	58,6%
	CM	50.0%	45.8%	-	60,6%
	EGG	37,0%	47,5%	-	56,3%
	MAT	28.6%	25.5%	-	27,3%
	STA	40.0%	19.0%	-	50,0%
	CS	11.1%	18.7%	-	28,6%
	PHY	18.2%	47.1%	-	22,9%
2014	ECO	41.0%	42.7%	38,2%	63,2%
	IS	42.9%	41.9%	-	40,0%
	CE	-	28.0%	12,9%	18,5%
	EE	-	14.8%	8,6%	13,4%
	ME	-	22.4%	13,7%	14,2%
	IE	-	-	27,3%	26,9%
	CHE	-	51.2%	-	38,5%
	BMC	60,5%	57.9%	40,0%	61,5%
	BZE	59,4%	61.3%	100,0%	54,0%
	CM	39.3%	60.9%	66,7%	46,5%
	EGG	38,1%	48,3%	40,0%	55,4%
	MAT	28.6%	23.3%	33,3%	25,0%
	STA	28.6%	17.4%	30,0%	44,4%
	CS	9.3%	18.1%	0,0%	26,5%
	PHY	25.0%	57.9%	50,0%	15,8%
2015	ECO	36.1%	48.0%	47,7%	67,1%
	IS	50.0%	41.4%	-	30,0%

	CE	-	34.4%	14,4%	27,4%
	EE	-	11.5%	9,5%	12,5%
	ME	-	27.5%	12,5%	14,2%
	IE	-	-	28,1%	27,9%
	CHE	-	44.3%	-	42,9%
	BMC	60,5%	50.0%	63,3%	59,7%
	BZE	61,4%	61.4%	52,1%	43,1%
	CM	38.7%	57.1%	52,0%	50,0%
	EGG	44,2%	58,9%	46,2%	52,3%
	MAT	33.3%	31.0%	37,3%	32,6%
	STA	0.0%	35.5%	40,0%	46,7%
	CS	14.3%	19.1%	0,0%	29,5%
	PHY	21.4%	50.0%	20,0%	18,4%
2016	ECO	42.2%	48.1%	37,7%	50,5%
	IS	50.0%	43.2%	-	44,8%
	CE	-	34.4%	22,0%	29,7%
	EE	-	14.2%	11,2%	13,2%
	ME	-	26.1%	12,6%	16,7%
	IE	-	-	32,2%	34,9%
	CHE	-	42.5%	-	36,0%
	BMC	62,5%	51.5%	56,7%	61,7%
	BZE	56,3%	66.7%	53,3%	44,4%
	CM	45.7%	42.9%	50,9%	45,6%
	EGG	41,0%	60,2%	44,0%	51,8%
	MAT	0.0%	38.7%	40,0%	27,0%
	STA	40.0%	36.8%	40,7%	55,0%
	CS	14.3%	21.1%	0,0%	30,4%
	PHY	21.4%	38.1%	33,3%	18,3%
2017	ECO	40.5%	48.4%	41,9%	39,1%
	IS	43.8%	45.6%	-	41,5%
	CE	-	35.6%	25,4%	34,7%
	EE	-	14.8%	10,0%	19,7%
	ME	-	29.7%	10,9%	16,8%
	IE	-	-	38,2%	45,5%
	CHE	-	41.5%	-	39,6%
	BMC	56,8%	56.1%	53,1%	60,7%
	BZE	51,2%	58.5%	60,0%	48,3%
	CM	43.8%	47.2%	47,9%	54,5%
	EGG	33,9%	62,5%	35,7%	49,8%
	MAT	0.0%	44.8%	38,5%	24,2%
	STA	25.0%	36.2%	33,3%	52,2%
	CS	11.3%	21.4%	0,0%	22,4%

	PHY	23.1%	27.3%	33,3%	25,5%
2018	ECO	52.4%	44.3%	41,4%	-
	IS	22.2%	40.0%	-	-
	CE	-	33.8%	28,0%	-
	EE	-	16.0%	17,5%	-
	ME	-	29.9%	12,6%	-
	IE	-	-	40,5%	-
	CHE	-	45.7%	-	-
	BMC	57,7%	63.9%	56,6%	-
	BZE	56,1%	65.4%	59,4%	-
	CM	45.7%	45.0%	38,5%	-
	EGG	36,2%	62,2%	42,3%	-
	MAT	33.3%	44.4%	36,4%	-
	STA	66.7%	33.3%	36,7%	-
	CS	11.6%	22.6%	0,0%	-
	PHY	33.3%	28.6%	18,8%	-
2019	ECO	57.5%	42.3%	42,9%	-
	IS	40.0%	44.4%	-	-
	CE	-	35.3%	28,4%	-
	EE	-	20.5%	25,3%	-
	ME	-	34.5%	11,9%	-
	IE	-	-	32,4%	-
	CHE	-	45.5%	-	-
	BMC	58,8%	65.4%	52,5%	-
	BZE	57,1%	66.1%	58,8%	-
	CM	35.5%	54.2%	53,8%	-
	EGG	35,5%	61,4%	61,9%	-
	MAT	0.0%	30.8%	43,5%	-
	STA	66.7%	31.3%	37,5%	-
	CS	6.5%	30.3%	0,0%	-
	PHY	40.0%	30.8%	17,6%	-

Appendix C4

The percentage of female students enrolled in Doctoral studies under each department at each university; 2013-2019.

*Note: Where there are blank spaces, this means that the data was not provided, and a '-' means that, that particular course was not offered.

