HIV Testing, Subjective Beliefs and Economic Behavior

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February 2012

Abstract:

This paper examines the effects of learning HIV status on economic behavior among rural Malawians. According to economic life-cycle models, if learning HIV results is informative about additional years of life, being diagnosed HIV-positive or negative should predict changes in consumption, investment and savings behavior with important micro and macro-economic implications. Using an experiment that randomly assigned incentives to learn HIV results, I find that while learning HIV results had short term effects on subjective belief of HIV infection, these differences did not persist after two years. Consistent with this, there were relatively few differences two years later in savings, income, expenditures, and employment between those who learned and did not learn their status.

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I thank Jere Behrman, Hans-Peter Kohler, Susan Watkins and the MDICP team for the support during field work activities. I am grateful to David Cutler, Michael Kremer, Sendhil Mullainathan, and Susan Watkins for helpful comments and discussion on earlier drafts of this paper. I also thank Taryn Dinkelman, David Lam, Emily Oster, and Jeff Smith for their comments.
The Malawi Diffusion and Ideational Change Project is supported by grants from the Rockefeller Foundation; NICHD (R01-HD4173, R01 HD372-276); NIA (AG1236-S3); the Center for AIDS Research and the Center on the Demography of Aging at the University of Pennsylvania. The project on Information, Incentives and HIV/AIDS Prevention is supported by the University Research Foundation, University of Pennsylvania. Follow-up data collection was supported by the Warburg Foundation of the Economics of Poverty. I am grateful for financial support from the National Institute on Aging through MiCDA grant number P30 AG012846 at the University of Michigan.

1 Introduction

Economic models of lifetime consumption suggest that life expectancy is important for behavior such as savings, investment, and retirement decisions (Ben-Porath, 1967; Browning and Crossley, 2001; Kalemli-Ozcan et al., 2000; Modigliani and Brumberg, 1954; Murphy and Topel, 2006; Yaari, 1965). A large body of literature has attempted to empirically measure the effects of changes in life expectancy on savings, investment, and economic growth. Many papers have taken a macro approach, generally finding a positive correlation between increases in average life expectancy at birth, and savings rates or human capital investment (Bloom et al., 2003; Bloom and Sachs, 1998; Gallup and Sachs, 2001; Jayachandran and Lleras-Muney, 2009; Lee et al., 1998; Lee et al., 2000; Lorentzen et al., 2005; Shastry and Weil, 2003; Tsai et al., 2000).[1] There have been several, albeit fewer, micro-level studies that have examined how individuals respond to changes in health status or information affecting their own life expectancy, on savings or investment behavior (Khwaja, Sloan, and Chung, 2007; Stoler, 2004; Salm, 2010). One reason for the limited number of micro-level studies quantifying individual-level responses to changes in life expectancy is the difficulty of econometrically identifying a causal effect. In most cases, life expectancy is endogenously determined; therefore, empirical analyses must rely on unexpected health or information shocks. Moreover, health shocks or new information affecting life expectancy may need to be relatively large in order to have a measureable effect on subsequent economic behavior.

One example of a large change in life expectancy is in high HIV prevalence countries in Africa where demographers have estimated that life expectancy at birth has dropped dramatically – for example, up to 30 years in Botswana and Swaziland – as a result of the AIDS epidemic (Stover, 1998; United Nations, 2004). This large drop in life expectancy and its potential effects at the macro and micro level has been of great interest and debate to both academics and policy makers.[2] On the one hand, while some economists have argued large effects of the epidemic on economic growth because of the reduction in

[1] On the other hand, others have found weaker relationships between aggregate life expectancy and growth. Acemoglu and Johnson (2007) exploit large improvements in life expectancy in the 1940s and find no significant effect on growth. Weil (2007) calibrates the effects of health on growth finding significant effects on growth; however these are smaller than previous cross-country regressions results.

[2] For a good overview on the issues see Ainsworth and Over (1994).

working-age adults and the reduced incentive to save or invest, others argue a more limited effect of HIV/AIDS.[3]

There are relatively fewer micro studies available that have examined the relationship between the HIV/AIDS epidemic on economic behavior or outcomes. Empirically, one of the biggest challenges in this literature is to establish a causal link between HIV and subsequent economic outcomes because HIV infection is non-random. Existing research has focused on quantifying the effect of being HIV positive on productivity, health care costs, or lost work or the effects of having HIV/AIDS-related death or illness in the household (Canning et al., 2008; Case and Ardington, 2006; Chapoto and Jayne, 2005; Evans and Miguel, 2007; Goldstein et al., 2008; Steinberg et al., 2002; Thirumurthy et al., 2008). While several of these papers utilize propensity score matching or instrumental variables to identify causal effects, finding a set of plausibly exogenous instruments or a counterfactual is a challenge.

Rather than measure the impact of HIV rates on aggregate savings rates or growth (as in the macro literature), or quantifying the impacts of having HIV on economic behavior (as in much of the existing micro literature), this paper evaluates the impact of individuals learning their own HIV status on economic behavior. Individuals learning they are HIV-positive or negative may obtain important information that informs them as to the number of additional years they could expect live. This could, in turn, affect savings or investment: those learning that they are HIV-negative would be expected to increase savings, and those learning they are HIV-positive would be expected to decrease savings. There may be other factors that could lead to a positive relationship between learning one is HIV-positive and savings. For example, HIV positives may want to save for future health expenses (Lammers and Kuilen 2007). Reduced morbidity may increase an individual's working life span which would reduce savings rates (Fogel, 1994; Fogel, 1997). Altruism and bequest motives might also motivate HIV-positives to save

[3] For research arguing large effects of HIV/AIDS on economic growth, see Arndt and Lewis, 2000; Arndt and Lewis, 2001; Arndt, 2006; Bell et al., 2006; Bell et al., 2003; Bonnel, 2000; Corrigan et al., 2005;Cuddington, 1993a; Cuddington, 1993b; Cuddington and Hancock, 1994; Cuddington and Hancock, 1995; Dixon et al., 2001a; Dixon et al. 2001b; Dixon et al. 2002; Engel, 2002; Freire, 2004; Gaffeo, 2003; Huang et al., 2003; Kalemli-Ozcan, 2006; Papageorgiou and Stoytcheva, 2004; Robalino et al., 2002. Other literature arguing smaller or no effects of HIV/AIDS on growth include: Bloom and Mahal, 1997; Mahal, 2004; Werker et al., 2006; and Young, 2005.

in order to provide for their children or other dependents, or to finance funeral costs (Stoler, 2004). Theoretically, the impact of learning HIV status (either positive or negative) on economic activity is ambiguous and ultimately an empirical question.

The paper uses data from individuals living in rural Malawi to measure differences in economic behavior between individuals who learn their HIV status and those who do not. In most settings, using cross-sectional or longitudinal data to measure the effects of learning HIV-positive or HIV-negative results is complicated by the fact that individuals endogenously choose to learn their HIV status. Depending on the direction of this selection bias, comparing those who know their HIV results with those who do not know their HIV results may either overstate or understate the true causal effects of learning HIV status.

The analyses in this paper overcome this empirical limitation by utilizing a field experiment that randomly offered individuals living in rural Malawi monetary incentives to learn their HIV results at centers randomly placed throughout their communities. Both the monetary incentives and the distance of the HIV results centers had large and significant effects on individuals learning their HIV status (Thornton, 2008). This randomization created an experimental treatment and control group of HIV-positives and HIV-negatives who learned and who did not learn their HIV results, due in part, to the exogenous monetary incentives and distance. This design and these data allow for an instrumental variable analysis of the economic impact of learning HIV-positive and negative results.

The baseline survey, HIV testing, and field experiment incentivizing individuals to learn their HIV results were conducted in late 2004. Approximately two years later in 2006, respondents were re-interviewed and asked a variety of questions on economic behavior and output (e.g. savings, employment, income, and expenditures).

To the extent that economic models predict behavioral responses to information about life expectancy, it is important to consider how that information affects subjective beliefs. There is a growing literature in economics suggesting that subjective beliefs are essential to consider and, in many instances, are better predictors of behavior than objective measures (Engelberg et al., 2006; Gan et al., 2003; Gan et al., 2004; Hamermesh, 1985; Lusardi, 1999; Manski and Dominitz, 1994; Perozek, 2005; Salm, 2005; Schunk, 2005; Smith et al., 2001). A first approach in measuring the impact of learning HIV results on economic outcomes and behavior is to measure how learning HIV results affected individual's subjective beliefs after testing. While receiving an HIV-positive or HIV-negative diagnosis has strong implications on objective life expectancy, what matters most is how learning this information affects *beliefs* about life expectancy, or HIV infection. In early 2005, approximately two to six months after respondents were given the opportunity to learn their HIV results, a survey was conducted among a sub-sample of the baseline respondents that asked about subjective beliefs of HIV infection. Individuals were also asked about their subjective beliefs of HIV infection during the 2006 follow-up survey. The results suggest changes in subjective beliefs about the likelihood of HIV infection in the short term (after two to six months), the effects of learning HIV results on beliefs did not persist to the follow-up survey conducted after two years.

