Attitudes and Preferences in Relation to Internet Banking in the Caribbean

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Executive Summary

The financial services industry plays a key role in the development of any country, and is an especially large and important sector in the Caribbean. Given the importance of the financial services industry to overall economic activity in the Caribbean, it is important to monitor and assess new developments in the industry. One of the major developments in the financial services sector over the last five years has been the launch of internet banking services. Commercial banks across the region have invested hundreds of millions of dollars in developing online structures and services for their customers. How have customers in the Caribbean reacted to the presence of these services? Are they snapping up these new services, why or why not? This study represents a pioneering attempt to begin to answer these questions by conducting a survey of the attitudes and preferences towards Internet Banking across the Caribbean. The study surveys over 3,000 individuals across Antigua and Barbuda, Barbados, Dominica, Grenada, Jamaica, Montserrat, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, and Trinidad and Tobago.

The primary research tool for this study was a multi-sample project conducted between December and January 2008/2009. The survey targeted 4,000 individuals across ten (10) Caribbean countries. The sample sizes for each country were based on population sizes. The data on attitudes and preferences towards internet banking was obtained via structured questionnaires and convenience sampling. The study sought to investigate the extent to which persons in the Caribbean utilized internet banking services, the frequency with which such services were used and the factors that influenced the extent and frequency with which internet banking services were used. Prior research suggests that attitudes and preferences related to internet banking depend on demographic and socio-economic characteristics such as age, income, gender and education level among others, prior experience with computers and technology and various attributes of internet banking such as the level of fees and ease of use among others.

The survey results suggest that while there was a high awareness as to the availability of internet banking service (89%), on average thirty percent (30%) of respondents currently use internet-banking services. The utilization rate ranges from a high of 39.3% in Antigua and Barbuda to a low 14.5% in Grenada. In terms of frequency of use, the majority of users (55%) access online banking services one (1) to three (3) times a month. The survey results suggest that the adoption and frequency of use on internet banking services in the Caribbean are primarily influenced by age, income, and education attainment. With younger, higher income better educated persons being more likely to adopt and more frequently use internet-banking services. The results also suggest that internet banking services were mainly used for checking balances (45%) and making bill payments (39%). The results suggest that the main reasons for not using internet banking services were concerns for the security of transactions and balances (41%) and the perceived complexity of internet banking (23%). However, the majority of non-users indicated that they

were either likely (17.5%) or very likely (34.5%) to start using internet banking in the next twelve months.

The study suggests that despite a high level of awareness of internet banking services, only a relatively modest proportion of customers in the Caribbean currently use internet-banking services. Those that use internet-banking services do so relatively infrequently and use the service mainly to check balances and pay bills. Those that do not use internet-banking services perceive a high level of insecurity surrounding internet banking and perceive it to be a relatively complex activity. Commercial banks may consider expanding their online payment services and building up public confidence in the security and ease of online banking if adoption rates and frequency of use are to increase significantly.

1. Introduction

The financial industry plays a key role in the development of any country. In 2007 domestic credit provided by the banking sector in Latin America and the Caribbean represented 60 percent of gross domestic product (GDP), reaching as high as 149 percent in St. Kitts and Nevis, 124 percent in St. Lucia and 112 percent in the Bahamas. In comparison, the ratio for Europe and Central Asia was 39 percent, 48 percent in the Middle East and North Africa, 62 percent in South Asia and 81 percent in Sub-Saharan Africa (*World Development Indicators Online Database*) Money and quasi money as a percent of GDP, another indicator of financial depth, was 40 percent for the region, with St. Kitts and Nevis again being the leader for the region. This ratio was on par with that for Europe and Central Asia and Sub-Saharan Africa but below the ratio for East Asia and Pacific, Middle East and North Africa and South Asia.

The financial industry plays a key role in the production of information about potential investment projects, monitoring of investments, trading, diversification and risk management, mobilisation and pooling of savings and the exchange of goods and services (Levine, 2005). Each of these functions can influence national savings and investment decisions, and as a result

economic growth. Economists generally agree that there is a relationship between financial and economic development. There are, however, a number of explanations for this relationship. Schumpeter (1911) maintains that financial intermediaries are an essential element in fostering technological innovation and economic development due to the role they play in mobilising savings, evaluating projects, managing risk, monitoring managers and facilitating transactions. In contrast, Robinson (1952) argues that as the economy grows, more financial institutions and products emerge to satisfy untapped demand for these financial products: financial development follows economic growth. Iyare and Moore (2009) find that there is a positive association between financial development and growth in small states, with a bi-directional causal relationship between the two variables.

Given the importance of the financial industry to overall economic activity in the Caribbean, it is important to monitor and assess potential new developments in the industry. One such development is internet banking. Internet banking refers to a system that enables bank customers to obtain general information about the bank's products and services, access their accounts, and perform a number of different banking transactions using the internet. Internet banking has many advantages over the traditional "bricks and mortar" delivery-banking channel for both the bank and its customers. For the commercial bank, some of these advantages are the improved efficiency of operations, a reduction in operating costs and a stronger competitive advantage. Customers, on the other hand, benefit from the increased ease and efficiency of performing bank transactions and the choice of a faster, more convenient way to conduct transactions from any location and at any time. Craigwell et al. (2005) find large efficiency gains from financial innovation among Barbadian commercial banks. The study estimates that the introduction of

automatic teller machines would have increased efficiency among Barbadian banks by about 3.5 percent.

