"The relationship between sex ratios and marriage rates in South Africa"

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Abstract

We investigate the relationship between alternative definitions of sex ratios and marriage outcomes among African and white women in South Africa. In contrast to marriages among whites, African marriages in South Africa traditionally have involved the payment of bridewealth (or *ilobolo*) by a husband to the prospective wife's family. Using matched data from the 2001 Population Census and the South African Labour Force Surveys, we find that among Africans, both the quantity and quality of unmarried men relative to women in local marriage markets are significant predictors of marriage. However, economic-based measures of marriageability have a larger effect on marriage outcomes than simple sex ratios. These findings are consistent with the argument that bridewealth payments act as a financial constraint to marriage among African couples, raising the marriageability criteria of men. In contrast, we find mostly insignificant results for the relationship between sex ratios and marriage outcomes among white women.

Keywords: marriage, sex ratios, bridewealth, South Africa

Introduction

There is a large literature which investigates the effects of sex ratios on marriage outcomes, much of which has focused on marriage markets in the United States. A key hypothesis that has been tested in this literature is whether low and declining marriage rates among African American women can be explained by a relative shortage of men available for marriage, and more specifically, by a shortage of men with the economic status to be 'marriageable' (Wilson 1987; cf. Staples 1985; Schoen and Kluegel 1988; Lichter et al 1991; Lichter et al 1992; South and Lloyd 1992; Wood 1995; Brien 1997; Angrist 2002; Charles and Luoh 2005).

South Africa offers a particularly interesting opportunity to explore the relationship between sex ratios and marriage outcomes. Marriage rates among African women in South Africa are very low and unemployment rates among African men are very high.[1] Furthermore, in many traditional African marriages, bridewealth (or *ilobolo*) is paid by the prospective husband to the bride's family to validate the marriage. This payment which is considerably larger than the mean monthly earnings of African men (Casale and Posel 2010) suggests that economic status may be particularly important in identifying the marriageable pool of African men. It is plausible therefore that low marriage rates among African women reflect not so much a shortage of available (unmarried) African men, but a shortage of marriageable men.

In this study, we investigate marriage markets in South Africa. In particular, we test whether economic-based measures of marriageability, which take into account the quality of available men, perform better in predicting marriage than sex ratios which

[1] The term African is used to describe black South Africans who make up the majority of the population (approximately eighty percent).

capture only the quantity of unmarried men relative to women in local marriage markets. Alternative measures of sex ratios, which differ according to how the marriageable pool of men is identified, are generated using the 2001 Population Census (the most recently released census in South Africa). To better approximate the local marriage market, age-specific sex ratios are estimated at the district level and these district sex ratios are matched to the 2003 Labour Force Survey (LFS). We then use the matched data on samples of African and white young women (aged 20 to 30 years) to estimate the probability of marriage.

Our estimations show that the probability of marriage among young African women is positively and significantly related to the local pool of unmarried African men, but that the effect is largest where these men are employed and earning incomes above a certain threshold. Consistent with the view that bridewealth payments raise the marriageability criteria for men, we find that these results are even stronger in the province of KwaZulu-Natal, a province which contains the largest Zulu-speaking population in the country and where the practice of paying bridewealth is most common. In contrast, there is only weak evidence to link the marriageability of white men according to their economic status to the probability of marriage among young white women. We also show that our findings are robust to controls for possible migration effects in the South African context and to different lags in the sex ratio variables.

In the next section, we review the literature on sex ratios and marriage rates, and we outline specific characteristics of marriage markets and labour markets in South Africa. Section 3 describes the data and methods used in the study and in Section 4,

the main estimations from the 2003 LFS data are presented. In Section 5, we report on the robustness tests undertaken and in the last section we summarize the key empirical findings of the study.

1. Literature review: Sex ratios and marriage outcomes

In standard economic theory, the event of marriage has been explained as a match in the marriage market between prospective partners, where for both partners the utility of being married outweighs the utility of remaining single, and the gains from marriage typically are understood as deriving from the specialization of labour within the household (Becker 1973; 1981). In the context of incomplete information in the marriage market, individuals engage in a costly search process to find a suitable marriage partner, conceptually similar to the job search process in the labour market (Lichter et al 1992; Wood 1995; Brien and Sheran 2003).

One of the factors affecting the probability of marriage is the availability of potential marriage partners in local marriage markets (Lichter et al 1992; Wood 1995). For example, a large supply of unmarried men relative to unmarried women will reduce the cost of search for a male partner and increase the potential benefits from marriage. This marriage market model therefore predicts a positive relationship between the sex ratio and the likelihood that a woman will marry.

However, not all available potential spouses may be viewed as suitable marriage partners. For each individual, the suitability or marriageability of potential partners is judged against what has been referred to as the "reservation quality partner" (Lichter et al 1992), a partner who has some minimum level of characteristics without which

the marriage offer will not be accepted. In addition to certain demographic characteristics such as age and race, the economic attractiveness of potential male partners is one of the qualities commonly assumed to determine the reservation partner for women. Women may only consider marrying men who have achieved a "minimum acceptable level of current labour market success" (Wood 1995: 165), as this success provides some indication of a man's future earnings potential. In this case, economic-based measures of sex ratios, which recognize the quality of available male partners relative to the supply of unmarried women, may provide a better indication of marriage market conditions than sex ratios which reflect only the relative number of unmarried men.

