FACTORS AFFECTING LOAN REPAYMENT PERFORMANCE OF FLORICULTURE INDUSTRIES TO THE DEVELOPMENT BANK OF ETHIOPIA

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Abstract

This study was carried out to assess factors that influence loan repayment performance of DBE's floriculture borrowers. The study used data collected from individual farm files of fifty four floriculture borrowers of DBE. The study shows that 52% of the borrowers were defaulters, whereas, the remaining 48% were non-defaulters. Probit model was used to identify variables which determine loan repayment performance. Educational status, sustainable floriculture certification status and farming experience of growers were statistically significant factors affecting repayment of floriculture loan of DBE. The analysis of partial marginal effect shows that sustainable floriculture certification is the most important factor among the other three variables. The policy implications of the study are: educating all floriculture growers on the importance of being certified with a multitude of standards in the form of certification schemes, codes of practice and a handful of consumer labels so that they can adopt those standards which best meet customer needs, intensifying supervision work in order to provide information and technical assistance for the established project, and improving customer recruitment system to emphasize on educational status of borrowers and farming experience of project managers deserve special attention. Finally, credit institutions or lending agencies should evaluate the factors that significantly influence loan repayment before granting loans to floriculture farms to reduce loan defaults.

Key Words: *Floriculture growers, Loan repayment, Probit model*

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Introduction

Floriculture is a class of horticulture that deals with the science and practice of cultivating and arranging of ornamental flowering plants for aesthetic purpose (Acquaah, 2004). It is the science and practice of growing, harvesting, storing, designing and marketing of ornamental plants. It also involves the intensive production of flowers and ornamental shrubs (Muthoka and Muriithi, 2008). Hence, floricultural plants are classified by the use of cut flowers, potted plants, foliage plants and bedding plants grown in a controlled environment (Barden, Gordon, and Dave, 1987).

The present day flower industry is a dynamic and highly international industry. Significant growth rates have been achieved during the past few decades. Trade is dominated by south-north flows with Europe and North-America housing the world's largest consumer markets, while the producing countries are situated close to the equator. For the past ten years, the leading flower exporting countries have been the Netherlands, Colombia, Kenya, Ecuador and Israel. Since the last few years, Ethiopia has joined this list.
Today, the cut-flower trade is conceived to be an important means of diversifying the export regime, an additional source of export earnings and an employment generation opportunity in Ethiopia.

Currently, more than 120 foreign and local companies are engaged in the cultivation of horticultural export products. The majority of the companies operating in the sector are owned by foreign investors in the form of sole proprietorship or partnerships. Out of the total number of horticulture producers and exporters, about 80% are engaged in the floriculture business, whereas the remaining 20% are involved in the development of vegetables and fruits (EHDA, 2012).

Ethiopia is now the second largest flower exporter in Africa ranking only second to Kenya and fifth in the world after Holland, Colombia, Kenya and Ecuador. With a good mix of incentives and active facilitation, the Government of Ethiopia took a non-existing flower sector and developed it into a USD $212 million export sector with more than 50,000 laborers employed. This was possible because Ethiopia enjoys an inherent comparative and competitive advantage in the production and delivery of flowers. While Ethiopia's agro-climatic and altitudinal diversity provides vast advantages in growing a wide variety of flowers, its location affords fast and cheaper transport and delivery potential. Flowers produced in modern farms around Addis Ababa and in the Rift Valley are exported via Bole International Airport in Addis Ababa (Ibid, 2012).

To enhance the production and export of flowers, the government of Ethiopia has been providing different facilities and efficient services, through various institutions, to the investors. Development Bank of Ethiopia (DBE) has been engaged in providing financial support to development projects within the country for more than a century. Since floriculture business is one of the commercial scale agricultural sub-sectors and the government's priority area, DBE has been providing loan to almost half of floriculture farms operating in the country (DBE, 2013).

However, among DBE financed floriculture farms a number of them delayed the loan repayment schedule.This has an impact on the sustainable provision of credit to the potential investors and existence of the bank as a financial institution. It is therefore, important for the financial institutions to devise means to reduce the level of loan default by studying the factors that influence loan repayment behaviour of floriculture growers.

The sustainability and continuity of the financial institutions to increase the volume of credit to stimulate the poverty reduction goal depends on the repayment rates. High repayment rates allow the institutions to lower the interest rates and processing costs and consequently increase patronage of loans. Repayment performance thus serves as a positive signal for increasing the volume of credit availability to various sectors of the economy (Acquah and Addo, 2011).

According to data obtained from central data base of DBE as of June 30, 2013, among the 54 floricultural projects, more than half of them delayed repayment of loan instalments.This has an impact on the sustainable provision of credit to the potential investors and existence of the bank as a financial institution.

This study, therefore, focuses on the Development Bank of Ethiopia which grants loan to government priority area projects such as floriculture sub-sector. The general objective of the study is to analyze factors affecting loan repayment performance of DBE financed flower growers. The specific objectives were:

- to identify critical factors in improving loan repayment performance of floriculture growers;
- to determine the relative importance of factors affecting loan repayment performance of floriculture growers.

