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Marriage markets and single motherhood in South Africa

By Siv Gustafsson and Seble Worku

Abstract

This paper studies the effects of local marriage markets on South African women's marital decisions. The analysis is motivated by the low proportion of married among African mothers since 48% are never married. This means that the children of all these never married mothers have no access to their fathers' resources. The low sex ratio of 92 men to 100 women among Africans aged 20-40 makes us believe that shortage of marriageable men may explain marriage patterns. Economic theory predicts less attractive marital outcomes for women when the sex ratio is low. We analyze this hypothesis using the 2001 Census of South Africa. An ordered probit model is fitted with the different marital type ranked from less desirable (never married) to more attractive (married civil). The estimation results suggest that both the quantity and quality of marriageable men matter in the marital choice of women who have at least one child. Exposing African women to the White woman's marriage market and the achievement of educational levels similar to those of Whites increase their probability of marriage by 8%, implying that only 44% of African women are expected to marry even given good marital opportunities and improved levels of education.

Key words: local marriage market, sex ratio, marriageable men, ordered probit, African, White.

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1. Introduction

Most women would probably prefer to live with the father of their child whether in married or unmarried cohabitation. However finding a good match depends on the availability of marriageable men, so that one can speak of a marriage market (Becker 1981, 1991). Links between labour market positions, government policies, the marriage market and the cost of children have an influence on union formation and fertility decisions (Gustafsson 2001, Ermisch 2003, Gustafsson and Worku 2005). Several US studies have focused on the causes of existing racial differences in marriages and family structure using the concepts of the marriage market (Wood 1995, Brien 1997, Lichter et al 1991, Angrist 2002).

Other economic factors advanced in American studies are women's independence created by their own earnings, the incentives created by welfare policies and the feeling of powerlessness created by the legacy of slavery (Frazier 1939, Murray 1984, Elwood and Bane 1985, Moffit 1990, Blau et al 2002, Burgess et al 2002, Fitzgerald 2003). However almost all findings show that welfare benefits have no impact on the decisions of single women to have children but do have effects on the living arrangements of these women after the birth of their child. They often move out of their parents' home to live on their own, whilst women who married at a young age are more likely to become divorced or separated.

This paper models women's decisions in the marriage market as an outcome of marital choice. It is the purpose of this paper to explain the low marriage rate among African South African mothers. We assume that women other things equal would prefer a civil marriage to other types of relationship once they have a child. This paper aims at testing the hypothesis that when the sex ratio declines women are more likely to accept less desirable forms of marriages.

The rest of the paper is organized as follows. Section 2 describes the different types of marriages in South Africa and gives empirical evidence on the decline of marriage as well as on the profile of individuals who enter the marriage market. Section 3 discusses the economic theory of marriage in the South African context. Section 4 presents the empirical strategy followed in the study and section 5 describes the data set used. Section 6 examines the results and section 7 concludes.

2. The demography of South Africa

In South Africa, different types of marriage habits are practiced depending on the population group of the individuals. Civil marriages are similar to those in developed countries. Traditional marriages, also known as customary marriages, include marriages according to African tradition as well as ceremonies according to the Hindu or Muslim religions. Traditional marriages may be polygamous. In 2001, there were 31,382 polygamous men in South Africa. Before 1984 all marriages among Whites and Coloureds were civil marriages by which men and women shared their joint marital property equally unless they specifically chose to marry out of community of property and signed an anti nuptial contract. Africans and Indians could choose to marry according to civil or customary marriages. In customary marriages women had no right to the marital property if they were divorced or widowed.

Panel A of Table 1 shows the marital status of the White and African South African female population aged 20-40, overall and according to motherhood and education, according to the 2001 census¹. The breakdown for all females in both 2001 and 1996 is also given for comparison. It can be seen that among women aged between 20 and 40 with at least one child, 78% of the White women were in a civil marriage while only 19% of the African women were in a civil marriage and 16% were in a customary marriage. This total of 34% increases if unmarried cohabitation is added, making a total

Table 1: Demographic characteristics of South Africa

A. Marital status	African				White				
	Never married	Married civil	Married customary	Living together	Never married	Married civil	Married customary	Living together	
Census 1996: All women	67.5	12.0	10.4	3.4	37.4	46.0	0.8	1.9	
Census 2001: All women	66.6	10.9	8.7	5.6	35.6	45.1	0.9	3.4	
Census 2001: Women 20-40									
With at least one child ²	48.4	18.5	15.7	12.9	5.2	78.0	1.6	5.8	
Highest education: None	46.0	12.6	21.3	14.9	43.8	40.0	2.6	5.6	
Low	50.8	14.5	15.4	15.1	19.1	61.2	1.8	8.2	
Medium	66.7	14.0	8.3	8.9	27.3	57.1	1.2	7.3	
High	57.0	28.1	6.4	5.0	26.9	60.0	1.0	6.6	
Employed	51.4	20.9	9.8	12.2	25.6	57.2	1.1	8.0	
B. Sex ratios 2001									
	Britain	Sweden	SA: African	SA: White	SA: Total				
Men total (Thou)	28,582	4,869	16,887	2,080	21,434				
Women total (Thou)	30,208	5,374	18,528	2,212	23,385				
Sex ratio total	94.6	90.6	91.1	94.0	91.7				
Men 20-40 (Thou)	8,571	1,319	5,755	665	7,292				
Women 20-40 (Thou)	8,836	1,295	6,271	691	7,894				
Sex ratio 20-40	97.0	101.8	91.8	96.4	92.4				
C. Mortality in South Africa among those 15-49, 1997-2001					Men	Women	Sex ratio	Sex ratio	Sex ratio
					2001	2001	1997	1999	2001
1. Tuberculosis					20,325	17,473	147	133	116
2. Influenza & pneumonia					8,405	10,170	109	93	83
3. Certain disorders involving the immune mechanism					3,835	5,090	68	75	75
4. Intestinal infectious diseases					3,535	4,991	83	77	71
5. HIV					3,542	4,009	96	94	88
6. Other forms of heart disease					2,809	2,852	111	103	98
7. Cerebrovascular diseases					1,882	1,942	111	110	97
8. Chronic lower respiratory diseases					1,656	1,423	134	129	116
9. Other viral diseases					1,519	2,160	-	-	70
10. Inflammatory diseases of the central nervous system					1,485	1,473	-	-	101
Other causes					59,533	39,156	210	177	152
... of which unnatural					29,061	6,858	410	389	424
All causes					108,536	90,733	169	140	120

Sources: Own computation based on South African Censuses 1996, 2001; Office of the National Statistics UK: Mid-2001 population estimates: http://www.statistics.gov.uk/census2001/pop2001/united_kingdom_ages.asp; Statistics Sweden: Administrative records data, 2001; Statistics South Africa: Mortality and causes of death in South Africa 1997-2003.

Note: The census registered more men than women overall.

¹ This study only looks at African and White South Africans, for comparability with the US studies, and ignores Indian and Coloured (mixed race). The proportions of each group in 2001 were: African 79%; Coloured 9%; Indian 2% and White 10%. The apartheid terminology is still used for monitoring reasons although people are self-classified as to population group. See footnote 5 for more details of the situation under apartheid.

² Proportions in other categories were low and not germane to our study. Among African women aged 20-40 with at least one child, 2.0% were widows; 1.3% were separated and 1.2% were divorced. Among Whites 1.2% were widows; 0.9% were separated and 7.2% were divorced.

of 47% of women in a union with presumably in most cases with the father of their child. But more than 48% of the African mothers had never been married and probably lived as single mothers with their children.

Panel B of Table 1 shows the sex ratios, namely the number of men divided by the number of women, for South African Africans and Whites separately, for all ages and for persons aged 20-40, in 2001. We include similarly computed sex ratios for Sweden and Britain for comparison³. Although South Africa has a relatively young population compared to Sweden and Britain the White population has sex ratios closer to those countries.

Women are in the majority for all the populations presented in panel B, with a total sex ratio of 90.6 for Sweden and 95.5 for Britain. In Sweden, this is largely due to an over-representation of older women because women's life expectancy is higher than that of men. The picture is different if we focus on people in the age group 20-40, defined as the age group of interest for our purpose since marriage and childbearing for the most part takes place in this age group. The sex ratio is close to 100 for the age group 20-40 in Britain (99.3) and in Sweden (100.2), whereas it is lower among White South Africans (96.4) and as low as 91.8 among African South Africans. This shows that there are 1.6 million fewer African men than women and half a million in the age group 20-40.

In panel C of Table 1 we examine mortality data for South Africa, which is available for the age group 15-49, which differs to some extent from our target age group. The data show a clearly higher mortality among men than among women for these young adults. The number one killer disease is tuberculosis. Men in this age group are also four times more likely to die of unnatural causes than women, mostly as a result of violence. The rate is probably higher than stated here since we are dealing with reported causes of death only⁴.

In 1997, the sex ratio from all causes of death was 169, meaning that 1.7 times more men than women; this had decreased to 120 by 2001, with 20% more men than women dying in 2001. The under-representation of men aged 20-40 is likely to be the result of higher male than female mortality during the previous two decades. It is possible that the mortality sex ratios are even higher among Africans than all population groups together (as given here), although since Africans make up the vast majority of the total South African population (79% in 2001) they heavily weight the total. This shortage of men in marriageable age groups may be one reason why there are such low marriage rates among African mothers.