This idea was embodied in Wilson's (1987) "male marriageable pool" hypothesis, that the large decline in marriage rates among African Americans in the United States was being driven by the deterioration in economic circumstances among this group of men, and consequently by a shrinking supply of marriageable young men available for young African American women (in contrast to their white counterparts). Wilson (1987) defined marriageablity in terms of the employment status of available men (relative to available women) but other studies have subsequently investigated the concept of marriageability in more depth to include the educational status of men and their employability, the quality of employment, or some minimum level of earnings (cf. Schoen and Kluegel 1988; Bennett et al 1989; Lichter et al 1991; Lichter et al 1992; South and Lloyd 1992; Wood 1995; Brien 1997; Borooah 2002).

The empirical evidence from the literature which tests the relationship between sex ratios and marriage propensities in the United States is mixed. Although studies

generally find broad support for Wilson's hypothesis, they differ on the extent to which the declining marriageability of African American men accounts for the fall in marriage rates over time, once other factors have been controlled for.

In South Africa, as in the United States, there are large racial differences in marriage rates, with young white women at least twice as likely as young African women to be married. These differences typically have been explained by the ravaging effects of apartheid policies, which impinged on almost every aspect of the social, political and economic life of Africans. Studies on family formation in South Africa have pointed to the devastating impact of restrictions on the free movement of Africans, where the majority of the population was forced into crowded homeland areas and movement to urban areas to work was strictly regulated (see Hosegood et al 2009 for a comprehensive review). Men predominantly migrated for periods of work, while women remained in rural areas with children, creating both emotional and financial instability within marriage.

Although geographic restrictions on permanent residence were dismantled in the late 1980s, marriage rates among Africans remain low and have continued to decline in the post-apartheid era. In this study we seek to add to the literature by exploring whether economic conditions, in the context of traditional marriage practices, explain low marriage rates among Africans in South Africa.[2] Marriage among Africans

[2] It is also possible that attitudes to marriage, particularly in the context of high rates of HIV infection in South Africa, contribute to low and declining marital rates. However this view is challenged by data collected in a nationally representative attitudinal survey, the South African Social Attitudes Survey (SASAS) of 2005, where almost 90 percent of African unmarried adults (20 to 39 years) reported that they wanted to be married someday (own calculations, SASAS 2005). In addition, couples continue to form other types of partnerships despite the risks involved. South African household survey data from 1995 and 2008 suggest that while marriage rates have been on the decline among Africans, rates of cohabitation have trebled from about five to 15 percent. Africans are also almost three times more

traditionally has involved the payment of *ilobolo* or bridewealth by the prospective groom to the bride's family to validate the marriage. The limited quantitative data that exist on *ilobolo* in South Africa suggest that the practice is still widespread and that the payment remains substantial (in the region of over a year's worth of average earnings for African men) (Casale and Posel 2010).[3] Recent reports suggest also that larger bridewealth payments may be negotiated for women with higher levels of educational attainment (Kalule-Sabiti et al 2007). Educated women bring more status and are expected to contribute more to the marriage, and parents who have invested in the education of their daughters expect larger bridewealth payments in return. For African women, therefore, the requirement of an economically suitable marriage partner may be driven not just by the expectation for the male to be a significant contributor to household economic resources, but further by the need for the man to afford *ilobolo*.

At the same time, the supply of African men with suitable economic characteristics is limited. Due to discriminatory practices in the South African labour market during the decades of apartheid, and reinforced by lacklustre employment growth in the post-apartheid period (cf. Casale et al 2004; Bhorat 2006), African men are much more likely to be unemployed, and among the employed, they are far less likely to work in

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likely than whites to cohabit with a partner, which would be consistent with the idea that for many African couples marriage may not be a financially viable option. Nonetheless, data from the SASAS 2005 also suggest that for the majority of unmarried African men and women (64 percent of those 20 to 39 years), cohabitation is not seen as an acceptable alternative to marriage, which would help explain why, in the face of low marriage rates, cohabitation rates among African have not risen by even more.

[3] There is no information collected on the payment of *ilobolo* in national household surveys in South Africa. Information collected in the 1998 wave of a regionally-based panel study (the KwaZulu-Natal Income Dynamics Study) gives some indication of the extent to which *ilobolo* is still practiced and its value. Of the married respondents aged 60 years or younger, three quarters reported making *ilobolo* payments with marriage. The average value of *ilobolo* reported for people married from 1985 to 1998 was approximately 20 000 Rands (2000 prices) or almost 13 times the average monthly real earnings of African men in the 1998 sample (Casale and Posel 2010). This value is consistent with reports in other literature of *ilobolo* typically ranging from 10,000 Rands to 25,000 Rands (Kaarsholm 2005, Gustafsson and Worku 2006).

stable, high-earning jobs, than white men. Data from the 2001 Population Census suggest that among young African men, unemployment rates are nine-fold higher than among young white men, and that on average they earn only a quarter of what white men earn. The pool of marriageable men available to young African women therefore is small, and considerably smaller than that for white women.

Earlier ethnographic research in South Africa has also made reference to the added financial pressures of *ilobolo* on the prospects of marriage (Hunter 2004; Hosegood et al 2009). This research has focused mostly on marriage traditions in the province of KwaZulu-Natal, which is home to the largest Zulu-speaking population, where *ilobolo* is practiced widely and where marriage rates are the lowest in the country. Research in this area also suggests that the practice and value of *ilobolo* are particularly inflexible, despite the inadequate economic opportunities facing African men.[4] We therefore explore whether the relationship between the marriageability of available men and marriage among young African women is particularly strong in KwaZulu-Natal.

