Marital strategies for managing exposure to HIV in rural Malawi

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1. Background

From early in the epidemic, the ABC of AIDS prevention[2] has been the focus of advocacy efforts in Africa. While some evidence has been collected that testifies to changes in sexual practice in response to HIV/AIDS (Gregson, Zhuwau, Anderson, and Chandiwana 1998; Bloom et al. 2000), the tone in the literature is rather pessimistic with the vulnerability of women often taking center stage. Without trying to understate the magnitude of the problem, this paper highlights agency rather than helplessness. The central premise is that behavioral responses to the HIV/AIDS epidemic will go beyond the advice promoted in advocacy programs. These alternative strategies are expected because the rigorous application of the ABC is either not very realistic (e.g. abstinence or condom use within marriage), or beyond the control of the individual (e.g. faithfulness of the partner, and, for women often also the enforcement of condom use). The life-threatening character of AIDS and the absence of a cure are plain and unmistakable incentives. Spousal communication is one documented practice for sensitizing partners to lead less risky sexual lives and for evaluating one's own exposure to HIV (Gregson et al. 1998; Zulu and Chepngeno 2003). Strategies for selecting low risk marriage partners and the divorce of spouses that are believed to bring HIV into the household are other avenues for limiting risk. The latter have been identified in predominantly qualitative research (e.g. Mukiza-Gapere and Ntozi 1995; Schatz 2003; Watkins 2004; Smith and Watkins 2005). Simulations suggest that (some of) these strategies could indeed be

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[2] Abstinence, Be faithful, and Condoms use

effective in decreasing an individual's risk of infection (Bracher, Santow, and Watkins 2003). Here I will revisit these hypotheses using evidence from retrospective marital histories and longitudinal data from the Malawi Diffusion and Ideational Change Project (MDICP).

The idea that marriage is an important mediating factor in individuals' health trajectories is not new. Usually the debate is framed in a discussion aimed at resolving the relative importance of selection into marriage based on health characteristics versus the beneficial health outcomes of marriage itself (i.e. marriage protection) (Goldman 1993; Waldron, Hughes, and Brooks 1996). At times the debate is extended to also include the effect of health status on marital quality and stability (Booth and Johnson 1994). The latter has also proven to be of importance in HIV serodiscordant couples where divorce rates are higher than in couples where both spouses are negative (Porter et al. 2004). As opposed to the selection into marriage based on positive health conditions, this effect is labeled 'negative selection' to denote the elimination from marriage based on adverse health conditions[3]. In analogy with the marriage and health literature I investigate two hypotheses in this paper: 1) whether behavior associated with the risk of HIV infection has a destabilizing effect on unions (negative selection); 2) whether characteristics associated with the risk of infection are an important criterion for spouse selection (positive selection)[4]. The expectation is that these effects operate in concert, and together they would provide support for the proposition that men and women deploy marital strategies for controlling their exposure to HIV.

This project deviates in an important respect from the bulk of the existing literature on marriage and health because health status (in this case HIV status) is not measured directly. Instead, I use 'worry for infection' or behavior and characteristics usually associated with the risk of infection (e.g. extra marital affairs). The choice for these variables rather than HIV status itself is informed by the fact that HIV status is often unobserved by the actors themselves, and that it is the perceived risk of getting infected and observable characteristics thought to be associated with HIV rather than the HIV status itself that guides behavior[5]. This line of thought is consistent with a prior observation that it is the health potential rather than observed health characteristics that is driving marital selection (Fu and Goldman 1996). Another difference with the classical marriage and health literature has to do with the characteristics of HIV itself. HIV as a health condition is particular because it is communicable and life threatening. If anything, this quality will amplify the hypothesized effects.

[3] Alternatively, this could be considered the reverse causal effect of marriage protection.
[4] The results presented here are all based on women's reports. I am now replicating the analyses for men and may present some of the results at the conference. The protective effect of marriage with regard to HIV is a third hypothesis derived from the marriage and health literature that I hope to look at in the near future.
[5] This aspect may of course change as HIV counseling and testing services are offered more widely.

