THE RELATIONSHIP BETWEEN MARITAL STATUS AND GENDER WAGE GAPS IN SOUTH AFRICA

ABSTRACT

Marital status has an overarching influence on all people's way of life and influence men and women vastly different. This makes marital status an essential element required for the understanding of gender wage gaps. This article uses both propensity score matching and a Blinder-Oaxaca decomposition to evaluate the gender wage gap in South Africa. The results confirm that marital status has a significant impact on wage gaps. Those that have never married were found to have largest gender wage gaps of all the marital statuses, followed by those that are married, Widowed and divorced groups were found to have the lowest gender wage gaps.

KEYWORDS

Wage gap, Propensity Score Matching, marital status,

JEL Codes: B54, C14, J71

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 (See: Friedman, 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 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; Killewald and Gough, 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, 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; which is also referred to as comparing 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.

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.

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 2008-9 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 (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 (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 2001-7. 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 percent 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 0.05 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.

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 2008-14. NIDS is a nationally representative individual and household survey that collects data of approximately 28,000 individuals and 7,300 households in South Africa. Missing observations on any of the key explanatory variables were deleted, along with all unemployed persons, as they do not earn a wage and fall outside the scope of this study. The final sample consisted of 9,923 observations.

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:

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

where:

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

$\bar{X}_m$ and $\bar{X}_f \rightarrow$ 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).

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 1986-95 and 1996-99, respectively.

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

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

and the mean wage for men:

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

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:

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

and for men:

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

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

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

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 percent 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.

Firstly, 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 → The treatment effect

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

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

RESULTS

In this section, the results of the models 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).

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 **Error! Reference source not found.**, 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 percent, and that the section due to characteristics (E) is negatively related to the wage gap, decreasing the wage gap by 15 percent. Both of these are also statistically significant.

Table 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 (NIDS, 2016)

Table 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 (NIDS, 2016)

Error! Reference source not found. 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 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 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)

PROPENSITY SCORE MATCHING (PSM)

The propensity score matching (PSM) results can be seen in **Error! Reference source not found.** and **Error! Reference source not found.**. 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 5 and Table 6. 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 percent 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 percent of what women earn, or 259.43 percent more than women do. For divorcees, the wage gap was 5.03 percent 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 percent of women's mean wages. This means that widows earn 1.09 percent 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 percent that of the matched women's mean wages. The second largest wage gap was found among married men and women at 154.25 percent of the matched women's mean wages. Widows earned 4.49 percent 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.

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) (Rudwick and Posel, 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.

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 (**Error! Reference source not found.** and **Error! Reference source not found.**), 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.

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