**Descriptions of abbreviations can be found in the glossary on page ix.

POSTGRADUATE STUDENT DATA AT A DOCTORAL LEVEL

		UNI1	UNI2	UNI3	UNI4
2013	ECO	0,0%	35,0%	-	-
	IS	-	42,1%	-	-
	CE	-	26,9%	-	15,4%
	EE	-	13,0%	-	14,8%
	ME	-	33,3%	-	15,4%
	IE	-		-	
	CHE	-	39,0%	-	25,4%
	BMC	46,4%	51,2%	-	57,5%
	BZE	41,0%	51,0%	-	100,0%
	CM	51,6%	55,9%	-	42,6%
	EGG	55,0%	51,4%	-	47,4%
	MAT	12,5%	18,8%	-	40,0%
	STA	-	50,0%	-	46,7%
	CS	5,0%	21,4%	-	16,7%
	PHY	20,0%	6,5%	-	13,5%
2014	ECO	28,6%	33,0%	35,5%	23,5%
	IS	66,7%	29,6%	-	40,0%
	CE	-	24,1%	15,9%	16,7%
	EE	-	13,9%	18,4%	18,2%
	ME	-	31,6%	2,8%	20,0%
	IE	-	-	10,0%	
	CHE	-	36,1%	-	21,6%
	BMC	51,5%	53,7%	55,6%	61,2%
	BZE	57,5%	56,0%	54,8%	-
	CM	51,6%	48,1%	34,5%	40,4%
	EGG	53,8%	45,0%	11,1%	42,9%
	MAT	0,0%	30,0%	25,0%	30,6%
	STA	-	27,8%	50,0%	35,7%
	CS	10,0%	28,1%	30,0%	21,4%
	PHY	25,0%	17,1%	18,8%	13,7%
2015	ECO	37,5%	32,0%	35,5%	28,9%
	IS	57,1%	35,6%	-	22,2%
	CE	-	24,1%	15,6%	15,8%
	EE	-	17,1%	21,7%	14,6%
	ME	-	34,1%	2,8%	22,6%
	IE	-		20,5%	-
	CHE	-	39,1%	-	28,8%
	BMC	48,6%	56,8%	49,0%	66,0%
	BZE	59,0%	50,0%	55,9%	0,0%
	CM	43,2%	48,1%	37,7%	43,5%
	EGG	54,5%	55,1%	40,0%	45,5%

	MAT	12,5%	29,4%	34,6%	26,5%
	STA	-	11,8%	50,0%	46,7%
	CS	18,8%	31,3%	40,0%	21,1%
	PHY	26,7%	20,0%	23,3%	10,9%
2016	ECO	37,5%	38,2%	34,4%	35,1%
	IS	50,0%	39,3%	-	12,5%
	CE	-	34,4%	18,9%	11,8%
	EE	-	16,3%	15,2%	15,9%
	ME	-	28,6%	2,7%	23,3%
	IE	-		22,2%	-
	CHE	-	37,3%	-	25,9%
	BMC	51,1%	60,0%	54,5%	59,4%
	BZE	61,1%	51,0%	62,5%	-
	CM	42,1%	50,9%	39,1%	44,4%
	EGG	57,1%	52,5%	36,4%	45,4%
	MAT	12,5%	26,7%	37,5%	23,7%
	STA	-	13,6%	66,7%	35,7%
	CS	23,1%	26,5%	44,4%	15,8%
	PHY	25,0%	30,0%	25,0%	15,7%
2017	ECO	44,4%	44,2%	24,2%	33,3%
	IS	66,7%	35,3%	-	12,5%
	CE	-	27,8%	29,5%	14,3%
	EE	-	19,3%	11,6%	14,3%
	ME	-	32,0%	11,4%	32,1%
	IE	-		28,6%	-
	CHE	-	35,9%	-	33,3%
	BMC	54,2%	63,3%	61,1%	62,4%
	BZE	55,3%	51,5%	63,6%	-
	CM	39,5%	47,9%	41,5%	44,6%
	EGG	58,6%	53,2%	21,4%	45,3%
	MAT	25,0%	27,6%	36,4%	28,2%
	STA	-	25,0%	42,9%	30,8%
	CS	20,0%	28,6%	22,2%	20,8%
	PHY	33,3%	28,0%	26,7%	18,8%
2018	ECO	62,5%	42,9%	27,8%	-
	IS	33,3%	37,9%	-	-
	CE	-	31,0%	31,9%	-
	EE	-	13,9%	11,1%	-
	ME	-	41,7%	10,3%	-
	IE	-		28,9%	-
	CHE	-	36,7%	-	-
	BMC	61,8%	79,3%	62,3%	-

	BZE	51,3%	52,7%	62,5%	-
	CM	47,4%	38,1%	47,1%	-
	EGG	45,2%	53,6%	37,5%	-
	MAT	0,0%	32,3%	34,3%	-
	STA	-	24,0%	44,4%	-
	CS	11,1%	20,0%	0,0%	-
	PHY	23,8%	28,6%	28,6%	-
2019	ECO	54,5%	48,4%	33,3%	-
	IS	0,0%	47,1%	-	-
	CE	-	27,8%	26,7%	-
	EE	-	10,3%	12,7%	-
	ME	-	37,1%	11,8%	-
	IE	-		29,8%	-
	CHE	-	44,6%	-	-
	BMC	63,3%	84,6%	58,5%	-
	BZE	47,4%	58,6%	62,9%	-
	CM	51,2%	51,5%	44,4%	-
	EGG	50,0%	44,4%	42,1%	-
	MAT	25,0%	35,0%	37,5%	-
	STA	-	26,7%	55,6%	-
	CS	12,5%	28,6%	0,0%	-
	PHY	25,0%	33,3%	32,1%	-

Appendix D1

ECONOMICS 3 STUDENT QUESTIONNAIRE

Do you identify as: Male / Female / Other

Degree:

1. To what extent was your choice to major in Economics influenced by the following factors? Please evaluate the degree of influence of each factor using a scale of 1 to 5 where: 1 = no influence, 2 = minor influence, 3 = somewhat minor influence, 4 = somewhat major influence and 5 = major influence.
    - ☐ Interest in the subject
    - ☐ Aptitude (skill) in the subject
    - ☐ Parent/guardian
    - ☐ Lecturers
    - ☐ Potential job opportunities
    - ☐ Potential for career advancement
    - ☐ Level of compensation (pay) in this field
    - ☐ Strong female role models in the department
    - ☐ Strong male role models in the department
    - ☐ Friends
2. I chose to major in Economics because I feel that it would be a valuable skill to have
    - ☐ Strongly Agree
    - ☐ Agree
    - ☐ Neutral
    - ☐ Disagree
    - ☐ Strongly Disagree
3. I chose to major in Economics because I am good at it
    - ☐ Strongly Agree
    - ☐ Agree
    - ☐ Neutral
    - ☐ Disagree
    - ☐ Strongly Disagree
4. I chose to major in Economics because it requires less effort than my other subject options
    - ☐ Strongly Agree
    - ☐ Agree
    - ☐ Neutral
    - ☐ Disagree
    - ☐ Strongly Disagree
5. I chose to major in Economics because my friends were going to major in Economics
    - ☐ Strongly Agree
    - ☐ Agree
    - ☐ Neutral
    - ☐ Disagree
    - ☐ Strongly Disagree