Because learning HIV-results had no persistent impact on subjective beliefs of infection two years later, there is little reason to expect a change in economic behavior or outcomes. Consistent with the lack of a longer term effect on subjective beliefs, the results yield few significant effects of obtaining either HIV-positive or negative results in 2004 on economic behavior or outcomes in 2006. There are no robust significant differences in propensity to savings, working in the past 6 months, income, or expenditures among HIV-positives and HIV-negatives. While HIV-negatives who receive their test results report working approximately 40 minutes more on the day prior to the follow-up survey, this does not translate to additional income or overall likelihood of working. There is some suggestive evidence that HIV-positives learning their results may have reduced their savings, although these results are not statistically significant. More generally, we present the results among the HIV-positives with caution. Because of the small sample size of HIV-positives, the estimates are less precise; moreover, evidence of differential attrition complicates estimation.

There is some existing literature that examines the relationship between learning HIV results and economic behavior. Using the absence of a health worker as an instrument for taking an HIV test, Goldstein et al., (2008) find households of women testing HIV-negative increase schooling and livestock holdings (marginally significant at the 10 percent level). One limitation in this analysis, however, is that they do not observe the HIV status of all individuals, only those who learn their HIV results.[4] This paper, however, observes the HIV status of all individuals who test and utilizes the variation between those who learn and do not learn their results.

It has been suggested that the reduction in life expectancy as a result of HIV/AIDS could be an important factor contributing to reduced growth, declines in savings and investment rates, and increased health care costs. While this paper does not evaluate the economic effects of acquiring the HIV virus itself, the findings suggest limited economic effects of HIV testing. One limitation is that because of the small number of HIV-positives in the sample, the results are somewhat imprecisely measured for those learning they are infected. These limitations are discussed below.

This paper also adds to the growing literature of subjective beliefs and points to the importance of understanding the formation and persistence of beliefs. While beliefs are crucial to economic models of behavior, economists are only just beginning to focus on their measurement and effects; more attention to this is needed in future research.[5]

The paper proceeds as follows: Section 2 describes the data and experiment. Section 3 presents the empirical strategy. Section 4 discusses subjective beliefs at baseline. Section 5 presents the results of the effects of learning HIV results on beliefs. Section 6 presents effects on economic output and behavior and Section 7 concludes.

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[4] Other similar papers include Van de Kuilen and Lammers (2007) who find in laboratory experiments among South African students that both HIV contamination risk and being HIV-positive status is positively correlated with savings. Using data from Demographic Health Surveys, Fortson (2010) measures the effects of reductions in life expectancy due to HIV on investments and savings. Using HIV prevalence rates as a proxy for life expectancy; she finds areas with higher levels of HIV experienced relatively larger declines in schooling. However, the aggregate HIV rates are not necessarily good proxies for individuals' subjective life-expectancy; this empirical strategy ignores differences in beliefs regarding longevity or likelihood of HIV infection. There may also be regional omitted variables that are correlated with both HIV prevalence and investment that would bias an analysis of the impact of HIV on investment and savings.

[5] See for example Delevande et al. (2011), Gine et al. (2009), McKenzie et al. (2007), Manski (2004), and Rabin (1998).

2 Data and Experimental Design

The data used in the analysis for this paper are part of the Malawi Diffusion and Ideational Change Project (MDICP), a panel study of men, women, and adolescents randomly selected from approximately 125 rural villages in three districts of Malawi.[6] In 1998, households in study villages were listed and a sample of married men and women was randomly drawn. In 2004, an additional randomly selected sample of adolescent men and women (ages 14-24) from the same villages was added to the original sample and the original respondents were re-interviewed. During data collection in 2004, respondents were offered free tests for HIV (Bignami-Van Assche et al., 2004; Angotti et al., 2009). Among those offered a test, 91 percent, or 2,894 individuals, accepted. Of those who accepted an HIV test, the HIV prevalence rate was 6.4 percent.[7]

Of the original 2,894 individuals who accepted an HIV test, 2,834 respondents were offered monetary incentives to obtain their HIV results (Table 1, Panel A). These individuals were given a randomly assigned monetary voucher redeemable upon obtaining their HIV test results two months after the test samples were taken. Vouchers ranged between one and three dollars; the average total voucher amount was approximately one dollar. Test results were available at mobile counseling centers randomly placed throughout the villages and individuals were informed of the location and opening times of their assigned results center. See Thornton (2008) for a full description and design of the experiment.

In early 2005, approximately two to six months after the availability of HIV results, a subset of the baseline sample was re-interviewed. These respondents consisted of those living in Rumphi or Balaka (but not Mchinji). At this time respondents were asked about their sexual behavior and subjective beliefs (but not about their economic activity). There was a 75 percent completion rate among those who were eligible for the 2005 interview.

In 2006, approximately two years after HIV results were available, respondents in all districts

[6] See http://www.malawi.pop.upenn.edu/Level%203/Malawi/level3_malawi_sampling.htm.

[7] The HIV rate in this sample is significantly lower than the estimated national prevalence rate of 12.54 percent (Demographic Health Survey, Malawi 2004). The difference may also be due to the inclusion of an adolescent sample, attrition from the original 1998 sample, or due to selection bias in HIV test refusals.

were approached for a (second) follow-up interview. Of those enrolled in the incentives program, 2,089 respondents (74 percent), were re-interviewed in 2006.

The analytic sample for the paper consists of all respondents who were offered incentives to obtain their HIV results in 2004, who had complete baseline covariates (e.g., age, income, years of education, marital status), and were re-interviewed in 2006. In all, 1,813 individuals are analyzed in this paper (Table 1, Panel A). The extent that selective sample attrition occurred across survey waves (e.g., men and HIV-positive individuals are less likely to be interviewed in 2006) may threaten external validity because these individuals may no longer be represented in the sample. However, in terms of internal validity, to measure the effect of learning HIV results the analysis utilizes the randomized incentives and distance from results centers as instrumental variables. In this case, it is important to examine the rates of attrition across the set of instruments for internal validity. Among HIV-negatives, attrition is not correlated with the randomized incentives or distance to the HIV results center (Appendix A, Column 6). Among HIV-positives we can (marginally) reject that the set of instruments used in the econometric analysis are jointly equal to zero (Appendix A, Column 1). This may be simply random error – in part related to the fact the sample size of HIV-positives is relatively small. In a pooled sample containing both HIV-positives and HIV-negatives, we again can reject that the instruments are jointly equal to zero when predicting attrition, however, this is mainly driven by the interaction of HIV-positive and receiving any incentive (Appendix D, Column 1). Appendix A also examines the type of individuals who were more likely to attrit and how these characteristics interact with the set of instruments. Among HIV-negatives we cannot reject the test that the instruments and interactions are jointly equal to zero (Columns 7-10). Because of the small sample of HIV-positives which provide imprecise measurements and large standard errors, and the potential differential attrition, the analysis and interpretation focuses mainly on the results among the HIV-negatives. Readers should interpret the results among HIV positives with caution. Some of the analysis relies on data from the 2005 follow-up survey. The patterns of attrition in the 2005 survey are similar by random assignment (results not shown).

Table 1 Panel B presents summary statistics for the analytic sample: 41 percent are male, with an average age of 35, and 4.7 children. Respondents had completed, on average, just over 4.9 years of school in 2004. The majority of the respondents, indeed most individuals living in rural Malawi, are subsistence farmers and respondents are quite poor. Out of a variety of expenditure categories, respondents reported an average of 33 dollars worth of household and individual expenditures in the previous 3 months with a median of ten dollars.[8] The largest expenses were farm-related expenses and expenses for children (including school-fees, clothes, and medicine). There were 79 individuals (4 percent) in the sample, who were HIV-positive in 2004 and who are in the analytic sample. This small sample size is one limitation for the analysis when we measure the effects of learning HIV results among this population. Nineteen percent of the sample reported having a prior HIV test at baseline.

In terms of the incentives and distance variables, almost 80 percent of the respondents received any incentive to learn HIV results, with the average amount worth approximately one dollar (Table 1, Panel B). On average, respondents needed to walk approximately 2 kilometers to reach the mobile HIV results center.

3 Empirical Strategy

In retrospective studies, the decision to learn HIV results is likely correlated with other behaviors, perceptions of risk, or other individual characteristics, leading to a biased estimate of cross-sectional analyses of the impact of learning HIV results. To estimate the causal effects of learning HIV status in 2004 on beliefs and economic outcomes, I use the fact that the experiment randomly assigned the benefits and costs of learning HIV results to each individual who agreed to be tested. I estimate the following specification, separately among HIV-positives and HIV-negatives:

$$(1)\ Y_{ij} = \alpha + \beta_1 GotResults_{ij} + X'_{ij}\mu + \varepsilon_{ij}$$ [9]

[8] These categories included: clothes or medical expenses for themselves, expenses on children (including clothes, medical expenses, and school fees), farm expenses (including seeds, fertilizer, labor, new tools or inputs), and expenses on funerals.

[9] Another possible specification would be to conduct the analysis by estimating how differences between baseline and follow-up are affected by learning HIV results. Unfortunately many of the economic variables (such as savings) were not asked at baseline. The results using differences with other variables such savings, expenditures, or work do

Y indicates some economic behavior or outcome measured in 2006 for person i in village j. *"GotResults"* indicates an individual went to the VCT center and obtained HIV results in 2004. "*X*" is a vector including indicators of gender, age, age-squared, if the respondent was married, years of completed education in 2004, log 2004 expenditures, as well as district fixed effects. Standard errors are clustered by village. In the case of both binary and continuous outcome variables, the IV regressions are modeled as linear (Angrist 2001).

