The relationship between marital status and labour market outcomes in the South African economy

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List of Abbreviations

ATT:	Average treatment effect on the treated
BO:	Blinder-Oaxaca decomposition method
GDP:	Gross domestic product
KM:	Kernel matching
LFP:	Labour force participation
LFS:	Labour Force Survey
NIDS:	National Income Dynamics Survey
NNM:	Nearest neighbour matching
OHS:	October Household Survey
PSM:	Propensity score matching
RIF:	Re-centred influence function
SALDRU:	South African Labour – Development Research Unit
QLFS:	Quarterly Labour Force Survey

Abstract

Marriage has the potential to irreversibly change one's life, both socially and economically. For this reason, it is pertinent to investigate and understand the influences that marriage holds over the labour market outcomes of a country. This greater understanding is achieved through investigation of the influence of marriage on labour force participation, employment, and the gender wage gap in South Africa. The impact on labour force participation and employment is gauged through logistic regressions. The gender wage gap is calculated with propensity score matching and Blinder-Oaxaca decomposition. The results indicated that widows are more likely to be employed than married women are and that they earn more than widowers do. The results were, however, not as positive in all marital statuses. In all the other marital statuses, men earn more than women do. The findings also show that women are least likely to be employed when they are married. Marriage influences the labour market outcomes for women differently than for men. This is an important certitude, especially for policy makers that have to consider how their policies will differently affect men and women, and thereby work either against or for gender equality.

Keywords: Blinder-Oaxaca decomposition, employment, gender, labour demand, labour force participation, labour supply, marital status, propensity score matching, wage gap.

Problem statement: Marital status can have a great impact on labour market activities because of the way in which it alters bargaining power and because of the social norms connected to marriage. Around the world, marriage is in decline with cohabiting and divorce on the rise. Research focusing on the effects of marital status on labour market outcomes is scarce, despite the life-changing impact that marriage has on the labour supply of a country. Research focusing on the influence of marriage on labour is especially scarce in South Africa. Given South Africa's high unemployment levels and the gender disparities in the labour market, it is important to understand which factors drive labour market outcomes, especially for women in South Africa.

Research question: How does marital status influence the labour market outcomes of women in South Africa?

Research objectives: The aim of this study is to uncover how it is that marriage influences the labour force outcomes of women and the wage gap in South Africa.

Introduction

Work on equality in societies has taken many shapes and stances in recent years. A plethora of work on the differences experienced by class, race, and gender has taken centre stage. These studies have improved in nuance and understanding over the years because of the apparent inability for inequalities to be countered. This does not imply that there have not been great strides in the last hundred years, just that the momentum of change is slowing because a more nuanced approach is needed in addressing what is left of social inequality.

Such developments as allowing women to vote and to allow them the same rights as men have made a great difference in bridging the gap between men and women. Ensuring that women are able to fully catch up to their male counterparts will require a deeper understanding of all societal structures and how they impact on inequality. It is for this reason that this dissertation focuses on marriage. Marriage, in all its forms, is deeply rooted in most cultures, swaying labour market decisions of both individuals and organisations.

Marital status can have a great impact on labour market activities because of the way in which it alters bargaining power and because of the social norms connected to marriage. Around the world, marriage is in decline with cohabiting and divorce on the rise. Research focusing on the effects of marital status on labour market outcomes is scarce, despite the life-changing impact that marriage has on the labour supply of a country. Research focusing on the influence of marriage on labour is especially scarce in South Africa.

South Africa is chosen as the location of the study for two reasons. Firstly, the plethora of cultures that make up the South African society, with various different views on marriage and other marital statuses, makes for a fascinating study of the interaction between marital status and the labour market. The second, and more important, reason is that the author hopes to gear policy makers in South Africa with a nuanced understanding of gender disparities so that the way forward is paved with policies that breaks down unseen obstacles to gender equality.

Other than the introduction and conclusion, this dissertation consists of two chapters that are entire articles on their own, and each covers a vitally important aspect of the

labour market of South Africa. This dynamic will allow each article to partially answer the research question: How does marital status influence the labour force characteristics in South Africa?

The first article, *The Relationship between Marital Status and Female Employment in South Africa,* analyses the labour force participation and employment of women and men in South Africa. The purpose of this article is to understand the impact that various marital statuses have on the participation and employment of women and men in South Africa and to understand how those marital statuses differently impact on women and men. The major contribution of this article in the existing literature is that it looks at the influence of individual characteristics, rather than macro variables, as an explanation for whom it is that gets employed.

The second article, *The Relationship between Marital Status and Gender Wage Gaps in South Africa,* analyses the gender wage gap by considering the individual characteristics, including marital status, of men and women in South Africa. This article's purpose is to clarify the role that marital status has on the gender wage gap in South Africa. The contribution of the article is twofold. It is the first time, to the best of my knowledge, that the gender wage gap is analysed, in South Africa, with post financial crisis data. It is also the first article in South Africa that uses propensity score matching in order to compare individuals with similar characteristics and in this way gather a deeper understanding of the wage gap that is not explained by those characteristics.

The Relationship between Marital Status and Female Employment in South Africa

1. Introduction

The nature of marriage has changed dramatically since the 1950s, with people waiting longer to get married, cohabitation increasing, and divorce increasing (Lundberg and Pollak, 2015; OECD Family Database, 2014), and in this case, South Africa is no exception (Casale, Posel, and Rudwick, 2011). It is in the light of this change that it would be appropriate to determine the effect this transition in the marriage institution has on the labour force. This study attempts to uncover that effect by looking at the labour supply of women, and also the interaction between labour supply and demand.

Consideration of the historical context that underpins the literature is insightful to understand the background upon which this study is based. The sexual revolution of the 1960s acted as the catalyst for the change in marriage statistics. During this time feminists, like Betty Friedan (1963), advocated that women could be more satisfied if they were given greater options than just being housewives and mothers. Being a housewife and mother was, at the time, considered to be the most fulfilling position a woman could have. The sexual revolution led to a surge of feminist critique of patriarchal institutions (Firestone, 1970; French, 1977; Greer, 1970; Millet, 1969; Smart, 1989) that started a change in the way marriage was approached, leading to an ever-increasing abandonment of the marriage institution. Carol Smart (1989), in particular, advocated for the abandonment of marriage, rather than an appeal for the legal reformation of the marriage institution. She advocated for a search of alternatives, as she believed the patriarchy of marriage would not be changed by simply reforming the laws supporting marriage (Smart, 1984). Other feminists also pushed to abolish the institution of marriage because of how it enables and reinforces patriarchal norms, and therefore gender inequality (deBeauvoir, 1949; Friedan, 1963; Mill, 1869; Okin, 1989; Pateman, 1988; Wollstonecraft, 1792).

In the years since these early feminists, marriage has lost its power, as people are, to a greater extent, opting out of the marriage institution or rather delaying before opting in to it. This is evident in decreased marriage rates and increased divorce

and cohabitation rates (Auchmuty, 2012). Co-habitation is when a couple lives together but do not legally subscribe to the institution of marriage. There has been an increase in cohabitation which then leads to the offsetting of marriage (Casale, Posel, and Rudwick, 2011; Hosegood, McGrath, and Moultrie, 2009). Cohabitation is often seen as either a replacement for marriage, or in other cases, as a procrastination of the decision to get married. Cohabitation is however still playing an ever-increasing role in influencing the dynamics of unions. Auchmuty (2012) finds that, from a legal standpoint, the progress that has been made, in terms of women's rights, in Britain specifically, is largely due to the loss of power of the marriage institution and not so much due to the attempts at legal changes to marriage.

Along with a decrease in marriage, there has been a trend toward greater female labour force participation and employment has increased across the world, including in the developing world. This can be seen in the studies by Coleman and Pencavel (1993), Mehra and Gammage (1999), and Wamboye, Adekola, and Sergi (2015) where it was found that women's employment was increasing. Despite the fact that women had higher employment levels, they were more likely to be retained in less desirable employment, such as in the agricultural sector rather than the manufacturing or services sectors, which required more working hours for lower wages. This should also be considered when investigating the employment of women, especially when focusing on marriage rates, as it lowers the incentive for women to enter the labour market if they know that the employment opportunities available to them are not as good as what their husband's opportunities are. Studies concerning the labour supply of women often involve the inclusion of a marital status/rate variable because of the important role it plays in influencing women's behaviour in the labour market (Hamid, 1991; Muller and Posel, 2008; Ntuli, 2007; Yakubu, 2010). These studies also focussed on women rather than labour in general because men tend to be on the beneficial end of an unequal labour market. For this same reason this study also focuses on women in the labour force.

Women play a prominent role in a country's economy, which is evident in the multitude of research suggesting that greater gender inequality results in lower GDP growth (Agenor and Canuto, 2015; Dollar and Gatti, 1999; Forbes, 2000; Klasen, 1999; Klasen and Lamanna, 2009; Seguino, 2000). This research shows that there

is a negative relationship between growth and inequality. So even if one does not deem it to be important from a developmental perspective to consider the principled injustices women face due to gender inequality, it is worth noting that this inequality is to the detriment of the economy as a whole.

It is a worthy goal to strive for the increase of women's participation in economic activities because it provides greater efficiency to the economy (Jaumotte, 2003; Ntuli, 2007). This is because the potentially available workforce is more efficiently utilised when both genders are given the equal opportunities. Another important argument to take from these studies is to note that it is not just one aspect of gender inequality that is detrimental to an economy, but all aspects, including the wage gap, educational inequality, and employment inequality.

Within this global context of changes in marriage trends, the South African gender landscape is unique. It is not just distinctive, in terms of other foreign countries, but even on the African continent (Hosegood, McGrath, and Moultrie, 2009). Due to distinct historical discrimination that was institutionalised in South Africa, there are significant detriments to women. To a large degree, the political and the cultural differences in the marriage institution is what sets South Africa apart. Those effects, along with the costs of paying a bridewealth (ilobolo) and the costs of supporting a family, prove to be great barriers to entry into matrimony (Mkhizwe, 2006; Casale, Posel, and Rudwick, 2011; Casale and Posel, 2013; Posel and Rudwick, 2013; Posel and Rudwick, 2015). Therefore, the decrease in the South African nuptiality has been higher than in most other African countries (Hosegood, McGrath, and Moultrie, 2009).

Understanding the link in marriage trends and female labour market outcomes in South Africa is important because the South African labour force is characterised by high levels of unemployment, and this is much higher for women than for men. In the first 2016 quarterly labour force survey (StatSA, 2016), it is made evident that women in South Africa have a higher unemployment rate than men, 29.3 per cent as compared with 24.6 per cent. Women also have a lower absorption ratio (37) and labour force participation rate (52.4) than men (49.1 and 65.2, respectively). Among women there are also great disparities in labour force participation between the

different ethnic groups, with white women consistently participating more than black women do (Ntuli, 2007).

Women within marriages act economically very different than women outside marriages. Married women tend to do the largest portion of home work and are given the responsibility of taking care of children. For these reasons women may find it difficult to find work that would still allow them the time to complete their household duties, and employers may be disincentivised to hire women. There is undoubtedly a relationship between marriage and labour force characteristics, a more thorough analysis of this relationship is however necessary.

The aim of this paper is to uncover what it is that influences the employment of women in South Africa, with specific focus on how it is that marriage influences women in the economy. First, the literature review will provide background of studies that have been done on women in the labour force, looking specifically at how these studies have influenced the way in which we conduct this study. Thereafter, the methodology of this paper will be discussed, before the results are presented and explained.

2. South African labour market characteristics

In order to analyse the labour market in South Africa, a general understanding of the market is needed. It is to this end that this section will briefly give some information about the characteristics of the South African labour market.

Over the years, there has been a large increase in the labour supply of South Africa, which is largely due to the increase in female labour force participation. In 1960, women made up only 23 per cent of the economically active population; a little more than half a century later, in 2012, women made up 45 per cent of the economically active population in South Africa (Barker, 2015). An increase in the labour supply of South Africa is positive because of the benefits of increased productive potential, and also because this increased labour force participation shows that there is some progress in terms of women participating in the labour force. This could indicate that there is progress in improving equality between the genders. This increased labour force participation is, however, only beneficial if that extra labour supply is absorbed in the labour market.

Unemployment is, however, a very large issue in the country. StatsSA (2016) reported that from 2010 to the first quarter of 2016, unemployment ranged between 23.8 per cent and 26.7 per cent. This shows a systemic unemployment problem and that the increased labour force participation is not utilised in the labour market. This leads one to conclude that there is a mismatch between the demand and supply of labour in South Africa. Looking at the skills that labour possesses would be the first place to look for this mismatch. There has, however, been very little increase in the demand for low-skilled and unskilled labour, and the unemployment rate for skilled labour has also increased (Barker, 2015).

The problem, then, could be that there is not enough demand for the large amount of labour supply available. This would then change the power dynamics between employers and the labour force, increasing the bargaining power of employers. The employer has the ability to choose from a greater variety of competing potential employees. The increased power of choice makes the individual characteristics of the labour force important to understand as to whom it is that gets absorbed into the employed echelons. Trade unions increase the bargaining power of employees, on the other hand. In South Africa, however, the high strike incidence of unions has resulted in employers being less likely to hire unskilled labour (Barker, 2015). Employers could, as a result, be more particular about the individual characteristics that they deem important for their employees.

3. Theoretical overview

In this section the theoretical underpinnings of the study are discussed. Firstly, theory surrounding labour supply will be uncovered. Here the theoretical determinants of a person's willingness to participate in the labour force are considered. Secondly, labour demand theory will be discussed in order to show the other side of the labour coin. The final section looks at the household and specifically at marriage and its influence on the labour force. Here the theoretical link is made between the labour market and the marriage market.

3.1. Labour Supply Theory

As a starting point, when looking at labour supply theory, the neo-classical view that individuals are utility maximising is assumed. This would then imply that a person's decision to participate in the labour market is influenced by two things, the person's

potential wage, and the opportunity cost of working (often referred to as leisure) (McConnell and Brue, 1995). If the potential wage and opportunity cost are then calculated, one should have a fair idea of the probability of this person participating in the economy. This is, however, not easy, since it is very difficult to determine what someone would have earned if they had worked, when they do not, and the opportunity cost of not working is oftentimes not monetarised and it is therefore difficult to measure.

Human capital theory provides a good starting point to understanding wage determination. This could be used to determine what it is that influences a person's wage even before that person has started working. Human capital theory states that a person's productivity, and thereby income, is directly influenced by that person's 'stock of knowledge', i.e. his or her knowledge, ideas, skills, and health (Becker, 2002). This 'stock of knowledge' can be gathered through formal education or through informal education in the form of experience. It therefore stands that when attempting to determine a person's probability of participating in the economy, that such variables as schooling, that improve "human capital" should be included in the study.

The opportunity cost of participating in the labour force is a much more convoluted topic that is even more difficult to measure. This is because oftentimes the opportunity cost of working could be to increase utility and not necessarily increase income from another source. Both of those need to be taken into account when determining individual labour supply: other sources of income as well as other factors that discourage participation. Other opportunity costs that increase utility, but not income, are typically household factors such as responsibilities at home such as children. More of this will be understood after the section on marriage specific theory.

3.2. Labour Demand Theory

Labour force participation only explains one side of the labour force. It indicates whether a person is willing to work, but tells nothing of whether the person might be successful in receiving work. It is to this end that it is important to consider the interaction between supply and demand of labour. In order to capture this interaction, this study will look at the labour supply characteristics of individuals and

how that affects their probability of being employed, which can be categorised as a demand side variable.

Much of the theory of labour demand is preoccupied with the amount of employment that is demanded by the employers, but is not as concerned by what type of employment is demanded (Barker, 2015). This means that there is no generalised theory that explains the individual characteristics that are sought by employers. For a study that looks at those individual characteristics, theory has to be salvaged from a variety of places and conglomerated to be able to build a theoretically sound model.

This endeavour has resulted in the realisation that there are a few trends in the labour market, which serve as a theoretical basis of what to expect when studying employment or unemployment from the demand side. Some insights on employment and unemployment are provided by Bhorat (2003), Kingdon and Knight (2004), Burger and Jafta (2006), Dias and Posel (2007), and Barker (2015). An example is that education is valued in the labour market, which is evident from the increasing decline of unskilled employment relative to skilled employment (Barker, 2015). There may be some debate surrounding the relative importance of different types of education or how important it is, but there are not many studies that attempt to entirely disprove the value of education. This provides weight to the proposition of analysing employment by considering the interaction of demand and supply of labour.

3.3. Marriage Specific Theory

In "*A Theory of the Allocation of Time*", Becker (1965) hypothesised about the allocation of time within a household. In this model, the household is set to be the same as a small firm. The household then is assumed to produce commodities by using time and other goods. Households typically face budget constraints and time constraints, which limit their ability to increase utility. Income is then spent either by buying goods, or by giving up income for other purposes (Becker, 1965). This implies that households will have to make decisions regarding who works in the labour market and for how much.