³For Britain, mid-year of the resident population estimates revised in the light of the local authority population studies are used. For Sweden administrative record data showing the conditions in December 2001 are used. To make the comparison easier, 2001 data has been used for all the countries.

⁴Death registration are based upon voluntary registration and thus can be registered years after the event. Official mortality data derived from this source can thus be incomplete, although deaths are captured according to year of death not year of reporting.

3. Marriage in South Africa

Under apartheid law⁵, the various customary marriages were not recognized as legal marriages and thus not regulated by the government. Although marriage laws were different for Whites and non-Whites, as noted above, husbands received marital powers over their wives in all types of marriage⁶. Women were regarded as minors and could not own property in their own right, enter into contracts without the help of their male guardian, or act as guardians of their own children. This may be one reason why during the apartheid years, African women preferred having no marriage and tried to provide as single mothers for themselves and their children.

For some South African traditionalists, polygamy is a way of preserving their culture. Polygamy was in the past mostly confined to members of the royal family and traditional leaders. It also solved the problem of the barren wife, that the husband cannot abandon, since divorce was not allowed in African customary marriages. According to customary laws, the first wife has to give consent to the second marriage. The husband must also provide proper living arrangements whereby the wives get their separate quarters. However because of the system of migrant workers and thereby lack of control from the community these rules were often not observed and men married a second wife without the knowledge of the first wife. Subsequently, the first wife often found herself deprived from access to the marital property. To many people traditional marriage without polygamy is a cultural manifestation. They continue to take place as many as 15.7 % per year of African women aged 20-40 with at least one child as noted above in Table 1. Lobola (or bride price), the transfers of cattle and/or money by the husband to the wife's father, validates customary marriages. It is as if the husband buys his wife from her parents. Becker (1991) p. 86-87 comments: "Bride prices then not only compensate parents for their transfer of their 'property' but also induce them to invest optimally in daughters if girls with appropriate accumulations of human capital command sufficiently high prices". In Asia it is common for the bride's family to pay a dowry to the groom's family (e.g. Parish and Willis, 1995). It is as if the groom's family takes over the responsibility of providing for her, thinking about what she will cost rather than thinking about what she will produce as in the African case. The settlement of the terms of the lobola is done through elaborate negotiations between the two families. As soon as the lobola price is agreed upon the first installment is delivered and

⁵ After the Afrikaner Nationalist party came to power in 1948, apartheid was systematized under a series of laws, with the main ones being the Population Registration Act of 1950, which put all South Africans into 4 racial categories: Bantu (black African), Coloured (of mixed race), Indian and White; the Group Areas Act of 1950 and Land Acts of 1954 and 1955 assigned races to different residential and business sections in urban and rural areas; the 1952 pass law enacted to control influx of the African population into urban areas required African men and women over the age of 16 to carry a pass book showing permission to stay in urban areas. The law allowed the arrest and removal of any African who is considered idle and undesirable. By leaving the workers families on the land with the assumption that women could feed their families of the produce of the land it was possible to pay lower wages and avoid having to build houses and supply services that were essential to maintain urban populations while ensuring the continued supply of labour through annual leave periods that allowed the conception of children. The Pass Laws were repealed in 1986 and that eased legal restrictions on the migration from rural areas to the cities and townships by people searching for work. But the migration also caused a proliferation of informal settlements (squatter communities) on the periphery of urban centers.

⁶ The matrimonial Act of 1984 scrapped marital power of a husband over his wife in White civil marriages. The Marriage and Matrimonial Property Amendment Act of 1988 made African civil marriages automatically joint property for husband and wife and scrapped marital power of the husband.

the rest is paid later⁷. Although some feminists view lobola as oppressive to women, people are still attached to the customs of lobola and children are considered illegitimate if lobola has not been transferred. Thus while lobola payments are not necessary in civil marriages many Africans who marry in civil marriages go through the rites of lobola transactions⁸.

In 1998, the Recognition of Customary Marriage Act was passed giving legal recognition to African customary marriages through compulsory registration of the marriages and abolishing the husband's marital powers. Marital property is automatically the joint property of the husband and wife unless an ante-nuptial contract is signed between the partners. The law directs that entry into customary marriage must be with consent of both partners. This means that widows do not have to marry their brothers-in-law as traditionally, but can do so if they agree. Even polygamy is permitted to continue as long as the interests of the first wife are protected. The law regulates second and subsequent marriages entered into by the man by cutting down on the excessive power that a husband used to have in a customary marriage. Furthermore, the law ensures equitable distribution of family property between all wives and children and thus is seen by many as solving the problem of property rights on the death of the husband⁹ (Mamashela and Xaba, 2003). In addition, the law regulates the dissolution of customary marriages and thus ensures the protection of women. However some argue that the true reason why polygamy couldn't be outlawed was that individual choice between customary and civil marriage should be considered a matter of democracy and freedom of choice in the new South Africa. Others view this choice as a pure matter of personal taste and thus it should be replaced by civil marriage.

Traditional African marriages affect people's lives in South Africa in the early 21st century. The most famous polygamist is the ex-deputy president Jacob Zuma who was married to 3 wives and paid lobola for a 4th wife in 2002. One of his wives, the Minister of Foreign Affairs Nkosazana Dlamini-Zuma, divorced him in 1998, another wife died of a heart attack in 2000, and he is still married to the 3rd wife. His 4th wife to be is Princess Sebentile Dlamini, a niece of Swazi King Mswati III. Mr Zuma has paid a down payment of 10 cattle to the family of the bride and could pay from 50 up to 100 head of cattle as speculated by some newspapers to marry a princess¹⁰. Although there has been no official statement from the royal family, there has been much speculation that the wedding is off due to the tarnished name of the ex-deputy president¹¹. Another example of polygamy is that of the Chief Executive Officer of Johannesburg City Power, Mr Mogwailane Mohlala, who announced in an interview with a Sunday paper in 2003 that he was looking for wife number two. Apparently his first wife, who was sitting next to him during the interview, was quite comfortable with this idea as long as she was part of the decision-making process¹².

⁷ In 2005, lobola payment can vary from R10,000 to R25,000 depending on the value of the bride. In 2005 the exchange rate was on the average €1 to R12.66.

⁸ Even with the recognition of customary marriages as of 1998 couples tend to register their marriages as civil but would still practice the rites of lobola transfers. Lawmakers tend to currently look at the best interest of the mother and child when lobola-related custody or money transfers become court cases.

⁹ The court has to approve a written contract that will regulate the matrimonial property. The court may not grant the application for the second and subsequent wife if it believes that the interests of all parties are not sufficiently safeguarded.

¹⁰ Gama L., 2002, Zuma to marry Swazi princess, City press.

¹¹ Schmidt M., Carter C. and Terreblanche C., 2005, More woes for Jacob Zuma, Saturday Star.

¹² Ndlangisa S., 2003, Wanted: wife No. 2, The Sunday Times.

Another example is a young woman widowed at age 32 who was married by customary law to her late husband. The couple bought the property after their marriage while during the marriage the wife invested most of her own income in the improvement of the property. In 2003 when her husband died her in-laws occupied her property, making reference to their rights according to traditional marriage. Before 1998, in customary African marriages no actual wedding ceremony and signing of a marriage contract needed to take place. Lobola payment was the proof that the marriage had taken place, therefore the young widow didn't have a marriage certificate. Thus according to the old law, she had no right to the property of her husband and succession to the property goes through the male lineage of the family (her eldest son or her husband's male relative). The couple bought the property after their marriage while during the marriage the wife invested most of her own income in the improvement of the property. The marriage did not produce any child but her husband had a daughter from a previous relationship. The brother-in-law claimed guardianship of both child and widow and occupied the house together with his family. The young widow returned to her parent's house and battled in court to get back what belonged to her. According to the 1998 Recognition of Customary Marriage Act she must win her case and this has in fact occurred.

Cohabitation in South Africa has no legal bearing in terms of ownership of assets unless the property is registered under both partners' names. Partners have no automatic right to pensions and other benefits. Either of the parents can act as legal guardians of the children depending on the best interest of the child. This was the situation of an African woman who works as a domestic worker. She was in unmarried cohabitation for more than 10 years with a man that she called her "husband". He was still legally married to another woman with whom he has four children. This man has five children with the domestic worker and has guardianship of all nine children. Upon recent break up of the relationship, the domestic worker is fighting to get guardianship of her five children so that she can get access to child support grants from the government for her children.

These examples show how African women depend on men. There are contradictions between the legal situation, which demands that men provide for their families, and the reality men can get away from the dependence requirement if they are not married to the mother of their child. This makes them less interested in controlling their fertility. The possibility for women to enter paid work and access different forms of government support has recently made an important impact on relationships making women more independent from men and also pushing away from marriage.

4. Theoretical considerations

4.1 Gary Becker's theory

Following Becker (1991), we analyze marriage markets outcomes for women or men in terms of gains from marriage output. The marital output includes labour earnings but also results of household work and enjoyment of children. Let us assume identical male and female marriage participants and let a common marriage output be produced within the household and be known with certainty.