2. Data and methods

To investigate marriage markets in South Africa, we analyse cross-sectional data drawn from the nationally representative Labour Force Survey (LFS). The LFS, which surveys approximately 30,000 households in each round, was conducted biannually (in March and September) in South Africa from 2000 to 2007. We use data from the September 2003 round of the survey (LFS 2003:2), although we show later

[4] Hosegood et al (2009: 284) write: "The legacy of the early Natal administrators is that they co-opted and codified bridewealth. While historically the amount of bridewealth was negotiated by the families involved and was rarely paid in full before the marriage took place, the Natal code subjected Zulu women to a fixed and very high bridewealth of eleven head of cattle or their equivalent value."

that our results remain robust when we use samples drawn from the September 2002 and March 2004 surveys (the LFS 2002:2 and LFS 2004:1 respectively).

The LFS captures individuals' current marital status but it does not collect information on when or where marriage occurred. We therefore restrict the sample to young white and African women (aged 20 to 30 years), who are likely to be in first marriages and to have been married in the same district in which they were surveyed. Figure 1 describes marriage rates[5] among these women in 2003. White women are significantly more likely than African women to be married and the gap in marriage rates remains large even as age increases. These differences are not simply the result of racial differences in the timing of marriage. Although marriage rates increase among older cohorts of African women, they remain significantly lower than marriage rates among white women. For example, in 2003, only three percent of white women older than fifty had never been married compared to 13 percent of African women in the same age cohort.

[Insert Figure 1 about here]

To examine the effects of sex ratios on marriage rates, we recognize that marriage outcomes in 2003 are likely to reflect the nature of the marriage market, or the relative availability of male partners, over some period prior to 2003 rather than in that same year. We therefore use lagged sex ratios, which are generated using the most recently available Population Census, conducted in 2001. The Census data have the advantage

[5] The Labour Force Surveys from March 2000 to March 2004 do not distinguish between marriage and cohabitation. Consequently our measures will overstate the true marriage rate, and because cohabitation rates are typically higher among African women than among white women (Budlender et al 2004), the difference between white and African marriage rates will be underestimated.

over household survey data of providing larger sample sizes at high levels of disaggregation, thereby offering more reliable sex ratio measures than those which would be generated using the LFS data.

To better approximate the local marriage market, we estimate sex ratios at the district level, across the 53 district council and metropolitan areas in South Africa. Marriage markets are still racially segregated, and we therefore construct separate sex ratios for whites and Africans. For each young white and African woman in each district, we generate age-specific sex ratios (S_i) following Lichter et al (1992):

$$S_i = \sum_{i}^{i+9} M_i \Big/ \sum_{i-2}^{i+7} F_i$$

The measure assumes that for all unmarried women of age i (F_i), the appropriate pool of available spouses is the sum of unmarried men of age i (M_i) to age i+9. The pool of all women available for marriage is the sum of unmarried women of age i-2 to age i+7.[6] For example, for a woman aged 30, the sex ratio is calculated as the sum of all unmarried men aged 30 to 39 divided by the sum of all unmarried women aged 28 to 37.

In addition to sex ratios based only on the quantity of unmarried men relative to women in each district (S_1), we calculate three further age-specific district sex ratios,

[6] It is possible that men who are in polygamous marriages will be considered part of the potential set of partners available to unmarried women. However, a negligible percentage of African men (0.14 percent) in the age group 20 to 39 years report being involved in polygamous marriages in the 2001 Population Census. We therefore do not adjust the sex ratio to reflect the potential availability of these men.

which limit the pool of unmarried men according to different marriageability criteria. In the second ratio (S_2), the pool of unmarried men is restricted to only those men with employment. In the third and fourth ratios (S_3 and S_4), male marriageability is identified according to the earnings of employed men. We distinguish a lower threshold at median earnings by race for all employed men aged 20 to 39 years, so that the numerator for S_3 includes only those unmarried men with at least median earnings, and an upper threshold at mean earnings by race for all men in the same age cohort (for S_4).[7]

[Insert Table 1 about here]

Table 1 describes the average values of these age-specific district sex ratios for young African and white women in the 2001 Population Census. For both Africans and whites, sex ratios fall as the marriageability criteria increase. However, the fall is particularly dramatic for Africans. Although simple sex ratios are significantly higher for whites than for Africans,[8] the difference is far larger when the ratios incorporate the economic status of potential male partners. The pool of marriageable men, relative to women, is more than three-fold smaller for young African women than young white women. This large divergence in economic-based sex ratios reflects substantial differences in unemployment rates among young African and white men: in the 2001 Census, approximately 53 percent of African men aged 20 to 39 years were unemployed according to the expanded definition of unemployment (which includes

[7]. Because of a skewed earnings distribution in South Africa, mean earnings are considerably higher than median earnings, and given the legacy of racial segregation in the labour market, mean and median earnings for young white men are significantly greater than those for young African men.
[8] Among whites, the age-specific district sex ratio in 2001 ranged from 0.507 to 3.468 and among Africans, from 0.249 to 2.471. Relatively low sex ratios among Africans compared to whites are partly explained by a higher proportion of the male population being incarcerated and by low sex ratios in districts with larger populations.

the non-searching unemployed), compared to only six percent of white men in the same age cohort.

To test the relationship between the different sex ratios and marriage outcomes, we match these district sex ratios to the LFS 2003:2 data. A large degree of racial segregation remains in residential living arrangements in South Africa, and whites in particular are heavily concentrated in a small number of districts, primarily in the metropolitan areas. Consequently, although the LFS 2003:2 surveyed approximately 27,000 households (or 98,747 individuals), sample sizes particularly of young white women are very low in a large number of districts. In estimating marriage outcomes, all districts for which there are fewer than seven young women in the LFS sub-sample are excluded: of the 53 districts, marriage rates can be identified in 23 districts for whites and in 51 districts for Africans.[9]

We estimate the relationship between sex ratios and the probability of marriage, among young African and white women, using a probit model:

$$\Pr (M_j = 1 \mid S_k X_j)$$

where M_j represents woman j's current marital status (married or not), S_k captures the lagged age-specific sex ratio of the district k in which the woman resides; and X_j, represents a set of individual characteristics including a quadratic in age, education, location (whether living in an urban or rural area) and language spoken most often at home.[10]

[9] This resulted in the loss of five out of 7,705 observations in the African sample of women aged 20 to 30 years and 70 out of 635 observations in the white sample of young women.
[10] The means and standard errors of the explanatory variables are provided in Table A1 in the Appendix.