6. To what extent did the following factors influence your decision to major in Economics? Please evaluate the degree of influence using a scale of 1 to 5 where: 1 = no influence, 2 = minor influence, 3 = somewhat minor influence, 4 = somewhat major influence and 5 = major influence.
    - Maths
    - Essays
    - Applications to real world scenarios
    - Graphs
    - Problem solving
    - Other: _____
7. Do you feel men and women are treated in a like manner in your courses?
    □ Always □ Often □ Sometimes □ Never
8. Were your Economics lecturers mostly people who identify as male or female?
    - Male
    - Female
9. Did this have any influence on your decision to major in Economics?
    □ No influence
    □ Minor Influence
    □ Somewhat Minor Influence
    □ Somewhat Major Influence
    □ Major Influence
10. Do you prefer to be taught by lecturers who identify as male or female?
    - Male
    - Female
    - Neutral
11. Were your Economics tutors mostly people who identify as male or female?
    - Male
    - Female
    - Not sure
12. Did this have any influence on your decision to major in Economics?
    □ No influence
    □ Minor Influence
    □ Somewhat Minor Influence
    □ Somewhat Major Influence
    □ Major Influence
13. Do you prefer to be taught by tutors who identify as male or female?
    - Male
    - Female
    - Neutral
14. Have you ever felt that your opinions were not taken seriously by other students in your Economics tutor groups?
    □ Always □ Often □ Sometimes □ Never

If you selected ‘always’, ‘often’, or ‘sometimes’ in Question 14, which do you believe is the reason this happened to you?

- Gender
- Race
- Age
- Ethnicity
- Sexual orientation
- None of the above

Appendix D2

ECONOMICS HONOURS STUDENT QUESTIONNAIRE

Do you identify as: Male / Female / Other

Degree:

1. To what extent was your choice to take Economics at the postgraduate level influenced by the following factors? Please evaluate the degree of influence of each factor using a scale of 1 to 5 where: 1 = no influence, 2 = minor influence, 3 = somewhat minor influence, 4 = somewhat major influence and 5 = major influence.
   - Interest in the subject
   - Aptitude (skill) in the subject
   - Parent/guardian
   - Lecturers
   - Potential job opportunities
   - Potential for career advancement
   - Level of compensation (pay) in this field
   - Strong female role models in the department
   - Strong male role models in the department
   - Friends
2. I chose to pursue Honours in Economics because I feel that it would be a valuable skill to have
   - Strongly Agree
   - Agree
   - Neutral
   - Disagree
   - Strongly Disagree
3. I chose to pursue Honours in Economics because I am good at it
   - Strongly Agree
   - Agree
   - Neutral
   - Disagree
   - Strongly Disagree

4. I chose to pursue Honours in Economics because it requires less effort than my other major choice
    - Strongly Agree
    - Agree
    - Neutral
    - Disagree
    - Strongly Disagree
5. I chose to pursue Honours in Economics because my friends were going to pursue Honours in Economics
    - Strongly Agree
    - Agree
    - Neutral
    - Disagree
    - Strongly Disagree
6. To what extent did the following factors influence your decision to pursue Honours in Economics? Please evaluate the degree of influence using a scale of 1 to 5 where: 1 = no influence, 2 = minor influence, 3 = somewhat minor influence, 4 = somewhat major influence and 5 = major influence.
    - Maths
    - Essays
    - Applications to real world scenarios
    - Graphs
    - Problem solving
    - Other: _____
7. Do you feel men and women are treated in a like manner in your courses?
   □ Always □ Often □ Sometimes □ Never
8. In your undergraduate years were your Economics lecturers mostly people who identify as male or female?
    - Male
    - Female
9. Did this have any influence on your decision to pursue Honours in Economics?
   □ No influence

   □ Minor Influence

   □ Somewhat Minor Influence

   □ Somewhat Major Influence

   □ Major Influence
10. Do you prefer to be taught by lecturers who identify as male or female?
    - Male
    - Female
    - Neutral
11. In your undergraduate years were your Economics tutors mostly people who identified as male or female?
    - Male
    - Female
    - Not sure

12. Did this have any influence on your decision to major in Economics?
    □ No influence

    □ Minor Influence

    □ Somewhat Minor Influence

    □ Somewhat Major Influence

    □ Major Influence

13. Have you ever felt that your opinions were not taken seriously by other students when doing group work in Economics?
    □ Always □ Often □ Sometimes □ Never

    If you selected 'always', 'often', or 'sometimes' in Question 13, which do you believe is the reason this happened to you?

    - Gender
    - Race
    - Age
    - Ethnicity
    - Sexual orientation
    - None of the above

14. Have you ever felt that your opinions were not taken as seriously as that of other students by your lecturer in Economics?
    □ Always □ Often □ Sometimes □ Never

    If you selected 'always', 'often', or 'sometimes' in Question 14, which do you believe is the reason this happened to you?

    - Gender
    - Race
    - Age
    - Ethnicity
    - Sexual orientation
    - None of the above

Appendix D3

Represented in the table is the answers given by each Economics Honours respondent, broken down by gender, to each of the listed questions.

Sample:	Do you feel men and women are treated in a like manner in your courses?	Were your Economics lecturers mostly people who identify as male or female?	Did this have any influence on your decision to major in Economics?	Do you prefer to be taught by lecturers who identify as male or female?	Were your Economics tutors mostly people who identify as male or female?	Did this have any influence on your decision to major in Economics?	Do you prefer to be taught by tutors who identify as male or female?
Female	Always	Male	No influence	Neutral	Male	No influence	Neutral
Female	Always	Male	No influence	Neutral	Don't know	No influence	Neutral
Female	Always	Female	No influence	Neutral	Female	No influence	Neutral
Female	Often	Male	No influence	Neutral	Male	No influence	Neutral
Female	Often	Male	No influence	Neutral	Female	Somewhat minor influence	Female
Female	Sometimes	Male	Minor influence	Female	Male	No influence	Neutral
Female	Never	Male	Somewhat minor influence	Female	Male	No influence	Female
Male	Always	Male	Somewhat minor influence	Male	Female	No influence	Male
Male	Often	Male	No influence	Neutral	Female	Minor influence	Female
Male	Always	Male	No influence	Neutral	Male	Somewhat minor influence	Neutral
Male	Never	Male	No influence	Female	Male	No influence	Female
Male	Always	Male	No influence	Neutral	Female	No influence	Neutral
Male	Always	Male	No influence	Neutral	Male	No influence	Female
Male	No comment	Male	No influence	Neutral	Female	No influence	Neutral
Male	Always	Male	No influence	Female	Female	No influence	Female
Prefer not to say	No comment	Male	No influence	Neutral	Male	No influence	Neutral

