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Which Online Channel Is Right? Online Auction Channel Choice for Personal Computers in the Presence of Demand Decay

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Abstract

Electronic commerce has become a viable marketing channel for many companies as they take advantage of the ease of electronic markets to move merchandise quickly and inexpensively. Researchers have investigated the use of an e-commerce channel in conjunction with traditional channels, but less research has been dedicated to choosing which e-commerce channel to use. In this study, we examine the choices made by Dell, a computer manufacturer, about whether to utilize their own proprietary auction site to sell computers or to use eBay, a popular and well-established third-party auction site, to move excess merchandise. We find that Dell receives a price premium over other vendors of Dell computers, and that DellAuction.com receives a price premium over eBay.com auctions. This price premium is drastically reduced as technology ages and is made obsolete by newer technology-based products. We further find that there is little to no price premium for extremely new technology, which is consistent with a contention that the online auction demand is so high for new technology that Dell cannot realize much of a price premium making a more popular third-party channel a more viable option.

1. Introduction

Information technology (IT), specifically the Internet, has changed the way people exchange information and participate in business transactions in electronic commerce, allowing business models whose definition and scope are unattainable in traditional markets. Online auctions, in particular, exemplify business models that are far-reaching in scope, with incredible growth rates. A seller in an online auction can find a buyer who is willing to place the highest bid on an item and hence complete a transaction. Consumer-to-consumer (C2C) auctions enable anyone to buy or sell through an online auction while business-to-consumer (B2C) auctions allow firms to develop new sales channels to extend their market reach (Pinker et al. 2003). Furthermore, while marketing researchers point out how traditional channels are difficult to change (e.g., Ramaseshan and Patton 1994), electronic channels are more easily created or
abandoned as the Internet makes the cost of information transfer from supplier to consumer less costly. For example, it is not difficult to start selling goods in an online auction such as eBay, or to abandon or supplement that channel in favor of your own proprietary online auction site such as Dell computer’s selling of excess computer inventory on both eBay.com and DellAuction.com.

eBay, the premier online auction retailer, boasts millions of daily listings and billions of dollars of transactions annually, primarily in C2C auctions. However, as companies try to reach consumers in B2C transactions, online auctions have become markets of considerable size and importance, and strategies that employ online auctions as viable market channels can affect a large amount of transactions. Retailers such as Disney, Dell, Enesco, and Goebel have started to utilize eBay as a marketing channel to reach customers. In fact, Art Business News (Anonymous 2004) reports that these companies alone have sold over $2.6 million over eBay, according to eBay officials.

It is interesting to note that several of these companies also have their own dedicated auction site that is used in conjunction with sales done over eBay. In particular, Dell computers has always used multiple channels to move their products, selling at computer stores, department stores, office supply stores and over the phone directly to the consumer. Dell sells computers on eBay auctions through Dell Financial Services too, as shown in Fig. 1, and they also sell computers on their own proprietary auction site at DellAuction.com, as shown in Fig. 2.

In this article, we explore an additional facet of auctions where the demand changes over time due to the goods being sensitive to time. Time-sensitive goods are items where the value decreases over time, possibly to zero as in the case of perishable products. Examples of time-sensitive item are airline tickets, tickets to events or hotel reservations that will be immediately devalued if they are not used on time. Kuruzovich and Lucas (2004) proposed that in the case of real-time aspects of time-sensitive goods, electronic markets are quite efficient for reducing transaction costs. They also enable companies to balance sales across online and offline channels, allowing these companies to better respond to market changes.

An electronic market allows for efficient mechanisms to quickly match buyers and sellers by lowering search costs (Bakos 1997). Kuruzovich and Lucas (2004) compared online versus offline market channels for time-sensitive products in terms of behavioral differences between consumers, sales strategy and market design. Snir (2006) studied the secondary computer market and confirmed that the prices of used laptops decreased over time. The existence of multiple online auction channels leads to some interesting research questions:

- How are consumer interest and willingness-to-pay for technology-based products affected by
a brand name vendor, even when selling identical equipment?

- How do consumer interest and willingness-to-pay in a popular third-party auction house like eBay compare to consumer interest and willingness-to-pay in a smaller proprietary auction house, like DellAuction.com, where the bidders are fewer in number but more loyal to the brand name?
- How does demand decay for technology-based products, such as PCs, affect the price premiums that can be charged by a brand name vendors like Dell?

This research examines auctions at DellAuction.com and at eBay.com. We compare computer sales made by Dell with sales made by others selling Dell computers over eBay. We also compare Dell computers sales on eBay with Dell computer sales on DellAuction.com. Using data collected on 557 auctions from DellAuction.com and 373 auctions from eBay.com, we find that Dell receives a price premium for Dell computers when compared to non-Dell vendors for Dell computers. Further, we find that Dell computers sold at DellAuction.com, overall, sell for a price premium when compared to Dell computers sold by Dell at eBay.com. One possible explanation is that a more loyal and brand-conscious customer base congregates at DellAuction.com to look for Dell laptops. A further consideration to make is that these auction items are price-sensitive and demand decay perhaps might reduce these price premiums as technology ages and slowly become obsolete. Therefore, a strategy that Dell can adopt is to sell used laptops with newer technology on DellAuction.com, and then switch to eBay.com as the technology ages.

This paper is organized as follows. In Section 2, we review the relevant literature and theory. In Section 3, we present our empirical models and provide a description of the data. The empirical results are presented in Section 4. In Section 5, we discuss additional analyses and new findings. In Section 6, we conclude with our contributions, reflections on the limitations of this research, and some next steps for future research.

2. Theoretical Relationships and Market Channels

Most discussions of market channels deal with the concept of achieving a greater price in a particular channel to maximize profit (e.g., Ramaseshan and Patton 1994, Coughlan 1985). There have been many studies that discuss the prices received for items sold through online auctions. Kauffman and Wood (2006) discuss how different auction characteristics will change a bidder’s willingness-to-pay for an item over time. Bapna et al. (2003) define different bidder types and discuss the bid levels of each of those types. Vakrat and Seidmann (2000) examine how
much consumers were willing to pay for identical products offered through online auctions versus online catalogs. They show that bidders prefer shorter auctions and expect larger discounts for expensive items. Snir (2006) discusses how online auctions have opened up secondary markets for vendors like Dell. Lucking-Reiley et al. (2007) empirically investigated how distinct factors affect final prices for transactional exchange at eBay. In auctions that include bids, the authors conclude that the book value of a coin, the starting bid of an auction, the number of negative comments, and the length of the auction all affect price. In their study, the authors describe characteristics that sellers can incorporate to affect the final price of an item.