Within recent years, many regional banks have made significant investments in their online infrastructure, particularly in the late 1990s. Despite the tremendous investment made by banks in this aspect of bank service delivery, customer use and perceptions in relation to internet banking remain an under researched topic in the Caribbean. Basic information in relation to the number of individuals that use internet banking and their characteristics is still not readily available in the region. Understanding the characteristics of customers that tend to use internet banking would allow financial institutions to target desirable demographic sectors and thereby enhance their revenue.

The closest study to ours conducted in the Caribbean is that by Fraser and Henry (2007), which looked at online purchasing within Barbados. The authors used the data collected via the survey to identify trends and patterns and to perform various tests of associations with respect to demographic characteristics. Online shopping was related to three factors, gender, age and ethnicity. The present study differs from that done by Fraser and Henry by focusing on issue of online banking. In addition, by utilising a database drawn from individuals throughout the Caribbean, it the authors to identify country-specific differences regarding the use and perceptions in relation to online banking services.

The main goal of the present study is to provide individuals working in the financial industry some assessment of Caribbean people's attitudes and perception of internet banking. As a result, the study interviewed over 3,000 individuals in 10 Caribbean countries. The responses span a

range of individuals with various socio-economic backgrounds and therefore allow the researchers to assess the characteristics of individuals that are currently using online banking services and those that might do so in the future.

The remainder of the report is structured as follows. After the introduction, Section 2 reviews the previous literature on internet banking. Section 3 provides an examination of the methodological approach employed in the study as well as the basic demographic characteristics of survey participants. Section 4 gives a preliminary assessment of the use of internet banking services in the Caribbean, while Section 5 attempts to identify the factors that are highly correlated with the use of internet banking services. Section 6 summarises the main findings of the study and provides policy recommendations.

2. Review of Previous Literature

2.1 Economics of Internet Banking

Benjamin et al. (1987) provide a general framework for assessing how technology is likely to affect market structures and corporate strategies. The authors first note that the flow of materials and services through the value-added chain can be done via markets or hierarchies. Markets coordinate the flow through the market mechanism (i.e. supply and demand forces): market forces determine the design, price, quantity and delivery schedules for a given good or service. In contrast, hierarchies coordinate the flow of goods and services through the value-added chain through the managerial hierarchy.

The internet and new technologies in general, reduce the time, cost of communicating information, and therefore lead to cost savings. In terms of markets, the main benefit of the internet is the so-called 'electronic brokerage effect': the internet by acting as a broker increases the number of alternatives that can be considered, enhances the quality of these alternatives, and decreases the cost of the product selection process. For hierarchies, the main benefit of the

internet is the so-called 'electronic integration effect' as the information technology is used to integrate the various stages of the value-added chain.

In addition to the 'electronic brokerage effect' and the 'electronic integration effect' there are also likely to be cost savings as a result of a reduction in the transactions cost of producing a good or service (Clemons et al., 1993). Transaction cost is the cost incurred by making an economic exchange. It can be disaggregated into coordination cost (cost of coordinating with units producing the good), operations risk (risk that other parties to the transaction may withhold information or underperform) and opportunism risk (the risk associated with the lack of bargaining power due to the operation of a business relationship). The internet, by reducing each of these three elements of transactions cost can lead to an overall reduction in transaction cost. Jayawardhena and Foley (2000) report that the transaction cost for non-cash payment at a branch relative to the internet can be 11 times as great.

2.2 Why Do Individuals Use Internet Banking Services?

Previous research on customers' attitude and the adoption of internet banking identified several factors that influence a person's attitude towards and the use of internet banking. These are demographic and socio-economic characteristics; prior experience with computers and technology; personal banking experiences, and; various attributes of internet banking.

Demographic and socio-economic characteristics are attributes pertaining to a population. Examples of these include, age, gender, marital status, educational qualification, income,

employment, area of residence, and ethnic background. All of these variables have been investigated in previous literature dealing with the use of internet banking. However, age, income and educational qualification are the variables that have been studied predominantly and have yielded the more significant results. Demographic and socio-economic variables result in differences among individuals, and these differences account for the varying choices that are made by these persons. It established that demographic and socio-economic characteristics have a significant impact on customers' attitudes and behaviour regarding banking on the internet (Sathye, 1999; Jayawardhena and Foley, 2000; Mattila, 2001; Karjaluoto, 2002; Karjaluoto et al., 2002; Mattila et al., 2003; Akinci et al., 2004).

DeLone (1988), Igbaria and Iivari (1995), Potosky (2002) and Hasan (2003) all suggested that prior experience with technology, especially computers, impacts on consumers' belief and attitudes towards computer related systems and technology. Additionally, Igbaria and Iivari (1995) and Kim et al. (2005) argued that previous experience with computers and technology increases the ability of an individual to competently use computers. In their study, Karjaluoto et al. (2002b) showed that past experience with computers and technology, as well as the individual's attitude towards computers influence both their attitude towards and the use of online banking services. Moreover, Black et al. (2001) found that persons who were more comfortable using the internet had more positive attitudes towards the use of internet banking.

There are a number of other factors that may result in a customer switching to internet banking as their desired choice of banking services. One such factor is the potential benefits associated with the use of internet banking services. These benefits include cost savings, timesavings, improved service, and reliability. Many studies showed that customers perceive the service provided from

internet banking as an improvement over that offered by other channels of delivery. For example, Howcroft et al. (2002) found that lower fees and the higher quality of service where the main factors contributing to the use of home-based banking services in the United Kingdom. However, bank customers in Turkey identified instant feedback, faster transactions, easy access and cost savings as some of the positive attributes pertaining to internet banking (Polatoglu and Ekin, 2001). Liao and Cheung (2002) and Gerrard and Cunningham (2003) all found that the speed of response associated with electronic banking and the rapid access to services were important attributes for individuals who used internet banking.