Appendix E1

Headcount of staff members at South African HEIs by employment rank and gender; 2007-2017

Staff Members at HEIs	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Senior Management											
Males	1155	1254	1307	1395	1459	1445	1510	1495	1579	1663	1679
Females	637	748	909	1014	1113	1125	1154	1072	1121	1332	1361
%Female	**35,5%**	**37,4%**	**41,0%**	**42,1%**	**43,3%**	**43,8%**	**43,3%**	**41,8%**	**41,5%**	**44,5%**	**44,8%**
Academic Staff											
Males	22863	22901	23363	24963	26321	26865	27397	26350	27765	27925	28121
Females	18520	18833	20081	21611	23660	24704	25171	24141	26308	27126	28405
%Female	**44,8%**	**45,1%**	**46,2%**	**46,4%**	**47,3%**	**47,9%**	**47,9%**	**47,8%**	**48,7%**	**49,3%**	**50,3%**
Administrative Staff											
Males	16242	18172	17206	19879	20795	20941	21105	22184	22468	23143	25377
Females	26571	28765	28656	32279	32879	33077	33464	34993	36120	35596	37065
%Female	**62,1%**	**61,3%**	**62,5%**	**61,9%**	**61,3%**	**61,2%**	**61,3%**	**61,2%**	**61,7%**	**60,6%**	**59,4%**

Source: **Council on Higher Education (2019: 45-54; 2018: 45-53; 2017: 45-53; 2016: 45-53; 2015: 45-53; 2014: 45-53)**

Appendix E2

Headcount of academic staff at South African HEIs and the qualification they hold, by gender; 2007-2017.

Undergraduate Diploma/Certificate	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Male	197	475	676	671	679	544	532	583	715	772	915
Female	176	495	670	649	638	600	573	563	769	812	930
%Female	**47,2%**	**51,0%**	**49,8%**	**49,2%**	**48,4%**	**52,4%**	**51,9%**	**49,1%**	**51,8%**	**51,3%**	**50,4%**
Undergraduate Degrees											
Male	785	2552	2917	3134	3084	3045	3084	2740	2567	2560	6299
Female	732	2512	2927	3191	3375	3471	3657	3212	3175	3091	8565
%Female	**48,3%**	**49,6%**	**50,1%**	**50,5%**	**52,3%**	**53,3%**	**54,3%**	**54,0%**	**55,3%**	**54,7%**	**57,6%**
Postgraduate up to Honours											
Male	1073	2308	2277	2578	2676	2720	2630	2376	2400	2420	2046
Female	1032	2326	2343	2758	2969	3217	3099	2789	2926	3016	2599
%Female	**49,0%**	**50,2%**	**50,7%**	**51,7%**	**52,6%**	**54,2%**	**54,1%**	**54,0%**	**54,9%**	**55,5%**	**56,0%**
Masters Degree											
Male	2674	4472	4716	5081	5402	5355	5673	5453	5654	5729	5882
Female	2398	3806	4226	4635	5073	5051	5361	5176	5743	5990	6250
%Female	**47,3%**	**46,0%**	**47,3%**	**47,7%**	**48,4%**	**48,5%**	**48,6%**	**48,7%**	**50,4%**	**51,1%**	**51,5%**
Doctoral Degree											
Male	3520	5349	5390	6027	6399	6555	6752	7078	7608	7799	8022
Female	1672	2652	2742	3238	3636	3857	4046	4425	5004	5256	5561
%Female	**32,2%**	**33,1%**	**33,7%**	**34,9%**	**36,2%**	**37,0%**	**37,5%**	**38,5%**	**39,7%**	**40,3%**	**40,9%**

Source: **Council on Higher Education (2019: 45-54; 2018: 45-53; 2017: 45-53; 2016: 45-53; 2015: 45-53; 2014: 45-53)**

Appendix E3

The percentage of female academic staff members per academic rank, nationally and at the top 10 South African universities.

	Professor	Associate Professor	Senior Lecturer	Lecturer	Junior Lecturer	Below Junior Lecturer
National	29,0%	41,2%	46,2%	53,4%	56,6%	64,6%
UCT	30,6%	44,6%	51,4%	57,0%	80,0%	0,0%
WITS	27,9%	42,4%	50,5%	59,2%	65,5%	0,0%
UP	31,2%	42,2%	54,1%	65,2%	45,5%	0,0%
SU	25,9%	42,2%	46,1%	61,7%	80,0%	53,7%
UJ	33,1%	43,9%	45,3%	53,1%	52,7%	0,0%
UKZN	24,3%	40,7%	34,8%	54,5%	60,0%	67,1%
RU	18,6%	37,1%	48,0%	51,3%	66,7%	0,0%
UWC	31,5%	46,1%	50,0%	58,8%	0,0%	0,0%
NWU	27,2%	33,0%	50,0%	59,4%	59,2%	0,0%
UFS	24,8%	37,5%	49,8%	58,0%	65,5%	70,6%

Source: **Department of Higher Education and Training (2017).**

Appendix F1

Percentage of females in Science, Commerce and Engineering at UNI1 by subject and academic rank.

		UNI1				
		Junior Lecturer	Lecturer	Senior Lecturer	Associate Professor	Professor
	ECO		50,0%	75,0%	33,3%	0,0%
	IS		0,0%	50,0%	0,0%	
	CE	-	-	-	-	-
	EE	-	-	-	-	-
	ME	-	-	-	-	-
	IE	-	-	-	-	-
	CHE	-	-	-	-	-
2013	BMC			83,3%	50,0%	50,0%
	BZE	50,0%	66,7%	50,0%	0,0%	0,0%
	CM	100,0%	0,0%	40,0%	0,0%	0,0%
	EGG		66,7%	0,0%	50,0%	33,3%
	MAT		0,0%	0,0%		0,0%
	STA		0,0%	50,0%	0,0%	100,0%
	CS		50,0%	50,0%	25,0%	0,0%
	PHY		33,3%	0,0%	0,0%	0,0%
	ECO		100,0%	40,0%	50,0%	33,3%
	IS		0,0%	50,0%	0,0%	
	CE	-	-	-	-	-
	EE	-	-	-	-	-
	ME	-	-	-	-	-
	IE	-	-	-	-	-
	CHE	-	-	-	-	-
2014	BMC	100,0%		80,0%	50,0%	66,7%
	BZE	0,0%	66,7%	66,7%	0,0%	0,0%
	CM	50,0%	0,0%	40,0%	0,0%	0,0%
	EGG		75,0%	0,0%	25,0%	20,0%
	MAT		0,0%	0,0%		0,0%
	STA		0,0%	66,7%	0,0%	100,0%
	CS		50,0%	50,0%	25,0%	0,0%
	PHY		25,0%	0,0%	0,0%	0,0%
2015	ECO		100,0%	40,0%	50,0%	33,3%

