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Adoption of Automatic Teller Machine (ATM) of Customers in Commercial Bank Of Ethiopia: the case of Hawassa City

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Abstract

An ATM is a specialized computer that makes it convenient to manage a bank account holder's funds. It allows a person to check account balances, withdraw or deposit money, print a statement of account activities or transactions by so doing which it makes life convenient for customers. The study attempted to analyse the determinants of Automated Teller Machine (ATM) adoption of users in Commercial Bank of Ethiopia in Hawassa City.

To this end the study used primary data from a randomly selected 300 customers of commercial bank of Ethiopia in Hawassa city. The econometric result of the probit model indicated that Age, Education, Income and attitude are significant variables, in determining the adoption of ATM, at various levels of significance.

Keywords: Automatic Teller Machine, Adoption, Probit, Hawassa

1. Introduction

Technology affects almost every aspect of 21st century life, from transport efficiency and safety, to access to food and healthcare, socialization and productivity. Technology has affected the way we do things and the way we live and will continues impacting our life and of the world. And one of the manifestations of technological changes is the emergence of information technologies which have done a lot in the banking industries all over the world. According), the converging innovations of technological forces have changed the manual way of service delivery of banks tremendously and have subsequently paved way for electronic delivery platforms in recent time.(Ogbuji et al. , 2012)

Innovation and digital technologies have great potential to create jobs, boost productivity growth, reduce poverty, foster inclusion, and reduce inequality. They are vital for increasing the production of farms, firms, manufacturers, and service providers, and for accumulating knowledge capital. But they require collaboration by many actors working in digital and innovation ecosystems to ensure that they deliver benefits for society. The Automated Teller Machine is one of the outcomes of this situation which is replacing the paper based payment instruments. (Adepoju, A. (2010)

The commercial bank of Ethiopia is a state owned bank in Ethiopia. The bank is the pioneer to introduce ATM banking technology to the local users. The service the bank provides through ATM include; cash withdrawals, bill payments, forex, fund transfer , mobile top up, balance inquiry, etc . ATM banking is thus an important innovation that has the potential of overcoming the disadvantages arising from having human bank tellers at the center of the banking transactions; and reducing the banking costs in the long run. (Mathiassen and Pries-Heje, 2006; Takele, 2013)

Commercial Bank of Ethiopia is the leading bank in Ethiopia, established in 1942. Pioneer to introduce modern banking to the country with more than 1700 branches across the country. It is the leading bank in the Ethiopian banking market with more than one thousand ATMs stretched across the country. Currently, CBE has more than 13.3 million account holders and the number of Mobile and Internet Banking users also reached more than 1,352,000 as of September 30th 2016 (68% active users). Moreover, 61% of its 3 million ATM card holders are active ATM Banking users for cash withdrawals, bill payments, forex transactions, fund transfers, balance inquiries and so forth (CBE, 2016Annual report).

However, despite the fact that the ATMs are strategically installed in branches, hotels, malls and other public places, Only a small portion of the Bank's customers are using ATM.((Jemal, A. &Naser, K., 2002))

2. Statement of the Problem

Use of ATM has become extremely popular among customers as convenient mode of transactions. The technological innovation has transformed the banking business. Banks have aggressively adopted this mode. The advantages of using ATM have given new impetus in dimensions of service quality and banks are offering new choices to customers. (Horton et al, 2001) noted investment opportunities, reduction in costs, satisfaction of customers and competitiveness as motives to install and add new ATM to the existing network. It is very intuitive that ATM facility resulted in speed of transactions and saved time for customers (Emeka and Favour, 2012)

Although, ATMs provide alternative self-banking delivery services such as withdrawals, pay utility settlement, and transfers on 24 hours a day for 7 days in a week basis without the help of bank personnel's and all Ethiopian commercial banks are investing huge capital to provide banking services to their customers through them, long queue to get served by tellers remain common in the Ethiopian Banking industry. There is believed that the available free ATM machines at the gate of the banks and other public centres offer a more efficient mode of service delivery- as compared to the use of tellers, although the gaps regarding with the adoption of ATM make them far less popular. It’s in this light that the study seeks to study the problems of adoption of ATM Banking in Ethiopia- with specific reference to the commercial bank of Ethiopia (CBE). The underlying assumption of the study is that customers of commercial bank of Ethiopia differ in in their decision of adopting automatic teller machine. The causes of the diversity are attributable to various demographic, social, economic, or institutional factors. This being the case, therefore, this article tried to uncover the factors behind such diversity.