Let the partners' marriage output be:

$$Z_{mf} = Z^m + Z^f \quad (1)$$

where Z^m and Z^f are male and female shares of marital output within marriage respectively. Men and women would prefer to marry if and only if their utility from marriage exceeds their utility from remaining single:

$$Z^f > Z_{sf} \quad \text{and} \quad Z^m > Z_{sm} \quad (2)$$

where Z_{sf} and Z_{sm} are outputs of single women and men outputs respectively. At $Z^f = Z_{sf}$ women are indifferent between marrying and being single, at $Z^m = Z_{sm}$ men are indifferent between marrying and being single, and at $Z_{mf} - Z^m < Z_{mf} - Z_{sm}$ men gain from marrying.

Because as Shown in Table 1 above, the sex ratio is below 1 in South Africa, we will carry out the argument for a situation where the number of women exceeds the number of men. In the case of monogamy, if $N_m < N_f$ as drawn in Figure 1 all men marry and some women ($N_f - N_m$) remain single. In this case all men take all gains from the marriage. These women are willing to stay single because their income equals the income of married women. If $N_m > N_f$ then women take all gains from marriage. Thus the model suggests that the proportion of married women is positively related to the ratio of men to women.

The above discussion can be extended to polygamous marriages. Assume that the demand for wives increases with polygamy, thus some men are willing to marry an additional wife and offer her:

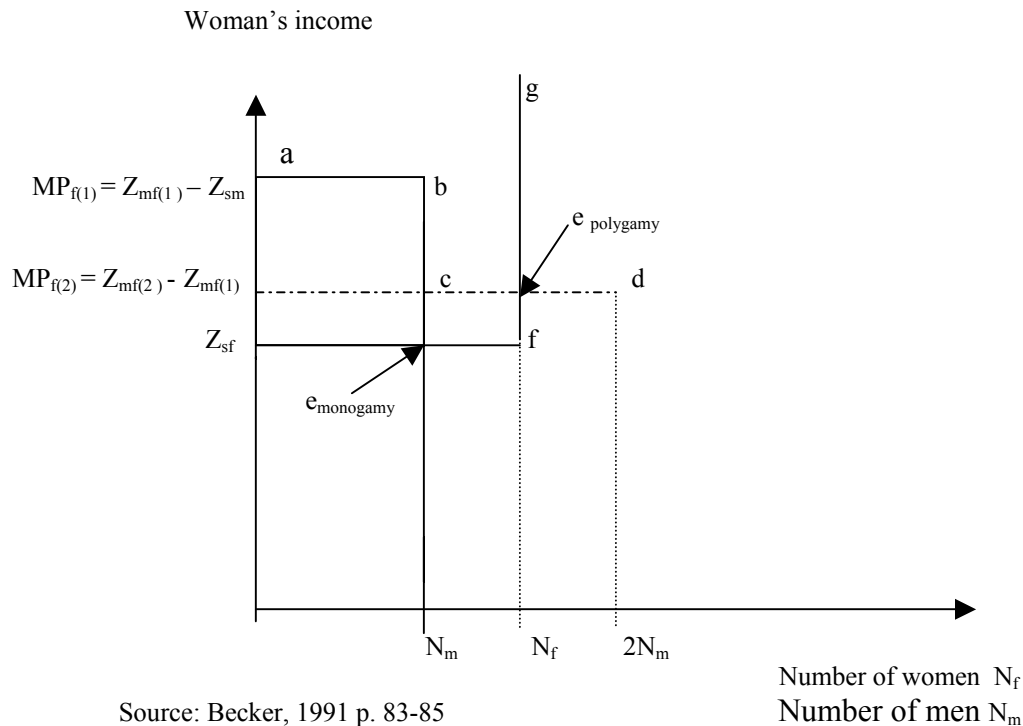
$$Z^f = MP_{f(2)} = Z_{mf(2)} - Z_{mf(1)} \quad (3)$$

Where the marginal product of a second wife $MP_{f(2)}$ is computed according to formula (3) and $Z_{mf(1)}$ is the output of a household with one man and one woman and $Z_{mf(2)}$ is the output of a household with one man and two women. Equilibrium in an efficient polygamous marriage market doesn't require that the same number of men and women want to marry, only that the number of women who want to marry equals the demand for wives. Thus at point $e_{polygamy}$ all men and all women marry and some men have two wives.

At $e_{polygamy}$ all men and all women receive the same income $Z_{mf(2)} - Z_{mf(1)}$ where all receive the same marginal product of the second wife. Although the number of women is higher than the number of men, the equilibrium income of women is above their single income. Thus women would rather enter polygamous marriages than remain single. In sum, if all men had at least one wife and some had two wives, monogamy would cost each woman the difference between the marginal product of the second wife and her single income. Thus according to Becker (1991), in the situation where there are more women than men, as is the case among Africans in South Africa, women are better off in terms of income under polygamy than under monogamy. Given the inequality in resources between women and men and the shortage of marriageable men, it is better for a woman to be a second wife than remain single. It is even the case that all women benefit if some are second wives because this mechanism washes away the shortage of men. This does not mean that women are happy with these arrangements. If they had

more resources they would prefer an egalitarian monogamous marriage. If the women were better off as single women they would not accept marriage. They might be better off as first wives only if they have the opportunity to have a say in the choice of subsequent wives, as in the anecdote of Mrs Mohlala, whose story suggests that she would not consent to a second wife unless she played a role in the process.

Figure 1: Equilibrium male-female income distribution in monogamous and polygamous marriages



4.2 The incidence of polygamy, bride prices and dowries

From Figure 1 it is clear that sex ratio imbalances are necessary for polygamy to occur. Becker argues in a subsequent section that heterogeneity in men may cause the wealthier men to become polygamists even if some men remain single. Grossbard (1976) used survey data collected in 1969 on the Maiduguni tribe (Nigeria) and showed that polygamy in this tribe was a positive function of male income and male education. She also showed that the more educated the senior wife was, the fewer her co-wives, suggesting that some men had substituted marriage to one highly educated wife for marriage to a number of uneducated women. There is also the probability that an educated wife commands a higher bride price, so that the resources of the man could be spent on one high quality wife rather than on two low quality wives. Kanazawa and Still (1999) used data from 127 countries and organized them according to an index which runs from 0 if there was only monogamy to 3 if polygamy was widespread. They explained this index by the degree of democracy in 1960, 1965 and 1980 and income in those same years. They found that income inequality was the most important prediction of incidence of polygamy and showed that increasing women's power resulted in more polygamous marriages if the inequality of men's resources was large, but in more monogamous marriages if that inequality was small. Using this hypothesis, Gould et al (2004) argued that the incidence of monogamy or polygamy is determined by the

sources of inequality, not just the level of inequality. In particular, they showed that the marriage market is more monogamous if inequality is determined more by differences in human capital than in non-labour income. They estimated the probability of having one or more wives in Cote d'Ivoire. Their finding shows that richer men have more wives. But after controlling for total wealth, they found that men who earn their money through education and labour income have fewer wives.

Becker's (1981, 1991) marriage model also includes transfers required to clear the marriage markets; these are commonly known as bride prices or dowries, but he refers to them as the price of the joint value of marriage over the utility of either spouse had he/she remained single. Bride price or lobola is viewed as a payment made as compensation to the bride's family for the loss of a productive member of the household, but also payment by the groom's family for the services he receives from his wife including the rights to the children she bears for him. But some authors maintain that such transfers are unrelated to the marriage market and should be regarded as bequests given to sons and daughters at marriage or as having some kind of ceremonial or status-defining function (Botticini and Siow 2003, Kressel 1977). In South Africa, lobola transfers occur even if the marriage is a civil modern marriage. The high unemployment rate and the low incomes of the urban poor make it impossible for many of them to raise the lobola money and they are therefore not allowed to marry. The recent shift to cohabitation may be partly because of the lobola price. Unfortunately we do not have data on lobola payments.

4.3 Sex ratios and single motherhood in previous studies

Becker's theory predicts that sex ratios have implications for the proportion of women who remain single and this prediction has been analyzed in a number of studies. Bergstrom and Lam (1989) used a general equilibrium of marriage assignment model to study how the marriage market absorbed marriage candidates in Sweden, where fluctuations in fertility created large differences in cohort sizes. Assuming that men preferred to marry a woman who is three years younger large imbalances on the marriage market resulted. The model assigned partners to all men and women born between 1895 and 1945. They observed that reduced sex ratios caused by the fertility boom was associated with decline of the age gap between the spouses, men having to accept a wife less than three years younger, and a decrease in the proportion of women marrying in comparison to adjacent cohorts.

Similarly the incidence of single motherhood among Afro-American women in the United States has received attention by population economists and sociologists. Being a single mother rather than marrying the father of her child can be partly explained by the shortage of marriageable men (Wilson 1987, Lichter et al 1992, Wood 1995, Brien 1997, Fitzgerald 2003). An important finding from these studies is that marriage market variables have to be created in various marriage pools and must include a spouse quality measure. The definition of marriageable men used by Wilson (1987) includes being employed, and his finding was that the short supply of marriageable men was the reason for the rise in single motherhood among Afro-American women with a low level of education. Wilson subsequently inspired other researchers to expand on the definition of marriageable men.

There have been two main types of empirical studies of marriage markets: those using static models and those using dynamic models to evaluate the proportion of marriages. Wood (1995) used the 1970 and 1980 US census data aggregated at SMSA¹³ level for the different categories (sex, race, employment status, income, marital status) to estimate a fixed-effect model of the proportion of Afro-American women aged 20-34 ever married. He included both married and unmarried men, which is logical because the model is static, using the proportion of men that were married as the dependent variable. He used three definitions of marriageable men: 1) all men; 2) men who were employed full-time; 3) men who earned above a certain threshold (in this analysis he used three different cut-off points). The sex ratios were based on 76 SMSAs which had an Afro-American population of over 30,000 people. He concluded that the decline of the pool of high income marriageable Afro-American men was responsible for 7-10% of the 1970-1980 decline in marriage rates among Afro-American women aged 20-34.