In this section, we review literature that examines price premiums due to reputation and channel choice as they relate to a market where demand decreases as technology-based products become obsolete. We develop new theory based upon previous research that deals with brand name price premiums, and with the reduction of price premiums for high-tech products.

2.1. Reputation and Brand Name Price Premiums

Marketing and economics researchers (e.g., Sullivan 1998, Klein and Leffler 1981, Shapiro 1982) describe how brand names can garner a premium above the prices charged by competitors because a brand name is an indicator of higher product quality or service. Sullivan (1998) describes how brand names can increase demand for nearly identical automobiles marketed by different automotive companies. Landes and Posner (1987) model why consumers are willing to pay more for brand names, since brand names can reduce search costs and the cognitive effort required to make buying decisions.

We are not the first to study brand name price premiums in the electronic commerce environment. There are many articles that show price dispersion, where brand name vendors charge a higher price than other vendors (e.g., Bailey 1998, Brynjolfsson and Smith 2000, Clemons et al. 2002). Kauffman and Wood (2007) discuss how brand name vendors form a market tier of market leaders who compete at a different price level than market followers. Brynjolfsson and Smith (2000) examine shopbot logs and show how market friction exists in online markets, where consumers do not always purchase the cheapest item but tend to gravitate toward brand name retailers. Lal and Sarvary (1999) also discuss how consumers show vendor preferences with Web purchases, if the product has digital attributes. Both Ba and Pavlou (2002) and Dellarocas and Wood (2008) discuss how reputable online auction sellers receive a price premium over less-reputable sellers.

We build on this research by exploring how best to capitalize on brand name premiums
when selling over online auctions. In particular, we examine how Dell fares with respect to a brand name price premium when it sells over eBay.com when compared to other vendors, and how Dell’s price premium is affected when it sells through its own less popular online auction site when compared to the more popular eBay site. Since Dell is a recognized brand, previous research in marketing and economics indicates that Dell can receive a price premium when selling Dell computers through eBay.com when compared to other vendors who are concurrently selling Dell computers on eBay.com.

2.2. Proprietary and Third-party Channel Choice and Brand Name Price Premiums

Ramaseshan and Patton (1994) discuss the tradeoffs between using a third-party channel, such as Dell’s use of eBay, and a proprietary channel, such as DellAuction.com. They point out how third-party channels provide little or no control and little or no meaningful links to customers. By contrast, while a proprietary channel does not have these weaknesses, it requires setup costs, responsibility, and commitment, and still presents the vendor with attendant risks.

We notice how Dell employs both an eBay auction channel as well as a proprietary Dell auction channel to sell its products. It is reasonable to assume that shoppers who purchase through DellAuction.com indicate, through their choice of channel, that they tend to prefer Dell computers, and reflect this preference through a willingness to pay a price premium. However, auctions on eBay.com will attract more bidders, thus giving a greater likelihood for a sale than when compared to auctions on DellAuction.com, primarily because of the extremely large user base on eBay.com. Channel choice, then, is an important consideration for profit maximization.

There have been many articles in marketing that discuss the choice of market channel that a firm uses to maximize profit. For instance, Coughlan (1985) models this situation by comparing a vertically-integrated proprietary marketing channel with a marketing channel administered by a third-party middleman, such as eBay, that allows competition. She shows that channel integration is not always profit-maximizing. Integration of the marketing function can result in decreased profits due to several factors, including a better increase in demand due to price promotions, and an increase in aggregate demand due to an aggregate of marketing efforts of all competitors and of the third-party integrator. This is in contrast to much of the reputation literature, as discussed by Shapiro (1982) and Klein and Leffler (1981), and price premiums due to high reputation in online auctions, as discussed by Ba and Pavlou (2002).

There is some disagreement on whether firms should take advantage of price premiums by establishing their own integrated market channel, thereby eliminating competition and driving loyal consumers to their site, or whether market leaders should instead sign up with a popular
third-party middleman, such as eBay, that increase the pool of possible consumers. Empirical examination prior to 2002 was difficult because data constraints in the pre-Internet era hindered in-depth empirical analysis of companies that utilize multiple channels. Kauffman and Wood (2009) discuss how the Internet allows investigation of relationships that heretofore have not been easily investigated. One of the goals of this research is to examine the price premiums that Dell realizes when selling through an integrated environment vs. the price premiums Dell receives when selling through eBay.com.

2.3. Demand Decay and Brand Name Price Premiums

Many authors discuss how demand decays as a product approaches obsolescence. For example, van der Veen and Venugopal (2005) discuss how the video market demand decays over time, and suggests that, in such situations, revenue sharing can result in a positive sum game. Gönül and Srinivasan (1996) research the effect of future coupon availability on purchase timing as the coupons approach expiration.

Computer technology also falls in value as better technology becomes available thus reducing the value of existing computer technology. There is much research that discusses the timing of the decision to purchase technology, especially PCs, in that there is a trade-off between delaying purchase to obtain the same technology at a reduced price, and immediate purchase in order to immediately obtain benefits of a technology. Lee and Lee (1998) discuss how PC purchase decisions can be impacted due to expected future obsolescence in the PC market. Song (2002) analyzes the diffusion patterns of new high-tech products with a forward-looking perspective. Melinkov (2000) examines the computer printer market and purchase decision-making using an optimal stopping model, similar to an American call option. Erdemm et al. (2005) adds to Melinkov’s work by including information search costs and future price expectations.

It is well known that consumers who are the most price-sensitive will wait before adopting new technology. As demand for a particular high-tech product decays, only the most price-sensitive consumers would make a purchase. The price-insensitive would opt for newer, better technology that has been more recently introduced. If older technology consumers are dominated by the price-sensitive buyers relative to newer technology, we expect to see a reduction in the overall price premium between Dell vendors and non-Dell vendors when they both compete in the same market, such as competing auctions on eBay.com.

It is not clear from existing research how decaying demand for a technology-based product will affect channel price premiums for a brand name vendor. As technology ages,
information asymmetry becomes more of an issue. Older technology that has been in use for a
while, particularly with older parts that are subject to corrosion or decay, such as circuit boards,
or technology with moving parts that are subject to wear and tear, such as the bearings on a disk
drive, can result in a “lemons” purchase (Akerlof 1970) where older technology fails at a greater
rate than newer technology. A reputable brand name presence in a transaction that promises
support and service, such as Dell, will make purchasing directly from Dell easier and perhaps
more desirable than purchasing on a third-party site. Following this logic, we would expect to see
an increase in the price premium between laptops sold on DellAuction.com versus those that
were sold on eBay.com by Dell during this same period.