3. Objective of the study

The objective of this study is to investigate determinants of adoption of ATM of the customers of commercial bank of Ethiopia

4. Sampling technique, Sample size and Data type

The study applied multi stage sampling technique where by credible sampling technique is employed in each and every stage. In the first stage Hawassa City, the study area, was purposively selected. In the second stage three branches of Commercial bank of Ethiopia in Hawassa City, namely Piazza Brach, Meneharia Branch and Fura Branch are randomly selected. From this randomly selected Branches 300 customers (100 customers from each Branch) are accessed based on convince sampling technique. From the total of 300 customers 65% of them (195) are adopters and the rest 35 %(105) of them are non adoptors of ATM. The determination of the sample size is based on the intuition of the researcher and the experience of previous researchers in the similar topic (Kolodinsky et al, 2004; Friday and Mary, 2013; Gemechu, 2012)

5. Instrument of Data collection

Questionnaire was used as a primary tool for collecting data from the sampled customers at the chosen Branches. The questionnaire contained many close ended and some open ended items. Moreover, the questionnaire was prepared, commented and pilot tested to make sure that reliable and authentic data was collected.

6. Method of Data analysis: The probit Model

The three competing models that may help the research capture the variability in adoption decision are: the linear probability model, the logit model and the probit model. The linear probability model has a major flaw: it assumes the conditional probability function to be linear. This does not restrict$P = (Y = 1/X_i)$. It also assumes that that the marginal or incremental effect of explanatory variables remains constant. Due to this limitation this model does not most credibly help us capture the behavior of the dependent variable. The study employed the probit model due to its convenience and also due to the fact that both the logit and the probit models are comparable and they both yield similar results (Gujarati, 2007; Wooldridge, 2009)

6. The mathematical form of the model

The Probit model is generated by a latent variable whose observation is not clearly identifiable. The functional form of the probit model is given by

$$y_i = X'\boldsymbol{\beta} + \boldsymbol{\epsilon} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots .\ldots .(\mathbf{1})$$

In Probit regression, the cumulative standard normal distribution function $\Phi(\cdot)$ is used to model the regression function when the dependent variable is binary, that is, we assume

$$E(Y|X) = P(Y = 1|X) = \Phi(\boldsymbol{\beta}_0 + \boldsymbol{\beta}_i X_i) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots .. (2).$$

$$y_i = \begin{Bmatrix} 1\ if\ y_i^* > 0 \\ 0\ \ otherwise \end{Bmatrix} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where $y_i^*$the latent variable or unobserved variable and its value is 1 if the customer is adopting ATM and 0 otherwise; X_i is a vector of explanatory variables; β is a vector of parameters to be estimated and ϵ is the error term which is normally distributed with mean 0 and variance σ^2.

The probability that a randomly chosen customer will adopt ATM can be estimated by

$$P_i = 1 = \boldsymbol{\Phi}(\boldsymbol{\beta}_0 + \boldsymbol{\beta}_i X_i) = \int_{-\infty}^{\boldsymbol{\beta}_0 + \boldsymbol{\beta}_i X_i} \varphi_t d_t$$

Where the symbol Φ is simply the cumulative standard distribution, while the lower case symbol, φ represents the standard normal density function. We maximize the log-likelihood function. The partial derivatives, however, come from the following expression:

$$\frac{\partial P_i}{\partial x_{i,k}} = \boldsymbol{\varphi}(\boldsymbol{\beta}_0 + \boldsymbol{\beta}_i X_i)\beta_k$$

7. Model Specification

The specific probit model for the adoption decision can be defined as:

$$y_i = \quad \beta_1 AGE + \beta_2 SEX + \beta_3 EDU + \beta_4 TPW + \beta_5 INC + \beta_6 ATT + \epsilon_i .. \ldots .(4)$$