Angrist (2002) used data from the US 1910 and 1940 censuses to study the effects of sex ratios on the incidence and quality of marriage. He noted that about 50% of all marriages were within the same ethnic group. The quota act of immigration in effect from 1921 to 1965 set annual quotas on the basis of nationality from the mainly European immigration e.g. Italians, Irish etc. had different quotas. There was large-scale exogenous variation in both the number and sex composition of new immigrants. Angrist used these immigration sex ratios by ethnicity as instruments for marriage markets sex ratios for the second generation of the various ethnical groups. He found that higher sex ratios were associated with higher marriage rates for men and women, lower female labour force participation and higher spouse and couple income. His findings suggest that children born to parents in a high sex ratio environment were better off.

Other studies utilized dynamic models of the hazard of entry into first marriage with predetermined time-varying explanatory variables. Lichter et al (1992) studied women's transition into first marriage using panel data and defined the marriage market as consisting of: 1) unmarried men; 2) unmarried men who were employed; 3) unmarried men who were full-time employed; and 4) unmarried men whose income was above a certain threshold. They used the National Longitudinal Survey of Youth (NLSY) which studied Afro-American and White women aged 18-28 in the US. They constructed the sex ratios using US census 1980 data (PUMS-D data) to allow for 382 local marriage markets. They concluded that a shortage in the quantity and quality of available mates in local areas slowed down women's transition to marriage. They also concluded that local mate availability accounted for most of the observed racial difference in marriage rates in the US.

Brien (1997) studied the timing of first marriage using the NLS72 longitudinal data. He used five definitions of marriageable men: 1) all men; 2) all employed men; 3) all men who were employed, in school or short-term unemployed; 4) all men who were full-time employed; and 5) all men with earnings above a certain amount. He used the 5% sample of census 1980 data to construct the sex ratios and he distinguished different level of geography (county, SMSA, state) for all the sex ratios; his pool of marriageable men definition coincided with that of Wood (1995). He argued that the 1980 marriage market characteristics were expected to capture the marriage market characteristics over

¹³ Standard metropolitan statistical area. The USA was divided into about 318 SMSAs to facilitate the 1970 and 1980 censuses count.

the entire NLS72 data sample. He used the US NLS72 longitudinal data to study the role of the marriage market in the timing of first marriage among Afro-Americans and Whites. He concluded that residing in a state that had a favorable marriage market shortened the waiting time to marriage and he attributed racial differences in the timing of marriage to the differences in the availability of marriageable mates.

Burgess et al (2002) measured the marriage market by the average quality of potential partners. They studied transitions to first marriage and exit from first marriage using the NLSY 1979-1992 panel data. They proposed the self-reliance effect, which can make marriage less likely, as opposed to the 'good catch' effect derived from a good pool of marriageable men, which can make marriage more attractive. Part of the self-reliance stems from AFDC income. AFDC aid for families with dependent children is the type of welfare that is available for single mothers in the US¹⁴.

These previous studies also suggest that measures have to be disaggregated by race and local area, since marriage markets are usually segregated by race, and spouse-searching is generally confined to a local area. Yet Brien's (1997) finding suggests that defining marriage market variables at a much lower geographical level (county in his case) can mask the true impact of these variables due to measurement error in localized definitions.

Fitzgerald (2003) studied the link between spouse availability and the duration of welfare use among US women. He used household panel data collected among AFDC recipients starting from 1984. The study sample included single women with children. He measured the marriage market by using plain sex ratios of unmarried men to unmarried women from the 1980 census. He concluded that the availability of employed single men speeds exit from welfare. He further showed that for Afro-American women labour market conditions are more important than marriage market conditions for exit from welfare.

It has been argued that these women are better off as single mothers because of the low quality in terms of earnings and personal characteristics that the available men can offer, and would thus rather rely on state welfare income to survive. Another factor to which the single status of women has been attributed and which has been the focus of much research is the economic independence of women through labour income. The literature provides different measurements for women's independence using time-varying values for education, employment status, earnings in the previous year, and public assistance income received during the year preceding the survey date (Lichter et al, 1992, Brien 1997). Wood (1995) constructed a women-earning index to measure women's economic independence. The index was constructed using the national median earnings of Afro-American women, the national concentration of Afro-American women and the employment rate in the SMSA for each industry. Wood also developed a measure for welfare generosity by taking the maximum AFDC benefit available for a family of four

¹⁴Aid to Families with Dependent Children (AFDC) is a welfare system in the US created in the Social Security Act of 1935 to provide cash assistance to children who had been deprived of the support of one of their parents, usually the father. Initially, the program paid benefits only to children; adults were not counted in the grant calculation until 1950. AFDC is supposed to have induced some women to enter motherhood thereby achieving financial independence through this support. Also this system is supposed to discourage labour force participation. Many of the US states have substituted the AFDC system by the Earned Income Tax Credit (EITC) which does not have these work disincentive effects.

as well as the cash value of food stamps and Medicare by SMSA. We conduct a study for South Africa similar to those discussed above drawing mostly from the US studies.

5. Empirical approach

We argue that a woman who has at least one child would order marital status in the following way, from the least attractive, 1) never married, through 2) unmarried cohabitation, and 3) traditional marriage, to the most attractive, 4) civil marriage. Among these institutional arrangements some are easier to enter and exit (particularly cohabitation) and others have better benefits but entry and exit may be more difficult, thus some may be more desirable and others may be less desirable. Civil marriage may be preferred over traditional marriage to avoid polygamy, although only 0.2 percent of African men live in official polygamous marriages. Never married mothers who are not cohabiting with a man may have done so earlier. Men who are never married may have several sexual relations and thus be in practice polygamous although not registered as such. Traditional marriages have been legally acknowledged only since 1998 and give the woman the right to marital property.

We assume that the women are utility maximizer so that this ordering has to be understood as her preference other thing being equal. With ordered alternative choices, any alternative is more similar to those close to it and less similar to those further away. The ordered nature can be handled by specifying an ordered probit model that accounts for the pattern of similarity and dissimilarity among alternatives. Other models such as the multinomial logit and multinomial probit models ignore the ordered nature of the data. The use of these models is also associated with undesirable properties, such as the independence of irrelevant alternatives in the case of a multinomial logit or lack of closed-form likelihood in the case of a multinomial probit (Greene, 2003).

In ordered probit, an underlying score is estimated as a linear function of the independent variables and a set of cut-off points or thresholds (Greene, 2003). The probability of observing outcome j corresponds to the probability that the estimated linear function, plus random error, is within the range of the cut-off points or thresholds μ_{j-1} estimated for the outcome. Let the underlying response model be described as:

$$Y^* = X' \beta + \varepsilon \quad (4)$$

where Y^* is an unobserved variable, X is a set of explanatory variables that are measurable factors and ε is the residual or error term. We observe that:

$$\begin{aligned} Y = \text{single} & & \text{if } Y^* < \mu_1 & (5) \\ Y = \text{cohabit} & & \text{if } \mu_2 < Y^* \leq \mu_1 \\ Y = \text{married traditional} & & \text{if } \mu_3 < Y^* \leq \mu_2 \\ Y = \text{married civil} & & \text{if } \mu_3 \leq Y^* \end{aligned}$$

The log-likelihood function for this model is given by (6) and the Z_{ij} is an indicator variable with $Z_{ij}=1$ if Y falls in the j th category and $Z_{ij}=0$ otherwise:

$$\log L = \sum_{i=1}^n \sum_{j=1}^k Z_{ij} \log[\phi(\mu_j - X' \beta) - \phi(\mu_{j-1} - X' \beta)] \quad (6)$$

The β s and μ are unknown parameters to be estimated. The X s are the explanatory variables. In order to identify the parameters of the model, the normalization rule that $\text{var}(\varepsilon)=1$ is imposed. Thus $\varepsilon \sim \text{IN}(0,1)$. Thus we have the following probabilities:

$$\begin{aligned} \text{Pr ob}(Y = \text{single} | X) &= \phi(\mu_1 - X' \beta) - \phi(-X' \beta) & (7) \\ \text{Pr ob}(Y = \text{cohabit} | X) &= \phi(\mu_2 - X' \beta) - \phi(\mu_1 - X' \beta) \\ \text{Pr ob}(Y = \text{married traditional} | X) &= \phi(\mu_3 - X' \beta) - \phi(\mu_2 - X' \beta) \\ \text{Pr ob}(Y = \text{married civil} | X) &= 1 - \phi(\mu_3 - X' \beta) \end{aligned}$$

For all the probabilities to be positive we must have $0 < \mu_1 < \mu_2 < \mu_3$. The interpretation of the model's parameter β is that positive signs indicate a more desirable marital status as the value of the associated variables increase, namely 'civil marriage', while negative signs suggest a less desirable status. These interactions must be compared to the ranges between the various thresholds, in order to determine the most likely marital choice for a particular woman.