2. The setting and data

Even by African standards, Malawi is a relatively poor country. It ranks 165th (out of 177) on the Human Development Index and its GDP per capita is $580 US (in purchasing power parity) compared to an average of $1,790 for Sub-Saharan Africa (UNDP 2004). Good data on trends in HIV prevalence are hard to come by but sentinel surveillance data in antenatal clinics suggest that HIV prevalence among pregnant women in urban areas increased from under 10% in the late 1980s around 25% by the end of the 1990s. The earliest data points from outside the main urban areas (but not necessarily representative for rural areas that are covered in this study) date from 1992 and indicate a prevalence of just above 5%. By the end of the 1990s this figure had reached the 20% mark (UNAIDS/WHO 2002). Not surprisingly adult mortality rates increased in the 1990s as well: reports on sibling survival in the DHS surveys suggest that adult mortality (15-49) increased with 75% between the late 1980s and late 1990s. As a result, life expectancy decreased slightly and is now estimated at around 40 years for males and 44 years for females (NSO and ORC Macro 2001).

These dramatic increases in HIV prevalence and mortality do not imply that most people are or were ignorant about AIDS. To the contrary, AIDS knowledge spread fairly quickly in Malawi. Already in 1992, over 95% of the rural population had ever heard about AIDS, and 85.6 and 92.4% of rural women and men respectively identified sexual intercourse as a mode of transmission (NSO and ORC Macro 1994). In 2000 general knowledge about HIV and its transmission via intercourse was virtually universal (NSO and ORC Macro 2001).

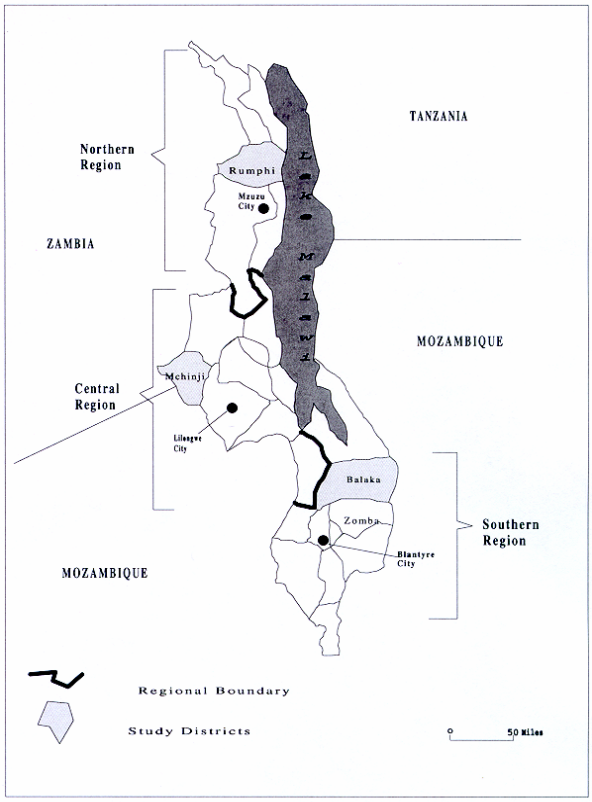
The data used in this paper come from the Malawi Diffusion and Ideational Change project (MDICP)[6]. These are longitudinal survey data with approximately 1500 women (and their husbands) who have been interviewed three times between 1998 and 2004[7]. The sample consists of three ethnically and religiously heterogeneous rural districts (figure 1): Rumphi in the north is characterized by a predominantly patrilineal system of descent with patrilocal residence after marriage. The ethnic groups in Balaka in the south follow a matrilineal descent system and residence after marriage is most often matrilocal. In Mchinji, in the center of the country, descent is less rigidly matrilineal and residence may be either matrilocal or patrilocal. The southern district is predominantly Muslim; Christians are in the majority in the other two areas.

[6] http://www.ssc.upenn.edu/Social_Networks/

[7] In the 2001 round of data collection new wives of men interviewed in 1998 were included in the panel. For most purposes I excluded them from the analyses presented here.

Marriage in Malawi is quasi universal but divorce rates are high and considerable variation exists between the three research sites. In Balaka, in the south, over 50% of first marriages dissolve within 15 years. In the two other districts, this figure is more than 10%-points lower. Part of this discrepancy is to be attributed to the matrilineal system of descent in most southern ethnic groups wherein marriage dissolution is traditionally higher (Reniers 2003). In the 2004 round of data collection, respondents have been tested for HIV and certain STD's. HIV prevalence in the sample is close to 10% with regional differences that correspond to the variability in divorce rates.