Ethiopia is endowed with several agro-ecological zones- an opportunity to grow varieties of flowers throughout the year. Gypsophilia, hypericum, eryngium, carnations, cala, agapanthus, freesia, and lilies are produced. Rose is the widely produced variety; Ethiopia is producer of all bud size roses. The highland climate enables production of large budded and long

stemmed roses with vibrant colors.. The total land area developed for flower production currently is 1442.4 hectares (EHDA, 2012).

DBE has been financing major flower projects operating in the country. It has approved a total loan amount of Birr 1,135,233,079 to 45 flower farms. Out of the total approved amount, 76% or Birr 858,195,492 has been disbursed to 42 flower farms. It has to be understood that this loan amount is not the original approval and disbursement to floriculture projects from the inception to date. These figures represent only the existing project loan approval and disbursement amount (DBE, 2013).

Loan collection is one of the core operational activities of the bank. However, the performance of the bank regarding loan collection was poor when compared to the demand of collection in each year. The bank could have collected birr 242.7 million from the sub-sectors in the past two years. The amount of loan in arrears during the past two years (2012 to 2013) is presented in Table 1 below.

Table 1. Amount of floriculture loan in arrears

Birr in millions

Description	Year				
	2011/12	2012/13	% change	2013/14(July-December,2013)	% change
Loan in Arrears	127.97	104.24	(18.5)	118.16	13.4

Source: DBE central data base (2011/12-2012/13)

Research Methodology

The survey constituted fifty four Floriculture farms as samples representing the actual floriculture credit beneficiaries of DBE.

Data types and Methods of Collection

Cross-sectional data were collected from the files of individual borrower of DBE. The analysis of factors affecting loan repayment performance of the floriculture industry was also obtained from the borrower's file as well as the financial reports of the bank. The data were collected using a standard format prepared for the purpose of collecting all the necessary information with the help of a trained data collector.

The data collected include socio-economic characteristics, such as educational status, farming experience, sustainable floriculture certification status, access to off-farm income, amount of loan, ability to pay the loan as per the loan repayment agreement, repayment status of the borrower, loan processing time, farm size, capital structure (equity contribution of the borrower), level of technology used, type of management, number of supervisory visit by the bank's officials and other factors influencing loan repayment by flower growers.

The data collected were analyzed using both descriptive and econometric analytic methods using software called STATA version 11.0. The descriptive statistics like the means, percentages, standard deviations and frequency distribution of the variables were used to describe the socio-economic characteristics of the respondents. In addition, the t- and chi-square statistics were employed to compare defaulters and non-defaulters

group with respect to explanatory variables.

The floriculture grower's ability to pay the loan at the specified time is dichotomized, involving two mutually exclusive alternatives, either able to pay the loan per the agreed time table or not. Models for estimating such phenomena in which the dependent variable is binary have been propounded (Madala, 2005; Asante et al., 2011). The framework for such analysis has its root in the threshold theory of decision making in which a reaction occurs only after the strength of a stimulus increases beyond the individual's reaction threshold (Hill and Kau, 1981). This implies that every individual when faced with a choice has a reaction threshold influenced by several factors (Asante et al., 2011).This yields a binary dependent variable, y_i which takes the values of zero if the grower is unable to pay the loan (Defaulter) and one if a the grower is able to pay the loan (Non-defaulter).

Non-defaulters are credit worthy borrowers who settled the debt amount on the due date signed on the contract. This implies that the clients are committed on the agreements made with the lending institution. Defaulters are non-credit worthy borrowers who breach their loan contract and have repayment problem on the due date.

The probability of observing a value of one is:

$$P_r(y_i = \frac{1}{x_i\beta_i}) = 1 - F\ (-x_i\beta_i) \quad \text{..... (1)}$$

where 'F' is a cumulative distribution function. It is a continuous, strictly increasing function that takes a real value and returns a value which ranges from 0 to 1.

Then, it follows that the probability of observing a value of zero is:

$$P_r(y_i = \frac{0}{x_i\beta_i}) = F\ (-x_i\beta_i) \quad \text{..... (2)}$$

Given such a specification, we determine the parameters for estimating this model using the maximum likelihood estimation approach. The dependent variable is an unobserved latent variable that is linearly related to 'y_i' by the equation:

$$y_i = \beta_i x_i + u_i \quad \text{..... (3)}$$

where 'u_i' is a random disturbance term. The observed dependent variable is determined by whether 'y_i' exceeds a threshold value or otherwise:

$$y_i = \begin{cases} 1 \; if \; y_i^* > 0 \\ 0 \; if \; y_i^* \leq 0 \end{cases} \quad \text{.....(4)}$$

where 'y_i*' is the threshold value for 'y_i' and is assumed to be normally distributed. Common models for estimating such parameters include probit (standard normal), logit (logistic) and tobit (extreme value) (Madala, 2005; Asante et al, 2011).