Marriage market theory shows that the outcomes of marital choice depend on local marriage markets as well as women's own characteristics of the 'good catch' and 'self-reliance' effects. We use two strategies to explain racial differences in these outcomes. We first explain racial differences in a joint model for all population groups assuming that all women have the same behaviour and entered dummies for population group. We then estimate separate models for Africans and Whites and examine predicted probabilities by simulating the effect of the marriage market on marital outcomes if African women were exposed to White women's marriage markets or had education levels similar to those of White women. To do so we calculated predicted probabilities by using formula 7 but assuming that African women had access to marriage markets with the characteristics of the White women's marriage markets. Therefore we calculated an index:

$$\text{index} = \sum_i^n \sum_j^{k-1} \beta_j X_{ij}^{\text{african}} + \beta_k X_{ik}^{\text{white}} \quad (8)$$

where $k-1$ variables of the n African women are multiplied by the estimated coefficients of the ordered probit. The k th variable is the marriage market indicator variable for example number of men divided by number of women in the local marriage market. For this variable we multiplied the estimated coefficient from the ordered probit β_k with the marriage market characteristics which applies to Whites living in the same local marriage market as the African woman considered. We then used a formula supplied by STATA to estimate the probabilities for African women for each of the four outcomes given that they had had access to marriage markets with the more female friendly White characteristics (StataCorp, 2003).

$$\begin{aligned} \text{Pr ob}(Y = \text{single} | X) &= \text{norm}(_b[_\mu_1] - \text{index}) & (9) \\ \text{Pr ob}(Y = \text{cohabit} | X) &= \text{norm}(_b[_\mu_2] - \text{index}) - \text{norm}(_b[_\mu_1] - \text{index}) \\ \text{Pr ob}(Y = \text{married traditional} | X) &= \text{norm}(_b[_\mu_3] - \text{index}) - \text{norm}(_b[_\mu_2] - \text{index}) \\ \text{Pr ob}(Y = \text{married civil} | X) &= \text{norm}(\text{index} - _b[_\mu_3]) \end{aligned}$$

6. Data and variables

The South African 2001 census is the second comprehensive census since the advent of democracy in 1994. Data collection was done by face-to-face interviews or self-completion of the questionnaires by respondents (Stats SA, 2003). The complete census data at unit record level were used for analysis. We used a sub-sample of women aged 20 to 40 who had already given birth to their first child. This resulted in a sample size of 4.5 million women. Three groups of variables influencing the choice of marital status among women with at least one child were considered: the available pool of marriageable men, exogenous variables and potentially endogenous variables associated with the women's background, and economic status. The first group of variables represents the local marriage markets at district council level (DC)¹⁵. The DC is assumed to be the geographical area where women would search for potential partners. We consider the province to be too broad and the local municipality too narrow to measure the local marriage market. The DC is the third level of hierarchy from high (country) to low (enumeration area). There are 53 local areas (district councils) in our analysis. We constructed the local marriage market variables as follows:

$$SRP_i = \frac{\sum_{i+9} M_i}{\sum_{i-3} F_i} \quad (10)$$

where SRP_i is the sex ratio for the population of each single year of age i . M_i is the number of all men for a certain population group and in a certain age group in the local marriage market. F_i has a similar definition. For a 20-year-old African woman, the sex ratio is equal to the number of African men aged 20 to 29 divided by the number of African women aged 17 to 26. By selecting this age range for the computation of the available pool of marriageable men, we assumed that women have a preference for men of their own age or at a maximum 9 years older. Some women do marry much older men and that is one possible effect of the scarce marriage market. Next we compute three other ratios by modifying the numerator of the above ratio where M_i becomes: 1) the number of employed men; 2) the number of men with completed education higher than grade 12 (standard 10); 3) the number of men with an income greater than R800 per month. These sex ratios are calculated for the 53 local areas (district councils) and for each of the population groups. Thus we have $53 \times 4 = 212$ local marriage markets. Furthermore, as shown in equation 10, an individual woman is given a marriage market value which varies with her age (with 21 possible values), with her population group (4

¹⁵ Administratively, the country is divided into nine provinces (Western Cape, Eastern Cape, Northern Cape, Free State, KwaZulu-Natal, North West, Gauteng, Mpumalanga, Limpopo). The provinces are in turn divided into 231 local municipalities. Each has a unique name, a unique code number and clearly defined boundaries. These municipalities are grouped into district councils. Included with the district councils for this purpose are six independent metropolitan areas, which feature a high population density and multiple business districts and industrial areas. They are: City of Cape Town Metropolitan Municipality; Ethekwini Municipality (Durban); City of Johannesburg Metropolitan Municipality; Ekurhuleni Metropolitan Municipality (East Rand); Nelson Mandela Metropolitan Municipality (Port Elizabeth); and City of Tshwane Metropolitan Municipality (Pretoria). The main place is level five in the geographical area hierarchy structure and there are 2,674 main places in total. The sub-place is sixth in the geographical area hierarchy structure and there are 15,966 sub-places. Enumeration Areas come last and have been created by Stats SA for census administrative purposes to create small unit of manageable size for enumeration. A total of 80,787 EAs were demarcated for Census 2001 (Stats SA, 2003).

possible values) and the district council in which she lives (53 possible values). Therefore there are $21 \times 4 \times 53 = 4,452$ different values of the four different marriage market indicators we use.

In the selection of R800 as a minimum level we wanted to use an income above poverty. However, in South Africa, there is still no national poverty line. Thus researchers have used different measures of poverty¹⁶. Given the small number of interracial marriages that take place in South Africa, it is proper to assume that the marriage market is racially segregated¹⁷.

In panel A of Table 2, the sex ratios averaged over 53 district councils are shown for selected age of the woman, for each population group and according to the different definitions. Since they are computed for groups they will be exogenous to individual women, the unit of analysis in our study. The average number of men for each woman among Africans declines from 0.869 at aged 20 to 0.637 at age 40. The decline is similar

Table 2: Sex ratio of availability of mate by population group and age

A. Mate availability in South Africa 2001								
African					White			
Age	Sex ratio	Employed men	Men with sufficient income	Men with \geq high school	Sex ratio	Employed men	Men with sufficient income	Men with \geq high school
20	0.869	0.291	0.139	1.129	0.952	0.746	0.703	1.341
25	0.844	0.401	0.231	0.819	1.032	0.919	0.888	1.083
30	0.823	0.443	0.283	0.709	0.980	0.882	0.865	1.065
35	0.807	0.441	0.294	0.642	0.976	0.868	0.855	1.091
40	0.637	0.420	0.285	0.629	0.755	0.813	0.814	1.064
Coloured					Indian			
20	0.936	0.439	0.306	1.315	0.854	0.609	0.545	1.136
25	0.936	0.559	0.419	1.002	0.974	0.820	0.756	1.021
30	0.894	0.567	0.437	0.969	1.248	1.097	1.014	1.349
35	0.868	0.548	0.417	1.007	0.933	0.787	0.745	1.127
40	0.684	0.503	0.381	0.866	0.695	0.710	0.694	1.154

B. Mate availability in the US 1992						
Afro-American				White		
Age	Sex ratio	Employed men	Men with sufficient income	Sex ratio	Employed men	Men with sufficient income
20	0.829	0.473	0.242	1.202	0.885	0.522
25	0.681	0.447	0.304	1.120	0.922	0.720

Source: Own computation based on Census 2001 and on 53 local areas; Lichter et al, 1992, Table 3 p.791.

Note: Lichter et al (1992)'s definition of mate availability is based on unmarried men and women.

¹⁶ In 2000, a household income of R800 per month was considered as poor (Stats SA, 2000). The Human Science Research Council considered an income of R587 per household member as a poverty income (HSRC, 2004). Currently R2 000 is considered the minimum wage in the public sector. We use an individual income of R800 per month or above as income suitable to support a family. In October 2001, R11.91 equaled €1.

¹⁷ The 1949 Mixed Marriages Act prohibited marriage between persons of different population groups. The 1950 Immorality Act also banned sexual relations between non-Whites and Whites. The 1950 Group Area Act declared areas for the exclusive use of one particular racial group. It made it compulsory for people to live in an area designated for their classification group. Although this legislation has now been scrapped marriage across racial lines still rarely occurs.

for Whites. On the other hand, at age 30 for each African woman there are only on average 0.283 men with sufficient income, which is the largest deficit among all population groups in the country, with Indians showing a surplus. White women at age 30 have a better marriage market than an African woman at any age.

In panel B, we present mate availability in the US extracted from Lichter et al (1992). Although the definitions used are different we can see that potential marriage candidates were fewer for Afro-Americans whereas Whites in the US had no deficits in terms of plain sex ratios. If mate availability measures by employment status or sufficiency of income are used instead, deficits of Afro-American men are much more severe than of White men.