In addition to the factors mentioned previously, internet banking provides consumers with a more convenient way to conduct banking transactions (Lockett and Litter, 1997; Black et al., 2001; Polatoglu and Ekin, 2001; Gerrard and Cunningham, 2003). Moreover, Mols et al. (1999), Moutinho and Smith (2000) and Kolodinsky et al. (2004) found that convenience was an important consideration affecting a consumer's decision to use internet banking. Younger consumers, in particular, value the convenience of online banking and also regarded the lack of face to face contact as less important than older persons (Howcroft et al., 2002).

The previously mentioned considerations are benefits associated with internet banking and may positively influence a customer's decision with respect to the use of internet banking services. The level of complexity and concerns about the safety of an online banking transaction will now be discussed. The associated level of complexity or the ease of use of the service is a very important factor when looking at customer acceptance of any innovative service or product, such as internet banking (Daniel, 1999; Sathye, 1999; Moutinho and Smith, 2000). Sathye (1999) stated that some customers, even though they were aware of the service, were not using internet

banking in Australia because it was difficult to use. He proposed that this problem could be rectified through appropriate customer education. However, Polatoglu and Ekin (2001) reported that Turkish bank customers have sufficient understanding of computers and computer-related technology because of their relatively high educational level. Consequently, these consumers do not view internet banking services as difficult to use and there was a high acceptance of internet banking by Turkish customers. Lockett and Litter (1997) and Kolodinsky et al. (2004) also viewed the level of complexity associated with internet banking transactions as a deterring factor. Even though the level of complexity is a concern for some individuals, Laforet and Li (2005) found that this variable did not play a major role in the decision of Chinese bank customers to use online and mobile banking services.

The topic of confidentially or assurance is another major factor impacting on an individual's decision to use internet banking services and it has been discussed in many research papers (Lockett and Litter, 1997; Polatoglu and Ekin, 2001; Liao and Cheung, 2002; Gerrard and Cunningham, 2003). The risks associated with possible errors and security concerns are some of the major barriers to the acceptance of internet banking. Looking at individual studies, Gerrard and Cunningham (2003) found that both adopters and non-adopters of internet banking services were very concerned about matters relating to the confidentiality of internet banking services and that the assurance dimension was positively related to the use of internet banking. Laforet and Li (2005) also reported that respondents were concerned about the security of the bank's online system and the possibility that hackers and other third parties may be able to gain access to their account information. Additionally, Laforet and Li posited that a high rating of importance was attached other to risk factors, including the likelihood of the occurrence of fraud. Security concerns are a major deterrent to banks customers when considering the adoption of internet

banking services. If these concerns are not addressed the online banking sector in countries may only experience moderate rates of expansion. This point was reiterated when O'Connell (1996) attributed the slow growth of internet banking in Australia to concerns relating to the security of conducting banking transactions via the internet.

3. Research Methods and Data Collection

3.1 Research Methods

The primary research tool was a multi-sample project conducted between December and January 2008/2009. The authors recruited research assistant from the University of the West Indies, Cave Hill Campus to conduct the interviews in ten Caribbean countries: Antigua and Barbuda, Barbados, Dominica, Grenada, Jamaica, Montserrat, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines and Trinidad Tobago. The survey targeted a total of 4000 individuals throughout the Caribbean. Sample sizes for each country were based on population sizes (see Table 3.1). The actual number of questionnaires collected represented 89 percent of the target

Table 3.1: Sample Sizes by Country

Country	Target Sample Size	Actual Sample Size
Antigua and Barbuda	150	150
Barbados	500	545
Dominica	150	131
Grenada	150	73
Jamaica	1225	1034
Montserrat	50	50
St. Kitts and Nevis	150	137
St. Lucia	250	246
St. Vincent and the Grenadines	200	157
Trinidad and Tobago	1100	1028
Total	4000	3551

sample size. Jamaica and Trinidad and Tobago, due to their relative size accounted for almost 60 percent of the actual questionnaires collected.

The data was obtained through the use of structured questionnaires and convenience sampling. The questionnaires were developed and pre-tested in Barbados on individuals from various backgrounds. Information collected can be grouped into three main areas:

- Demographic characteristics;
- Technological background and utilisation of bank services, and;
- Utilisation of internet banking services.

In relation to demographics, background information on the gender, age, marital status, education, employment and income is collected. The technological background and utilisation of bank services section solicited responses in relation to the familiarity and usage of the computer and the internet as well as frequency and type of banking services typically done by the

individual. The final block of the questionnaire collected responses in terms of the awareness of internet banking services, usage, motivating factors and future utilisation of these services.

3.2 Sample Characteristics

Table 3.2 provides the demographic characteristics of the individuals participating in the survey. In terms of gender, two-thirds of the sample was female. This ratio was quite similar across most of the countries surveyed. The only outliers were Montserrat and Grenada, where the ratio was closer to 70:30. Age was disaggregated into six main categories: (1) 'less than 18 years'; (2) '18-25 years'; (3) '26 – 35 years'; (4) '36 – 45 years'; (5) '46 – 55 years', and; (6) '56 years and older'. The majority of respondents fell in the '18-25 years' and '26 – 35 years' range: these two categories combined accounted for about 60 percent of all respondents.