The study adopted the probit model partly because of its ability to constrain the utility value of the ability to pay for loans variable to lie within 0 and 1, and its ability to resolve the problem of heteroskedasticity. The other advantages of the probit model include believable error term distribution as well as realistic probabilities. Following from Madala (2005) and Asante et al (2011), the probit model adopted for the study is specified as:

$$P_i = P\,(y_i^* < y_i)$$

$$P_i = P(y_i^* < \beta_0 + \beta_i x_{ji}) = F(y_i) \quad \text{..... (5)}$$

$$P_i = F(y_i) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{z_i} e \frac{s^2}{2} ds$$

where 'P_i' is the probability that an individual will make a certain choice (ability to pay for loans collected at the right time or otherwise); *s* is a random variable normally distributed with mean zero and unit variance; 'y_i' is the dependent variable (ability to pay for loans collected at the right time

or otherwise); y_i* is the threshold value of the dependent variable. To obtain an estimate of the index Z_i, the inverse of the cumulative normal function is used:

$$y_i = F^{-1}(P_i) = \beta_0 + \beta_i x_i + u_i \quad \text{..... (6)}$$

The parameters *β0,β1,β2,β3,……..,β∞* of the probit model do not provide direct information about the effect of the changes in the explanatory variables on the probability of a floriculture grower's being able to pay the loan alone. The relative effect of each explanatory variable on the likelihood that a borrower will be able to repay the loan (marginal effect) is given by:

$$\frac{\partial P_i}{\partial x_{ij}} = \beta_{ij} f(Z_i) \quad \text{..... (7)}$$

where *Pi* is the mean dependent variable whose value is given in the probit results as:

$$f(Z_i) = F^{-1}(P_i) \quad \text{..... (8)}$$

$$Z_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_1 + \cdots\ldots + \beta_k X_k \quad \text{..... (9)}$$

$f(Z_i)$ = Density function of the standard normal variable and is given by:

$$f(Z_i) = \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}Z^2} \quad \text{..... (10)}$$

The empirical model is specified as:

$ATP_i = \beta_0 + \beta_1 EDUS + \beta_2 FAE + \beta_3 AML + \beta_4 NSPV + \beta_5 FSZ + \beta_6 SFC + \beta_7 LTECH + \beta_8 TMGT + \beta_9 OSI + u_i$

Where ATP_i (Ability to pay) is the explained variable, β_0 is constant, $\beta_i X_i$'s are explanatory variables and u_i is the error term. The detail of each variable is explained on table 2.

Definition and Hypothesis of Variables

Table 2. Summary of variables used in probit model

Variable	Type and Definitions	Measurement
Dependent		
ATP	Dummy, ability to pay	1 if yes , 0 otherwise
Explanatory		
EDUS	Continuous, education status	Number of years completed
FAE	Continuous , farming experience in floriculture	In years
NSPV	Continuous , follow ups/supervisions by bank's loan officers	In number
OSI	Dummy ,Income derived from other business	1= yes, 0 = No
AML	Continuous ,Amount of loan disbursed to the borrower	In birr
FSZ	Continuous ,total farm size	In Hectare
SFC	Dummy , floriculture certification status	1= certified, 0= not certified
LTECH	Dummy, Level of technology used	1=advanced,0=otherwise
TMGT	Dummy, Type of management	1=managed by owner,0=otherwise

Source: Own Definition (2014)

Results and Discussion

The results of descriptive analysis are presented in the form of mean, percentages, standard deviations and frequency distribution. In addition, the t-test (for continuous variables) and chi-square statistics (for categorical variables) were employed to compare defaulter and non-defaulter group with respect to explanatory variables. Econometric analysis was carried out to identify the most important factors that affect loan repayment performance of flower growers and measure the relative importance of each explanatory variable on loan repayment.

Demographic and Socio-Economic Characteristics of Flower Growers

Educational status

With regard to education, 87% of sample borrowers had diploma or above level of education, whereas 13% of them had schooling at 12^{th} grade or lower level (Table 3).

Table 3. Educational status of flower growers

	Education		Defaulters		Total		
Education	Frequency	%	Frequency	%	Frequency	%	t-value
≤ 12	1	3.8	6	21.4	7	13	-3.98***
Certificate and Diploma(13-15)	1	3.8	9	32.1	10	18.5	
Degree and above(> 15)	24	92.3	13	46.4	37	68.5	
Total	26	100	28	100	54	100	
Mean	16.88		14.07		15.43		
Std. deviation	2.03		3.02		2.94		

***significant at 1% probability level

Source: Own compilation (2014)

The result indicates that, 4% of non-defaulters and 21% of defaulters had attended less than or equal to 12^{th} grade of education. On the other hand, 96% of non-defaulters and 75% of defaulters had junior college level of education.This implies that floriculture owners/managers at this level of education are less likely of being non-defaulters. The difference between the defaulters and non-defaulters with regard to education status of borrowers were statistically significant at 1% probability level (Table 3).