These types of decision mean that it is important to consider a person's human capital because of how it will impact on the household's income (Becker, 1965). If,

for example, the household perceives the woman's chances of being employed to be less and her potential income to also be less, the household may make a collective decision that the woman should rather spend her time tending to household matters rather than attempt to acquire more income. It logically follows that unmarried individuals should make their decisions based solely on the individual's potential income and not the collective, resulting in a greater likelihood of participating in the labour force.

The implication for this article is that because the total household income is important to consider, it means that the husband's income has an impact on whether a woman would enter the labour force. The higher the income of the husband in a household is, the more valuable the time of the wife would be, resulting in her rather not entering the labour force. In this study, both married and unmarried people will be considered and therefore considering the spouse's income, for the unmarried, would not be possible. The marital status itself will serve as a proxy for receiving an income from the husband.

Grossbard-Schechtman and Neuman (1988) further develop the theory of the allocation of time by including the interaction of the characteristics between both parties in the marriage and looking at how that influences women's labour supply. They found that the husband's characteristics are positively related to the wife's labour supply. Women that have specific characteristics, such as being younger, are valued in the marriage market but are less attractive in the labour force. This study shows that it can be expected that married women are less likely to enter the labour market. The study done by Grossbard-Schechtman and Neuman (1988) further gives an indication of the type of variables that need to be included when looking at the labour supply of women and how that is affected by the marital status. This is said to work through a mechanism of compensating differentials which basically means that the higher the woman's traits are valued, in the marriage market, the more the husband has to compensate for those traits by providing her with a larger share of the income. The more valued a women's characteristics are, the more likely it is that her 'needs' will be satisfied in the marriage and she will therefore be less likely to participate in the labour force. Therefore, characteristics, such as age and education, which play a role in both the marriage market and the labour market need to be considered.

The theory on marriage suggests that marriage is a deterrent to gender equality in the labour market. This is due to marriage discouraging investment in human capital and due to compensating differentials that provide further disincentive to enter the labour market. The theory does, however, assume marital status to be a binary opposition where one is either married or not. It does not provide any insight into what can be expected when a person is separated or divorced, and simply assumes that all single persons can be grouped together. This theory also tells nothing of the dynamics of when a person is living with a partner, but they are not legally married.

4. Literature Review

A literature review of the determinants of female labour force participation and employment in studies published between 2000 and 2016 is presented in this section. This time frame was chosen because it provides the most relevant literature before and after the financial crisis, which may have had a big impact on the labour market of South Africa (Verick, 2012). The section starts off discussing past international studies that utilise the theories mentioned above, in order to gain a better and broader understanding of labour supply characteristics around the world. The second part then focuses on studies that investigate how individual characteristics influence labour supply in South Africa. Women in South Africa are less likely to enter the labour market, and when they do, they are less likely to be employed (Barker, 2015). For this reason, the interaction of supply and demand needs to be considered. The final part of this literature review will therefore specifically look at studies that have analysed employment in the context of the individual characteristics of labour supply in South Africa.

4.1. International perspectives

Human capital theory shows that those skills which are accumulated through experience increase the probability that one would participate in the labour force (Becker, 1993). This has become a cornerstone assumption for empirical research on labour force characteristics. Collet and Legros (2016) use education level as a proxy for potential wages, since potential wages for the unemployed are not available in survey data. This illustrates that potential wages could be the mechanism through which education influences the decision to participate in the workforce.

Education may serve as a proxy for potential income, but this does not include non-salary income. Non-labour income is, however, a relevant consideration for women that have to decide whether or not to participate in the labour force (Collet and Legros, 2016). This is because the non-labour income could serve as a substitute for a wage, which reduces the incentive to work. Non-labour income could deter women from entering the labour force since a higher non-labour income reduces the need for other incomes. Capital income is one source of non-labour income that has been used (Hardoy and Schone, 2015), but there are many other sources that can also be considered, such as social grants.

When investigating female labour force participation, children are often included since it is common in most cultures that the woman has the responsibility to take care of the children (Chen et al., 2014). It is therefore argued that children take up the time that women could have otherwise used to participate in the labour force (Bredemeier and Juessen, 2013; Collet and Legros, 2016). Therefore, childcare and other familial responsibilities can be considered as the opportunity cost of labour participation for women (Borck, 2014).

Age is yet another variable that is widely accepted as a driver behind labour participation (Chen et al., 2014; Barker, 2015). This is due to age being viewed as an indicator of the skills, knowledge, and experience that was accumulated over those years. Collet and Legros (2016) referred to age as a proxy for the marketability of women, which then reflects those skills, knowledge, and experience. This does, however, come with considerable complexities especially when considering the age of that woman's children. After the age of fifty, age also tended to have an opposing effect on woman's willingness to enter the labour market.

The husband's work is also a variable that is often considered when analysing women in the labour market (Chen et al., 2014; Berger, Islam, and Liegeois, 2011). This is something that can obviously only be measured if the woman is married. Since unmarried women are to be considered in this article, it would make sense to see marriage as a proxy for the income of husbands.

4.2. Female labour force participation in South Africa

Ntuli's study (2007) analyses women's labour force participation in South Africa with the aim of discovering its determinants. A combination of the October Household

Survey (OHS) and Labour Force Survey (LFS) was used in order to acquire nationally representative data for 1995–2004. The time period of this article captures the first decade of democracy in South Africa. The model of this study had labour force participation as the dependent variable. Explanatory variables that were used were the respondent's age and age squared, a dummy for rural or urban living, the province of residence, and the respondent's marital status, education, children, and non-labour income. Ntuli (2007) made use of a logistic regression, followed by a decomposition analysis to assess the country's labour force participation.

Ntuli (2007) found that marriage reduced the likelihood of South African women participating in the labour force. The further findings were that education was an important determinant of female labour force participation, as expected. Higher levels of education were associated with higher probabilities of participating in the labour force. Women living in rural areas were less likely to participate, as were women with children younger than fifteen who were still living in the house. Non-labour income had a larger effect on decreasing the probability of women participating in the labour force than the marital status or fertility did (Ntuli, 2007).

Yakubu (2010) researched the factors that influence female labour force participation and used a binary logistic regression model in this endeavour. The data that was used for the study came from the quarterly labour force survey (QLFS) of South Africa for 2008. A logistic regression was run with the aim of uncovering the factors that influence female labour force participation in South Africa, focusing on the effect of education. In this study, labour force participation was set as the dependent variable. The control variables are sex, population group, age group, marital status, and province.

Yakubu (2010) found that women who were co-habiting were 29.2 per cent more likely to participate in the labour force than married women were, and widows were 21.8 per cent less likely to participate in the labour force. Further, the study found that having received a tertiary education greatly improves the likelihood that someone would participate in the labour force (895.4 per cent more likely than no schooling). Looking at the population group, and setting African/Black as the reference variable, Indian/Asian women were 41.3 per cent more likely to participate and Coloured women 12.3 per cent more likely to do so. Being white resulted in

being 10.5 per cent less likely to participate in the labour force than being black did. The age variable showed that the optimal time to participate in the labour force was between the ages of 45 and 49. The Provincial variables also showed that the location made a significant difference in a woman's labour force participation. Limpopo reduced the probability of participating by 51.7 per cent, in comparison with the Western Cape. Participation in the labour force in Gauteng was 31.8 per cent more likely (Yakubu, 2010).

4.3. Employment in South Africa

Both of the studies above look at labour force participation and therefore only consider the supply side of the labour force. Labour force participation is, by definition, reflected by all those citizens that are both employed and unemployed. In the research, this indicates all the employed and unemployed people who have made themselves available to work, whether they received work or not. This is therefore considered to be the labour supply. Employment on its own indicates who it is, of those that are willing to work (supply), that actually gets work. This can then be referred to as the demand for labour. In this study the supply side will first be analysed through labour force participation. The study will then be extended to also consider the interaction between supply and demand by using the demand for labour (employment) and then looking at what supply side individual characteristics influence employment. The studies that are going to be discussed below looked at this intersection in order to gain a deeper understanding of the dynamics of the South African labour force.

Kingdon and Knight (2004) studied the dynamics of the entry into and duration of unemployment in South Africa. The aim of this study was to determine the extent to which individual characteristics mattered in reducing employment, and therewith also the extent to which structural characteristics matter. A combination of the October Household Survey (OHS) of 1994 and an integrated household survey by the South African Labour – Development Research Unit (SALDRU) for 1993 was used. Probit models were subsequently run with the dependent variables being entry into unemployment from employment and voluntary entry into unemployment from employment. The control variables that were used were age, gender, household head, marital status, number of dependents, race, region (rural or urban), number of

employed members in the household, education, homeownership, province, distance from a telephone, the district home-ownership rate. These variables include both individual and household characteristics and household characteristics, and some of them, like education, influence both labour supply and demand.

What Kingdon and Knight (2004) found was that men were 19.1 per cent less likely to voluntarily enter into unemployment from employment than what women were, but they were 11.3 per cent more likely to do so. It was also found that married individuals had a 6.4 percentage point greater probability of entering into unemployment from employment than unmarried individuals were. In this study a race gap in unemployment was then calculated and decomposed. It was discovered that the African–white gap in unemployment probability was 33.7 percentage points, the coloured–white gap in unemployment probability was 16.1 percentage points, and the Indian-white gap in unemployment probability was 8.4 percentage points. They concluded by stating that the individual characteristics of previously disadvantaged groups do matter in procuring employment, but only up to a point since the unemployment levels in the country can be explained more by a lack of demand than a lack of supply.

The Kingdon and Knight (2004) study's purpose was to better understand racial employment dynamics. This may be different from this study, but the empirical approach is quite useful. In their study, a demand side variable (entry into unemployment) was used as the dependant and supply side individual characteristics were used as controls. This indicates the usefulness of looking at this interaction between supply and demand.

Another study that looked at the interaction of demand and supply by analysing employment through the lens of personal productive characteristics, was one done by Burger and Jafta (2006). This study was aimed at uncovering the effectiveness of post-apartheid policy at reducing racial discrimination. To do this, an employment gap was calculated and a Blinder-Oaxaca (BO) decomposition method, which is usually used to decompose wage gaps, was utilised. This was adapted for binary variables and used to decompose the race employment gap into a section described by individual characteristics and a section not described by those characteristics. This latter section is assumed to partly illustrate any possible discrimination in the

labour market. The data used for the study was retrieved from the October Household Survey for the years 1995 to 1999 and the Labour Force Surveys for the years 2000 to 2004.

To be able to do BO decomposition, a probit model was first run with employment as the dependent variable. The explanatory variables that were used were education, education squared, experience, experience squared, household head, a rural dummy, marital status, children, and province (Burger and Jafta, 2006).

The results of the probit model showed that being married increased the probability of being employed by 0.512 for black men and 0.171 for white men. From the ensuing decomposition, it was concluded that direct discrimination in the labour market did decrease, but that the differences in returns to education is now the driver behind employment inequality. They also concluded that that affirmative action influenced the higher levels of the occupational hierarchy more than the rest did.

One major shortcoming of this study is that it was only done for men because they did not want the racial discrimination to be complicated by the interaction of added gender discrimination. The focus of their study may have been race, but gender plays an important role, especially when combined with race. The focus of this study is gender, but will include analysis of race and thereby significantly improve on any study that neglects to include both characteristics. In the next section, the data used for the empirical analysis will be discussed, followed by an explanation of the methodology employed for each of the models that are going to be run.

5. Data and Methodology

The data used for this paper was acquired from the National Income Dynamics Survey (NIDS, 2016). NIDS is a nationally representative individual and household survey that collects data of approximately 28 000 individuals and 7 300 households. The same individuals are interviewed for each of the four waves of the survey. The four waves cover the years 2008, 2010, 2012 and 2014. Observations with missing variables were dropped, leaving a sample of 12 897 observations.

Conventional neoclassical individual supply theory is used as the base from which labour supply models are derived. This means that there is an assumption for a person to have a set amount of time (T) at his/her disposal and that this time is

divided up into hours spent working (H) and hours spent in leisure (L), which is illustrated in the equation below.

$$T = H + L$$

An individual is also assumed to have a set utility function (U) which is made up of the commodities the person consumes (X), the hours spent working and the person's individual characteristics (A), such as age, race, and marital status. This can be formally expressed as:

$$U = U(X, H, A, \varepsilon)$$

where: ε = individual's preferences

The person is then assumed to have a budget which is constrained to the income that person receives. This is formally expressed as:

$$PX = WH + Y$$

where: P = Fixed per unit price of a bundle of commodities.
W = Wage rate
Y = Non labour income

The person is then expected to choose X>0 and H≥0 such that the utility is maximised, subject to the person's budgetary constraints and individual characteristics. This is illustrated in the following formula:

$$U_X = (X, H, A, \varepsilon) = \lambda$$

and

$$U_H = (X, H, A, \varepsilon) \leq \lambda W$$

where: λ = The marginal utility of income

This last equation enables the setting of a reservation wage rate (W_r) at which the individual would only participate in the labour force if it is lower than the market wage offer (W_i):

$$W_r < W_i$$

From this theoretical understanding and the data availability, a model for labour force participation (LFP) can be built, in which an individual's personal characteristics will be included along with the non-labour income that a person may receive. An understanding of the behaviour of this model is also attained. Ntuli (2007) used a similar understanding to derive a labour supply model that analyses LFP. Given this information, the following labour supply model will be constructed:

LFP[1] *= f(gender, marital status, population group, education level, age, province of residence, non-labour income, and whether the person has children living with them)*

Labour force participation (LFP) includes all those that are either employed or unemployed while still looking for work. This means that it includes all economically active people in the sample. This study further contributes to the field by analysing both the labour supply, through labour force participation, and adding to that the interaction of labour supply and demand, through employment. The individual characteristics that are considered to influence a person's labour force participation are also observed as influencing employment. The equations that result from substituting the LFP with employment is,

Whether a person is employed[2] *= f(gender, marital status, population group, education level, age, province of residence, non-labour income, and whether the person has children living with them)*

'Employed' includes only those people who are working for a wage, unlike LFP that also includes the unemployed. The study was done in sections with a panel logistic model that progressed through various stages. In the first logistic model, gender was included as a dummy variable so that the difference between the genders can be seen, in general. In the next model, the genders were split up into two separate regressions in order to observe the more specific differences in the factors affecting

1 Refer to the questions section in the Appendix for the question that is used to set up the LFP dummy variable.

2 Refer to the questions section in the Appendix for the question that is used to set up the employment dummy variable.

the employment and labour force participation of women and men. In the third model, the effect of having biological children living with the women is included.[3]

Based on the theory and data availability, the following overarching models can be specified:

$$\Pr(EMP = 1|X) = F(\beta + \beta_0 GEN + \beta_1 \sum_{j=1}^{3} MST + \beta_2 \sum_{j=1}^{4} GRP + \beta_3 \sum_{j=1}^{3} EDS + \beta_4 \sum_{j=1}^{4} EDT + \beta_5 \sum_{j=1}^{5} AGE + \beta_6 \sum_{j=1}^{9} PROV + \beta_7 NEI + \beta_8 CHILD)$$

And

$$\Pr(LFP = 1|X) = F(\beta + \beta_0 GEN + \beta_1 \sum_{j=1}^{3} MST + \beta_2 \sum_{j=1}^{4} GRP + \beta_3 \sum_{j=1}^{3} EDS + \beta_4 \sum_{j=1}^{4} EDT + \beta_5 \sum_{j=1}^{5} AGE + \beta_6 \sum_{j=1}^{9} PROV + \beta_7 NEI + \beta_8 CHILD)$$

where:

EMP[4] = Dichotomous dependent variable, indicating **employment**, where 1 is employed and 0 is not employed.

LFP[5] = Dichotomous dependent variable, indicating **labour force participation** (employed and unemployed), where 1 is participating and 0 is not participating.

X = A vector of explanatory variables

j = Number of dummies

GEN = Dichotomous variable, indicating **gender**, where 1 is male and 0 is female.

3 Unfortunately, this variable is not available for men, so a comparison of the genders is not possible.

4 Refer to the questions section in the Appendix for the question that is used to set up the employment dummy variable.

5 Refer to the questions section in the Appendix for the question that is used to set up the LFP dummy variable.

MST = A set of dichotomous variables indicating **marital status** with the following categories; married, divorced, widowed, cohabiting, and never married.

GRP = A set of dichotomous variables, indicating **population group**, with the following categories; black, coloured, Asian, and white.

EDS = A set of dichotomous variables indicating **education at school level**, with the following categories; matric, some schooling, and no schooling.

EDT = A set of dichotomous variables indicating **education at tertiary level**, with the following categories; bachelor's degree, honours degree, masters and doctoral, and other tertiary education.