In terms of educational background, over 90 percent of the sample had at least some basic primary education, while over one-third of individuals had at least college level education. Approximately 70 percent of respondents were married and were employed full-time. In terms of income distribution, most of the participants earned less than US$20,000 per annum, with approximately 50 percent of those persons surveyed reporting that their income was between US$0 to US$20,000. In St. Vincent and the Grenadines as well as Grenada 60 percent of the respondents reported income between US$0 to US$20,000 most of the other countries clustered around the sample mean. The only exceptions were Antigua and Barbuda and Barbados where this lower income bracket was only selected by 30 percent of individuals.

Table 3.2: Descriptive Statistics

	Frequency (N)	Percentages (%)
Gender		
Male	**1398**	**40**
Female	**2101**	**60**
Age		
Less than 18 years	**89**	**2.5**
18 – 25 years	**1083**	**31.0**
26 – 35 years	**1009**	**28.9**
36 – 45 years	**672**	**19.2**
46 – 55 years	**429**	**12.3**
56 years and older	**212**	**6.1**
Marital Status		
Single	**2457**	**70.4**
Married	**1032**	**29.6**
Education		
Primary	**176**	**5.1**
Secondary	**1253**	**36.1**
Associate Degree	**838**	**24.1**
Bachelor's Degree	**863**	**24.9**
Post Graduate	**252**	**7.3**
Other	**88**	**2.5**
Employment Status		
Student	**512**	**14.7**
Unemployed	**126**	**3.6**
Employed (Part-Time)	**383**	**11.0**
Employed (Full-Time)	**2360**	**67.8**
Retired	**102**	**2.9**
Annual Income (US$)		
$0 - $10,000	**1715**	**50.4**
$10,001 - $20,000	**1095**	**32.2**
$20,001 - $30,000	**395**	**11.6**
$30,001 - $40,000	**110**	**3.2**
More than $40,000	**85**	**2.5**

Source: Authors' Calculations

4. Utilisation of Internet Banking Services

Figure 4.1 provides an assessment of the popularity of internet banking services across the Caribbean. Across the Caribbean, about one-third of individuals indicated that they had utilised internet Banking Services. The highest utilisation rates were in Antigua and Barbuda (39.3 percent), Barbados (31 percent), Jamaica (35.2 percent) and St. Kitts and Nevis (35.1 percent). In contrast, in Grenada and Montserrat less than one-fifth of individuals surveyed indicated that they use internet-banking services.

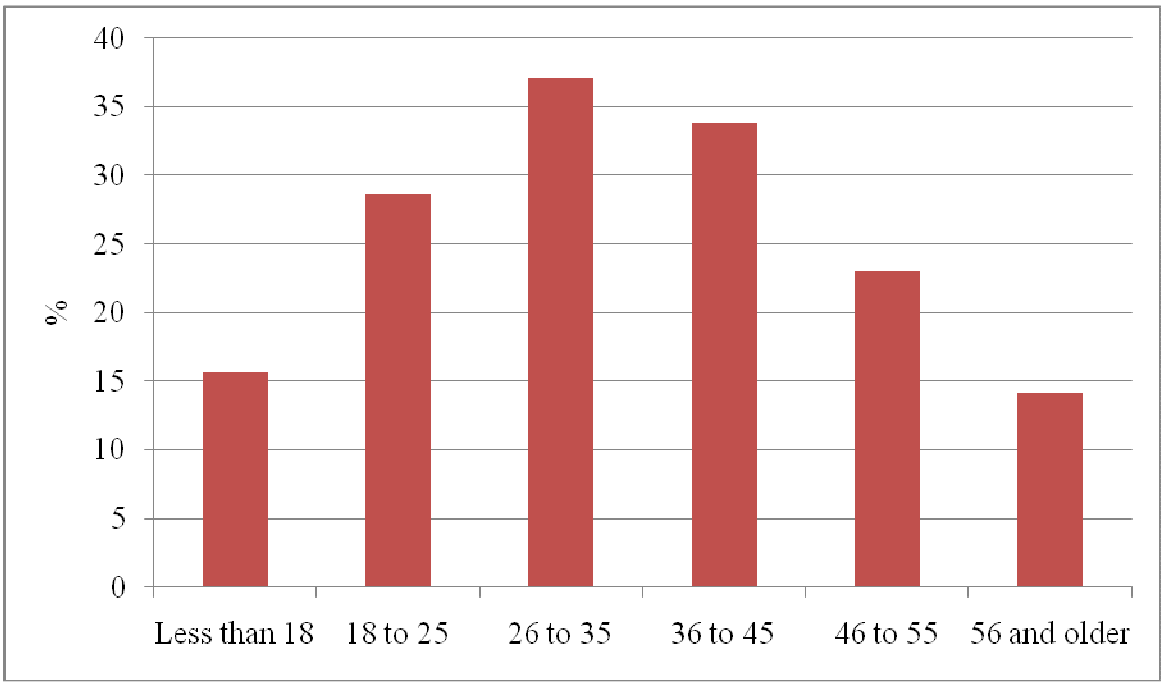
Table 4.1: Utilisation of Internet Banking Services by Country

	Yes		No		Total
Country	**Frequency**	**Percent**	**Frequency**	**Percent**	**Frequency**
Antigua and Barbuda	**53**	**39.3**	**82**	**60.7**	135
Barbados	**153**	**31.0**	**341**	**69.0**	494
Dominica	**28**	**26.4**	**78**	**73.6**	106
Grenada	**8**	**14.5**	**47**	**85.5**	55
Jamaica	**342**	**35.2**	**629**	**64.8**	971
Montserrat	**7**	**17.5**	**33**	**82.5**	40
St. Kitts and Nevis	**47**	**35.1**	**87**	**64.9**	134
St. Lucia	**59**	**27.1**	**159**	**72.9**	218
St. Vincent and Grenadines	**29**	**20.3**	**114**	**79.7**	143
Trinidad and Tobago	**262**	**28.1**	**672**	**71.9**	934

In terms of frequency of use, most (55 percent) individuals indicated that they tend to access online banking services about 1 to 3 times every month, while just under 20 percent reported that access rates of about 4 to 7 times every month. Only a few individuals (less than 6 percent of individuals surveyed) use these services more than 8 times every month. In the same way, those individuals that indicated that they do use internet banking, only 15 percent of customers utilised this service less than once per month.