In equation (1), the coefficient on *"GotResults"* represents the effect of an individual learning his or her HIV results in 2004, separately analyzed for HIV-positives or HIV-negatives. Omitted variables that affect whether an individual obtained HIV results are likely to bias the coefficients on "*GotResults*", although the direction of this bias is ambiguous. For example, HIV-negative individuals who are more conscientious about their future may be more likely to go to the HIV results center to learn their results and also be the type of person who would save more for the future upon learning they were HIV-negative, leading to an upward bias. On the other hand, individuals with a higher income may have higher opportunity costs of time and thus be less likely to go to the VCT center to learn their HIV results. This would imply that individuals choosing to attend the VCT centers would be less likely to save after learning their HIV results, thus leading to a downward bias.

The baseline data provides some indication of the potential direction of selection. HIV positives were slightly less likely to get their results, although this difference is not statistically significant. Importantly, education, number of assets and log expenditures negatively predict attending the HIV results centers to learn HIV results (not shown). In general, those who are economically better off are less likely to learn their HIV results suggesting that the OLS estimate of the impact of learning HIV results on economic outcomes may be downwardly biased.

To deal with these potential biases, I use the randomized design to instrument for choosing to learn HIV results. In this case, the variable "*GotResults*" is instrumented by exogenously assigned incentives and distance to the assigned VCT center. The first stage is modeled as:

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not produce different results than the specification in equation (1) above (not shown).

$$(2)\, GotResults_{ij} = \alpha + \beta_1 Any_{ij} + \beta_2 Amount_{ij} + \beta_3 Dist_{ij} + X_{ij}\mu + \varepsilon_{ij}$$

where *"Any"* is an indicator for whether an individual received any incentive, *"Amount"* indicates the total amount of the incentive, and *"Dist"* is the distance in kilometers from the randomly assigned HIV results center from an individual's home. The F-statistic for learning HIV results among HIV-positives is 8.6 and among HIV-negatives is 128.11 (Appendix B). Estimates should be interpreted as local average treatment effects (LATE) as the effects are driven by those who respond to the incentives and distance.[10]

Because of the small sample size of HIV-positives in the analytical sample (79 respondents), in addition to measuring the effects of learning HIV results separately among HIV-negatives and HIV-positives, some specifications are run among a pooled sample of all individuals. Pooled results are presented in the Appendix and are consistent with the separate regressions.[11]However, Because of the small sample size of HIV-positives, differential attrition, and the ability to allow the effects of covariates to be different across HIV status, our preferred specifications are those that estimate effects among HIV-negatives and HIV-positives alone.

One important consideration is whether the randomization "worked". For almost each baseline variable, regressing that baseline characteristic on incentives and distance variables, separately among HIV-positives and HIV-negatives, there is no significant correlation with incentives or distance (Appendix C). There is a small but significant difference in age by incentive amount among HIV-positives (Panel A, Column 2). However, overall, the randomization appears to be balanced among observables. Balancing statistics for the pooled sample are presented in Appendix D, Columns 4-8, yielding similar results.

Before turning to the results, it is worthwhile mentioning the outcome variables used in the analysis. First, subjective beliefs were measured in 2004, 2005, and in 2006. During survey interviews in

[10] However, it is not likely that the ATE and LATE are very different as the IV and the ITT estimates do not differ greatly in most specification, most of those who were offered incentives were compliers and received their results (86 percent), and there are no significant differences in learning results among those offered and not offered incentives by baseline characteristics.
[11] These specifications are equivalent to equations (1) and (2) only that I include interactions with an indicator of HIV status. The F-statistic for learning HIV results is 69.67 and the interaction between learning HIV results and HIV status is 4.16 (Appendix D, Columns 2 and 3).

2004 and 2006 respondents were asked about their subjective likelihood of HIV infection: “What is the likelihood that you are currently infected with HIV?”. Possible answers included “No Likelihood”, “Low Likelihood”, “Some Likelihood”, “High Likelihood”, or “Don’t Know”. In 2005 subjective beliefs were asked slightly differently than in 2004 or 2006. In particular, they were allowed only four categories of responses (“No Likelihood”, “Some Likelihood”, “High Likelihood”, or “Don’t Know”), rather than five categories.

For the analysis on the effects of learning HIV results on subjective beliefs, the responses are coded in several different ways: responses are either coded as a zero-one indicator that the respondent believed there was no likelihood of infection, or as a continuous variable (ranging from zero to 3 in 2005 or from zero to 4 in 2006). Zero in both cases indicates no likelihood of infection. In both cases, it is unclear how to interpret “Don’t know” responses. For this reason, the analysis is run first with “Don’t know” responses treated as missing and omitted from the analysis, and second in which “Don’t know” is imputed as believing there is some likelihood of infection – because they did not say that there was “No likelihood”. For additional sensitivity analysis “Don’t Know” responses are randomly assigned to other categories with the same probability as the likelihood distribution.

For the analysis using the zero-one indicator, a linear IV specification of the effects of learning HIV status on belief of HIV infection is estimated as described above. For the analysis using the continuous variable, an IV ordered probit is estimated and the marginal likelihood of believing there is no likelihood of infection is reported.

In terms of measuring economic output and activities, Respondents were asked about savings, as well as whether or not they had worked in the past six months. In 2006 (but not in 2004), respondents were asked about their annual income by estimating the value of all work done (paid in cash and kind) within the previous year. Expenditures on medicine (for the respondent him or herself), child-related (either on medicine, clothes, or school-fees), and farm related expenses (wages, fertilizer, inputs, or tools) were all asked in 2006. Time use was measured by asking the amount of time spent the day before the interview on a variety of activities. I report productive time (in hours) spent earning cash or doing agriculture work.

4 Baseline Subjective Beliefs

Before measuring how learning HIV results affects beliefs of HIV infection, I first present statistics on subjective beliefs at baseline, separately for HIV-negatives and HIV-positives. Table 2, Column 1 presents this for HIV-positives (Panel A) and HIV-negatives (Panel B). Among the HIV-positives almost 37 percent reported that there was no likelihood of infection, while 19 percent said a low likelihood, 10 percent reported some likelihood, 9 percent reported a high likelihood, and 25 percent reported that they did not know. This differs from the self-reports of HIV-negatives of whom 59 percent reported that there was no likelihood of infection, 19 percent reported a low likelihood, 5 percent reported some likelihood, 6 percent reported a high likelihood, and 11 percent reported they did not know. It is worth pointing out that the majority of the HIV-negatives reported fairly accurate beliefs with only 17 percent reporting high likelihood or don't know. This may be a first indication of the scope of possible behavior change after testing HIV-negative. There are significant differences between the overall reports among the HIV-negatives and HIV-positives, especially among those reporting there was no likelihood of infection (a 22 percentage point difference), those reporting there was some likelihood of infection (a 4.9 percentage point difference) and those reporting they did not know (a 14 percentage point difference). Overall, HIV-positives and HIV-negative have different reported subjective beliefs about their likelihood of infection. This is tested further with a chi-square to test the null hypothesis that rows and columns of the 5x2 contingency table are independent.

I next compare beliefs among those who reported ever having an HIV test at baseline. In 2004, approximately 19 percent reported having had a prior HIV test. Columns 3 and 4 of Table 2 present the percentage of HIV-positives (Panel A) and HIV-negatives (Panel B) reporting beliefs of HIV infection. Column 5 presents the difference between those who had a prior test and those who did not. Among HIV-positives, those with a prior test were almost 23 percentage points less likely to report no likelihood of infection, and 23 percentage points more likely to report a low likelihood of infection; both of these differences are statistically significant. Other differences move in the predicted direction with a 12 percentage point increase among those with a prior test reporting a high likelihood of infection, although this difference is not statistically significant. Among those who were HIV-negative, there are some differences between those with a prior test and those without, although the differences are of smaller magnitude. HIV-negatives with a prior test are 7 percentage points more likely to report a low likelihood of infection and 4.5 percentage points less likely to report that they do not know.

These differences suggest that HIV-positives and negatives have different beliefs of infection and that these beliefs are correlated with information associated with HIV testing. The comparison between those who had a prior test and those who did not in Table 2 indicates some differences in beliefs although it is not possible to conclude that this is a causal difference, given that prior testing at the baseline is endogenous and other omitted variables may bias beliefs in one direction or another.

Before turning to measuring the causal effect of learning HIV results on beliefs with an IV regression as specified above, it is useful to simply compare average reported baseline beliefs between those who were offered a financial incentive and those who were not. For the most part, there are no differences across baseline beliefs between those who were offered an incentive and those who were not, except for a small – yet statistically significant – difference among HIV-negatives reporting that there was a low likelihood of infection. This gives further evidence of the credibility of the randomization at baseline.

5 Effects of Learning HIV Results on Subjective Beliefs

I next turn to measuring the causal effects of learning HIV results in 2004 on subsequent beliefs of HIV infection. Figures 1a and 1b present respondents average subjective beliefs of infection in 2005 among HIV-positives and HIV-negatives. The lighter shaded bars represent those who were offered a positive valued incentive to learn their HIV results while the darker shaded bars represent those who did not receive an incentive to learn their HIV results. Notice first that there are some important differences among both HIV-positives and HIV-negatives in reported likelihood of HIV infection between those who were offered and who were not offered a financial incentive. Among HIV-positives, those who were offered a financial incentive are less likely to report having “No Likelihood” of infection, with an increase in those reporting “Some Likelihood” or “High Likelihood”. Among HIV-negatives, among those who were offered an incentive there is an increase in reporting “No Likelihood” of infection, and decrease in reporting “Don’t Know”.