In panel A of Table 3 are presented those of the 53 district councils with the highest sex ratios by population group for women 20 to 40 and in panel B are the ones with the lowest sex ratios. It shows that there is a larger supply of men in urban areas than in so-called tribal areas. Moreover these districts have a considerable influx of migrant labourers in general, since most of the mines, large commercial farms and other real or perceived work opportunities are there. For example, the West Rand has lots of worker hostels (more than 8% of the population in the DC constitutes of hostel residents) while the West Coast,

Table 3: Local marriage markets ranked by ratio of men per woman

Rank	DC name	Province	DC type ¹⁸	African		White	
				No. of women	All men/women	No. of women	All men/women
<i>A. Top 10 sex ratios among Africans 2001</i>							
1	Namakwa	Northern Cape	Urban area	1,074	1.588	2,493	1.055
2	West Coast	Western Cape	Urban area	7,451	1.300	10,116	1.032
3	Overberg	Western Cape	Urban area	10,596	1.270	7,322	0.898
4	West Rand	Gauteng	Urban area	153,306	1.257	31,746	1.009
5	Metsweding	Gauteng	Urban area	32,297	1.060	7,195	1.131
6	Eden	Western Cape	Urban area	24,194	1.009	18,911	1.008
7	Bojanala	North West	Tribal area	253,767	0.990	19,175	0.991
8	Ekurhuleni	Gauteng	Urban area	520,611	0.973	119,031	0.894
9	Siyanda City of	Northern Cape	Urban area	14,088	0.936	5,337	0.876
10	Johannesburg	Gauteng	Urban area	685,927	0.928	126,659	0.878
<i>B. Bottom 10 sex ratios among Africans 2001</i>							
1	Umzinyathi	KwaZulu-Natal	Tribal area	94,534	0.493	1,534	0.760
2	Sekhukhune	Mpumalanga	Tribal area	207,585	0.517	1,663	0.895
3	Bohlabela	Mpumalanga	Tribal area	134,718	0.525	994	0.849
4	O.R.Tambo	Eastern Cape	Tribal area	335,662	0.537	402	0.942
5	Umkhanyakude	KwaZulu-Natal	Tribal area	126,196	0.542	747	0.932
6	Vhembe	Northern Province	Tribal area	271,177	0.551	3,175	0.948
7	Alfred Nzo	Eastern Cape	Tribal area	106,734	0.557	17	0.638
8	Zululand	KwaZulu-Natal	Tribal area	168,893	0.565	3,033	0.858
9	Mopani	Northern Province	Tribal area	223,818	0.574	5,022	0.949
10	Sisonke	KwaZulu-Natal	Tribal area	62,208	0.586	1,405	0.880

Source: Own computation based on Census 2001 and on 53 local areas

Note: The totals include men aged 20 to 49 and women aged 17 to 46. Direct computations will give sex ratios slightly higher than those reflected in the table since these are averages by DC and are computed using equation 10.

¹⁸ Derived from the dominant enumeration area type within the DC. The ten EA types are: Tribal area; Urban area; Informal settlement; Farm; Smallholding; Industrial area; Recreational area; Institutions; Hostels; and Sparse (fewer than 10 households).

Overberg, Metsweding and Siyanda district councils have a large concentration of commercial farms (from 22 to 30% of the population in the DC constitutes of farm residents). Thus the migrants are either accommodated in single sex hostels (not meant for families) or build informal shelters or shacks in the vacant lands close to their work place. Ekurhuleni and the West Rand have the highest numbers of informal settlements dwellers, 17% and 12% respectively of all informal settlement in the country (Census 2001).

In panel B of Table 3 are presented DCs or metropolitan area that have the largest surplus of women in comparison to men. These are all rural areas with no or very few farms or towns. The deficit of men is the result of large-scale migration of men to urban and farm areas to seek employment. Thus from Tables 2 and 3, it is clear that men and women do not reside in the same areas of South Africa. For example, 45% of African males under the age of 20 live in rural areas, but this figure declines to only 39% by age 30. This trend begins to reverse itself after the age of 55, with almost 38% of males returning to their rural homelands by age 70 (Census 2001).

Other controls used in the analysis are the woman's population group, age, religion, whether she lived in a metropolitan area and the local unemployment rate at the DC or metropolitan area level. These variables are considered purely exogenous. The DC level unemployment rate is estimated using unit record level Census 2001 data¹⁹. The metropolitan municipalities include the six biggest metropolitan areas in South Africa- City of Cape Town Metropolitan Municipality; Ethekwini Municipality; City of Johannesburg Metropolitan Municipality; Ekurhuleni Metropolitan Municipality; Nelson Mandela Metropolitan Municipality; and City of Tshwane Metropolitan Municipality. We also control for the woman's education and whether she was studying. The education classification is based on the highest level achieved, collapsed into four levels: none – no education; low – grade 6 or below; medium – grade 7 to grade 12; high – diploma or above. Another control is the woman's income, which has four categories: none – no income; low – income less than or equal to R3,200 per month; medium – income from R3,201 to R6,400 per month, and high – income of R6,401 or more per month. Further controls are employment status and whether the woman was living with her parents.

There is potential endogeneity with the woman's marital status, her current employment status, her education, whether she is studying, her income level and whether she lives with her parents. Moreover some of the causality can run both ways, as the women may have changed their behaviour after their marriage. For instance, some women may decide to get a job to supplement their husband's income whereas others leave employment to be a full time housekeeper or homemaker after giving birth to at least one child. Some women may choose to live with their parents after they learnt that the father of their child is not marriageable.

The problems of endogeneity and reversed causality would have best been avoided by using panel or some historical data instead of the cross-section information we are using. However the use of the potentially endogenous variables can take care of the heterogeneity across women. For these reasons we run two different models: one with

¹⁹ The official definition of unemployment rate is used. Derived from a logical series of steps involving a) Worked past 7 days, b) Job although absent, Work category, c) Reason absent from work, d) Acceptance of job, e) Time to start work, f) Work-seeking action.

only exogenous variables and another with both exogenous and potentially endogenous variables.

The means and standard deviations of all variables included in the analysis are presented in Table 4. The majority of women (46%) have low education and an even larger number (66%) have no income at all. The means on the local marriage market index vary from 79% for the raw sex ratio to 33%, women finding a marriageable man with sufficient income

Table 4: Means and standard deviations of explanatory variables

Variable	Description	Mean	SD, Max, Min
<i>Dependent variable</i>			
Marital choice	Never married	0.46	
	Cohabiting	0.13	
	Married traditional	0.14	
	Married civil	0.28	
<i>Exogenous variables</i>			
Sex ratio	Ratio of men per woman	0.79	(0.17; 6.50; 0.35)
No. of employed men	Ratio of employed men per woman	0.44	(0.21; 6.50; 0.05)
No. of educated men	Ratio of men with \geq high school education per woman	0.74	(0.19; 9.25; 0.00)
No. of men with sufficient income	Ratio of men with income above R800 per woman	0.33	(0.21; 6.50; 0.02)
Population group (based on self-classification)	African	0.81	
	Coloured	0.10	
	Indian	0.02	
	White	0.07	
Current age	Age in completed years	30.26	(6.3; 40; 20)
Religion (broad grouping)	Christian	0.83	
	Traditional	0.01	
	Judaism	0.01	
	Hinduism	0.01	
	Islam	0.01	
	No religion	0.13	
Metropolitan area	If the woman is currently staying in a big city	0.35	
Unemployment rate	Local unemployment rate	43.54	(11.03; 68.02; 13.83)
<i>Potentially endogenous variables</i>			
Highest level of education	None	0.12	
	Low	0.46	
	Medium	0.34	
	High	0.08	
Studying	If the woman is currently studying	0.07	
Employed	If the woman is employed	0.30	
Income	None	0.64	
	Low	0.29	
	Medium	0.06	
	High	0.01	
Employed*low income		0.23	
Employed*medium income		0.06	
Employed*high income		0.01	
Lives with parents	If the woman lives with her parents	0.25	

Source: Own computation based on Census 2001

7. Results

Table 5 presents results from estimating ordered probit models to establish the determinants of type of marital relationship entered into among South African mothers between the ages of 20 and 40. The exogenous model includes all purely exogenous variables and is estimated by using the number of employed men per woman as a control of the marriage market and other exogenous controls such as the background of the woman and geographical location.

Table 5: Ordered probit model of choice of marital status of South African mothers

Explanatory variables	Exogenous only		Exogenous and endogenous	
	Coef	S.E	Coef	S.E
<i>Local marriage markets</i>				
Number of employed men	0.523	0.005	0.333	0.006
<i>Exogenous variables</i>				
Coloured	0.422	0.002	0.618	0.002
Indian	1.327	0.006	1.449	0.007
White	1.540	0.003	1.485	0.004
Age	0.069	0.000	0.055	0.000
Religion: Traditional	0.205	0.006	0.218	0.006
Judaism	-0.008	0.022	0.004	0.024
Hinduism	0.271	0.009	0.261	0.009
Islam	0.558	0.006	0.568	0.006
No religion	-0.066	0.002	-0.108	0.002
Metropolitan area	-0.019	0.001	-0.069	0.001
Unemployment rate of the area	0.003	0.000	0.003	0.000
<i>Potentially endogenous variables</i>				
Education: Low			0.053	0.002
Medium			0.123	0.002
High			0.366	0.003
Studying			-0.239	0.003
Employed			-0.126	0.007
Income: Low			-0.054	0.002
Medium			0.164	0.013
High			0.001	0.022
Employed*low income			-0.053	0.007
Employed*medium income			0.122	0.015
Employed*high income			0.145	0.025
Lives with parents			-1.576	0.002
<i>Parameters of the model</i>				
Thresholds: μ_1	2.472	0.006	1.627	0.007
μ_2	2.846	0.006	2.070	0.007
μ_3	3.315	0.006	2.587	0.007
Number of observations	4,565,849		4,565,849	
Log likelihood	-5076697.9		-4578396.7	
LR Chi square	1255701.43		2252303.76	
Likelihood ratio index	11.01%		19.74%	

Source: Own computation based on Census 2001

Note: Reference categories for the explanatory variables: Population group - African; Religion - Christian; Education - None; Monthly income - No income.