Farm size

Based on the result, on average, each flower grower had a farm size of 27.87 hectares. The minimum and maximum farm sizes were 10 hectares and 124 hectares, respectively. Group wise, on average, non-defaulters had a farm size of around 33 hectares, whereas defaulters had owned farms of around 23 hectares. This means flower growers with larger farm size are more likely to repay the loan on due date. The mean difference between the defaulters and non-defaulters in terms of farm size were statistically significant at 10% probability level (Table 4).

Table 4. Farm size of flower growers

	Non-defaulters		Defaulters		Total		
Farm size	Frequency	%	Frequency	%	Frequency	%	t-value
≤ 20	9	34.6	15	53.6	24	44.4	-1.99*
21-40	14	53.8	11	39.3	25	46.3	
> 40	3	11.5	2	7.1	5	9.3	
Total	26	100	28	100	54	100	
Mean	33.42		22.5		27.7554		
Std. deviation	26.22		12.19		20.7030		

*significant at 10% probability level

Source: Own compilation (2014)

Sustainable floriculture certification status

Based on the sample survey, 51.9% of the borrowers had not obtained sustainable floriculture certification while the remaining 48.1% were certified with a multitude of standards in the form of certification schemes, codes of practice and posting consumer labels. This means that only 48.1% of flower growers met the requirements in line with environmental

stewardship, or sustainable production and fair labor practices which best meet customer needs and will get more market access and as a result they generate more revenue (Table 5).

Table 5. Certification status of flower growers

Certification status	Non-defaulters		Defaulters		Total		
	Frequency	%	Frequency	%	Frequency	%	*χ2 - value*
Not cert.	7	26.9	21	75	28	51.9	12.48***
Certified	19	73.1	7	25	26	48.1	
Total	26	100	28	100	54	100	

***Significant at 1% probability level

Source: Own compilation (2014)

Group wise, 26.9% of non-defaulters and 75% of defaulters had not obtained sustainable floriculture certification. On the other hand, 73.1% of non-defaulters and 25% of defaulters were certified. This implies that certified flower growers are more likely become non-defaulters. The difference between the defaulters and non-defaulters with regard to sustainable floriculture certification of flower growers were statistically significant at 1% probability level (Table 5).

Level of technology used

In general, 38.9% of flower growers used advanced level of technology, i.e., green houses with automatic ventilation, computerised irrigation, such as smart system, but, 61.1% of the growers used manual irrigation system and the like (Table 6).

Table 6. Proportion of flower growers by level of technology used

	Non-defaulters		Defaulters		Total		
Technology	Frequency	%	Frequency	%	Frequency	%	*χ2 - value*
Advanced	18	69.2	3	10.7	21	38.9	19.42***
Manual	8	30.8	25	89.3	33	61.1	
Total	26	100	28	100	54	100	

***Significant at 1% probability level

Source: Own compilation (2014)

Group wise, 69.2% of non-defaulters and 10.7% of defaulters used advanced technology. On the other hand, 31% of non-defaulters and 89% of defaulters were using manual technology. Thus, the probability of defaulters and non-defaulters in this sample, using manual technology is 0.89 and 0.31, respectively, which implies that flower growers who use manual technology are more likely to be defaulters. However, those flower growers who use advanced technology control the production process easily and more likely to repay the loan on time. The difference between the defaulters and non-defaulters with regard to level of technology used were statistically significant at 1% probability level (Table 6).

Farming experience

Experience is a crucial element for the success of business project operation. DBE appraises the farming experience of the credit seeker and ones capablity of managing the business successfully. Based on this study, the average farming experience of the grower was 8 years while the minimum and maximum managerial experience was zero and twenty two years, respectively (Table 7).

Table 7. Farming experience of flower growers

Experience (years)	Non-defaulters		Defaulters		Total		t-value
	Frequency	%	Frequency	%	Frequency	%	
Advanced	9	34.6	26	92.9	35	64.8	-5.4***
Manual	17	65.4	2	7.1	19	35.2	
Total	26	100	28	100	54	100	
Mean	11.12		4.18		7.5185		
Std. deviation	5.42		3.94		5.833		

***significant at 1% probability level

Source: Own compilation (2014)

Group wise, the average farming experience of the growers was 11 years and 4 years for non-defaulters and defaulters, respectively. The difference between non-defaulters and defaulters in terms of number of years of farming experience was statistically significant at 1% probability level (Table 7).

Type of management

The analysis shows that, 61.1% of flower projects, financed by DBE, were managed by owners, whereas 38.9% were operated by employed managers. Among the non-defaulters, 53.8% of farms were managed by employed managers, while 46.2% were managed by owners. However, among the defaulters, 25% of the farms were managed by employed managers while 75% were owner managed farms. The difference between the defaulters and non-defaulters with regard to type of management were statistically significant at 5% probability level (Table 8).