If sex ratios approximate the marriage market, then we would expect the probability that a woman is married to be larger in districts where the sex ratio is higher. However, if the pool of men available for marriage depends also on the quality of these men, then sex ratios which capture economic status should provide a better indication of the marriage market than simple sex ratios. Given the practice of bridewealth payment in South Africa, we would expect a significant relationship between economic-based measures of marriageability and marriage outcomes particularly among African women: only those men who can afford *ilobolo* can enter the marriage market. We would also anticipate that the economic characteristics of men matter more for marriage outcomes in districts where bridewealth payments are more widespread. We investigate this by estimating the same regressions but for a restricted sample of young African women living in the province of KwaZulu-Natal where the practice of bridewealth is commonly observed. In a final set of estimations, we test the consistency of our results, given possible endogeneity in sex ratios, by running a number of robustness tests.

3. Results

The results for the first set of regressions, which estimate the probability of marriage among young women aged 20 to 30 years, are reported in Tables 2a and 2b. For the sample of young African women, the coefficients on all four age-specific sex ratio variables are positive and highly significant. However, the coefficient is largest when the sex ratio defines the male marriageable pool as men with earnings in excess of the average earnings of their cohort (S_4). When both S_1 and S_4 are included in the same regression (Regression V), both remain significant predictors of marriage but the estimated coefficient for S_4 is significantly greater than that for S_1 ($\chi^2 = 9.97$).

Marginal effects for the sex ratio variables are reported in the Appendix Table A2. They indicate that a one percent increase in the age-specific sex ratio S_1 would increase the probability of marriage by 16 percent (Regression I), while a corresponding increase in S_4 would increase the probability of marriage by approximately 83 percent (Regression IV). Even after controlling for the number of unmarried men relative to women in the simple sex ratio (S_1), a one percent increase in S_4, capturing the earnings capability of these unmarried men, would raise the probability of marriage by 59 percent (Regression V).

Among young white women, the relationship between sex ratios and marriage outcomes is mostly positive, but it is only (weakly) significant for S_2, which restricts the pool of available men to those with employment. However, there is no evidence that further restricting sex ratios according to men's earnings performs better in predicting marriage outcomes.

[Insert Tables 2a and 2b about here]

As elaborated on in the earlier sections, the practice of bridewealth is a possible explanation for why the probability of marriage increases dramatically among African women (and not among white women) when the pool of higher-earning unmarried men increases. Because *ilobolo* is a sizeable payment, the marriageability criteria for African men may be more stringent, and only higher-earning men who can afford bridewealth payments are considered marriageable.

The tables also describe other racial differences in the determinants of marriage. For both African and white women, the probability of marriage increases in age, but the effect is much larger for white women. At age 30, more than 80 percent of young white women are married, compared to only 43 percent of young African women. Whereas educational attainment seems to have no significant effect on the probability of marriage among white women, the probability of marriage decreases significantly as educational levels among African women rise, a relationship commonly found in the marriage literature. Compared to a woman with similar observed characteristics, possession of completed secondary (or higher) education reduces the probability of marriage by between 15 and 18 percent relative to having no schooling. This negative relationship for young African women is also consistent with reports, noted earlier, of larger bridewealth payments being required for more educated women.

In our estimations, differences in economic-based measures of sex ratios also make the largest contribution to explaining racial differences in marriage rates. In 2003, the gap in marital rates between white and African young women was 0.274. Differences in age-specific sex ratios, not adjusted for the quality of men, account for 0.022 (or about eight percent) of this gap. However, differences in sex ratios which capture the economic characteristics of unmarried men account for between 0.115 (for S_2) and 0.158 (for S_4) (or between 42 and 58 percent) of the racial gap in marriage rates.[11]

Age differences between the samples of white and African women explain a further five to 15 percent of the racial gap in marriage rates. Lower levels of educational attainment among African women, however, reduce the gap in marriage rates (by

[11] We applied an extension of the Blinder-Oaxaca decomposition technique to binary outcome variables, developed by Fairlie (2006), to decompose the racial gap in marriage rates.

approximately 20 percent) indicating that, if the education of African women were to increase, racial differences in marriage rates would widen further.

In Table 3, we repeat the probit regressions for African women but we restrict the sample to women living in KwaZulu-Natal, one of the nine provinces in South Africa. KwaZulu-Natal is a province in which the majority of Africans are Zulu-speakers who live in rural areas (in 2003, approximately 94 percent of all young African women in the province were Zulu-speakers, more than 60 percent of whom were rural-dwellers), and where the practice of bridewealth is relatively more widespread (Hosegood et al 2009). It is also the province in South Africa in which marriage rates among young African women are lowest: in 2003, only 16 percent of all young African women in KwaZulu-Natal were married compared to the national average of 23 percent.[12] Table 3 shows that the probability of marriage among African women in KwaZulu-Natal increases dramatically in districts where the pool of unmarried, higher-earning men is relatively larger. These results are clearly consistent with the argument that bridewealth payments are a financial constraint to marriage, raising the marriageability criteria for men.