AGE = A set of dichotomous variables indicating **age**, with the following categories; 15-25, 26-35, 36-45, 46-55, and 56-65.

PROV = A set of dichotomous variables indicating **province of residence**, with the following categories; Gauteng, Western Cape, Eastern Cape, Northern Cape Free State, KwaZulu-Natal, North West, Mpumalanga, and Limpopo.

NEI = Dichotomous variable, indicating **non-employment income**, where 1 is receiving non-employment income and 0 is not receiving non-employment income.

CHILD = Dichotomous variable, indicating the presence of biological **children** living in the house, where 1 is that there is a biological child living in the house and 0 is that there is not a biological child living in the house.

The labour force participation (LFP) dependent variable is a dummy variable that was derived from the following question (NIDS, 2016):

Which one of the following best describes what you were doing one year ago?

1. *Working for pay*
2. *Self-employed*
3. *Working on own plot or looking after livestock*
4. *Helping another family member with their business, without pay*
5. *Full-time scholar or student at school, university, college or another educational institution*
6. *Homemaker (looking after children / others / home)*
7. *Long term sick or disabled*
8. *Retired*
9. *Unemployed and actively searching for a job in the last four weeks*
10. *Unemployed but not actively searching for a job in the last four weeks*

Parameters (1) and (9) were combined so that answering one of those two resulted in a one. The rest were set to zero in order to create a dummy variable.

The employment dependent variable (EMP) was derived from the following question in the NIDS survey (NIDS, 2016):

Are you currently being paid a wage or salary to work on a regular basis for an employer (that is not yourself) whether full time or part time?

More specifications of each model will be given in the discussion of each model's result, below.

6. Results

The following tables provide some summary statistics of the data being used, hinting toward what could be expected from the models. To ensure that the data remains nationally representative, weightings provided by NIDS (2016) were used. Because all of the variables are dummies, the means can be interpreted as percentages for which the dummy is equal to one. Table 1.1 shows the summary statistics for the year 2014, refer to Table 3.1, Table 3.2, and Table 3.3 for the summary statistics of

2008, 2010, and 2012, respectively. From Table 1.1 it is evident that 45.5 per cent of the respondents are working for a wage, yet 98.8 per cent were either working or looking for work. This does pose some concern for the model using LFP as the dependent variable, since there is very little room for analysing the difference between those that participate in the labour force, and those that do not. The majority of respondents have either never married or are currently married; 49.1 per cent and 34.6 per cent, respectively. In 2014 all respondents received some form of non-employment income, which may present some difficulties when the model is run, attributable to there being not enough difference between the groups analysed.

Table 1.1: Summary Statistics for 2014

Variable	Mean	Std. Dev.
Employed	0.455	0.498
LFP	0.988	0.107
Male dummy	0.430	0.495
Married	0.346	0.476
Divorced	0.036	0.187
Widow	0.064	0.245
Cohabit	0.062	0.241
Never married	0.491	0.500
African	0.800	0.400
Coloured	0.084	0.277
Indian	0.026	0.160
White	0.089	0.285
Matric	0.389	0.488
No schooling	0.014	0.117
Some schooling	0.564	0.496
Degree	0.028	0.164
Honours	0.013	0.112
Masters & PhD	0.007	0.083
Other Tertiary	0.237	0.425
15-25	0.158	0.365
26-35	0.303	0.459
36-45	0.232	0.422
46-55	0.185	0.388
56-65	0.123	0.328
Gauteng	0.290	0.454
Western cape	0.103	0.305
Eastern Cape	0.121	0.327
Northern Cape	0.027	0.162
Free State	0.054	0.227
KwaZulu-Natal	0.182	0.386
North-West	0.053	0.224
Mpumalanga	0.083	0.277
Limpopo	0.085	0.279
Non-employment income	1.000	0.000
Child dummy	0.418	0.493
Population = 18 378 281		

Own calculation, from NIDS (2016)

Table 1.2 is a cross tabulation of the employed dummy and the gender dummy. The same is then done for labour force participation in Table 1.3. From Table 1.2 a picture of the situation that women in general face in the labour force can be seen. For the results of the years 2008 to 2012, refer to Table 3.4 to Table 3.9. Of all

those that are not employed in the sample, 67.9 per cent were women in 2014. Women also make up 53.2 per cent of the employed population, which is a majority, but seeing as they make up 62.92 per cent of the entire sample, this figure is actually quite low. The chi squared test shows that there is good model fit between gender and employment, and therefore that there is some linear relationship between the two variables.

Table 1.2: Employment/gender cross-tabulation for 2014

			Gender		
			Male	**Female**	**Total**
Employed	**No**	Count	1832	3884	5716
		% within Employed	32.1 %	67.9 %	100.0 %
		% within Gender	51.1 %	66.1 %	60.4 %
		% of Total	19.4 %	41.1 %	60.4 %
	Yes	Count	1753	1990	3743
		% within Employed	46.8 %	53.2 %	100.0 %
		% within Gender	48.9 %	33.9 %	39.6 %
		% of Total	18.5 %	21.0 %	39.6 %
Total		Count	3585	5874	9459
		% within Employed	37.9 %	62.1 %	100.0 %
		% within Gender	100.0 %	100.0 %	100.0 %
		% of Total	37.9 %	62.1 %	100.0 %
Chi^2 test	Asymptotic Significance (2-sided)		0.000		

Own calculation, from NIDS (2016)

Table 1.3 breaks down the labour force into those that participate and those that do not, and cross-tabulates them with the gender dummy. What can be seen from this is that the non-participating portion of the labour force consists of 70.2 per cent women. The participating portion of the labour force is made up of 62 per cent women. Here the Chi squared test fails and it could then be concluded that LFP and gender do not have good fit because the differences between the models do not conform to the expected differences.

Table 1.3: LFP/gender cross-tabulation for 2014

			Gender		
			Male	**Female**	**Total**
LFP	**No**	Count	37	87	124
		% within LFP	29.8 %	70.2 %	100.0 %
		% within Gender	1.0 %	1.5 %	1.3 %
		% of Total	.4 %	.9 %	1.3 %
	Yes	Count	3548	5787	9335
		% within LFP	38.0 %	62.0 %	100.0 %
		% within Gender	99.0 %	98.5 %	98.7 %
		% of Total	37.5 %	61.2 %	98.7 %
Total		Count	3585	5874	9459
		% within LFP	37.9 %	62.1 %	100.0 %
		% within Gender	100.0 %	100.0 %	100.0 %
		% of Total	37.9 %	62.1 %	100.0 %
Chi^2 test	Asymptotic Significance (2-sided)		0.063		

Own calculation, from NIDS (2016)

Table 1.4 is a cross-tabulation of employment and marital status, followed by Table 1.5 which is a cross-tabulation of marital status and labour force participation.

In Table 1.4 the employed and not employed sections of the labour force are cross-tabulated with the five available marital statuses. Only the widowed and the never married dummies had a lower portion of employed people than the sample average. Of all of the divorced people in the sample, 46.78 per cent are employed, which is the largest of any of the marital statuses.

Table 1.5 shows that 98 plus per cent of each marital status is participating in the labour force. This could mean that there is very little room for movement in this variable, which may present some complication when running the models. Refer to Table 3.10 to Table 3.15 for the results of the cross-tabulations for the years from 2008 to 2012.

Table 1.4: Employed/marital status cross-tabulation for 2014

			Married		Cohabit		Widowed		Divorced		Never married	
			No	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**
Employed	**No**	Count	4078	1638	5276	440	5157	559	5562	154	2794	2922
		% within Employed	71.3 %	28.7 %	92.3 %	7.7 %	90.2 %	9.8 %	97.3 %	2.7 %	48.9 %	51.1 %
		% within Marital status	61.2 %	58.5 %	60.6 %	58.0 %	59.2 %	74.2 %	60.7 %	52.0 %	60.6 %	60.3 %
		% of Total	43.1 %	17.3 %	55.8 %	4.7 %	54.5 %	5.9 %	58.8 %	1.6 %	29.5 %	30.9 %
	Yes	Count	2581	1162	3425	318	3549	194	3601	142	1817	1926
		% within Employed	69.0 %	31.0 %	91.5 %	8.5 %	94.8 %	5.2 %	96.2 %	3.8 %	48.5 %	51.5 %
		% within Marital status	38.8 %	41.5 %	39.4 %	42.0 %	40.8 %	25.8 %	39.3 %	48.0 %	39.4 %	39.7 %
		% of Total	27.3 %	12.3 %	36.2 %	3.4 %	37.5 %	2.1 %	38.1 %	1.5 %	19.2 %	20.4 %
Total		Count	6659	2800	8701	758	8706	753	9163	296	4611	4848
		% within Employed	70.4 %	29.6 %	92.0 %	8.0 %	92.0 %	8.0 %	96.9 %	3.1 %	48.7 %	51.3 %
		% within Marital status	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %
		% of Total	70.4 %	29.6 %	92.0 %	8.0 %	92.0 %	8.0 %	96.9 %	3.1 %	48.7 %	51.3 %
Chi2 test		Asymptotic Significance (2-sided)	0.013		0.162		0.000		0.003		0.749	

Own calculation, from NIDS (2016)

Table 1.5: LFP/marital status cross-tabulation for 2014

			Married		Cohabit		Widowed		Divorced		Never married	
			No	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**
LFP	**No**	Count	102	22	113	11	115	9	118	6	48	76
		% within LFP	82.3 %	17.7 %	91.1 %	8.9 %	92.7 %	7.3 %	95.2 %	4.8 %	38.7 %	61.3 %
		% within Marital status	1.5 %	.8 %	1.3 %	1.5 %	1.3 %	1.2 %	1.3 %	2.0 %	1.0 %	1.6 %
		% of Total	1.1 %	.2 %	1.2 %	.1 %	1.2 %	.1 %	1.2 %	.1 %	.5 %	.8 %
	Yes	Count	6557	2778	8588	747	8591	744	9045	290	4563	4772
		% within LFP	70.2 %	29.8 %	92.0 %	8.0 %	92.0 %	8.0 %	96.9 %	3.1 %	48.9 %	51.1 %
		% within Marital status	98.5 %	99.2 %	98.7 %	98.5 %	98.7 %	98.8 %	98.7 %	98.0 %	99.0 %	98.4 %
		% of Total	69.3 %	29.4 %	90.8 %	7.9 %	90.8 %	7.9 %	95.6 %	3.1 %	48.2 %	50.4 %
Total		Count	6659	2800	8701	758	8706	753	9163	296	4611	4848
		% within LFP	70.4 %	29.6 %	92.0 %	8.0 %	92.0 %	8.0 %	96.9 %	3.1 %	48.7 %	51.3 %
		% within Marital status	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %
		% of Total	70.4 %	29.6 %	92.0 %	8.0 %	92.0 %	8.0 %	96.9 %	3.1 %	48.7 %	51.3 %
Chi2 test		Asymptotic Significance (2-sided)	0.004		0.723		0.771		0.271		0.024	

Own calculation, from: NIDS (2016)

The cross tabulations, especially of labour force participation, raised some concerns about invariance. It is for this reason that panel tabulations and a transition matrices will be run for employment and labour force participation. Table 1.6 indicates the panel tabulation for labour force participation (LFP). The *Overall* column shows that 96.48 per cent of all person-years are found to be participating. The *Between* column at some point all individuals in the data set reported to participate in the labour force, but that 13.03 per cent of them also did not participate at some point. If LFP was time invariant, then the *Within* column would only show 100s. Table 1.6 confirms that LFP is not time invariant, and therefore that the models could still show useful results.

Table 1.6: Labour force participation (LFP) panel tabulation

		Overall		Between		Within
		Freq.	%	Freq.	%	%
LFP	No	1333	3.52	1239	13.03	26.95
	Yes	36585	96.48	9512	100	96.49
	Total	37918	100	10751	113.03	88.48
(n= 9512)						

Own calculation, from NIDS (2016)

The panel tabulation for employment in Table 1.7 shows vastly different results for employment than for LFP. 31.94 per cent of all (person-year) observations are employed. It will be seen that 54.72 per cent of all individuals had been employed at some stage between the years 2008 and 2014, for which the surveys were conducted. The total of the *Between* column shows that 140.8 per cent of the individuals were either employed or unemployed. This means that 40.8 per cent of the sample either made a transition from employed to unemployed, or the other way around. The *Within* column further confirms that there is considerable time variance for the employed variable.

Table 1.7: Employment panel tabulation

		Overall		Between		Within
		Freq.	%	Freq.	%	%
employed	No	23678	68.06	8188	86.08	78.88
	Yes	11110	31.94	5205	54.72	58.66
	Total	34788	100	13393	140.8	71.02
(n= 9512)						

Own calculation, from NIDS (2016)

The transition matrix of LFP in Table 1.8 shows the probability that an individual will transition from participating in the labour force to not participating, and vice versa. There is a 94.62 per cent chance that someone who is not participating will participate in the following year. There is only a 2.25 per cent chance that someone who is participating will not be participating in the labour force in the following year.

Table 1.8: LFP transition matrix

		LFP		
		No	**Yes**	**Total**
LFP	**No**	5.38	94.62	100
	Yes	2.11	97.89	100
	Total	2.25	97.75	100

Own calculation, from NIDS (2016)

The employment transition matrix for employment in Table 1.9 indicates the probability that an individual will transition from/to employment in the following year. There is a 26.16 per cent chance that an individual who is currently employed will not have a job in the next year. There is, however, only a 16.74 per cent chance that an individual who does not currently have employment will be employed in the following year.

Table 1.9: Employment transition matrix

		employed		
		No	**Yes**	**Total**
employed	**No**	83.26	16.74	100
	Yes	26.16	73.84	100
	Total	66.57	33.43	100

Own calculation, from NIDS (2016)

Now that a rough understanding of the data has been overviewed, the model results will be dealt with. The results are presented below for the labour force participation models, followed by the employment models. Thereafter, analysis of the results will be presented for each model separately.

Table 1.10: Labour force participation (LFP) logistic regression results[6]

Characteristics	Model 1	Model 2		Model 3
		Men	Women	Women
Gender	***Odds Ratios***	***Odds Ratios***	***Odds Ratios***	***Odds Ratios***
Man [r]	**1.000**			
Woman	0.512			
	(0.034)			
Marital Status				
Married [r]	**1.000**	**1.000**	**1.000**	**1.000**
Divorced	1.110	0.778	1.182	1.137
	(0.246)	(0.112)*	(0.282)	(0.271)
Widowed	1.229	0.724	1.322	1.310
	(0.196)	(0.118)**	(0.222)*	(0.220)
Cohabit	0.704	0.836	0.735	0.708
	(0.075)	(0.065)**	(0.087)**	(0.084)***
Never married	0.963	0.364	1.107	1.034
	(0.081)	(0.023)***	(0.102)	(0.096)
Population Group				
Black [r]	**1.000**	**1.000**	**1.000**	**1.000**
Coloured	0.776	1.662	0.799	0.825
	(0.090)	(0.137)***	(0.103)*	(0.106)
Asian	0.725	1.205	0.860	0.853
	(0.174)	(0.236)	(0.264)	(0.262)
White	0.803	0.924	0.675	0.647
	(0.221)	(0.126)	(0.195)	(0.187)
Education				
Matric [r]	**1.000**	**1.000**	**1.000**	**1.000**
No schooling	0.482	0.559	0.409	0.415
	(0.063)	(0.055)***	(0.061)***	(0.061)***
Some schooling	0.590	0.558	0.552	0.563
	(0.046)	(0.026)***	(0.051)***	(0.052)***
Tertiary Education				
Degree [r]	**1.000**	**1.000**	**1.000**	**1.000**
Honours	1.000	3.288	1.000	1.000
	(omitted)	(1.354)***	(omitted)	(omitted)
Masters and PhD	1.000	1.773	1.000	1.000
	(omitted)	(0.612)*	(omitted)	(omitted)
Other tertiary education	1.605	1.442	1.645	1.633
	(0.204)	(0.091)***	(0.248)***	(0.246)***

Own calculation, from NIDS (2016)

6 ***, **, * = Statistically significant at 0.01, 0.05, and 0.1. Standard Deviation in brackets.