It is of particular interest to identify the characteristics of those persons that presently utilise internet-banking services in the region. One of the key characteristics identified from the

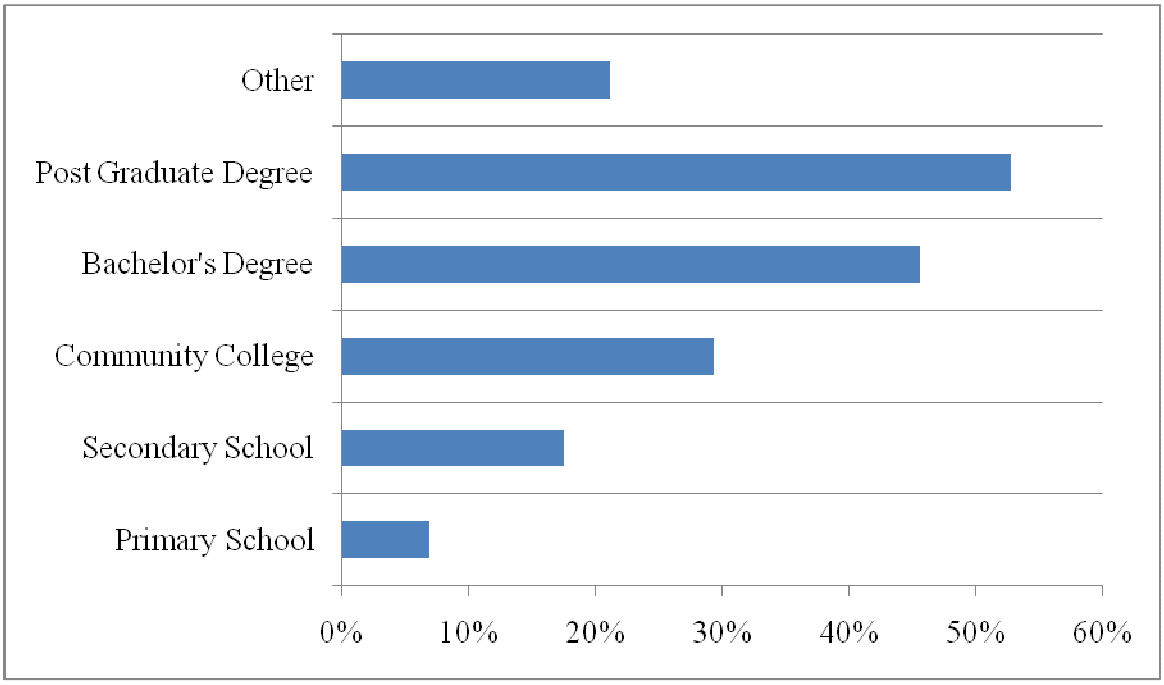
Figure 4.1: Utilisation of Internet Banking Services by Age Group (years)



the previous literature was the potential impact that an individual's age can have on adoption rates. Figure 4.1 plots the take-up rates for six age groups: less than 18 years, 18 to 25 years, 26 to 35 years, 36 to 45 years, 46 to 55 years and 56 years and older. In agreement with *a priori* expectations the 26 to 35 years cohort had the highest take up rates of any of the six age group categories considered, with almost 40 percent of this group indicating that they presently use internet-banking services. Adoption rates generally declined by age, with the 56 years and older cohort reporting the lowest internet banking adoption rate for all the age categories considered.

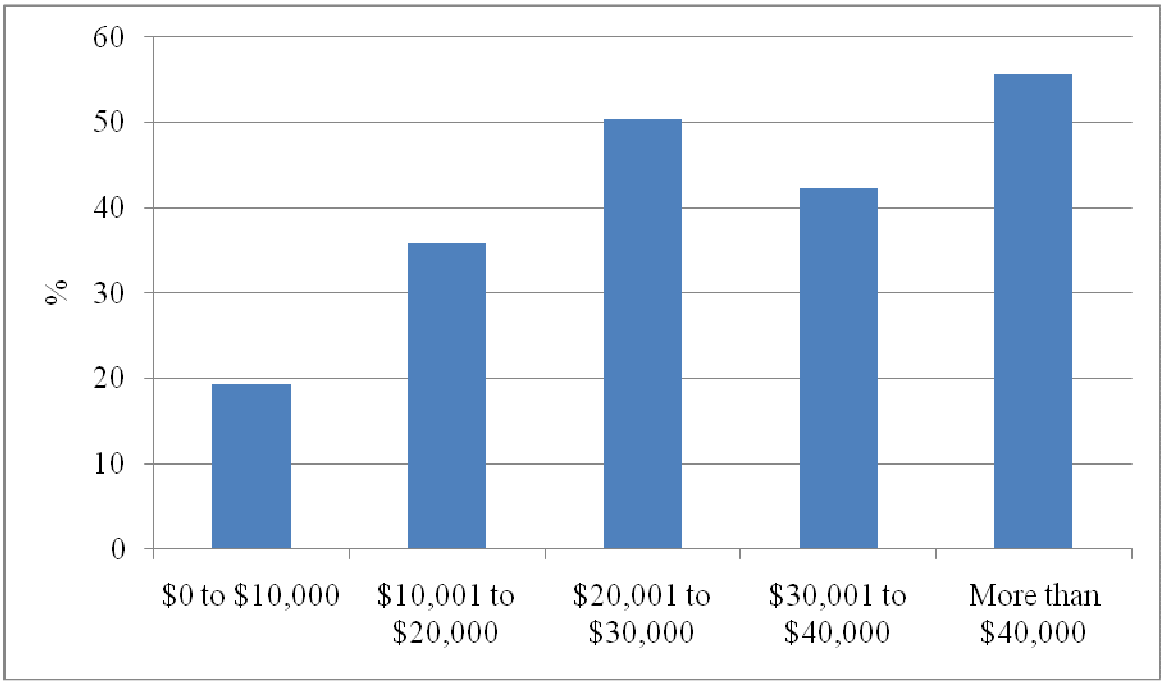
As with age, adoption rates should be related to the highest level of education attained. Individuals that are more educated are likely to have more access and experience to technological innovations. Figure 4.2 shows that adoption rates generally increase with the level of education. At the lowest level, primary school, only 7 percent of these individuals utilised internet-banking services, while the usage rate was 18 percent for individuals with secondary school education. The highest adoption rates were reported among those individuals with post-graduate (53 percent) and undergraduate degrees (46 percent).

