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**The effect of product price and product category on
online payment methods and on the decision to own the
secure server**

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A thesis submitted to the Faculty of Graduate Studies and Research
in partial fulfillment of the requirements of the degree of
Master of Engineering in Telecommunications Technology Management

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March 29, 1999

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Studies and Research the acceptance of the thesis

**The effect of product price and product category on online
payment methods and on the decision to own the secure server**

Submitted by Arshad Usman, B.E.
in partial fulfillment of the requirements for the degree of
Master of Engineering in Telecommunications
Technology Management

Professor A.J. Bailetti
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ABSTRACT

Online stores support three credit card payment methods: secured, unsecured, and mail and telephone order (MOTO). The first objective of this research is to examine the relationship between the payment methods supported by online stores and product price, product category and site longevity.

The second objective of this research is to examine the effect of product price and product category on merchants' decisions on whether or not to own the secured server that supports online credit card transactions.

Price data on 9631 products in 10 categories were collected from 127 online stores using a shopping agent. Data on secure server ownership was collected from a database maintained by an organization that provides domain-registering services. Univariate Analysis of Variance and the Logit Model of Log Linear Analysis were used to examine the data.

Results from the research show that online stores' payment methods are related to product price and product category, but not to site longevity. Online stores selling high-priced, technology-based products are more likely to own secure servers than online stores selling low-priced products such as flowers, gifts and groceries.

The results suggest that important differences exist between retail methods in the electronic world and the physical one. In the electronic world, product price and product category affect payment methods and ownership of the infrastructure required to support payment transactions. The provision of secured payment methods may have less to do with the desire to protect consumers' confidential information travelling over the Internet, and more to do with product prices and categories.

The finding that site longevity is not related to payment methods suggest that the barriers to offering secure payment transactions are low.

Finally, the use of a shopping agent was found to be an effective way to collect data for research purposes.

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CHAPTER 1 INTRODUCTION

1.1 Research Questions

Online stores support three credit card payment methods: secured, unsecured, and mail order-telephone order (MOTO). The first objective of this research is to examine the relationship between the payment methods supported by online stores and product price, product category and site longevity.

The second objective of this research is to examine the effect of product price and product category on merchants' decisions on whether or not to own the secure server that supports online credit card transactions.

Price data on 9631 products in 10 categories were collected from 127 online stores using a shopping agent. Data on secure server ownership was collected from a database maintained by an organization that provides domain-registering services. Univariate Analysis of Variance and the Logit Model of Log Linear Analysis were used to examine the data.

These investigations were translated into the following questions:

1. Do the means of product prices grouped by the payment method used to sell them differ?
-

2. Do the means of product prices grouped by secured server ownership differ?
3. How do product categories and the three payment methods relate to each other?
4. How do product categories relate to secure server ownership?
5. How do site longevity and the three payment methods relate to each other?

Results from the research show that online stores' payment methods are related to product price and product category, but not to site longevity. Online stores selling high-priced, technology-based products are more likely to own secure servers than online stores selling low-priced products such as flowers, gifts and groceries.

The results suggest that important differences exist between retail methods in the electronic world and the physical one. In the electronic world, product price and product category affect payment methods and ownership of the infrastructure required to support payment transactions. The provision of secured payment methods may have less to do with the desire to protect consumers' confidential information travelling over the Internet, and more to do with product prices and product categories.

The finding that site longevity is not related to payment methods suggest that the barriers to offering secure payment transactions are low. Finally, the use of a shopping agent was found an effective way to collect data for research purposes.

1.2 Motivation for the Study

A recent study on online shopping by Ernst & Young [7] identifies that the fear of giving credit card numbers over the Internet is the main reason that restrained people from buying products from online stores. This fear is based on the confidential nature of credit card information. This makes payment method a key issue in electronic commerce, as without offering appropriate payment method to consumers, electronic commerce may not grow with expected rate. The industry has so far proposed various electronic payment methods and the research literature is focused on describing the functions and the frameworks for these payment methods while little has been done to investigate merchant behaviour towards their adoption. The electronic commerce industry needs some studies on explaining differences between physical retailing and online retailing in the context of payment methods. The intent was to fill this gap by finding out that why merchants use different payment methods, and what influences adoption of the Secured Socket Layer (SSL) protocol other than the desire to protect consumers' confidential information.

1.3 Summary of Contribution

As far as can be determined, this study is the first to:

1. establish that online payment methods are related to product price and categories
 2. establish that secure server ownership is related to product price and categories
 3. use a shopping agent to collect data directly from the Internet for research purposes
-

1.4 Thesis Organization

The research is organized into five chapters. Chapter 2 provides a brief overview of the literature on online retailing. Section 2.1 examines electronic commerce. Section 2.2 identifies the issues unique to online retail businesses. Electronic payment methods suitable for online shopping are examined in Section 2.3. Section 2.4 describes security issues related to credit card transactions over the Internet. Finally section 2.5 describes shopping agents.

Chapter 3 identifies research questions and the set of hypotheses that guided the research effort. The variables used in this study and how they were measured are defined in Section 3.2. Section 3.3 describes procedures that were used to collect the data, and section 3.4 describes the tests and procedures used to analyze the data.

Chapter 4 describes the results of the research.

Chapter 5 discusses the implications of the research results, identifies the limitations of the research and suggests future research opportunities.

CHAPTER 2 LITERATURE REVIEW

This chapter is a brief overview of the literature related to e-commerce, web merchandizing, payment methods, security issues and shopping agents. It provides the basics to understand terminology used in this research. It also forms the basis for the rationales behind the hypotheses examined in this research, and explains why this research is unique from its subject and methodology points of view.

2.1 Electronic Commerce

Edelheit & Miller, 1997 [6] argue that for most people e-commerce is just an on-line shop on the Internet, but in fact it encompasses all sorts of electronic communication to facilitate trade between two or more parties. They have quoted a definition of e-commerce as proposed by the High Level Strategy Group [14] that electronic commerce is a set of tools and services that:

- “Reduces the cost of creating, moving, managing and processing the documents on which are built relationships between trading partners,
 - Improves business entities processes by reducing the cost of operating business and improving overall quality,
 - Increases revenue by opening new market channels.”
-

This definition explains the objectives of electronic commerce well but lacks in specifying the use of some sort of electronic communication tool to achieve these objectives. For example, electronic communication can be conducted over various electronic communication channels such as Intranet, Extranet or the Internet. Based on these three distinct modes of communication channels Riggins & Rghee, 1998 [25] identify three classes of e-commerce applications: namely inter-organizational, business-to-business and customer-to-business applications. The Electronic Data Interface standard covers various aspects of the first two types of e-commerce: inter-organizational and business-to-business. Many standards are evolving for customer-to-business applications such as electronic payment systems.

This research focuses on the credit card based payment method used in web stores, one of the customer-to-business applications. A document published by the White House [28] focuses mainly on the challenges and issues associated with web-based merchandizing, especially with electronic payment methods. A similar document published by the Canadian Information Highway Advisory Council [5] also urges better understanding of the potential available on the Internet, “the emergence of electronic commerce and the development of the Internet as a platform for business activity of all kinds are critical to putting small business on the Information Highway.” These documents provide one clear insight – the term “Electronic Commerce” refers to activities that facilitate trade between two or more parties using the Internet as a medium of communication.

Interestingly, this opportunity of conducting business globally is equally problematic for web merchants. Alberts et al, 1998 [1] emphasizes that “the threat of being called into court in any of 50 different states could be enough to dissuade many businesses from ever operating on the Internet.” One possibility of a web merchant running into legal problems involves an inappropriate choice of electronic payment system.

2.2 Web Merchandizing

In 1994-1995 only a few retailers were present on the Internet [29]. Start-ups like Amazon.com, CDNow, N2K, Peapod and Virtual Vineyards were the first to use the Internet for retail business. They invested heavily to build image and to gain market share in their specialty market segments. Then came large retailers like Wal-Mart, Barnes & Noble, J.C. Penny and others. Today many big manufacturers are either doing some actual business on the web or at least contemplating it. The second annual report published by Ernst & Young [7] on Internet Shopping examines the future direction of e-business from customers' and merchants' points of views. This report shows 200 percent growth in online sales in the last six months of 1998. For consumers, the top motive to shop online is to save money and time. Secondly, online shopping affords wide comparison and research before making buying decisions.

The Ernst & Young report [7] shows that a vast majority of online consumers do not buy using the Internet because of concerns about credit card number and privacy risks.

Another reason for not using the Internet to buy is that consumers cannot feel or touch products before purchasing. The report also provides some statistics on what prevents physical retail merchants from going online where security seems to be the major concern.

A similar study jointly conducted by shop.org and The Boston Consulting Group [31] identifies some other challenges as well. These include difficulties in navigating the sites, conflicts with existing distribution channels and less considerable difference in prices of items (shipping cost included) to offset fear of security risks using the Internet.

2.3 Payment Methods

Payment methods are one of the most important issues on the Internet. A number of electronic payment schemes have been proposed in the literature. The factors which distinguish one payment method from the other are atomicity, consistency, isolation, durability, economy, divisibility, scalability, interoperability, security and conservation [OII Guide to Electronic Payment 1998, 21]. Payment method needs confidentiality, authentication, integrity, non-repudiation, trust, anonymity and untraceability.

Putland et al, 1997 [23] have categorized payment methods proposed for the Internet into four broad categories: credit card, electronic cheque, electronic cash and micropayments systems. Preliminary surveys for this research showed that web merchants dominantly

use credit card-based payment methods. In case of the “direct” credit card-based payment method, online shoppers provide credit card information to web merchants. With indirect credit card systems (e.g. Secure Electronic Transaction SET, cybercoin and First Virtual), credit card information is provided to a trusted third party and it does not go to the merchant. A preliminary survey conducted by the author of this research showed that indirect credit card payment methods are not used widely. Moreover, many merchants who adopted these methods have switched to direct systems [Appendix C]. The reasons for the slow adoption of indirect payment methods are two: poor technical support from inventing firms and the requirement that shoppers download and install specialized software referred to as “a wallet” into their computers.

The number of merchants using other payment methods like Cybercoin™ and e-cash™ was very small at the time this research was conducted. Therefore, this research focuses on the three types of direct credit card-based payment methods: secured, non-secured and mail-order telephone-order (MOTO).

2.4 Security on the Internet

Despite claims of potential extraordinary growth of web-based commerce, some market research firms are reporting slow growth. A study by Shelley Taylor & Associates, 1999 [26] shows that Internet Shopping is not growing because of security threats. Backhouse, 1998 [2] has put forward some interesting questions such as: how do customers know that

the electronic shop they are buying from really belongs to the apparent owner and is not a spoof site? How do customers know that a merchant on the web is not selling stolen goods? How do merchants know the credit card number they have received is not stolen? How do merchants know that money they receive is “clean” and they will not be accused of assisting cyber-laundering?

Bhimani, 1996 [3] quotes many incidents of Internet insecurity and attacks made on large firms like AT&T and Citibank. Problems like eavesdropping, password “sniffing,” data modification, spoofing and repudiation have to be tackled by developers of security products. Various security initiatives have been taken so far on network, protocol and on application levels of communication. On the network layer side, Internet Protocol Version 6 (IPv6) will provide security by adding an Authentication Header (AH), which provides authenticity and integrity using the Message Digest (MD5) algorithm and Encapsulating Security Payload (ESP), which provides confidentiality using the Data Encryption Standard (DES) algorithm. In session layer security solutions, the most prevalent and widely used protocol is the Secure Socket Layer (SSL), first introduced by Netscape in 1994. SSL provides security services just above Transport Control Protocol (TCP) layer. SSL is currently supported by most browsers such as Internet Explorer™ and Netscape™. Bhimani, 1996 [3] has described some initiatives taken by the Internet Engineering Task Force (IETF) such as Simple Key exchange for Internet Protocols (SKIP), Photuris, Internet Security Association and Key Management Protocol (ISAKMP). On application layer security, the IETF Privacy-Enhanced Mail (PEM)

Working Group defined a standard for securing e-mail. But this did not develop because of limitations in scope and the popularity of the second proposal: MIME Object Security Services (MOSS). Pretty Good Privacy (PGP) is another widely available encryption protocol. On the World Wide Web (WWW) side, there are two protocols: The Hyper Text Transfer Protocol Secured (HTTPS) which means HTTP over SSL and secured HTTP (SHTTP). Like SSL, SHTTP provides confidentiality and integrity of data, and authenticates the merchant and optionally the consumer.

