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The Impact of Increased Credit Card Usage on Costs Incurred by Merchant Establishments in Singapore*

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Abstract

The research aims to help merchant acquiring institutions gain a better insight on what merchant establishments in the Singapore market perceive of the costs they incur due to credit card acceptance. The research attempts to study the Singapore market and establish if increased credit card usage does increase costs for the merchant establishments that accept credit cards, this will help to acquire institutions in Singapore have a better understanding of merchant perceptions and what drives or deters credit card acceptance in the Singapore market. The survey was based on an interview of merchant establishments and the views of the merchants and was not based on their financial data. As a first step, the variables used in the survey were tested for interdependence using Chi-square tests; subsequently data reduction using factor analysis was performed and finally linear regression to establish a relation between dependent and independent variables. Merchant establishments believe accepting credit cards and increasing volume is costlier compared to another form of payment, but have mixed awareness about interchange fee. It also indicated that interchange fee and cardholder benefits are independent of the merchant establishments. The study only broadly attempts to gauge merchants view if increased credit card usage has increased costs for them.

Keywords: Credit Card, Interchange Fee, Association Fee, Credit Card Payment.

JEL Classification Codes: G10, L10, M10, M21.

1. Introduction

In the recent past, there has been a lot of discussion in the payment systems space over costs that merchant establishments incur over credit card acceptance and the upward trend of these costs. Especially in the US, merchant establishments have for long been raising concerns about increased interchange costs that are eventually increasing

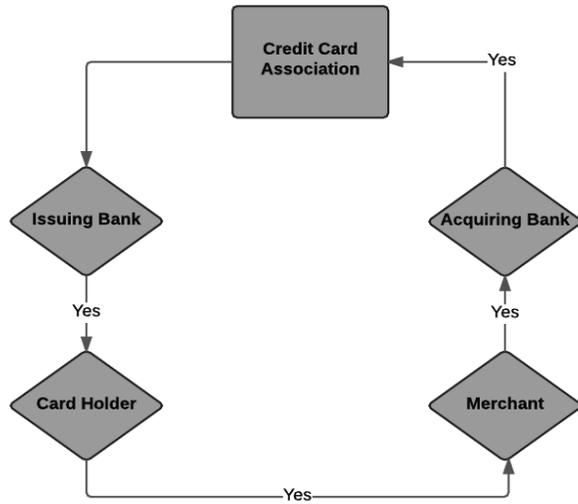
the merchant service charges they pay to their acquiring banks, leading to regulations imposed by the government around the level of interchange that card networks can charge. There have not been much of these discussions and concerns heard in the local Singapore market, but this may not necessarily imply that Singapore merchant establishments are indifferent to processing costs associated with credit card acceptance. The research attempts to study the Singapore market and establish if increased credit card usage does increase costs for the merchant establishments that accept credit cards, and analyze merchant perceptions of the cheapest form of payment option that the establishment can offer.

1.1. The Basics of a Credit Card Payment System

A merchant establishment offers various payment options to a customer as a means to pay for their purchases namely cash, cheque, store credit and payment cards. On the payment cards space, the merchant could accept charge cards, debit cards, credit cards. In a credit card transaction, the card issuing bank provides a credit facility to the

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customer up to a certain credit limit and the customer can pay-off his balance over a period of time, subject to interest costs (see <Figure 1>).



<Figure 1> Credit card payment system network

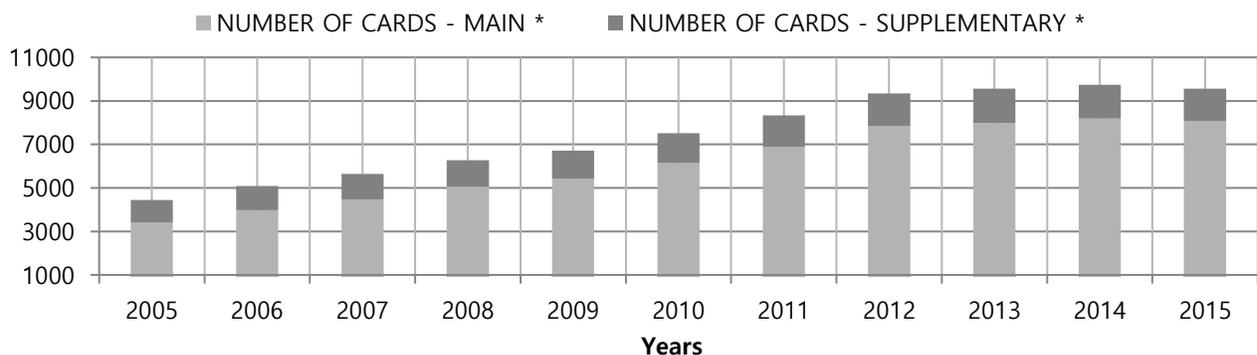
The card association ensures proper functioning of the overall system and facilitates funds transfer between the issuing and acquiring banks. It brings together the other four players in the system, acting as an intermediary in the process. The issuing bank settles for the transaction overnight by paying the acquiring bank through the association, though the issuing bank receives payment from the credit card holder only when the payment is due from the cardholder’s perspective. So the issuing bank guarantees the payment to the acquiring bank while bearing the risk of default by the cardholder. The credit card issuing bank thus assumes all the credit risk, while the merchant establishment secures the sale and boosts its revenue. For this, the issuing bank charges the merchant (through the acquiring bank) what is called as the interchange fee. The interchange fee rates are set by the card association

depending on the type of card used, the type of transaction, type of purchase etc. so there is standardization of the interchange fees and the issuing banks cannot set differential charges. When the issuing bank settles the transaction with the acquiring bank, it withholds the interchange fee and settles the rest of the transaction amount. Now a day’s cardholder does not pay the annual fee and still receives rewards for using and paying through credit card. The interchange fee thus forms a significant portion of the revenue that the issuing bank earns.