Table 1.11: Labour force participation (LFP) logistic regression results (continued)[7]

Characteristics ***Gender***	**Model 1** ***Odds Ratios***	**Model 2** **Men** ***Odds Ratios***	**Model 2** **Women** ***Odds Ratios***	**Model 3** **Women** ***Odds Ratios***
Age				
15 – 25	0.620	0.641	0.525	0.473
	(0.064)	(0.050)***	(0.062)***	(0.056)***
26 – 35	0.730	1.971	0.617	0.641
	(0.073)	(0.142)***	(0.070)***	(0.073)***
36 – 45	0.808	1.735	0.705	0.732
	(0.077)	(0.117)***	(0.076)***	(0.079)***
46 – 55 [r]	**1.000**	**1.000**	**1.000**	**1.000**
56 – 65	2.477	0.475	2.244	2.121
	(0.400)	(0.040)***	(0.401)***	(0.380)***
Province				
Gauteng [r]	**1.000**	**1.000**	**1.000**	**1.000**
Western Cape	0.792	0.837	0.764	0.769
	(0.133)	(0.081)*	(0.142)	(0.143)
Eastern Cape	0.753	0.378	0.772	0.785
	(0.109)	(0.030)***	(0.126)	(0.128)
Northern Cape	0.457	0.653	0.437	0.446
	(0.071)	(0.061)***	(0.076)***	(0.078)***
Free State	0.627	0.628	0.626	0.640
	(0.101)	(0.056)***	(0.113)***	(0.116)**
KwaZulu-Natal	0.386	0.433	0.475	0.493
	(0.047)	(0.029)***	(0.066)***	(0.068)***
North West	0.399	0.675	0.444	0.466
	(0.057)	(0.058)***	(0.073)***	(0.077)***
Mpumalanga	0.670	0.735	0.672	0.695
	(0.106)	(0.063)***	(0.120)**	(0.124)**
Limpopo	1.107	0.317	1.137	1.167
	(0.185)	(0.028)***	(0.214)	(0.220)
Non-employment Income				
No non-employment income [r]	**1.000**	**1.000**	**1.000**	**1.000**
Non-employment Income	1.000	0.524	1.000	1.000
	(omitted)	(0.453)	(omitted)	(omitted)
Children				
Don't have children [r]				**1.000**
Have children				0.627
				(0.053)***
Pseudo R^2	**0.048**	**0.066**	**0.039**	**0.043**
Observations	**34578**	**12793**	**21785**	**21785**

Own calculation, from NIDS (2016)

7 ***, **, * = Statistically significant at 0.01, 0.05, and 0.1. Standard Deviation in brackets.

6.1. Labour force participation model 1 (Table 1.10 and Table 1.11)

The first preliminary model that was run (Table 1.10 and Table 1.11) included all the variables mentioned in the equations above, except for the CHILD dummy. The CHILD dummy is not included in this model because the data for having children that live with you was not available for men. The CHILD dummy can therefore only be included in a model that only observes women. Gender is included as a dummy variable in order to get an idea of the differences that can be expected from the two genders in Model 1 (Table 1.10 and Table 1.11). This method was, however, lacking in terms of a more in-depth assessment of how it is that the two genders differ regarding employment and labour force participation, which is why the other two models were subsequently run.

This model simply provides an overarching view of the general characteristics that influence labour force participation in South Africa; refer to Table 1.10 and Table 1.11 above. The main contribution to this model is the dummy variable for gender that shows that women are about half as likely to participate in the labour force as men are. The rest of the variables are interesting, but it is expected that these should differ greatly between the genders and therefore it is unclear how these would differ for the two genders separately.

6.2. Labour force participation model 2 (Table 1.10 and Table 1.11)

In the second model, two separate regressions were run for men and women in order to be able to compare the differences for the two genders (Table 1.10 and Table 1.11). This provides a more thorough perspective of the characteristics that affect employment and labour force participation in South Africa for each gender.

This second model provides a more in-depth view of the differences in the characteristics that influence the labour force participation of women and men in the country: refer to Table 1.10 and Table 1.11. In terms of marital status, women are most likely to participate when they are widowed, 32.2 per cent more probable than when being married. This makes intuitive sense, since widows have lost a source of income, often the main source, and are therefore more likely to seek employment. It also conforms to the theory of the allocation of time (Becker, 1965) because if the husband is deceased, then his potential income relative to hers is irrelevant and she will then choose to participate in the labour force.

Furthermore the probability of women participating in the labour force is, respectively, 18.2 and 10.7 per cent higher when they are divorced or have never been married, than when they are married. This is consistent with the theory of the allocation of time because married women are less likely to participate when married because of the expected higher income of the husband. What is interesting is to note is that women are least likely to participate in the labour force when they are cohabiting, with a probability of 26.5 per cent lower than when they are married. This might be due to cohabiting often being used as a way of substituting marriage and therefore the same can be expected as from marriage. The theory of time allocation therefore also applies here. Added to this effect could be that cohabitation can serve as a means of postponing marriage, which means that it is often younger people who cohabit. This would explain a larger effect when cohabiting than when married. These younger women may have a variety of reasons not to participate in the labour force, such as that they may still be studying, or due to a lack of investment in human capital, consider it unlikely that they will be able to find a job and therefore do not participate. The divorced and never married statistics were statistically insignificant and therefore caution is advised when interpreting these results. For men, the picture looks strikingly different, yet still in line with the theory of the allocation of time. Men are most likely to participate when they are married and have a probability of 63.6 per cent lower when they have never married. The other marital statuses, widowed, divorced, and cohabiting, are 27.6, 22.2, and 16.4 per cent, respectively, less probable to participate than when they are married.

The race variables showed that for both genders, white people had the lowest probability of participating in the labour force (Table 1.10). This is a strange and unexpected result, since Statistics South Africa showed that white people had the largest labour force participation rates (StatsSA, 2016). An explanation may be that white women have more financial security through such sources as parents and husbands that are better off financially, compared with other races. This financial security provides white women with a greater disincentive to work. The results are, however, mostly not statistically significant, which may provide some explanation to the findings.

Both men and women were most likely to participate in the labour force if they had a matric certificate (Table 1.10). In terms of tertiary education, having a degree meant

they would have the highest probability of participating. For women, postgraduate degrees were omitted because of near perfect results. This means that they were almost exactly as likely to participate in the labour force as when they have a degree. The reason for this is possibly due to the very small amount of women with tertiary education in the sample, which is expected from the compensating differentials theory (Grossbard-Schechtman and Neuman, 1988). The probability of participating in the labour force peaked between the ages of 36 and 45 for men and peaked between the ages of 56 and 65 for women. This last result is interesting and may indicate that women tend to retire at a later stage. More studies on this could provide some interesting results. Men had the highest probability of participating in the labour force when they did not receive non-employment income (NEI). For women, the NEI made no difference and therefore was omitted from the model.

6.3. Labour force participation model 3 (Table 1.10 and Table 1.11)

The third and final model that was run (Table 1.10 and Table 1.11) was done in order to capture the effects that children can have on a person's probability of being employed. This is done as a separate model because the dataset with which we worked does not have data on the biological children of men. This limits the usefulness of the third model since it cannot be compared with men. It was however still necessary to add this model because of the impact that a child can have on a woman's participation in the labour market. A child requires much attention and time, and therefore a child greatly increases the opportunity cost of working (Grossbard-Schechtman and Neuman, 1988). Children should therefore serve as a disincentive for women to work.

Women who had biological children still living with them were 37.3 per cent less probable to participate in the labour force (Table 1.11) than women who did not have biological children living with them. This conforms to the theory of Grossbard-Schechtman and Neuman (1988) where household factors such as children should have a negative impact on female labour force participation. The introduction of the child variable had only a marginal effect on the rest of the variables that were illustrated in Model 2. The model does serve its purpose in showing the significance of children on women's labour force participation and employment.

Table 1.12: Employment logistic regression results[8]

Characteristics	Model 1	Model 2		Model 3
		Men	Women	Women
Gender	***Odds Ratios***	***Odds Ratios***	***Odds Ratios***	***Odds Ratios***
Man [r]	**1.000**			
Woman	0.469			
	(0 .012)***			
Marital Status				
Married [r]	**1.000**	**1.000**	**1.000**	**1.000**
Divorced	1.435	0.778	1.927	1.898
	(0.109)***	(0.112)*	(0.174)***	(0.172)***
Widowed	1.085	0.724	1.307	1.304
	(0.065)	(0.118)**	(0.088)***	(0.088)***
Cohabit	1.057	0.836	1.103	1.085
	(0.052)	(0.065)**	(0.075)	(0.073)
Never married	0.869	0.364	1.332	1.302
	(0.030)***	(0.023)***	(0.058)***	(0.057)***
Population Group				
Black [r]	**1.000**	**1.000**	**1.000**	**1.000**
Coloured	1.598	1.662	1.570	1.587
	(0.080)***	(0.137)***	(0.101)***	(0.102)***
Asian	0.973	1.205	0.831	0.835
	(0.120)	(0.236)	(0.138)	(0.138)
White	0.844	0.924	0.811	0.795
	(0.070)**	(0.126)	(0.088)*	(0.086)**
Education				
Matric [r]	**1.000**	**1.000**	**1.000**	**1.000**
No schooling	0.362	0.559	0.279	0.280
	(0.022)***	(0.055)***	(0.023)***	(0.023)***
Some schooling	0.483	0.558	0.441	0.445
	(0.015)***	(0.026)***	(0.017)***	(0.018)***
Tertiary Education				
Degree [r]	**1.000**	**1.000**	**1.000**	**1.000**
Honours	4.240	3.288	4.699	4.772
	(0.938)***	(1.354)***	(1.236)***	(1.255)***
Masters and PhD	2.178	1.773	6.608	6.863
	(0.666)**	(0.612)*	(4.70)***	(4.897)***
Other tertiary education	1.875	1.442	2.180	2.174
	(0.074)***	(0.091)***	(0.110)***	(0.110)***

Own calculation, from NIDS (2016)

8 ***, **, * = Statistically significant at 0.01, 0.05, and 0.1. Standard Deviation in brackets.

Table 1.13: Employment logistic regression results (continued)[9]

Characteristics	Model 1	Model 2		Model 3
		Men	Women	Women
	Odds Ratios	*Odds Ratios*	*Odds Ratios*	*Odds Ratios*
Age				
15 – 25	0.312	0.641	0.234	0.225
	(0.015)***	(0.050)***	(0.015)***	(0.014)***
26 – 35	1.038	1.971	0.812	0.821
	(0.043)	(0.142)***	(0.042)***	(0.043)***
36 – 45	1.341	1.735	1.235	1.254
	(0.052)***	(0.117)***	(0.060)***	(0.061)***
46 – 55 [r]	**1.000**	**1.000**	**1.000**	**1.000**
56 – 65	0.485	0.475	0.475	0.465
	(0.026)***	(0.040)***	(0.032)***	(0.032)***
Province				
Gauteng [r]	**1.000**	**1.000**	**1.000**	**1.000**
Western Cape	0.938	0.837	0.999	1.001
	(0.056)	(0.081)*	(0.077)	(0.078)
Eastern Cape	0.447	0.378	0.497	0.498
	(0.023)***	(0.030)***	(0.034)***	(0.034)***
Northern Cape	0.599	0.653	0.558	0.562
	(0.037)***	(0.061)***	(0.046)***	(0.046)***
Free State	0.688	0.628	0.741	0.748
	(0.040)***	(0.056)***	(0.057)***	(0.058)***
KwaZulu-Natal	0.505	0.433	0.544	0.552
	(0.022)***	(0.029)***	(0.031)***	(0.032)***
North West	0.576	0.675	0.511	0.520
	(0.033)***	(0.058)***	(0.041)***	(0.042)***
Mpumalanga	0.698	0.735	0.661	0.669
	(0.039)***	(0.063)***	(0.050)***	(0.050)***
Limpopo	0.393	0.317	0.452	0.457
	(0.022)***	(0.028)***	(0.034)***	(0.034)***
Non-employment Income				
No non-employment income [r]	**1.000**	**1.000**	**1.000**	**1.000**
Non-employment Income	0.640	0.524	1.369	1.420
	(0.433)	(0.453)***	(1.664)	(1.717)
Children				
Don't have children [r]				**1.000**
Have children				0.859
				(0.034)***
Pseudo R^2	**0.136**	**0.149**	**0.125**	**0.125**
Observations	**34784**	**12897**	**21887**	**21887**

Own calculation, from NIDS (2016)

9 ***, **, * = Statistically significant at 0.01, 0.05, and 0.1. Standard Deviation in brackets.

6.4. Employment model 1 (Table 1.12 and Table 1.13)

The same, as in the case of labour force participation models (Table 1.10 and Table 1.11), can be taken from the first employment models (Table 1.12 and Table 1.13). According to the model, women have a 72.6 per cent lower probability of being employed in South Africa than men do. The rest of the model only shows what traits influence a person's probability of being employed, without showing how these traits differently affect women and men. It does, however, provide an indication of the general trends caused by these characteristics in the country.

6.5. Employment model 2 (Table 1.12 and Table 1.13)

The analysis of this section is derived from the second column in Table 1.12 and Table 1.13. From the high odds ratios for all the marital statuses for women, it is made clear that women are least likely to be employed if they are married. Women are most likely to be employed if they are divorced or if they have never been married, 92.7 and 33.2 per cent more probable, respectively, than when they are married. This means that women are most likely to be employed if they are not living with their partner, married or not. The opposite is true for men. Men are most likely to be employed if they are married or living with a partner. They have a 63.6 per cent lower probability of being employed if they have never been married.

For both genders, coloured people were most likely to be employed (Table 1.12). Coloured women have a 57 per cent higher probability of being employed than black women do. Coloured men have a 66.2 per cent higher probability of being employed than black men do. Asian (Indian) men have a 20.5 per cent higher probability of being employed than black men do, whereas Asian women have a 16.9 per cent lower probability of being employed than black women do. The same anomalies in terms of the strangely low white employment and lack of statistical significance for the race variables are evident, as was the case with the labour force participation in Table 1.10.

Non-employment income (NEI) was omitted when the logistic model was run due to near perfect results (See Table 1.13). This again means that there was almost no discernible difference between women that received NEI and those who did not. Men showed a higher probability of being employed when receiving NEI than when not receiving it. The NEI variable for men was, however, not statistically significant.

6.6. Employment model 3 (Table 1.12 and Table 1.13)

Women who had biological children still living with them were 14.1 per cent less probable to be employed (Table 1.13) than women who did not have biological children living with them were. The introduction of the child variable had only a marginal effect on the rest of the variables that were illustrated in Model 2. Model 3 shows how children can influence labour market outcomes. The limited availability of the data unfortunately restricts our analysis of the influence of children on employment.

7. Conclusion

This study was aimed at providing a deeper understanding of how it is that individual characteristics are valued in the labour market, especially when it comes to marital status. To do this, two perspectives were assumed – the perspective of the individual and the perspective of the employer. This means that both labour demand and supply were taken into consideration. To do this, the same characteristics (marital status, population group, education, age, province, and non-employment income) were used to observe their impact on both labour force participation and employment.

The results of the logistic regressions showed that although the probabilities of the two regressions differed, similar patterns were apparent in both. The same characteristics that increased the probability of participating in the labour force also increased the probability of being employed. The same is also true for the characteristics that contributed least. There are two reasons that can contribute to this phenomenon. The most obvious of these is that those that are employed are, by definition, also participating in the labour force, and they therefore also significantly contribute to the same results. The other reason for this is that it could be reasonable to assume that people know which characteristics are sought by employers, causing those that satisfy these requirements to be less likely to be discouraged and so continue to look for work.

In terms of marital status more specifically, it was striking how marital statuses conversely affect participation and employment of women and men. When men are living with their partner, through either marriage or cohabitation, they were most likely to participate in the labour force and ultimately be employed. The opposite is

true for women in that they are least likely to be employed when living with their partner. This should give insight to policymakers in understanding how differently policies can affect women and men in the labour force. Policies that promote cohabitation and marriage, for example, could improve men's labour force behaviour but distort women's participation and employment.

Future research could look into the change of these characteristics over time, in order to understand how it is that the demand for certain characteristics change over time. Other studies could also do more in-depth analysis of the effects of children in and outside of marriage and the implications on employment and labour force participation. Further, it would be beneficial to undertake more research into the interaction between labour demand and supply, rather than only looking at the one or the other.

The Relationship between Marital Status and Gender Wage Gaps in South Africa

1. Introduction

The marital institution has for the longest time been criticised for its reinforcement of patriarchal norms. The bulk of this criticism appeared in the 1960s and 1970s (Friedan, 1963; Brill, 1967; Millet, 1969; Firestone, 1970; Greer, 1970; Gillespie, 1971; Gordon and Shankweiler, 1971; Felson and Knoke, 1974; French, 1977) when the voices of feminists gained increasing volume due to the sexual revolution causing an escalated awareness of the inequality between men and women. Feminists of the time had much to say about marriage, either opting for it to change or be removed. Since then, marriage as an institution has changed, in most of the world, allowing divorce to become more accessible and thereby changing the grip marriage has on women (Auchmuty, 2012).