Focusing first on the exogenous only model, the marriage market indicator of the availability of employed men has a positive effect and population group is positive and significant with Whites and Indians more likely to have good marriages. The coefficient for age is positive and significant. Note that this result is by single year of age going from 20 to 30 means 0.069 which is not so small. Going from 20 to 40 is an increase by $20 \times 0.069 = 1.38$ which is a large coefficient in the vicinity of being White and exceeding the coefficient for being Indian. The same reasoning applies for unemployment rate. Going from minimum 13.8 to maximum 68% is a 44 percentage points difference, so $0.003 \times 44 = 1.32$ such that the probability of a good marriage is substantially increased in a low unemployment area. The interaction terms of employed and income are interesting since they are different in the distinct income intervals. The high income shows a coefficient of 0.145 and a standard error of 0.025, thus highly significant. This means other things equal, an employed woman with low income is less likely to be in a good marriage than an unemployed woman. But an employed woman with high or medium income is more likely to be in a good marriage than a woman who is not employed. Religious affiliation also contributes positively to marriage whereas women who reported having no religion are most likely to remain single. Living in a metropolitan area has a weak negative effect on marriages.

In column 3 and 4 of Table 5 potentially endogenous variables are added to the previous model to control for heterogeneity among women. Once more, all explanatory variables are all highly significant except for Judaism and income.

The introduction of potentially endogenous variables does not eliminate the local marriage market effect, which declines from 0.523 to 0.333, increasing the race effect for Coloureds and Indians and decreasing it for Whites although being a White woman still gives the highest probability for a good marriage. Controlling for women's economic independence augments the negative effects of living in a metropolitan area. Employed women prefer to remain single. Better educated women have better marriages, with large differences between low and high education. Better educated women with more economic resources are more likely to be married.

The thresholds can be interpreted in terms of the Z-scores. The boundary between the marital statuses of 'never married' and 'cohabiting' is at $Z=2.47$; between 'cohabiting' and 'married traditional' at $Z=2.85$; between 'married traditional' and 'married civil' at $Z=3.32$. These values leave $\Phi(2.47)=0.9932$ or 99% of the reference category in the 'never married' category; $\Phi(2.85) - \Phi(2.47)=0.0046$ or 0.46% in the cohabiting category; $\Phi(3.32) - \Phi(2.85)=0.0016$ or 0.16% in the 'married traditional' category and $1 - \Phi(3.32)=0.0006$ or 0.06% in the 'married civil' category. We notice a change in boundary probabilities when we use the model with both exogenous and endogenous variables, with 95% in the 'never married' category while the 'cohabiting' increase to 3% and the 'married traditional' and 'married civil' categories to 1% each. These values are quite different from the observed proportions.

In Table 6 we present the effects of the sex ratios on the population groups in order to better gauge racial differences. Only the coefficients of the sex ratios are shown in the table but all variables presented in Table 5 have been used. In the first column, we present the model without the sex ratios to serve as a benchmark. The results are higher marriage rates among Indians and Whites than among Africans and Coloureds. Once we control for local marriage markets the effects decrease slightly for all population groups.

In panel B of Table 6, we present the models with the additional variables to control for observed heterogeneity like in Table 5 above. We observe that the effects become more pronounced. This finding shows that marriage market factors explain only some of the racial effects. A shortage of men with good income reduces the possibility of good marriages, especially among African and Coloured women. This indicates that the shortage of marriageable men is not only a pure demographic effect of imbalances in the sex ratio but relates to the deficit of quality men. Yet the effect of the availability of employed men is almost twice as high among White women as African women (Table 7). Furthermore, African women's decisions to enter marriage is more dependent on the availability of employed men and to a lesser extent availability of educated men whereas for White women availability of men with sufficient income is more important. But in total the highest impact on the racial differences is made by the income-based local marriage market measure, a finding similar to Wood's (1995).

Table 6: Effects of the population group in ordered probits of marital status of South African mothers

	No sex ratio	All men/women	Employed men/women	Men with sufficient income/women	Men with \geq high school men/women
<i>A. Models with only exogenous controls</i>					
Coloured	0.412 (0.002)	0.433 (0.002)	0.422 (0.002)	0.403 (0.002)	0.389 (0.003)
Indian	1.478 (0.006)	1.463 (0.006)	1.327 (0.006)	1.272 (0.007)	1.428 (0.006)
White	1.715 (0.003)	1.702 (0.003)	1.540 (0.003)	1.445 (0.004)	1.663 (0.003)
<i>B. Models with exogenous and (potentially) endogenous controls</i>					
Coloured	0.611 (0.002)	0.619 (0.002)	0.618 (0.002)	0.605 (0.002)	0.597 (0.002)
Indian	1.544 (0.007)	1.538 (0.007)	1.449 (0.007)	1.397 (0.007)	1.516 (0.007)
White	1.596 (0.003)	1.591 (0.003)	1.485 (0.004)	1.402 (0.004)	1.567 (0.004)

Source: Own computation based on Census 2001

Note: Number of observations: 4,565,849. Only the coefficients of the sex ratio are shown in the table but all variables presented in Table 5 have been used in the regression.

We estimated different versions of the above ordered probit model. Separate estimation is done for African and White women aged 20-40 with at least one child and varying the definition of the sex ratios of marriageable men. The results for the coefficients on the marriage market indicators are shown in Table 7. The marriage market indicators are all positive and significant but availability of economically attractive men (men with sufficient income or employed men) contributes highly on the shift to marriage. This implies that it is not only the quantity of the marriage market that counts for women to seek marriage but also the quality. Availability of educated men is also important for a good marriage among Africans whereas the effect is negative among Whites. Once more, the introduction of potentially endogenous variables in the regression, as presented in panel B of Table 6, reduces the effects of the sex ratios but the basic pattern remains.

Table 7: Effects of sex ratios in ordered probits of marital status of South African mothers

	All men/ women	Employed men/women	Men with sufficient income/women	Men with \geq high school men/women
<i>A. Models with only exogenous controls</i>				
All	0.215 (0.005)	0.523 (0.005)	0.598 (0.005)	0.168 (0.004)
African	0.234 (0.005)	0.523 (0.006)	0.494 (0.006)	0.216 (0.005)
White	0.494 (0.049)	1.466 (0.060)	1.571 (0.064)	-0.039 (0.022)
<i>B. Models with exogenous and (potentially) endogenous controls</i>				
All	0.083 (0.005)	0.333 (0.006)	0.434 (0.006)	0.094 (0.004)
African	0.118 (0.005)	0.304 (0.006)	0.289 (0.006)	0.198 (0.005)
White	0.409 (0.050)	1.086 (0.062)	1.136 (0.066)	0.022 (0.023)

Source: Own computation based on Census 2001

Note: Number of observations: all - 4,565,849; African - 3,721,535; White - 283,163.

Only the coefficients of the sex ratio are shown in the table but all variables presented in Table 5 have been used in the regression.

In Table 8 we present probabilities for the four different outcomes of the effects of marriage markets using separate models for White and African women and measuring marriage markets by the ratio of employed men to women in the district council where the woman lives from her respective age range. To analyse the racial effect further we perform two simulations. First we give an African woman the marriage market characteristics of a White woman living in her district council and being of the same age as herself. Second we shift the education level of the African woman upwards. This means that if the woman's observed level of education is 'none', she is assigned 'low' level in a one-level shift and 'medium' in a two-level shift. The one-level shift in education gives African women educational levels comparable to those of Whites. The distributions of observed and assigned levels of education are shown in Table A3 of the appendix.

Table 8: Probabilities for marital outcomes

Marital outcomes	White		Obs	Pred	Pred with Whites' sex ratio (a)	African			
	Obs	Pred				Pred with better education (b)	Pred with both (a) and (b)	One level	Two level
<i>A. Models with only exogenous controls</i>									
Single	0.058	0.058	0.506	0.508	0.414				
Cohabit	0.064	0.065	0.135	0.135	0.138				
Married traditional	0.018	0.018	0.165	0.166	0.187				
Married civil	0.861	0.860	0.194	0.192	0.261				
<i>B. Models with exogenous and (potentially) endogenous controls</i>									
Single		0.058		0.511	0.467	0.510	0.439	0.433	0.366
Cohabit		0.066		0.134	0.134	0.135	0.133	0.133	0.126
Married traditional		0.017		0.163	0.171	0.163	0.175	0.177	0.182
Married civil		0.858		0.193	0.227	0.192	0.253	0.258	0.326

Source: Own computation based on Census 2001

Note: Number of observations: African - 3,721,535; White - 283,163.

Using exogenous controls only and exposing African women to White women's marriage market increases the predicted probability of civil marriage by 7% (from 0.192 to 0.261) and the predicted probability of traditional marriage by 2% (from 0.166 to 0.187) which is a total increase of 9% of the predicted probability of marriage. If African women's education is shifted up by one level the effect on the predicted probability of marital status is negligible, whereas a shift of two levels increases the probability of marriage by 7%, with a 6% rise in the share of civil marriages only. Next we expose African women to a marriage market and educational levels similar to Whites. The result is that 44% of women would marry, out of which 26% would be in civil marriage. This is a rise in marriage rate of close to 8%. Lastly we expose African women to the White women's marriage market while at the same time shifting their education up by two levels, which is a much higher level than those of Whites. The result is presented in the last column of Table 8 and shows that 51% of African women would marry (33% in a civil marriage and the rest in a traditional marriage). However these rates still remain lower than those for White women. Thus these findings confirm that the racial differences are not solely due to the poor marital prospects of African women. Our results indicate that the conclusion holds even when we control for variables that may be related to marital choice decisions.