For providing credit card acceptance services, the acquiring bank charges a merchant servicing fee to the merchant establishment availing the services. The interchange fees that the acquiring bank pays to the issuing bank would be part of this merchant service charge – hence effectively it is charged back to the merchant establishment that accepted the credit card. So eventually the acquiring bank will pay the merchant for the original transaction less the merchant service fee (a.k.a. merchant discount in some markets), one part of which would be the interchange fee. Thus for every credit card sale, the merchant effectively gets paid by the acquiring bank less than the original sale amount that the cardholder swiped his card for. So the merchant pays for the incentives the credit card holder receives. But it may not be just the merchants who pay. If the merchant does not discriminate price between customers paying through credit card and those paying by say, cash, the cash paying customer also pays for the incentives the credit cardholder receives vis-a-vis the credit period, zero annual fee and rewards.

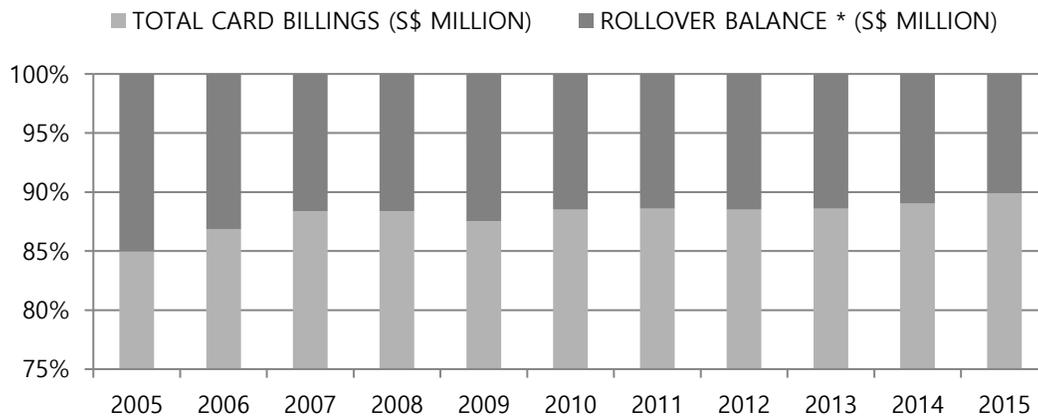
1.2. Recent Trends in Credit Card Take up in Singapore

Singapore is seen as a mature market for the credit card space with a number of leading card issuers wooing customers. The number credit cards in circulation in the market have more than doubled in the last 10 years (see <Figure 2> and <Figure 3>).



Data source: Monetary Authority of Singapore

<Figure 2> Trends in credit card take-up in Singapore from 2005-2015



Data source: Monetary Authority of Singapore

<Figure 3> Depicts credit card spend and repayment behaviour between year 2005-2015

Singapore households have multiple cards because there are benefits such as discount and promotions and access to promotions that are offered through one credit card may offer through one credit card but not another. There has been a strong growth of main cards at a growth rate of 136% since 2005 where as supplementary cards have grown by a marginal increase of 45%. Total card billing has increased considerably from \$3600 per card per year to \$ 4924 where as rollover balances have increased from \$2700 per card per year to \$4900. Bad debts written off have increased by 133% to charge-off rate increased by only 18%.

This increase in usage of credit cards may have its own implications for the merchants who accept (or not) credit cards as a payment method. The increase in credit card usage would mean, increased merchant discount the merchants would have to pay to their acquiring institutions, as the same sale, if accepted by cash, would not incur the merchant discount. Also, where merchants do not employ price discrimination, i.e. the merchant establishment sets the same price for cash paying and credit card paying customers and assuming the merchant establishment has pegged up the price to cover merchant discount costs, the surplus paid by the cash paying merchant will be reduced while the merchant also has to pay merchant discount on the credit card transaction.

2. Research Problem

Even in a mature market like Singapore, many a time, we find that some merchants prefer to accept payment by cash or NETS (Network for Electronic Transfers (Singapore)) – a

local debit payment network owned and run by local banks in Singapore). In some cases, there is an additional charge if payment is by credit card. In others, there is a minimum purchase amount stipulated for accepting credit card as a payment method. All of these indicate that in spite of the deep and wide penetration of credit cards, there is still some reluctance for acceptance of credit cards and the patterns above could indicate that costs of accepting a credit card could be a factor for such behavior by merchants.

- a) To study whether increase use of credit card and Interchange fee influenced the cost of credit card acceptance in Singapore.
- b) Secondly, whether merchant establishment in Singapore perceives accepting credit cards as a costly payment mechanism.

2.1. Research Objective

Study and review of literature around credit card acceptance and interchange fees coupled with the fact that even in an advanced market like Singapore, we notice some retailers and merchants showing reluctance to accept credit cards for purchases below a certain dollar value or charging extra for a credit card payment, we felt it necessary to study the Singapore credit card acceptance market. Many studies have been done on the consumer choice of credit card as a payment method and the costs involved. But there seems to be a dearth of studies around merchant acceptance of credit cards. This was quite astonishing as the merchants form a critical part of the payment systems value chain and if card acceptance levels go down, it has a direct impact on the

credit card usage and issuance, impacting issuers and associations alike.

The objectives of this paper are to look at the Singapore card acceptance market and to,

- a) Explore current practices of merchants and their view and perceptions of the credit card payment systems and costs involved with it.
- b) Examine drivers for credit card acceptance by retailers.
- c) Analyze significant difference in demographics of merchants who are indifferent to accepting credit cards and those who are not.
- d) Examine the role the merchant discount fee paid by the merchant plays in the card acceptance decision.
- e) Examine the role Interchange Fees plays to the costs incurred by merchants and awareness of interchange fees by merchants.