Figures 2a and 2b present the analogous figures for answers on subjective likelihood of infection in 2006 (2 years after results were available) among the same sample of individuals who were also interviewed in 2005. Thus the sample between Figures 1 and Figures 2 are equivalent only that approximately 1.5 to 2 years have passed. Among HIV-positives, there is both an increase in those reporting a “High Likelihood” as well as an unexpected increase in reporting “No Likelihood” of HIV infection among those who were offered a financial incentive to learn their results. It could be that some HIV-positives are in denial of their results, or that they mistrust them. It could also be that they do not want to report to interviewers, with the concern that this would reveal their true status. Among the HIV-negatives, while there was a short term difference in reported changes in subjective likelihood of infection (Figure 1), this disappears after 2 years.

To estimate the causal effect of learning HIV results on subjective beliefs, I next turn to IV regressions presented in Table 3. For each survey – either the 2005 follow-up that was conducted 2 to six months after the opportunity to learn HIV results, or the 2006 follow-up conducted approximately 2 years after the opportunity to learn HIV results – I present the effect of learning HIV results on subjective beliefs. Recall that subjective beliefs are either coded as a zero-one indicator of believing there is no likelihood of HIV infection or as a continuous variable with zero indicating no belief of HIV infection. For each outcome variable, “Don’t know” responses are either coded as missing and omitted from the analysis, or coded as believing there is some likelihood of HIV infection. For the continuous measure, I estimate an IV ordered probit and present the marginal likelihood of reporting there is no likelihood of infection. Note that these estimates are local average treatment effects among those who were affected by the incentives or distance to learn their HIV results.

Columns 1-4 presents the effect of learning HIV results in 2005, 2 to six months after the opportunity of learning HIV results in 2004. Recall that this survey was only conducted on a subset of the original baseline and thus the sample size is smaller than the full analytical sample. Among HIV positives (Panel A), there is a negative coefficient on learning HIV results across all four specifications, although the coefficient is not statistically significant. It is important to note that there are only 35-45 observations in these specifications and thus the estimates are fairly imprecisely measured. While these results are each suggestive and consistent, the confidence intervals are wide.

Among the HIV negatives, there is a positive coefficient on learning HIV results, although not when the "Don't Know" responses are coded as missing. Thus, similar to the results from Table 2, Columns 3-5, comparing HIV negatives who had a prior HIV test with those who did not, much of the difference is driven by reducing uncertainty as revealed by Don't Know responses.

Because of the potential sensitivity of the results driven by how "Don't Know" responses are treated, for additional robustness checks I assign "Don't Know" responses randomly to other response with the same probability as the original likelihood distribution without the "Don't Know" responses. For example, in 2005, the distribution of beliefs consist of 89.83 percent who say there is no likelihood of infection, 8.77 percent who say there is low likelihood of infection and 1.41 percent who say there is a high likelihood of infection. I randomly assign those who reported "Don't Know" (174 respondents) to those categories with equal likelihood as the distribution. I then rerun the analysis with "Don't Know" responses imputed in this way. Among HIV-positives, the linear IV coefficient on learning HIV results is -0.425 (se 0.240, p-value 0.09; result not shown). Among the HIV-negatives, the linear IV coefficient on learning HIV results is 0.54 (se 0.048; p-value 0.27; result not shown).

Columns 5 to 8 present the results for 2006 follow-up beliefs among the analogous sample as in Columns 1-4 – those who were also interviewed in 2005. Here, there are two striking findings. First, among the HIV-positives learning their results we see fairly large positive coefficients. That is to say, it appears that HIV-positives who learned their results believe they are *less likely* to be infected. However, the standard errors are large and when we examine the IV ordered probit, we find that the coefficient is close to zero and not statistically significant. There are no cases of HIV-positives who report "Don't know" in the 2006 survey. It may be that if HIV positives are still alive after 2 years they may incorrectly believe that they are less likely to be infected or believe that they received the wrong diagnosis.[12]

Among the HIV-negatives, the results indicate no significant impact of learning HIV results on subjective beliefs. Because these individuals have remained sexually active they have faced risk of HIV infection; thus it is perfectly rational that HIV test results two years prior are not informative to current HIV status.[13]

Turning to the results in 2006 among the full sample of respondents, we find similar results among the HIV-positives but a negative and statistically significant coefficient on learning HIV-negative results (Columns 9-12). Driving this result are those who were not interviewed during the 2005 survey – respondents living in Mchinji District, and in particular women living in this district. The IV coefficient analogous to Column 9 restricted to those living in Mchinji is -0.428 (standard error 0.140; p-value 0.004); among women it is -0.642 (standard error 0.233) and men it is -0.168 (standard error 0.216). These results suggest that in this district learning HIV results increased the likelihood in believing there is a chance of infection. No other subgroups constructed with baseline demographic variables yielded these results.

To understand what might be different about this district, first note that there were no significant differences among baseline demographic variables (other than ethnicity) among those living in Mchinji, as compared to districts (results not shown). Second, note that the IV and OLS results yield very different estimates among this sample. Among Mchinji women who were HIV-negative, the OLS estimate among is -0.021 (standard error 0.075; results not shown) as compared to the IV estimate of -0.642. The main driver of the differences in the OLS and IV estimates comes from systematic differences in beliefs correlated to the treatment among these women. In particular, we gain insight in comparing beliefs among

[12] This has also been found anecdotally in another sample of adolescent girls tested for HIV. Among girls who tested positive for HIV, several months later 39% said that there was zero chance that they were infected (Ozler, 2012).
[13] Kohler and Delevande (forthcoming) also find that HIV testing in 2004 decreased condom use among married respondents in HIV-negative couples; learning both partners' statuses increased condom use.

those who did not learn their HIV-negative results. Among Mchinji women who did not learn their results and were not offered an incentive (20 women), 85 percent believed there was no likelihood of infection whereas among those who were offered a positive incentive (28 women), only 57 percent believed there was no likelihood of infection. This is a distinctly different pattern from the sample in Columns 5-8. Among those who did not learn their HIV-negative results and who were not offered an incentive 69 percent believed there was no likelihood of infection, which is the same levels of beliefs of those who were offered a positive incentive. It is unclear as to why exactly this occurred in the data among this group of women – baseline beliefs do not follow this pattern (not shown) and these results are similar among the pooled sample of HIV-positives and HIV-negatives (Appendix E). The result among this sample of women should not be generalized across the entire sample and what remains is that learning HIV-negative results has little impact on subjective beliefs after two year.

6 Effects of Learning HIV Results on Economic Outcomes

In all, the data indicates very little persistent effect of learning HIV-negative results on subjective beliefs of infection. Because of this, it is unlikely that learning HIV results would have a long term effect on economic behaviors or outcomes, however, it is worth verifying if there are any effects. Table 4 presents the IV estimates of the impact of learning HIV results on economic outcomes and behavior; specifically savings, earnings, log expenditures, and hours worked in 2006.

I first present the results among HIV-positive with the strong caution regarding interpretation of results. There are only 79 HIV-positives in this sample and we found evidence of differential attrition from the baseline. These results should be seen as suggestive at most. Among HIV-positives, almost all of the point estimates on economic behaviors are negative, although none are statistically significant. The point estimate on "*GotResults*" is large and negative for savings (-0.228) and log savings (-1.039) (Panel A, Columns 1-2). We gain some statistical precision in the pooled sample of HIV-positives and HIV-negatives (Appendix F, Columns 1-4). In these specifications, we can reject the joint test that "Got Result" + "Got Results * HIV-Positive" is equal to zero indicating that among those HIV-positives affected by the instrument, those who learn their results are significantly less likely to save, and save less overall, consistent in part with a lifecycle model of investment and savings. However, these interpretations should be taken with caution with only 79 HIV-positive observations, and the degree of differential attrition discussed above.[14]

Similarly, coefficients on working for income in the past six months or log income are also negative and not statistically significant (Panel A, Columns 3 and 4). There are no statistically significant differences in log expenditures on medicine for self, expenses for children, farm expenses, or on hours worked between HIV-positives who know their status and those who do not (Columns 5-9). The pooled results yield consistently insignificant results (Appendix F, Columns 3-9).

Panel B of Table 4 presents the results for the HIV-negatives. Here both the coefficients and the standard errors are much smaller and with more precise point-estimates. In all, most of the coefficients on the impact of learning HIV-negative results are small and near zero and I am unable to reject that the effects are equal to zero. However, HIV-negatives who obtained their results spent approximately 0.64 hours more per day on wage work. This does not appear to be driven by outliers and is robust to a logged specification (results not shown). However, this did not result in additional likelihood of working in the past six months, nor in overall reported log income. The results are consistent in the pooled sample (Appendix F). In addition, there were no significant effects of learning HIV results on reported planned future investments (results not shown).[15]

Although I find no significant effects of learning HIV-negative results, there may in fact be small to moderate effects that I am under-powered to detect. In the case of having any savings, I can rule out

[14] An earlier working version of this paper reports significant effects on savings among HIV positives learning their results. In certain specifications, the point estimate on learning HIV results is statistically significant although this is not robust to various specifications. Because of the smaller number of HIV-positives in the sample, the results are highly dependent on the particular covariates included and are not robust to various specifications. While the negative point estimate is in the same direction supporting a negative effect on receiving an HIV-positive diagnosis, readers should take caution on drawing too broad of conclusions from this estimate.