8. Conclusion

A comparison of plain sex ratios between African women and White women in South Africa shows that White women have a better marriage market. The marriage market worsens as the women become more selective sex ratio as low as 30% applies for African women aged 35 if the requirement is that marriage candidates should earn above poverty income. The corresponding figure for White women is 86%. Using census data, this paper provides insights into the marital choices among women in South Africa taking into account the different types of marriage markets and the different population groups of the women. The findings can be summarized as follows. Better education increases the chances of women to be married. The availability of economically attractive men increases the opportunities for better marriages for all women. However African women in South Africa are prepared to have a civil marriage only if the man is employed, regardless of his income level. This is because there are fewer African men than women, but even fewer eligible African men and thus the men would most likely be very selective. If African women are exposed to the same marriage markets as their White counterparts, the probability of marriage increases but not to the same level as for the White women.

In our study, all the women have at least one child, in most cases born out of wedlock. It is not uncommon for African couples first to have a child and to marry later as it takes a while to raise the lobola money. Thus what we observe may to some extent be postponement of marriage. Yet we include women until age 40 in our analysis. One of the apartheid legacies is to make the nuclear families difficult to be maintained. Instead there are families consisting of one parent, children and grandparents, a family which even now seems to be prevalent.

Research in the determinants of marriage rates among women in the US has shown the decline in marriage rates to be due to poor marriage markets as measured by the shortage of "quality marriageable" men. These studies suggest that even exposed to marriage market conditions similar to those of White women, Afro-American women

are less likely to marry than their White counterparts. Among Afro-American women only 50% are expected to marry by age 28, compared to nearly 80% of White women (Lichter et al, 1992), which is a finding similar to ours. Moreover their finding indicates that the annual probability of first marriage among Afro-American women would increase by 23% if these women were exposed to the same marriage markets as those of White women, a figure still much lower than that for Whites. In addition, US findings have reported mate availability to be a significant factor contributing to delayed marriage among Afro-American women, and have shown that women with the greatest economic means the most likely to be married. This is consistent with our findings for South Africa.

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Appendix

Table A1: Distribution of ratio of all men per woman by local area

District council	Province	DC type	African	Coloured	Indian	White	Overall
Alfred Nzo	Eastern Cape	Tribal area	0.557	1.147	0.536	0.313	0.638
Amajuba	KwaZulu-Natal	Urban area	0.697	0.916	0.908	0.958	0.870
Amatole	Eastern Cape	Tribal area	0.673	0.838	1.061	0.968	0.885
Bohlabela	Mpumalanga	Tribal area	0.525	0.702	1.103	1.065	0.849
Bojanala	North West	Tribal area	0.990	0.961	1.025	0.987	0.991
Boland	Western Cape	Urban area	0.922	0.853	1.084	0.863	0.931
Bophirima	North West	Tribal area	0.679	0.780	0.948	0.987	0.848
Cacadu	Eastern Cape	Urban area	0.812	0.798	0.801	0.923	0.834
Capricorn	Northern Province	Tribal area	0.589	0.718	1.315	0.946	0.892
Central	North West	Tribal area	0.713	0.908	1.192	1.014	0.957
Central Karoo	Western Cape	Urban area	0.900	0.792	0.444	1.063	0.800
Chris Hani	Eastern Cape	Tribal area	0.614	0.870	0.905	0.989	0.844
City of Cape Town	Western Cape	Urban area	0.837	0.822	0.897	0.915	0.868
City of Johannesburg	Gauteng	Urban area	0.928	0.791	0.888	0.904	0.878
City of Tshwane	Gauteng	Urban area	0.875	0.790	0.908	0.891	0.866
Eden	Western Cape	Urban area	1.009	0.816	1.258	0.950	1.008
Ehlanzeni	Mpumalanga	Tribal area	0.742	0.782	1.161	0.955	0.910
Ekurhuleni	Gauteng	Urban area	0.973	0.788	0.904	0.913	0.894
Ethekwini	KwaZulu-Natal	Urban area	0.780	0.803	0.861	0.928	0.843
Frances Baard	Northern Cape	Urban area	0.821	0.805	0.934	0.955	0.879
Govan Mbeki	Mpumalanga	Urban area	0.799	0.968	0.968	0.973	0.927
Karoo	Northern Cape	Urban area	0.876	0.855	0.677	1.004	0.853
Kgalagadi	Northern Cape	Tribal area	0.648	0.872	0.482	1.045	0.762
Lejweleputswa	Free State	Urban area	0.869	0.837	1.345	0.939	0.997
Metsweding	Gauteng	Urban area	1.060	1.446	0.992	1.026	1.131
Mopani	Northern Province	Tribal area	0.574	0.926	1.340	0.958	0.949
Motheo	Free State	Urban area	0.765	0.842	1.212	0.842	0.916
Namakwa	Northern Cape	Urban area	1.588	0.852	0.795	1.055	1.073
Nelson Mandela	Eastern Cape	Urban area	0.795	0.814	0.934	0.939	0.870
Nkangala	Mpumalanga	Urban area	0.796	0.845	1.003	0.954	0.899
Northern Free State	Free State	Urban area	0.897	0.962	1.158	0.958	0.994
Oliver R. Tambo	Eastern Cape	Tribal area	0.537	0.923	0.939	1.369	0.942
Overberg	Western Cape	Urban area	1.270	0.922	0.407	0.993	0.898
Siyanda	Northern Cape	Urban area	0.936	0.809	0.767	0.993	0.876
Sedibeng	Gauteng	Urban area	0.850	0.850	0.929	0.953	0.896
Sekhukhune	Mpumalanga	Tribal area	0.517	0.767	1.291	1.003	0.895
Sisonke	KwaZulu-Natal	Tribal area	0.586	0.902	1.015	1.019	0.880
Southern	North West	Urban area	0.903	0.783	0.864	0.883	0.858
Thabo Mofutsanyane	Free State	Urban area	0.666	0.933	1.125	0.934	0.915
UMgungundlovu	KwaZulu-Natal	Urban area	0.698	0.842	0.874	0.895	0.827
Ugu	KwaZulu-Natal	Tribal area	0.597	0.733	0.859	0.925	0.778
Ukhahlamba	Eastern Cape	Tribal area	0.650	0.876	0.917	1.018	0.865
Umkhanyakude	KwaZulu-Natal	Tribal area	0.542	1.026	1.030	1.129	0.932
Umzinyathi	KwaZulu-Natal	Tribal area	0.493	0.778	0.882	0.885	0.760
Uthukela	KwaZulu-Natal	Tribal area	0.608	0.788	0.892	0.977	0.816
Uthungulu	KwaZulu-Natal	Tribal area	0.639	0.871	0.968	1.000	0.869
Vhembe	Northern Province	Tribal area	0.551	0.705	1.547	0.989	0.948
Waterberg	Northern Province	Tribal area	0.749	0.873	0.881	0.957	0.865
West Coast	Western Cape	Urban area	1.300	0.903	1.155	1.032	1.097
West Rand	Gauteng	Urban area	1.257	0.844	0.993	0.940	1.009
Xhariep	Free State	Urban area	0.912	0.866	0.464	1.053	0.824
Zululand	KwaZulu-Natal	Tribal area	0.565	0.898	1.049	0.918	0.858
iLembe	KwaZulu-Natal	Tribal area	0.635	0.870	0.828	1.001	0.834
<i>Mean</i>			0.788	0.862	0.957	0.963	0.892
<i>Min</i>			0.493	0.702	0.407	0.313	0.638
<i>Max</i>			1.588	1.446	1.547	1.369	1.131
<i>1st quartile</i>			0.614	0.792	0.874	0.928	0.849
<i>Median</i>			0.765	0.845	0.934	0.958	0.879
<i>3rd quartile</i>			0.900	0.902	1.084	1.003	0.931

Source: Own computation based on Census 2001

Table A2: Distribution of sex ratios by 53 local areas

Measure	African				White			
	All men	Employed men	Men with sufficient income	Men with \geq high school	All men	Employed men	Men with sufficient income	Men with \geq high school
Mean	0.788	0.402	0.271	0.732	0.963	0.865	0.857	1.071
Min	0.493	0.118	0.088	0.478	0.313	0.260	0.223	0.095
Max	1.588	1.240	0.758	2.206	1.369	1.181	1.197	1.442
1 st quartile	0.614	0.242	0.158	0.619	0.928	0.821	0.825	1.006
Median	0.765	0.386	0.244	0.682	0.958	0.869	0.852	1.079
3 rd quartile	0.900	0.507	0.348	0.773	1.003	0.920	0.904	1.140

Source: Own computation based on Census 2001 and on 53 local areas

Table A3: Educational distribution by population group

Education level	White		African	
	Observed	Observed	Moved one level up	Moved two levels up
None	0.008	0.140		
Low	0.180	0.465	0.140	
Medium	0.507	0.329	0.465	0.140
High	0.304	0.066	0.395	0.860

Source: Own computation based on Census 2001