AN ANALYSIS OF HELB SOCIO-ECONOMIC STATUS CRITERIA ON LOAN AWARDS TO SELF-SPONSORED STUDENTS IN PUBLIC UNIVERSITIES IN KENYA

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ABSTRACT

Studies done in Kenya have faulted the higher education loan scheme on accounts that it disproportionately favours the children of well-to-do families. However, these studies to a larger extent were limited to government sponsored students despite the fact that there has been a growing number of students seeking enrolment into self-sponsored programmes (SSPs) as well as HELB funding. This paper provides empirical evidence on equity in financing self-sponsored students in Kenyan public universities using students loaning scheme. The study targeted 16,082 fourth year self-sponsored loan recipients in seven public universities before the enactment of the University Bill 2012. A sample of 536 loan recipients was drawn to provide data for the study. The results of the multiple regression analysis after controlling for all the variables in the model indicate a recipient's SES was significant in explaining the variations in the amount of loan awarded to self-sponsored recipients. This is a good indication that HELB loan allocations to self-sponsored students in public universities in Kenya are equitable.

Key Words: Higher Education, Loan Allocation, Higher Education, Socio-Economic Status, Self-Sponsored Students, Equity.

INTRODUCTION

Higher Education (HE) has received global recognition and it is expected not only to spur economic prosperity in increasingly knowledge driven economies, but also to enhance healthy democracies and civil societies (Pundy, 2010). In addition, HE is expected to enable individuals achieve intellectual fulfilment that enhance greater job opportunities and productivity. HE is also becoming more expensive due to increasing costs and surging enrolments'. However, HE is selective, depending on academic achievement and financial ability—all of which in virtually all societies are unequally distributed (David, 2011). The result is that HE everywhere tends to be accessible disproportionately based on factors such as socio-economic status (SES) (Mlama, 1997; Sabine & Johnstone, 2009; Kasozi, 2009; David, 2011).

In Sub-Saharan Africa (SSA) specifically, access to and equity in HE has continued to be elusive in most countries. This inequity has largely been attributed to SES (Wen, 2005; Song, 2007; Andrea & Sue, 2008; Sabine & Johnstone, 2009). Available statistics indicate that in many SSA countries, participation in HE is dominated by students from the highest income quintiles

(Kasozi, 2009; David, 2011; Boit, 1998; 2012). Studies done in Kenya (Boit, 1998; Owino, 2003; Otieno, 2004; Odebero, 2007), have also demonstrated that enrolment in HE is mainly influenced by socio-economic status. However, the situation has further been complicated by the introduction of cost sharing in HE where students are expected to meet part of the cost and the liberalization of HE where self-sponsored students (SSS) meet full program costs and living expenses.

While it is expected that self-sponsored programmes (SSP) may largely widen access, the programmes may as well widen the social gaps in access to higher education. This has been demonstrated by a number of studies done in East Africa. For example, Mayanja's (2009) study at Makerere University shows that SSP in Uganda are dominated by students from the rich and higher SES families. A study by the University of Dar es Salaam (2009) indicate that majority of participants in SSP in Tanzania have businessmen and women as their parents or guardians. In Kenya, Otieno (2004) study indicate that 78.3 per cent of student enrolment in HE are from high income/high middle income and middle income families, with a paltry 21.7 per cent from low income families. Therefore, as much as SSPs have been credited for increasing access to HE in Kenya (Munavu et al., 2008) in addition to aiding placement of students to preferred programmes so long as they are able to pay (Nganga et al., 2010); SSPs may not only largely widen access but also significantly contribute to social gaps in access to HE due to inability to pay especially by lower socio-economic groups.

Realizing this danger, the Kenyan government decided to finance SSS in 2008 through Higher Education Loans Board (HELB) in order to equalize opportunities by removing socio-economic barriers for students from disadvantaged groups in accessing HE through SSP (Cheboi, 2008). However, it has been observed that where funding mechanisms exists to cushion students of low SES access HE, such funding mechanisms have on the contrary exacerbated inequalities by providing free HE to students who invariably come from the wealthiest households (Wen, 2005; Andrea and Sue, 2008; Pundy, 2010; David, 2011). For example, studies done in Kenya on HELB (Owino, 2003; Otieno, 2004; Odebero, 2007) have faulted the higher education loan scheme on accounts that it disproportionately favours the children of well-to-do families. However, these studies to a larger extent were limited to government sponsored students despite the fact that there has been a growing number of students seeking enrolment into self-sponsored programmes (SSPs) as well as HELB funding. Since access to SSPs is highly dependent on the ability to meet the unit cost, empirical data on HELB funding SSS is necessary. The practice currently is that HELB considers funding students who have secured admission and have at least enrolled for a self-sponsored program. The main challenge is that students who may enrol are those who can afford the initial cost of self-sponsored programmes hence are the ones who are more likely to secure HELB loans. This makes it important to evaluate the effect of loan recipient's SES on the amount of loan awarded to self-sponsored loan recipients. This paper provides empirical evidence on equity in financing self-sponsored students in Kenyan public universities using students loaning scheme**.**