For credit card transactions over a secured network, four parties are involved: consumer or purchaser, an issuer of a credit card to the purchaser (purchaser's bank), a merchant, and an acquirer who maintains a relationship with the merchant. The current secured option requires that credit card information be provided to merchants. With the Secure Electronic Transaction (SET) protocol, credit card information will not be issued to the merchant and all four players will together work to complete a transaction.

2.5 Shopping Agents

Shopping agents are software programs that perform searches in partnering merchants' catalogues for prices and product details. They are also called "bots"; a word derived from robots. The idea of a shopping agent was first developed with Anderson Consulting's Bargain Finder [9]. It was designed for searching music albums only. That

agent did not work at that time because many vendors did not let it access their catalogues.

Thanks to Anderson Consulting's pioneering efforts, today there are many shopping agents operating on the Internet. There are shopping agents for books, music, computer accessories and other items. The most widely used shopping agent is Jango; developed by Netbot and then bought by Excite in 1997 [20]. Jango is sponsored by MasterCard. Another widely used agent is Canopy, which was developed by Janglee Corporation. Canopy is operated by Yahoo and sponsored by Visa Card.

Both Jango and Canopy, are web-based shopping agents. Users do not need to download a plug-in to run queries. These shopping agents are different from client software-base shopping agents in that the latter have to be installed on users' machines. Examples of client software-base shopping agents are Roboshoper and Shopping Explorer. Shopping Explorer has a good number of merchants registered and offers significant customization. Unfortunately, this software is not free and users have to spend some money before buying anything from the Internet.

This research has used the Jango agent to search for merchants and price quotes. The reason for this preference is explained in section 3.1.

CHAPTER 3 RESEARCH DESIGN

This chapter describes research questions, set of hypotheses, study variables and their measurements, data collection and data analysis.

3.1 Research

This research has examined relationships between the payment method used in online stores and secured server ownership, with product price, product category and site longevity. Hypotheses have been formulated to test favouring or opposing arguments for the existence of relationships between these variables. Data analyses have been performed at two levels. The first level explores relationships between payment methods and product price, product categories and web site longevity. The second level determines relationships between secured server ownership (a measure to reflect outsourcing decision for implementing secured payment method) and product price and product category.

3.2 Set of Hypotheses

This section describes the hypotheses that guided this research.

3.2.1 Hypothesis 1

This hypothesis analyzes how payment methods used at web stores are related to the prices of the products offered in these stores. An economic argument for the existence of a relationship between payment methods and product prices would be that merchants selling higher priced items would have a higher incentive to pay to set up a secured server. The cost of setting up a secured infrastructure (secured server and certification) ranges from \$1000 to \$250,000 [17,18]. Merchants pay this cost to secure customers' confidential information and to provide an incentive for customers to complete the buying process. In a way, this is an insurance premium for customers' privacy paid by merchants.

Merchants selling low priced items may not be motivated to pay this premium because of low cash flows from sales of low priced products. Investing in a secured infrastructure may not offer high returns.

A technological argument for the nonexistence of a relationship between prices and payment method is that the secured payment method is only used to encrypt data to prevent eavesdropping. Therefore, no matter what the prices of goods are, secrecy of

credit card information or type of payment method should not be associated with product prices.

The first hypothesis tests these two opposing arguments described above. It examines means of product prices from merchants' stores using these three payment methods. The null hypothesis states that the mean of product prices grouped by payment methods are statistically the same. The alternate hypothesis states that means of product prices from secured payment method stores will be higher than the means of product prices from non-secured payment method stores, which in turn will be higher than the means of product prices from MOTO payment method stores. The direction of means used in the alternate hypothesis is based on the fact that secured infrastructure costs are higher than the cost of non-secured infrastructure, which in turn is higher than that of MOTO payment method. Formally, the hypotheses are:

H_{10} : Mean price (secured)=Mean price (non-secured)=Mean price (MOTO)

H_{11} : Mean price (secured)>Mean price (non-secured)>Mean price (MOTO)

3.2.2 Hypothesis 2

This hypothesis tests the relationship between the payment method used in web stores and the type of products available for sale. The intent is to test whether the "product effect" exists in web merchandizing in the same way that "industry effects" exist in technology adoption.

Industry effect means that companies in one industry tend to use the same technologies and standards as other companies in the industry do. Therefore, the argument is that merchants dealing in the same types of product would tend to use the same types of payment method. For instance, merchants with more familiarity with high-tech products such as computer related products might find it easier and less costly to use the secured payment method.

An opposing argument to the rationale described above is that security of confidential data passing over the Internet is essential from a technical point-of-view. Hence product categories available for sale on web stores will have no bearing with the payment method used in web stores.

Therefore we test the null and alternate hypotheses:

H2₀: Payment method is not a function of product category

H2₁: Payment method is a function of product category

3.2.3 Hypothesis 3

This hypothesis examines the relationship between secured server ownership and product prices. The sample is comprised of data for product items sold under the secured payment method. Merchants can offer a secured payment method by either having their own secured server or they can use a third party's secured server. The first option entails a

higher investment and maintenance costs. The second option offers less security. An economic argument for the existence of a relationship between secured server ownership and product price is that the higher the price of the goods, the more merchants will be willing to control and complete transactions by having their own secured server. The lower the prices, the lesser the incentive to pay higher costs of owning a secured server.

A technological argument is that securing confidential data of shoppers over the Internet is essential from technical point of view and has the same degree of secrecy no matter who owns the secured server. Therefore, secured server ownership will have no bearing with product prices.

This hypothesis tests these two opposing arguments by examining means of product prices from stores using their own server with the means of product prices from stores using a third party secured server. The null hypothesis states that these means are statistically equal for these two types of secured server ownership. The alternate hypothesis states that the mean of product prices from owned secured server merchants will be higher than the mean of prices from stores using third party secured server. The direction of means used in the alternate hypothesis is based on the fact that the cost of owning secured infrastructure is higher than the cost of using a third party's server. So the hypotheses are:

H3₀: Mean price (own secured server)=Mean price (third party's secured server)

H3₁: Mean price (own secured server)> Mean price (third party's secured server)

3.2.4 Hypothesis 4

This hypothesis tests the relationship between secured server ownership and product categories. The sample is comprised of merchants who support the secured payment method. The intent, again, is to test the existence of the “product effect” in the outsourcing decision. This hypothesis tests the argument that merchants dealing in the same types of products would tend to exhibit the same trends in secured server ownership. Merchants with more familiarity with high-tech products, such as computer related products, might find it easier to maintain and less costly to own a secured server.

An opposing argument to this rationale, is that security of confidential data passing through the Internet is essential from a technical point of view and hence product categories available for sale on web stores will have no bearing with the secured server ownership. Therefore, we test the null and alternate hypotheses:

H₄₀: Secured server ownership is not a function of product category

H₄₁: Secured server ownership is a function of product category

3.2.5 Hypothesis 5

This hypothesis examines the relationship between the payment method and the site longevity (number of years a web site has been operational on the Internet). An argument in favour of the existence of a relationship between the payment method and site

longevity is that the more time web merchants spend on the Internet the more they learn about security issues and hence have a higher probability of using secured payment methods. The less time web merchants spend on the Internet the less experience they have about security issues, and would tend to use non-secured payment methods.

An argument for the nonexistence of a relationship between site longevity and payment methods will be that the security of consumers' information is important and both newer and older merchants will be equally likely to use the payment method of their choice. This means that site longevity would not have a bearing on the payment method used in web stores.

The two opposing arguments are tested using the null hypothesis that the means of site longevity grouped by the three payment methods would be statistically the same, and by the alternate hypothesis that these means will be statistically different. Therefore:

H5₀: Site Longevity (secured merchants)= Site Longevity (non-secured merchants)=Site Longevity (MOTO merchants)

H5₁: Site Longevity (secured merchants)≠ Site Longevity (non-secured merchants)≠Site Longevity (MOTO merchants)

3.3 Study Variables and their Measures

This study focuses on five variables: payment method, product price, product category, secured server ownership and site longevity. A brief description of each variable follows.

3.3.1 Payment Method

This variable measures the credit card based payment method used in a web store. This variable takes three values: “secured,” “non-secured” and “MOTO,” which have been coded as 1, 2 and 3 respectively for statistical analysis. A “Secured” payment method means that the web store supports SSL credit card transactions. Secured web stores may or may not offer a non-secured and MOTO options.

“Non-secured” means that the store requires consumers to fill out an HTML form and send it over a non-SSL connection. Information passing over a non-secured connection is not encrypted and can be picked up and read by an Internet Protocol (IP) “packet sniffer.” Non-secured stores may also take orders over the phone.

“MOTO” means that consumers place orders by telephone, fax , surface or electronic mail.

3.3.2 Product Price

This variable measures prices of products in American Dollars (US\$). The data collected for prices from Canadian web sites were converted into US\$. These prices do not include tax or shipping costs.

3.3.3 Product Category

This variable is a measure of product categories of the items available for sale on online stores. Ten product categories have been examined. These categories were those supported by the Jango shopping agent. This is a categorical variable with no order associated with it and has been coded as 1 through 10 as shown in Table 1. Each category has some subcategories. At the time of collecting data for this research (July-August 1998) there were 33 subcategories. At any other time these subcategories may be different because Jango keeps adding categories and subcategories. A complete list of these 33 subcategories is also given in Table 1, which were available in July-August 1998. A screen shot of <http://www.jango.com> showing these categories and subcategories is shown in Appendix A.

Table 1: Product categories and subcategories

No	Category	No	Subcategory
1	Computer Hardware	1	Desktops
		2	Laptops
		3	Modems
		4	Monitors
		5	PDAs
		6	Printer
		7	Peripherals
		8	Scanners
2	Computer Software	9	Software
3	Electronics	10	Home Audio
		11	Personal Audio
		12	Car Audio
		13	Video Equipment
		14	Television
		15	Phones and Fax
		16	DBS Equipment
4	Cameras	17	Digital Cameras
5	Flowers and Gifts	18	Florists
		19	Fragrances
		20	Cigars
6	Games and Toys	21	Barbie Dolls
		22	Beanie Babies
		23	Computer and Video Games
7	Gourmet and Groceries	24	Coffee
		25	Tea
		26	Wine
		27	Spirits
		28	Liqueurs
8	Home and Garden	29	Garden Supplies
9	Movies	30	Movies
10	Sports and Leisure	31	Camping Equipment
		32	Golf Equipment
		33	Fitness Equipment

3.3.5 Secure Server Ownership

This variable measures whether or not merchants outsource the infrastructure required to support secured credit card transactions. This variable takes two values: “own server” and “third party server.” “Own server” means that merchants have their own secured server and digital certificate. “Third party server” involves merchants redirect shoppers to another Internet commerce service provider for submitting credit card information. Hence, “third party” here means an Internet service provider and not a trusted third party such as banks and financial institutes. This is a categorical variable with no order assigned to it, and two values have been coded as 1 for “own server” and 2 for “third party.”

3.3.6 Site Longevity

This variable measures a web site’s longevity: time in years the web site has been operating on the Internet. It is a continuous variable and takes values from 0 to any number. The value has been calculated from the date of registration of the merchants’ domain on the Internet until August 1998 when this data was collected. A time period of 2 years and 4 months, for example, has been recorded as 2.33 years.¹

¹ It is 2 plus 4/12 years making it 2.33

3.4 Data Collection

Data have been collected using the Jango shopping agent. The following reasons supported the use of a shopping agent and especially Jango:

1. A shopping agent provides a random selection of web merchants. This is a requirement for the validity of results.
 2. Jango was the only shopping agent available on the Internet with a variety of product categories. Product categories ranged from computer hardware and software to home electronics, flowers, wine and others. No other shopping agent provided this product variety.
 3. Jango is run and supported by two of the leading e-commerce players, Excite™ and MasterCard.™
 4. A large number of merchants are registered with Jango. This feature provides an opportunity to collect data from most of the active web merchants on the Internet. This research contains data from 127 merchants.
 5. Jango returns a large number of prices from a single search (maximum 400 quotes). This feature provides an opportunity to collect large price samples. Larger samples make research more reliable.
 6. Search for price quotes can be customized. For example, desktop computer shoppers may specify processor speed and/or manufacturer to narrow down the search. Similarly, wine shoppers may specify a particular type of wine. This feature broadens the data in terms of number of product items, prices and merchants.
-

7. The output from Jango is in tabular form and can be transported directly to spreadsheet programs enabling exact and error free recording of price data. The columns of the output can be sorted with respect to criteria such as price, merchant or any relevant feature.