Conversely, by following the logic that the price sensitivity of older technology consumers
is greater than that of newer technology consumers, we expect to see a reduction in the price
premium between laptops sold on DellAuction.com versus those that were sold on eBay.com by
Dell. As technology ages, price becomes the most salient product attribute for price-sensitive
consumers, and these consumers will seek out the lowest priced item whether that item is for
sale on eBay or on DellAuction.com.

2.4. Conceptual Model

Vendors like Dell try to maximize profits, and Shapiro (1982) points out that a price
premium due to a brand name reputation can be a method where market leaders increase
profitability. One can now see Dell’s dilemma: a widely-available auction site (eBay.com)
generates interest though bids due to a large user base, but a proprietary auction site
(DellAuction.com) can provide a larger price premium. Furthermore, demand decays as newer
technological capabilities are introduced into the marketplace. This reduction in demand can
affect price premiums at both eBay.com and DellAuction.com. The decision is then to determine
which appropriate auction site should be used for each computer sale. In this research, we
examine price premiums in online auctions, both as a brand-name presence in a third-party site,
and as a comparison between third-party channels and brand-name proprietary channels. Again,
we stress the point made by Kauffman and Wood (2009) of how investigation of many
phenomenon, such as this apparent disagreement, is now possible due to the wide availability of
data. Fig. 3 shows our conceptual model that is driven by the theory previously discussed.1

In Fig. 3, we contend that there are three major factors that can affect interest in an item
in an online auction, reflected in auctions by the number of bids, and the willingness to pay more
for that item. Brand name reputation can bolster interest in an item and increase the
willingness-to-pay of consumers that are willing to pay more in order to deal with a reputable
dealer. A third-party channel like eBay can increase the interest in an item through greater exposure, but participants in a third-party channel may have a reduced willingness-to-pay when compared to those who purchase through a proprietary channel, like Dell-Auction.com. Finally, if an item has greater technological capabilities, then it is more likely that consumers will be interested in the product, and brand name dealers can take advantage of the price-insensitivity of high-tech purchasers who are willing to pay more for a reputable vendor.

3. Data and Empirical Methods

We next discuss our data and the variables that we used in this research. We also specify our empirical model and discuss some issues associated with their estimation.

3.1. The Marketplace and Data

To investigate the choice between selling on a third-party auction site (Dell selling computers on eBay.com auctions) compared to selling on a proprietary auction site (Dell selling computers on DellAuction.com auctions), we gathered data on all Dell computers sold in eBay.com auctions and DellAuction.com auctions for April 2004. We examined Dell computer auctions for this study where the computer model was specified, the CPU speed was specified, the amount of RAM that was installed was specified, and the size of the hard drive was specified. This resulted in the data set described in Table 1, which contains 557 auctions from DellAuction.com and 373 auctions from eBay.com. We include all variables that are available to the bidder per every computer auction. Table 2 describes the variables used in this empirical study grouped with the construct of interest shown in the conceptual model in Fig. 3. The correlation tables for the main effects in both models are shown in Tables 3 and 4.

There is little correlation between the main effects in either model. The highest correlation between any variables is 0.511, well below the levels indicated by Kennedy (2003) and Greene (2002). However, Kennedy and Greene warn that while simple pair-wise correlation detects if corruption can occur because of the relationship between two variables, pair-wise correlation is not sufficient to detect estimate corruption effects due to multicollinearity, and they recommend a condition number test that exposes possible corruption of coefficient estimates due to multicollinearity. Kennedy recommends a condition number of 30 as a cutoff, while Greene recommends a condition number of 20. Below 20, there is little possibility of coefficient estimate corruption due to the presence of multicollinearity. Our empirical models show condition numbers well below this cutoff for main effect variables.²
3.2. Empirical Models and Econometric Issues

The conceptual model shown in Fig. 3 is challenging to estimate. Specifically, the Number of Bids variable acts as both a dependent variable as it is affected by Price Premium Factors and acts as an independent variable as it affects the final willingness-to-pay that bidders have for the item for sale. A variable that acts as a dependent variable and an independent variable in a system of equations causes the error terms in equations that predict Price Premium to be correlated with other observations that have a similar number of bids observation. This is a violation of ordinary least squares (OLS) since such correlation will cause coefficient estimates to be unstable. To resolve this, we follow the examples in prior research that recommended using seemingly unrelated regression (SUR) in cases where error terms are likely to be correlated. SUR is used to estimate coefficients of multiple equations that may be related via their correlated errors (Markovitch et al. 2005, Banker and Kauffman 1991, Zellner 1962).

This research investigates two major areas. First, we wish to examine how a brand name leader’s price premium is affected by a decaying demand when selling technology-based products when compared to other sellers. Second, we wish to examine how a brand name leader’s price premium is affected by channel choice as demand decays when selling technology-based products. Since two major areas are investigated, two empirical models are required. The first model will examine Dell computer sales on eBay, a third-party channel, and compare Dell price premiums with non-Dell price premiums when both are selling similar or identical computers. The second model will only consider sales made by Dell, and compare computer sales over a third-party auction channel, eBay, with computer sales over a proprietary auction channel, DellAuction.com.

One of the goals of this research is to examine the consumer interest and the level of price premium as demand decays for a technology-based product. This can be accomplished by interacting a variable that can act as a proxy for the age of the computer, such as CPU Speed, with weather Dell is a seller (in the first model) or whether a third-party channel is used (in the second model). However, interaction terms are known to cause multicollinearity. In such cases, it is common to incorporate a type of step regression where only the main effects are considered, and then the interaction terms are added to see their effect on the model (Kankanahalli et al. 2005, Henderson and Cool 2003). As such, each of our models is analyzed using only the main effects in the first step and main effects with interactions in the second step.

The result is that we estimate eight empirical equations in this research. First, two equations come from the conceptual model shown in Fig. 3, where we estimate the number of bids and the selling price concurrently. Second, each of these two equations is calculated with
only main effects and with interaction effects. Finally, we estimate (a) consumer interest and price premiums (b) with and without interactions (c) comparing Dell against other sellers in a third-party channel and examining only Dell sales by comparing Dell sales over eBay against Dell sales in their own proprietary channel, DellAuction.com.