Figure 4.2: Utilisation of Internet Banking Services by Highest Level Education Attained



Higher income individuals, due to the number of transactions that they tend to undertake, should also be more likely to use online banking services due to the relative convenience of the service. In addition, these individuals should also be more able to accommodate the fees associated with online banking. Figure 4.3 plots the utilisation rates for internet banking services for five income groups across the region: less than $10,000; $10,001 to $20,000; $20,001 to $30,000; $30,001 to 40,000, and; more than $40,000. In agreement with *a priori* expectations, use generally tended to increase with income, with the utilisation rate for individuals earning more than $40,000 being more than double that for those persons with a reported income of less than $10,000. Indeed, individuals earning more than $20,000 were 60 percent more likely to use internet-banking services.

Figure 4.3: Utilisation of Internet Banking Services by Income Level (US$)



In general, there was not a significant difference in terms of the take-up rates of males and females: 32 percent of males indicated that they presently use online financial services while 30 percent of females had a similar response. Similarly, there was also little or difference in terms of the adoption rates of married (34 percent) and single individuals (29 percent) as well as employed (32 percent) and un-employed (25 percent) persons.

The study also sought to investigate the demand for internet banking services in the future. Survey participants were asked to rate on a five-point scale with 1 being very unlikely and 5 being very likely their willingness to use internet banking services within the next 12 months and within the next 5 years. Across the region, there were no short-term plans for individuals to

adopt internet-banking services. About 46 percent of individuals indicated that they were very unlikely to use internet-banking services within the next 12 months. This finding was consistent across all ten of the Caribbean countries considered, with the figure reaching as high as 54 percent in St. Lucia and a low of 33 percent in Antigua and Barbuda.

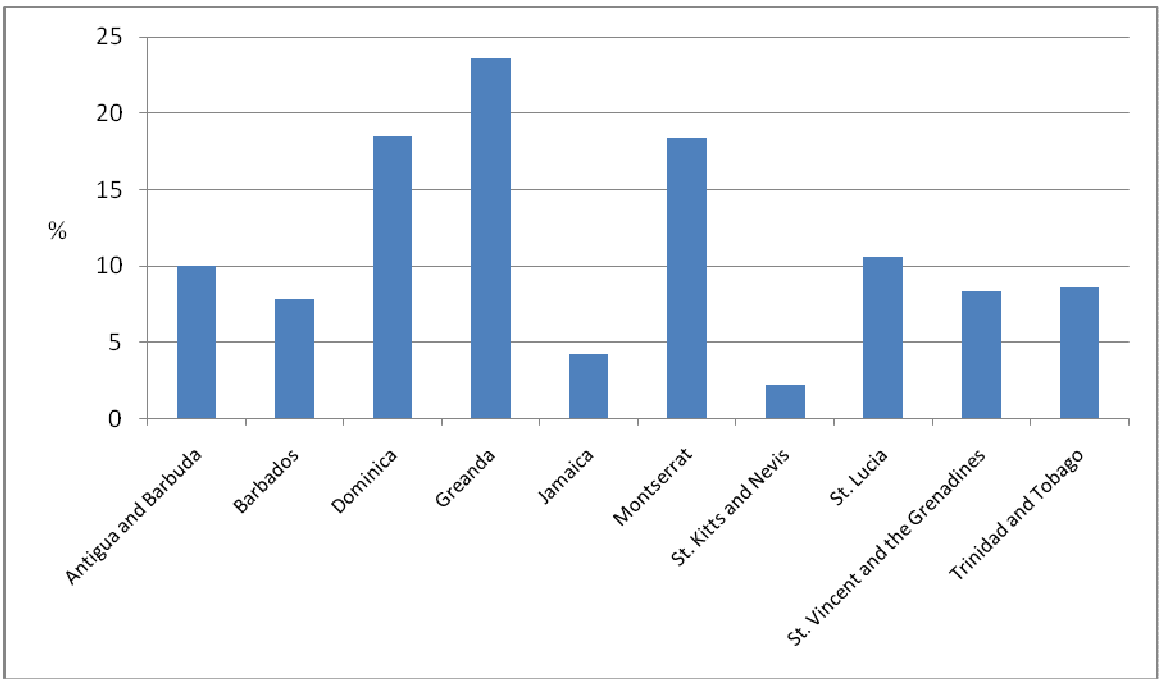
When the horizon was lengthened to 5 years, however, the findings changed somewhat. In this instance, 35 percent of individuals across the Caribbean indicated that they were either likely or very likely to use internet-banking services within the medium-term. Within Jamaica, Antigua and Barbuda and Montserrat the figure was over 40 percent. These findings suggest that while individuals in the region are somewhat averse to adopting internet-banking services in the Caribbean in the short-run there is some scope for the future growth of the industry in the next five years. In addition, as the young cohort of individuals move into the older age and higher income groups the characteristics of use could change somewhat.