The research is aimed at helping merchant acquiring institutions gain a better insight on what merchant establishments in the Singapore market perceive of the costs they incur due to credit card acceptance. It is expected to establish the views of merchant establishments if charges fees that they pay to their acquiring banks are hurting their bottom line. It's also expected to bring out the demographics of different kinds of merchant establishments and their perceptions of merchant discounts rates and credit card acceptance preferences of those establishments – this will help to acquire banks to better target specific segments of merchant establishments segments with special plans as required.

The managerial implications of the research would be for the decisions taken by merchant acquirers around pricing the merchant discount rate for merchant establishments. According to a recent report from the Lafferty Group, a major provider of advanced knowledge services for the financial industry worldwide, the merchant acquiring business has in the recent past become a low-margin business, where massive scale is an essential prerequisite to profitability. This is due to continue pressure in mature markets over the merchant discount or merchant service charge which is a direct result due to pressure on the interchange.

2.2. Research Hypothesis

The findings out of this research will help merchant acquiring institutions assess merchant establishment perceptions of current merchant service charges and if it is a significant factor in the establishment's decision in accepting credit cards for their sales. This is important in the payment

system eco system as these decisions by the merchant establishment has a direct impact on customer's usage and take up of credit cards.

H1: Merchant Costs of accepting credit cards are expected to be high when merchant discount paid is high.

H2: Merchant Costs of accepting credit cards are expected to be high when the merchant does not employ price discrimination.

H3: Merchant Costs of accepting credit cards are expected to be high when volume of credit card transactions is high and the merchant discount is not volume based.

H4: Merchant Costs of accepting credit cards are expected to be high when interchange fees are high.

H5: Merchant Costs of accepting credit cards are expected to be high when cardholder benefits are high.

2.3. Scope of Research

The Scope of this research will be restricted to the Singapore market and to perceptions of merchant establishments and also if they perceive their cost to have gone up due to credit card acceptance. The paper does not intend to study the actual financials and costs structures of merchant establishments, but will rather be based on a survey interview of merchant establishments and opinions drawn out of their daily experience. The scope of the research will also be restricted to studying credit card acceptance and not other forms of payment cards. Using both qualitative and quantitative research techniques, the paper attempts to validate findings from past papers on the subject against real merchant perception data from the Singapore market.

3. Review of Literature

3.1. Costs incurred by Merchant Establishment:

The basis of this paper is determining if merchant establishments in Singapore perceive their costs to have gone up due to increase in a volume of credit card transactions. A review of the literature on financial services pricing reveals that a number of authors have underlined the importance of pricing for financial services providers (Avlonitis & Indounas, 2015). Hence cost incurred by merchant establishments is viewed as the dependent variable. The Cost incurred by merchant establishments is dependent on a number of other independent variables like the merchant discount paid by the establishment, the volume of credit card transactions, benefits realized by

cardholders upon using credit cards, price discrimination measures, if any, adopted by the establishment. Credit card markets are called "two-sided markets," where each side, prospective card-holders or merchant (Guseva, 2015).

Arango and Taylor (2008) describe the type of costs the merchant bears to support credit card acceptance vis-a-vis the rental paid for the point of sale terminal, monthly charges for communication lines, charges for maintenance and upgrades etc. they categorize these costs as these fixed costs. Arango and Taylor (2008) further describe the variable costs borne by the merchants - merchants incur a set fee for every debit card transaction and a percentage fee for every credit card transaction. The credit card fee, known as the merchant's discount rate, is applied to the total value of the transaction. In addition to the discount rate, some merchants pay a flat transaction fee and face a minimum monthly charge if their credit card fees do not reach a certain threshold. Rysman (2007) argues that many merchants accept more than one network and in spite of some networks being cheaper to tie up with (like Discover) than others (like Visa), there are more merchants who accept Visa but not Discover suggesting there are other perceived costs/benefits involved when merchants choose a network e.g. fixed costs involved, high consumer benefits which may cause consumers to spend more, the way the networks report information on sales and remittances etc. (Jalbert, Stewart, & Martin, 2010). The benefits are twofold, offerings of bank get optimized so as individuals can optimize their payment patterns.

Also important is to compare the costs and also intangible benefits of other types of payment options of merchants with the costs of credit card acceptance. Bolt and Chakravorti (2005) note that some merchants have started to accept only card payments for safety and convenient reasons. They also cite Rafsanjani (2006), noting the case of a cafe that stopped accepting cash because the cost of safekeeping cash was too expensive. This fascinating study of the creation of credit card markets around global is the latest and most expansive work on the subject benefit accruing credit cards is large, in comparison to opportunity cost of cash payments (Jalbert et al., 2010; Yenkey, Akos, & Alya, 2015).

The US Government Accountability Office report on Credit Card Interchange Fees findings establish that in the US, fees that merchants pay for accepting credit cards have increased over time and this may be related to the competition for issuers in the credit card market. The report also cites that the reasons for the increase in merchant card acceptance costs include consumers increasing use of credit and debit cards and the increase in fee rates.

3.2. Merchant Discount/fees charged by acquirer:

Merchant credit card fees have been subject to the numerous antitrust actions, private class-action lawsuits and scholarly criticism alleging collusion among credit card companies (Merchant, 2016). Despite these criticisms, the credit card usage is on increase. The merchant discount is the most direct cost that a merchant establishment incurs as a result of accepting credit card as a payment method from their customers. Chakravorti and Emmons (2003) cite that a large component of a merchant's cost of accepting credit cards is the merchant discount, the portion of the transactions that the acquirer retains as its fee. To determine the optimal values of an issuer's interchange fee rate, Guo, Leng, and Wang (2012) have considered two different scenarios using acquirer's merchant discount rate, and a merchant's retail price in a credit card network. In the first scenario authors have followed two-stage procedures, first stage is where the issuer and the acquirer initially negotiate the interchange fee rate, and during second stage acquirer and the retailer subsequently determine their merchant discount rate and retail price, respectively. In the second scenario Guo et al. (2012) have developed a three-player cooperative game forming a grand coalition within the issuer, the acquirer, and the merchant and subsequently bargain over the interchange fee rate and the merchant discount rate.