Table 8. Proportion of flower growers by type of management

Manager	Non-defaulters		Defaulters		Total		
	Frequency	%	Frequency	%	Frequency	%	*χ2-value*
Employed	14	53.8	7	25.0	21	38.9	4.720**
Owned	12	46.2	21	75.0	33	61.1	
Total	26	100	28	100	54	100	

** Significant at 5% probability level

Source: Own compilation (2014)

Other source of income

Sales of project product are the major source of income of the flower growers. Based on the study result, 57.4% of them had no other source of income, whereas 42.6% of growers had claimed to have other sources of income (Table 9).

Table 9. Proportion of flower growers by other source of income

Other source of income	Non-defaulters		Defaulters		Total		
	Frequency	%	Frequency	%	Frequency	%	*χ2-value*
No	11	42.3	20	71.4	31	57.4	4.676*
Yes	15	57.7	8	28.6	23	42.6	
Total	26	100	28	100	54	100	

*Significant at 10% probability level

Source: Own compilation (2014)

In general, 57.7% of non-defaulters and 28.6% of defaulters of sample growers were engaged in economic activities other than the financed project. This means flower growers engaged in other businesses that

generate income had got better opportunity to repay the loan in more effective manner (Table 9).

Institutional Factors

Time of Loan Disbursement

Time of loan disbursement is an important factor affecting the flower farm operation. It has a significant impact on production and revenue generation. This, in turn, affects the repayment performance of borrowers and was the cause for a number of rescheduling of loan repayment period. With regard to the number of days required, the study result indicates that on average it takes 269 days to process the loan from application to first disbursement, with a minimum and maximum of 59 and 680 days, respectively (Table 10).

Table 10. Loan processing time by DBE for flower growers

	Non-defaulters		Defaulters		Total		
Time(days)	Frequency	%	Frequency	%	Frequency	%	t-value
≤ 60	4	15.4	0	0.0	4	7.4	
61-100	3	11.5	0	0.0	3	5.6	5.270***
101-200	11	42.3	3	10.7	14	25.9	
>200	8	30.8	25	89.3	33	61.1	
Total	26	100	28	100	54	100	
Mean	172		358		268.78		
Std. deviation	93		156		158.714		

***significant at 1% probability level

Source: Own compilation (2014)

The average loan processing time for the non-defaulters and defaulters was about 172 days and 358 days, respectively. In general, for 61.1% of applicants, it requires more than 200 days for disbursement of loan.

According to Mulugeta (2010), the loan processing time for agricultural projects in DBE is on average 175 days with a minimum and maximum of 30 and 630 days, respectively. This shows that the loan processing time of floriculture projects was relatively long as compared to agricultural projects in general, and too long as compared to average loan processing time set as standard by DBE, i.e., 60 working days. The mean difference between non-defaulters and defaulters in terms of waiting time for loan approval was statistically significant at less than 1% probability level (Table 10).

Amount of loan

On average, the bank had disbursed birr 24,192,436.00 for a single floriculture borrower with a maximum and a minimum of birr 154,140,994.00 and birr 3,189,318.00, respectively. Groupwise, on average, a non-defaulter borrower's loan size was about birr 33,214,758.00, whereas a defaulters loan size on average was about birr 15,814,565.00. The mean difference between defaulters and non defaulters in terms of loan size was statistically significant at 5% probability level (t-value -2.2811).

Equity contribution (capital)

The amount of equity/ capital contributed by the floriculture project owner was birr 14,874,834.00 with a maximum and a minimum of birr 204,326,434.00 and birr 1,366,851.00, respectively. Groupwise, on average, a non-defaulter's equity contribution was about birr 22,429,937.86, whereas a defaulter's equity contribution on average was about birr 7,859,381.00.

Frequency of follow-up by the bank

The study had indicated that, on average, the bank supervised each project eight times during the entire project life with a minimum and maximum of two times and twenty one times, respectively.

Table 11. Frequency of follow-up made by the bank

Number of Follow-ups	Non-defaulters		Defaulters		Total		t-value
	Frequency	%	Frequency	%	Frequency	%	
≤ 4	0	0.0	13	46.4	13	24.1	
5-8	4	15.4	13	46.4	17	31.5	-7.57***
> 8	22	84.6	2	7.1	24	44.4	
Total	26	100	28	100	54	100	
Mean	11		5		7.89		
Std. deviation	3		2		3.922		

***significant at 1% probability level

Source: Own computation (2014)

On average, eleven and five visits were made to non-defaulters and defaulters' floriculture projects, respectively, by the bank's credit officers. In addition, only 46% of defaulter's floriculture projects were visited by the bank's credit officers for a maximum of four times during the entire project life, while 54% of defaulter's floriculture projects were visited for more than four times. However, 100% of non-defaulter's projects were visited more than four times. This shows that those floriculture projects which enjoyed visitation by the bank officers more frequently were likely to repay the loan on time. The mean difference between non-defaulters and

defaulters with regard to follow up were statistical significant at 1% probability level (Table 11).

Econometric Analysis

Econometric analysis was employed to identify the factors that influence loan repayment performance among flower growers by using binary outcome estimation method by utilizing Probit model. Estimate of the relative importance (marginal effect) of each significant variable was also assessed.