Model 1 uses only main effects in Step 1 and interactions in Step 2, and examines Dell’s consumer interest and price premium when comparing Dell to other sellers when all are selling over eBay.

Model 1 – Dell Price Premium Compared to Other Vendors on eBay

- **Step 1**: Main Effects
  
  Number of bids = $\alpha_1 + \beta_{1,1} \text{ Dell is seller} + \beta_{1,2} \text{ CPU Speed}$
  
  + $\beta_{1,3} \text{ Memory} + \beta_{1,4} \text{ Disk size}$
  
  + $\beta_{1,5} \text{ Includes Windows} + \beta_{1,6} \text{ Includes DVD}$
  
  + $\beta_{1,7} \text{ Includes Modem} + \epsilon_1$

  Selling Price = $\eta_1 + \beta_{1,8} \text{ Dell is seller} + \beta_{1,9} \text{ CPU Speed} + \beta_{1,10} \text{ Memory}$
  
  + $\beta_{1,11} \text{ Disk size} + \beta_{1,12} \text{ Includes Windows} + \beta_{1,13} \text{ Includes DVD}$
  
  + $\beta_{1,14} \text{ Includes Modem} + \beta_{1,15} \text{ Number of bids} + \gamma_1$

- **Step 2**: With Interaction
  
  Number of bids = $\alpha_1 + \beta_{1,1} \text{ Dell is seller} + \beta_{1,2} \text{ CPU Speed}$
  
  + $\beta_{1,3} \text{ Memory}$
  
  + $\beta_{1,4} \text{ Disk size} + \beta_{1,5} \text{ Includes Windows} + \beta_{1,6} \text{ Includes DVD}$
  
  + $\beta_{1,7} \text{ Includes Modem} + \beta_{1,8} \text{ Dell is seller} \times \text{ CPU Speed} + \epsilon_1$

  Selling Price = $\eta_1 + \beta_{1,9} \text{ Dell is seller} + \beta_{1,10} \text{ CPU Speed}$
  
  + $\beta_{1,11} \text{ Memory}$
  
  + $\beta_{1,12} \text{ Disk size} + \beta_{1,13} \text{ Includes Windows} + \beta_{1,14} \text{ Includes DVD}$
  
  + $\beta_{1,15} \text{ Includes Modem} + \beta_{1,16} \text{ Number of bids}$
  
  + $\beta_{1,17} \text{ Dell is seller} \times \text{ CPU Speed} + \gamma_1$

Model 2 uses only main effects in Step 1 and interactions in Step 2, and examines Dell’s consumer interest and price premium when comparing Dell sales on eBay, a third party auction channel, against sales on DellAuction.com, a proprietary auction channel owned by Dell.
Model 2 – Dell’s Computer Sales on eBay and DellAuction.com

• **Step 1:** Main Effects

\[ \text{Number of bids} = \alpha_2 + \beta_{2,1} \text{ Sold through eBay} + \beta_{2,2} \text{ CPU Speed} + \beta_{2,3} \text{ Memory} + \beta_{2,4} \text{ Disk size} + \beta_{2,5} \text{ Includes Windows} + \beta_{2,6} \text{ Includes DVD} + \beta_{2,7} \text{ Includes Modem} + \varepsilon_2 \]

\[ \text{Price Premium} = \eta_2 + \beta_{2,8} \text{ Sold through eBay} + \beta_{2,9} \text{ CPU Speed} + \beta_{2,10} \text{ Memory} + \beta_{2,11} \text{ Disk size} + \beta_{2,12} \text{ Includes Windows} + \beta_{2,13} \text{ Includes DVD} + \beta_{2,14} \text{ Includes Modem} + \beta_{2,15} \text{ Number of bids} + \gamma_2 \]

• **Step 2:** With Interaction

\[ \text{Number of bids} = \alpha_2 + \beta_{2,1} \text{ Sold through eBay} + \beta_{2,2} \text{ CPU Speed} + \beta_{2,3} \text{ Memory} + \beta_{2,4} \text{ Disk size} + \beta_{2,5} \text{ Includes Windows} + \beta_{2,6} \text{ Includes DVD} + \beta_{2,7} \text{ Includes Modem} + \beta_{2,8} \text{ Sold through eBay} \ast \text{ CPU Speed} + \varepsilon_2 \]

\[ \text{Price Premium} = \eta_2 + \beta_{2,9} \text{ Sold through eBay} + \beta_{2,10} \text{ CPU Speed} + \beta_{2,11} \text{ Memory} + \beta_{2,12} \text{ Disk size} + \beta_{2,13} \text{ Includes Windows} + \beta_{2,14} \text{ Includes DVD} + \beta_{2,15} \text{ Includes Modem} + \beta_{2,16} \text{ Number of bids} + \beta_{2,17} \text{ Sold through eBay} \ast \text{ CPU Speed} + \gamma_2 \]

### 3.3. Robust Weighting and Heteroskedasticity

A Breusch and Pagan (1979) test reveals that heteroskedasticity affects our analysis. Hoaglin et al. (1983) describe how robust regression is resilient to violations of OLS assumptions. With robust regression, coefficient estimates are more stable, so that removal of a small part of the sample, even the outliers, does not cause large shifts in the estimators. Stata 10.0, the statistics package used in this research, incorporates two types of robust weighting. 

*M-estimation* (Huber 1981) uses maximum likelihood estimation to minimize the effects of heteroskedasticity. Stata 10 also incorporates a *biweight (or bisquare) estimator* (Hoaglin et al. 1983), which is a form of robust regression that adjusts for extreme residuals. Robust regression ensures that heteroskedasticity will not adversely impact our results. After robust weighting, another Breusch and Pagan test did not detect any heteroskedasticity, and the estimated
coefficients remained relatively stable even when we removed the outliers.

4. Results from Empirical Analysis

We present our results on factors that affect willingness-to-pay when selling technology-based products. Dell’s price premium over other vendors is evaluated using Model 1. Price premiums in the third-party eBay channel and the DellAuction.com proprietary channel are estimated using Model 2.

4.1. Brand-name Price Premiums over a Third-party Channel

Model 1 is used to examine how Dell compares to other vendors when selling over a common third-party channel, eBay. For this task, we only use eBay auction data, where Dell and other sellers compete when selling computers. The robust SUR results are shown in Table 5.

The estimation of the factors that affect the number of bids (the main effects model in Table 5 with number of bids as the dependent variable) shows that CPU Speed is the primary driver for increasing interest in a computer over eBay, with Dell being only weakly better than other vendors at gathering more bids for their items. An insignificant interaction indicates this effect is not affected by computer age.