As mentioned earlier, Arango and Taylor (2008) establish that merchants pay a set fee for debit card transactions and a percentage fee for credit card transactions – called the discount rate. In addition merchants may pay a flat fee per transactions and sometimes are also penalized if the monthly discount does not reach a certain threshold. Loke and Yiing (2008) in a study of merchants in Malaysia say that, while it does not cost the cardholder much, merchants still have to pay a certain percentage of sales to their banks to process credit cards. Merchant discount waivers are apparently unheard of in Malaysia. Loke and Yiing (2008) further say that as merchants have to pay 1.5 – 5 % discount for credit card payments to the banks, some merchants impose a surcharge either in the form of an additional percentage of the transactions value or in the form of a minimum purchase amount (Jalbert, Stewart, & Mercedes, 2008). Low interest rate offered by financial institutions increase possibility of earning arbitrage profit. DeGennaro (2006) counter argues and says that most merchants are small and will not be able to dedicate resources to design effective procedures like fraud protection etc. and the merchant acquirer adds value by supplementing them. The merchant discount rate, as per DeGennaro (2006) provides a means for the acquirer to give

incentives without mandating specific procedures for each merchant, effectively arguing that the merchant discount also provides benefits to the merchants in terms of the services they receive.

3.3. Price Discrimination:

Price discrimination is adopted by merchant establishments either in the form of an additional surcharge/service fee for accepting credit card as the payment instrument or by offering a discount to payment by other sources. Card associations typically used to impose a NSR (no surcharge rule) that prevent merchant establishments from passing on additional costs they incur by accepting credit cards on to the consumers using credit cards to pay. Credit cards play an important role in consumer finances (Agarwal, Chomsisengphet, Liu, & Souleles, 2015).

Gans and King (2003) note that some countries like Australia bought in regulation that removes the NSR and allows merchants to surcharge card payments as part of efforts to regulate and control high interchange fees. This is basically allowing merchants to price discriminate and was expected to allay some of the merchants' concerns over high interchange fees. Majority of participants paid a roughly 5% premium to buy products (Acquisti, Brandimarte, & Loewenstein, 2015). Chakravorti et al. (2003) in their paper summarize following points with regards to price discrimination employed by merchant establishments:

- a) If merchant establishments employ price discrimination between cash payments and credit card payments, only customers having liquidity issues may tend to use credit cards for payments, thus credit card costs will be borne entirely by credit card holders.
- b) If merchants do not employ price discrimination, and there is no incentives for credit card holders who do not revolve balances, only customers having liquidity issues may be attracted towards merchant establishments that accept card payments.
- c) If merchants do not employ price discrimination, and there are incentives for credit card holders who do not revolve balances, all credit card holders will be attracted – the customers with liquidity issues will pay for the incentives to those revolving balances.
- d) A system where merchants charge different prices would be cheaper for the society than a system where merchants charge the same price and revolvers are rewarded.

When a merchant does not employ price discrimination, the view that a cash paying customer actually subsidizes the

benefits released by credit card paying consumers was first discussed by Carlton and Frankel (1995) and then by Frankel (1998). Katz (2001), Gans et al. (2003) Shwartz and Vincent (2006) and Chakravorti et al. (2003) point out, when a merchant chooses to differentially price goods for credit card and non-credit card paying consumers, the credit card payer entirely pays up for the subsidies and rewards that are provided by the credit card issuer and the cash paying customer is not penalized with higher prices.

Bolt and Chakravorti (2010) argue that while consumers generally react to price incentives at the point of sale, merchant establishments are reluctant to charge higher prices to consumers who benefit from card use. Chakravorti and Shah (2003) are puzzled by the decision by most merchants not to charge higher prices to their credit card customers as merchant establishments face higher costs to process credit card transactions. They argue that merchants accept credit cards because they expect their profits would be lower if they did not. Chakravorti et al. (2003) also cite the case of gasoline stations that Barron, Staten and Umbeck (1992) found that gas stations that charged a single price for all consumers (regardless of the payment method) actually were charging a higher price to cash consumers than stations that employed differential pricing for cash vs credit card. They found that the gas station operators imposed these price discrimination policies when their credit card processing charges were high. It is clear and we can comfortably conclude that while the associations enforce a no-surcharge rule, merchants still employ either differential pricing or discounts for payments by cash when they find that their credit card acceptance costs are high. Bolt and Schmiedel (2013) argue that factors such as safety, income uncertainty, default risk, and the merchant's handling cost of cash into account should be considered while determining optimal consumer and merchant fees.

3.4. Benefits Realized by Cardholders:

Credit card payments provide a number of benefits to cardholders. Apart from the convenience part of credit card payments, the cardholders (who do not revolve balances) enjoy an interest-free period between the time of purchase and the time of their repayment to the issuer. And those customers with short-term liquidity issues enjoy the benefit of credit for their living expenses at an interest charged by the issuer. And furthermore, cardholders enjoy rewards and benefits provided by the issuers. The use of credit cards is fast becoming the most efficient and stress-free way of purchasing goods and services; as it can be used both physically and online (Fashoto, Owolabi, Adeleye, & Wandera, 2016).

Schuh, Shy and Stavins (2010) discuss who gains and who loses from credit card payments in their paper and summarize their findings as below:

- a) Customers paying by cash subsidize those paying by credit cards
- b) Credit card holders in low-income households subsidize those in high-income households.
- c) Credit card holders in low-income households take on a large part of merchant's cost as they tend to pay by cash more often.
- d) Cash paying customers do not receive any rewards, while credit card holders in high-income households receive the maximum rewards.
- e) Banks net position with credit card holders is a loss but banks' income from cash paying customers make up for this loss.
- f) Payment by credit card of those who do not revolve balances pushes up the retail price.