The following methods were used to collect the data:

1. A subcategory from 1 through 33 (as shown in Table 1) was selected in sequence and product features within a subcategory were arbitrarily chosen. For example, for “Desktop” computers different processing speeds were chosen to collect price quotes. For “Computer Games and Videos”, category searches were made for PC, Mac, Sony Play-station and Nintendo based games. This technique ensured collection of prices for a broad range of products within a category. It also helped in getting quotes from merchants who deal in specific types of products.
 2. The output was cut from the browser window and pasted on an MS Excel spreadsheet. The data was then filtered for prices and merchant names.
 3. For each merchant reported in the price quote search, a buying situation was simulated until the stage when the site asked for credit card information. At that point payment method supported by the merchant was noted as “secured”, “non-secured” or “MOTO”. This payment method was associated with all the price quotes from that merchant in the database.
-

4. To measure secured server ownership the name of the secure server domain was noted and the certificate was checked. A redirection to third party secured server ² was recorded as “third party server.”
5. Domain registering service available at <http://www.internic.net> was used to collect data on dates of domain registration. Site longevity was recorded in years as described in section 3.3.6. A list of names and web site addresses of all the 127 merchants is given in Appendix B.

A row in the database contains 7 variables: merchants' identification, product price, product category, product subcategory, payment method, secured server ownership and site longevity.

3.4.1 Research Sample

The sample for this research is comprised of 9631 product items in 10 product categories from 127 merchants. Table 2 summarizes the distribution of the number of items and merchants in the three payment methods and in the ten product categories. Table 2 shows that 6614 items from 85 stores were offered using the secured payment method, 817 items from 19 stores used the non-secured payment method, and 2200 items from 23 stores were offered using the MOTO payment method.

² It was further verified by reading properties of “certificates” and counter checking the owner of the site from <http://www.internic.net>

Table 2: Distribution of Items and merchants with respect to payment methods

Distribution of Items & Merchants	Secured	Non-secured	MOTO	Total
Number of Items	6614	817	2200	9631
Number of Merchants	85	19	23	127
# of Items of Cat-1 (Computer HW)	1829	40	88	1957
# of Items of Cat-2 (Computer SW)	415	0	0	415
# of Items of Cat-3 (Electronics)	1303	70	321	1694
# of Items of Cat-4 (Digital Camera)	412	0	9	421
# of Items of Cat-5 (Flowers & Gifts)	496	93	176	765
# of Items of Cat-6 (Games & Toys)	157	0	653	810
# of Items of Cat-7 (Gourmet & Groceries)	441	569	777	1787
# of Items of Cat-8 (Home & Garden)	220	0	0	220
# of Items of Cat-9 (Movies)	580	0	0	580
# of Items of Cat-10 (Sports & Leisure)	761	45	176	982

3.5 Data Analysis

The data was analyzed using the following steps:

1. Descriptive summary statistics for mean, median, standard deviation, variances and frequency distribution were obtained for the continuous variables price and site longevity.
2. Skewness, kurtosis, box plot, scatter diagram and histograms were used to measure normality and spread of variances of price and site longevity
3. Outliers were double-checked from original collection and by revisiting relevant web sites.
4. Logarithmic transformation was applied on the price variable to shift the distribution towards normality.

5. Levene's Tests were performed to test homogeneity of variances in price and site longevity data with payment method and secured server ownership as factors.
 6. Weight variables were calculated for data related to each class of payment method and secured server ownership to stabilize variances for Analysis of Variance (ANOVA) tests.
 7. Generalized Linear Model (GLM) General Factorial Analysis of Variances (ANOVA) was used to test the hypotheses related to price and site longevity against the factors as payment method and secured server ownership.
 8. Model selection methods were applied on payment method and secured server ownership as response variables against the product category as explanatory variables to determine appropriate model for Logit Model of Log Linear Analysis.
 9. Logit Model of Log Linear Analysis was then used to determine the likelihood of using a particular payment method or secure server ownership against product categories.
 10. Comparison tables were developed using parameter estimates resulting from Logit analysis to determine relative likelihood of using a particular payment method over the other payment method in given product categories. Similar analysis was performed for secured server ownership against product categories.
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CHAPTER 4 RESULTS

This chapter has six sections. Section 4.1 examines the data for suitability of required statistical test. It also shows results from transformation of data to make them fit the testing hypotheses. The later five sections provide the results from testing the five hypotheses.

4.1 Results from the Statistical Exploration of Variables

Normality of price data was analyzed for testing hypotheses 1 (equality of means of prices for the payment method) and hypothesis 3 (equality of means of prices for secured ownership). Descriptive statistics of price data grouped by the three payment methods is given in Table 3.

Table 3: Descriptive statistics of price grouped by payment methods

Payment Method			Statistic
Price	Secured	Mean	674.667
		Median	149.000
		Variance	7.E+06
		Std. Deviation	2736.94
		Minimum	1.00
		Maximum	62478.0
		Skewness	12.470
		Kurtosis	207.682
	Non-Secured	Mean	173.277
		Median	30.0000
		Variance	227488
		Std. Deviation	476.957
		Minimum	2.00
		Maximum	7600.00
		Skewness	7.018
		Kurtosis	80.636
	MOTO	Mean	233.514
		Median	48.0000
		Variance	585236
		Std. Deviation	765.007
		Minimum	1.00
		Maximum	25000.0
		Skewness	17.581
		Kurtosis	510.869

Histograms of prices in the three payment methods are shown in Figure 1, 2 and 3.

Figure 1: Histogram of price data for secured payment method **Figure 2: Histogram of price data for non-secured payment method**

Figure 3: Histogram of price data for MOTO payment method **Figure 4: Box plot of price grouped by payment methods**

It is apparent from the histograms in Figure 1, 2 and 3 that data deviates from normality.

Lilliefors test of normality also shows that data is not normal as shown in Table 4

Table 4: Test of normality of price data grouped by payment methods

Tests of Normality				
	Payment Method	Kolmogorov-Smirnov ^a		
		Statistic	df	Sig.
Price	1.00	.403	6614	.000
	2.00	.360	817	.000
	3.00	.381	2200	.000

a. Lilliefors Significance Correction

After applying the logarithmic transformation the data moves towards normality and the spreads are more balanced as shown in Table 5 and in histograms and box plots in Figures 5, 6, 7 and 8.

Table 5: Descriptive statistics of LogPrice grouped by payment methods

Payment Method			Statistic
LogPrice	Secured	Mean	2.1114
		Median	2.1732
		Variance	.601
		Std. Deviation	.7756
		Skewness	.058
		Kurtosis	-.082
	Non-secured	Mean	1.5829
		Median	1.4771
		Variance	.443
		Std. Deviation	.6655
		Skewness	.940
		Kurtosis	.310
	MOTO	Mean	1.7660
		Median	1.6812
		Variance	.477
		Std. Deviation	.6908
		Skewness	.322
		Kurtosis	-.092

Figure 5: Histogram of LogPrice data for secured payment method

Figure 6: Histogram of LogPrice data for non-secured payment method

Figure 7: Histogram of LogPrice data for MOTO payment method

Figure 8: Box plot of LogPrice grouped by payment methods

By considering the data for secured payment method only and exploring the distribution of LogPrice with secured server ownership as the factor, the following statistics and histograms were obtained:

Table 6: Descriptive statistics of LogPrice data grouped by secured server ownership

Server Ownership			Statistic
LogPrice	Own Server	Mean	2.2691
		Median	2.3424
		Variance	.572
		Std. Deviation	.7565
		Skewness	-.130
		Kurtosis	.320
	Third Party Server	Mean	1.6876
		Median	1.6021
		Variance	.434
		Std. Deviation	.6586
		Skewness	.496
		Kurtosis	.070

Figure 9: Histogram of LogPrice data for owned secured server

Figure 10: Histogram of LogPrice data for third party secured server **Figure 11: Box plot of LogPrice data grouped by secured server ownership**

Distribution of number of items of ten product categories in the three payment method was examined using clustered bar charts Figure 12 and cross tabulation (Table 7).

Figure 12: Clustered bar chart of product categories grouped by payment methods

Table 7: Distribution of number of items of in ten product categories grouped by payment methods

			Payment Method			Total
			Secured	Non-secured	MOTO	
Category 1.00	Count		1829	40	88	1957
	% within Category		93.5%	2.0%	4.5%	100.0%
	% within Payment method		27.7%	4.9%	4.0%	20.3%
	% of Total		19.0%	.4%	.9%	20.3%
2.00	Count		415			415
	% within Category		100.0%			100.0%
	% within Payment method		6.3%			4.3%
	% of Total		4.3%			4.3%
3.00	Count		1303	70	321	1694
	% within Category		76.9%	4.1%	18.9%	100.0%
	% within Payment method		19.7%	8.6%	14.6%	17.6%
	% of Total		13.5%	.7%	3.3%	17.6%
4.00	Count		412		9	421
	% within Category		97.9%		2.1%	100.0%
	% within Payment method		6.2%		.4%	4.4%
	% of Total		4.3%		.1%	4.4%
5.00	Count		496	93	176	765
	% within Category		64.8%	12.2%	23.0%	100.0%
	% within Payment method		7.5%	11.4%	8.0%	7.9%
	% of Total		5.2%	1.0%	1.8%	7.9%
6.00	Count		157		653	810
	% within Category		19.4%		80.6%	100.0%
	% within Payment method		2.4%		29.7%	8.4%
	% of Total		1.6%		6.8%	8.4%
7.00	Count		441	569	777	1787
	% within Category		24.7%	31.8%	43.5%	100.0%
	% within Payment method		6.7%	69.6%	35.3%	18.6%
	% of Total		4.6%	5.9%	8.1%	18.6%
8.00	Count		220			220
	% within Category		100.0%			100.0%
	% within Payment method		3.3%			2.3%
	% of Total		2.3%			2.3%
9.00	Count		580			580
	% within Category		100.0%			100.0%
	% within Payment method		8.8%			6.0%
	% of Total		6.0%			6.0%
10.00	Count		761	45	176	982
	% within Category		77.5%	4.6%	17.9%	100.0%
	% within Payment method		11.5%	5.5%	8.0%	10.2%
	% of Total		7.9%	.5%	1.8%	10.2%
Total	Count		6614	817	2200	9631
	% within Category		68.7%	8.5%	22.8%	100.0%
	% within Payment method		100.0%	100.0%	100.0%	100.0%
	% of Total		68.7%	8.5%	22.8%	100.0%

Similarly, filtering out the data for secured payment method and getting the distribution of 10 product categories for 2 cases of secured server ownership gives the following clustered bar chart (Figure 13) and cross tabulation of Table 8

Figure 13: Clustered bar chart for product categories grouped by secured server ownership

Table 8: Cross tabulation of product categories for two cases of secured server ownership

			Server Ownership		Total
			Own Server	Third Party	
Category 1.00	Count		1829		1829
	% within Category		100.0%		100.0%
	% within Server Ownership		37.9%		27.7%
	% of Total		27.7%		27.7%
2.00	Count		415		415
	% within Category		100.0%		100.0%
	% within Server Ownership		8.6%		6.3%
	% of Total		6.3%		6.3%
3.00	Count		927	376	1303
	% within Category		71.1%	28.9%	100.0%
	% within Server Ownership		19.2%	21.0%	19.7%
	% of Total		14.0%	5.7%	19.7%
4.00	Count		412		412
	% within Category		100.0%		100.0%
	% within Server Ownership		8.5%		6.2%
	% of Total		6.2%		6.2%
5.00	Count		16	480	496
	% within Category		3.2%	96.8%	100.0%
	% within Server Ownership		.3%	26.8%	7.5%
	% of Total		.2%	7.3%	7.5%
6.00	Count		4	153	157
	% within Category		2.5%	97.5%	100.0%
	% within Server Ownership		.1%	8.5%	2.4%
	% of Total		.1%	2.3%	2.4%
7.00	Count		82	359	441
	% within Category		18.6%	81.4%	100.0%
	% within Server Ownership		1.7%	20.0%	6.7%
	% of Total		1.2%	5.4%	6.7%
8.00	Count		209	11	220
	% within Category		95.0%	5.0%	100.0%
	% within Server Ownership		4.3%	.6%	3.3%
	% of Total		3.2%	.2%	3.3%
9.00	Count		491	89	580
	% within Category		84.7%	15.3%	100.0%
	% within Server Ownership		10.2%	5.0%	8.8%
	% of Total		7.4%	1.3%	8.8%
10	Count		435	326	761
	% within Category		57.2%	42.8%	100.0%
	% within Server Ownership		9.0%	18.2%	11.5%
	% of Total		6.6%	4.9%	11.5%
Total	Count		4820	1794	6614
	% within Category		72.9%	27.1%	100.0%
	% within Server Ownership		100.0%	100.0%	100.0%
	% of Total		72.9%	27.1%	100.0%

Site longevity data was also grouped by payment methods and each group was examined for normality. Summary of this data exploration is shown in Table 9 and 10 and histograms and box plots are shown in Figures 14, 15, 16 and 17.