Determinants of loan repayment capacity by flower growers

Prior to running the probit regression model, both the continuous and discrete explanatory variables were checked for the existence of multicollinearity and the degree of association using Variance Inflation Factor (VIF) and contingency coefficients. The VIF values for continuous variables were found to be very small (much less than 10), indicating absence of multicollinearity among the continuous explanatory variables (Appendix 1).

Similarly, contingency coefficients were computed to check the existence of multicollinarty problem among the discrete explanatory variables. When the correlation coefficient becomes high (close to 1) in absolute value, multicollinarty is present with the result that the estimated variances of both parameters get very large. The results of the computation of contingency coefficients reveal that there was no serious problem of association among discrete explanatory variables (Appendix 2). Based on the computed results of VIF and contingency coefficients, nine explanatory variables were

included in the final analysis. More specifically, five continuous and four discrete explanatory variables were used to estimate the probit model.

To determine the explanatory variables that are good predictors of the loan repayment performance among flower growers, the probit regression model was estimated using the Maximum Likelihood Estimation Method. The results of the analysis are presented in Table 12.

Table 12. The Maximum Likelihood Estimation of probit model

Variables	Estimated coefficient	Std. Error	z-statistics	p-value
Constant	-17.2962	8.461089	-2.04	0.041**
Education status	0.7477643	0.4439519	1.68	0.092*
Farm size	0.0513733	0.0412531	1.25	0.213
Amount of loan	-5.37e-08	4.35e-08	-1.24	0.216
No. of follow up	0.4101408	0.1679938	2.44	0.015**
Certification status	1.663743	0.9403766	1.77	0.077*
Technology used	1.315612	1.259961	1.04	0.296
Type of management	-1.662491	1.263278	-1.32	0.188
Farming experience	0.2595511	0.1260204	2.06	.039**
Other source of income	-0.6652184	1.068602	-0.62	0.534

Number of observation = 54 Log likelihood = - 8.1577615

Prob > chi^2 = 0.000

LR chi^2 (9) = 58.47 Pseudo R2 = 0.7818

** & * is significant at 5% and 10%, respectively

Source: Own computation (2014)

As shown on table 12 above, a likelihood ratio (LR) statistic of 58.47 with a chi squared (χ^2) distribution at nine degree of freedom is significant at 1% probability level. This means that at least one of the explanatory variables in the model has a significant effect on loan repayment performance of flower growers and that the explanatory variables jointly influence flower growers ability to pay for their loans.

Out of the nine variables hypothesized to influence the loan repayment performance of flower growers, four were found to be statistically significant. The maximum likelihood estimates of the probit regression model shows that education level, number of supervisions/ follow-ups by the bank, sustainable floriculture certification status and farming experience of the growers were important factors determining the loan repayment performance of borrowers from DBE. On the other hand, the coefficients of five explanatory variables, namely farm size, amount of loan, other source of income, type of management and level of technology used were less powerful in explaining loan repayment performance of DBE's borrowers for running floriculture business (Table 12).

The education level of flower farmers has significant and positive effect on ability to repay their loan. It might be because of the fact that borrowers who have higher education level could find better market for their products, and could also be cost conscious and resort to economical usage of resources and may have future investment plan by working with the bank. Because of the indicated factors, higher education status of the grower contributes to the good repayment performance. Thus, by increasing the education level of the grower by one year has the effect of increasing the probability of a grower to be able to repay the loan by 33.9%. This implies that a borrower will likely have greater loan repayment ability when he or she has a higher educational level and vice versa. This was also confirmed by studies of Wongnaa and Awunyo (2013), Mulugeta(2010), Eze and Ibekwe (2007), Birhanu (1999) and Abrham (2002).

The Number of follow-up/supervisory visit is an important institutional factor, which is positively related to flower grower's ability to repay their

loans and is significant at 5% probability level. Increasing the number of supervisory visits by one will increase the probability of a floriculturist to be able to repay the loan by 20.2%. This means that the more credit officers visit borrowers' projects, in order to supervise the utilization of the loan, the better borrowers repayment abilities and vice versa. In other words, this implies that borrowers with more access to technical assistance and guidance on farming activities during the visit were able to repay their loan as promised than those who had less or no visiting at all. The reason for this is that borrowers who have frequent contact with the bank's professionals are better informed about markets and production technologies, as well as, bank's rule and regulation on repayment of loan. This will motivate borrowers to work harder and the probability of diverting the loan to unintended purpose will be less. Bankhshi and Koopahi (2002), Mulugeta (2010), Wongnaa and Awunyo (2013), Jama and Kulundu (1992), Okovie (1996) and Fantahun (2000) had also reported the positive effect of this variable on loan repayment.