Bolt and Chakravorti (2008) observe that cardholders react to price incentives when they purchase goods – like higher rewards etc. Zywicki (2010) agrees that Rewards and other benefits offered by many credit cards provide an effective discount to the card holders which lead to increased spending at merchants' shops.

Jalbert et al. (2010) state that consumers' credit card rewards represent a method for cardholders to transfer part of the purchase cost to the retailer. They conclude saying that there are substantial benefits for using credit cards offering frequent flyer miles. These incentives are sufficient to motivate most individuals to take necessary actions to realize these benefits. Jalbert et al. (2010) further say that paying for purchases with credit cards appear to be more rational than using cash and that, individuals using cash rather than credit cards as a mean to control their spending and as men to be averse to potential financial charges, are using a costly budgeting method. Koritos, Koronios and Stathakopoulos (2014) classified and compared the importance of benefits derived by consumers in affinity credit card programs. It was found that functional benefits were outperformed by the relational benefits of affinity credit cards. This also depended on a number of additional credit cards held by affinity card holders.

3.5. Interchange Fees set by Associations:

Interchange fees set by the card associations form the major part of the merchant discount paid by the merchant establishments to their acquiring banks. The interchange fee is usually charged by the consumer or cardholder's bank to the merchant's bank in order to facilitate the payment transaction. The interchange fee is charged by the issuer to

cover the risks that the issuer is exposed to by facilitating the credit. As Schmalensee (2002) puts it, —The main economic role of the interchange fee is to shift costs between issuers and acquirers and thus to shift charges between merchants and consumers to enhance the value of the payment system as a whole to its owners. Transaction volume as well as acceptance level by merchants and consumer increases with reduction in interchange fee (Valverde, Chakravorti, & Fernández, 2016a). Fee has a positive impact card market but it restricts competition and also entry on new innovative products (Harasim, 2013).

Harris (2010) in his white paper on Interchange plus pricing says that interchange fees are usually based on 3 components

- a) *The type of credit or debit card used for the transaction:* There are 581 different card types for Master Card and 404 types for Visa as of Oct 2010 and it is almost impossible for merchant establishments to track the rates across the different types.
- b) *The type of merchandise that is purchased:* This is basically tied to the merchant type or the MCC code (merchant category code) the merchant establishment is classified under. The MCC is assigned by the acquirer based what product or service the merchant establishment sells. For e.g. Super markets are usually afforded discounted rates over a doctor's office or a store selling sports goods etc. Travel, utility and service stations typically get a special rate as well.
- c) *The type of transaction:* For example, paper based transaction, internet etc. A CNP (card not present) transaction. Interchange fees vary by how the transaction was executed and the riskiness associated with the mode of the transaction. For E.g., retail environments where the card is usually present get a preferred rate while transactions performed online or through a gateway are charged premium rates.

Frankel and Shampine (2006) state that Interchange fees establish the major component of acquirers' marginal costs for processing transactions and account for most of the fees paid by merchants to acquirers for processing credit card transactions—the —merchant discount. He also argues that the interchange fee can be viewed as a commission that the issuer receives each time a cardholder transacts with the card. The increase in interchange fee will increase profits for the issuer. And since the interchange fees are anyway high, even if the cardholder does not pay fees (like annual fees) the issuer still remains profitable. Issuers tend to pass on some of these profits to the cardholders in terms of rewards and other benefits. According to Guthrie and Wright (2007) there is lower interchange fee in single payment association in comparison to competing card schemes under

homogeneity of merchants which differs when are heterogeneous. Gans et al. (2003) cite that the interchange fee that is paid from the merchant establishments bank to the cardholders bank is collectively set by issuers and acquirers, and as merchant establishments pass it on to all customers (where there is no price discrimination), they argue that banks can set a high interchange fee to capture more fees from merchants without loss in credit card usage. Gans et al. (2003) also argue that as the interchange fee flows into the card issuers, the issuers might set very low or in some cases negative cardholder fees. As interchange fees increases, the merchant discount paid by merchant establishments increases, cardholder fees charged by issuers decreases and the value of perks and rebates offered by the issuer to the cardholder increases.

Frankel et al. (2006) also argue that interchange fees artificially increase transaction costs and that interchange fee forces consumers to use more costly payment methods. They say that if interchange fees fall, banks will pass on the benefits to merchant establishments by reducing the merchant discount revenue. Gans and King (2003) also critically examine in detail actions by Australian regulator, the Reserve Bank of Australia, which brought in a regulation that effectively amounted to direct regulation of the interchange fee set the be associations in the Australian market. They conclude by saying it is not certain that the regulated approach to interchange fees adopted by the RBA will lead to lower transaction costs. Baxter (2003) argued that because the payment system volume is determined by both card issuers and merchant acquirers, and the fact that

the interchange fee merely shifts cost between the two sides, —collective determination of the interchange fee is not ordinary anti- competitive price-fixing”. Baxter also demonstrated that under perfect competition among issuers and acquirers, the socially optimal interchange fee is generally zero. Valverde, Chakravorti and Fernandez (2016) concluded that there was a strong correlation of the interchange fees with the process of credit card transactions.