	IS		0,0%	50,0%	0,0%	
	CE	-	-	-	-	-
	EE	-	-	-	-	-
	ME	-	-	-	-	-
	IE	-	-	-	-	-
	CHE	-	-	-	-	-
	BMC	100,0%		60,0%	66,7%	0,0%
	BZE		75,0%	66,7%	0,0%	0,0%
	CM		0,0%	33,3%	0,0%	0,0%
	EGG		60,0%	0,0%	0,0%	25,0%
	MAT		0,0%	0,0%	0,0%	0,0%
	STA	0,0%	0,0%	66,7%	0,0%	100,0%
	CS		50,0%	50,0%	33,3%	0,0%
	PHY		25,0%		0,0%	0,0%
	ECO		60,0%	40,0%	50,0%	33,3%
	IS		0,0%	50,0%	33,3%	
	CE	-	-	-	-	-
	EE	-	-	-	-	-
	ME	-	-	-	-	-
	IE	-	-	-	-	-
	CHE	-	-	-	-	-
2016	BMC			60,0%	66,7%	0,0%
	BZE		50,0%	66,7%	50,0%	0,0%
	CM		0,0%	33,3%	0,0%	0,0%
	EGG		50,0%		0,0%	20,0%
	MAT		0,0%	0,0%	0,0%	0,0%
	STA		0,0%	66,7%	0,0%	100,0%
	CS		25,0%	0,0%	50,0%	0,0%
	PHY		33,3%	0,0%	0,0%	0,0%
	ECO		25,0%	40,0%	50,0%	50,0%
	IS		25,0%	50,0%	50,0%	
	CE	-	-	-	-	-
2017	EE	-	-	-	-	-
	ME	-	-	-	-	-
	IE	-	-	-	-	-
	CHE	-	-	-	-	-

	BMC		0,0%	50,0%	66,7%	0,0%
	BZE		100,0%	50,0%	66,7%	0,0%
	CM		0,0%	33,3%	0,0%	0,0%
	EGG		80,0%	0,0%	0,0%	20,0%
	MAT		0,0%	0,0%	0,0%	
	STA		33,3%	50,0%	50,0%	
	CS		0,0%	0,0%	33,3%	0,0%
	PHY		33,3%	0,0%	0,0%	0,0%
	ECO		50,0%	25,0%	33,3%	50,0%
	IS		40,0%	33,3%	50,0%	0,0%
	CE	-	-	-	-	-
	EE	-	-	-	-	-
	ME	-	-	-	-	-
	IE	-	-	-	-	-
	CHE	-	-	-	-	-
2018	BMC		0,0%	50,0%	75,0%	66,7%
	BZE		100,0%	0,0%	75,0%	0,0%
	CM	0,0%	0,0%	33,3%	0,0%	0,0%
	EGG	100,0%	80,0%	0,0%	0,0%	0,0%
	MAT		33,3%	0,0%	0,0%	
	STA		33,3%	50,0%	0,0%	
	CS		0,0%	0,0%	33,3%	0,0%
	PHY		33,3%	0,0%	0,0%	0,0%

**Blank spaces indicate that there were no staff in that position.*

***The dash (-) indicated that, that particular course was not offered of the data was missing.*

Appendix F2

Percentage of females in Science, Commerce and Engineering at UNI1 by subject and academic rank.

UNI2						
		Junior Lecturer	Lecturer	Senior Lecturer	Associate Professor	Professor
	ECO		60,0%	14,3%	53,8%	12,5%
	IS		0,0%	57,1%	25,0%	0,0%
	CE		50,0%	33,3%	25,0%	0,0%
	EE		60,0%	14,3%	14,3%	0,0%
	ME		0,0%	38,5%	12,5%	0,0%
	IE	-	-	-	-	-
	CHE	0,0%	50,0%	0,0%	0,0%	33,3%
2013	BMC		50,0%	60,0%	66,7%	75,0%
	BZE	100,0%	40,0%	25,0%	23,1%	11,1%
	CM		0,0%	0,0%	0,0%	14,3%
	EGG		28,6%	28,6%	40,0%	20,0%
	MAT		26,7%	38,5%	0,0%	0,0%
	STA		33,3%	33,3%	75,0%	0,0%
	CS			50,0%	50,0%	0,0%
	PHY		0,0%	0,0%	20,0%	0,0%
	ECO		75,0%	12,5%	50,0%	11,1%
	IS			50,0%	40,0%	0,0%
	CE		66,7%	20,0%	28,6%	0,0%
	EE		60,0%	28,6%	12,5%	0,0%
	ME		0,0%	35,3%	0,0%	14,3%
	IE	-	-	-	-	-
	CHE	0,0%	62,5%	16,7%	0,0%	30,0%
2014	BMC		75,0%	50,0%	66,7%	75,0%
	BZE	100,0%	40,0%	25,0%	30,8%	12,5%
	CM		0,0%	50,0%	0,0%	14,3%
	EGG		71,4%	16,7%	60,0%	20,0%
	MAT		25,0%	33,3%	0,0%	0,0%
	STA		30,0%	28,6%	75,0%	0,0%
	CS			80,0%	40,0%	0,0%
	PHY		0,0%	0,0%	25,0%	0,0%
2015	ECO		75,0%	14,3%	45,5%	18,2%