[15] Respondents in 2006 were asked if they were planning on engaging in a variety of investment behaviors in the up-coming two years. They were asked about making large repairs, starting a business, opening a bank account, purchasing land, sending a child or grandchild to secondary school or university, or saving money. Respondents could answer "yes" or "no" to these questions and these are used as indicators of future investment intentions. While there was a great deal of variation across individuals, reported intentions did not vary systematically across HIV status, or across those who learned their HIV status.

positive effects larger 0.10 and negative effects larger than -0.06 (at 0.90 level). In Table 4, Panel B, for each of the estimated effects of learning HIV-negative results on economic behavior, I present the minimum detectable effect size for the given outcome. I can only rule out effects on economic outcomes larger than the presented minimum effect sizes.

Overall, using various measures of economic behavior and outcomes, there are few large or statistically significant effects of learning HIV results in 2004 on economic outcomes in 2006. The fact that learning HIV results did not have a persistent effect on subjective beliefs of infection may be the leading reason for no significant effect on economic outcomes. However, there are several other potential reasons that could lead to differential responses, or a lack of a response, of learning HIV results.

First, according to lifetime models of consumption, the biggest effects of receiving an HIV-positive or HIV-negative diagnosis may be among those who are younger. By grouping all ages of respondents together, we may miss out on some of the largest potential effects on economic behavior among those who are young. Second, if individuals are altruistic towards their children, there may be differential responses to HIV testing among those with and without children. Third, theoretically, receiving an HIV diagnosis (either negative or positive) may only affect subsequent behavior if individuals learn new information, changing their subjective probability of infection. This is violated if an individual's posterior belief of infection is equal to her prior. For example, if an individual had perfect knowledge of her status (either through prior testing or through inference from previous sexual behavior), there would be no additional information from the diagnosis.[16]

To estimate differential effects of learning HIV results I interact baseline variables (e.g., age of the respondent, number of children, prior belief of infection, and whether an individual had a prior HIV test) with learning HIV results and re-estimate the IV causal effects on posterior beliefs (as in Table 3),

[16] Using data from unmarried respondents interviewed and tested in San Francisco during 1988 and 1989, Boozer and Philipson (2000) find that those with different prior beliefs of infection had asymmetric behavior after learning their HIV status: those who thought they were at risk and were diagnosed HIV-negative increased sexual contact by 20 percent; those who thought they were not at risk but were diagnosed HIV-positive, decreased sexual contact by 50 percent. This is also addressed in de Paula et al., (2010). Alternatively, there may be confirmation bias in which those who have the correct beliefs are the ones to change their behavior after learning new information and this may be related to the type of information learned (Eil and Rao, 2011).

and economic outcomes (as in Table 4). In general, there are no significant heterogeneous treatment effects of learning HIV results among these different groups (results not shown).

7 Conclusion

This paper uses an experiment that randomly assigned individuals monetary incentives to learn their HIV results after being tested and randomly assigned the location of the HIV results centers to estimate the causal impact of learning HIV-positive and negative results on economic behavior. One of the striking findings of the paper is that while there appears to be some short term effects of learning results on subjective beliefs (after 2 to six months), these results do not persist after 2 years. This is striking especially among HIV-positives who appear to believe they are less likely to be infected, pointing to potential denial or wrongly inferring infection status after still being alive. There is a growing literature integrating economic behavior and decision making with subjective beliefs (Delevande et al., 2009). How and why individuals update when they do is of interest to incorporate into behavioral models.

One open question is to whether repeat testing would affect beliefs in the long run. This would be difficult to measure empirically in cross-sectional data because those who choose to repeat test would likely be those individuals who either didn't believe their results or who were put at risk of infection. In addition, even with very low costs of testing, initial and repeat testing rates are likely to be low, even if higher testing rates are socially optimal for HIV prevention and treatment (Oster et al., 2011).

Among HIV-positives, there is some suggestive evidence of lower rates of savings among those who learned their results, however this should be interpreted with caution due to the small sample size. Consistent with this finding of no long-term effects of learning HIV-negative results on subjective beliefs of infection, there is little evidence of large effects of learning HIV results on economic outcomes. There were no differential effects among those at younger ages, those with more children, or those with different prior beliefs of infection.

While the HIV/AIDS epidemic is devastating to those losing lives and loved ones, rigorous empirical research is needed to quantify the extent to which HIV and the subsequent reduced life expectancy has an effect on individuals in Africa. If individuals are not responding in updating their beliefs in predicted ways, the overall effects on economic outcomes may be smaller than theoretical models predict.

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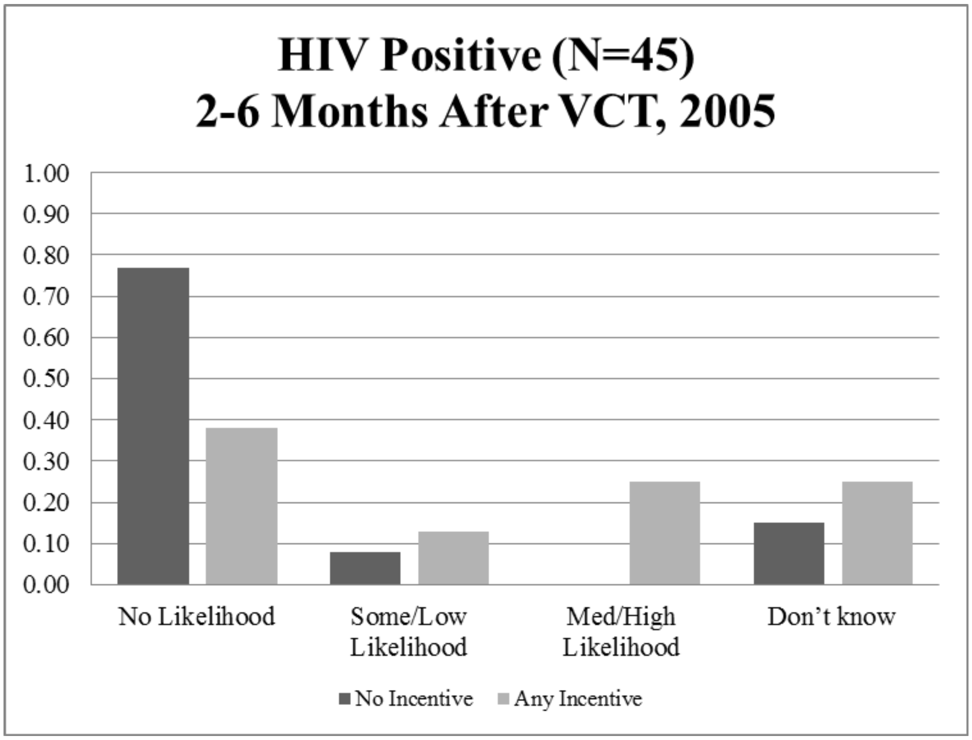
Figure 1: Subjective Beliefs of HIV Infection in 2005