4. Research Methodology

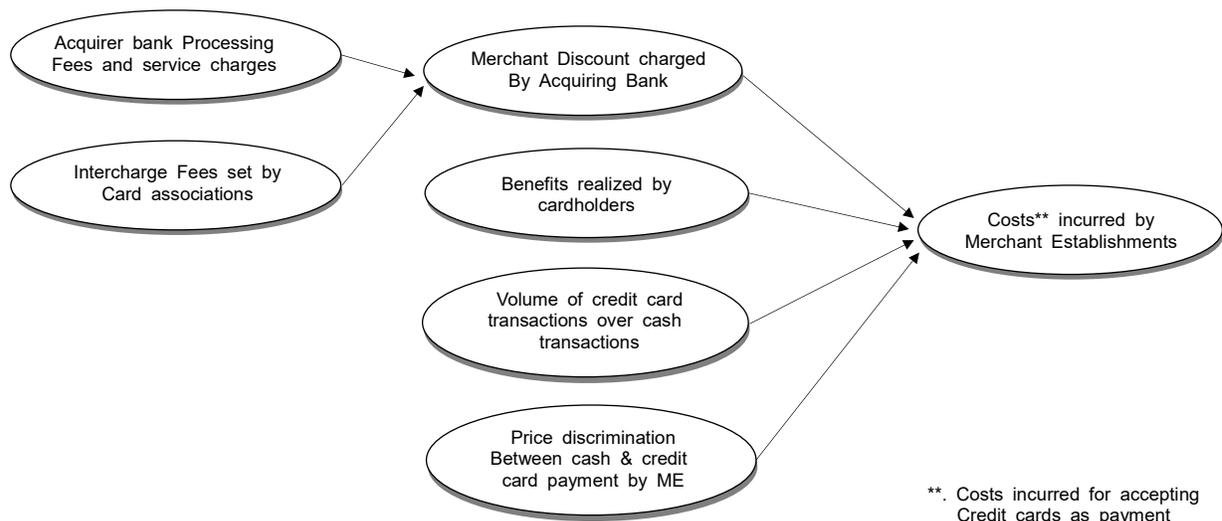
This paper employs both qualitative and quantitative research techniques, bringing together the findings so far from past papers and data from a survey and analyzing specifics related to the Singapore market. Existing literature on card acceptance, payments systems, and interchange fees were studied as part of qualitative research to analyze cost structures for card acceptance systems, interchange fee impact and challenges faced by all parties in the payment eco system. Quantitative research carried out through a survey of retailers/merchants and consumers in Singapore.

4.1. The Research Framework:

The research framework used and the dependent and independent variables proposed as part of the research is detailed in the following section (see Figure 4).

Research Framework

Factors Influencing Costs** incurred by Merchant Establishment



** Costs incurred for accepting Credit cards as payment

<Figure 4> Factors influencing costs incurred by Merchant Establishments

Acquiring Bank Processing fees & charges:

The fees and charges the merchant establishment's bank charges the merchant will have a direct impact on the merchant costs of accepting credit card payments.

Interchange Fees:

Interchange fees are fees set by the card association based on the merchant type, card type, and transaction type and are paid by the acquiring bank to the issuing bank. This is typically passed on to the merchant by the acquiring bank.

Merchant Discount charged by acquiring bank:

The merchant discount comprises of the acquiring bank's processing fee and the interchange fee. Depending on the type of merchant discount structure, the interchange fee may be hidden within the merchant discount.

Benefits realized by cardholders:

Card issuers provide credit card holders incentives for using their card. This incentive basically comes out of the interchange fee that the card issuing bank earns for every transaction. Further, the cardholder also gets an interest free credit for a maximum of up to 45 days if the full balance of the credit card statement is paid. If a card is of high.

Volume of credit card transactions over cash transactions:

The volume of credit card transactions over cash transactions will determine what percentage of credit card acceptance costs that the cash paying customer subsidizes as the merchant charges the same price for either form of payment.

Price discrimination between cash & credit payments by ME:

If the merchant establishment chooses to set different prices for credit card and cash payments, this will have a certain impact on the credit card acceptance costs for the merchant establishment.

4.2. Sources of Data

A survey of merchant establishments in Singapore was conducted to capture their demographics, usage, and perceptions of accepting credit cards. The survey was conducted as a walk in the survey to merchant establishments capturing their responses through an interview of pre-designed questions. While the targeted size for responses was around 200, the actual sample size post survey turned out to be 107. Secondary data research was based on the study of data from industry sources, journals, and papers.

4.3. Statistical Techniques or Tools

The survey results were analyzed with the help of the SPSS statistical package and following techniques were used. As a first step, the variables used in the survey were

tested for interdependence. Chi-square tests were used to identify if certain variables are related to the dependent variable. Factor analysis was used in this case to generate hypotheses regarding casual mechanisms, to identify co linearity prior to performing linear regression analysis. Based on the chi-square test performed initially, independent variables were selected and used to reduce the number of variables to common factors. Subsequently linear regression was performed between the dependant variable – the response from merchant establishments if they thought increased volume of credit card transactions has increased cost for them – against a set of independent variables namely the factors obtained from factor analysis in which variables like interchange fees, cardholder benefits, price discrimination etc, were reduced to a few factors.

5. Discussion, Analysis, and Findings

5.1. Survey Background & first level data analysis / insights:

A survey was conducted on about 107 merchant establishments in Singapore located in popular malls like the Tampines Mall, Century Plaza, Parkway Parade, Marina Square and Suntec City Mall. Of the 107 merchant establishments interviewed, 89 merchants responded that they accept credit cards in their shop while the remaining responded that they accept only Cash and/or NETS but responded with their views on credit card acceptance. Another observation just based on initial analysis of the data gathered was that over 50% of the merchant establishments said that they would rather prefer Cash or NETS over credit card payments.

Based on the response, in Singapore, merchant discount by way of a flat percentage per transactions seemed to be the most prevalent type of discount method followed and less than 1/4th of the merchants interviewed thought that the discount rates were low.

The most interesting observation of all was the lack of awareness of interchange fee and how it impacts the merchant discount, less than 10% of the merchants surveyed were even aware of what interchange fees meant. This is rather sharply in contrast with the observations from the US, where merchant establishments have been fighting against perceived high interchange fees and there being a high awareness of interchange fees and issues such as if interchange fees should be the same level as credit cards for debit cards etc. The findings indicate that In Singapore, Merchant establishments are not so much aware and sensitive towards interchange fees.