METHODOLOGY

The paper utilizes stratified and simple random sampling techniques to draw a sample of 536 from 16,082 fourth year self-sponsored higher education loan recipients in the seven public universities in Kenya namely; Nairobi, Moi, Kenyatta, Egerton, JKUAT, Maseno and Masinde Muliro before the enactment of the University Bill 2012. The study modified the 2008-09 Kenya Demographic and Health Survey (KDHS) questionnaire to reflect the relevant issues of the study so as to collect data on recipients SES using their asset ownership and sanitation data and the amount of loan allocation for four academic years (2010/11-2013/14). Face and content analysis was used to validate the questionnaire while the test-retest technique was used to test its reliability. The obtained (r) coefficient of 0.85 was large enough to surpass the set threshold of $r = 0.7$.

To construct the SES quintiles of self-sponsored loan recipients the paper utilises Principal Component Analysis (PCA) (Seema & Lilani, 2006; Booysen et al., 2008; Howe et al., 2008). PCA was applied to the socio-economic data of self-sponsored loan recipients to obtain weights and principal components using the principal factor/axis method (PROC FACTOR). The results in the first principal component explaining the most variability were used to develop the loan recipient's socio-economic index (Cortinovis et al., 1993; Filmer & Pritchett, 2001; Howe et al., 2008 and Booysen et al., 2008). Each household asset and housing and sanitation variable was assigned a score generated through the PCA. The resulting household asset and housing and sanitation scores were standardized in relation to a standard normal distribution with a mean of zero and a standard deviation of one. The SES quintiles (Lowest SES, Low SES, Middle SES, High SES and Highest SES) constitute the explanatory variable. The results of the PCA are presented in Table 2 in Appendix 1.

The paper also utilises information obtained from the self-sponsored loan recipients' on the amount of HELB loan awarded in academic years 2010/11–2013/14 to determine the initial and overall loan amount awards. The overall loan allocation is the outcome variable and measured on an interval scale. In addition, the paper utilises data on loan recipient characteristics (gender, university enrolled, program of study, recipients' parental status) and number of times loan is awarded. The loan recipient characteristics and number of times loan is awarded are control variables. The descriptive statistics for the explanatory, outcome and control variables are presented in Table 3 in Appendix 2.

Therefore, this paper utilises data on; loan recipients SES quintiles, recipients' loan amounts, recipient's characteristics and number of times loan is awarded to test the null hypothesis that a loan recipients SES has no statistically significant effect on the amount of higher education loan awarded to a self-sponsored students in public universities in Kenya using Multiple Linear Regression Analysis (MLRA). Linear regression modelling is appropriate for modelling outcome variables that are measured on the interval or ratio scale such as HELB loan awards. Since the overall HELB loan allocation to applicants is not just based on SES, it was appropriate to employ MLR which models the outcome variable as a function of multiple explanatory variables. To establish which variables to pursue in the regression model we run a pair-wise correlation between the outcome variable and its covariates. The results are presented in Table 4 in Appendix 3.

RESULTS AND DISCUSSION

It is expected that a variety of variables account for variations in the amount of loan awarded to self-sponsored loan recipients in public universities in Kenya. Therefore, the paper models the amount of loan awards to self-sponsored students as a function of recipient's SES and recipient's characteristics. In model 1, we assess the effect of a recipient's SES and loan recipient characteristics on the overall HELB loan awarded while controlling for the number of times a recipient was awarded a loan. In model 2 we assess the effect of the recipient's SES, recipient's characteristics and the number of times a recipient was awarded a loan on the overall HELB loan awarded. In the model, the positive sign of the coefficient indicates increased amount of loan award to a loan recipient while the negative sign indicates decreased amount of loan awards to a recipient. The value of the coefficient indicates the amount of loan award to a recipient. The significance of the relationship between a given explanatory variable and the outcome variable is tested at $p=0.05$. The results of the multiple linear regression are presented in Table 1.