Despite this criticism, marriage still proves to be a barrier to equality between women and men. Marriage is an important contributor to changes and variations in the labour force. This is illustrated when men tend to be positively impacted upon by marriage in the form of a marital wage premium, even when provision was made for control variables such as education (Korenman and Neumark, 1991; Hersch and Stratton, 2000). Another way in which men benefit from marriage is through increased labour force participation. Women experience the opposite effect. Women, in many cases, undergo a marital wage penalty and are also less likely to participate in the work force. These results have, however, been found to vary for women (Geist, 2006; Alexandra and Margaret, 2013).

Marriage can affect individual income due to the ability to pool income within the household and also through the social norms that are implied within marriage. This means that in most societies it is expected for a woman to do the housework and the caring of family members, leaving little to no time for income-related work. This is expected to increase the gender wage gap. The time constraints that women face within the household also limit their ability to improve their human capital through studying, which further impedes their ability to generate a higher wage when they do work (Erosa, Fuster, and Restuccia, 2016; Winkler, 1998).

One of the reasons for the importance of observing the income of women, especially in the context of marriage, is because of the influence that income has on the bargaining power of women. The low income of women, relative to men, causes a situation where the man in the marriage has more bargaining power, enabling him to dominate decisions in the household (Aizer, 2010). This basically means that the relative income inequality between women and men in a marriage contributes to women not being equals to their husbands through the mechanism of reduced bargaining power.

Although it is expected that the difference between the income of men and women would now be less than ever before, there is still a long way to go (Winkler, 1998). This is illustrated in the large amount of literature surveying the gender income gap (Weischelbaumer and Winter-Ebmer, 2005). In almost all of these cases, it was found that a gender wage gap exists. The wage differences are often blamed on such factors as education, with the claim that women were less educated and therefore received a lower wage, or the point that the women are less productive because of responsibilities at home. It is for these reasons that a matching approach would be beneficial so that the income of two people with the same characteristics can be compared in order to have a greater understanding of what it is that generates the differences in the income of women and men.

This article is geared towards uncovering the gender wage gap in South Africa and ascertaining how it differs, based on a person's marital status. Looking at wage gaps has its own set of difficulties, for example if all men and women are compared, then there could be a difference in wages due to differences in characteristics, such as education and age. To be able to discover if there is a wage gap, and if this is due to human capital endowments, it stands to reason that only women and men with similar characteristics should be compared; this is also referred to as men and women in common support. Propensity score matching (PSM) allows the calculation of the mean wage of women and men in the common support. Subtracting these two from each other gives the wage gap, given that men and women have the same characteristics. This wage gap therefore illustrates the differences in wages between the genders due to unforeseen characteristics and discrimination. The wage gap will be calculated for each of the marital statuses separately, so that the impact of marital status on wage discrimination can be uncovered.

In the next section a better understanding of the calculation of a gender wage gap will be explained, in which PSM and methods that are more traditional will be compared. After that, the third section provides the theoretical background for the current study, followed by the fourth section in which the data and methodology of the study is explained. In section five the empirical results of the models will be presented and discussed.

2. Theoretical overview

Mincer (1974) developed what came to be known as the Mincerian earnings equation, where the logged income is seen as a function of schooling and potential labour market experience. This research has become seminal in understanding the role that human capital has on a person's earnings. It is expected that education and experience should have a positive impact on earnings. This Mincerian earnings function will be used as the foundation from which the model will be built.

Human capital theory as developed by Becker (1975) further highlights the importance of individual characteristics that make up human capital, especially education and experience. The theory states that investment in human capital will inevitably increase the value of that human capital, resulting in higher wages. The expected return on this investment is important in determining if future investment will take place. Women expect to get a lower yield, in the form of wages, for their investment in education than men do, because of more breaks from employment. They are therefore less likely to invest in education. Firms are also less likely to hire women because of lower yields for their investment. This results in a cycle of lower employment and lower wages for women.

Becker (1981) further develops the household specialisation theory that uses the incentive to invest in human capital as an explanation as to why women experience a marriage penalty. Becker argues that specialisation of labour and time should be significant in the family and therefore the acquisition of human capital should also be specialised. Because a lower wage for women is expected, in the labour market, men tend to increase their human capital that would increase their value in the labour market even more, and women then specialise in home work. This process results in married women having lower human capital and also receiving lower wages in the labour market. Because the option of specialisation is not present for

unmarried groups, it could be expected that there is increased value for single women to invest in human capital.

In theory, exceptional emphasis is placed on the importance of individual factors that increase productivity, especially education. Human capital is considered to be the mechanism through which marriage should impact on income. It is therefore theorised that married women would have less time to devote to increasing their human capital, resulting in lower wages for married women in comparison with unmarried women.

These theories will be used when setting up the current study, but because of the methodology that will be used, these theories will in essence also be put to the test. Human capital theory will be used when the individual characteristics of individuals are considered as the factors influencing income. Propensity score matching (PSM) does, however, allow a comparison of the mean wages of groups with similar characteristics. This means that if it is found that there is still a gender wage gap when comparing similar individuals that are married, there has to be a different reason than specialisation for that gap.

3. Literature review

This literature review covers studies that used individual characteristics to calculate a wage gap in South Africa in the last ten years (2007–2016). These studies covered time periods as early as 1995, and up to as late as 2007. All of these studies are therefore dated prior to the financial crisis of 2008. The 2008 to 2009 recession, in South Africa, was caused by the financial crisis and resulted in devastating changes to the labour force (Verick, 2012). The results of these studies should therefore be interesting to compare with this paper, since the data that will be used for this paper spans from 2008 to 2014 (NIDS, 2016).

Ntuli (2007) examined the gender wage gap in South Africa with the aim of discovering if women, in formal employment, have a limitation in terms of progression of their careers (‘sticky floor’), or if there is a limitation in terms of the jobs that are available to them (‘glass ceiling’). This is done by running a quantile regression and gender wage decomposition. The data that was used came from the September Labour Force Survey (LFS) of 2004 and the October Household Survey

(OHS) for the years 1995 and 1999. The dependent variable for these regressions was the real monthly income. The independent variables were children younger than fifteen years and older than six years, various occupations, various industries and provinces, and a dummy for marital status. The human capital dependent variables were age, age squared, log of hours working, and education.

The results revealed that there was a larger wage gap among the higher wage quantiles (Ntuli, 2007). The wage gaps therefore indicated that there is a sticky floor for women in the South African labour force. This is because of the apparent increased discrimination against women who earn wages in the upper wage quantiles. This study may not have focused on marital status, but included it as a control variable. Seeing that marital status is the focus of the current study, the marital status will specifically be looked at. Ntuli (2007) found that in 1995, marital status decreased women's wages for all of the wage quantiles and increased men's wages in all of the quantiles. In 1999, only the lowest quantile of women's wages decreased due to marriage, whereas the rest increased because of marriage. For men, marriage increased wages in all of the quantiles. Men's wage increase due to marriage was considerably higher than that for women. In 2004, marriage increased the wages of both men and women in all quantiles of the wage distribution. Men received a larger increase caused by marriage than women did. The wage gap increased for the lowest three quantiles and decreased for the upper two quantiles from 1995 to 2004.

Bhorat and Goga (2012; 2013) produced two seminal studies on the gender wage gap in South Africa. The first of these (Bhorat and Goga, 2012) analysed the gender wage gap for Africans in South Africa from 2001 to 2007. The September LFS was used to run regressions for women and men and then to decompose them through a Blinder-Oaxaca (BO) decomposition method. Earnings are the dependent variable in their model, with education, experience, location, occupation groups, industry, a public sector dummy, a formal sector dummy, a self-employment dummy, and a marriage dummy.

Bhorat and Goga (2012) found that the explained portion of their BO decomposition has decreased over time, but that the unexplained portion had not changed significantly. The unexplained portion of their gender wage gap accounted for 78.2

per cent of the gap. This portion is argued to be due, in part, to discrimination, although it could also account for unseen variables. The gender wage coefficient, with male as the reference coefficient, was shown to decrease from 0.191 in 2001 to 0.086 in 2007. The impact of marriage on the earnings of men decreased from a coefficient of 0.127 in 2001 to 0.096 in 2007. For women, the marriage coefficient was 0.050 in 2001, decreasing to 0.013 in 2007. This shows that there is a considerably larger impact of marriage on earnings for men than for women. It also hinted at a deteriorating role that marriage plays on income. This regression did not, however, consider the role of any other marital status, such as cohabitation, which may have affected the wage gap differently.

Bhorat and Goga (2013) returned the following year with an attempt at better analysing the gender wage gap in South Africa. In this article, a re-centred influence function (RIF) was used to decompose the gender wage. The analysis of the wage gap is done across the wage distribution. The September LFS for 2007 was used in this endeavour. The RIF replaces the normal income variable as the dependent. The independent variables used are education, occupations, industries, a public employment dummy, experience, experience squared, a formal employment dummy, a self-employment dummy, and a marriage dummy.

Bhorat and Goga (2013) found that there was a larger wage gap in the lower quantiles of the wage distribution, and that 'pure discrimination' made up the largest portion of the wage gap between the 20^{th} and 50^{th} quantiles. They also found that there were positive, unexplained contributions between the 70^{th} and 90^{th} quantiles. Marriage caused a significantly positive income for men in the lower portion of the wage distribution, up to the 60^{th} quantile. For women, there was also a significantly positive impact that was caused by marriage. This positive impact was, however, only seen for some higher wage quantiles (60^{th}, 70^{th}, and 90^{th}).

The literature on the South African gender wage gap shows that a positive wage gap can be expected across the board. This means that men are expected to earn more than women do. In terms of marriage, it was found that women's wages decrease when married and that men's wages increase, causing an increase in the gender wage gap. A focus on marriage is missing in the literature, with marriage in each

case only treated as a control variable. This article aims to rectify this shortcoming in the South African literature on the wage gap.

4. Data and methodology

In order to calculate and decompose the gender wage gap in South Africa, data from the National Income Dynamics Survey (NIDS, 2016) was used for all of the available years spanning from 2008 to 2014. NIDS is a nationally representative individual and household survey that collects data of approximately 28 000 individuals and 7 300 households. Missing observations on any of the key explanatory variables were deleted, along with all unemployed persons, as they do not earn a wage. The final sample consisted of 9 923 observations.

4.1. Blinder-Oaxaca decomposition

Blinder (1973) and Oaxaca (1973) formulated a decomposition method in which an ordinary least squares linear regression is run for the different groups (for which the wage gap needs to be analysed) in order to discover the wage differentials of those different groups. Thereafter, the wage gap is calculated and decomposed into the portion that is explained by the differences in characteristics (E), and the portion that is attributable to unseen variables (C). Most studies done on wage gaps, including gender wage gaps, use the BO decomposition (Weischelbaumer and Winter-Ebmer, 2005).

The Blinder-Oaxaca (BO) decomposition technique requires that a linear regression be run for both genders separately, such that:

$$W_i = \beta X_i + \epsilon_i \qquad (1)$$

where:

$W_i \rightarrow$ The log wage rate for the ith worker.

$X_i \rightarrow$ A vector of individual characteristics.

The mean wages can then be written as:

$$\overline{W}_m - \overline{W}_f = \left(\bar{X}_m - \bar{X}_f\right)\hat{\beta}_m + \left(\hat{\beta}_m - \hat{\beta}_f\right)\bar{X}_f \equiv E + C \qquad (2)$$

where:

$\bar{W}_m$ and $\bar{W}_f$ → The mean log wages for males (m) and females (f).

$\bar{X}_m$ and $\bar{X}_f$ → The mean characteristics of males and females.

$\hat{\beta}_m$ and $\hat{\beta}_f$ → The estimated parameters for males and females from equation (1).

E → Difference due to characteristics

C → Difference due to coefficients.

The aim of this BO method would then be to uncover the unexplained residual which could explain other unseen forces driving the wage gap, such as discrimination. The purpose of this method is to determine the counterfactual wages that men (women) would earn if they had the human capital endowments of women (men).

4.2. Propensity score matching (PSM)

Propensity score matching (PSM) is a statistical method in which a "treatment" is given to a randomised group, called the treated group. A control group is then set such that their mean characteristics are similar to those of the treated group. The idea is to then compare the mean of the variable that should be affected between the two groups. In this way, it is possible to compare two groups with similar characteristics.

There are various methods through which the PSM can be done, as opposed to exact matching in which two observations need to be found with exactly the same characteristics. There may be only a limited amount of observations with exactly the same characteristics, especially when there are many characteristics that are looked at (Gunderson, 2016). Two of the PSM weighting methods that are best suited for analysing the wage gap are nearest neighbour matching (NNM) and kernel matching (KM). In NNM, individual observations from the control group with propensity scores closest to those of the observations in the treated group are chosen. In KM, the weighted averages of all the observations in the control group are used to match with the observations in the treated group (Caliendo and Kopeinig, 2008).

Ñopo (2008) published a paper in which propensity score matching (PSM) is presented as an alternative to the Blinder-Oaxaca (BO) decomposition approach. The study utilised household data from *Encuestas Nacionales de Hogares* and

Encuesta Especializada de Empleo, two Peruvian surveys for the time period between 1986–1995 and 1996–1999, respectively.

Ñopo (2008) provides the following decomposition method when using matching. First, the mean wage for women is given by:

$$m_w(x) \equiv E[Y|X = x, D = w] \quad (3)$$

and the mean wage for men:

$$m_m(x) \equiv E[Y|X = x, D = w] \quad (4)$$

where:

$m_w(x)$ and $m_m(x) \rightarrow$ mean wage for women and men, given their set of characteristics.

If $f_w(x)$ and $f_m(x)$ are then set as the distribution of characteristics among women and men, this leads to the definition of the subpopulations with and without common characteristics. When groups of women and men have comparable characteristics, they are considered to have common support. Therefore, S can be defined as the common support for f_w and f_m. $\bar{S}$ is the compliment of S. With this notation, the average wage of women can be set as:

$$E[Y|D = w] = (E_{\bar{S}}[Y|D = w] - E_S[Y|D = w]) \cdot P_{\frac{\bar{S}}{w}} + E_S[Y|D = w] \quad (5)$$

and for men:

$$E[Y|D = m] = (E_{\bar{S}}[Y|D = m] - E_S[Y|D = m]) \cdot P_{\frac{\bar{S}}{m}} + E_S[Y|D = m] \quad (6)$$

The gender wage gap can then be found by subtracting (5) from (6), which would look as follows:

$$\begin{aligned} E_S[Y|D = m] - E_S[Y|D = w] \quad (7) \\ = (E_{\bar{S}}[Y|D = m] - E_S[Y|D = m]) \cdot P_{\frac{\bar{S}}{m}} \\ - (E_{\bar{S}}[Y|D = w] - E_S[Y|D = w]) \cdot P_{\frac{\bar{S}}{w}} + \{E_S[Y|D = m] \\ - E_S[Y|D = w]\} \end{aligned}$$

As with the Blinder-Oaxaca decomposition (Equation (2) above), this wage gap can be split up into two parts. The first of these two illustrates the portion of the wage gap that is caused by varying distributions of the characteristics of men and women. The second part illustrates the part that is not explained by the distribution of characteristics, and can therefore not be explained. It is possible that part of this unexplained part can show discrimination in the labour force, although it could also indicate other unseen factors.

Ñopo (2008) found that it is important to only consider the observations that are comparable when decomposing the gender wage gap. An overarching average wage gap of 28 per cent was found. The results revealed a larger dispersion of the unexplained wage differences amongst married individuals than single individuals. Further results also indicated that there was a larger wage gap with individuals that were more educated. The study also found that there were certain combinations of characteristics that were only found in men that were highly rewarded in the labour market (Ñopo, 2008).

Frölich (2007) also presented an alternative to the Blinder-Oaxaca (BO) method to decomposing wage gaps. The fault that was identified by Frölich (2007) in the previous methods was that they did not take into account the fact that so many observations in the sample could not be compared with one another because they had different characteristics, yet previous studies had continued to compare all observations in the sample. The BO method resulted in an overestimation of the unobserved portion of the wage gap. By using Propensity Score Matching (PSM), those variables that are not comparable with similar observations are excluded from the regression, in an attempt to gain a more accurate decomposition of the wage gap.

The study by Frölich (2007) continued to apply the PSM to analyse the gender wage gap among graduates in the UK. The aim of the study was to determine the importance of the subject studied by the graduates. The results showed that the subject of the degree studied had an important impact on the gender wage gap for college graduates in the UK. The results were also found to show a larger impact of the subject of degree in the PSM model than in the BO linear decomposition.

A core difference between matching and BO is that matching is nonparametric and BO is parametric. This difference means that while BO specifies a linear regression as was illustrated in equation (1), matching is left unspecified (Frölich, 2007). Leaving the regression unspecified allowed the determination of the effects, without forcing the results to look a certain, preordained way. The other difference between BO and matching is that, for the BO method, the counterfactual mean wage is calculated for the entire population, whereas with matching, the counterfactual mean wage is only calculated for the portion of the population where men and women share the same characteristics (Frölich, 2007). This is beneficial because it allows for more accurate determination of whether men receive a higher wage because of the characteristics they possess or because of a bias in the labour market.