[Insert Table 3 about here]

[12] The next lowest marriage rates by province were in the Eastern Cape and North West province, where approximately 19 percent of African women in the 20 to 30 age cohort were married.

4. Robustness tests

A key concern for studies that estimate the effects of sex ratios on marriage outcomes is endogeneity in sex ratios (Wood; 1995; Angrist 2002; Charles and Luoh 2005; Abramitzky et al 2009). This endogeneity may derive from omitted variable bias, measurement error and reverse causality. If unobserved characteristics that affect sex ratios also affect marriage outcomes, then sex ratio variables will be correlated with the error term, and the estimated coefficients will be biased. A particular concern in the case of sex ratios is that of non-random migration. If low sex ratios correspond to high rates of permanent male out-migration, and if male migrants are positively selected, the estimated coefficients on sex ratios will be biased upwards.

In the South African context, male migration may not involve the permanent movement of men from one geographical area to another. Rather, migrants may continue to retain membership in their household of origin and participate in marriage markets at their district of origin. Patterns of circular or temporary migration derive from restrictions on the urbanization of Africans in apartheid South Africa. A key impetus for this labour migration historically was for men to generate income needed for bridewealth payments (Hunter 2004). Although restrictions on urbanization no longer exist, evidence suggests that circular patterns of labour migration have continued in post-apartheid South Africa (Posel and Casale 2003; Posel and Casale 2006).

If men who migrate still participate in marriage markets at their district of origin, then sex ratios, which are calculated for men and women who are resident in the district, will underestimate the pool of unmarried men in sending districts (and overestimate

the pool in destination areas). Furthermore, if male migrants are more motivated than other men, then sex ratios will also underestimate the quality of men available for marriage in sending districts.

In the absence of data on labour migration in the 2001 Census, we use a module on migrant workers[13] included in the September LFS 2003 to estimate the ratio of unmarried male migrants to unmarried female migrants at the district level. We construct a migration index, identifying districts with low, medium and high unmarried male to female migration, which we include in the probit estimations.[14] Because very few whites are reported as labour migrants, we generate the migration variables only for the African sample.

Table 4 reports the results of these probit regressions. In districts with a medium ratio of migration, the migration coefficients are consistently positive, suggesting that women living in districts with relatively more male labour migration have a higher probability of marrying. However, the coefficients are only significant in the estimations which include S_1 and S_4. The coefficients for high migration are noisy and insignificant. The effects of the sex ratio variables remain significant and consistent with earlier estimations: the probability of marriage for young African women increases as the relative pool of available men increases, and particularly when there is a larger pool of higher-earning unmarried men.

[13] A migrant worker is defined as an individual who is reported as a member of the household but who is not resident in the household and is away for at least a month each year to work or to look for work.
[14] This index is calculated using the LFS 2003:2 data as there is no information on migration in the 2001 Population Census (or in the 2001 LFS).The LFSs which include a migration module do not collect information on the age of the migrant worker, and we therefore could not identify a ratio of young migrants specifically.

[Insert Table 4 about here]

Endogeneity in the estimations may also derive from simultaneity between the pool of marriageable men and men's earnings. For example, if earnings are a function of marriage, then low marriage rates may explain why the pool of marriageable men is so small. In this case, estimated coefficients for the economic-based sex ratios will be biased upwards (Wood 1995). We do not have suitable variables to instrument for sex ratios in our data. However, research on the male marital earnings premium in South Africa finds that the marriage premium among African men derives from strong selection effects into marriage, rather than from the effects of marriage itself (Casale and Posel 2010). The finding suggests that only higher-earning men are able to afford marriage, which would be consistent with the argument that *ilobolo* acts as a constraint to marriage and which suggests that, at least for Africans, this source of endogeneity is unlikely.

In a final set of estimations, we consider alternative lags for the sex ratio variables. We test whether the relationship between marriage rates and sex ratios estimated for the September 2003 LFS, holds also for the September 2002 LFS and the March 2004 LFS, thereby shortening and extending respectively the lag in the sex ratios.

The results, described in Table 5, show that sex-ratio effects remain largely consistent, sizeable and significant for Africans in both years, although the coefficients are smaller than in the LFS 2003:2. Among white women, there is mostly

a positive relationship between sex ratios and marriage outcomes, but the coefficients are only significant in the LFS 2002:2, and only for ratios S_1 and S_2.[15]

[Insert Table 5 about here]

5. Conclusion

In this study, we investigated the relationship between marriage and the availability of suitable or marriageable partners among African and white women in South Africa. In particular, we tested whether economic-based measures of marriageability, which take into account the quality of available men, have a larger effect on the likelihood of being married than simple sex ratios, which capture only the quantity of available men.

For young African women, the probability of marriage is positively and significantly related to the local pool of unmarried African men, but the effect is greater where these men are employed with earnings above a certain threshold (and particularly above the national mean for their cohort). One explanation that is consistent with these findings is that bridewealth raises the marriageability criteria for African men; only men who can afford to pay *ilobolo* are considered 'marriageable'. Further evidence is provided in the stronger results we find for the province of KwaZulu-Natal, where the custom of bridewealth is commonly practiced. In contrast, estimated coefficients among white women are mostly positive but only significant for sex

[15] We also tested whether our results remained robust for a reduced age cohort of women aged 25 to 30 years; and when we restrict economic-based measures of marriageable males to men with formal (non-farming) employment. Formal sector employment, which tends to be more secure than informal sector employment, may offer a better indication of a man's future economic status and therefore his marriageability. We find that the pattern and significance of results remain unchanged for both Africans and whites in both sets of estimations.

ratios defined in terms of employed men. There is no evidence that white women living in districts with larger pools of higher-earning men are more likely to marry.