Figure 1: location of the research sites



A common problem in longitudinal studies is attrition between survey waves and because individuals lost for follow up tend to be selective, attrition may bias means and coefficient estimates in regression models (Bignami-Van Assche, Reniers, and Weinreb 2003). This study is equally susceptible to that problem. Close to 20% of the women

interviewed in 1998 were not interviewed in wave two; mostly because they moved out of the sample areas (75%) or died (15%). One important characteristic of attrition for this study are regional differences in the propensity to migrate by marital status. To the extent that marriages involve partners from different locations, marriage breakup almost automatically leads to migration of one of the spouses. Where residence after marriage is virilocal, women are more likely to move out whereas husbands are expected to head off if residence is uxorilocal. In southern local narratives, it is often said that the man is supposed to "leave with his blanket", meaning that he is not only expected to leave after divorce, but that he cannot claim any material goods from the household –except for his blanket– nor the custody over the children (Zulu 1996). This logic would lead us to expect sex-based differences in divorce-related migration out of the different sample districts. Even though the observed differences in the loss of follow-up between the three districts point in that direction (i.e., slightly higher loss of follow-up in Rumphi and Mchinji than in Balaka), it is not statistically significant. To nullify the effect of regional variability in attrition and possibly other characteristics, statistical models will include district as a control variable.

A second weakness of this project is that it relies in great part on retrospectively reported marriage histories (collected as part of the MDICP2 survey round). Where possible, results will be filled in with longitudinal evidence (change in marital status between MDICP1-2). Obviously retrospectively reported marital histories are subject to a variety of biases ranging from the post-factum rationalization of proceedings and decision-making processes, to a greater propensity to omit short unsuccessful unions from marriage histories as time passes, as well as the accuracy in reporting of ages and dates. The latter of these problems has –in part– been addressed by calculating marriage durations and intervals via two different pieces of information: age at marriage and marriage duration on the one hand and reported starting and ending years of marriages on the other. Cases with highly discrepant information on both pieces of information were omitted from the analyses. Other potential problems with retrospective reporting of marriage histories will be addressed where they might affect conclusions.

3. Divorce

If divorce is used for regulating exposure to HIV, divorce should 1) be higher in couples where one of the spouses engages in behavior associated with the risk of infection, and 2) become more prevalent in the period where AIDS is believed to pose a greater threat. We investigate both requirements through retrospective marriage histories reported by women. These histories were collected for the current, previous and first

marriage, meaning that the marriage histories are not complete for women married more than three times. For each recorded marriage information is collected on the start, duration and end, and also on marriage characteristics such as residence patterns during marriage, polygamy, as well as the women's suspicion of their spouses' infidelity. The latter is operationalized via the question: *"During your time together, did you suspect or know that your husband had sexual relations with other women apart from you?"* [8]

For divorce to be considered a plausible strategy in response to the HIV epidemic, we should witness a change in divorce rates from the early 1990s onwards because that is the period where both HIV prevalence and AIDS mortality increased. To model such an effect, marriage year was coded to 0 for marriages up to 1990 and 1 to 11 for the following years up to 2001.

A proportional hazards or Cox regression was chosen to model the change in divorce rates by a number of background characteristics. Cox regression is attractive in this context because it accommodates right censoring of observations. Parameter estimates are an expression of the ratio of divorce hazards by marriage duration. The latter is left unspecified.

[8] The interviewers were given the instruction to stress that for polygamous husbands the questions refers to women who were not his wives. The answers were recoded to create an indicator variable that distinguishes women who suspected or knew that their husbands had (or has) extra marital affairs versus those who answered the question negatively or -claimed- they did not know.

Table 1: Hazard ratios for Cox regression models of marriage dissolution

	Model 1	Model 2	Model 3	Model 4
District:				
- center	0.69**	0.68**	0.75**	0.74**
- north	0.55**	0.55**	0.72**	0.62**
2nd marriage+	0.70**	0.70**	0.58**	0.57**
YM90+	1.05**	1.04	1.03	1.02
XMA		1.44**	1.53**	1.39**
YM90+ * XMA (interaction)		1.07*	1.07**	1.07**
Educational status (≥ 3y)			0.93	0.95
Age at marriage			1.01	1.01
Polygamy:				
- other wives present			1.23*	1.21*
- h married additional wives			0.75**	0.74**
Virilocal residence			0.75**	0.80**
Age diff bet spouses (≥ 6 y's)			0.64**	0.65**
Ethn homog marriage			0.80**	0.80**
Coresidence (time varying)				0.88**
N (marriages)	1860	1858	1816	1794