Table 1: The Effect of Recipient's SES on Overall Loan Allocation as Measured by Multiple Linear Regression Coefficients

Variable	Variable label	Model 1 (m415)	Model 2 (m415)
		Coefficient	Coefficient
pcases5	Socio-economic status		
	Lowest SES quintile (Ref.)		
	Low SES quintile	-15823.9* (-6423.8)	-10144.4* (-3944.6)
	Middle SES quintile	-11785.9† (-6528.3)	-12449.1** (-4124.9)
	High SES quintile	-11128† (-6110.8)	-15390.1*** (-4218.3)
	Highest SES quintile	-8537.1 (-6544.1)	-10089.2* (-4279.6)
m311	Loan recipient's both parents are alive	-2794.7 (-7911.8)	-5963.2 (-5005.7)
m314	Loan recipient's both parent are dead	-16335.3 (-29234.6)	-6476.2 (-19066.3)
m315	Loan recipient's parents are divorced	10545.7 (-11696.7)	364.8 (-8874.1)
m32	Loan recipient's father is alive	-11894.6 (-10806)	-5988.6 (-7713.8)
m331	Loan recipient's father did not attend	11434.1† (-6921.6)	9519.8* (-4686.1)

	school		
m34	Loan recipient's mother is alive	-10142.7 (-8856.1)	-12762.1* (-5538.3)
m381	Guardian is responsible for loan recipient's university education	11293.9 (-10206.8)	11748.4† (-6502.7)
m513	Loan recipient attended government primary school	-9521.0* (-4413.8)	-6672.8* (-2718.7)
m531	Loan recipient's university is Moi	8211.2 (-7057.5)	9160.2* (-4248.4)
m532	Loan recipient's university is Nairobi	-1289.9 (-6879.6)	705.6 (-4077.6)
m541	Loan recipient's field of study is arts	3379.5 (-4991.1)	4593 (-3159.5)
m546	Loan recipient's field of study is information technology	-5440.9 (-6046)	-2979.5 (-3786.7)
m5528	Loan recipient's County is Nakuru	12845.9 (-9370.8)	6654.7 (-6031.4)
m5529	Loan recipient's County is Nandi	-11284.7 (-8058.4)	-3697.4 (-4016.9)
m558	Loan recipient's County is Kakamega	15605.2** (-4910.7)	1995.1 (-3991)
m576	Loan recipient's KCSE grade is less than A⁻	-5586.9 (-5311.7)	-817.4 (-3378.4)
m416	Number of times recipient got loan allocation		39249.9*** (-1267.7)
Constant		182257.8***(14233.1)	39124.1*** (-9643.7)
N		383	383
F-statistic		$(F(20, 362)=3.06^{***})$	$(F(21, 361)=53.02^{***})$
R^2		0.131	0.661
Adjusted R^2		0.083	0.641
Root Mean Squared Error (RMSE)		36989.4	23152.3

Note. Robust standard errors in parentheses; RMSE=Standard deviation of the regression model (the closer to zero better the fit); †$p<.10$ *$p<.05$, **$p<.01$, ***$p<.001$

Source: Stata output

The results of the multiple linear regression (MLR) in Table 1 show that the constant of regression is significant for both model 1 and 2 at p<0.05, p<0.01 and p<0.001; an indication that the model captured all the pertinent variables that explained the variations in the overall amount of loan awards to self-sponsored students in public universities in Kenya. The F-statistic (F (20, 362) =3.06, p=<0.001) and (F (21, 361) =53.02, p=<0.001) for model 1 and 2 respectively indicate that the R2 for the two models are significantly different from zero at p=0.05. This imply that all the coefficients in the model are significantly different from zero and are important in explaining the variation in the overall amount of loan awards to the self-sponsored loan recipients in public universities in Kenya.

The MLR results in model 1 indicate that low SES in reference to lowest SES is statistically significant in explaining the variations in overall loan amount awarded at p<0.05. The results further indicate that loan recipient's County was Kakamega and loan recipient attended government primary school predicted increased and reduced loan awards to recipients respectively. In model 2, the results indicate the variables; loan recipient's SES, loan recipient's father did not attend school, loan recipient's mother was alive, loan recipient's university was Moi, loan recipient attended government primary school and the number of times a recipient is awarded loan are statistically significant in explaining the variations in the overall amount of loan awarded to self-sponsored loan recipients at *p*=0.05.