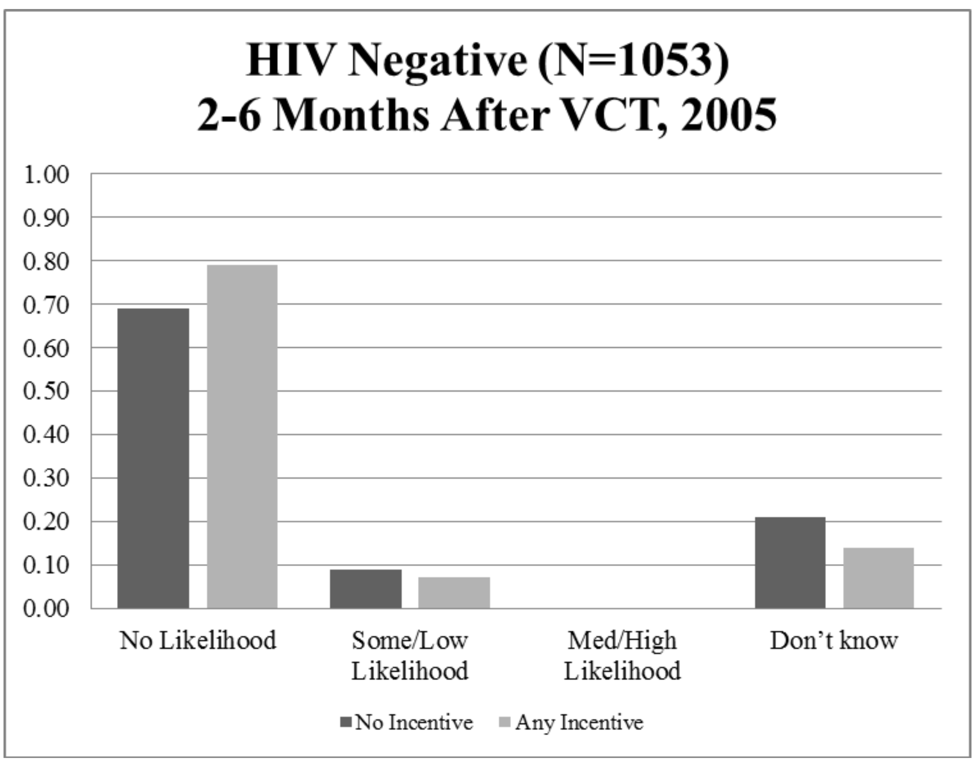
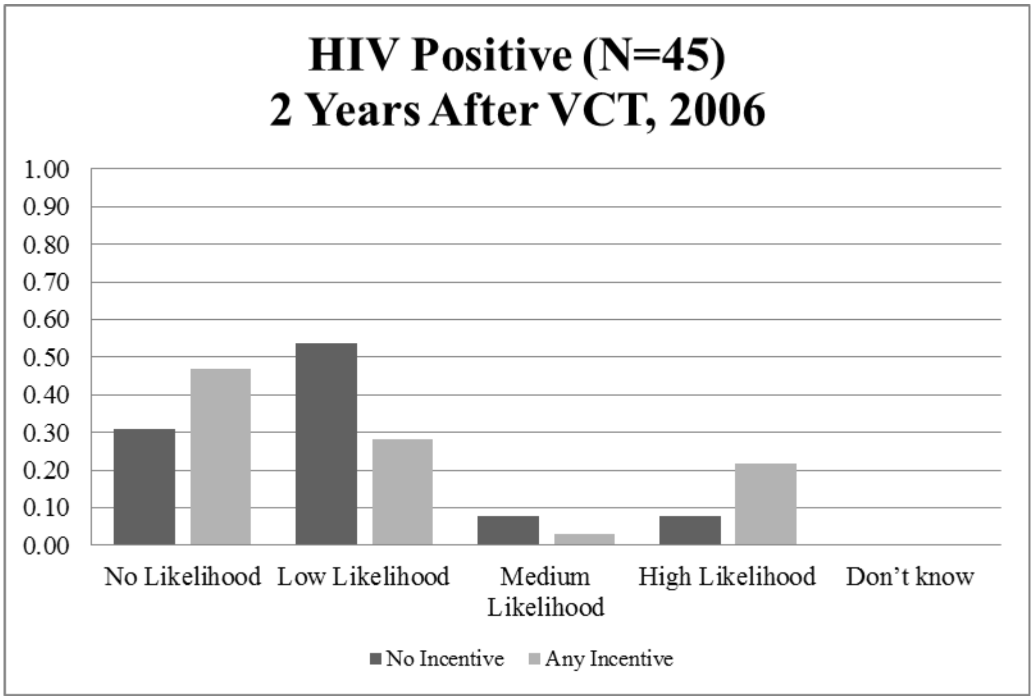
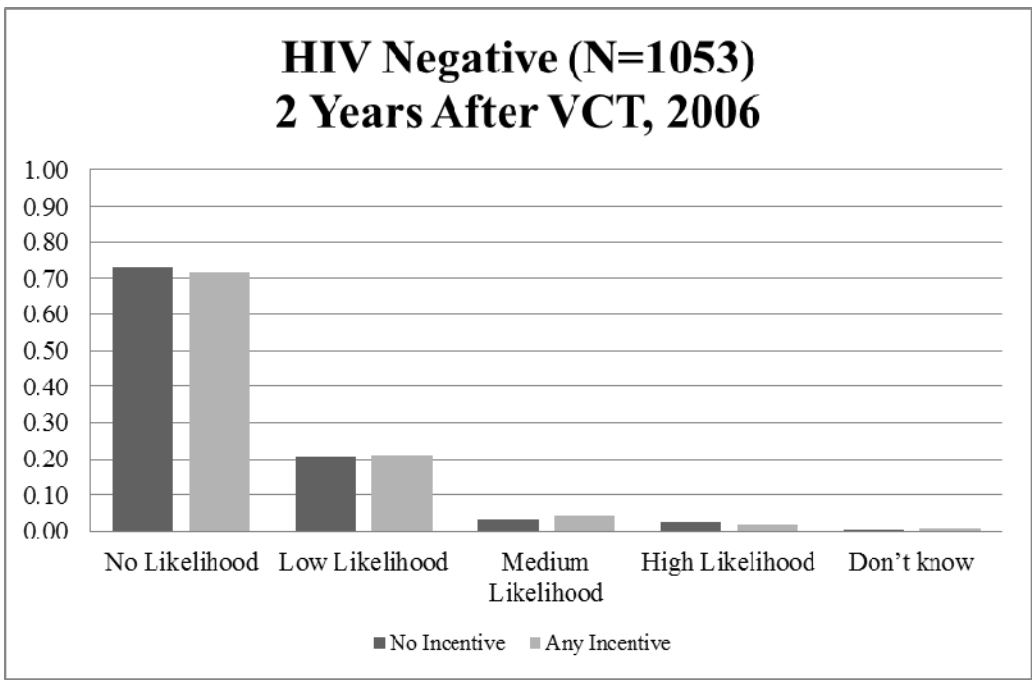


Figure 2: Subjective Beliefs of HIV Infection in 2006





Notes: This figure includes only those who also were interviewed in 2005. The sample is analogous to that in Figure 1.

Table 1: Summary Statistics

Panel A: Sample	Obs (1)	Follow-up survey completion rate (2)
2004 Baseline Sample[1]	2834	N/A
2005 Follow-up survey[2]	1528	0.75
2006 Follow-up survey	2089	0.74
2006 Analytical Sample[3]	1813	0.64
Panel B: Baseline Summary Statistics	2006 Analytical Sample (N=1813)	
Demographics	Mean (1)	SD (2)
Male	0.41	0.49
Married	0.77	0.42
Age	34.84	13.38
Number of children	4.7	3.81
Years of education	4.93	3.54
Total expenditure (dollars/3 months)	33.91	110.11
HIV positive	0.04	0.2
Had prior HIV test	0.19	0.39
Experimental Variables	Mean (1)	SD (2)
Any Incentive	0.78	0.41
Amount of Incentive (Dollars)	1.02	0.90
Distance (Kilometers)	1.99	1.24

Notes:

[1] The Baseline Sample includes those who accepted an HIV test and were enrolled into the incentives program in 2004. 3185 individuals were offered a test and 91 percent accepted; 60 individuals were not enrolled into the incentives program because of the delay in their HIV testing.

[2] The Follow-up survey in 2005 was only in two of the three districts and thus only 2,030 individuals were approached for interviews.

[3] The Analytical Sample for 2006 consists of those who were interviewed in 2006, who were in the incentives program, who had baseline 2004 demographic covariates and excludes 2004 HIV indeterminents.

Table 2: Beliefs of Current HIV Infection

	Baseline Survey, 2004							
Panel A: HIV Positives	All		Prior Test	No Prior Test	Difference: Prior Test - No Prior Test	Any Incentive	No Incentive	Difference: Any Incentive - No Incentive
	(1)		(3)	(4)	(5)	(6)	(7)	(8)
No Likelihood	0.367		0.188	0.413	-0.225*	0.411	0.261	0.150
Low Likelihood	0.190		0.375	0.143	0.232**	0.179	0.217	-0.038
Some Likelihood	0.101		0.125	0.095	0.030	0.089	0.130	-0.041
High Likelihood	0.089		0.188	0.064	0.124	0.071	0.130	-0.059
Don't know	0.253		0.125	0.286	-0.161	0.250	0.261	-0.011
Observations	79		16	63		56	23	
P-value of Chi-square					0.060			0.73

	Baseline Survey, 2004							
Panel B: HIV Negatives	All	Difference: HIV Positives - HIV Negatives	Prior Test	No Prior Test	Difference: Prior Test - No Prior Test	Any Incentive	No Incentive	Difference: Any Incentive - No Incentive
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
No Likelihood	0.589	-0.223***	0.590	0.589	0.001	0.596	0.565	0.031
Low Likelihood	0.188	0.002	0.245	0.175	0.070***	0.177	0.227	-0.049**
Some Likelihood	0.053	0.049*	0.037	0.056	-0.019	0.053	0.051	0.002
High Likelihood	0.061	0.028	0.055	0.062	-0.007	0.062	0.056	0.006
Don't know	0.110	0.144***	0.073	0.118	-0.045**	0.112	0.101	0.011
Observations	1734		327	1407		1359	375	
P-value of Chi-square		0.00			0.01			0.31

Notes: Columns 2, 5, and 8 represent unconditional differences between other columns: Columns 5 present the difference between Columns 3 and 4, Column 8 presents the difference between Columns 6 and 7, and Panel B Column 2 presents the difference between Panel A Column 1 and Panel B Column 1. P-values of chi-squared tests are presented to test the null hypothesis that rows and columns in each 5x2 contingency table are independent.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 3: Average Belief of Likelihood of Current Infection After VCT