Where **AGE** is age of the respondent, **SEX** is sex of the respondent **EDU** is education of the of the respondent, **TPW** is type work that the respondent is engaged in , **INC** is income of the respondent, **ATT is** attitude of the respondent toward ATM

8. Description of variables and Expected sign

The table below describes the behavior of the variables being used and their expected sign of relationship with the dependent variable

Independent Variable name	Type	Measurement	Expected sign (Hypothesis)
AGE	Continuous	Number of years	Negative
SEX	Dummy	1 if male, 0 otherwise	Positive
EDU	Continuous	Years of schooling	Positive
TPW	Dummy	1 if governmental, 0 otherwise	Negative
INC	continuous	Amount of Birr obtained per month	Positive
ATT	Dummy	1 if positive attitude toward ATM, 0 otherwise	Positive

9. Result and Discussion

The Model result of the Stata output is depicted in the table below. Based on the result of the model, we understood that accordingly, all of the variables have the expected sign except for Type of work (TYP). From the total variables hypothesized to determine adoption of ATM, four variables are significantly detrimental in so far as adoption of ATM is concerned at various levels of significance.

Table II: Result of the Probit Model

Variable	**Coefficient**	**St. Err**	**Z stat**	**P value**
AGE	-.0433417	.0115436	-3.75	0.081***
SEX	-.0205648	.0468294	-0.44 0.661	0.661
EDU	.0829259	.0760511	0.11	0.036**
TYW	-0.4877135	.1078955	4.52	0.976
INC	.9200818	.3150254	2.92	0.245**
ATT	.5032632	.6781314	0.74	0.000*
Constant	.0030098	1.03942	0.00	0.998
Number of obs = 300				
LR chi2(9)= 127. 37				
Prob > chi2= 0.0000				
-Pseudo R2=0.6507				

Source: own survey and computation, 2021

,**, Significant at 1%,5% and 10%**

The above table can tell us only the direction of the relationship between dependent variable and a set of independent variables. In order to interpret the quantitative implications of the determinants, we need to compute the partial effects, using marginal effects for continuous explanatory variables and average effects for binary explanatory variable and this is depicted in the table below.

Table III: Partial effect of the probit model

Variable	$\frac{dy}{dx}$	**St. Err**	**Z stat**	**P value**
AGE	-0.1296128	.00356	-3.64	0.089*
SEX	-0.0061509	.01395	-0.44	0.659
EDU	0.0247987	.02274	0.11	0.021**
TYW	-0.1458498	.03321	4.39	0.986
INC	0.0076052	.00092	0.06	0.036**
ATT	0.2755081	.0929	2.97	0.003*

Source: own survey and computation, 2021

,**, Significant at 1%,5% and 10%**

The above table revealed that age, education, type of work, income and attitude of the respondents significantly determines the adoption decision of individuals at various levels of significance.

The age of the respondent affects probability of adopting ATM significantly and negatively at 10% level of significance. Keeping all other factors constant, a one year increases in the age of the respondent, decreases the ` probability of adoption of ATM by nearly 13 %. This implies that younger individuals, citrus paribus, are more prone to adoption of the technology than their older counter parts and the result is very much intuitive. Several other researchers have also come up with similar results. (Kolodinsky et al, 2004; Friday and Mary, 2013)

When we come to education of the respondents, the variable positively and significantly determines adoption decision. The partial effect revealed that, keeping all other factors constant, a one year increase in education the probability of gender disparity by 2 %.

Income positively and significantly determines adoption decision at 5 % level of significance. According to the above, citers paribus, an increase in monthly income by 100 increases the probability of adoption of ATM by 8%

Attitude toward technology, quite intuitively, determines probability of adoption of ATM positively and significantly. Those with positive attitude have 28% more likely to adopt ATM than their counter part and this result is significant at 1% level of significance.

10. Implication

Working on the attitude of the customers by applying different promotional schemes and encouraging older ones to get used to technology is duly emphasized as can be understood form the model result.

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