The results in model 2 indicate a recipient in the low SES quintile; middle SES quintile, high SES quintile and highest SES quintile are predicted to get Ksh 10,144.4, 12,449.1, 15,390.1 and 10,089.2 respectively less than what a recipient from the lowest SES quintile would get over the four years. The results suggest that the variations in the overall loan awards to self-sponsored loan recipients are explained by the recipient's SES. Further, the results in model 2 indicate that in reference to a recipient in the lowest SES quintile, a recipient in the low SES quintile would get higher amount of overall loan award compared to a recipient in the middle or higher SES quintile. Similarly, a recipient in middle SES quintile would get a higher amount of overall loan amount than a recipient in the high SES quintile. The results imply that the beneficiaries of the highest amount of overall loan awards are self-sponsored loan recipients in the lowest SES followed by those in the low, middle and high SES respectively. The results therefore imply that HELB loans target needy self-sponsored students. In addition, the results imply that HELB loan amounts to self-sponsored students are differentiated based on their level of need. This indicates that HELB loans to self-sponsored students are equitable. If loan allocations were not equitable the differences in loan allocations to the SES quintiles would not been seen (Mingat & Tan, 1985).

Other than recipient's SES, the results of MLR in model 2 indicate that the variables; if a loan recipient's father did not attend school, if a loan recipient's university is Moi and the number of times a recipient got loan allocation predicted increased overall loan awards of Ksh 9,519.8; 9,160.2 and 39,249.9 respectively for such loan recipients. Similarly, the variables; if a loan recipient's mother is alive and if a loan recipient attended government primary school predicted reduced overall loan awards of Ksh 12,762.1 and 6, 672.8 respectively for such loan recipients. In addition, the results in model 2 indicate that the number of times a recipient is awarded loan

explained the greatest variation (55.8%) in the overall loan award to the recipients. The results suggest that after the initial amount of loan award to a self-sponsored loan recipient based on their SES, it is the number of times the loan is awarded that accounts for most of the variation in the overall loan award to self-sponsored loan recipients in public universities in Kenya. This imply that the neediest continued to accumulate higher total amounts of loan awards over the years than any other recipient in the other SES quintiles would so long as they applied for HELB loans in the subsequent academic years. Rarely is the subsequent amount reduced by HELB once awarded. However, the amount could be reviewed upward if the socio-economic status of the loan recipient changed negatively.

This paper tested the overall effect of the individual proxies of loan recipients SES quintiles (Highest SES, high SES, middle SES, low SES and lowest SES) on the amount of higher education loan awarded to self-sponsored students in public universities in Kenya. The results of the Highest SES, high SES, middle SES and low SES (F (1, 361) =6.61, p =0.0105; F (1, 361) = 9.11, p =0.0027; F (1, 361) =13.31, p =0.0003; and F (1, 361) =5.56, p =0.0189) respectively indicate that a loan recipients SES statistically significant in explaining variations in the amount of HELB loan awards to self-sponsored students in public universities in Kenya. This paper therefore reject the null hypothesis that a loan recipients SES has no statistically significant effect on the amount of higher education loan awarded to a self-sponsored students in public universities in Kenya. Indeed, the empirical results of the Multiple Linear Regression indicate that loan awards to self-sponsored students are differentiated based on a recipient SES hence equitable.

These results correlate the results of a study by Owino (2003) whose results of the logistic estimation indicate that family status was significant in explaining the variations in the amount of loan and/or bursary awards to recipients. Similarly, the results match those of Odebero (2007). Odebero's multiple comparisons results in the year 2001-2004 and composite year 1-4 showed a statistically significant difference in loan allocation by students socio-economic status to be in favour of Low SES ($p<0.05$). However, no significant differences existed in the means between the medium SES and the high SES for all the years studied ($p>0.05$).