	IS			50,0%	75,0%	0,0%
	CE		66,7%	20,0%	20,0%	0,0%
	EE		42,9%	28,6%	12,5%	0,0%
	ME		20,0%	35,3%	0,0%	14,3%
	IE	-	-	-	-	-
	CHE	0,0%	57,1%	25,0%	25,0%	33,3%
	BMC		66,7%	50,0%	66,7%	75,0%
	BZE	100,0%	33,3%	28,6%	33,3%	12,5%
	CM		0,0%	50,0%	0,0%	16,7%
	EGG	100,0%	50,0%	25,0%	75,0%	16,7%
	MAT		35,7%	38,5%	0,0%	0,0%
	STA		22,2%	28,6%	75,0%	0,0%
	CS	0,0%	100,0%	60,0%	40,0%	0,0%
	PHY	0,0%	0,0%	0,0%	33,3%	0,0%
	ECO		100,0%	22,2%	25,0%	25,0%
	IS			50,0%	66,7%	16,7%
	CE		66,7%	20,0%	20,0%	0,0%
	EE		42,9%	33,3%	11,1%	0,0%
	ME		60,0%	35,3%	0,0%	16,7%
	IE	-	-	-	-	-
	CHE	0,0%	57,1%	41,7%	50,0%	27,3%
2016	BMC		66,7%	40,0%	66,7%	75,0%
	BZE	100,0%	0,0%	37,5%	33,3%	25,0%
	CM		0,0%	50,0%	0,0%	16,7%
	EGG	100,0%	55,6%	30,8%	75,0%	14,3%
	MAT		31,3%	41,7%	16,7%	0,0%
	STA		25,0%	25,0%	75,0%	0,0%
	CS			60,0%	33,3%	0,0%
	PHY		25,0%	0,0%	0,0%	0,0%
	ECO		80,0%	40,0%	37,5%	30,8%
	IS			40,0%	66,7%	16,7%
	CE		50,0%	20,0%	33,3%	0,0%
2017	EE		50,0%	20,0%	20,0%	0,0%
	ME		50,0%	38,9%	0,0%	16,7%
	IE	-	-	-	-	-
	CHE	0,0%	42,9%	40,0%	33,3%	27,3%

BMC		50,0%	40,0%	50,0%	75,0%
BZE	100,0%		37,5%	30,8%	25,0%
CM		0,0%	33,3%	0,0%	16,7%
EGG	100,0%	55,6%	36,4%	60,0%	14,3%
MAT		33,3%	40,0%	14,3%	0,0%
STA		11,1%	25,0%	60,0%	0,0%
CS		0,0%	50,0%	33,3%	0,0%
PHY	0,0%	40,0%	0,0%	0,0%	0,0%

**Blank spaces indicate that there were no staff in that position.*

***The dash (-) indicated that, that particular course was not offered of the data was missing.*

Appendix F3

Percentage of females in Science, Commerce and Engineering at UNI1 by subject and academic rank.

UNI3						
		Junior Lecturer	Lecturer	Senior Lecturer	Associate Professor	Professor
2014	ECO	100,0%	30,8%	20,0%	40,0%	20,0%
	IS	-	-	-	-	-
	CE	0,0%	30,0%	16,7%	33,3%	0,0%
	EE	0,0%	0,0%	0,0%	0,0%	0,0%
	ME		25,0%	16,7%	0,0%	0,0%
	IE		33,3%	0,0%	0,0%	0,0%
	CHE	-	-	-	-	-
	BMC	25,0%	50,0%	66,7%	100,0%	22,2%
	BZE	0,0%	100,0%	30,0%	20,0%	12,5%
	CM	0,0%	80,0%	50,0%	33,3%	0,0%
	EGG	0,0%	50,0%	66,7%		0,0%
	MAT	0,0%	33,3%	28,6%	16,7%	16,7%
	STA		33,3%	36,4%	33,3%	0,0%
	CS					
	PHY		0,0%	33,3%	0,0%	0,0%
2015	ECO	100,0%	27,3%	28,6%	40,0%	33,3%
	IS	-	-	-	-	-
	CE	0,0%	38,5%	16,7%	33,3%	0,0%
	EE	50,0%	0,0%	0,0%	0,0%	0,0%
	ME		16,7%	18,2%	0,0%	0,0%
	IE		40,0%	14,3%	0,0%	0,0%
	CHE	-	-	-	-	-
	BMC	25,0%	66,7%	50,0%	100,0%	28,6%
	BZE	0,0%	100,0%	57,1%	33,3%	14,3%
	CM	0,0%	80,0%	50,0%	40,0%	0,0%
	EGG		33,3%	66,7%		0,0%
	MAT	0,0%	36,4%	36,4%	20,0%	16,7%
	CS					
	STA		33,3%	40,0%	25,0%	0,0%
	PHY		0,0%	50,0%	0,0%	0,0%
2016	ECO	100,0%	25,0%	50,0%	25,0%	50,0%
	IS	-	-	-	-	-
	CE		50,0%	11,1%	33,3%	0,0%
	EE	50,0%	16,7%	0,0%	0,0%	0,0%
	ME		14,3%	20,0%	0,0%	0,0%
	IE		28,6%	14,3%	0,0%	0,0%

	CHE	-	-	-	-	-
	BMC	100,0%	75,0%	50,0%	100,0%	25,0%
	BZE		100,0%	50,0%	44,4%	12,5%
	CM		83,3%	42,9%	50,0%	0,0%
	EGG		33,3%	66,7%		0,0%
	MAT	0,0%	41,7%	27,3%	20,0%	16,7%
	STA		33,3%	40,0%	25,0%	0,0%
	CS					
	PHY		0,0%	50,0%	0,0%	0,0%
	ECO	100,0%	23,1%	50,0%	14,3%	66,7%
	IS	-	-	-	-	-
	CE		54,5%	0,0%	50,0%	0,0%
	EE	33,3%	25,0%	0,0%	0,0%	0,0%
	ME		14,3%	11,1%	20,0%	0,0%
	IE		28,6%	0,0%	25,0%	0,0%
	CHE	-	-	-	-	-
2017	BMC	100,0%	80,0%	33,3%	100,0%	33,3%
	BZE		100,0%	50,0%	50,0%	11,1%
	CM		80,0%	57,1%	66,7%	0,0%
	EGG		33,3%	66,7%		0,0%
	MAT	0,0%	60,0%	23,1%	25,0%	16,7%
	STA	0,0%	66,7%	36,4%	0,0%	33,3%
	CS					
	PHY		0,0%	25,0%	0,0%	0,0%
	ECO	100,0%	28,6%	50,0%	25,0%	50,0%
	IS	-	-	-	-	-
	CE		60,0%	0,0%	50,0%	0,0%
	EE		33,3%	0,0%	0,0%	0,0%
	ME	0,0%	16,7%	0,0%	28,6%	0,0%
	IE		40,0%	0,0%	20,0%	0,0%
	CHE	-	-	-	-	-
2018	BMC	100,0%	80,0%	0,0%	100,0%	33,3%
	BZE			50,0%	50,0%	11,1%
	CM		80,0%	57,1%	100,0%	11,1%
	EGG		33,3%	66,7%		0,0%
	MAT	0,0%	66,7%	16,7%	25,0%	16,7%
	STA	0,0%	33,3%	35,7%	0,0%	33,3%
	CS					
	PHY		33,3%	25,0%	0,0%	0,0%
	ECO	100,0%	28,6%	0,0%	37,5%	50,0%
2019	IS	-	-	-	-	-
	CE		60,0%	0,0%	40,0%	0,0%