Legend:
- YM90+: year at marriage, <=1990 = 0, 1991 = 1, 1992 = 2, etc.
- XMA: suspicion husband had extra marital affairs during marriage
- ** = P<.05, * = p<.10 (robust standard errors: adjusted for clustering on respondent)

The first model highlights the effect of district, marriage order and year of marriage. Divorce hazards are highest for first order marriages and in the matrilineal southern district (reference category). Controlled for the other variables in the model and compared to previous years, the divorce hazard has increased by 5% a year since the early 1990s. If divorce of partners that put women at risk of HIV infection is a behavioral response to the AIDS epidemic, one would indeed expect divorce rates to increase. Bias due to retrospective reporting of marriage histories could also contribute to this effect as older women may be more likely than younger women to omit early unsuccessful marriages from their marriage histories.

After controlling for the suspicion that the husband had extra marital affairs during marriage (XMA - model 2), the effect of marriage year disappears but is subsumed in an interaction effect with XMA that is even more suggestive of a behavioral response to the AIDS epidemic. The suspicion that the husband had extra-marital affairs during marriage is not only positively correlated with divorce, but that relationship increases in strength after 1990 by 7% a year. This means that extra-marital affairs are sanctioned more importantly by divorce in the period where AIDS materialized as a threat. In models 3 and 4, several controls are introduced that are potentially related to marriage stability. These variables were previously used in an exploratory analysis of marriage stability and the effects observed here replicate the results obtained earlier (Reniers 2003). The controls include: educational status of the respondent (>= 3 years of

education versus less than that); age at marriage; two polygamy variables (whether other wives were present at the time of marriage and whether the husband married additional wives during marriage); virilocal versus uxori- and neolocal residence; ethnic homogenous versus ethnic heterogenous marriages, and coresidence of the spouses. Absence of coresidence can be due to a variety of factors (labor migration, polygyny and matrilineal descent) and is an importance predictor of the suspicion of adultery. Because the effect of coresidence violates the proportional hazards assumption, it is included as a time varying covariate[9]. Even after the introduction of these controls, the interaction between marriage period and the suspicion of adultery remains stable and significant.

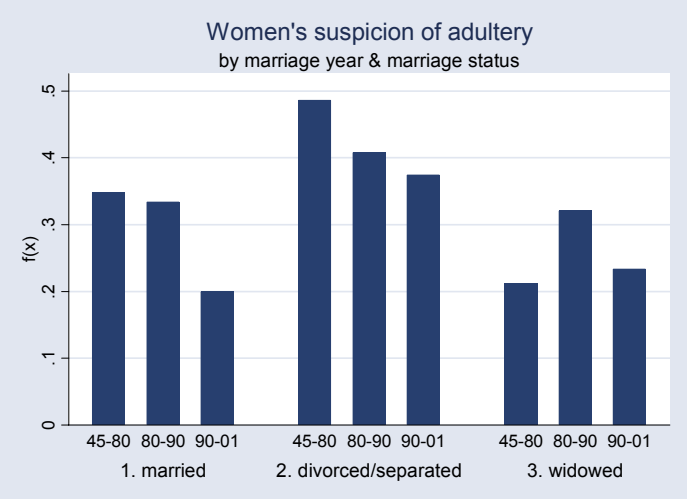
This conclusion, however, is liable to be affected by biases due to the retrospective nature of the data. The after the fact reporting of the suspicion of adultery could be problematic as it may merely reflect a normative change in the permissiveness of divorce under the pretext of infidelity[10] instead of a change in the reaction to adultery itself (meaning that adultery is merely a better excuse for divorce now than it used to be). However, if it were just the former that was happening, we would expect the suspicion of adultery to be reported more often for the most recent period; particularly for marriages that ended in divorce. This is not what is happening. In fact, the suspicion of adultery seems to have decreased in both marriages that are still intact and those that have dissolved (figure 2). Provided that infidelity is not simply a function of marriage duration and to the extent that the suspicion of adultery and adultery itself are correlated, this already provides a good indication that some behavioral change has taken place in response to the AIDS epidemic[11]. In combination with the previous results it means that infidelity seems to have decreased over time, and where happens, it is sanctioned more importantly by divorce.