Table 9: Descriptive statistics of site longevity grouped by payment methods

Payment Method		Statistic
Site Longevity (years)	Secured	Mean
		2.5106
		Median
		2.4200
		Variance
		2.259
		Std. Deviation
		1.5031
	Non-secured	Minimum
		.00
		Maximum
		9.75
		Skewness
		1.346
		Kurtosis
		5.296
	MOTO	Mean
		2.6963
		Median
		2.3300
		Variance
		5.461
		Std. Deviation
		2.3369
		Minimum
		.17
		Maximum
		11.50
		Skewness
		3.161
		Kurtosis
		12.268

Table 10: Test of normality for site longevity data

		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Site Longevity (years)	Secured	.094	85	.063			
	Non-secured	.288	19	.000	.643	19	.010*
	MOTO	.124	23	.200*	.969	23	.640

**. This is an upper bound of the true significance.
 *. This is a lower bound of the true significance.
 a. Lilliefors Significance Correction

Table 9 shows that means and medians are very close to each other and significance levels of 0.063, 0.010 and 0.640 for the secured, non secured and MOTO payment method respectively shows that the data is fairly normal. The histograms in the following figure demonstrate this distribution as well.

Figure 14: Histogram of site longevity data for secured payment method

Figure 15: Histograms of site longevity data for non-secured payment method

Figure 16: Histogram of site longevity data for MOTO payment method

Figure 17: Box plot of site longevity data grouped by payment methods

Figure 17 shows some outliers, which in fact are true data items representing Apple Computers (11.5 years), Dell Computers (9.75 years), Wine Exchange (0.5 years) and Radar City (0.08 years).

4.2 GLM General Factorial Analysis of Variances (ANOVA) of LogPrice with Payment Method as Factors

Test of Hypothesis 1

Generalized Linear Model (GLM) general factorial Analysis of Variances (ANOVA) was used to test the null hypothesis that means of product prices grouped by the three payment methods are statistically equal between these groups. First, Levene's test of homogeneity of variances was used to examine whether or not variances in these groups are stable. The weight variables were taken as the inverse of variances (1/0.601, 1/0.443, 1/0.447 from Table 5) in the respective. The results of Levene's test are shown in Table 11.

Table 11: Levene's test of equality of error variances

Dependent Variable: LOG_PR			
F	df1	df2	Sig.
2.566	2	9628	.077

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

Significance level greater than 0.05 shows that variances are homogeneous in the three groups. The ANOVA test was then performed to test the null hypothesis of equality of means in the three groups. The results are shown in Table 12.

Table 12: Test results (hypothesis 1)

Test results (Hypothesis-1)						
Dependent Variable: LOG_PR						
Source	Sum of Squares	df	Mean Square	F	Sig.	Eta Squared
Contrast	687.613	2	343.807	343.580	.000	.067
Error	9634.352	9628	1.001			

a. Weighted Least Squares Regression - Weighted by WTLOGPR

Significance of 0 implies that means of LogPrice in the three payment methods are statistically different. Tukey HSD post hoc multiple comparison tests were used to compare each mean with the other two. The result is shown in Table 13.

Table 13: Multiple Comparisons of means of LogPrice grouped by payment methods

Dependent Variable: LOG_PR						
Tukey HSD						
(I) PM	(J) PM	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1.00	2.00	.5285*	.025	.000	.4695	.5874
	3.00	.3454*	.018	.000	.3042	.3865
2.00	1.00	-.5285*	.025	.000	-.5874	-.4695
	3.00	-.1831*	.028	.000	-.2477	-.1185
3.00	1.00	-.3454*	.018	.000	-.3865	-.3042
	2.00	.1831*	.028	.000	.1185	.2477

Based on observed means. PM: 1=Secured, 2=Non-Secured, 3=MOTO
*. The mean difference is significant at the .05 level.

Table 13 shows that the mean of product prices from merchants stores using a secured payment method ($10^{2.1114} = \$130$) is higher than the mean of product prices from merchants stores using a MOTO payment method ($10^{1.7660} = \$58.34$). This in turn is higher than the mean of product prices from stores using non-secured payment methods ($10^{1.5829} = \$38.27$).

Since the means are not equal, the alternate hypothesis is accepted. Results were further verified by performing these tests on an equal sample size for each group. Since the number of items from stores using non-secured payment method was the smallest group (817 items), it was taken as sample size for this analysis and therefore, 817 items from the other two groups (6614 for secured and 2200 for MOTO) of payment methods were randomly picked for this analysis. Table 14 shows descriptive statistics of LogPrice data for equal group size grouped by payment methods.

Table 14: Descriptive statistics of LogPrice data (equal group size) grouped by payment methods

Payment Method			Statistic
LogPrice	Secured	Mean	2.0846
		Median	2.1732
		Variance	.584
		Std. Deviation	.7639
		Skewness	.018
		Kurtosis	-.062
	Non-secured	Mean	1.5829
		Median	1.4771
		Variance	.443
		Std. Deviation	.6655
		Skewness	.940
		Kurtosis	.310
	MOTO	Mean	1.7729
		Median	1.6990
		Variance	.465
		Std. Deviation	.6823
		Skewness	.283
		Kurtosis	-.148

Levene's Test was performed on this data to determine whether or not variances are homogeneous in these groups. Weight variables were again inverse of variances; $1/0.584$, $1/0.443$ and $1/0.465$ from secured, non-secured and MOTO groups respectively. The results of Levene's test of homogeneity of variances are shown in Table 15. Significance level of 0.291 shows that variances are homogeneous in these groups.

Table 15: Levene's test of equality of variances for LogPrice data (equal sample size)

Dependent Variable: LOG_PR			
F	df1	df2	Sig.
1.237	2	2448	.291
Tests the null hypothesis that the error variance of the dependent variable is equal across groups (equal size group).			

ANOVA test on this equal group size sample shows that the means of LogPrice of items from three different groups are statistically different (significance is 0). Test results are shown in Table 16

Table 16: Test results for equality of means of LogPrice data grouped by payment methods (equal group size)

Test Results for equal group size (Null Hypothesis: means are equal)						
Dependent Variable: LOG_PR						
Source	Sum of Squares	df	Mean Square	F	Sig.	Eta Squared
Contrast	201.012	2	100.506	100.502	.000	.076
Error	2448.088	2448	1.000			
a. Weighted Least Squares Regression - Weighted by WTLOGPR						

Tukey HSD post-hoc test was performed to determine relative differences in the means. Result of this test is shown in Table 17.

Table 17: Multiple comparison of mean of LogPrice data grouped by payment methods (equal group size)

Multiple Comparisons (Equal Sample Size)						
Dependent Variable: LOG_PR						
Tukey HSD						
(I) PAYMENT	(J) PAYMENT	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1.00	2.00	.5017*	.035	.000	.4186	.5848
	3.00	.3117*	.036	.000	.2278	.3957
2.00	1.00	-.5017*	.035	.000	-.5848	-.4186
	3.00	-.1899*	.033	.000	-.2681	-.1118
3.00	1.00	-.3117*	.036	.000	-.3957	-.2278
	2.00	.1899*	.033	.000	.1118	.2681

Based on observed means. (Payment : 1=Secured, 2=Non-Secured, 3= MOTO)

*. The mean difference is significant at the .05 level.

a. Weighted Least Squares Regression - Weighted by WTLOGPR

Table 17 shows that the mean of product prices from merchants' stores using secured payment method ($10^{2.0846} = \$121.50$), is higher than the mean of product prices from stores using MOTO payment method ($10^{1.7729} = \$59.27$), which in turn is higher than the mean of product prices from stores using non-secured payment method ($10^{1.5829} = \$38.27$). The results are consistent with that of unequal group size.

4.3 Log Linear Analysis with Payment Method as Response Variable and Product Categories as Explanatory Variables

Test of Hypothesis 2

Logit Model of Log Linear analysis was used to test the null hypothesis that payment methods are not the function of product categories. Since both the dependent variable (payment method) and the independent variable (product categories) are categorical variables, developing a contingency table and testing appropriate chi-square statistics can perform a test of independence between these two variables. But this test will not provide a measure of the relationship between payment methods and product categories. The Multinomial Logit Model, which is a special class of the Loglinear model, was therefore used to test both independence between variables (null hypothesis) and to determine the relationship between them. This test examines the behaviour of the dependent or response variable (payment method) with the independent or explanatory variable (product category) in terms of odds of the dependent variables (instead of cell frequency in Loglinear model) expressed as a linear combination of parameters. The counts within each combination of category of independent variables are assumed to have a multinomial distribution, which is specified in the test. In this analysis the response variable (payment method) is polytomous because of three responses (secured, non-secured and MOTO) in payment methods.

The following equation represents the model:

$$\text{Model: } \ln(m_{ij}) = \text{Cat}_j(\text{main-effect}) + \text{PM}_i(\text{main-effect}) + \text{PM}_i * \text{Cat}_j(\text{interaction})$$

or

$$\ln(m_{ij}/m_{i\cdot j}) = \lambda_i + \omega_{ij} \quad \text{Equation 1}$$

where m_{ij} = The expected count of product items of Category j sold by payment method i

λ_i = Difference of main effect of PM_i and PM_1

and

ω_{ij} = Difference of Interaction estimate between PM_i and Cat_j

ω_{ij} represents the modifying effect on the expected count on cells due to product categories.

The right hand side of equation 1 shows the log odds of selecting PM_i for Cat_j .

Summaries of Logit Analysis are shown in Tables 18, 19 and 20.

Table 18: Analysis of Dispersion

Source of Dispersion	Entropy	Concentration	DF
Due to Model	2411.792	1462.5309	18
Due to Residual	5359.313	3067.476	19272
Total	7771.106	4530.0068	19290
Measures of Association		Entropy = .3104	
		Concentration = .3229	

As shown in Table 18, entropy due to model is 2411.792. This makes chi-square statistics (twice this value) as 4823.584 with degree of freedom 18 showing strong fitness of the model. Computing $p=1-\text{CDF.CHISQ}(4823.584,18)$ gives a value of this probability as 0.

The F distribution can be calculated from the concentration due to model and due to residual, which is given by:

$$F_c = (S_c(M)/DF(M))/(S_c(R)/DF(R))$$

Using values from Table 18 F_c was calculated using the above equation as $F_c=510.479$ which gives $p=1-CDF.F(510.479)=0$, again showing strong evidence that payment method and category are not independent. The Measure of Association row shows two coefficients. One is the entropy coefficient $R_H=0.3104$ (uncertainty co-efficient with payment method as the response) and the other is the concentration coefficient $R_C=0.3229$ (the square of Kendall's tau-b). The observed R_H and R_C do indicate a fairly strong relationship between payment method and categories.

Table 19: Results of Logit analysis (MOTO taken as reference)

Payment Method	Category	Category	Estimates for Category	Estimates for Payment Method	Estimates for Interaction	Logit
Secured	1	Computer Hardware	4.483	1.462	1.5668	7.5118
Secured	2	Computer Software	-0.6931	1.462	5.2607	6.0296
Secured	3	Electronics	5.773	1.462	-0.0622	7.1728
Secured	4	Digital Camera	2.2513	1.462	2.309	6.0223
Secured	5	Flowers & Gift	5.1733	1.462	-0.4277	6.2076
Secured	6	Games and Toys	6.4823	1.462	-2.8849	5.0594
Secured	7	Gourmet & Groceries	6.6561	1.462	-2.0279	6.0902
Secured	8	Home and Garden	-0.6931	1.462	4.6271	5.396
Secured	9	Movies	-0.6931	1.462	5.5951	6.364
Secured	10	Sport and Leisure	5.1733	1.462	0	6.6353
Non-secured	1	Computer Hardware	4.483	-1.3556	0.5739	3.7013
Non-secured	2	Computer Software	-0.6931	-1.3556	1.3556	-0.6931
Non-secured	3	Electronics	5.773	-1.3556	-0.1618	4.2556
Non-secured	4	Digital Camera	2.2513	-1.3556	-1.5888	-0.6931
Non-secured	5	Flowers & Gift	5.1733	-1.3556	0.7202	4.5379
Non-secured	6	Games and Toys	6.4823	-1.3556	-5.8199	-0.6932
Non-secured	7	Gourmet & Groceries	6.6561	-1.3556	1.0443	6.3448
Non-secured	8	Home and Garden	-0.6931	-1.3556	1.3556	-0.6931
Non-secured	9	Movies	-0.6931	-1.3556	1.3556	-0.6931
Non-secured	10	Sport and Leisure	5.1733	-1.3556	0	3.8177
MOTO	1	Computer Hardware	4.483	0	0	4.483
MOTO	2	Computer Software	-0.6931	0	0	-0.6931
MOTO	3	Electronics	5.773	0	0	5.773
MOTO	4	Digital Camera	2.2513	0	0	2.2513
MOTO	5	Flowers & Gift	5.1733	0	0	5.1733
MOTO	6	Games and Toys	6.4823	0	0	6.4823
MOTO	7	Gourmet & Groceries	6.6561	0	0	6.6561
MOTO	8	Home and Garden	-0.6931	0	0	-0.6931
MOTO	9	Movies	-0.6931	0	0	-0.6931
MOTO	10	Sport and Leisure	5.1733	0	0	5.1733

From Table 19 a comparison table (Table 20) was developed, where the odds ratio of using one payment method over the other are calculated for each of the ten product categories.