The results of the study suggest that part of the reason why marriage rates are much lower among African women is because the economic status of men matters more for their marriageability. At the same time, the supply of marriageable men is small given high unemployment rates and relatively low earnings among a majority of employed African men. A standard marriage market model would predict that under these circumstances, the value of bridewealth should fall (Anderson 2007), making it easier for men to marry. However, our research supports the view that bridewealth payments in South Africa are relatively inflexible, and that they act as a key constraint to marriage among Africans.

Appendix

Table A1. Individual characteristics of young women aged 20 to 30 years, 2003

	Africans	Whites
Married	0.234	0.508
	(0.005)	(0.021)
Age	24.673	25.085
	(0.036)	(0.142)
Grade 1 – grade 7	0.140	0.007
	(0.004)	(0.004)
Grade 8 – grade 11	0.460	0.149
	(0.006)	(0.015)
Grade 12 (Matric)	0.302	0.538
	(0.005)	(0.021)
Post-matric	0.070	0.303
	(0.003)	(0.019)
Urban	0.508	0.917
	(0.006)	(0.012)
Afrikaans	0.007	0.639
	(0001)	(0.020)
English	0.005	0.359
	(0.001)	(0.020)
Ndebele	0.020	--
	(0.002)	
Xhosa	0.205	--
	(0.005)	
Zulu	0.287	--
	(0.005)	
Northern Sotho	0.112	--
	(0.004)	
Southern Sotho	0.114	--
	(0.004)	
Tswana	0.123	0.002
	(0.004)	(0.002)
Swazi	0.039	--
	(0.002)	

Venda	0.027	--
	(0.002)	
Tsonga	0.059	--
	(0.003)	
Other language	0.002	0.011
	(0.000)	(0.004)
Unweighted sample size	7,700	565

Source: LFS 2003:2
Notes: Standard errors are in parentheses. All districts for which there are less than seven observations to generate a sex ratio or a marriage rate in the LFS 2003:2 have been excluded.

Table A2. The probability of marriage and sex ratios among African and white women aged 20 to 30 years, 2003, marginal effects after probit estimations

	I	II	III	IV	V
			African		
S_1 (all unmarried men)	0.157*** (0.024)	--	--	--	0.085*** (0.029)
S_2 (unmarried employed men)	--	0.180*** (0.030)	--	--	--
S_3 (unmarried men with at least median earnings)	--	--	0.173*** (0.033)	--	--
S_4 (unmarried men with at least average earnings)	--	--	--	0.834*** (0.114)	0.592*** (0.141)
			White		
S_1 (all unmarried men)	0.188 (0.125)	--	--	--	0.193 (0.125)
S_2 (unmarried employed men)	--	0.273* (0.153)	--	--	--
S_3 (unmarried men with at least median earnings)	--	--	0.190 (0.201)	--	--
S_4 (unmarried men with at least average earnings)	--	--	--	-0.040 (0.280)	-0.091 (0.284)

Source: LFS 2003:2

Notes: The probit regressions also include the same set of independent variables as that reported in Table 2a.

The marginal effects are calculated as a change in the probability for an infinitesimal change in the continuous variables and for a discrete change in the dummy variables.

*** Significant at the one percent level. * Significant at the ten percent level.

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Table 1. District sex ratios among Africans and whites, 2001

	Africans	Whites
S_1 = Σ (unmarried men)/	0.830	1.068
Σ (unmarried women)	(0.000)	(0.002)
S_2 = Σ (unmarried men with employment)/	0.256	0.835
Σ (unmarried women)	(0.000)	(0.002)
S_3 = Σ (unmarried men with at least median earnings)/	0.154	0.520
Σ (unmarried women)	(0.000)	(0.001)
S_4 = Σ (unmarried men with at least average earnings)/	0.068	0.285
Σ (unmarried women)	(0.000)	(0.001)

Source: South African Population Census 2001
Notes: The data are weighted. Standard errors are in parentheses. All means are significantly different at the one percent level.
Monthly median earnings (in 2001 prices) for S_3 are estimated at 801 Rands and 5 201 Rands for African and white men respectively; and monthly average earnings for S_4 are estimated at 1 601 Rands and 6 401 Rands for African and white men respectively.
For whites, four districts with less than ten observations for unmarried young men and women in the Census have been excluded, and one outlier district with a simple sex ratio of over 160 has also been excluded.

Table 2a. Probit estimation of the effect of sex ratios on the likelihood of marriage among African women (20 - 30 years), 2003