[9] It violates the proportional hazards assumption in the sense that the divorce hazard declines faster by marriage duration among cohabiting than among non-cohabiting spouses.

[10] Some normative change in the permissiveness of divorce under suspicion of adultery appears to have happened: between 1998 and 2001 the percentage of women reporting that a women could divorce her husband in case of adultery increased from 68 to 75.

[11] In a logistic regression predicting the suspicion of adultery, the effects of both marriage duration and marriage year are negative. Adding an additional control for marriage outcome leads to estimation problems due to multicollinearity.

Figure 2:



The relationship between the suspicion of adultery and divorce is also noticeable in a longitudinal design. Smith and Watkins (2005) have, for example, modeled the change in marital status between survey rounds using worry for infection in the first wave as a predictor. The suspicion of adultery was not measured in the first wave, but women generally point at infidelity of their husbands as the major source for concern, and worry for infection in wave 2 is positively correlated with the suspicion that the spouse has extra-marital affairs (gamma=0.24 in first marriages). In a simple logistic regression model, women who report to worry much about getting infected with HIV are 50% more likely to get divorced between survey rounds ($p<.05$). This effect persists after controlling for age but disappears when we introduce district as a control variable. Because of the high variability in divorce rates between districts and the small subsample of cases with a change marital status between the two survey waves we may simply lack the statistical power to identify this effect in the presence of more rigorous controls.

Another feature of marriages that might have changed in response to the AIDS epidemic is their relative frailty by marriage duration. This is illustrated in the figure 3a which contrasts the divorce hazard by marriage duration for marriages contracted prior to versus later than 1990. The figure suggests that divorce rates are higher early on in marriage for recent marriages, but decline faster by marriage duration than marriages contracted earlier. The crossover occurs at a duration of around 7 years. Various factors could explain this change in the frailty of marriages by marriage duration: one possible candidate for explaining this pattern is data quality because women might have the

tendency to omit short and unsuccessful marriages from the retrospective marriage histories as time passes. An alternative explanation is that marriage simply became a weaker institution and that individuals move in and out of marriage with greater ease. Both scenarios would indeed lead to a higher divorce hazard at short marriage durations for marriages that were contracted after 1990, but are not a good explanation for the lower divorce hazard at marriage durations of 7 years and above. The downward slope of the divorce hazard for the most recent period could also be a data artifact if the increase in divorce rates follows a marriage cohort pattern. In that case the observed marriages surviving their fifth year come from marriage cohorts wherein divorce rates are lower. It is, however, doubtful that the behavioral response to the HIV/AIDS epidemic follows such a clear cohort (as opposed to period) pattern. A final explanation, and one that accommodates both the increase in divorce rates for recent marriages at short marriage durations as well as their faster decline at longer marriage durations is that individuals resort faster to divorce in case one of the spouses engages in behavior believed to be associated with HIV infection. Whereas extra-marital affairs may have been tolerated longer in the past, they are now sanctioned earlier on in marriage. Because these frail marriages are selected out earlier and at a higher rate, the remaining ones are more robust and that explains the fast decline in the divorce hazard at longer durations for more recent marriages. Figure 3b, wherein the divorce hazard is further broken down by the suspicion of adultery, supports that reasoning[12].

[12] Incidentally the difference in the shape of the divorce hazards in figures 3a and 3b suggests that the proportional hazards assumption for these variables is violated. In the future I might model their effects more appropriately by using time varying covariates for either one of these effects (or the interaction between YM90 & XMA) in the Cox regression reported in table 1.

Figure 3a:

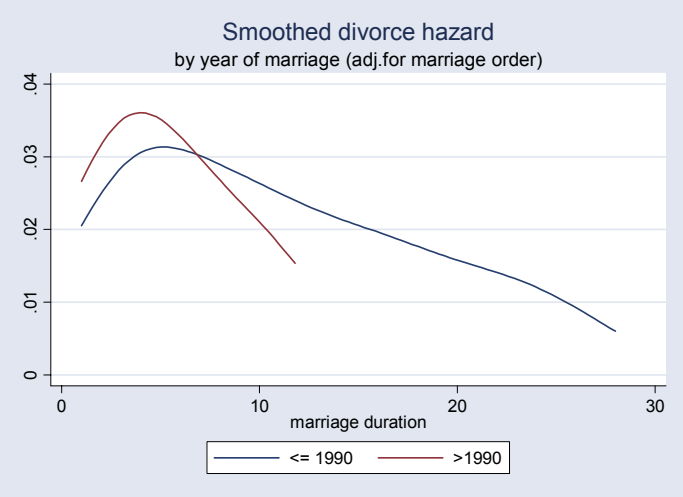
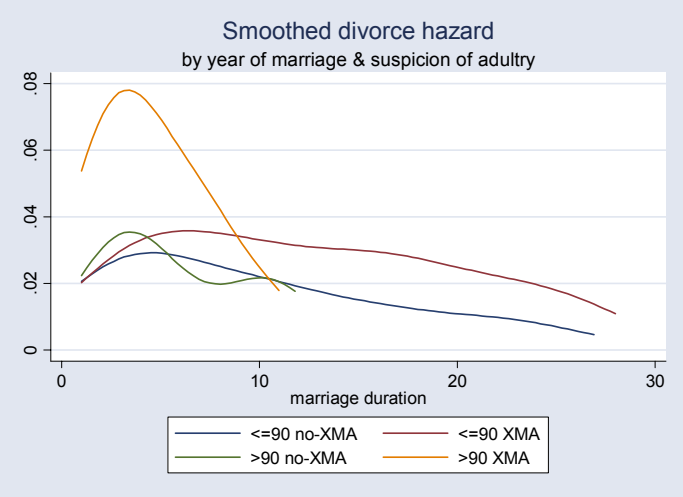


Figure 3b:



For marriages contracted prior to 1990, infidelity increases the divorce hazard over the whole range of marriage durations. After 1990, extra-marital affairs invoke divorce much earlier on in marriage.

4. Spouse selection

Complementary to the divorce of spouses thought to increase one's exposure to HIV, men and women may also engage in the selection of spouses to control their risk of infection. Local popular culture is replete with examples of men and women pondering about characteristics of potential spouses thought to be associated with HIV infection {Watkins 2004 #1620}, but most of them are difficult to retrieve in a retrospective survey approach. Ideally one would like to analyze selection into marriage based on the sexual biographies of singles on the marriage market at any particular time. However, this information is not available and will be difficult to obtain. The information that we do have for women and that may be correlated with HIV infection is the outcome of the previous marriage. Because three quarters of between-survey mortality can be attributed to AIDS (Doctor and Weinreb 2003), we may assume that a high proportion of the widows in the most recent period are surviving spouses of AIDS victims and have a high likelihood of being infected themselves. If this assumption is valid and if marriage selection based on likelihood of infection is taking place, then one would expect widows to have greater difficulty in finding a new spouse than divorcees. Again the presumption that this selection occurs in response to the threat of HIV infection implies that we should witness a change in the remarriage hazard by outcome of the previous marriage (widow vs. divorcee) and calendar year. To test this hypothesis, a proportional hazards model was chosen with remarriage hazards by duration since the end of the previous marriage as the outcome (table 2). Contrary to the previous analysis calendar year is coded as an indicator variable that distinguishes between women whose previous marriage ended in the period leading up to, and after 1990.

Table 2: Hazard ratios for Cox regression models of remarriage

	Model 1	Model 2
District:		
- center	0.71**	0.71**
- north	0.55**	0.55**
Age	0.97**	0.97**
YR	1.22**	1.28**
Widow (vs divorcee)	0.74**	0.86
YR * Widow (interaction)		0.71*
N (intervals between marriages)	691	691

Legend: - Age: age at end of previous marriage
- YR: year at end of previous marriage (≤1990 vs. >1990)
- ** = P<.05, * = p<.10 (robust standard errors, adjusted for clustering on respondent)

In model 1 remarriage differs by district: in the matrilineal south remarriage rates are higher than in the strictly patrilineal northern district. The effect of age indicates that older women are less likely to remarry. A similar effect seems to exist for higher order versus lower order marriages but it is only marginally significant and not reported in table 2. The effect of the period wherein the previous marriage ended is curious and suggests that women who became single in the most recent period are more likely to remarry or remarry earlier than those who became single in the period prior to the 1990s. This suggests that rather than resorting to abstinence, women (and probably also men) shorten intervals between marriages in the period that AIDS became more important. The coefficient for 'widow' means that the remarriage hazard is around 25% lower for widowed as opposed to divorced women. That effect is diluted once an interaction with marriage period is included (model 2). This suggests that it is particularly in the post 1990 period that widowed women find it more difficult to remarry, and this confirms our hypothesis that in order to control their own risk of infection men and women in Malawi resort to the selection of spouses based on their presumed likelihood of infection. Here it is illustrated with respect to the outcome of the previous marriage, but it is likely to operate on other characteristics as well.