Table 20: Comparison of likelihood of selecting a payment method over the others by merchants selling products from different categories

Category	Secured vs Non-secured		Secured vs MOTO		Non-secured vs MOTO	
	Log odds ratio	Odds ratio	Log odds ratio	Odds ratio	Log odds ratio	Odds ratio
1	3.8105	45.17	3.0288	20.67	-0.7817	0.46
2	6.7227	831.06	6.7227	831.06	0	1.00
3	2.9172	18.49	1.3998	4.05	-1.5174	0.22
4	6.7154	825.01	3.771	43.42	-2.9444	0.05
5	1.6697	5.31	1.0343	2.81	-0.6354	0.53
6	5.7526	315.01	-1.4229	0.24	-7.1755	0.00
7	-0.2546	0.78	-0.5659	0.57	-0.3113	0.73
8	6.0891	441.02	6.0891	441.02	0	1.00
9	7.0571	1161.07	7.0571	1161.07	0	1.00
10	2.8176	16.74	1.462	4.31	-1.3556	0.26

As shown in Table 20 the odds of using a secured payment method are much higher for computer-related goods, compared to electronics and sports goods and groceries. A detailed discussion on these results is presented in Chapter 5.

By this analysis, the null hypothesis is rejected and the alternate hypothesis is accepted that payment methods are the function of product categories.

As shown in Table 20, in some cases this relationship is very strong. This strong relationship between payment methods and product categories was more apparent when this analysis is performed on groups of the same type of product categories. For example, these ten categories were grouped into four types of product categories; computer hardware and software (category 1, 2 and 4), durable products (category 3 and 10), gifts

and fun-related items (category 5 and 6), consumable products (category 7, 8 and 9).

The analysis is shown in Table 21 and Table 22.

Table 21: Results of Logit analysis (grouped categories)

Payment Method	Category	Estimates for Category	Estimates for Payment M.	Estimates for Interaction	Logit
Secured	Computer HW&SW (1+2+4)	4.5799	0.468	2.8369	7.8848
Secured	Durables (3+10)	6.2096	0.468	0.9551	7.6327
Secured	Gifts and fun (5+6)	6.7208	0.468	-0.7065	6.4823
Secured	Consumables (7+8+9)	6.6561	0.468	0	7.1241
Non-secured	Computer HW&SW (1+2+4)	4.5799	-0.3113	-0.5672	3.7014
Non-secured	Durables (3+10)	6.2096	-0.3113	-1.149	4.7493
Non-secured	Gifts and fun (5+6)	6.7208	-0.3113	-1.8715	4.538
Non-secured	Consumables (7+8+9)	6.6561	-0.3113	0	6.3448
MOTO	Computer HW&SW (1+2+4)	4.5799	0	0	4.5799
MOTO	Durables (3+10)	6.2096	0	0	6.2096
MOTO	Gifts and fun (5+6)	6.7208	0	0	6.7208
MOTO	Consumables (7+8+9)	6.6561	0	0	6.6561

Table 22: Comparison of likelihood of preferring one payment method for different product categories

Category	Secured vs Non-secured		Secured vs MOTO		Non-secured vs MOTO	
	Log odds ratio	Odds ratio	Log odds ratio	Odds ratio	Log odds ratio	Odds ratio
Computer HW&SW (1+2+4)	4.1834	65.59	3.3049	27.25	-0.8785	0.42
Durables (3+10)	2.8834	17.87	1.4231	4.15	-1.4603	0.23
Gifts and fun (5+6)	1.9443	6.99	-0.2385	0.79	-2.1828	0.11
Consumables (7+8+9)	0.7793	2.18	0.468	1.60	-0.3113	0.73

The analysis was further verified using equal sample sizes for each of the ten product categories. Since the smallest number of items, 220, were in category 8, it was chosen as the group size for each categories and, therefore, 220 items were randomly chosen from all other categories. The test was again performed and the results are shown in Table 23 and 24.

Table 23: Logit analysis of equal group size (220) in each of the ten categories

Payment Method	Category	Category	Estimates for Category	Estimates for Payment Method	Estimates for Interaction	Logit
Secured	1	Computer Hardware	1.8718	1.4016	2.0808	5.3542
Secured	2	Computer Software	-0.6931	1.4016	4.6874	5.3959
Secured	3	Electronics	3.8607	1.4016	-0.1778	5.0845
Secured	4	Digital Camera	1.8718	1.4016	2.0949	5.3683
Secured	5	Flowers & Gift	3.8607	1.4016	-0.303	4.9593
Secured	6	Games and Toys	5.2013	1.4016	-2.9266	3.6763
Secured	7	Gourmet & Groceries	4.5901	1.4016	-1.9935	3.9982
Secured	8	Home and Garden	-0.6931	1.4016	4.6874	5.3959
Secured	9	Movies	-0.6931	1.4016	4.6874	5.3959
Secured	10	Sport and Leisure	3.7013	1.4016	0	5.1029
Non-secured	1	Computer Hardware	1.8718	-0.8979	0.2789	1.2528
Non-secured	2	Computer Software	-0.6931	-0.8979	0.8979	-0.6931
Non-secured	3	Electronics	3.8607	-0.8979	-0.4371	2.5257
Non-secured	4	Digital Camera	1.8718	-0.8979	-1.667	-0.6931
Non-secured	5	Flowers & Gift	3.8607	-0.8979	0.4872	3.45
Non-secured	6	Games and Toys	5.2013	-0.8979	-4.99565	-0.69225
Non-secured	7	Gourmet & Groceries	4.5901	-0.8979	0.5347	4.2269
Non-secured	8	Home and Garden	-0.6931	-0.8979	0.8979	-0.6931
Non-secured	9	Movies	-0.6931	-0.8979	0.8979	-0.6931
Non-secured	10	Sport and Leisure	3.7013	-0.8979	0	2.6034
MOTO	1	Computer Hardware	1.8718	0	0	1.8718
MOTO	2	Computer Software	-0.6931	0	0	-0.6931
MOTO	3	Electronics	3.8607	0	0	3.8607
MOTO	4	Digital Camera	1.8718	0	0	1.8718
MOTO	5	Flowers & Gift	3.8607	0	0	3.8607
MOTO	6	Games and Toys	5.2013	0	0	5.2013
MOTO	7	Gourmet & Groceries	4.5901	0	0	4.5901
MOTO	8	Home and Garden	-0.6931	0	0	-0.6931
MOTO	9	Movies	-0.6931	0	0	-0.6931
MOTO	10	Sport and Leisure	3.7013	0	0	3.7013

Table 24: Comparison of likelihood of using a payment method over the other for different product categories (equal sample size)

Category	Secured vs Non-secured		Secured vs MOTO		Non-secured vs MOTO	
	Log odds ratio	Odds ratio	Log odds ratio	Odds ratio	Log odds ratio	Odds ratio
1	4.1014	60.42	3.4824	32.54	-0.619	0.54
2	6.089	440.98	6.089	440.98	0	1.00
3	2.5588	12.92	1.2238	3.40	-1.335	0.26
4	6.0614	428.98	3.4965	33.00	-2.5649	0.08
5	1.5093	4.52	1.0986	3.00	-0.4107	0.66
6	4.36855	78.93	-1.525	0.22	-5.89355	0.00
7	-0.2287	0.80	-0.5919	0.55	-0.3632	0.70
8	6.089	440.98	6.089	440.98	0	1.00
9	6.089	440.98	6.089	440.98	0	1.00
10	2.2995	9.97	1.4016	4.06	-0.8979	0.41

Table 24 shows that the likelihood of using secured payment method for categories such as computer software is 440 times higher than using non-secured or MOTO payment methods whereas the likelihood of using secured payment method for groceries are 0.79 and 0.55 times higher (in fact lesser) than using non-secured and MOTO payment method respectively. So, the results are consistent with the analysis of unequal group size.

4.4 GLM General Factorial Analysis of Variances (ANOVA) of LogPrice with Secured Server Ownership as Factors

Test of Hypothesis 3

Univariate Analysis of Variances was used to test the null hypothesis that the mean of product prices from stores using their own secured server will be equal to the mean of product prices from stores using a third party's secured server. This analysis was performed on 6614 items from stores using secured payment method and either had their own secured server (4820 items) or used a third party's secured server (1794 items). Section 4.1 shows the descriptive statistics of LogPrice under these two types of secured server ownership and presents graphical representation of their distribution. Univariate Analysis of Variances requires that error variances in these two groups are homogeneous. This condition was tested using Levene's test of homogeneity and the result is shown Table 25 where weight variables are the inverse of variances ($1/0.572$ and $1/0.434$) in respective groups.

Table 25: Levene's test of equality of error variances in LogPrice for two types of secured server ownership

Levene's Test of Equality of Error Variances ^{a,b}			
Dependent Variable: LOG_PR			
F	df1	df2	Sig.
4.273	1	6612	.039

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept+Secured Server Ownership

b. Weighted Least Squares Regression - Weighted by WTVAR (Inverse of Variance in respective setup group)

Significance of 0.039 implies that variances are homogenous in these groups. The null hypothesis was then tested using Univariate Analysis of variances and result is shown Table-26.

Table 26: Test results (test the null Hypothesis that means are statistically equal)

Test Results (Test the null hypothesis that means are statistically equal)						
Dependent Variable: LOG_PR						
Source	Sum of Squares	df	Mean Square	F	Sig.	Eta Squared
Contrast	937.835	1	937.835	937.635	.000	.124
Error	6613.411	6612	1.000			

a. Weighted Least Squares Regression - Weighted by WTVAR

A 0 level of significance implies that the two means are not equal. Since there are only two groups, a multiple comparison was not needed and it can be observed that mean of product prices from merchants stores using their own secured server ($10^{2.2691} = \$185.82$) is

higher than the mean of product prices from merchants stores using third party server
 $(10^{1.6876} = \$48.70)$.

4.5 Logit Analysis for Secured Server Ownership as Response Variable and Product Categories as Explanatory Variables

Test of Hypothesis 4

Logit Model of Loglinear Analysis was used to test the hypothesis that secured server ownership is not a function of payment methods. The response variable or dependent variable is secured server ownership with two responses as own-server and third-party-server, whereas explanatory variables or independent variables are the ten product categories. This test examines only 6614 items from stores using secured payment method. Logit Model used in this test was:

$$\ln(m_{ij}) = \text{Cat}_j(\text{main-effect}) + \text{Secured Server Ownership}_i(\text{main-effect}) + \text{Secured Server Ownership}_i * \text{Cat}_j(\text{interaction})$$

or

$$\ln(m_{ij}/m_{i \cdot j}) = \lambda_i + \omega_{ij} \quad \text{Equation-2}$$

where

m_{ij} = The expected count of product items of Category j under secured server ownership i

λ_i = Difference of main effect of Secured Server Ownership $_i$ and Secured Server

Ownership $_i$, and

ω_{ij} = Difference of interaction estimate between Secured Server Ownership_i with Cat_j

ω_{ij} represents the modifying effect on the expected count in cells due to product

categories. Table 27 shows the analysis of dispersion and verifies the fitness of the model

Table 27: Analysis of dispersion of Logit model with secured server ownership as response and product categories as explanatory variables

Source of Dispersion	Entropy	Concentration	DF
Due to Model	1957.109	1360.9561	18
Due to Residual	1916.819	1259.8697	6614
Total	3873.928	2620.8258	6623
Measures of Association		Entropy = .5052	
		Concentration = .5193	

As shown in Table 27, the entropy due to the model is 1957.109. This makes chi-square statistics (twice this value) as 3914.218 with degree of freedom 18 showing strong fitness of the model. Computing $p=1-\text{CDF.CHISQ}(3914.218,18)$ gives a value of this probability as 0. The F distribution can be calculated from the concentration due to model and due to residual, which is given by:

$$F_c = (S_c(M)/DF(M))/(S_c(R)/DF(R))$$

Using values from Table 27, F_c was calculated using above equations as $F_c=396.92$ which gives $p=1-\text{CDF.F}(396.926)=0$ again showing strong evidence that secure server ownership and product categories are not independent. The Measure of Association row shows two coefficients. One is the entropy coefficient $R_H=0.5052$ (uncertainty coefficient with secured server ownership as the response) and other is the concentration

coefficient $R_C=0.5193$ (the square of Kendall's tau- b). The observed R_H and R_C also indicate strong relationship between secured server ownership and product categories.