Panel A: HIV Positives	Follow-up Sample Only				Follow-up Sample Only				Full Sample			
	2-6 Months after VCT, 2005 Follow-up Survey				2 Years after VCT, 2006 Follow-up Survey				2 Years after VCT, 2006 Follow-up Survey			
	IV		IV Ordered Probit		IV		IV Ordered Probit		IV		IV Ordered Probit	
	No Likelihood		No Likelihood (1-3)		No Likelihood		No Likelihood (1-4)		No Likelihood		No Likelihood (1-4)	
	DKs = Some Likelihood	DKs = Missing	DKs = Some Likelihood	DKs = Missing	DKs = Some Likelihood	DKs = Missing	DKs = Some Likelihood	DKs = Missing	DKs = Some Likelihood	DKs = Missing	DKs = Some Likelihood	DKs = Missing
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Got Results	-0.237	-0.412	-0.307	-0.390	0.357	N/A	0.099	N/A	0.273	N/A	0.088	N/A
	[0.289]	[0.311]	[0.280]	[0.299]	[0.262]	N/A	[319]	N/A	[0.261]	N/A	[0.310]	N/A
Observations	45	35	45	35	45	N/A	45	N/A	79	N/A	79	N/A
R-squared	0.189	0.152	--	--	0.220	N/A	--	N/A	0.184	N/A	--	N/A
Mean of Dependent Variable	0.49	0.63	1.69	1.60	0.42	N/A	1.98	N/A	0.38	N/A	2.09	N/A
Panel B: HIV Negatives	Follow-up Sample Only				Follow-up Sample Only				Full Sample			
	2-6 Months after VCT, 2005 Follow-up Survey				2 Years after VCT, 2006 Follow-up Survey				2 Years after VCT, 2006 Follow-up Survey			
	IV		IV Ordered Probit		IV		IV Ordered Probit		IV		IV Ordered Probit	
	No Likelihood		No Likelihood (1-3)		No Likelihood		No Likelihood (1-4)		No Likelihood		No Likelihood (1-4)	
	DKs = Some Likelihood	DKs = Missing	DKs = Some Likelihood	DKs = Missing	DKs = Some Likelihood	DKs = Missing	DKs = Some Likelihood	DKs = Missing	DKs = Some Likelihood	DKs = Missing	DKs = Some Likelihood	DKs = Missing
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Got Results	0.296***	0.079	0.261***	0.044	0.016	0.011	0.003	-0.002	-0.091**	-0.097**	-0.102**	-0.105**
	[0.054]	[0.066]	[0.072]	[0.063]	[0.054]	[0.053]	[0.057]	[0.055]	[0.045]	[0.044]	[0.043]	[0.041]
Observations	1,053	889	1053	889	1,053	1,046	1053	1046	1734	1,723	1734	1,723
R-squared	0.184	0.044	--	--	0.036	0.035	--	--	0.016	0.014	--	--
Mean of Dependent Variable	0.77	0.91	1.24	1.10	0.72	0.73	1.36	1.36	0.73	0.73	1.37	1.37

Notes: Each column represents an IV regression where "Got Results" is instrumented with having any incentive, the amount of the incentive, and distance from the HIV results center. Standard errors are clustered by village. Also includes age and age squared, a simulated average distance to the VCT tent, a gender dummy, log expenditures at baseline, years of education, a dummy for being married, and district fixed effects. Columsn 3,4, 7, 8, 11, and 12 present IV ordered probits where "don't know" responses are coded as either some likelihood or are missing values, as indicated above. Coefficients are marginal effects reported as the probility of believing there is no likelihood of infection. In these columns, "Got Results" is instrumented with the same set of instruments as indicated above. Robust standard errors in brackets.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 4: Impact of Learning HIV Results on Economic Outcomes in 2006

Panel A: HIV Positives	Savings		Earnings		Log expenditures			Hours Working	
	Any Savings	Log Savings	Work in past 6 months	Log Income	Medicine (Self)	Children	Farm	Cash Labor	Agriculture
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Got Results	-0.228	-1.039	-0.109	-0.125	-0.251	0.370	-0.246	1.597	-0.624
	[0.152]	[0.668]	[0.186]	[0.893]	[0.439]	[0.521]	[0.880]	[1.409]	[1.387]
Observations	79	79	79	79	79	79	79	79	79
R-squared	0.310	0.370	0.096	0.248	0.220	0.279	0.227	0.226	0.230
Mean of Dependent Variable	0.23	0.95	0.87	3.82	0.61	2.26	1.19	1.35	2.41

Panel B: HIV Negatives	Savings		Earnings		Log expenditures			Hours Working	
	Any Savings	Log Savings	Work in past 6 months	Log Income	Medicine (Self)	Children	Farm	Cash Labor	Agriculture
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Got Results	0.021	0.204	-0.047	0.109	0.109	0.040	0.081	0.637**	-0.321
	[0.049]	[0.190]	[0.046]	[0.194]	[0.077]	[0.174]	[0.177]	[0.283]	[0.414]
Observations	1,734	1,734	1,734	1,734	1,734	1,734	1,734	1,734	1,734
R-squared	0.039	0.060	0.108	0.106	0.030	0.192	0.092	0.173	0.162
Mean of Dependent Variable	0.23	0.86	0.86	3.66	0.37	1.92	1.24	1.31	2.79
Minumum Detectable Effect	0.081	0.315	0.076	0.322	0.128	0.289	0.294	0.469	0.687

Notes: Each column represents an IV regression where "Got Results" is instrumented with having any incentive, the amount of the incentive, the amount of incentive squared, distance from the HIV results center, and distance from the HIV results center squared. Each of these is also interacted with gender. Standard errors are clustered by village. Also includes age and age squared, a simulated average distance to the VCT tent, a gender dummy, log expenditures at baseline, years of education, and a dummy for being married, and district fixed effects. Robust standard errors in brackets. The minimum detectable effect is the minimum effect between those who got results and those who did not, at 0.90 power.

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix A: Retention in the 2004 Incentives Sample

Dependent Variable:	In the 2006 Analytic Sample									
	HIV Positives					HIV Negatives				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Any Incentive	-0.201*	-0.229	-0.100	-0.546***	-0.248*	0.018	0.025	0.032	0.027	0.006
	[0.102]	[0.150]	[0.163]	[0.185]	[0.128]	[0.025]	[0.036]	[0.053]	[0.048]	[0.036]
Amount of Incentive	0.040	0.018	0.010	0.140	0.098	0.008	0.006	0.007	0.019	0.007
	[0.046]	[0.058]	[0.076]	[0.110]	[0.063]	[0.013]	[0.015]	[0.020]	[0.020]	[0.017]
Distance	-0.053	-0.070	-0.051	-0.060	-0.065	-0.013	-0.010	-0.030*	-0.025	-0.023
	[0.044]	[0.055]	[0.052]	[0.065]	[0.045]	[0.015]	[0.016]	[0.018]	[0.017]	[0.017]
Male	-0.287***	-0.498**	-0.226***	-0.296***	-0.255***	-0.131***	-0.115***	-0.114***	-0.094***	-0.092***
	[0.074]	[0.212]	[0.084]	[0.082]	[0.090]	[0.019]	[0.044]	[0.020]	[0.020]	[0.019]
Any Incentive * Male		0.073					-0.015			
		[0.245]					[0.057]			
Amount of Incentive * Male		0.065					0.005			
		[0.099]					[0.026]			
Distance * Male		0.055					-0.005			
		[0.055]					[0.014]			
Education			0.042					0.000		
			[0.029]					[0.008]		
Any Incentive * Education			-0.038					-0.005		
			[0.026]					[0.008]		
Amount of Incentive * Education			0.017					0.001		
			[0.016]					[0.004]		
Distance * Education			0.003					0.003		
			[0.010]					[0.002]		
Log Expenditures				-0.039					0.020	
				[0.049]					[0.015]	
Any Incentive				0.105*					-0.016	
* Log Expenditures				[0.061]					[0.017]	
Amount of Incentive				-0.037					-0.001	
* Log Expenditures				[0.041]					[0.008]	
Distance * Log Expenditures				0.002					0.003	
				[0.020]					[0.004]	
Some Likelihood HIV positive					0.144					-0.053
					[0.141]					[0.051]
Any Incentive * Some Likelihood					-0.027					-0.042
					[0.158]					[0.055]
Amount of Incentive					-0.082					0.023
* Some Likelihood					[0.093]					[0.023]
Distance * Some likelihood					0.014					0.003
					[0.044]					[0.013]
Observations	177	177	163	166	166	2,652	2,652	2,550	2,444	2,443
R-squared	0.140	0.151	0.157	0.156	0.153	0.057	0.057	0.050	0.043	0.046
P-value (F-test of joint significance)	0.10	0.22	0.11	0.03	0.06	0.31	0.69	0.28	0.43	0.37
Mean of Dependent Variable	0.45	0.45	0.48	0.48	0.48	0.65	0.65	0.68	0.71	0.71

Notes: Coefficients are from OLS regressions with robust standard errors in brackets. Standard errors are clustered by village. Also includes age and age squared, a simulated average distance to the VCT tent, a gender dummy, and district fixed effects. Sample size varies by column due to missing data of baseline education and expenditures. The p-value is from a joint test of significance that Any Incentive = Amount of Incentive + Distance = 0 in Columns 1 and 6. In Columns 2-5 and 7-10 it is a test that also includes those variables interacted. Some likelihood of being HIV-positive is constructed with don't know responses equal to zero.

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix B: First Stage - Determinants of Learning HIV Results in 2004

Dependent Variable:	Got Results	
	HIV Positive	HIV Negative
	(1)	(2)
Any Incentive	0.236	0.336***
	[0.169]	[0.029]
Amount of Incentive	0.131*	0.088***
	[0.071]	[0.013]
Distance	-0.130**	-0.027**
	[0.054]	[0.011]
Observations	79	1,734
R-squared	0.328	0.240
F-statistic	8.6	128.11
Mean of Dependent Variable:	0.67	0.74

Notes: Columns 1 and 2 are OLS regressions with robust standard errors in brackets. Standard errors are clustered by village. Also includes age and age squared, a simulated average distance to the VCT tent, a gender dummy, years of education, log expenditures, an indicator of marital status, and district fixed effects.