Obtaining sustainable floriculture certification is hypothesized to affect loan repayment positively. The result of probit estimate in this study had confirmed that growers who had been certified with a multitude of standards in the form of certification schemes, codes of practice and a handful of consumer labels have good loan repayment performance. The coefficient is positive and significant at 10% probability level. The probability of being non-defaulter increases by 76.8% for certified DBE borrowers than those who have not been certified. This means that flower growers have more access to the market and compete better if certified, and as a result, they generate more revenue. This will enable the floriculturist to repay his/her loan at the right time. The market is characterized by the existence of a

multitude of standards in the form of certification schemes, codes of practice and a handful of consumer labels nowadays. One of the reasons for the large number of co-existing certificates is the fact that retailers tend to adopt those standards which best meet their needs. There is even a strong trend among large retailers to set up their own private standards. So, although fragmented, the importance of standards in the European flower market is increasing (ProVerde, 2010).

Furthermore, farming experience has a positive effect and it is significant at 5% probability level in this study. Increasing flower farming experience by one more year increases the probability of the borrower to repay the loan by 12.5%. This means that the likelihood of the farmer to pay the loan will increase when the years of farming experience increases and vice versa. The implication is that farming experience could probably lead to proper utilization agricultural loans and inputs and this could have a positive effect on the magnitude of farm profit. Similarly, as a grower gets more experience, it has a positive impact on the sustainability of the project. Consequently, loan repayment ability would be enhanced. This was also confirmed in the study of Oladeebo (2008), Wongnaa and Awunyo (2013) and Mulugeta (2010).

Marginal effect of significant variable

All significant explanatory variables do not have the same level of impact on loan repayment performance of flower farmers. In order to determine the relative importance of each explanatory variable on repayment performance of borrowers, it needs calculation of marginal effect of each significant explanatory variable, and the result after the probit model estimation is presented on table 13 below.

Table 13. Marginal effect of significant variables

Variable	dy/dx (Marginal Effect)
Education level	0.0616548
Number of follow-up	0.033817
Certification status	0.1371792
Farming experience	0.0214005

Source: Own computation (2014)

As indicated in table 13, the marginal effect of being certified with different floriculture certification standards is around 14%, that is, the highest when compared to other significant explanatory variables. The percentage implies that the probability of being non- defaulters increases by 14% for the borrower who has been certified with different floriculture certification standards. Next to certification status, education level has a significant and positive effect on repayment performance of borrowers. The probability of being non-defaulter increases by 6% for those with higher educational standard. Follow-up/supervisory visits by credit officers and farming experience takes the third and fourth important factors affecting repayment performance with 3.4% and 2%, respectively.

Conclusion

Development Bank of Ethiopia is one of the institutions engaged in providing financial support to development projects, such as floriculture sub-sectors. However, according to the central data base of DBE (2013), there is increasing default rate among DBE'S floriculture project borrowers. This has an impact on the sustainable provision of credit to potential investors and existence of the bank as a financial institution.The study had specifically identified critical factors and estimated the relative importance

of factors in improving loan repayment performance among floriculture borrowers.

The result shows that among nine explanatory variables, which were hypothesized to influence loan repayment performance of floriculture project borrowers, four variables, namely, education level, number of follow ups/supervisory project visit by credit officers, sustainable floriculture certification status and farming experience were significant in influencing defaulting while the remaining five were less powerful in explaining the variation in the dependent variable. The study has shown that the loan repayment ability can improve greatly if the flower farmer is well educated, has acquired experience in the job, and obtained certificate in the standard of operation, and when there is a regular follow-up by the lending organization. Hence, flower growers will get more market access and able to compete in the market. Consequently, it generates more revenue which enable the borrower to be able to repay the loan as per the agreement. In addition, floriculture certification has the highest relative marginal effect on loan repayment performance as compared to other significant explanatory variables.

Policy Implication

Based on the results obtained in this study, it is recommended that credit institutions or lending agencies should identify the factors that influence loan repayment ability before granting loans to flower growers to reduce loan defaults.

Routine visits by credit officers to floriculture producers will help put producers on track and monitor the proper use of the loan they acquired. Hence, the bank should take serious consideration on supervision of the

project in order to provide relevant information and technical support for the success of floriculture borrowers.

The study also recommends that all flower growers should be made aware on the importance of being certified with a multitude of standards in the form of certification schemes, codes of practice and a handful of consumer labels so that they can adopt those standards which best meet customer needs and more market access to generate more revenue in order to build better loan repayment capacity.

It is also recommended that the bank should give more focus on evaluating the relevant farming experience of the flower producer due to the fact that the more experienced producer probably know the proper utilization of floricultural loans and inputs which could have a positive effect on the magnitude of farm profit which enhance the timely loan repayment.

Finally, producers should be encouraged to further their education, a factor that encourages a higher repayment rate.

References

Abrham Gebeyehu, (2002).Loan Repayment and its Determinants in Small-Scale Enterprises Financing in Ethiopia: case of Private of Borrowers around Zeway Area. Unpublished MSc. Thesis, Addis Ababa University.

Acquah, H. D., Addo, J, (2011). Determinants of Loan Repayment Performance of Fishermen: Empirical Evidence from Ghana. Cercetări Agronomice in Moldova, XLIV(4), 148.