By contrast, the results in Table 5 show that many factors affect the Selling Price (the main effects model in Table 5 with Selling Price as the dependent variable). The results in Table 5 show that the mere fact of Dell being the seller adds, on average, about $85.81 to the price of the computer after controlling for other computer characteristics. This supports the assertion that Dell does indeed receive a price premium when competing in third-party channels like eBay. When interaction terms are considered, Table 5 describes how the price premium reacts with the CPU Speed, with newer computers typically having a greater CPU speed. Here, we get a more complex picture of the price premium over this time period. When examining the seller, the CPU Speed and keeping all else constant, the results shown in Table 5 indicate that that the price premium for Dell when selling a Dell computer through eBay.com auctions, when compared to other vendors selling Dell computers, is

\[
\text{Dell price premium} = $294:945 + \text{CPU Speed} - $148:604
\]

With CPU Speed measured in gigahertz (GHz), and with Dell selling computers ranging from 0.65 to 1.2 GHz over eBay.com during the study period, this translates to price premiums ranging from $43.11 to $205.33 for Dell computers sold over eBay, with the price premium increasing in CPU Speed. These results continue to suggest that Dell receives a price premium.
and the interaction analysis supports the assertion that older technology will achieve less of a 
price premium than newer technology when sold over eBay.com.³

Though we used computer characteristics to control for price, we note two observations. 
First, while CPU Speed, Memory, and Disk size all have the expected effects on the Selling Price, 
the inclusion of a modem and a Windows operating system actually bring the price of the 
computer down. This may be because broadband technology was prevalent during this period. 
Modems communicate with much slower telephone dial-up speeds, and so the inclusion of a 
model may signal that a computer is using older technology or that a modem is a feature that is 
less desirable. Similarly, most of the Windows operating systems included with these systems 
were Windows 2000, when Windows XP (a later version of Windows) was the prevalent 
operating system during this period, thus making some worry about the older technology. We 
also note that the number of bids appears to have a negative effect on the final price. Easley et al. 
(2009) have shown that this is a conflict between new bidders who learn from other bidders and 
bid higher in the number of bidders, and experienced bidders who reduce their bid as more 
bidders enter an auction in order to avoid a winner’s curse.

4.2. Analysis Comparing Auction Channels

Model 2 is used to analyze how a proprietary auction channel, DellAuction.com, 
compares to a third-party auction channel, eBay.com. For this task, we only use Dell computer 
sales and we examine the prices Dell receives over eBay with the prices Dell receives over 
DellAuction.com. The robust SUR results are shown in Table 6.

The main effects in Table 6 show that the number of bids received in eBay.com auctions 
is significantly greater than the number of bids received in DellAuction.com auctions, indicating 
that eBay.com auctions run by Dell are able to generate more interest than DellAuction.com 
auctions run by Dell.⁴ However, for those computers that do sell, we show that computers sold by 
Dell through eBay have a significantly reduced price when compared to computers sold by Dell 
through DellAuction.com auctions. The empirical model results shown in Table 6 indicate that the 
price premium for selling through DellAuction.com is about 5% above what the same computer 
would sell for on eBay.com.

Table 6 also shows that there is a positive interaction between CPU Speed and Sold on 
eBay, supporting the assertion that eBay is relatively better at selling new technology, and that 
DellAuction.com is better a selling old technology. Holding every variable constant, except 
whether the computer was sold on eBay.com auctions (vs. DellAuction.com auctions) and CPU 
Speed, the results in Table 6 can be used to generate the following relationship:
eBay.com’s price premium above DellAuction.com

\[ \text{premium} = (0.294 \times \text{CPUSpeed}) - 0.287 \]

With CPU Speed measured in gigahertz (GHz), and with Dell selling computers ranging from 0.65 to 1.2 GHz over eBay.com during this study, this translates to price premiums ranging from 9.59% when Dell sells 0.65 GHz Dell computers through DellAuction.com auctions (when compared to eBay.com auctions) to a 6.58% price discount when Dell sells 1.2 GHz Dell computers through DellAuction.com auctions (when compared to eBay.com auctions). This indicates that, to maximize profit, Dell should choose to sell faster, newer computers through eBay, where there is a greater user base and more chance for a sale, and slower, older computers through DellAuction.com. This supports the contention that the price premium Dell receives through selling on its own auction site increases as technology ages. These results indicate that customers require more of a brand-name appeal as a computer ages and information asymmetry can possibly become a larger factor in purchases. They also indicate that popular third-party channels that generate more interest should be used for newer technology, while older technology should be sold on proprietary channels where shoppers desire more of a brand name presence and support.

Finally, Table 6 shows how DellAuction.com’s price premium is not directly significantly affected by CPU Speed, Memory, Disk size, Includes Windows, Includes DVD, or Includes Modem. The main effects in Table 6 for the number of bids as the dependent variable show a significant effect on price paid, and in our analysis, of all these control variables have a positive, significant effect on number of bids except Memory, and thus all have a significant positive indirect effect (or sometimes referred to as mediation effect) on the price premium received on DellAuction.com when compared to eBay.com.

5. Additional Analysis

The results described in Tables 5 and 6 paint a complex picture describing the factors that affect price premiums given to a brand-name vendor. Table 5 shows that Dell receives a price premium when competing with other sellers in a third-party channel like eBay, and that this price premium is greater with newer technology. Table 6 shows that in a proprietary channel like DellAuctions.com, this price premium is decreased with newer technology, but increased with older technology. Questions still remain as to exactly how the price premium is affected as a product ages and what are the implications to theory that are suggested by this research. These questions are addressed in this section.
5.1. Further Examination of Data

Fig. 4 graphically examines Dell’s price premium by charting the price of computers sold by Dell and those sold by other vendors, broken down by CPU Speed. Dell’s price premium is concentrated in the middle range. There is no significant difference between Dell and the other vendors in the extremely low end of computers, with CPU Speed = 0.65 GHz, nor at the extremely high end of computers, with CPU Speed = 1.0 GHz. Rather, the middle range is where Dell appears to be able to charge a price premium. We conjecture that at the high end, the demand is great for any computer on sale through an auction, and at the low end, the bidders are extremely price conscious. Thus, a story develops where, at the extreme high end, price premiums are similar for all vendors, but demand for the non-brand name vendors drops at a more precipitous rate until demand remains similar for both brand name and non-brand name at the extreme low end. Further research is suggested in this area.