Analysing the gender wage gap in South Africa will take two steps in this paper. First, a linear Blinder-Oaxaca decomposition will be conducted, mostly so that it can be compared with the results from the propensity score matching. Propensity score matching, which is the second step, will be conducted. The two different PSM weighting methods, kernel matching (KM) and nearest neighbour matching (NNM), discussed above are used, which serves as a robustness check. In order to achieve greater in-depth understanding of the wage gap, various combinations of variables will be used when conducting propensity score matching, and these will be discussed further where the results are shown.

First, five Blinder-Oaxaca (BO) decompositions will be conducted, one for each marital status. This means that two linear regressions, one for each gender, will be run which will then be decomposed into the portion explained by the coefficients (C) and the portion explained by the characteristics (E). The equation that will be used for the BO decomposition is the same as equation (2). The characteristics that will be used are:

Marital status: A set of dichotomous variables with the following categories; married, divorced, widowed, cohabiting, and never married.

Schooling: A categorical variable indicating a person's level of secondary schooling.

Tertiary education: A categorical variable indicating a person's level of tertiary schooling.

Province: A set of dichotomous variables with each of South Africa's nine provinces as a category.

Age: A continuous variable indicating a person's age, and ranges from 15 to 65.

Age^2: A continuous variable where the respondent's age is squared.

Union: A dichotomous variable where 1 indicates that the respondent is a member of a union and 0 the respondent is not.

In order to be able to use propensity score matching (PSM) to better understand this wage gap, various PSM models will have to be run. Five different groups will firstly be established according to each of the marital statuses that have been identified. For each of these groups, fifteen models will be run with various combinations of variables. Each of those fifteen models will also be run through four different PSM methods in order to check for robustness in the model. The same variables that were used in the BO decomposition will also be employed in the PSM.

Gender will be set as the "treatment" and the analysis will be concerned mostly with the average treatment effect on the treated (ATT). The ATT will show the counterfactual wage of men if they had the same characteristics of women. Those characteristics that are going to be set equal are the variables that are used in the model regression. In other words, the ATT will indicate a combination of the average wage discrimination and the unseen characteristics that could not be taken into consideration. Theoretically, the ATT can have the following equation:

$$ATT = E(\tau|D = 1) = E[Y(1)|D = 1] - E[Y(0)|D = 1]$$

where:

τ $\rightarrow$ The treatment effect

$E[Y(1)|D = 1] \rightarrow$ The mean wage for the treated (i.e. the mean wage of men)

$E[Y(0)|D = 1] \rightarrow$ The counterfactual mean wage for those that are not treated (i.e. the mean wage for women with the same characteristics as the men)

5. Results

In this section of the paper, the results of the paper will be discussed. This will start off with Blinder-Oaxaca (BO) decomposition so that an idea of the wage gap can be established. After the analysis of the BO decomposition results, analysis of the gender wage gap will be improved by using non-parametric propensity score matching (PSM).

5.1. Blinder-Oaxaca (BO) decomposition

In order to execute BO decomposition, two linear regressions were run for each gender. The dependent variable is income and the independent variables are the same as those discussed in the previous section. In Table 2.1, the decomposition results are shown. This shows an overview of the results. It indicates that the part of the gender wage gap that is due to unexplained coefficients (C) is positively related to the gender wage gap, increasing the wage gap by 36.9 per cent, and that the section due to characteristics (E) is negatively related to the wage gap, decreasing the wage gap by 15 per cent. Both of these are also statistically significant.

Table 2.1: Decomposition Results

High outcome group: man		**Low outcome group: woman**		
ln(income)	**Coefficient**	**Std. Err.**	**P>z**	**Pct.**
E	-0.150	0.023	0.000	-68.545
C	0.369	0.056	0.000	168.550
R	0.219	0.049	0.000	
Number of observations = 9847				

Own calculation, from NIDS (2016)

Table 2.2: Difference due to Characteristics (E) and Coefficients (C)

	(E)		(C)	
ln(income)	**Coefficient**	**Std. Err.**	**Coefficient**	**Std. Err.**
Married	-0.003	0.009	0.033	0.058
Divorced	0.002	0.011	0.003	0.015
Never married	0.010	0.003***	-0.057	0.083
Widowed	-0.017	0.006***	-0.007	0.008
Cohabiting	0.000	0.000	0.000	0.000
Schooling	-0.043	0.005***	1.001	0.275***
Tertiary education	-0.045	0.007***	-1.022	0.382***
Gauteng	0.002	0.001*	-0.103	0.037***
Western Cape	-0.002	0.002	-0.020	0.023
Eastern Cape	0.000	0.000	0.009	0.011
Northern Cape	-0.005	0.003	-0.007	0.012
Free State	-0.002	0.001***	-0.003	0.013
KwaZulu-Natal	0.017	0.010*	-0.052	0.035
North West	-0.029	0.013**	0.000	0.000
Mpumalanga	0.007	0.005	0.019	0.013
Limpopo	0.002	0.001**	-0.019	0.015
Age	-0.016	0.036	-1.425	1.055
Age^2	-0.016	0.033	0.666	0.532***
Union member	-0.010	0.002***	-0.131	0.043*

Own calculation, from NIDS (2016)

Table 2.2 shows the results for the variables of each of the sections of the BO decomposition. The section of the wage gap that is attributable to the characteristics (E) illustrates the portion of the wage gap that is explained by the variables that are used in the regression. The section of the wage gap in income that is due to the coefficients (C) illustrates the portion of the wage gap that is caused by factors that are not explained by the variables that are used in the regression Cohabiting was dropped from the regression because of an insignificant change to the gender wage outcome. Being married and widowed resulted in a decrease of the gender wage gap, whereas being divorced and never having married resulted in an increase in the gender wage gap. The unexplained portion of the marital statuses showed a different story. The unseen effect of never having married and being widowed both decreased the gender wage gap, whereas being married or divorced increased the unseen portion. For all of the marital statuses, except for being widowed, the unseen effect is larger than the explained effect.

What these results mean is that there is evidence of negative discrimination against women that are married and women that are divorced. This is predicted by the

household specialisation theory (Becker, 1981) because women that are married do not invest in human capital as much, because it is the man that specialises in labour market activities. The lower levels of human capital then result in lower wages. The same counts for women that are divorced, because when they were married they did not invest as much in human capital. If a woman has never married, it falls on her to invest in human capital, leading to higher wages and a reduced wage gap. The interesting result here is that for widowed women, who actually earn more than widowers do. From specialisation theory, it was expected that the result would be similar to that for divorced women, yet the results were very different. Further investigation into this phenomenon is required to better understand this dynamic.

Education tended to decrease the wage gap, although the unseen portion of secondary education mitigated this positive effect. This result is counter to the household specialisation theory (Becker, 1981), because it would imply that the returns of human capital investment for women is greater for women than for men, since it reduces the wage gap. The wage gap is reduced for those living in the Western Cape, Northern Cape, Free State, and the North West. The wage gap was, however, increased in all of the other provinces. The section of the wage gap that can be explained through the age squared had a decreasing effect on the gender wage gap, although the unseen section had a larger and increasing effect on the gap. Being part of a union increased the wage gap, both through the seen and unseen sections.

Table 2.3: Wage gap as a percentage of matched women's mean wages

		Married		Cohabiting		Widowed		Divorced		Never married	
	Matched Variables	**KM**	**NNM**	**KM**	**NNM**	**KM**	**NNM**	**KM**	**NNM**	**KM**	**NNM**
1	age	115.46 %	121.04 %	39.41 %	32.36 %	38.74 %	39.74 %	15.67 %	21.90 %	186.13 %	188.53 %
2	education	149.72 %	155.71 %	41.10 %	37.79 %	9.90 %	27.14 %	5.03 %	-10.52 %	359.43 %	373.46 %
3	province	114.32 %	114.80 %	38.59 %	39.07 %	49.50 %	44.60 %	13.23 %	16.48 %	164.21 %	163.62 %
4	population group	119.91 %	120.03 %	44.89 %	44.45 %	-1.09 %	-1.09 %	21.28 %	21.80 %	155.53 %	156.43 %
5	union	82.95 %	82.95 %	27.31 %	27.31 %	5.02 %	5.02 %	-0.28 %	-0.28 %	165.97 %	167.25 %
6	Age and education	141.92 %	157.96 %	42.85 %	10.35 %	8.09 %	10.22 %	10.80 %	-9.85 %	453.64 %	461.31 %
7	Age and province	113.31 %	117.84 %	38.33 %	22.93 %	52.54 %	93.68 %	15.57 %	36.12 %	183.57 %	187.94 %
8	Age and population group	115.18 %	123.88 %	45.92 %	44.08 %	0.88 %	56.22 %	20.11 %	36.14 %	180.80 %	184.89 %
9	Age and union	79.33 %	84.15 %	27.10 %	24.94 %	4.57 %	-4.20 %	2.13 %	0.92 %	180.94 %	179.01 %
10	Education and province	154.49 %	166.88 %	50.90 %	101.42 %	-0.04 %	0.64 %	8.81 %	17.28 %	383.69 %	400.49 %
11	Education and population group	152.87 %	164.49 %	49.52 %	42.90 %	-0.23 %	87.76 %	7.49 %	-24.93 %	344.32 %	332.06 %
12	Education and union	148.69 %	152.36 %	30.29 %	24.99 %	-8.70 %	10.35 %	2.17 %	-6.51 %	375.21 %	385.94 %
13	Province and population group	126.90 %	119.97 %	43.27 %	43.01 %	42.44 %	27.05 %	23.45 %	23.52 %	153.44 %	156.23 %
14	Province and union	79.19 %	73.80 %	27.59 %	26.67 %	0.94 %	7.01 %	1.78 %	5.41 %	166.26 %	169.56 %
15	population group and union	83.82 %	84.70 %	34.62 %	35.36 %	-22.49 %	-22.52 %	0.80 %	-0.58 %	150.35 %	156.86 %

Own calculation, from NIDS (2016)

Table 2.4: Wage gap as a percentage of matched women's mean wages (continued)

		Married		Cohabiting		Widowed		Divorced		Never Married	
	Matched Variables	**KM**	**NNM**	**KM**	**NNM**	**KM**	**NNM**	**KM**	**NNM**	**KM**	**NNM**
16	age, education, and province	148.12 %	167.05 %	44.93 %	72.75 %	-9.54 %	-19.94 %	23.97 %	51.21 %	460.79 %	487.54 %
17	age, education, and population group	147.40 %	162.63 %	49.90 %	62.18 %	-4.30 %	159.14 %	4.44 %	-9.40 %	424.67 %	467.28 %
18	age, education, and union	140.43 %	146.75 %	44.44 %	40.39 %	-10.28 %	117.21 %	8.71 %	-3.74 %	449.46 %	446.11 %
19	age, province, and population group	112.23 %	142.01 %	42.41 %	25.99 %	4.55 %	76.17 %	20.04 %	35.40 %	178.96 %	187.53 %
20	age, province, and union	76.84 %	100.77 %	28.18 %	10.55 %	4.27 %	41.13 %	6.15 %	-1.30 %	180.38 %	184.26 %
21	age, population group, and union	78.08 %	89.69 %	35.71 %	32.24 %	-21.50 %	18.58 %	0.06 %	2.41 %	175.84 %	175.60 %
22	education, province, and population group	159.60 %	190.29 %	47.59 %	78.50 %	-2.94 %	-40.02 %	12.34 %	-13.93 %	374.10 %	409.24 %
23	education, province, and union	154.29 %	155.68 %	37.28 %	55.50 %	20.76 %	0.27 %	12.54 %	10.77 %	400.03 %	419.34 %
24	education, population group, and union	154.96 %	172.75 %	49.18 %	59.89 %	-52.50 %	-61.03 %	2.09 %	-25.91 %	358.34 %	334.77 %
25	province, population group, and union	88.03 %	73.02 %	30.69 %	32.32 %	-15.68 %	10.80 %	3.19 %	5.42 %	157.45 %	157.78 %
26	age, education, province, and population group	153.81 %	160.98 %	45.79 %	61.87 %	-2.95 %	355.29 %	35.10 %	38.52 %	445.80 %	486.06 %
27	age, education, province, and union	148.06 %	155.83 %	35.74 %	62.74 %	24.62 %	61.08 %	20.27 %	18.72 %	459.30 %	453.03 %
28	age, education, population group, and union	148.95 %	104.29 %	49.13 %	55.75 %	-51.26 %	-59.60 %	2.84 %	-11.95 %	419.60 %	441.70 %
29	age, province, population group, and union	77.56 %	79.82 %	30.98 %	19.76 %	-26.65 %	-11.29 %	8.19 %	-25.22 %	175.71 %	184.00 %
30	education, province, population group, and union	159.11 %	170.89 %	51.32 %	48.69 %	-8.97 %	62.79 %	13.42 %	-13.26 %	386.25 %	406.07 %
31	age, education, province, population group, and union	154.25 %	148.20 %	54.04 %	32.67 %	-4.49 %	55.23 %	24.55 %	26.20 %	442.66 %	516.02 %

Own calculation, from NIDS (2016)

5.2. Propensity score matching (PSM)

The propensity score matching (PSM) results can be seen in Table 2.3 and Table 2.4. These two tables show the wage gap as a percentage of matched women's mean wages. The results in real terms can be seen in the Appendix in Table 3.16 and Table 3.17. Thirty-one different PSM models were run with various combinations of variables. This was done in an attempt to determine the effects on the wage gap when specific personal traits are similar to those of the opposite sex. Each of these variables is replicated for a different marital status. The marital statuses used are married, cohabiting, widowed, divorced, and never married. Furthermore, as a robustness check, the PSM was done in two different methods, kernel matching (KM) and nearest-neighbour matching (NNM).

The general tendency is for the wage gap to be largest among those that have never been married, with those that are currently married having the second largest wage gap. Unlike the BO model, the PSM model only looked at the wage gap of those individuals with similar characteristics. It is for this reason that there would not be differences in human capital investment to explain why there is a wage gap. Other factors, which have not been tested for, may be the cause of these wage gaps. It could be that women are grouped in certain low-paying industries which have not been controlled for. It could also be that there is greater discrimination against women that are younger and unmarried, and women that are married and not necessarily looking for full-time employment. The smallest wage gap is among those that are widowed. There are some cases in which a negative wage gap is observed for widowed people. This means that widowed women earn a higher mean wage than widowed men do. This result is strange and unexpected, but confirms what was found in the BO model.

In the first five cases, men and women were matched on only one of the variables that are being used. Here, the wage gap between men and women can be seen if, for example, they have the same education. It is interesting to note here how matching groups on specific character traits can affect the wage gap differently for people with different marital statuses. When matching on education alone, for example, the wage gap for those that have never been married is 359.43 per cent of the women's mean wages. To put this in perspective, it means that given that they

share similar education and that both men and women have never married, men earn 359.43 per cent of what women earn, or 259.43 per cent more than women do. For divorcees, the wage gap was 5.03 per cent of women's mean wages, when matching on education only. For each of the cases where men and women were matched on only one of the variables, those that have never been married faced the largest wage gap. Divorcees faced the smallest wage gap, except when only the population group was matched. In the case where only the population group is matched, there is a negative wage gap of 1.09 per cent of women's mean wages. This means that widows earn 1.09 per cent of their mean wage more than widowers of the same population group do.

This provides a preliminary indication of the gender wage gaps by marital status. Here, it is clear that women who have never married are far worse off than men that have never been married are, regardless of the characteristic that is controlled for. PSM also provides unique perspectives. For example, by matching education, to a large degree the theories that base discrimination on human capital investment are left void and a different form of direct or indirect discrimination should be considered.

In the models where two, three and four variables were used to match men and women, those that have never been married consistently had the highest wage gap. Being widowed resulted in the lowest wage gap most of the time, alternating with those that are divorced, or separated. In many cases, widows had a higher wage when comparing them with widowers with the same characteristics. Those that are married and those that are cohabiting have large wage gaps, regardless of the characteristics being matched, but none as high as those that have never married. In all of the cases, the wage gap was smaller when cohabiting than when being married.

In the final model that was run, all of the variables that were available were used to match. In this model, the wage gap between men and women of similar ages, education level, living in the same province and being part of the same population group can be observed. The largest wage gap is again found among those that have never married, with a wage gap that is 442.66 per cent that of the matched women's mean wages. The second largest wage gap was found among married men and women at 154.25 per cent of the matched women's mean wages. Widows

earned 4.49 per cent of their wage more than did widowers with all of those characteristics being similar. The large differences in the gender wage gaps between people with different marital statuses show that there are unseen factors affecting the gender wage gap. These factors are not captured in the model's variables, yet relate to marital status and contribute to gender inequality.