Although no direct proof of a change in marriage patterns in response to the AIDS epidemic, a similar relationship between outcome of previous marriage and the likelihood of remarriage between the two survey waves can be identified (table 3).

Table 3: Odds ratios for remarrying between survey waves

	Model 1
District:	
- central	2.09
- north	0.84
Age	0.91**
Widow	0.30**
N (single women in 1998)	103
Pseudo R^2	0.20

Legend: - ** = P<.05, * = p<.10 (robust standard errors, adjusted for clustering by village)

After controlling for district and age, divorcees are more than three times more likely to remarry between 1998 and 2001 than widows.

5. Conclusion

Rather than adding to the fatalistic tenor, the results suggest that men and women in Malawi are quite resourceful in their response to the HIV/AIDS. While some behavioral change along the guidelines of the ABC of AIDS prevention seems to have occurred, it is not offering the toolkit to pacify uncertainty in the face of AIDS, nor will it contain behavioral responses to its prescriptions. The complaint that women (and men) lack control over the faithfulness of their spouses or may not be in a position to enforce condom use within marriage is not new in the literature; what is often overlooked, however, is that marriage itself is a resource at their disposal with they can steer away from the risk of infection either via mechanisms of positive or negative selection. Divorcing a spouse that might bring HIV into the household is the most obvious strategy, and evidence for that is found in the increasing responsiveness of divorce to the suspicion of adultery as the threat of AIDS started to materialize. Even more interesting is that the sanctioning of adultery by means of divorce increased while reported adultery itself has declined.

A phenomenon that requires further attention is whether there has also been a change in the timing of divorce in addition to the tightening correlation between the suspicion of adultery and divorce. While marriages with an unfaithful spouse have always been more fragile than those in the absence of adultery, infidelity may now be given less respite and is possibly sanctioned by divorce much earlier on in marriage than ten or fifteen years ago. One of the consequences is that frail marriages are selected out earlier and that marriages that survive the first five 5-10 years of marriage are on average more stable than in the period before AIDS became a threat. The latter, in a sense, keeps the divorce rates in check. This interpretation should remain preliminary as competing explanations for the observed pattern in the data are possible.

In a very analogous way that spouses are selected out of marriage based on behavior that is associated with the risk of infection, positive selection mechanisms ensure that those who remarry are on average less likely to be infected than those that remain single. This is illustrated by lower remarriage rates of widows than those of divorcees. Again that relationship tightens in the 1990s; the period where an increasing share of widows have become surviving spouses of AIDS victims.

Most evidence presented in this paper is circumstantial in the sense that the relationship has to be read into trends in marriage characteristics that coincide with HIV prevalence and AIDS mortality. Preliminary longitudinal evidence, however, confirms that marital decision-making responds to the perceived exposure to HIV.

Among the unresolved issues that come to mind when considering these findings are the possibility of gendered marital strategies, the effectiveness of these marital

strategies for containing the epidemic, and the external validity of these results to other contexts. The possibility of gender differences in marital strategies for avoiding HIV exposure are based on reports that women often point to their husbands as the major source of concern for exposure to HIV, while men regard their 'girlfriends' as sources of infection {Watkins 2004 #1620}. We therefore expect husbands to be less suspicious about their wives' fidelity and, as a result, they should not need to resort to divorce to the same extent for managing their risk of infection.

The effectiveness of these strategies is another pending matter and since HIV status of respondents was collected as part of the MDICP3 survey round in 2004, it becomes possible to investigate this. Finally, the question arises to what extent marital strategies similar to those observed in Malawi might be deployed in other contexts. In that respect Malawi is perhaps a particularly conducive environment because marriage and divorce rates are traditionally high, and men and women move in and out of unions quite liberally. Marriage payments in Malawi are low or non-existent and the sanctions on divorce are limited. The absence of these constraints clearly only affects the feasibility of negative selection and leaves positive selection into marriage unaffected. Extending these conjectures even further might lead us to hypothesize differences in marital strategies by type of filiation (matrilinial or patrilineal), or even consider –some of these– marital strategies as a possible contributing factor to regional differences in HIV prevalence.

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