In Fig. 5, we examine the price premium for computers sold by Dell on DellAuction.com compared to computers sold by Dell on eBay.com. We see a similar picture: at the extreme high end and extreme low end, Dell is better off selling computers on eBay. Thus, when there is a high demand for new technology, the ability to attract more bidders results in a higher price. Similarly, when demand is low, having a larger pool of bidders will result in a higher price. In the middle range where Dell can charge a price premium, as shown by Fig. 4, then it is also better to sell computers on their own proprietary site, DellAuction.com, where consumers are attracted to buy a recently made computer at a bargain price.

5.2. Theoretical Implications

There are several theoretical implications of this study that may be of use to vendors who may be considering multiple channels or even which channel to employ. As shown by Brynjolfsson and Smith (2000), brand-name vendors who sell online benefit from price premiums even though products are similar and search costs are low or even non-existent. This finding is consistent with the reputation literature (e.g., Shapiro 1982, Klein and Leffler 1981) which has shown that vendors pursue a higher reputation at some cost because it is expected to lead to greater revenues that exceed the cost of developing and maintaining a high reputation. Along these lines, we believe that we are the first to empirically demonstrate how a branded online marketing channel (e.g., DellAuction.com) can result in higher price premiums when compared to a third-party online channel (e.g., eBay.com). As loyal customers flock to the company’s site for their purchases, they are willing to pay more than those who purchase through the third-party site.
Our results in Tables 5 and 6 indicate that brand name price premiums are greater when the technology is newer. In addition, further exploration of the data has brought up some limitations to the traditional reputation literature that we can discern in this data, and require deeper analysis in future research. Figs. 4 and 5 both imply three stages of price premiums.

In the first stage, the technology is relatively new. With the newest technology, we believe that the information asymmetry between the buyer and the seller is less of an issue, in that consumers believe that if a new computer is for sale, it is less likely to break down than an old computer. With less of a probability of losing money due to information held by the seller and withheld from the consumer, there is less of a probability of a price premium.

In the second stage, this situation changes as the technology starts to age. Information asymmetry plays a greater role after the technology ages. With age, there is a greater likelihood of part failure and less of a chance of manufacturer support. As such, price premiums on moderately aged technology are shown to be the greatest.

In the third stage, only extremely price-sensitive individuals are left in the market. Even though the chance of information asymmetry is great with the oldest technology, price is the overriding concern for individuals who purchase at this stage. In fact, as Akerlof (1970) points out in the used car market, greater information asymmetry drives prices down in a market as consumers adjust their valuation. For price-sensitive consumers, this is a good thing since even though the quality of the computer will be low, so will the price.

6. Conclusion

In this research, we examined how Dell sells their own computers over online auctions, both within their proprietary channel at DellAuction.com and through a popular third-party auction house, eBay.com. We found that Dell makes the best price premiums, both on eBay when compared to other vendors, and when selling over their own site compared to selling over eBay, when the technology is recent, but not new. The newest technology does not easily generate a price premium, presumably because new technology is rarer in online auctions and consumers who want to purchase through this channel are willing to pay a lot to anyone who can provide it. The buyers of older technology are extremely price conscious and thus are not willing to give Dell a price premium when they can get the same computer for less from a less reputable vendor. In both of these cases, our research shows that Dell is better off selling through eBay rather than their own proprietary auctions. However, in the case of recent, but not new technology, Dell can make more of a price premium on its own site. At any rate, demand decays appear to reduce any price premium.
This research has many implications for practice and research. We show the importance of examining popular third-party channels in conjunction with proprietary channels but that the choice between proprietary and third-party channels is not that simple for technology-based products. For new technology, we find it is best for Dell to sell over a popular auction channel, like eBay. For recent, but not new technology, vendors like Dell can take advantage of their brand name and should consider concentrating on their own proprietary auction site where loyal customers are willing to bid a higher price. As demand decays further, there may be motivation to sell, once again, over a popular auction channel so that the auction site with the largest demand will yield the best prices. We show that optimal channel choice may change for technology-based products as demand decays for a given product.

There are several questions leading from this research that future research can investigate regarding online channel choice. How should vendors best utilize third-party channels? Do vendors make the optimal channel choices with regard to proprietary and third-party channels? Are there other considerations, such as channel control and fee structure, that will adversely affect a decision to move to a third-party auction site? What inventory and selling practices are best for a decaying demand when online auctions are available? Methods used in this research can be easily duplicated in other areas to generate a more generalized theory of channel choice in online auctions when proprietary auction houses coexist with more popular third-party auction houses.

This study has several limitations. First, we only examined Dell computer sales in this context, and so we call for future research that examines multiple companies using popular online auction sites like eBay in conjunction with their own proprietary auction sites. Second, the point estimates we derived in this study for price premiums compared to specific CPU speeds are bound to change over time. We show that there is motivation to switch from popular third-party auctions to proprietary auctions as demand for a specific technology decreases due to better technology being introduced, but researchers should apply this technique to find their own point estimates for future studies and not assume that our point estimates are constant for all time periods.

Acknowledgments

We thank Rob Kauffman, Claudia Loebbecke, and Roumen Vragov for helpful comments. We also benefited from input from a number of participants at presentations at the University of Notre Dame and Marquette University, as well as the participants of the Midwest IS Conference. We also thank the anonymous reviewers at Electronic Commerce Research and Applications for
useful comments on this paper prior to its submission, and in its various versions during several rounds of review.

**Notes**

1. Although we developed this framework to examine sales through two different auction channels, this conceptual model can be applied to other marketing channels that sell technology-based products.

2. We do not specifically test for demand decay of technology in this research, as that effect is well known. However, notice in Table 3 how CPU speed is highly correlated with selling price. As new computers typically are introduced at similar high levels, this is indicative of demand decay, where older technology sells for less.

3. We also tested the percentage of price premium rather than the nominal price premium with similar results – that Dell’s price premium will decrease in percentage as technology ages.

4. When interactions are added in the right-hand column in Table 6, they are insignificant. The correlation between the interaction and Number of Bids causes the Number of Bids to become insignificantly different from zero.