Table 28 shows the parameter estimates for the two types of secured server ownership in ten product categories.

Table 28: Results of Logit analysis secured server ownership and product categories (third party taken as reference)

Server Ownership	Category	Category	Estimates for Category	Estimates for Server Ownership	Estimates for Interaction	Logit
Owned Server	1	Computer Hardware	-0.6931	0.2881	7.9169	7.5119
Owned Server	2	Computer Software	-0.6931	0.2881	6.4346	6.0296
Owned Server	3	Electronics	5.9309	0.2881	0.6135	6.8325
Owned Server	4	Digital Camera	-0.6931	0.2881	6.4273	6.0223
Owned Server	5	Flowers & Gift	6.1748	0.2881	-3.6595	2.8034
Owned Server	6	Games and Toys	5.0337	0.2881	-3.8177	1.5041
Owned Server	7	Gourmet & Groceries	5.8847	0.2881	-1.76	4.4128
Owned Server	8	Home and Garden	2.4423	0.2881	2.6143	5.3447
Owned Server	9	Movies	4.4942	0.2881	1.4152	6.1975
Owned Server	10	Sport and Leisure	5.7884	0.2881	0	6.0765
Third Party Server	1	Computer Hardware	-0.6931	0	0	-0.6931
Third Party Server	2	Computer Software	-0.6931	0	0	-0.6931
Third Party Server	3	Electronics	5.9309	0	0	5.9309
Third Party Server	4	Digital Camera	-0.6931	0	0	-0.6931
Third Party Server	5	Flowers & Gift	6.1748	0	0	6.1748
Third Party Server	6	Games and Toys	5.0337	0	0	5.0337
Third Party Server	7	Gourmet & Groceries	5.8847	0	0	5.8847
Third Party Server	8	Home and Garden	2.4423	0	0	2.4423
Third Party Server	9	Movies	4.4942	0	0	4.4942
Third Party Server	10	Sport and Leisure	5.7884	0	0	5.7884

Using parameter estimates from this table, a comparison table (Table 29) was developed which shows the relative likelihood of using own-secured-server versus using third-party-server for ten product categories. Table 29 shows that the odds of using owned secured server are much higher for items such as computer hardware and software (3659 and 831 respectively) than for items such as flowers and groceries (0.03, 0.22 respectively) over using a third party secured server.

Table 29: Comparison of likelihood of preferring owned server setup in ten product categories

Category	Category	Owned Server vs Third Party Server	
		Log odds ratio	Odds ratio
1	Computer Hardware	8.2050	3659.20
2	Computer Software	6.7227	831.06
3	Electronics	0.9016	2.46
4	Digital Camera	6.7154	825.01
5	Flowers & Gift	-3.3714	0.03
6	Games and Toys	-3.5296	0.03
7	Gourmet & Groceries	-1.4719	0.23
8	Home and Garden	2.9024	18.22
9	Movies	1.7033	5.49
10	Sport and Leisure	0.2881	1.33

4.6 GLM General Factorial Analysis of Variances (ANOVA) of Site Longevity with Payment Methods as Factors

Test of Hypothesis 5

Univariate Analysis of Variances was used to test the null hypothesis that mean years of operation (site longevity) grouped by payment methods are statistically equal. Section 4.1 shows the descriptive statistics of site longevity data grouped by payment methods with mean years as 2.5076, 2.6963 and 2.3804 for stores using secured, non-secured and MOTO payment methods respectively. Levene's test was first performed to test homogeneity of variances in these groups. The results of Levene's test are shown in Table 30.

Table 30: Levene's test of equality of variances in site longevity data grouped by payment methods

Levene's Test of Equality of Error Variances ^a			
Dependent Variable: YEARS			
F	df1	df2	Sig.
.603	2	125	.549
Tests the null hypothesis that the error variance of the dependent variable is equal across groups.			
a. Design: Intercept+PAYMENT			

Significance level of 0.549 shows that variances in these groups are homogenous.

Univariate Analysis of Variances (ANOVA) was then performed to test the null hypothesis that means of these groups are statistically equal. Results of this test are shown in Table 31.

Table 31: Test results (test the null hypothesis that means are equal)

Dependent Variable: YEARS					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1.045 ^a	2	.523	.207	.814
Intercept	533.905	1	533.905	211.124	.000
Payment Methods	1.045	2	.523	.207	.814
Error	316.109	125	2.529		
Total	1125.325	128			
Corrected Total	317.155	127			
a. R Squared = .003 (Adjusted R Squared = -.013)					

Table 31 shows that the means of site longevity of web stores using different payment methods are statistically the same and therefore, the null hypothesis was accepted. Scatter

plot (Figure 18) of site longevity data with site longevity on x-axis and payment methods of y-axis also shows no pattern of site longevity associated with payment method.

Figure 18: Scatter plot of site longevity on x-axis and payment methods on y-axis

CHAPTER 5 DISCUSSION AND CONCLUSION

5.1 Discussion of Findings

5.1.1 Relationship between payment methods, and product price and category

Univariate Analysis of Variances and Logit analysis for the test of hypotheses 1 and 2 respectively show that payment methods used by web merchants are related to product price and category. The test of hypothesis 1 (equal sample size) shows that the mean prices of items from stores using different payment methods are statistically different. The mean price of goods offered by secured online stores, \$121.50, is higher than the mean price of goods offered by merchants using the MOTO payment method, \$59.27. The mean price with the MOTO payment is higher than the mean price of goods offered by non-secured online stores, \$38.27.

These results support the argument that merchants are more likely to pay for a secured infrastructure if they sell high priced items. The results, however, deviate from the original hypothesis in one respect. The mean price of items from non-secured online stores is lower than the mean price of items from online stores using the MOTO payment method. A reason for this deviation might be the higher cost associated in handling mail or telephone orders in the case of MOTO payment method, than developing HTML forms to fill out credit card information.

The results contradict the technological argument that SSL is only to encrypt credit card information and has no direct bearing on the price of items sold at online stores.

The results from Logit Analysis for testing hypothesis 2 show a strong relationship between payment methods and product categories. This proves the existence of a “product effect” similar to “industry effect”. For instance, Table 23 shows that the likelihood of using the secured payment method to sell computer hardware is much higher than using the non-secured and MOTO payment methods (60 and 32 times respectively). Whereas the likelihood of using the secured payment method for sports and leisure products is not as high as for computer products (only 9.9 and 4.0 times higher than using non-secured and MOTO payment methods respectively). This trends is more obvious in the case of groceries where the odds ratios of using the secured payment method over the non-secured and MOTO payment method are 0.79 and 0.55 times, respectively. This suggests that the more “high-tech” the product is (e.g. computer hardware and software), the more likely it is sold with a secured payment method and the simpler the product in nature (e.g. groceries) the more likely it is sold by the MOTO payment method. That shows that a merchants’ own knowledge and familiarity with the equipment used to implement payment method is reflected in the payment method offered at online stores. For instance, hardware and software merchants can more easily erect a secured infrastructure than merchants with experience in selling grocery-like products. This means that the desire to protect online shoppers’ confidential information by using SSL is also affected by product category sold through online stores.

5.1.2 Relationship between secure server ownership and product price and category

The result of testing hypotheses 3 and 4 shows that outsourcing the secured payment method infrastructure is affected by product price and product category. Univariate Analysis of Variance shows that the mean price of items from stores using their own secured web server, \$185.82 is higher than the mean price of items from merchants' stores which use a third party secured server, \$48.70.

This shows that the lower the price of goods sold online, the higher the incentive to outsource secured infrastructure. This is an interesting finding, from the view that giving out credit card information to third parties (Internet service providers) is riskier than giving it directly to merchants. Third parties' web sites are more prone to hacker attacks, because of the access to credit information in bulk quantity that is collected for a number of merchants. Also, third parties may keep shipping and mailing information to develop target mailing lists for onward sales.

Results of testing hypothesis 4 show that ownership of the secured payment infrastructure is related to product category. Table 29 shows that the likelihood that merchants selling computer hardware and software will own the secured server are 3659 and 831 times higher than using third party secured servers. For electronics, these odds decreased to 2.46 times higher than using third party servers. The odds ratios of using a merchant-owned server for categories such as "gifts & flowers", "games and toys" and "groceries"

fell to 0.03, 0.02 and 0.22 respectively. These findings suggest that web merchants with no experience in high-tech (e.g. computer-related items) tend to use third party services, which is inherently riskier for online shoppers. This observation again implies the desire to secure confidential information is affected by the return on investment and ease of operation needed to erect secured infrastructure by web merchants.

5.1.3 Relationship between site longevity and payment methods

Results from testing hypothesis 5 show that there is no relationship between site longevity and payment method. This result is contrary to the hypothesis that the longer the presence of web merchant's site on the Internet, the higher the incentive for web merchants to use secured payment method. The results suggest a low learning curve best describes the adoption of secured payment methods. Merchants do not need to spend long time to understand security issues and infrastructures. There is no entry barrier to use secured payment method, especially when merchants can use a third-party's secured server as well.

5.1.4 The Internet as a research tool

From the methodology used in the research it is evident that the Internet is a powerful tool to perform fast and accurate research. For instance, preliminary survey with nearly 80 Cybercoin and e-cash merchants was completed in 10 days and with almost no cost by

using e-mail. Secondly, the use of shopping agent to collect price data for 9631 items from 127 merchants was also less expensive and time consuming than using ordinary mail and questionnaires. Similarly, to measure web merchants' presence on the Internet was very fast and less expensive using free access to database of web domain registering service providers than accessing and querying printed records from libraries. Databases also provided the contact names and numbers of persons maintaining the web sites. Hence, this research has demonstrated that Internet is a cost and time effective way to conduct reliable research.

5.2 Insight for Researchers

This research suggests the following insights:

1. Differences between online retail and traditional retail methods exist. In physical stores, payment methods do not vary from store to store on the basis of price and category of products available for sale, but in online stores they do. This study introduces a new area of research: what are the differences between online retail and traditional retail business?
 2. This research demonstrates that although a secured payment method is essential for securing confidential information from online shoppers, this necessity is little recognized by merchants who sell low priced goods. For instance, web merchants selling low priced goods use non-secured payment methods, or if they use secured payment method they do not tend to own a secured server. Similarly, merchants
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selling non-technical items prefer using the MOTO payment method and if they choose to use a secured payment method they do it through third party secured servers. Merchants' desire to secure confidential information of online shoppers diminishes as prices decrease.

3. The research concludes that the Internet is emerging as a powerful tool and a data bank for researchers. First, this study began by exploring the archives of reputed universities and professional organizations for materials related to the proposed electronic payment methods for Internet commerce. This research was more up-to-date and of broad scope than was otherwise available from published archives in physical libraries. The Internet provides an opportunity to examine information from anywhere in the world, and contributes to finding a real and innovative research topic in shorter time with less effort. Second, e-mail was used for the preliminary survey of Cybercoin and e-cash merchants. It was learned from their responses (see Appendix C for summary of preliminary survey of this research) that they had long ago dismissed the idea of using these payment methods because of lack of technical support from the inventing firms, and lack of trust in the involved procedures (e.g. installing a wallet on their computers) by online shoppers. The inventors of these payment methods were claiming that these methods were a highly innovative solution for Internet commerce. It was quickly discovered that the adoption rate was poor (see Appendix C). This shows that the Internet is one the fastest ways of identifying industry trends and identifying core issues to research. Third, the use of a shopping agent to gather data is another example of research potential available on the Internet.
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The data obtained from shopping agents' search responses can be directly fed to statistical tools to minimize the possibilities of errors in collecting and recording the data.