5.2.1. Blinder-Oaxaca vs. propensity score matching

The PSM calculation of the mean gender wage gap was done separately for each of the five marital statuses. The highest wage gaps were found among those that have never married. Widows and widowers experienced the lowest gender wage gaps, and in some cases even negative wage gaps. This corroborates the story told by the BO decomposition. Married people had the second largest gender wage gap of all the marital statuses and never had a negative wage gap, according to the PSM results. This is interesting because it shows different results to those found through the BO decomposition. A reason for these disparities could be that the BO decomposition is linear, whereas the PSM is non-parametric. Income proves to be an obstacle to marriage, especially for the lower income groups because of such practices as ilobolo (bride wealth payments) (Posel and Rudwick, 2015). There is also a disproportionate amount of white people in the higher income brackets who do not subscribe to ilobolo. Therefore, marriage may occur more in the higher income categories, resulting in a nonlinear relationship between income and marriage. PSM would then be more suited to explaining the influence of marital status on the wage gap.

6. Conclusion

The gender wage gap was, and continues to be, an important tool for understanding the differences, in the experience of the labour force, between men and women. The importance of the gender wage gap has remained constant, but the way in which it is measured is evolving. Propensity score matching as a tool to decompose the gender wage gap is central to this evolution and has not, until now, been done for South Africa.

In this paper, the gender wage gap has been thoroughly analysed by first creating a 'normal' Blinder-Oaxaca (BO) decomposition and then continuing to calculate the gender wage gap by utilising propensity score matching (PSM). PSM allowed for the

calculation of a wage gap between men and the counterfactual wage if they had all the same characteristics as they currently do, but had a different gender.

From the BO decomposition (Table 2.1 and Table 2.2), it can be observed that there are forces that greatly increase the gender wage gap but that are not seen within the characteristics that are specified. The influence of the observed characteristics actually decrease the gender wage gap overall, but not enough to counter the unobserved effect. The unobserved portion of the wage gap has been used to indicate discrimination. This is, however, not necessarily the case since there are various variables that could not be observed, but that might influence the wage gap. Being married and widowed decreased the gender wage gap. Divorcees and especially those that have never married had increased gender wage gaps.

The existence of a wage gap, despite having controlled for individual characteristics, shows that there are more factors that influence the disparity of wages between men and women. The gender wage gap has very complex dynamics. It is for this reason that analysing the wage gap by looking at individual characteristics is not enough to explain the wage gap in its entirety. There are structural factors that need to be investigated further to better understand the dynamics of the gender wage gap and in so doing, attain a better understand how to mitigate such a gap.

What was found in this paper is that, looking solely at wages as the outcome of marriage, women find themselves in a catch-22 position where the worst position they can be in is to never be married and the second worst is to be married. Of course, marital status is only one aspect that influences the lives of individuals, both men and women. However, because of the apparent economic impact that marriage as an institution has, understanding this important social construct could bring great insight into understanding inequality better. Only by understanding inequality, can steps then be taken to mitigate that inequality.

Conclusion

The labour market of any country, including South Africa, is a complex structure with thousands of variables that influence, and are influenced by, thousands of other variables. Understanding the complexities of a fault in the system is a complex and possibly endless endeavour. The fault that was chosen as the focus of this dissertation is the inequality between men and women in the South African labour market, and the variable that was chosen was marital status. Marital status has often been the focus of research that considers it to be either the cause or result of labour market outcomes.

Two areas of the labour market are concentrated on in the dissertation and each received its own chapter (article). First, participation in the labour force along with employment was analysed. The second article considered wage differences between men and women by constructing gender wage gaps for South Africa. Each of these focused more specifically on the impact that a marital status can have on their respective outcomes.

The first article, which investigates labour force participation and employment in South Africa, was conducted by using nationally representative NIDS data for four waves spanning from 2008 to 2014 (NIDS, 2016). Various logistic regressions were conducted for both labour force participation and employment in order to capture the individual characteristics that influence these variables. The inclusion of the analysis of employment through the lens of individual, supply side, characteristics is a major contribution of this study. Normally, employment is analysed by looking at macro variables. This is not incorrect, but tends to overlook the decisions that firms make about whom to employ. In South Africa where there is considerable labour supply and limited demand for labour, employers have more control in choosing their employees. For this reason, analysing employment through individual characteristics is important to better understand the labour market. The study found that marital status did indeed have an impact that is very different for men, in comparison with women. The probability of participating in the labour force and of being employed was maximised for men when they are either married or living with their partner. The opposite is true for women.

The second article investigated the disparity in wages between men and women and how that disparity is different within each marital status. To do this comparison, NIDS data for the years 2008 to 2014 was again used. Two different models were run, a Blinder-Oaxaca decomposition and propensity score matching. In the Blinder-Oaxaca decomposition, a linear regression was run to calculate the mean wage of women and men. These are then subtracted from each other and decomposed into a portion that is explained by the variables used and an unexplained section. From this decomposition method, it was found that individuals that are divorced and individuals who have never married were more likely to have an increased gender wage gap than any of the other marital statuses. Those that were married or widowed had smaller wage gaps.

The second article also used propensity score matching to calculate the gender wage gap. In this method, groups of men and women with similar characteristics are matched. The mean wage for the matched men and women are then calculated and subtracted from each other to arrive at the mean wage gap, given that the individual characteristics are similar. This method is superior to the Blinder-Oaxaca decomposition because it is non-parametric and therefore the data does not need to conform to the shape prescribed by theory. The article is also the first to conduct propensity score matching as a way of analysing the gender wage gap in South Africa. The results showed that by far the largest wage gaps, regardless of the characteristics matched, were found when people have never married. On the other side of the spectrum, widowed people were found to have a negative wage gap. This means that the mean incomes of widows are larger than what the mean incomes of widowers are.

Individually, these two articles provide a very limited, albeit focused, perspective of the labour force. When combined, however, they provide a more holistic, although far from complete, perspective. Cumulatively, the articles answer the research question, *How does marital status influence labour market outcomes in South Africa?* They show that women are least likely to be employed when they are married, but if they do get employed, they receive a wage that is closer to that of their male counterparts than when they have never married. Women that are divorced are most likely to be employed, but receive a considerably lower income than do divorced men that share their individual characteristics. Widows receive a

higher wage than their male counterparts do and are more likely to be employed than married women are. Women that live with their partners are slightly more likely to be employed than women that are married, and also receive a wage that is closer to their male counterparts than women that are married.

These articles have barely scratched the surface by showing that marriage statuses do have varying effects on the labour market outcomes. To truly inform policy however deeper research would be needed into the reasons for these discrepancies. Gaining an understanding as to why it is that cohabiting women have a better chance of being employed and receiving a wage that is closer to her male counterpart could, for example, be integral to understanding the nature of the policy changes that would be necessary to reduce the barrier posed by marriage. Policy changes affected by this research would broadly have to happen in two areas, in the labour market and in the marriage market. In the labour market active steps need to be taken to ensure that there is no implicit or explicit discrimination in the hiring and firing practices of firms and also in the way they set up their remuneration. Firms would also need to be encouraged to hire more women in an attempt to strive towards a more equal labour market. The nature of these incentives would require dedicated research into the topic. Policy aimed at bringing about a more equal marriage environment would need to be geared towards incentivising women to be income earners. Reducing wage gaps between men and women could already have a significant impact on encouraging women to participate.

From these findings, it can be seen that marriage plays an important role in the labour market outcome for both men and women, and in the relative inequality between the two genders. Marriage on its own is, however, only one of various relationship statuses that significantly impact the labour market. Therefore, a simplistic view of marriage is not enough when attempting to understand, or even to reduce, the constraints caused by these statuses. More should, and indeed can, be done. Future research should look to expand on these articles by disaggregating the models by income quantiles, and by investigating the results for various sectors in the economy.

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Appendix

1. Tables

Table 3.1: Summary statistics for 2008

Variable	Mean	Std. Dev.
Employed	0.288	0.453
LFP	0.941	0.236
Male dummy	0.415	0.493
Married	0.289	0.453
Divorced	0.025	0.157
Widow	0.036	0.187
Cohabit	0.087	0.282
Never married	0.559	0.497
African	0.854	0.353
Coloured	0.075	0.264
Indian	0.021	0.144
White	0.049	0.215
Matric	0.287	0.453
No schooling	0.055	0.228
Some schooling	0.651	0.477
Degree	0.013	0.111
Honours	0.004	0.064
Masters & PhD	0.005	0.068
Other Tertiary	0.089	0.285
15-25	0.349	0.477
26-35	0.256	0.436
36-45	0.201	0.401
46-55	0.151	0.358
56-65	0.043	0.203
Gauteng	0.246	0.431
Western cape	0.078	0.267
Eastern Cape	0.131	0.337
Northern Cape	0.022	0.147
Free State	0.065	0.246
KwaZulu-Natal	0.187	0.390
North-West	0.067	0.251
Mpumalanga	0.078	0.268
Limpopo	0.126	0.331
Non-employment income	0.999	0.027
Child dummy	0.368	0.482
Population = 16 815 072		

Own calculation, from NIDS (2016)

Table 3.2: Summary statistics for 2010

Variable	Mean	Std. Dev.
Employed	0.351	0.477
LFP	0.955	0.207
Male dummy	0.427	0.495
Married	0.307	0.461
Divorced	0.028	0.166
Widow	0.043	0.203
Cohabit	0.077	0.267
Never married	0.517	0.500
African	0.832	0.374
Coloured	0.078	0.268
Indian	0.024	0.153
White	0.066	0.248
Matric	0.324	0.468
No schooling	0.055	0.227
Some schooling	0.591	0.492
Degree	0.021	0.143
Honours	0.007	0.084
Masters & PhD	0.007	0.081
Other Tertiary	0.136	0.342
15-25	0.252	0.434
26-35	0.285	0.451
36-45	0.228	0.420
46-55	0.168	0.374
56-65	0.067	0.250
Gauteng	0.270	0.444
Western cape	0.078	0.269
Eastern Cape	0.117	0.322
Northern Cape	0.023	0.150
Free State	0.067	0.250
KwaZulu-Natal	0.183	0.387
North-West	0.072	0.259
Mpumalanga	0.075	0.263
Limpopo	0.114	0.317
Non-employment income	0.976	0.154
Child dummy	0.404	0.491
Population = 16 563 610		

Own calculation, from NIDS (2016)

Table 3.3: Summary statistics for 2012

Variable	Mean	Std. Dev.
Employed	0.392	0.488
LFP	0.993	0.084
Male dummy	0.423	0.494
Married	0.318	0.466
Divorced	0.032	0.175
Widow	0.045	0.208
Cohabit	0.074	0.261
Never married	0.523	0.499
African	0.820	0.384
Coloured	0.084	0.277
Indian	0.023	0.149
White	0.073	0.260
Matric	0.353	0.478
No schooling	0.052	0.221
Some schooling	0.580	0.494
Degree	0.024	0.154
Honours	0.008	0.088
Masters & PhD	0.008	0.089
Other Tertiary	0.174	0.379
15-25	0.188	0.391
26-35	0.288	0.453
36-45	0.246	0.431
46-55	0.179	0.383
56-65	0.099	0.298
Gauteng	0.284	0.451
Western cape	0.091	0.288
Eastern Cape	0.127	0.333
Northern Cape	0.022	0.148
Free State	0.062	0.241
KwaZulu-Natal	0.172	0.377
North-West	0.071	0.256
Mpumalanga	0.073	0.260
Limpopo	0.099	0.298
Non-employment income	0.991	0.092
Child dummy	0.417	0.493
Population = 16 087 301		

Own calculation, from NIDS (2016)

Table 3.4: Employment/gender cross-tabulation for 2008

			Gender		
			Male	**Female**	**Total**
Employed	**No**	Count	2394	4617	7011
		% within Employed	34.1 %	65.9 %	100.0 %
		% within Gender	66.8 %	78.6 %	74.1 %
		% of Total	25.3 %	48.8 %	74.1 %
	Yes	Count	1191	1257	2448
		% within Employed	48.7 %	51.3 %	100.0 %
		% within Gender	33.2 %	21.4 %	25.9 %
		% of Total	12.6 %	13.3 %	25.9 %
Total		Count	3585	5874	9459
		% within Employed	37.9 %	62.1 %	100.0 %
		% within Gender	100.0 %	100.0 %	100.0 %
		% of Total	37.9 %	62.1 %	100.0 %
Chi^2 test	Asymptotic Significance (2-sided)		0.000		

Own calculation, from NIDS (2016)

Table 3.5: Employment/gender cross-tabulation for 2010

			Gender		
			Male	**Female**	**Total**
Employed	**No**	Count	1828	3797	5625
		% within Employed	32.5 %	67.5 %	100.0 %
		% within Gender	64.0 %	75.5 %	71.4 %
		% of Total	23.2 %	48.2 %	71.4 %
	Yes	Count	1027	1230	2257
		% within Employed	45.5 %	54.5 %	100.0 %
		% within Gender	36.0 %	24.5 %	28.6 %
		% of Total	13.0 %	15.6 %	28.6 %
Total		Count	2855	5027	7882
		% within Employed	36.2 %	63.8 %	100.0 %
		% within Gender	100.0 %	100.0 %	100.0 %
		% of Total	36.2 %	63.8 %	100.0 %
Chi^2 test	Asymptotic Significance (2-sided)		0.000		

Own calculation, from NIDS (2016)

Table 3.6: Employment/gender cross-tabulation for 2012

			Gender		
			Male	**Female**	**Total**
Employed	**No**	Count	1625	3646	5271
		% within Employed	30.8 %	69.2 %	100.0 %
		% within Gender	57.4 %	71.8 %	66.7 %
		% of Total	20.5 %	46.1 %	66.7 %
	Yes	Count	1207	1430	2637
		% within Employed	45.8 %	54.2 %	100.0 %
		% within Gender	42.6 %	28.2 %	33.3 %
		% of Total	15.3 %	18.1 %	33.3 %
Total		Count	2832	5076	7908
		% within Employed	35.8 %	64.2 %	100.0 %
		% within Gender	100.0 %	100.0 %	100.0 %
		% of Total	35.8 %	64.2 %	100.0 %
Chi^2 test	Asymptotic Significance (2-sided)		0.000		

Own calculation, from NIDS (2016)

Table 3.7: LFP/gender cross-tabulation for 2008

			Gender		
			Male	**Female**	**Total**
LFP	**No**	Count	146	546	692
		% within LFP	21.1 %	78.9 %	100.0 %
		% within Gender	4.1 %	9.3 %	7.3 %
		% of Total	1.5 %	5.8 %	7.3 %
	Yes	Count	3439	5328	8767
		% within LFP	39.2 %	60.8 %	100.0 %
		% within Gender	95.9 %	90.7 %	92.7 %
		% of Total	36.4 %	56.3 %	92.7 %
Total		Count	3585	5874	9459
		% within LFP	37.9 %	62.1 %	100.0 %
		% within Gender	100.0 %	100.0 %	100.0 %
		% of Total	37.9 %	62.1 %	100.0 %
Chi^2 test	Asymptotic Significance (2-sided)		0.000		

Own calculation, from NIDS (2016)

Table 3.8: LFP/gender cross-tabulation for 2010

			Gender		
			Male	**Female**	**Total**
LFP	**No**	Count	126	308	434
		% within LFP	29.0 %	71.0 %	100.0 %
		% within Gender	3.5 %	5.2 %	4.6 %
		% of Total	1.3 %	3.3 %	4.6 %
	Yes	Count	3459	5566	9025
		% within LFP	38.3 %	61.7 %	100.0 %
		% within Gender	96.5 %	94.8 %	95.4 %
		% of Total	36.6 %	58.8 %	95.4 %
Total		Count	3585	5874	9459
		% within LFP	37.9 %	62.1 %	100.0 %
		% within Gender	100.0 %	100.0 %	100.0 %
		% of Total	37.9 %	62.1 %	100.0 %
Chi^2 test		Asymptotic Significance (2-sided)	0.000		

Own calculation, from NIDS (2016)

Table 3.9: LFP/gender cross-tabulation for 2012

			Gender		
			Male	**Female**	**Total**
LFP	**No**	Count	13	68	81
		% within LFP	16.0 %	84.0 %	100.0 %
		% within Gender	.4 %	1.2 %	.9 %
		% of Total	.1 %	.7 %	.9 %
	Yes	Count	3572	5806	9378
		% within LFP	38.1 %	61.9 %	100.0 %
		% within Gender	99.6 %	98.8 %	99.1 %
		% of Total	37.8 %	61.4 %	99.1 %
Total		Count	3585	5874	9459
		% within LFP	37.9 %	62.1 %	100.0 %
		% within Gender	100.0 %	100.0 %	100.0 %
		% of Total	37.9 %	62.1 %	100.0 %
Chi^2 test		Asymptotic Significance (2-sided)	0.000		