	EE		33,3%	0,0%	0,0%	0,0%
	ME	0,0%	16,7%	0,0%	28,6%	0,0%
	IE		50,0%	0,0%	33,3%	0,0%
	CHE	-	-	-	-	-
	BMC	100,0%	80,0%	0,0%	75,0%	30,0%
	BZE		100,0%	50,0%	66,7%	11,1%
	CM		75,0%	71,4%	50,0%	12,5%
	EGG		33,3%	50,0%	100,0%	0,0%
	MAT	0,0%	60,0%	28,6%	25,0%	18,2%
	STA		33,3%	35,7%	0,0%	50,0%
	CS					
	PHY		33,3%	25,0%	0,0%	0,0%

**Blank spaces indicate that there were no staff in that position.*

***The dash (-) indicated that, that particular course was not offered of the data was missing.*

****CS falls under the department of MAT.*

Appendix F4

Percentage of females in Science, Commerce and Engineering at UNI1 by subject and academic rank.

UNI4						
		Junior Lecturer	Lecturer	Senior Lecturer	Associate Professor	Professor
2014	ECO	70,0%	47,1%	36,4%	21,4%	0,0%
	IS	-	-	-	-	-
	CE	100,0%	0,0%	50,0%	0,0%	0,0%
	EE	0,0%	16,7%	22,2%	0,0%	0,0%
	ME	33,3%	22,2%	12,5%	14,3%	0,0%
	IE					
	CHE	50,0%	16,7%	15,4%	100,0%	25,0%
	BMC	0,0%	83,3%	50,0%	20,0%	25,0%
	BZE	33,3%	44,4%	100,0%	50,0%	0,0%
	CM	100,0%	50,0%	53,8%	0,0%	14,3%
	EGG	66,7%	35,7%	42,9%	40,0%	18,2%
	MAT	41,7%	46,2%	25,0%	80,0%	8,3%
	CS	50,0%	33,3%	0,0%	0,0%	
	STA	50,0%	33,3%	66,7%	50,0%	0,0%
	PHY	0,0%	25,0%	10,0%	10,0%	0,0%
2015	ECO					
	IS	-	-	-	-	-
	CE	100,0%	0,0%	50,0%	0,0%	0,0%
	EE	7,7%	14,3%	12,5%	16,7%	0,0%
	ME	33,3%	25,0%	11,1%	12,5%	0,0%

	IE					
	CHE		22,2%	16,7%	50,0%	20,0%
	BMC	0,0%	80,0%	75,0%	40,0%	20,0%
	BZE	66,7%	50,0%	100,0%	50,0%	11,1%
	CM	100,0%	37,5%	63,6%	20,0%	12,5%
	EGG	60,0%	35,3%	66,7%	50,0%	15,4%
	MAT	50,0%	50,0%	50,0%	85,7%	0,0%
	CS	50,0%	33,3%	25,0%	100,0%	16,7%
	STA	33,3%	43,8%	50,0%	66,7%	0,0%
	PHY	0,0%	11,1%	22,2%	0,0%	0,0%
2016	ECO					
	IS	-	-	-	-	-
	CE		0,0%	40,0%	0,0%	0,0%
	EE	17,9%	10,5%	14,3%	18,2%	0,0%
	ME	50,0%	18,2%	14,3%	12,5%	20,0%
	IE					
	CHE		22,2%	16,7%	28,6%	20,0%
	BMC	0,0%	60,0%	100,0%	40,0%	20,0%
	BZE	66,7%	60,0%	66,7%	50,0%	11,1%
	CM	100,0%	55,6%	70,0%	28,6%	0,0%
	EGG	66,7%	33,3%	50,0%	55,6%	8,3%
	MAT	66,7%	50,0%	25,0%	85,7%	14,3%
	CS	25,0%	54,5%	25,0%	66,7%	16,7%
	STA	50,0%	47,1%	50,0%	66,7%	0,0%
	PHY	0,0%	10,0%	22,2%	0,0%	0,0%
2017	ECO					
	IS	-	-	-	-	-
	CE		40,0%	20,0%	20,0%	0,0%
	EE	0,0%	26,7%	12,5%	12,5%	14,3%
	ME	25,0%	30,8%	37,5%	12,5%	20,0%
	IE					
	CHE		44,4%	8,3%	33,3%	20,0%
	BMC	0,0%	66,7%	100,0%	40,0%	20,0%
	BZE	100,0%	55,6%	60,0%	57,1%	20,0%
	CM	100,0%	55,6%	85,7%	40,0%	0,0%
	EGG	66,7%	46,2%	45,5%	55,6%	8,3%
	MAT	33,3%	55,6%	40,0%	60,0%	25,0%
	CS	10,0%	60,0%	14,3%	100,0%	20,0%
	STA	50,0%	40,0%	66,7%	100,0%	0,0%
	PHY		0,0%	28,6%	0,0%	0,0%
2018	ECO	66,7%	48,5%	25,0%	38,5%	10,0%
	IS	-	-	-	-	-

CE		50,0%	16,7%	20,0%	0,0%
EE	0,0%	20,0%	10,0%	12,5%	11,1%
ME IE	0,0%	37,5%	37,5%	14,3%	20,0%
CHE		28,6%	12,5%	33,3%	0,0%
BMC	0,0%	100,0%	50,0%	57,1%	20,0%
BZE	100,0%	60,0%	60,0%	50,0%	20,0%
CM	50,0%	50,0%	87,5%	33,3%	10,0%
EGG	0,0%	42,9%	47,1%	55,6%	0,0%
MAT	33,3%	40,0%	33,3%	57,1%	33,3%
CS	0,0%	38,5%	28,6%	0,0%	20,0%
STA	50,0%	52,6%	50,0%	100,0%	0,0%
PHY		0,0%	30,0%	0,0%	0,0%

**Blank spaces indicate that there were no staff in that position.*

***The dash (-) indicated that, that particular course was not offered of the data was missing.*

****ME and IE are under one department.*

Appendix G1

ECONOMICS STAFF QUESTIONNAIRE

Do you identify as: Male / Female / Other

Academic Rank:

Age group: [20-39] [30-39] [40-49] [50-59] [+60]

1. **When you started working in your department did you ever feel as though certain co-workers felt uncomfortable being around you?**

□ Always □ Often □ Sometimes □ Never □ No comment

2. **Are you often interrupted by other colleagues when stating your opinion?**

□ Always □ Often □ Sometimes □ Never □ No comment

3. **Do you feel valued at your institute/place of employment?**

□ Always □ Often □ Sometimes □ Never □ No comment

4. **Do you feel included intellectually within your department?**

□ Always □ Often □ Sometimes □ Never □ No comment

5. **Have you ever felt socially excluded at a meeting or even in your field?**

□ Always □ Often □ Sometimes □ Never □ No comment

6. Have you ever felt disrespected by your economist colleagues?

□ Always □ Often □ Sometimes □ Never □ No comment

7. Have you ever felt that your work was not taken as seriously as that of your economist colleagues?

□ Always □ Often □ Sometimes □ Never □ No comment

8. Do you feel that the environment in your departmental meetings are aggressive or hostile?

□ Always □ Often □ Sometimes □ Never □ No comment

Please explain.