Surprisingly, the results significantly differ from those of Wachiye (2009) which revealed that only 23.6% of the loan recipients in Bungoma district were from the low socio economic status, an indication that HELB allocations to a larger extent were inequitably in favour of recipients of medium and high socio-economic backgrounds. The difference may be attributed to the categorization of loan recipients in SES groups, sample size and type of respondents. Unlike Wachiye's, where SES groups were assigned values, this paper utilises PCA to establish the SES of loan recipients. PCA has been widely used to categorise individuals into SES groups (McKenzie, 2003; Seema & Lilani, 2006). Besides, the paper used a wide sample of self-sponsored loan recipients in the whole republic of Kenya while Wachiye had a small sample and studied only government sponsored loan recipients in Bungoma district. Similarly, the results of this study differ with suggestions by Mohamad (2007); and Salmi and Hauptman (2006) that loan schemes aimed at assisting the disadvantaged students have continuously favoured mostly the non-poor.

The paper therefore models the overall loan allocation to self-sponsored students using model 1 and 2.

Model 1 for testing H_1 is estimated as;

$$Overall\ HELB\ loan\ awarded_{applicant/recipienti}$$
$$= \beta_0 + \beta_{1i}i.\,pcases5_{1i} + \beta_{2i}m311_{2i} + \beta_{3i}m314_{3i} + \beta_{4i}m315_{4i} + \beta_{5i}m32_{5i}$$
$$+ \beta_{6i}m331_{6i} + \beta_{7i}m34_{7i} + \beta_{8i}m381_{8i} + \beta_{9i}m531_{9i} + \beta_{10i}m532_{10i}$$
$$+ \beta_{11i}m541_{11i} + \beta_{12i}m546_{12i} + \beta_{13i}m558_{13i} + \beta_{14i}m5528_{14i}$$
$$+ \beta_{15i}m5529a_{15i} + \beta_{16i}m576_{16i} + \beta_{17i}m513_{17i} + \varepsilon_i$$

with pcases5 as five-level socio-economic status by Principal Components Analysis (PCA) categorical variable where 1=Lowest SES; 2=Low SES; 3=Middle SES; 4=High SES; and 5=Highest SES.

Model 1 predicts that over their course at the university, an applicant would have been awarded Kenya shillings 134, 008.1 from HELB. The raw mean for m415 over the entire course at the university is Kenya shillings 151,522.3 (Table 3, Appendix 2)

Model 2 controlled for the number of times (m416) an applicant is awarded the loan over their course at the university and is estimated as;

$$Overall\ HELB\ loan\ awarded_{applicant/recipienti}$$
$$= \beta_0 + \beta_{1i}i.\,pcases5_{1i} + \beta_{2i}m311_{2i} + \beta_{3i}m314_{3i} + \beta_{4i}m315_{4i} + \beta_{5i}m32_{5i}$$
$$+ \beta_{6i}m331_{6i} + \beta_{7i}m34_{7i} + \beta_{8i}m381_{8i} + \beta_{9i}m531_{9i} + \beta_{10i}m532_{10i}$$
$$+ \beta_{11i}m541_{11i} + \beta_{12i}m546_{12i} + \beta_{13i}m558_{13i} + \beta_{14i}m5528_{14i}$$
$$+ \beta_{15i}m5529a_{15i} + \beta_{16i}m576_{16i} + \beta_{17i}m513_{17i} + \beta_{18i}m416_{18i} + \varepsilon_i$$

The overall HELB loan awarded to an applicant in model 2 is predicted as Kenya Shillings 29,685.53. The adjusted R^2 in model 1 = 0.083 (8.3%) but when m416 is accounted for in model 2, the adjusted R^2 improves to 0.641 (64.1%) meaning that m416 single-handedly accounts for 55.869% of the variation in m415. With m416 accounted for, the final model predicts Kenya Shillings 29,685.53 for a one-time loan award, meaning that if one were to get the loan only once, one would get Kenya Shillings 29,685.53 from HELB. But as an individual variable, m416 predicts that a subsequent loan award accounts for an extra Kenya Shillings 39,249.89 in the overall amount at a given point in time. This figure is very close to the model 2 Constant (intercept) which is Kenya Shillings 39,124.05, again suggesting the large effect of m416 in the final model. Of the 485 cases in the sample, only four (4) got the loan once, 60 got it twice, 85 got it thrice and 336 got it four times. (Table 3, Appendix 2)

This paper also ran a model diagnostic to establish whether the regression model included all the variables and excluded irrelevant variables. The study used Kernel density to establish how the variables included in the regression were normally distributed. The results of the Kernel density estimate in Figure 1 in Appendix 4 show that the curve for the variables fitted well on the normal curve. The results suggested that the variables are normally distributed. Further, the results of the

linktest (p=0.150) for hatsq in Table 5 in Appendix 5 show that the regression model is correctly specified. In addition, the results of multicollinearity using variance inflation factor (VIF) test in Table 6 in Appendix 6 indicate that no variable in the regression model has a VIF>10. With a mean VIF of 1.57, the results suggest that the regression model did not experience collinearity problems (Stock and Watson, 2003).