5.3 Insights for the Electronic Commerce Industry

This research provides important insights to practitioners, such as:

1. The results showed that for certain product categories the secured payment method is the dominant choice. For example, merchants of computer hardware and software are more likely to use the secured payment method.
2. The entry barrier to supporting the secured payment method is low.
3. Given that most grocers use the non-secured payment method, a grocer who uses the secured payment method may drive competitive advantage.
4. The methodology present in this research can be used for benchmarking and competitive intelligence by looking into some other factors, which are peculiar to electronic space such as the effects of using graphics, animations, Java applets on the number of visits to web pages. The process is fast and inexpensive.

5.4 Study Limitations

Limitations of this study include:

1. This study is a cross-sectional study. The data were collected in July and August of 1998 and hence shows the situation of that time only. Data collected over a longer
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span will provide better insight on the trends of using different payment methods and their relationship with product price, product category and site longevity.

2. The study does not examine the relationship between payment method and profitability. For instance, it can be suggested but not verified from this study whether grocers and games and toys merchants' adoption of secured payment method will increase their profitability or produces a source of competitive advantage.
 3. Site longevity was measured using the date of registration of the Internet domain. This does not ensure it was the date from which the merchant began using the observed payment method. For instance, the secured payment method on a site with 6 years site longevity does not imply that the merchant was using the secured payment method for the last 6 years because SSL itself is only 4 years old in the industry (introduced by Netscape in late 1994). The data, however, is correct for testing the hypothesis on the relationship between web site longevity and the payment method used in the web store.
 4. The study does not cover some important product categories such as books and apparel. In order to keep the data as unbiased as possible the researcher had to choose a default arrangement of product categories and selection of merchants, only possible by using a particular shopping agent. Jango, the shopping agent used in this study does not have books and apparel.
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5.5 Recommendation for Future Studies

This study can be extended in the following ways:

1. In order to conduct a longitudinal research on this aspect, the participating merchants of this study can once again be investigated for payment methods after a certain period of time. That analysis would provide a clearer picture of payment method adoption in the industry.
 2. The participating merchants can be further surveyed about their expected and actual sales growth to try to measure the relationship between product price, product category, payment methods and profits from online stores.
 3. The data of this research can be merged with data collected from another shopping agent such as Junglelee at www.junglelee.com or, Yahoo, to add a variety of product categories and to increase the number of merchants. The results of that study will be more generalized.
 4. Merchants who have tried other payment methods such as Cybercoin or e-cash (detail given in Appendix C) can be further monitored for their adoption of other newly proposed payment methods such e-card. That analysis will provide an insight about the factors explaining success and failures of new technologies from a technology enthusiast's point of view. The study can be extended to those merchants who are trying more recent payment methods such as e-card and Secure Electronic Transaction (SET) based payment methods to compare the differences in payment method and product categories of these merchants with the merchants of this study.
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Appendix A

Screen Shot of Jango shopping agent

APPENDIX B

List of Merchants from this Study

S	Merchant	Product Category	Payment	Setup	M	Y	years	Domain Name	AP
1	1800Flowers	Flowers&Gift	SSL	OS	9	95	2.92	www.1800flowers.com	47
2	2G Roses	Flowers&Gift	SSL	CSP	1	96	2.58	www.freshroses.com	30
3	8 STREET WINE SHOP	Gourmet & Groceries	MOTO	OS	9	96	1.92	www.eightwine.com	133
4	800 SPIRITS	Gourmet & Groceries	NSSL	OS	1	96	2.58	www.800sprints.com	106
5	AccessMicro	Camera	SSL	OS	9	96	1.92	www.accessmicro.com	1673
6	Advanced Fitness	Sports & Leisures	NSSL	OS	9	96	1.92	www.advancedfitness.com	1235
7	Adventure Gear	Sports & Leisures	SSL	CSP	12	95	2.67	www.ewalker.com	111
8	Ahrre's Coffee Roastery	Gourmet & Groceries	NSSL	OS	11	95	2.75	www.ahre.com	10
9	Armeno Coffee Roasters	Gourmet & Groceries	MOTO	OS	9	96	1.92	www.armeno.com	9
10	Aroma Borealis	Gourmet & Groceries	SSL	CSP	7	95	3.08	www.tgx.com/coffee	11
11	Autotrek	Electronics	NSSL	OS	7	96	2.08	www.autotrek.com	281
12	Backcountry Experience	Sports & Leisures	MOTO	OS	5	96	2.25	www.bcexp.com	155
13	Baltimore Coffee & Tea	Gourmet & Groceries	SSL	CSP	3	96	2.42	www.baltcoffee.com	7
14	BAS Innovation	Games&Toys	SSL	CSP	6	97	1.17	www.basinnovations.com	19
15	Bea's Beanie	Games&Toys	MOTO	CSP		98	0.67	www.beaniebaby.net	15
16	Best Buy Online	Electronics	NPM	OS	3	94	4.42	www.bestbuy.com	288
17	Best Flowers	Flowers&Gift	NSSL	OS	4	97	1.33	www.bestflowers.com	61
18	BigStar	Movies	SSL	OS	4	98	0.33	www.bigstar.com	27
19	Body Trends	Sports & Leisures	NSSL	OS	8	96	2.00	www.bodytrends.com	1445
20	Borders.com	Movies	SSL	OS	na	na	na	www.borders.com	30
21	Bottom Line Distribution	Computer Hardware	SSL	OS	7	95	3.08	www2.blol.com	828
22	BuyComp.com	Computer Hardware	SSL	OS	6	97	1.17	www.buycomp.com	1604
23	Cabela's	Sports & Leisures	MOTO	OS	8	95	3.00	www.cabelas.com	250
24	Caffe Appassionato	Gourmet & Groceries	SSL	OS	12	95	2.67	www.greatfood.com	25
25	California Wine	Gourmet & Groceries	NSSL	OS	3	96	2.42	www.calwine.com	21
26	California Wine Connection	Gourmet & Groceries	SSL	CSP	8	96	2.00	www.wineconnection.com	43
27	Campmor	Sports & Leisures	SSL	OS	5	95	3.25	www.campmor.com	178
28	CDnow	Movies	SSL	OS	na	na	na	www.cdnow.com	28
29	CDW	Camera	SSL	OS	7	98	0.08	www.cdw.com	1438
30	CDWorld	Movies	SSL	OS	11	94	3.75	www.cdworld.com	15

Appendix B (contd.)

31	Chip Shot Golf	Sports & Leisures	SSL	CSP	8	96	2.00	www.chipshotgolf.com	152
32	Cigar Express	Flowers&Gift	MOTO	OS	4	96	2.33	www.cigarexpress.com	5
33	City Wine	Gourmet & Groceries	SSL	CSP	3	96	2.42	www.citywine.com	69
34	Claremont Tea Company	Gourmet & Groceries	NSSL	CSP	7	96	2.08	www.teaandcoffee.com	8
35	CMP Express	Camera	SSL	OS	11	95	2.75	www.cmpexpress.com	9513
36	Coffee beans of lees	Gourmet & Groceries	MOTO	OS	1	96	2.58	www.beanusa.com	9
37	Coffee Tea & Spice	Gourmet & Groceries	MOTO	CSP	8	94	4.00	www.best.com/~bihomes/coffeeandtea/	8
38	CompUSA	Camera	SSL	OS	12	94	3.67	www.compUSA.com	811
39	Consumer Direct WH	Electronics	SSL	OS	11	96	1.75	www.consumer-direct.com	304
40	COOLBEANS	Games&Toys	SSL	CSP	8	97	1.00	www.beaniebaby.com	26
41	Crutchfield	Electronics	SSL	OS	7	95	3.08	www.crutchfield.com	234
42	Cyberian Outpost	Camera	SSL	OS	4	95	3.33	www.cypout.com	494
43	CyberShop	Electronics	SSL	OS	9	94	3.92	www.cybershop.com	219
44	D&M Wines and Liquors	Gourmet & Groceries	MOTO	OS	11	96	1.75	www.dandm.com	183
45	Damark Online	Electronics	SSL	CSP	6	94	4.17	www.damark.co.uk	218
46	Dell	Computer Hardware	SSL	OS	11	88	9.75	www.dell.com	2599
47	Distinctive Car Audio	Electronics	MOTO	CSP	6	95	3.17	www.netreach.net	532
48	Drink Store	Gourmet & Groceries	SSL	CSP	7	97	1.08	www.drinkstore.com	9
49	DVD Express	Movies	SSL	OS	8	98	0.00	www.dvdexpress.com	20
50	Egghead Computer	Computer Software	SSL	OS	5	94	4.25	www.egghead.com	84
51	Electronics Outlet	Electronics	NSSL	CSP	5	96	2.25	www.electout.com	48
52	eToys	Games&Toys	SSL	OS	11	97	0.75	www1.etoys.com	37
53	e-Warehouse	Computer Software	SSL	OS	1	98	0.58	www.eWarehouse.com	224
54	FitnessNet	Sports & Leisures	NSSL	OS	8	95	3.00	www.fitnessnet.com	2129
55	FitnessZone	Sports & Leisures	SSL	CSP	4	96	2.33	www.fitnesszone.com	2668
56	Flower Stop	Flowers&Gift	SSL	OS	7	94	4.08	www.flowerstop.com	58
57	Flowers Fast	Flowers&Gift	SSL	CSP	6	97	1.17	www.flowersfast.com	42
58	Flowers USA	Flowers&Gift	SSL	CSP	8	95	3.00	www.flowersusa.com	37
59	FTD	Flowers&Gift	SSL	OS	5	95	3.25	www.ftd.com	47
60	Game Bros	Games&Toys	MOTO	OS	5	96	2.25	www.gamebros.com	44

Appendix B (contd.)

61	GameMasters	Games&Toys	MOTO	OS	5	96	2.25	www.game-masters.com	40
62	GamEscapes	Games&Toys	SSL	CSP	2	97	1.50	www.gamelovers.com	51
63	Garden Escape	Home & Garden	SSL	OS	3	94	4.42	www.garden.com	20
64	Gateway	Computer Hardware	SSL	OS	2	97	1.50	www.gateway.com	999
65	golf.com	Sports & Leisures	SSL	CSP	12	97	0.67	www.golf.com	162
66	GolfWeb	Sports & Leisures	SSL	CSP	12	94	3.67	www.golfweb.com	153
67	Home Fitness	Sports & Leisures	SSL	CSP	5	96	2.25	www.homefit.com	1102
68	ICN	Computer Hardware	SSL	OS	5	97	1.25	www.icn-corp.com	1455
69	Insight	Computer Hardware	SSL	OS	5	95	3.25	www.insight.com	1548
70	International Coffee House	Gourmet & Groceries	SSL	CSP	5	96	2.25	www.21stcenturyplaza.com/store101/	12
71	ISN	Camera	MOTO	OS	2	94	4.50	www.css.isn.com	1191
72	J&R Computer World	Camera	SSL	OS	7	95	3.08	www.jandr.com	942
73	JCPenney	Sports & Leisures	SSL	OS	10	93	4.83	www.jcpenney.com	114
74	K&L Wine Merchants	Gourmet & Groceries	SSL	CSP	2	97	1.50	www.khwines.com	14
75	Ken Cranes LaserDisc	Movies	SSL	OS	8	95	3.00	www.kencranes.com	31
76	Linray Fitness	Sports & Leisures	MOTO	OS	12	95	2.67	www.linray.com	2711
77	SuperStore	Sports & Leisures	MOTO	OS	12	95	2.67	www.linray.com	2711
77	McGlen.Com	Camera	SSL	OS	5	96	2.25	www.McGlen.com	372
78	Micron Electronics	Computer Hardware	SSL	OS	10	96	1.83	www.micronpc.com	3449
79	MicroWarehouse	Computer Hardware	SSL	OS	7	95	3.08	www.warehouse.com	460
80	Multiwave Direct	Camera	SSL	OS	4	98	0.33	www.mwavedirect.com	584
81	NECX	Camera	SSL	OS	4	94	4.33	www.necx.com	881
82	New Releases Video	Movies	SSL	CSP	3	97	1.42	www.newreleasesvideo.com	31
83	NordicTrack	Sports & Leisures	SSL	CSP	4	94	4.33	www.nordictrack.com	694
84	Pacific Northwest Wine Group	Gourmet & Groceries	NSSL	CSP	7	94	4.08	www.hammign.com/pnwgr/	16
85	Paris Fragrance	Flowers&Gift	SSL	CSP	2	97	1.50	www.pans-fr.com	21
86	PC Connection	Camera	SSL	OS	12	95	2.67	www.macconnection.com	852
87	PCMail/MacMail	Camera	SSL	OS	10	95	2.83	www.cc-ntc.com	868
88	QVC	Games&Toys	SSL	OS	11	94	3.75	www.qvc.com	158
89	Radar City	Electronics	MOTO	CSP	7	98	0.08	www.electronics.net/RadarCity	305
90	REI	Sports & Leisures	SSL	OS	3	96	2.42	www.rei.com	241