5.2. Result: Hypothesis Testing

We then analyzed the simplistic relationships between the various variables in our research to examine our research question – has increased the volume of credit card transactions increased costs for the merchants – and to establish interdependence between the variables used for the survey and research. Stipulating a minimum payment to accept credit cards is a way of discrimination and a survey question was made available to capture this and an analysis of chi-square tests between these variables was done with findings as below (see <Table 1>).

<Table 1> Results of Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.472 ^a	4	0.009
Likelihood Ratio	13.854	4	0.008
Linear-by-Linear Association	7.012	1	0.008
N of Valid Cases	107		

- a. 4 cells (40.0%) have expected count less than 5.
- b. The minimum expected count is 0.41

When reading Table 1 we are interested in the results of the "Pearson Chi-Square" row. We can see here that $\chi^2 = 13.472$, $p = 0.009$, which is much less than the significance level of 0.05. This tells us the null hypotheses that whether a merchant fixes a minimum payment for credit card purchases or not is independent of the merchant's perception if credit card acceptance costs have gone up with volume is rejected. The research hypotheses that decision of merchant establishments to employ a type of price discrimination by way of fixing a minimum amount to accept credit cards for payment is related to whether card acceptance costs are high due to increasing in credit card usage is supported by this analysis.

Merchant establishments usually work out a minimum amount for credit card purchases as the costs that come along with the transaction may not make monetary sense for the merchant to accept credit cards below this fixed amount. This should vary by merchant depending on the type of contract they hold with their acquiring bank for the merchant discount they pay. They were also asked if they employ differential pricing by way of either charging an additional amount for credit card purchases or providing a discount for cash purchases. While many merchants responded saying they do not, there were some who admitted to employing such measures.

As much literature suggest, like Chakravorti and Shah

(2003) as well as Carlton and Frankel (1994) and Frankel (1998), if price discrimination is used by the merchant establishments, the cash paying merchant does not pay more due to a pegged up single price and the credit card paying merchant actually pays all on his own to cover all costs of credit card acceptance. We can further see here that $\chi^2 = 32.461$, $p = 0.001$, which is much less than the significance level of 0.05, which is significantly less than the level of 0.05. So the null hypothesis that there is no relation between merchants decision to employ price discrimination or not and notion that credit card acceptance is getting costly can be rejected outright.

The research hypotheses that price discrimination has a direct relation to a merchant establishments position that increased credit card usage has increased costs for them is supported by this analysis. Of the population surveyed, there were 55% of merchant establishments which said that they do not employ price discrimination but thought that increased volume was increasing costs for them, while 40% of merchant establishment responded saying they do not employ differential pricing and did not think that costs were increasing with increase in credit card usage.

Next, the merchant discount paid by the merchants and their views on it were analyzed. The merchant discount of merchant service charge (MSC) as explained earlier is a portion of every transaction that the merchant pays to their acquiring bank/institution for the services offered by the acquirer. The merchant discount comprises of the acquirer's charge, the association fee, and the interchange fee. If the merchant discount increases due to increase in any of these factors, and the merchant employs price discrimination, the cost of accepting credit cards will increase as well. If the merchant does not employ price discrimination, then he charges the same price to credit card paying and cash paying customers, and some of the surplus paid by the cash paying customer would offset costs incurred by accepting credit cards.

About 73% of merchants who responded agreed that merchant discount charges paid by them were very high while about 13% did not think so and the rest did not have an opinion. Here again find that $\chi^2 = 30.408$, $p = 0.001$, which is much less than the significance level of 0.05 indicating that the null hypotheses that the merchant discount paid by the merchant is independent of whether cost has increased with increase in credit card usage can be rejected.

Again, the research hypotheses that there is a relation between the level of merchant discount paid and the overall cost incurred by the merchant establishment as credit card usage increases can be supported by this analysis. While this establishes that merchant discount plays a significant part, whether the merchant builds the merchant discount

paid into the price of the actual product is quite a different thing. If all merchants do pass on the full merchant discount they pay to the credit card holder, then the credit card holder pays in entirety for the costs involved in accepting credit cards. Interestingly, if merchants do pass on the full merchant discount to the price they set for the product, a cash paying customer would be paying in excess of the actual value he receives and this eventually ends up as a surplus for the merchant. We would expect that merchants who do pass on the merchant discount to their product prices to not complain about increasing costs due to increase in credit card transactions as they pass on the additional cost to the customer anyway. Merchants, who do not pass on the merchant discount to the price, would feel the pinch with an increase in credit card transaction volume.

Only about 32% of merchants who responded agreed that the merchant discount they pay is built into their product pricing. About 54% responded that they do pass on the merchant discount paid to their customers, while the rest did not have an opinion. But the chi-square test of interdependence indicates a $\chi^2 = 4.706$, $p = 0.319$, which is significantly higher than the significance level of 0.05. There is a 31.9% of risk involved in ignoring the null hypotheses that whether discount is built into the product price or not is not related to merchant's perception if the credit card transaction volume increase has increased costs for the merchant. i.e. regardless of whether the merchant discount is built into the product price or not, merchant establishments still think that increase in the volume of transactions has increased costs for them. With this result of the analysis, it was decided not to consider if a discount is built into product price or not as one of the variables used further in the research.

The analysis also indicated that awareness of interchange fee and its impact on the merchant discount was very low amongst the merchants interviewed. Also, 63% of respondents said that they thought credit cards offer more benefits to cardholders than to merchant establishments. As cited by Zywicki (2010), more and more premium cards are released by issuing banks providing more rewards and benefits to the cardholders as a means to induce them to increase spending with their credit cards. Higher rewards would mean higher interchange fees as the issuers typically pass through a portion of the interchange revenue to the cardholder as rewards and hence higher costs for the merchants.

The different variables discussed were studied and factor analysis was performed to establish which of these variables had a greater influence on the independent variable. The results of the analysis are discussed below.

5.3. Result: Factor Analysis

There were 10 variables for taken in for data reduction through factor analysis before running a linear regression to come up with the model, looking at the mean values of all variables, it suggests that the response that credit card is more convenient to cardholders than merchants to be a significant factor. The correlation matrix giving the correlation coefficients of a variable and all other variables was then analyzed to ensure the correlation matrix's determinant is non-zero.