9. Do you feel that the economics conferences you have attended exhibit a hostile and/or belligerent culture/environment?

□ Always □ Often □ Sometimes □ Never □ No comment

Please explain.

10. Have you personally experienced discrimination or unfair treatment with regard to: (*Please select as many options that apply*)

- o Promotion decisions
- o Compensation
- o Teaching assignments
- o Access to time and funding to attend conferences and seminars
- o Publishing decisions
- o Funding decisions
- o Sabbatical time
- o N/A

11. Have you ever done any of the following to avoid possible harassment, discrimination, or unfair or disrespectful treatment:
(*Please select as many options that apply*)

- o Not applied for or taken a particular employment position
- o Not applied for or taken a promotion at your place of employment
- o Left a particular employment position
- o Not presented your question, idea, or view at your place of work
- o Not participated at a conference
- o Not spoken at a conference or during a seminar presentation
- o Not attended social events after class, at work, or at a conference
- o N/A

12. **Have you ever been called by a 'pet' name or by some unprofessional / demeaning name by your co-workers or people in your field?**

□ Yes □ No

If yes, please explain.

13. **Have you ever experienced another colleague make offensive sexual remarks, either directed at you or overheard, including jokes or sexual stories?**

□ Always □ Often □ Sometimes □ Never □ No comment

14. **Have you ever experienced another colleague make remarks about your appearance, body, or sexual activities that made you uncomfortable?**

□ Always □ Often □ Sometimes □ Never □ No comment

15. **Have you ever experienced another colleague make gestures or used body language of a sexual nature which embarrassed or offended you?**

□ Always □ Often □ Sometimes □ Never □ No comment

16. **Have you ever experienced another colleague make unwanted attempts to establish a dating, romantic, or sexual relationship with you despite your efforts to discourage it?**

□ Always □ Often □ Sometimes □ Never □ No comment

17. **Studies have shown that there is a substantial underrepresentation of women in the field of Economics. Many reasons have been theorized to explain this underrepresentation. Please select which factors you think are the most responsible for low female representation in Economics:**
    - o Women are less interested in the subject of economics.
    - o Women are unwilling or able to obtain the necessary maths skills to do well.
    - o Women tend to dislike the combative and belligerent culture prevalent within the economics profession.
    - o Lack of female role models.
    - o Women avoid the field of economics to avoid possible discrimination.
    - o Women avoid the field of economics because of possible barriers to progression and promotion.
    - o Other. Please specify.

_____

Appendix G2

Gender	Academic Rank	Do you feel valued at your institute/place of employment?
Female	Professor	Always
Female	Associate Professor	Often
Female	Associate Professor	Often
Female	Associate Professor	Often
Female	Associate Professor	Sometimes
Female	Associate Professor	Sometimes
Female	Senior Lecturer	Often
Female	Senior Lecturer	Sometimes
Female	Senior Lecturer	Sometimes
Female	Lecturer	Often
Female	Lecturer	Often
Female	Lecturer	Sometimes
Female	Lecturer	Sometimes
Female	Lecturer	Sometimes
Female	Junior Lecturer	No Comment
Male	Professor Emeritus	Often
Male	Professor Emeritus	Often
Male	Professor	Always
Male	Professor	Always
Male	Professor	Always
Male	Professor	Always
Male	Professor	Always
Male	Professor	Often
Male	Professor	Often
Male	Professor	Often
Male	Associate Professor	Always
Male	Associate Professor	Always
Male	Associate Professor	Often
Male	Senior Lecturer	Always
Male	Senior Lecturer	Always
Male	Senior Lecturer	Often
Male	Senior Lecturer	Often

Male	Lecturer	Always
Male	Lecturer	Always
Male	Lecturer	Often
Male	Lecturer	Sometimes
Male	Lecturer	Never
Male	Lecturer	Never
Male	Junior Lecturer	Sometimes
Male	Unknown	Often

Appendix G3

Do you identify as:	**Academic Rank**	**Age Group**	**Have you ever experienced another colleague make offensive sexual remarks, either directed at you or overheard, including jokes or sexual stories?**
Female	Professor	40-49	Often
Female	Associate professor	30-39	Never
Female	Associate Professor	40-49	Never
Female	Associate Professor	40-49	Never
Female	Associate Professor	40-49	Never
Female	Associate Professor	50-59	Never
Female	Senior Lecturer	30-39	Sometimes
Female	Senior Lecturer	40-49	Never
Female	Senior Lecturer	40-49	Never
Female	Lecturer	30-39	Sometimes
Female	Lecturer	30-39	Never
Female	Lecturer	30-39	Never
Female	Lecturer	30-39	Never
Female	Lecturer	40-49	Never
Female	Junior Lecturer	40-49	Never
Male	Professor Emeritus	60+	Sometimes
Male	Professor Emeritus	60+	Sometimes
Male	Professor	40-49	Sometimes
Male	Professor	40-49	Never
Male	Professor	40-49	Never
Male	Professor	50-59	Sometimes
Male	Professor	50-59	Sometimes
Male	Professor	60+	Never
Male	Professor	60+	Never
Male	Professor	60+	Never
Male	Associate Professor	30-39	Never
Male	Associate Professor	40-49	Never
Male	Associate Professor	60+	Sometimes
Male	Senior Lecturer	30-39	Never
Male	Senior Lecturer	40-49	Never
Male	Senior Lecturer	50-59	Never
Male	Senior Lecturer	60+	Never
Male	Lecturer	20-29	Never

Male	Lecturer	20-29	Never
Male	Lecturer	30-39	Sometimes
Male	Lecturer	30-39	Never
Male	Lecturer	30-39	Never
Male	Lecturer	50-59	Never
Male	Junior Lecturer	20-29	Never
Male	Unknown	30-39	Never