91	Roxy	Electronics	SSL	OS	7	92	6.08	www.roxy.com	475
92	Same Old Grind	Gourmet & Groceries	SSL	CSP	4	97	1.33	www.sameoldgrind.com	11
93	Santa Barbara Roasting	Gourmet & Groceries	MOTO	CSP	7	95	3.08	www.santabarbara.net/roco	11
94	Say Tea	Gourmet & Groceries	NSSL	CSP	7	95	3.08	www.myma.com/~saytea/	7
95	Schneider's of Capitol Hill	Gourmet & Groceries	NSSL	OS	4	95	3.33	www.cellar.com	91
96	Simpson's Herb Farm	Home & Garden	SSL	CSP	11	96	1.75	www.simpsonsherbfarm.com	2
97	Softmania	Computer Software	SSL	OS	4	97	1.33	www.softmania.com	74
98	software.net	Computer Software	SSL	OS	8	98	0.00	www.beyond.com	78
99	Sparco	Computer Hardware	SSL	OS	7	93	5.08	www.sparco.com	953
100	Spinelli Coffee Company	Gourmet & Groceries	NSSL	OS	10	95	2.83	www.spinelli-coffee.com	10
101	Sportscape.com	Sports & Leisures	SSL	OS	8	98	0.00	www.sportscape.com	189
102	Surplus Direct	Computer Software	SSL	OS	11	95	2.75	www.surplusdirect.com	50
103	Taylor & Norton	Gourmet & Groceries	NSSL	OS	8	97	1.00	www.tene.com	26
104	Tek Discount Warehouse	Electronics	SSL	OS	1	97	1.58	www.tekgallery.com	262
105	The Apple Store	Computer Hardware	NSSL	OS	2	87	11.50	www.apple.com	737
106	The Cigar Box	Flowers&Gift	MOTO	CSP	7	94	4.08	www.inforamp.net/~ogarbox	157
107	The Coffee Bean of Lees	Gourmet & Groceries	MOTO	OS	1	96	2.58	www.beanusa.com	8
108	The Gourmet Gardener	Home & Garden	SSL	CSP	7	96	2.08	www.gourmetgardener.com	2
109	The Outdoor Gear Exchange	Sports & Leisures	MOTO	OS	10	97	0.83	www.gearx.com	192
110	The Perfume Garden	Flowers&Gift	NSSL	CSP	6	98	0.17	www.ternex/perfume	33
111	The Picture Palace	Movies	SSL	CSP	7	95	3.08	www.pcpal.com	28
112	The Tea Shop	Gourmet & Groceries	NSSL	OS	4	96	2.33	www.theteashop.com	34
113	The Wine House	Gourmet & Groceries	SSL	CSP	5	97	1.25	www.winehouse.com	24
114	Tier One Outfitters	Sports & Leisures	SSL	CSP	4	96	2.33	http://fayetteville.net/bronze	215
115	Tobacco Barns	Flowers&Gift	MOTO	OS	9	97	0.92	www.tobaccobarns.com	47
116	T-Off Custom Golf	Sports & Leisures	SSL	CSP	12	95	2.67	www.shopsite.com/golf/	42
117	Toys "R" Us	Games&Toys	SSL	OS	11	95	2.75	www.toysrus.com	33
118	Tully's Coffee	Gourmet & Groceries	SSL	OS	3	96	2.42	www.tullys.com	11
119	TweakoPhile	Electronics	MOTO	OS	7	96	2.08	www.tweakophile.com	334
120	Video Discount WH	Electronics	MOTO	OS	9	96	1.92	www.888camcorder.com	592
121	Video Online Express	Movies	SSL	OS	11	94	3.75	www.videoexpress.com	30
122	VideoServe.com	Movies	SSL	OS	11	97	0.75	www.speedserve.com	16
123	Virtual Winery	Gourmet & Groceries	SSL	OS	8	94	4.00	www.virtualwin.com	20
124	Warehouse Wines & Liquors	Gourmet & Groceries	MOTO	OS	9	94	3.92	www.wineliquor.com	415
125	Wholesale Connection	Electronics	SSL	CSP	5	96	2.25	www.wholesaleconnection.com	343
126	Wilderness Coffee House	Gourmet & Groceries	SSL	CSP	3	97	1.42	www.wilderness-coffee.com	11
127	Wine Exchange	Gourmet & Groceries	NSSL	OS	2	98	0.50	www.wine-ex.com	45

APPENDIX C

Summary of E-Cash Merchants as were listed on Mark Twain Bank's Site

Total Number of merchants listed on Mark Twain Bank' site	39
With E-Cash	2
With CC-SSL	8
With CC-Non SSL	2
With CC-SSI+E-cash	3
With E-Cash	2
With Mail order TP order	0
With Server Error	7
With No Payment method	1
With "Nothing for sale"	6
Non-Existant (Error 404)	8

Merchant	Product Category	Observation
AccuServe	Internet access	Link not found
Aftonbladet	News Paper	Link not found
Auto Net	Auto	Link not found
Bionet	Food	No payment method
CD Now	Music	CC-SSL
CILS	Info	CC-SSL+E-Cash
Community Connection	Internet access	CC-SSL
Cyberpass	Internet Access Provider	E-Cash
Delorie Software	Game	Nothing for sale
DigiMarket	NA	Link not found
Drift wood	Music	CC-SSL+E-Cash
EJ's Sunglass	Sunglass	Error
EJ's Sunglass	Sunglass	Error
Emit	Internet Access Provider	CC-SSL+E-Cash
Eye Q	NA	Error
Fringe Ware	Info	Nothing for sale
Health World Online	Info	CyberCoin
Highway technologies	Internet Access Provider	CC-SSL
Hotmix Music	Music	CC-SSL
ITS	Software	CC-SSL
Java Repository	Software	Nothing for sale
Jungle Quest	NA	Error
Karesuando Knife Outlife	NA	Error
Kentaro Original MIDI	NA	Error
Leisez Faire Book	Electronic Books	CC-SSL
Libertarian Party of Vir	NA	Link not found
momofoto gallery	Gift	CC-SSL
NetBeat	NA	Error
NetPaddler	NA	Nothing for sale
Play Brasil	Books	CC-Non SSL
Private Idaho	NA	Nothing for sale
Royal Copenhagen	NA	Link not found
Samplex	Gift	Nothing for sale
Sense Networking	ISP	CC-SSL
Sorkins Online	Information	Fax order
Soul Mates	Service	CC-Non SSL
The australian e-cash shop	NA	Link not found
The Real Nice Shop	NA	Error
The Solonial Journal	NA	Link not found
White Knight Publishing	Electronic Books	E-Cash

Appendix C (contd.)

Summary of Cyber Coin Merchants as were listed on First Union Banks'**Site**

Total Number of Cyber Coin Merchants as listed on First Union Banks' site	36
With Cybercoin	3
With CC-SSL	6
With CC-Non SSL	1
With E-mail order	1
With no item for sale	9
With TP order	1
With Server Error	6
Non-Existant (Error 404)	9

Merchant	Product Category	Observation
American Sightseeing	Information	Nothing for sale
Brain Tainment Centre	Software	CC-SSL
Central Coast Communication	Software	Error
Computing Japan Magazine	NA	Nothing for sale
Daddy Instincts	Link Error	NA
Digital NewsStand	Link Error	NA
Emperor's Oracle	Software	CC-Non SSL
ESPN Net Sportszone	Information	CC-SSL
Food Etc.	Link Error	NA
Game Socket	Computer game	Nothing for sale
Hard Shell Word Factory	Electronic books	CC-SSL
Headgames International	Link Error	NA
Health World Online	Electronic books	CC-SSL
Home Entrepreneur	Shoes	Nothing for sale
Information Ventures Inc.	Information	Cybercoin
InterVet Veterinary Hospital	Information	Nothing for sale
In touch USA	Link Error	NA
Internet Football L	Software	NA
Keystroke Financial Network	Information	NA
Lombre Books	Link Error	NA
Maze.com	Information	NA
Micrografx ART	Link Error	NA
National Housing & R	Information	Nothing for sale
Nordic entertainment Worldwide	Music	Cybercoin
OpenCAD International	Software	TP order
Painless Computing	Service provider	Nothing for sale
QuakeNet Technologies	Service provider	Nothing for sale
The Cook Book	Link Error	NA
The Refrigerator Store	Pictures	Cybercoin
Starbase3	Computer game	CC-SSL
Tennis Time	Software	Error
Virtual Vegas	Online game	Nothing for sale
World Hearts	Link Error	NA
www7.com	Service provider	E-mail order

APPENDIX D

Logit Analysis of Product Subcategories with Payment Method as the Response Variable

Cat	Category	Log odd ratio	Odd ratio	Log odd ratio	Odd ratio	Log odd ratio	Odd ratio
		SSL Vs NSSL		SSL vs MOTO		NSSL Vs MOTO	
1	Desktops	6.5812	721.4044954	4.9488	141.0056556	-1.6324	0.195459907
2	Laptops	6.9156	1007.875571	0.6881	1.98993107	-6.2275	0.001974382
3	Modems	8.3006	4026.287442	6.6682	786.9777688	-1.6324	0.195459907
4	Monitors	3.0412	20.93034458	5.6121	273.7184436	2.5709	13.07758898
5	PDA's	7.2071	1348.974563	2.3829	10.83628256	-4.8242	0.008032978
6	Printers	7.4162	1662.703216	6.8825	975.0609677	-0.5337	0.586431155
7	Peripheral	6.0513	424.6647355	4.4189	83.0049297	-1.6324	0.195459907
8	Scanners	8.0523	3141.010995	3.9987	54.52721855	-4.0536	0.017359767
9	Software	8.3551	4251.809772	6.7227	831.0583425	-1.6324	0.195459907
10	Home Audio	5.4919	242.7179331	4.1109	61.00159431	-1.381	0.2513271
11	Personal Audio	6.6886	803.1969889	1.8374	6.280188525	-4.8512	0.007818989
12	Car Audio	2.7587	15.7793165	2.5447	12.73940569	-0.214	0.807348385
13	Video Equipment	6.5995	734.7277335	0.0058	1.005816853	-6.5937	0.001368965
14	Television	7.0396	1140.931143	1.7963	6.027305128	-5.2433	0.005282795
15	Phone and Fax	4.5876	98.25832697	1.2575	3.516618941	-3.3301	0.035789526
16	DBS Equipment	7.6703	2143.724466	6.0379	419.0121847	-1.6324	0.195459907
17	Digital Camera	8.3478	4220.884575	3.771	43.4234666	-4.5768	0.010287765
18	Florists	3.3777	29.30329597	4.1432	63.00411237	0.7655	2.150069141
19	Fragrances	3.2838	26.67695276	6.8276	922.9730169	3.5438	34.59814265
20	Cigars	3.8193	45.57229655	-3.6692	0.025496859	-7.4885	0.000559482
21	Barbie Dolls	3.8296	46.0441169	2.1972	8.999778807	-1.6324	0.195459907
22	Beanie Babies	4.0303	56.27779205	1.2993	3.666729059	-2.731	0.065154103
23	Comp. & Video Games	7.3261	1519.444369	-1.4802	0.227592165	-8.8063	0.000149786
24	Coffee	1.2988	3.664896152	-0.6672	0.51314337	-1.966	0.140015801
25	Tea	1.9049	6.71873572	1.8582	6.412184445	-0.0467	0.954373667
26	Wine	2.4306	11.36569945	6.0186	411.0027889	3.588	36.16168019
27	Spirits	0.235	1.264908769	-1.5913	0.203660681	-1.8263	0.161008197
28	Liqueurs	-1.6947	0.183654317	-4.5171	0.010920648	-2.8224	0.05946306
29	Garden Supplies	7.7215	2256.341556	6.0891	441.0243106	-1.6324	0.195459907
30	Movies	8.6895	5940.211394	7.0571	1161.073167	-1.6324	0.195459907
31	Camping Equipment	8.6381	5642.598696	1.3533	3.870176062	-7.2848	0.000685885
32	Golf Equipment	7.1089	1222.801724	5.4765	239.0087112	-1.6324	0.195459907
33	Fitness Equipment	2.331	10.28822462	0.9754	2.65222789	-1.3556	0.257792572