Own calculation, from NIDS (2016)

Table 3.10: Employment/marital status cross-tabulation for 2008

			Married		Cohabit		Widowed		Divorced		Never married	
			No	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**
Employed	**No**	Count	5490	1521	6494	517	6758	253	6901	110	2420	4591
		% within emp2008	78.3 %	21.7 %	92.6 %	7.4 %	96.4 %	3.6 %	98.4 %	1.6 %	34.5 %	65.5 %
		% within married2008	78.1 %	62.5 %	75.1 %	63.9 %	74.3 %	68.9 %	74.7 %	50.5 %	62.8 %	81.9 %
		% of Total	58.0 %	16.1 %	68.7 %	5.5 %	71.4 %	2.7 %	73.0 %	1.2 %	25.6 %	48.5 %
	Yes	Count	1537	911	2156	292	2334	114	2340	108	1434	1014
		% within emp2008	62.8 %	37.2 %	88.1 %	11.9 %	95.3 %	4.7 %	95.6 %	4.4 %	58.6 %	41.4 %
		% within married2008	21.9 %	37.5 %	24.9 %	36.1 %	25.7 %	31.1 %	25.3 %	49.5 %	37.2 %	18.1 %
		% of Total	16.2 %	9.6 %	22.8 %	3.1 %	24.7 %	1.2 %	24.7 %	1.1 %	15.2 %	10.7 %
Total		Count	7027	2432	8650	809	9092	367	9241	218	3854	5605
		% within emp2008	74.3 %	25.7 %	91.4 %	8.6 %	96.1 %	3.9 %	97.7 %	2.3 %	40.7 %	59.3 %
		% within married2008	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %
		% of Total	74.3 %	25.7 %	91.4 %	8.6 %	96.1 %	3.9 %	97.7 %	2.3 %	40.7 %	59.3 %
Chi^2 test		Asymptotic Significance (2-sided)	0.000		0.000		0.021		0.000		0.000	

Own calculation, from NIDS (2016)

Table 3.11: Employment/marital status cross-tabulation for 2010

			Married		Cohabit		Widowed		Divorced		Never married	
			No	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**
Employed	**No**	Count	4287	1338	5237	388	5336	289	5524	101	2145	3480
		% within emp2010	76.2 %	23.8 %	93.1 %	6.9 %	94.9 %	5.1 %	98.2 %	1.8 %	38.1 %	61.9 %
		% within married2010	74.8 %	62.2 %	72.1 %	63.1 %	71.3 %	72.8 %	71.7 %	55.2 %	63.5 %	77.3 %
		% of Total	54.4 %	17.0 %	66.4 %	4.9 %	67.7 %	3.7 %	70.1 %	1.3 %	27.2 %	44.2 %
	Yes	Count	1445	812	2030	227	2149	108	2175	82	1233	1024
		% within emp2010	64.0 %	36.0 %	89.9 %	10.1 %	95.2 %	4.8 %	96.4 %	3.6 %	54.6 %	45.4 %
		% within married2010	25.2 %	37.8 %	27.9 %	36.9 %	28.7 %	27.2 %	28.3 %	44.8 %	36.5 %	22.7 %
		% of Total	18.3 %	10.3 %	25.8 %	2.9 %	27.3 %	1.4 %	27.6 %	1.0 %	15.6 %	13.0 %
Total		Count	5732	2150	7267	615	7485	397	7699	183	3378	4504
		% within emp2010	72.7 %	27.3 %	92.2 %	7.8 %	95.0 %	5.0 %	97.7 %	2.3 %	42.9 %	57.1 %
		% within married2010	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %
		% of Total	72.7 %	27.3 %	92.2 %	7.8 %	95.0 %	5.0 %	97.7 %	2.3 %	42.9 %	57.1 %
Chi^2 test		Asymptotic Significance (2-sided)	0.000		0.000		0.518		0.000		0.000	

Own calculation, from NIDS (2016)

Table 3.12: Employment/marital status cross-tabulation for 2012

			Married		Cohabit		Widowed		Divorced		Never married	
			No	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**
Employed	**No**	Count	3848	1423	4900	371	4948	323	5154	117	2238	3033
		% within emp2012	73.0 %	27.0 %	93.0 %	7.0 %	93.9 %	6.1 %	97.8 %	2.2 %	42.5 %	57.5 %
		% within married2012	68.9 %	61.2 %	67.1 %	61.1 %	66.1 %	75.5 %	66.9 %	57.4 %	62.7 %	69.9 %
		% of Total	48.7 %	18.0 %	62.0 %	4.7 %	62.6 %	4.1 %	65.2 %	1.5 %	28.3 %	38.4 %
	Yes	Count	1734	903	2401	236	2532	105	2550	87	1333	1304
		% within emp2012	65.8 %	34.2 %	91.1 %	8.9 %	96.0 %	4.0 %	96.7 %	3.3 %	50.5 %	49.5 %
		% within married2012	31.1 %	38.8 %	32.9 %	38.9 %	33.9 %	24.5 %	33.1 %	42.6 %	37.3 %	30.1 %
		% of Total	21.9 %	11.4 %	30.4 %	3.0 %	32.0 %	1.3 %	32.2 %	1.1 %	16.9 %	16.5 %
Total		Count	5582	2326	7301	607	7480	428	7704	204	3571	4337
		% within emp2012	70.6 %	29.4 %	92.3 %	7.7 %	94.6 %	5.4 %	97.4 %	2.6 %	45.2 %	54.8 %
		% within married2012	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %
		% of Total	70.6 %	29.4 %	92.3 %	7.7 %	94.6 %	5.4 %	97.4 %	2.6 %	45.2 %	54.8 %
Chi^2 test		Asymptotic Significance (2-sided)	0.000		0.003		0.000		0.004		0.000	

Own calculation, from NIDS (2016)

Table 3.13: LFP/marital status cross-tabulation for 2008

			Married		Cohabit		Widowed		Divorced		Never married	
			No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
LFP	No	Count	537	155	596	96	671	21	684	8	281	411
		% within lfp2008	77.6 %	22.4 %	86.1 %	13.9 %	97.0 %	3.0 %	98.8 %	1.2 %	40.6 %	59.4 %
		% within married2008	7.6 %	6.4 %	6.9 %	11.9 %	7.4 %	5.7 %	7.4 %	3.7 %	7.3 %	7.3 %
		% of Total	5.7 %	1.6 %	6.3 %	1.0 %	7.1 %	.2 %	7.2 %	.1 %	3.0 %	4.3 %
	Yes	Count	6490	2277	8054	713	8421	346	8557	210	3573	5194
		% within lfp2008	74.0 %	26.0 %	91.9 %	8.1 %	96.1 %	3.9 %	97.6 %	2.4 %	40.8 %	59.2 %
		% within married2008	92.4 %	93.6 %	93.1 %	88.1 %	92.6 %	94.3 %	92.6 %	96.3 %	92.7 %	92.7 %
		% of Total	68.6 %	24.1 %	85.1 %	7.5 %	89.0 %	3.7 %	90.5 %	2.2 %	37.8 %	54.9 %
Total		Count	7027	2432	8650	809	9092	367	9241	218	3854	5605
		% within lfp2008	74.3 %	25.7 %	91.4 %	8.6 %	96.1 %	3.9 %	97.7 %	2.3 %	40.7 %	59.3 %
		% within married2008	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %
		% of Total	74.3 %	25.7 %	91.4 %	8.6 %	96.1 %	3.9 %	97.7 %	2.3 %	40.7 %	59.3 %
Chi² test		Asymptotic Significance (2-sided)	0.038		0.000		0.232		0.036		0.939	

Own calculation, from NIDS (2016)

Table 3.14: LFP/marital status cross-tabulation for 2010

			Married		Cohabit		Widowed		Divorced		Never married	
			No	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**
LFP	**No**	Count	339	95	393	41	417	17	427	7	160	274
		% within lfp2010	78.1 %	21.9 %	90.6 %	9.4 %	96.1 %	3.9 %	98.4 %	1.6 %	36.9 %	63.1 %
		% within married2010	4.6 %	4.4 %	4.4 %	6.7 %	4.6 %	4.3 %	4.6 %	3.8 %	3.2 %	6.1 %
		% of Total	3.6 %	1.0 %	4.2 %	.4 %	4.4 %	.2 %	4.5 %	.1 %	1.7 %	2.9 %
	Yes	Count	6970	2055	8451	574	8645	380	8849	176	4795	4230
		% within lfp2010	77.2 %	22.8 %	93.6 %	6.4 %	95.8 %	4.2 %	98.0 %	2.0 %	53.1 %	46.9 %
		% within married2010	95.4 %	95.6 %	95.6 %	93.3 %	95.4 %	95.7 %	95.4 %	96.2 %	96.8 %	93.9 %
		% of Total	73.7 %	21.7 %	89.3 %	6.1 %	91.4 %	4.0 %	93.6 %	1.9 %	50.7 %	44.7 %
Total		Count	7309	2150	8844	615	9062	397	9276	183	4955	4504
		% within lfp2010	77.3 %	22.7 %	93.5 %	6.5 %	95.8 %	4.2 %	98.1 %	1.9 %	52.4 %	47.6 %
		% within married2010	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %
		% of Total	77.3 %	22.7 %	93.5 %	6.5 %	95.8 %	4.2 %	98.1 %	1.9 %	52.4 %	47.6 %
Chi^2 test		Asymptotic Significance (2-sided)	0.669		0.011		0.766		0.619		0.000	

Own calculation, from NIDS (2016)

Table 3.15: LFP/marital status cross-tabulation for 2012

			Married		Cohabit		Widowed		Divorced		Never married	
			No	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**
LFP	**No**	Count	62	19	74	7	78	3	79	2	31	50
		% within lfp2012	76.5 %	23.5 %	91.4 %	8.6 %	96.3 %	3.7 %	97.5 %	2.5 %	38.3 %	61.7 %
		% within married2012	.9 %	.8 %	.8 %	1.2 %	.9 %	.7 %	.9 %	1.0 %	.6 %	1.2 %
		% of Total	.7 %	.2 %	.8 %	.1 %	.8 %	.0 %	.8 %	.0 %	.3 %	.5 %
	Yes	Count	7071	2307	8778	600	8953	425	9176	202	5091	4287
		% within lfp2012	75.4 %	24.6 %	93.6 %	6.4 %	95.5 %	4.5 %	97.8 %	2.2 %	54.3 %	45.7 %
		% within married2012	99.1 %	99.2 %	99.2 %	98.8 %	99.1 %	99.3 %	99.1 %	99.0 %	99.4 %	98.8 %
		% of Total	74.8 %	24.4 %	92.8 %	6.3 %	94.7 %	4.5 %	97.0 %	2.1 %	53.8 %	45.3 %
Total		Count	7133	2326	8852	607	9031	428	9255	204	5122	4337
		% within lfp2012	75.4 %	24.6 %	93.6 %	6.4 %	95.5 %	4.5 %	97.8 %	2.2 %	54.1 %	45.9 %
		% within married2012	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %
		% of Total	75.4 %	24.6 %	93.6 %	6.4 %	95.5 %	4.5 %	97.8 %	2.2 %	54.1 %	45.9 %
Chi^2 test		Asymptotic Significance (2-sided)	0.812		0.412		0.721		0.619		0.846	

Own calculation, from NIDS (2016)

Table 3.16: Matched wage gap

	Matched Variables	Married		Cohabiting		Widowed		Divorced		Never Married	
		KM	NNM	KM	NNM	KM	NNM	KM	NNM	KM	NNM
1	age	7336.44	7496.80	935.85	809.33	1938.77	1974.34	1421.90	1886.18	6319.76	6347.96
2	education	18410.97	18699.46	2355.07	2178.47	1341.56	3749.85	966.96	-2322.62	25290.11	25450.44
3	province	7302.86	7317.00	921.80	930.13	2298.94	2141.57	1226.18	1485.04	6038.00	6029.79
4	population group	7465.20	7468.60	1025.67	1018.73	-76.72	-76.72	1841.67	1878.83	5913.15	5926.40
5	union	6207.47	6207.47	710.11	710.11	331.74	331.74	-29.15	-29.16	6062.39	6079.88
6	age, education	18051.99	18804.10	2425.06	745.05	1114.41	1629.17	1998.25	-2159.29	26437.37	26516.99
7	age, province	7272.38	7406.08	917.40	617.62	2391.50	3358.29	1414.54	2785.76	6289.09	6341.02
8	age, population group	7328.19	7575.45	1041.81	1012.93	60.27	2498.54	1757.49	2786.58	6255.32	6304.93
9	age, union	6056.28	6256.16	705.96	660.95	303.49	-304.29	218.58	95.77	6256.97	6233.10
10	education, province	18641.85	19202.02	2726.80	3999.78	-5.91	111.81	1632.86	2911.61	25594.49	25818.51
11	education, population group	18564.27	19097.78	2742.79	2384.81	-33.88	8210.51	1405.35	-6560.63	25003.49	24797.35
12	education, union	18360.32	18539.79	1836.03	1588.22	-1419.54	1647.16	428.76	-1376.17	25523.65	25625.43
13	province, population group	7656.92	7466.73	1002.77	995.63	2068.71	1478.25	1993.75	1999.01	5881.73	5923.58
14	province, union	6050.34	5813.20	715.88	697.13	64.60	454.78	183.22	538.43	6066.31	6111.02
15	population group, union	6242.94	6278.23	840.30	864.89	-2014.98	-2017.92	83.37	-60.81	5834.39	5932.74

Own calculation, *from* NIDS (2016)

Table 3.17: Matched wage gap (continued)

	Matched Variables	Married		Cohabiting		Widowed		Divorced		Never Married	
		KM	NNM	KM	NNM	KM	NNM	KM	NNM	KM	NNM
16	age, education, province	18331.83	19209.02	2533.39	3345.15	-1571.02	-4376.58	3821.00	6692.54	26564.57	26773.56
17	age, education, population group	18295.79	19015.73	2756.69	3045.55	-669.33	10787.84	840.16	-2051.33	26156.98	26577.45
18	age, education, union	17935.89	18263.37	2522.01	2285.19	-1705.62	9479.17	1616.52	-766.91	26393.04	26356.96
19	age, province, population group	7239.82	8033.55	988.75	683.02	275.62	3001.92	1752.76	2744.71	6232.48	6336.24
20	age, province, union	5948.96	6871.46	727.93	316.01	284.20	2023.25	608.14	-138.51	6250.05	6297.42
21	age, population group, union	6002.72	6473.14	871.18	807.20	-1901.68	1087.95	6.34	246.54	6193.08	6190.03
22	education, province, population group	18918.98	20129.69	2833.40	3493.37	-532.63	-11718.75	2216.38	-3198.46	25479.87	25929.25
23	education, province, union	18632.40	18697.62	2202.63	2835.29	3019.34	47.23	2248.60	1921.44	25812.55	26052.39
24	education, population group, union	18663.98	19449.33	2740.32	2975.56	-16455.71	-27514.15	412.64	-6910.56	25225.68	24844.05
25	province, population group, union	6409.57	5778.04	779.61	808.68	-1290.91	676.82	324.84	540.12	5941.52	5946.31
26	age, education, province, population group	18648.24	18941.83	2727.61	3036.07	-533.13	13708.34	5133.58	5495.47	26427.31	26759.75
27	age, education, province, union	18329.05	18704.83	2135.45	3062.32	3470.95	6661.09	3330.03	3115.52	26596.41	26430.95
28	age, education, population group, union	18373.36	15676.61	2738.67	2843.26	-15660.21	-25916.66	556.26	-2680.88	26096.88	26308.85
29	age, province, population group, union	5980.44	6077.28	785.29	546.32	-2298.52	-883.77	794.57	-3539.45	6191.44	6294.24
30	education, province, population group, union	18896.26	19372.08	2857.82	2601.18	-1426.34	6775.66	2387.79	-3020.60	25650.05	25889.55
31	age, education, province, population group, union	18669.19	18335.78	2956.19	1956.10	-679.97	6250.42	3976.85	4102.47	26440.08	27027.47

Own calculation, from NIDS (2016)

2. Questions

LFP question:

Which one of the following best describes what you were doing one year ago?

1. *Working for pay*
2. *Self-employed*
3. *Working on own plot or looking after livestock*
4. *Helping another family member with their business, without pay*
5. *Full-time scholar or student at school, university, college or another educational institution*
6. *Homemaker (looking after children / others / home)*
7. *Long term sick or disabled*
8. *Retired*
9. *Unemployed and actively searching for a job in the last four weeks*
10. *Unemployed but not actively searching for a job in the last four weeks*

(1) and (9) was combined and set to one. The rest were set to zero in order to create a dummy variable for LFP.

Employment question:

Are you currently being paid a wage or salary to work on a regular basis for an employer (that is not yourself) whether full time or part time?