5. Factors that Influence the Decision to Use Internet Banking

5.1 Survey

It is of particular interest to investigate the motivating factors behind the decision to use internet-banking services. One factor that could be potentially important is simply the awareness of these services. In general, the awareness of internet banking services was not a problem in the Caribbean: on average 89 percent of individuals indicated that they were aware of internet banking services available at their financial institution. The highest reported awareness rates were in St. Kitts and Nevis (98 percent), Jamaica (96 percent), and Barbados (92 percent). Only in Dominica and Grenada did a significant number of individuals indicate that there were unaware of the existence of these services.

Table 5.1: Proportion of Survey Participants that were Unaware of the Existence of Internet Banking Services



One of key characteristics of internet banking is its convenience. Rather than travelling to a financial institution and waiting in line to conduct their business, these activities can be completed wherever these individuals have access to internet services. Indeed the results provided in Table 5.2 suggest that convenience was the main motivating factor behind using the internet. The only other significant factor identified by survey participants was the speed of conducting transactions online.

Table 5.2: Key Motivations for Using Internet Banking Services

Country	To inquire about a balance	To pay bills	To transfer money between accounts
Overall	44.8	37.7	17.2
Antigua and Barbuda	73.1	11.5	15.4
Barbados	42.9	40.9	16.2
Dominica	70.4	7.4	18.5
Grenada	22.2	22.2	55.6
Jamaica	38.2	50.3	11.2
Montserrat	57.1	14.3	28.6
St. Kitts and Nevis	48.9	19.1	31.9
St. Lucia	13.3	58.3	28.3
St. Vincent and the Grenadines	31.0	41.4	27.6
Trinidad and Tobago	54.6	27.3	17.7

Across the region, the main motivation for using internet-banking services is simply to check individual bank balances: 45 percent of individuals indicated that that this was the main motivation for using online banking services. In Antigua and Barbuda and Dominica, more than 70 percent of individuals indicated that this was the main component of online banking services employed. Following bank inquiry transactions the next most popular activity was paying bills with 38 percent of respondents identifying this service as the main reason for using internet banking. In Jamaica and St. Lucia, more than half of all respondents identified this service as the one they engage in when they visit the websites of financial institutions. Only 17 percent of individuals indicated that their main motivation for using the internet was to transfer money between their accounts.

5.2 Econometric Model

While the analysis above can indicate the characteristics of individuals that do use internet-banking services, it cannot provide an indication of the statistical significant and the marginal effect that these factors can have on the consumers decision. To conduct this analysis a discrete choice specification is used to empirically model the decision to use internet banking. The consumer is assumed to utilise internet banking if the marginal utility (π) of doing so exceeds that of not utilising these services (π^*). The empirical model utilised is given below:

$$y_i = x_i'\delta + \varepsilon_i, \quad \varepsilon_i \sim NID(0,1) \tag{1}$$

where $y_i = 1$ if $\pi > \pi^*$ or zero otherwise. In Equation (1) above, y_i denotes the export decision, x_i is a matrix of explanatory variables thought to be related to the decision to export and δ is the coefficient vector.

The binary choice model is non-structural in form, i.e. a reduced form expression in exogenous consumer and demographic characteristics is used to identify the participation condition. The choice of variables included in the consumer choice model is based on the existing literature on the determinants of the internet banking use surveyed in Section 2. Three groups of variables are chosen: (1) frequency and number of financial transactions; (2) internet use, and; (3) demographic characteristics.

Demographic characteristics are included to control for the effects of individual characteristics on the adoption choice. More specifically younger and more educated individuals are more likely to

adopt new technologies and therefore would experience a higher level of satisfaction from the convenience attached to internet banking. Similarly, higher income individuals are more likely to use internet-banking services due to their ability to pay for the service.

A probit model, which assumes a standard normal distribution, is used to estimate the specification given in Equation (1). Thus, y_i is restricted to take values in the interval [0,1], in contrast to estimation by standard ordinary least squares. It should be noted, however, that the coefficients obtained from the probit model cannot be easily related to the probability of adopting online banking. Thus, marginal effects $\frac{\partial \Phi(x_i^{'}\beta)}{\partial x_{ik}} = \Phi(x_i^{'}\beta)\beta_k$ are calculated which give the probability that the firm is exporting given the *k-th* element in x_i these marginal effects can then be interpreted in terms of a given variable affecting the probability of adopting internet banking. This study reports the average marginal effects.

The model is estimated by the method of maximum likelihood using the Quadratic-Hill Climbing algorithm (other algorithms such as Bendt-Hall-Hausman and Netwon-Raphson are employed, but these yield similar estimation results). Since the maximum likelihood estimates are only consistent when the likelihood function is correctly specified, a test for homoscedasticity of the models errors are undertaken (see Verbeek, 2000). The generalized linear model (GLM) is used to generate robust standard errors. GLM imposes the condition that the true conditional variance of y_i is proportional to the conditional variance of the distribution used to specify the log-likelihood. Thus, when over-dispersion occurs, that is $\sigma^2 > 1$, the GLM covariance matrix has the property of being consistent and efficient (see Fahrmeir and Tutz, 1994).