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix C: Baseline Characteristics by Incentives and Distance

Dependent Variables (in 2004):	HIV Positives					HIV Negatives				
	Male	Age	Married	Yrs Educ	Log Expen	Male	Age	Married	Yrs Educ	Log Expen
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Any Incentive	0.069	6.222*	0.182	-0.609	0.454	-0.015	1.620*	-0.010	-0.134	-0.018
	[0.129]	[3.114]	[0.154]	[0.917]	[0.509]	[0.036]	[0.906]	[0.031]	[0.196]	[0.120]
Amount of Incentive	0.014	-2.984**	-0.073	0.451	-0.265*	0.016	-0.397	-0.015	0.061	0.033
	[0.055]	[1.268]	[0.077]	[0.501]	[0.153]	[0.018]	[0.362]	[0.013]	[0.094]	[0.048]
Distance	0.003	1.822	-0.002	-0.494*	-0.049	0.009	0.672	0.024*	-0.151	-0.019
	[0.053]	[1.337]	[0.048]	[0.281]	[0.164]	[0.009]	[0.469]	[0.013]	[0.142]	[0.044]
Observations	79	79	79	79	79	1,734	1,734	1,734	1,734	1,734
R^2	0.049	0.249	0.034	0.366	0.265	0.003	0.016	0.007	0.378	0.080
P-value (F-test)	0.86	0.02	0.67	0.26	0.34	0.53	0.19	0.12	0.72	0.86
Mean of Dependent Variable	0.24	35.25	0.81	4.47	2.55	0.42	34.82	0.77	4.95	2.33

Notes: Standard errors are clustered by village. Also includes age and age squared, a simulated average distance to the VCT tent,and district fixed effects.

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix D: Pooled Sample - Attrition, First Stage, and Balance

	Measuring Retention (Appendix A)	First Stage (Appendix B)		Balancing Statistics (Appendix C)				
Dependent Variable:	In the 2006 Analytic Sample	Got Results	Got Results * HIV Positive	Male	Age	Married	Yrs Educ	Log Expen
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Any Incentive	0.018	0.337***	-0.001	-0.013	1.743*	-0.009	-0.147	-0.007
	[0.025]	[0.029]	[0.002]	[0.037]	[0.909]	[0.031]	[0.195]	[0.121]
Amount of Incentive	0.008	0.088***	0.000	0.016	-0.417	-0.015	0.062	0.031
	[0.013]	[0.013]	[0.000]	[0.018]	[0.363]	[0.013]	[0.094]	[0.049]
Distance	-0.013	-0.027**	-0.000	0.008	0.731	0.023*	-0.178	-0.019
	[0.015]	[0.011]	[0.002]	[0.008]	[0.465]	[0.013]	[0.140]	[0.044]
Any Incentive * HIV Positive	-0.246**	-0.093	0.278*	-0.009	1.005	0.174	-0.360	0.108
	[0.100]	[0.155]	[0.155]	[0.125]	[3.458]	[0.126]	[0.910]	[0.444]
Amount of Incentive * HIV Positive	0.052	0.024	0.108	-0.001	-3.058**	-0.053	0.564	-0.309*
	[0.048]	[0.063]	[0.065]	[0.056]	[1.246]	[0.070]	[0.503]	[0.158]
Distance * HIV Positive	-0.029	-0.080*	-0.098**	-0.000	-0.199	-0.011	0.168	-0.063
	[0.030]	[0.047]	[0.046]	[0.041]	[1.150]	[0.033]	[0.296]	[0.139]
HIV Positive	-0.034	0.135	0.538***	-0.164	3.064	-0.011	-0.712	0.615
	[0.084]	[0.110]	[0.121]	[0.109]	[2.573]	[0.095]	[0.694]	[0.449]
Observations	2,829	1,813	1,813	1,813	1,813	1,813	1,813	1,813
R-squared	0.069	0.242	0.740	0.010	0.017	0.008	0.376	0.088
P-value (F-test of joint significance)	0.03	--	--	0.54	0.14	0.11	0.60	0.87
F-statistic	--	69.67	4.16	--	--	--	--	--
Mean of Dependent Variable	0.64	0.73	0.03	0.41	34.84	0.77	4.93	2.34

Notes: Coefficients are from OLS regressions with robust standard errors in brackets. Standard errors are clustered by village. All columns also include age and age squared, a simulated average distance to the VCT tent, a gender dummy, and district fixed effects. Columns 2 and 3 include controls for years of education, logged total expenditures, and an indicator of being married.

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix E: Average Belief of Likelihood of Current Infection After VCT

	Full Sample				Follow-up Sample				Full Sample			
	2-6 Months after VCT, 2005 Follow-up Survey				2 Years after VCT, 2006 Follow-up Survey				2 Years after VCT, 2006 Follow-up Survey			
	IV		IV Ordered Probit		IV		IV Ordered Probit		IV		IV Ordered Probit	
Dependent Variable:	No Likelihood		Likelihood (1-3)		No Likelihood		Likelihood (1-3)		No Likelihood		Likelihood (1-3)	
	DKs = Some Likelihood	DKs = Missing	DKs = Some Likelihood	DKs = Missing	DKs = Some Likelihood	DKs = Missing	DKs = Some Likelihood	DKs = Missing	DKs = Some Likelihood	DKs = Missing	DKs = Some Likelihood	DKs = Missing
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Got Results	0.304***	0.086	0.263***	0.050	0.014	0.009	0.001	-0.003	-0.091**	-0.096**	-0.103**	-0.107**
	[0.054]	[0.065]	[0.071]	[0.068]	[0.053]	[0.052]	[0.056]	[0.055]	[0.044]	[0.044]	[0.043]	[0.042]
Got Results * HIV Positive	-0.860**	-0.929**	-0.770***	-0.884***	0.130	0.140	-0.147	-0.135	0.141	0.145	0.021	0.023
	[0.332]	[0.412]	[0.102]	[0.144]	[0.300]	[0.300]	[0.297]	[0.290]	[0.227]	[0.226]	[0.202]	[0.196]
HIV Positive	0.359	0.358	0.172	0.091	-0.337	-0.349	-0.162	-0.171	-0.413**	-0.421**	-0.341**	-0.346***
	[0.242]	[0.284]	[0.120]	[0.059]	[0.230]	[0.228]	[0.192]	[0.189]	[0.164]	[0.164]	[0.148]	[0.147]
Observations	1,098	924	1098	924	1,098	1,091	1098	1091	1,813	1,802	1813	1802
R-squared	0.182	0.017	--	--	0.054	0.054	--	--	0.039	0.039	--	--
F-test (Got + Got*HIV Positive = 0)	0.11	0.05	0.15	0.12	0.83	0.83	0.60	0.61	0.83	0.83	0.68	0.68
Mean of Dependent Variable	0.76	0.90	1.26	1.12	0.71	0.72	1.39	1.39	0.72	0.72	1.40	1.40

Notes: Each column represents an IV regression where "Got Results" and "Got Results* HIV Positive" are instrumented with having any incentive, the amount of the incentive, distance from the HIV results center, as well as each of these interacted by HIV Positive. Standard errors are clustered by village. Also includes age and age squared, a simulated average distance to the VCT tent, a gender dummy, log expenditures at baseline, years of education, a dummy for being married, and district fixed effects. Columsn 3,4, 7, 8, 11, and 12 present IV ordered probits where "don't know" responses are coded as either some likelihood or are missing values, as indicated above. Coefficients are marginal effects reported as the probility of believing there is no likelihood of infection. Robust standard errors in brackets.

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix F: Impact of Learning HIV Results among Pooled Sample of HIV Positives and HIV Negatives

					Log expenditures			Hours working	
Dependent Variable:	Any Savings	Log Savings	Work in past 6 months	Log Income	Medicine (Self)	Children	Farm	Cash Labor	Agri-culture
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Got Results	0.025	0.218	-0.047	0.121	0.103	0.040	0.089	0.671**	-0.339
	[0.050]	[0.191]	[0.046]	[0.194]	[0.076]	[0.174]	[0.177]	[0.279]	[0.411]
Got Results * HIV Positive	-0.435***	-1.859***	-0.088	-0.356	-0.302	0.497	-0.340	-0.140	-0.061
	[0.160]	[0.691]	[0.177]	[0.775]	[0.482]	[0.535]	[0.756]	[1.409]	[1.605]
HIV Positive	0.294**	1.362**	0.029	0.464	0.410	-0.114	0.215	0.330	-0.194
	[0.134]	[0.572]	[0.126]	[0.539]	[0.348]	[0.399]	[0.566]	[0.953]	[1.260]
Observations	1,813	1,813	1,813	1,813	1,813	1,813	1,813	1,813	1,813
R-squared	0.044	0.067	0.101	0.108	0.036	0.190	0.094	0.175	0.160
F-test (Got+ Got*HIV Positive = 0)	0.02	0.03	0.46	0.75	0.69	0.31	0.74	0.69	0.79
Mean of Dependent Variable	0.23	0.87	0.86	3.67	0.38	1.95	1.24	1.32	2.77

Notes: Each column represents an IV regression where "Got Results" and "Got Results * HIV Positive" are instrumented with having any incentive, the amount of the incentive, distance from the HIV results center, and each of these interacted with HIV Positive. Standard errors are clustered by village. Also includes age and age squared, a simulated average distance to the VCT tent, a gender dummy, log expenditures at baseline, years of education, a dummy for being married, and district fixed effects. Robust standard errors in brackets.

* significant at 10%; ** significant at 5%; *** significant at 1%