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy indicates a value of 0.698 which is acceptable to proceed with the factor analysis output. Also, the Bartlett's test of sphericity shows a value less than 0.001 which indicates there is a relationship between the variables chosen for the factor analysis and the analysis is appropriate to proceed. The communalities table reflects the common variance in the data structure for e.g., 78.7% of the variance in response to the first variable is common. From the 10 variables initially taken in for the factor analysis, SPSS lists the Eigen values associated with each linear component and provides the Eigen value in terms of % of variance explained. For e.g. factor 1 explains 30.448% of the total variance, factor 2 explains 15.23% and factor 3 explains 10.98% and so on. Cumulatively, the three factors together explain 56.664% of the total variance. First 3 factors explain relatively large amount of the variance while the subsequent factors only explain small amounts. SPSS has extracted all factors with Eigen value greater than 1 and these are retained in the columns to the right. As there are no specific common themes across each component, we leave the names of the variables as Factor 1, Factor 2 and Factor 3.

5.4. Result: Regression Analysis

With the independent variables now reduced to 3 factors, we then run a linear regression to test the model for its effectiveness. The regression was run with the variable indicating increased volume of credit card transactions has increased cost as the dependent variable and the 3 factors as independent variables. The Model Summary for the regression output shows an R square value of .284. While this is on the lower side, in this case it simply means that the percentage of variance in the independent variable is explained by the collection of independent variables and this case it is 28.4%.

The significance test of the model is accepted as the p-value is less than 0.001 – far less than the accepted value of .05. This means that at least one independent variable is

a significant predictor of the dependent variable. (see <Table 2>).

<Table 2> Results of ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	7.366	3	2.455	13.641	.000 ^a
	Residual	18.540	103	0.180		
	Total	25.907	106			

- a. Predictors: (Constant), Reg factor scores
- b. Dependent Variable: Increased vol has Increased Cost
- ^ap value < 0.001 show significance of test

Finally, the Coefficient table indicates that two factors have a p-value of more than 0.05 indicating that the null hypotheses that these 2 factors are independent of the dependent variable cannot be rejected. Factor 1 has a p-value of less than 0.001 and it can be concluded that only factor 1 can be considered as a significant predictor of the dependent variable. Factor 1 Comprise of variables such as: Employ Differential Pricing, Credit Card Volume has increased, Discount paid is high, Average txn amount, and Bank charges a fixed percentage

As Factor 1 was the only factor that the initial regression showed as being a significant predictor, linear regression was re-run for a couple of iterations by eliminating variables that do not significantly explain the variance in the dependent variable – based on their p-value – one after the other, and the model finally ended up with 2 variables as being significant predictors of the dependent variable. The model summary for the linear regression run with these 2 variables results in an R square value of .279.

Given that the independent variable, whether merchants perceive costs to have gone up due to increase in credit card usage, is a binary variable, a logistic regression was also run to ensure the results of the linear regression match with that of the logistic regression (see <Table 3>).

<Table 3> Results of Logistic Regression

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	111.835 ^a	0.266	0.359

- a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

The model summary which is the result of running the logistic regression with the binary dependent variable and the factored independent variable indicates Cox & Snell R square value of 26% - similar to that of the linear regression. This result is in line with the results obtained by running a linear regression against the factored independent variables

and the output is proven consistent.

5.5. Summary of Findings

Based on the findings of the survey of Singapore-based merchant establishments, we can summarize following key points:

- a) Over 63% of merchant interviewed think that accepting credit cards is costlier compared to other forms of payment. While only 7.5% disagree, rest does not have an opinion.
- b) About 58% of those surveyed thought increased volume of credit cards have increased costs.
- c) The survey results indicate that Singapore merchants do not attach much importance to the interchange fee though it forms a major part of the merchant discount paid, due to their lack of awareness.
- d) The Chi-square tests of significance testing indicated that merchant establishments' decision to a) Stipulate minimum payment b) employ differential pricing c) include high discount paid into the product price are related to their thought that increased credit card usage is increasing costs for them.
- e) The Chi-square tests of significance also indicated that interchange fee and cardholder benefits are independent of the merchant establishments' view that increased credit card usage has increased costs for them.
- f) The Factor analysis performed with the independent variables resulted in 3 factors with 4 variables loaded into the first factor and 3 each loaded with the other 2 factors.
- g) The linear regression performed on these factors against the dependent variable – if increased credit card usage has increased merchant costs – and the factors indicated that only factor 1 was a significant predictor of the dependent variable.
- h) Price discrimination and discount paid being high directly influencing the fact that as volume increase costs have increased.

6. Limitations and Conclusions

While we were able to draw conclusions as above based on the research, survey findings and the results of the statistical analysis on the surveyed data, there are some limitations that exist as well. The study only broadly attempts to gauge merchants view if increased credit card usage has increased costs for them. The survey was based on an interview of merchant establishments and the views of

the merchants and was not based on their financial data. If exact financial data of merchant establishments can be obtained vis-a-vis the sales data in their shops, the number of credit card transactions, the amount of merchant discount paid, other expenses on maintaining the infrastructure to accept credit card transactions etc., a more informed and data backed conclusion can be arrived.

The survey could also not penetrate into many large chains and supermarkets in Singapore due to difficulties faced in obtaining responses. With the bargaining power that such large conglomerate chains may exert on the

acquiring banks, their view on costs would have been different. Also, data can be sought from the card issuing associations and leading issuing banks on the interchange fees, association fees and acquiring fees charged and analyze how it impacts merchants actual costs and if the perception of the merchant establishments that costs for accepting credit cards are increasing can be justified.

Finally, there were no such empirical studies from other countries that were available which could be used to compare the results from this study. These points can be considered for future research on the topic.

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