	I	II	III	IV	V
S_1	0.546***	--	--	--	0.297***
(all unmarried men)	(0.085)				(0.103)
S_2	--	0.627***	--	--	--
(unmarried employed men)		(0.104)			
S_3 (unmarried men with at least median earnings)	--	--	0.600***	--	--
			(0.115)		
S_4 (unmarried men with at least average earnings)	--	--	--	2.907***	2.066***
				(0.399)	(0.493)
Age	0.417***	0.350***	0.375***	0.293***	0.330***
	(0.096)	(0.096)	(0.096)	(0.097)	(0.098)
Age^2	-0.006***	-0.005***	-0.005***	-0.004***	-0.004**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Grade 1 – grade 7	-0.128	-0.116	-0.117	-0.146	-0.140
	(0.099)	(0.099)	(0.099)	(0.098)	(0.099)
Grade 8 – grade 11	-0.431***	-0.417***	-0.421***	-0.451***	-0.445***
	(0.094)	(0.094)	(0.094)	(0.093)	(0.094)
Grade 12 (matric)	-0.716***	-0.699***	-0.704***	-0.740***	-0.735***
	(0.097)	(0.097)	(0.096)	(0.096)	(0.096)
Tertiary	-0.743***	-0.727***	-0.738***	-0.753***	-0.749***
	(0.117)	(0.112)	(0.111)	(0.111)	(0.111)
Urban	0.066*	0.072**	0.088**	0.008	0.006
	(0.037)	(0.037)	(0.036)	(0.039)	(0.039)
English	0.295	0.339	0.275	0.245	0.250
	(0.280)	(0.281)	(0.280)	(0.283)	(0.283)
Ndebele	-0.345	-0.320	-0.367*	-0.441*	-0.399*
	(0.220)	(0.220)	(0.220)	(0.221)	(0.221)
Xhosa	-0.252	-0.179	-0.257	-0.225	-0.231
	(0.184)	(0.185)	(0.183)	(0.183)	(0.183)
Zulu	-0.337*	-0.300*	-0.361**	-0.385**	-0.373**

	(0.183)	(0.183)	(0.182)	(0.183)	(0.183)
Northern Sotho	-0.157	-0.123	-0.178	-0.193	-0.183
	(0.187)	(0.187)	(0.186)	(0.186)	(0.187)
Southern Sotho	-0.001	0.058	0.013	0.012	0.000
	(0.186)	(0.186)	(0.185)	(0.185)	(0.186)
Tswana	-0.460**	-0.428**	-0.466**	-0.447**	-0.481***
	(0.188)	(0.187)	(0.188)	(0.187)	(0.187)
Swazi	0.139	0.120	0.124	-0.137	0.135
	(0.197)	(0.197)	(0.197)	(0.197)	(0.197)
Venda	0.467**	0.500**	0.427**	0.448**	0.467**
	(0.203)	(0.204)	(0.202)	(0.202)	(0.203)
Tsonga	0.312*	0.351	0.291	0.227	0.288
	(0.192)	(0.192)	(0.191)	(0.191)	(0.192)
Other language	0.341	0.411	0.347	0.261	0.260
	(0.457)	(0.458)	(0.459)	(0.459)	(0.457)
Pseudo R-squared	0.1006	0.1000	0.0988	0.1017	0.1028
Wald chi-squared	793.58	785.51	776.28	793.46	805.10
Percent correctly predicted	76.96	77.04	77.05	76.99	76.98
Sample size	7,700	7,700	7,700	7,700	7,700

Source: LFS 2003:2
Notes: Robust standard errors are in parentheses. *** Significant at the one percent level. ** Significant at the five percent level. * Significant at the ten percent level.
The omitted educational category is no schooling; the omitted language is Afrikaans.

Table 2b. Probit estimation of the effect of sex ratios on the likelihood of marriage among white women (20 - 30 years), 2003

	I	II	III	IV	V
S_1 (all unmarried men)	0.472	--	--	--	0.484
	(0.312)				(0.314)
S_2 (unmarried employed men)	--	0.683*	--	--	--
		(0.383)			
S_3 (unmarried men with at least median earnings)	--	--	0.476	--	--
			(0.504)		
S_4 (unmarried men with at least average earnings)	--	--	--	-0.100	-0.229
				(0.701)	(0.712)
Age	1.091***	0.974***	1.049***	1.201***	1.131***
	(0.353)	(0.370)	(0.377)	(0.365)	(0.369)
Age^2	-0.018***	-0.016**	-0.017**	-0.020***	-0.019***
	(0.018)	(0.007)	(0.007)	(0.007)	(0.007)
Grade 8 – grade 11	0.181	0.142	0.146	0.165	0.187
	(0.468)	(0.471)	(0.464)	(0.461)	(0.469)
Grade 12 (matric)	-0.193	-0.225	-0.231	-0.216	-0.187
	(0.447)	(0.448)	(0.441)	(0.438)	(0.447)
Tertiary	-0.032	-0.067	-0.082	-0.065	-0.024
	(0.453)	(0.455)	(0.448)	(0.445)	(0.454)
Urban	-0.450*	-0.445*	-0.501**	-0.509**	-0.445*
	(0.239)	(0.239)	(0.233)	(0.232)	(0.240)
English	-0.136	-0.156	-0.172	-0.125	-0.118
	(0.121)	(0.122)	(0.128)	(0.132)	(0.132)
Pseudo R-squared	0.1959	0.1969	0.1940	0.1930	0.1960
Wald chi-squared	134.05	135.59	132.19	131.76	134.59
Percent correctly predicted	72.74	73.10	72.04	72.39	72.74
Unweighted sample size	565	565	565	565	565

Source: LFS 2003:2
Notes: The data are weighted. Standard errors are in parentheses. *** Significant at the one percent level. ** Significant at the five percent level. * Significant at the ten percent level.

Because very few white women report primary school education or less as their highest educational level, the omitted educational category in the estimations is less than Grade 8. The omitted language is Afrikaans.

Table 3. Probit estimation of the effect of sex ratios on the likelihood of marriage among African women (20 - 30 years) in KwaZulu-Natal, 2003

	Coefficient	Marginal effect
I: S_1 (all unmarried men)	0.769	0.163
	(0.548)	(0.116)
II: S_2 (unmarried employed men)	1.261*	0.267*
	(0.753)	(0.160)
II: S_3 (unmarried men with at least median earnings)	2. 387***	0.503***
	(0.837)	(0.177)
IV: S_4 (unmarried men with at least average earnings)	5.282***	1.116***
	(1.899)	(0.402)
V: S_1 (all unmarried men)	-0.676	-0.143
	(0.762)	(0.161)
S_4 (unmarried men with at least average earnings)	6.952***	1.467***
	(2.743)	(0.579)
Unweighted sample size	1,591	1,591

Source: LFS 2003:2

Notes: Robust standard errors are in parentheses. *** Significant at the one percent level. The probit regressions include the same set of independent variables as that reported in Table 2a.