Acquaah George, (2004).Horticulture Principle and Practice, 2nd Ed. New Delhi: Langston University India prentice hall of India private limited.

Asante, B. O., Sefa, V. A., Sarpong, D. B, (2011). Determinants of small scale farmers' decision to join farmer based organizations in Ghana. African Journal of Agricultural Research, 6 (10), 2273-2279.

Barden B; Gordon, H. and Dave P. (1987): Plant Science. New York: McGraw Hill Book Company.

Berhanu Lakew, (1999).Micro-Enterprise and Poverty Alleviation in Ethiopia: The Case of the Project Office for the Creation of Small-Scale Business Opportunities (POCSSBO) in Addis Ababa. Unpublished MSc. Thesis, Addis Ababa University.

DBE, (2013).''Commodity Study on DBE Financed Flower projects''. Strategic Planning and Development Effectiveness Process, Addis Ababa

EHDA,(2012).Ethiopian Horticulture Sector. Yearly Statistical Bulletin, Addis Ababa.

Embassy of Japan in Ethiopia (2008).A Series of Studies on Industries in Ethiopia.

Eze, C. C., Ibekwe, U. C,(2007). Determinants of loan repayment under the Indigenous financial system in Southeast Nigeria. The Social Sciences, 2(1): 116-120.

Fantahun Melles, (2000).Informal Financial Institution: Impact Analysis of ACORD's Credit Intervention through Iddir in Dire Dawa. Unpublished MSc Thesis, Addis Ababa University.

Gujarati, Damodar N., 2003. Basic Econometrics. Fourth Edition, New York: McGraw-Hill Book Company.

Hill L, Kau, (1981). Analysis of Purchasing Decision with Multivariate Probit.American Journal of Agricultural Economics, 53(5): 882-883.

Hunte**,** C. Kenrick, (1996). Controlling Loan Default and Improving the Lending Technology in Credit Institutions. Saving and Development Quarterly Review, 1, 45-59

Jama, M.A. and Kuulundu, D.M.,(1992). Small holder Farmers' Credit Repayment Performance: The case of Lugari Division, Kakameg District, Kenya. East African Economic Review.8 (2): 85-91.

Koopahi, M. and Bakhshi, M.R. (2002). Factors affecting agricultural credit repayment performance: Case study in Birjand district. Iranian journal of agricultural sciences, 33(1), 11-19.

Maddala, G. S, (2005). Introduction to Econometrics. 3rd Edition, The Atrium, Southern Gate, England :John Wiley & Sons Ltd..

Mulugeta shiferaw,(2010). The Determinants of Agricultural Loan Repayment Performance.Unpublished Master's Thesis, Hramaya University.

Muthoka, N. M. and Muriithi, A. N. (2008).Smallholder summer flower production in Kenya: A myth or A prospect?",Acta Hort. (ISHS), 766: 219-224.

Okovie Aja, (1996). Major Determinant of Agricultural Smallholder Loan Repayment in a Developing Economy: Empirical evidence from Ondo. Nigeria saving and Development Quarterly Review, No. 1, pp 88-99.

Oladeebo, J. O., Oladeebo, O. E, (2008). Determinants of loan repayment among smallholder farmers in Ogbomoso agricultural zone of Oyo State, Nigeria. Journal of Social Sciences,17(1): 59-62.

ProVerde,(2010).The European Market for Fair and Sustainable Flowers and Plants.Belgian development agency BTC & Trade for Development Centre.

Wongnaa, C.A. and D.Awunyo-Vitor, (2013). Factors Affecting Loan Repayment Performance among Yam Farmers. Agris on-line Papers in Economics and Informatics, 5(2), 111-122

APPENDIX

Appendix 1. VIF of the continuous explanatory variables

Variable	Tolerance(1/VIF)	VIF
Education level	0.732	1.365
Farm size	0.349	2.864
Amount of loan	0.323	3.091
Number of follow-up	0.475	1.105
Farming experience	0.683	1.464
Mean VIF	2.18	

Source: Own computation (2014)

According to Gujarati (2003), VIF can be defined as:

$$VIF= 1/1-R^2$$

Where, R^2 is the square of multi correlation coefficients that results when one explanatory variable (X_i) is regressed against all other explanatory variables. The larger the value of VIF (x_i) the most troublesome or collinear the variable X_i is.as a rule of thumb, if the VIF of a variable exceeds 10, there is a multicollinarity problem. The VIF values displayed above (Appendices 1) have shown that all the continuous explanatory variables have no serious multicollinarty problem.

Appendix 2. Contingence coefficient for discrete variables

Variable	CC
Certification status	0.433
Technology used	0.514
Management type	0.284
Other sources of income	0.282

Source: Own computation (2014)

When the variables to be calculated are discrete in nature, Contingency coefficient (CC) is used. Contingency coefficients can be calculated as:

$$CC = \sqrt{\frac{x^2}{N + x^2}}$$

Where, CC= Contingency coefficient, $\chi 2$ = Chi-square random variable and N=total sample size.