5. Note that we are only examining Dell computers in this study, so computers sold by Dell and computers sold by others vendors will all be originally manufactured by Dell.
References


279.
Markovitch, D. G., Steckel, J. H., and Yeung, B. Using capital markets as market intelligence:


Appendix

Fig. 1: Dell Computers on Sale by Dell at eBay.com
Fig. 2: Dell Computers on Sale by Dell at DellAuction.com
Fig. 3: Willingness-to-Pay Model for Technology-Based Products

Price Premium Factors
- Brand Name Reputation
- Channel Choice
- Technological Capabilities

Consumer Interest in Item

Willingness-to-pay
Fig. 4: Dell’s Price Premium when Selling through eBay.com
Fig. 5: DellAuction.com’s Price Premium over eBay when Dell Is the Vendor
## Table 1: Dell Computer Auctions in Study

<table>
<thead>
<tr>
<th>Model</th>
<th>CPU speed (GHz)</th>
<th>Disk size (GB)</th>
<th>Memory (GB)</th>
<th>Auctions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dell computers sold through DellAuction.com auctions hosted by Dell, April 2004</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optiplex</td>
<td>0.7–1</td>
<td>5–40</td>
<td>0.125–1</td>
<td>22</td>
</tr>
<tr>
<td>Inspiron</td>
<td>0.5–1.2</td>
<td>5–40</td>
<td>0.0625–0.5</td>
<td>15</td>
</tr>
<tr>
<td>Latitude</td>
<td>0.4–1.2</td>
<td>4.1–48</td>
<td>0.046875–1</td>
<td>496</td>
</tr>
<tr>
<td>Dimension</td>
<td>0.5–1.4</td>
<td>20–80</td>
<td>0.125–0.5</td>
<td>24</td>
</tr>
<tr>
<td><strong>Dell computers sold through eBay.com auctions hosted by Dell, April 2004</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inspiron</td>
<td>0.65–0.7</td>
<td>10–20</td>
<td>0.125–0.25</td>
<td>2</td>
</tr>
<tr>
<td>Latitude</td>
<td>0.65–1.2</td>
<td>6–30</td>
<td>0.125–0.5</td>
<td>52</td>
</tr>
<tr>
<td><strong>Dell computers sold through eBay.com auctions not hosted by Dell, April 2004</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inspiron</td>
<td>0.266–2.8</td>
<td>4–86</td>
<td>0.0625–1</td>
<td>153</td>
</tr>
<tr>
<td>Latitude</td>
<td>0.233–2.4</td>
<td>4–60</td>
<td>0.0625–1</td>
<td>164</td>
</tr>
<tr>
<td>Dimension</td>
<td>2.8</td>
<td>40 GB</td>
<td>0.25</td>
<td>1</td>
</tr>
<tr>
<td>Smart step</td>
<td>2</td>
<td>30 GB</td>
<td>0.25</td>
<td>1</td>
</tr>
</tbody>
</table>
Table 2: Definition of Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Brand name reputation</strong></td>
<td></td>
</tr>
<tr>
<td>Dell is seller</td>
<td>Dummy variable indicating whether Dell is hosting the auction (Dell is seller = 1) or whether the auction selling a Dell computer is hosted by another vendor (Dell is seller = 0)</td>
</tr>
<tr>
<td><strong>Channel choice</strong></td>
<td></td>
</tr>
<tr>
<td>Sold through eBay</td>
<td>Dummy variable indicating whether computer is sold through eBay (sold through eBay = 1) or through DellAuction.com (sold through eBay = 0)</td>
</tr>
<tr>
<td><strong>Technological capabilities</strong></td>
<td></td>
</tr>
<tr>
<td>CPU Speed</td>
<td>Speed of the central processing unit (in gigahertz, or GHz). CPU Speed is also a good indication of the age of the technology, since new computers tend to be faster</td>
</tr>
<tr>
<td>Memory</td>
<td>Amount of memory installed on the computer</td>
</tr>
<tr>
<td>Disk size</td>
<td>Size of the hard disk drive installed on the computer</td>
</tr>
<tr>
<td>Includes Windows</td>
<td>Dummy variable indicating if some version of Microsoft Windows was installed (Includes Windows = 1) or not (Includes Windows = 0)</td>
</tr>
<tr>
<td>Includes DVD</td>
<td>Dummy variable indicating if a DVD was installed (includes DVD = 1) or not (includes DVD = 0)</td>
</tr>
<tr>
<td>Includes Modem</td>
<td>Dummy variable indicating if a dial-up model was installed (Includes Modem = 1) or not (Includes Modem = 0). Note that since broadband access is widely available at this time, a modem may be considered indicative of older technology</td>
</tr>
<tr>
<td><strong>Consumer interest in item</strong></td>
<td></td>
</tr>
<tr>
<td>Number of bids</td>
<td>Control variable used to adjust for number of bids received during auction</td>
</tr>
<tr>
<td><strong>Willingness-to-pay</strong></td>
<td></td>
</tr>
<tr>
<td>Selling price</td>
<td>The selling/winning bid of the item</td>
</tr>
<tr>
<td>Price premium</td>
<td>Percentage of the selling price compared to the average selling price of this specific computer throughout the entire data set. It is calculated using selling price/average selling price</td>
</tr>
</tbody>
</table>
Table 3: Correlations between Main Effect Variables for Items Sold on eBay.com by Dell and non-Dell Vendors

<table>
<thead>
<tr>
<th></th>
<th>Selling price</th>
<th>Dell is seller</th>
<th>CPU Speed</th>
<th>Memory</th>
<th>Disk size</th>
<th>Includes Windows</th>
<th>Includes DVD</th>
<th>Includes Modem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dell is seller</td>
<td>-0.109</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPU Speed</td>
<td><strong>0.757</strong></td>
<td>-0.246</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Memory</td>
<td>0.501</td>
<td>-0.113</td>
<td>0.291</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disk size</td>
<td>0.506</td>
<td>0.012</td>
<td>0.364</td>
<td>0.248</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Includes Windows</td>
<td>0.101</td>
<td>0.059</td>
<td>0.218</td>
<td>0.102</td>
<td>-0.086</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Includes DVD</td>
<td>0.364</td>
<td>-0.103</td>
<td>0.511</td>
<td>0.035</td>
<td>0.272</td>
<td>0.069</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Includes Modem</td>
<td>-0.152</td>
<td>0.310</td>
<td>-0.115</td>
<td>-0.164</td>
<td>0.134</td>
<td>-0.073</td>
<td>0.055</td>
<td></td>
</tr>
<tr>
<td>Number of bids</td>
<td>0.257</td>
<td>0.044</td>
<td>0.331</td>
<td>0.066</td>
<td>0.172</td>
<td>0.136</td>
<td>0.217</td>
<td>0.048</td>
</tr>
</tbody>
</table>
Table 4: Correlations between Main Effect Variables for Items Sold by Dell on eBay.com and DellAuction.com