CONCLUSION

The empirical evidence provided in this paper casts doubt on the assumptions made by many stakeholders that HELB loans are inequitable. For example, Koigi (2006) argues that HELB loans are inequitably disbursed and that students from richer families get higher loan allocations. The empirical results in the paper indicate that HELB allocations targets the neediest (lowest SES) who have the highest amount of loan wards. This imply that HELB awards to self-sponsored students may be addressing disparities that exist in access to higher education in favour of students from affluent backgrounds through self-sponsored programs.

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Appendices

Appendix 1

Table 2: Results from Principal Component Analysis

Variable label and name	Mean Proportion	Standard Deviation	Factor Score	Variable label and name	Mean Proportion	Standard Deviation	Factor Score
m11 Household owns electric kettle	0.36	0.48	0.11	m23 Household wall type:			
m12 Household owns video machine	0.27	0.45	0.08	1=Stone/coral block/cement block/burnt	0.58	0.49	0.47
m13 Household owns refrigerator	0.23	0.42	0.15	2=Mud bricks	0.25	0.43	0.04
m14 Household owns wall clock	0.64	0.48	0.17	3=Mud and stick	0.13	0.33	-0.71
m15 Household owns sofa set	0.68	0.47	0.17	6=Other	0.04	0.20	0.07
m16 Household owns a wooden bed	0.91	0.29	0.01	m24 Household roof type:			
m17 Household owns an electric iron	0.61	0.49	0.31	1=Tiles/concrete/cement	0.20	0.40	0.30
m18 Household owns a foam mattress	0.84	0.36	0.09	2=Galvanized iron/asbestos	0.69	0.46	0.15
m19 Household owns a radio player	0.57	0.50	0.09	3=Bamboo/wood/mud/grass	0.08	0.28	-0.56
m110 Household owns a radio player	0.42	0.49	-0.17	6=Other	0.03	0.17	-0.15
m111 Household owns a water pump	0.20	0.40	0.04	m25 Number of rooms used for sleeping: 1	0.16	0.37	-0.04
m112 Household owns a colour television	0.62	0.48	0.21	2	0.33	0.47	-0.01
m113 Household owns a washing machine	0.18	0.39	0.04	3	0.28	0.45	-0.01
m114 Household owns a mosquito net	0.80	0.40	0.03	4	0.21	0.41	0.07
m115 Household owns a satellite dish	0.19	0.39	0.12	m26 Household main source of drinking water:			
m116 Household owns a sewing machine	0.15	0.36	0.03	1=Piped into residence	0.39	0.49	0.50
m117 Household owns a motor bike	0.21	0.40	0.08	2=Rain water	0.11	0.31	0.01
m118 Household owns land	0.57	0.50	-0.06	3=Public tap	0.19	0.40	0.07
m119 Household owns a car	0.26	0.44	0.13	4=Vendor	0.04	0.20	-0.11
m120 Household owns a fan	0.17	0.38	0.08	5=River/canal/spring	0.20	0.40	-0.56
m121 Household owns poultry	0.54	0.50	-0.09	6=Other	0.06	0.23	-0.11
m122 Household owns a wardrobe	0.42	0.49	0.18	m27 Household main toilet facility:			
m123 Household owns livestock	0.52	0.50	-0.08	1=Private flush	0.24	0.43	0.46
m124 Household owns a bicycle	0.47	0.50	-0.05	2=Shared flush	0.12	0.32	0.07
m21 Household pays rent for house	0.33	0.47	0.26	3=Own pit latrine	0.50	0.50	-0.28
m22 Household floor type: 1=Earth floor	0.22	0.41	-0.70	4=Shared pit latrine	0.14	0.35	-0.23
2=Wooden floor	0.08	0.28	0.01	m28 Household main source of cooking energy:			
3=Tiled floor	0.24	0.43	0.32	1=Electricity/gas/solar	0.25	0.43	0.36
4=Cemented floor	0.42	0.49	0.28	2=Biogas/kerosene/charcoal	0.40	0.49	0.39
6=Other	0.04	0.19	0.05	3=Firewood	0.34	0.48	-0.72