The marginal effects are calculated as a change in the probability for an infinitesimal change in the continuous variables and for a discrete change in the dummy variables.

Table 4. Probit estimation of the effect of sex ratios on the likelihood of marriage among African women (20 - 30 years), conditioning on migration effects, 2003

	I	II	III	IV	V
S_1	0.489***	--	--	--	0.257**
	(0.086)				(0.106)
S_2	--	0.520***	--	--	--
		(0.107)			
S_3	--	--	0.501***	--	--
			(0.116)		
S_4	--	--	--	2.718***	1.980***
				(0.411)	(0.512)
Medium migration	0.069*	0.056	0.052	0.101**	0.091**
ratio	(0.041)	(0.041)	(0.041)	(0.041)	(0.041)
High migration ratio	0.024	-0.015	-0.008	0.031	0.037
	(0.057)	(0.056)	(0.056)	(0.057)	(0.057)
Unweighted sample	7,604	7,604	7,604	7,604	7,604
size					

Source: LFS 2003:2

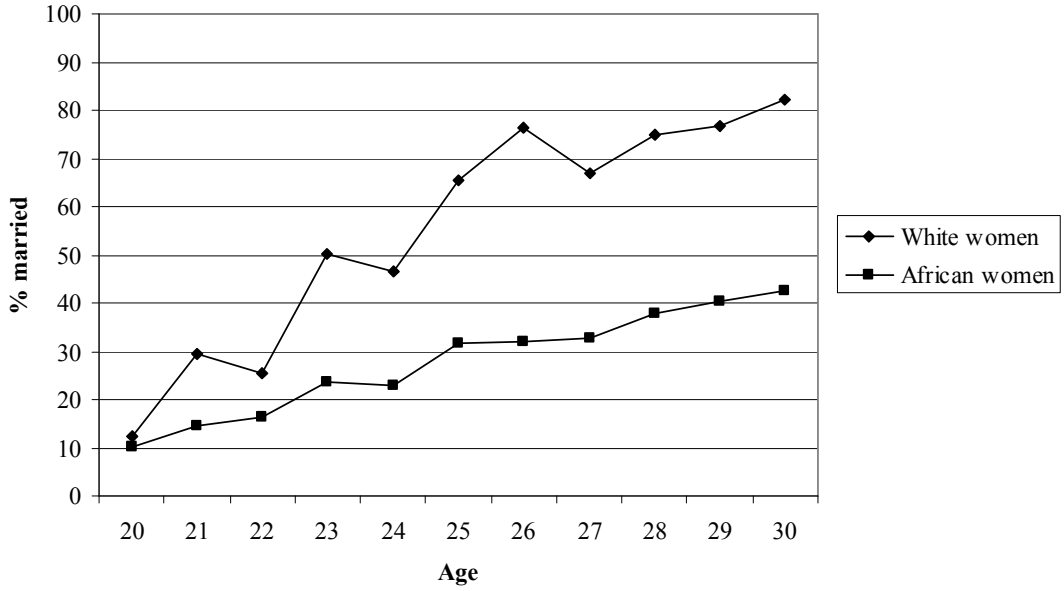
Notes: Robust standard errors are in parentheses. *** Significant at the one percent level. ** Significant at the five percent level. The migration ratio is calculated as the district ratio of unmarried male labour migrants to unmarried female labour migrants. A low migration ratio is the omitted variable. The probit regressions also include the same set of independent variables as that reported in Table 2a.

Table 5. Probit estimation of the effect of sex ratios on the likelihood of marriage among African and white women, using data from 2002 and 2004

	African	White
	LFS 2002:2	
I: S_1 (all unmarried men)	0.411***	0.478*
	(0.083)	(0.283)
II: S_2 (unmarried employed men)	0.471***	0.573*
	(0.104)	(0.329)
II: S_3 (unmarried men with at least median earnings)	0.442***	0.035
	(0.115)	(0.532)
IV: S_4 (unmarried men with at least average earnings)	2.045***	-0.840
	(0.389)	(0.746)
V: S_1 (all unmarried men)	0.249**	0.508*
	(0.105)	(0.283)
S_4 (unmarried men with at least average earnings)	1.332***	-0.952
	(0.489)	(0.764)
Unweighted sample size	7,982	527
	LFS 2004:1	
I: S_1 (all unmarried men)	0.497***	0.415
	(0.090)	(0.287)
II: S_2 (unmarried employed men)	0.412***	0.461
	(0.108)	(0.326)
II: S_3 (unmarried men with at least median earnings)	0.432***	0.544
	(0.120)	(0.500)
IV: S_4 (unmarried men with at least average earnings)	2.366***	-0.034
	(0.408)	(0.709)
V: S_1 (all unmarried men)	0.308***	0.428
	(0.111)	(0.292)
S_4 (unmarried men with at least average earnings)	1.498***	-0.205
	(0.509)	(0.725)
Unweighted sample size	7,907	507

Source: LFS 2002:2 and LFS 2004:1.
Notes: Robust standard errors are in parentheses. *** Significant at the one percent level. ** Significant at the five percent level. * Significant at the ten percent level. The regressions include a full set of independent variables specified in Tables 2a and 2b.

Figure 1. Marriage rates among African and white women aged 20-30 years, 2003



Source: LFS 2003:2.