<table>
<thead>
<tr>
<th></th>
<th>Selling price</th>
<th>Sold through eBay</th>
<th>CPU Speed</th>
<th>Memory</th>
<th>Disk size</th>
<th>Includes Windows</th>
<th>Includes DVD</th>
<th>Includes Modem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sold through eBay</td>
<td>−0.091</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPU Speed</td>
<td>0.000</td>
<td>−0.054</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Memory</td>
<td>0.000</td>
<td>−0.057</td>
<td>0.262</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disk size</td>
<td>0.000</td>
<td>0.061</td>
<td>0.189</td>
<td>0.293</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Includes Windows</td>
<td>0.000</td>
<td>−0.205</td>
<td>0.220</td>
<td>0.143</td>
<td>0.164</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Includes DVD</td>
<td>0.153</td>
<td>−0.271</td>
<td>0.010</td>
<td>−0.005</td>
<td>−0.249</td>
<td>−0.124</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Includes Modem</td>
<td>0.025</td>
<td>0.044</td>
<td>0.008</td>
<td>−0.075</td>
<td>−0.211</td>
<td>−0.145</td>
<td>0.182</td>
<td></td>
</tr>
<tr>
<td>Number of bids</td>
<td>0.290</td>
<td>0.077</td>
<td>0.137</td>
<td>0.044</td>
<td>0.107</td>
<td>0.065</td>
<td>0.204</td>
<td>0.045</td>
</tr>
</tbody>
</table>
Table 5: Results from Robust Seemingly Unrelated Regression (Model 1 – Dell Price Premium compared to Other Vendors on eBay)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Main effects</th>
<th>With interactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent variable is number of bids</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>9.786</td>
<td>1.517</td>
</tr>
<tr>
<td>Dell is seller</td>
<td>3.162</td>
<td>1.728</td>
</tr>
<tr>
<td>CPU Speed</td>
<td>3.860</td>
<td>0.923</td>
</tr>
<tr>
<td>Memory</td>
<td>−0.519</td>
<td>2.877</td>
</tr>
<tr>
<td>Disk size</td>
<td>0.069</td>
<td>0.059</td>
</tr>
<tr>
<td>Includes Windows</td>
<td>2.689</td>
<td>1.923</td>
</tr>
<tr>
<td>Includes DVD</td>
<td>1.956</td>
<td>1.468</td>
</tr>
<tr>
<td>Includes Modem</td>
<td>1.266</td>
<td>1.288</td>
</tr>
<tr>
<td>CPU Speed × Dell is seller</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>16.5%***</td>
</tr>
<tr>
<td>Dependent variable is selling price</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>183.898</td>
<td>11.097</td>
</tr>
<tr>
<td>Dell is seller</td>
<td>85.807</td>
<td>11.940</td>
</tr>
<tr>
<td>CPU Speed</td>
<td>197.107</td>
<td>6.520</td>
</tr>
<tr>
<td>Memory</td>
<td>210.545</td>
<td>19.783</td>
</tr>
<tr>
<td>Disk size</td>
<td>2.234</td>
<td>0.409</td>
</tr>
<tr>
<td>Includes Windows</td>
<td>−34.531</td>
<td>13.260</td>
</tr>
<tr>
<td>Includes DVD</td>
<td>24.091</td>
<td>10.119</td>
</tr>
<tr>
<td>Includes Modem</td>
<td>−23.258</td>
<td>8.871</td>
</tr>
<tr>
<td>Number of bids</td>
<td>−0.749</td>
<td>0.387</td>
</tr>
<tr>
<td>CPU Speed × Dell is seller</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>89.8%***</td>
</tr>
</tbody>
</table>

373 eBay.com auctions
† p < 0.01.
* p < 0.05.
** p < 0.01.
*** p < 0.001.
Table 6: Results from Robust Seemingly Unrelated Regression (Model 2 – Dell’s Sales on eBay and DellAuction.com)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Main effects</th>
<th>With interactions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent variable is number of bids</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>6.614</td>
<td>2.808</td>
</tr>
<tr>
<td>Sold on eBay</td>
<td>3.907</td>
<td>1.133</td>
</tr>
<tr>
<td>CPU Speed</td>
<td>3.950</td>
<td>1.867</td>
</tr>
<tr>
<td>Memory</td>
<td>−2.313</td>
<td>3.553</td>
</tr>
<tr>
<td>Disk size</td>
<td>0.173</td>
<td>0.059</td>
</tr>
<tr>
<td>Includes Windows</td>
<td>1.345</td>
<td>0.633</td>
</tr>
<tr>
<td>Includes DVD</td>
<td>4.037</td>
<td>0.693</td>
</tr>
<tr>
<td>Includes Modern</td>
<td>1.219</td>
<td>2.140</td>
</tr>
<tr>
<td>CPU Speed * sold through eBay</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$R^2 = 10.5%$™</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| **Dependent variable is price premium** |              |                   |        |              |                   |        |
| Constant                        | 0.943        | 0.037             | 25.78***| 0.951        | 0.036             | 26.07***|
| Number of bids                  | 0.004        | 0.001             | 6.19*** | 0.004        | 0.001             | 5.99***|
| Sold on eBay                    | −0.050       | 0.015             | −3.36** | −0.287       | 0.107             | −2.67**|
| CPU Speed                       | −0.007       | 0.024             | −0.31   | −0.016       | 0.024             | −0.64  |
| Memory                          | −0.032       | 0.046             | −0.70   | −0.030       | 0.046             | −0.65  |
| Disk size                       | 0.000        | 0.001             | −0.06   | 0.000        | 0.001             | −0.07  |
| Includes Windows                | −0.007       | 0.008             | −0.82   | −0.007       | 0.008             | −0.82  |
| Includes DVD                    | 0.004        | 0.009             | 0.47    | 0.004        | 0.009             | 0.47   |
| Includes Modern                 | 0.008        | 0.028             | 0.29    | 0.009        | 0.028             | 0.31   |
| CPU Speed * sold through eBay   |              |                   |         | **0.294**    | 0.133             | 2.2™  |
|                                 |              |                   |         |              |                   |        |
| $R^2 = 10.8%$™                  |              |                   |         | $R^2 = 11.8%$™ |                   |        |

495 eBay.com and DellAuction.com auctions. Bold entries relate to the price premium expression for eBay.

†Hypothesis supported.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$