Source: Stata Output

Appendix 2

Table 3: Description of the Variables used in the Analysis of Data

| Table 3: Description of the Variables used in the Analysis of Data			
Variable	Variable label	Variable scale	Variable values
m311	Loan recipient's both parents are alive	Dummy	0=No; 1=Yes
m313	Loan recipient's one parent is dead	Dummy	0=No; 1=Yes
m315	Loan recipient's parents are divorced	Dummy	0=No; 1=Yes
m32	Loan recipient's father is alive	Dummy	0=No; 1=Yes
m331	Loan recipient's father did not attend school	Dummy	0=No; 1=Yes
m34	Loan recipient's mother is alive	Dummy	0=No; 1=Yes
m381	Guardian is responsible for loan recipient's university education	Dummy	0=No; 1=Yes
m416	Number of times recipient got loan allocation	Interval	1-4
			Once=4
			Twice=60
			Thrice=85
			Four time=336
m513	Loan recipient attended government primary school	Dummy	0=Privates 1=Government
m531	Loan recipient's university is Moi	Dummy	0=No; 1=Yes
m532	Loan recipient's university is Nairobi	Dummy	0=No; 1=Yes
m541	Loan recipient's field of study is arts	Dummy	0=No; 1=Yes
m546	Loan recipient's field of study is information technology	Dummy	0=No; 1=Yes
m5528	Loan recipient's County is Nakuru	Dummy	0=No; 1=Yes
m5529	Loan recipient's County is Nandi	Dummy	0=No; 1=Yes
m558	Loan recipient's County is Kakamega	Dummy	0=No; 1=Yes
m576	Loan recipient's KCSE grade is less than A minus	Dummy	0=No; 1=Yes
m84	Recipient's initial loan allocation	Interval	35000-60000
m415	Recipient overall loan allocation	Interval	35000-240000
			Mean=151522.3
pcases5	Socio-economic status by Principal Components Analysis	Categorical	1=Lowest SES; 2=Low SES; 3=Middle SES; 4=High SES; 5=Highest SES

Source: Field Data

Appendix 3

Table 4: Correlation Matrix between m415 and Control Variables

Variable		m415	m311	m314	m315	m32	m331	m34
m415		1						
m311	a	-0.1923	1					
	b	<0.001						
m314	a	0.1163	-0.3478	1				
	b	0.0103	<0.001					
m315	a	0.0959	-0.2120	-0.0416	1			
	b	0.0348	<0.001	0.3604				
m32	a	-0.1521	0.7078	-0.4288	0.058	1		
	b	0.0008	<0.001	<0.001	0.2032			
m331	a	0.1013	-0.1734	-0.0369	-0.003	-0.1372	1	
	b	0.0443	0.0005	0.4641	0.952	0.0064		
m34	a	-0.1395	0.4122	-0.5643	-0.0101	0.2302	-0.0824	1
	b	0.0021	<0.001	<0.001	0.824	<0.001	0.1019	
m381	a	0.1104	-0.2259	0.3973	-0.0178	-0.3019	0.1211	-0.2464
	b	0.015	<0.001	<0.001	0.6958	<0.001	0.016	<0.001
m531	a	0.1853	-0.0959	0.0836	0.0518	-0.0019	-0.0102	-0.0999
	b	<0.001	0.0348	0.066	0.2549	0.9672	0.8397	0.0278
m532	a	-0.1882	0.1172	-0.0445	-0.0177	0.0394	0.023	0.0711
	b	<0.001	0.0098	0.3278	0.6973	0.3873	0.6492	0.1178
m541	a	0.1546	-0.1815	0.0374	0.057	-0.1218	0.0437	-0.0644
	b	0.0006	0.0001	0.411	0.2103	0.0074	0.3868	0.1567
m546	a	-0.1064	0.0643	-0.0463	-0.0471	-0.0172	0.029	0.0136
	b	0.0191	0.1574	0.3092	0.3006	0.7062	0.5656	0.7657
m558	a	0.0934	0.0323	-0.0873	-0.0517	-0.023	-0.0194	0.1374
	b	0.0422	0.483	0.0577	0.2609	0.6176	0.7046	0.0027
m5528	a	0.0908	-0.0314	-0.0139	0.1030	0.0017	0.0176	-0.0581
	b	0.0482	0.4954	0.7635	0.0249	0.9701	0.7303	0.2065
m5529	a	-0.0961	0.1132	-0.0115	-0.0324	0.0941	-0.0352	0.026
	b	0.0364	0.0137	0.8035	0.4823	0.0409	0.4918	0.572
m576	a	-0.1031	0.1280	-0.0521	0.0163	0.0608	-0.1095	0.0908
	b	0.0232	0.0047	0.2524	0.7197	0.1825	0.0295	0.0457
m513	a	-0.1251	0.0617	-0.0186	-0.0892	0.0243	0.0292	-0.0065
	b	0.0058	0.175	0.6834	0.0495	0.5936	0.5625	0.8869