5.3 Econometric Results

Table 5.4 reports the coefficients and standard errors of the explanatory variables along with some goodness of fit and test statistics for both the probit model and the linear probability model (LPM). Since the coefficients on the explanatory variables cannot be directly interpreted to indicate the probability of exporting, marginal effects are evaluated at the sample mean, and these are given in the final column of Table 5.4. The table also gives the LR statistic, which tests the null hypothesis that all of the slope coefficients except the constant can be restricted to zero. Comparing this statistic to the 5% critical value of 44.2 indicates that the null hypothesis cannot be accepted.

Table 5.4 also provides the McFadden R^2, which gives an indication of the goodness of fit of the model. The calculated statistics indicate that the estimated model performs 13% better than a model with just a constant. The predictive ability of the model can also be evaluated by examining the actual and predicted probabilities. The table suggest that the estimated model correctly is 18 percent better at predicting a non-adopter relative to the constant probability model and 16 percent better at forecasting adopters.

Table 5.4: Regression Results

	Linear Probability Model	Probit Model
Number of Bank Transactions	**0.099 (8.101)****	**0.091 (7.589)****
Use of Debit Cards	**0.169 (6.613)****	**0.206 (7.089)****
Frequency of ATM Use	**-0.052 (-4.214)****	**-0.049 (-4.050)****
Frequency of Branch Transactions	**-0.010 (-0.864)**	**-0.008 (-0.718)**
Number of Years with a Bank Account	**0.022 (1.749)***	**0.020 (1.610)**
Use of ATMS	**-0.312 (-1.217)**	**-0.358 (-1.156)**
Personal Computer Use (Hours per week)	**0.020 (2.481)****	**0.018 (2.294)****
Work-related Computer Use (Hours per week)	**0.018 (2.490)****	**0.020 (2.712)****
Internet Use (Hours per Week)	**0.042 (3.833)****	**0.047 (4.091)****
Age	**-0.049 (-3.923)****	**-0.052 (-4.023)****
Education	**0.038 (4.120)****	**0.037 (4.155)****
Employed	**0.004 (0.377)**	**0.004 (0.440)**
Income	**0.066 (5.351)****	**0.060 (4.984)****
Male	**0.019 (0.978)**	**0.021 (1.084)**
Married	**0.047 (3.323)****	**0.047 (3.419)****
McFadden R-Squared	**0.158**	**0.133**
LR Statistic	**-**	**409.454 [0.000]**

Notes: (1) ** and * indicates significance at the 5 and 10 percent levels of testing.

More formally, one can calculate Hosmer and Lemeshow (1984) and Andrews (1988) goodness-of-fit tests. These tests compare the fitted expected values to the actual values by group, and; if the differences are large the model can be rejected as providing an insufficient fit to the data. Calculating the Hosmer-Lemeshow and Andrews's test statistics the author obtains values of 4.03 and 5.89, respectively, which were statistically insignificant at normal levels of testing. It can therefore be concluded that the model adequately predicts internet-banking participation.

Given that the model provides an adequate representation of internet banking adoption, the coefficient estimates are now evaluated. Turning to the coefficient estimates, one notices that the results agree with *a priori* reasoning in most instances. The use of debit cards had the largest absolute impact on the decision to adopt internet-banking services: individuals that use debit cards to mark purchases were 20 percent more likely to adopt online banking. Related to convenience, customers that conducted a larger number of transactions were significantly more likely to take-on online banking. Other statistically significant factors that enhanced the probability of adopting internet banking were computer use for personal and work, use of the internet, educational level, income and marital status.

Of the potential determinants of the adoption of internet banking, the frequency of ATM use and age were inversely related online banking. The negative coefficient on the age variable suggests that younger individuals are more likely to adopt these services. The coefficient on the frequency of ATM use, however, was somewhat surprising. However, it could indicate that individuals that have a high intensity of ATM use may be substituting this service for online banking.

6. Conclusions and Policy Recommendations

The financial industry plays a key role in the development of any country. The industry plays a key role in the production of information about potential investment projects, monitoring of investments, trading, diversification and risk management, mobilisation and pooling of savings and the exchange of goods and services (Levine, 2005). Each of these functions can influence national savings and investment decisions, and as a result economic growth.

Given the importance of the financial industry to overall economic activity in the Caribbean, it is important to monitor and assess potential new developments in the industry. One such development is internet banking. The main goal of the present study is to provide individuals working in the financial industry some assessment of Caribbean people's attitudes and perception of internet banking. As a result, the study interviewed over 3,000 individuals in 10 Caribbean countries. The responses span a range of individuals with various socio-economic backgrounds and therefore allow the researchers to assess the characteristics of individuals that are currently using online banking services and those that might do so in the future.

The results from the survey suggest that about one-third of individuals in the Caribbean indicated that they had utilised internet Banking Services. The highest utilisation rates were in Antigua and Barbuda (39.3 percent), Barbados (31 percent), Jamaica (35.2 percent) and St. Kitts and Nevis (35.1 percent). In contrast, in Grenada and Montserrat less than one-fifth of individuals surveyed indicated that they use internet-banking services. In terms of frequency of use, most (55 percent) individuals indicated that they tend to access online banking services about 1 to 3 times every month.

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