Note: a=Pearson correlation coefficient; b=p-values (α=0.05); Pair-wise correlation: Source: Stata Output
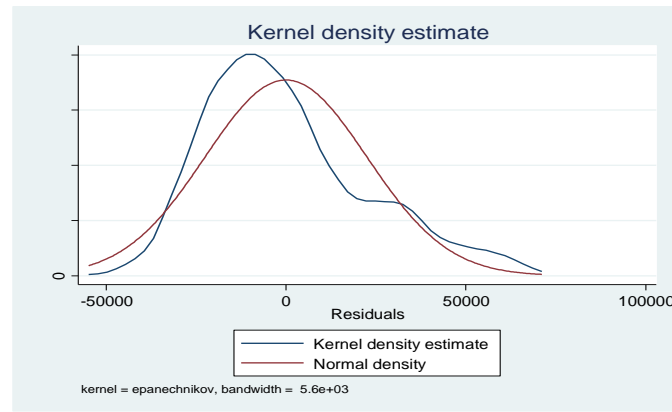
Figure 1: Kernel Density Estimate for the Regression Model for Overall Loan Allocation

Source: Stata Output

Appendix 5

Table 5: Test of whether the Regression Model for Objective i for Overall Loan Allocation is Mis specified

Variable	Coef.	Std. Err.	t	P>t	[95% CI]	
hat	0.4846813	0.2641803	1.83	0.167	-0.0347571	1.00412
hatsq	0.00000197	0.000001	1.97	0.150	0.00	0.00000394
Constant	31039.66	16723.25	1.86	0.164	-1842.024	63921.35

Note. n=349; Coef.=Coefficient; Std. Err=Standard Error; CI=Confidence Interval; R^2=0.2236; Adjusted R^2=0.2191; Root Mean Squared Error=6299.4

Source: Stata Output

Appendix 6

Table 6: Multicollinearity Test for the Independent Variables in the Regression Model for Overall Amount

Variable	Variable label	VIF	1/VIF
m532	Loan recipient's university is Nairobi	3.37	0.296299
m531	Loan recipient's university is Moi	3.36	0.297532
m311	Loan recipient's both parents are alive	2.18	0.459309
_Ipcases5_5	5=Highest SES quintile	1.89	0.529089
_Ipcases5_4	4=High SES quintile	1.87	0.533505
m32	Loan recipient's father is alive	1.79	0.557568
_Ipcases5_3	3=Middle SES quintile	1.78	0.561642
_Ipcases5_2	2=Low SES quintile	1.78	0.562701
m34	Loan recipient's mother is alive	1.43	0.700454
m314	Loan recipient's both parent are dead	1.33	0.752002
m315	Loan recipient's parents are divorced	1.22	0.819057
m513	Loan recipient attended government primary school	1.18	0.847823
m541	Loan recipient's field of study is arts	1.14	0.880943
m576	Loan recipient's KCSE grade is less than A-	1.13	0.884875
m381	Guardian is responsible for loan recipient's university education	1.12	0.896634
m558	Loan recipient's county is Kakamega	1.1	0.908466
m331	Loan recipient's father did not attend school	1.09	0.920808
m546	Loan recipient's field of study is information technology	1.08	0.925095
m5529	Loan recipient's county is Nandi	1.07	0.934295
m416	Number of times recipient got loan allocation	1.06	0.940415
m5528	Loan recipient's county is Nakuru	1.05	0.951652
	Mean VIF	1.57	

Note. VIF=Variance Inflation Factor; Variables should ideally have VIF<10