Price Dispersion in the Small and in the Large: Evidence from an Internet Price Comparison Site

Michael R. Baye
Indiana University

John Morgan
Princeton University

Patrick Scholten
Indiana University

July 2001

Abstract

This paper examines 4 million price observations over an eight month time period for 1000 of the best-selling consumer electronics products found on the price comparison site Shopper.com. We find that observed levels of price dispersion vary systematically with the number of firms listing price quotes for a given product. For example, for products where only two firms list prices, the gap between their prices averages 22 percent. In contrast, for products where 17 firms list prices (the average in our sample), the gap is only about 3.5 percent. Further, we find little support for the notion that prices on the Internet are converging to the "law of one price." The average range in prices was about 40 percent, and the average gap between the two lowest prices listed for a given product remained stable at around 5 percent. We show that the combination of stable and ubiquitous price dispersion, coupled with dispersion that differs in the small and in the large, is consistent with a number of theoretical models of equilibrium price dispersion.

JEL Numbers: D4, D8, M3, L13.

Keywords: Bertrand Competition, Internet, Law of One Price, Price Dispersion.

1 Introduction

Over the past decade, the Internet has revolutionized the way consumers gather information. In the United States, for instance, two-fifths of all households have home access to the Internet, and this figure is expected to grow dramatically over the next several years. Likewise, consumer purchases made using the Internet have increased exponentially in recent years. Some have speculated that Internet markets will eventually display pricing consistent with the textbook case of the "law of one price." The reasoning is that the ready availability of price and product information combined with the low costs of search leads to the frictionless environment that is typically assumed in idealized economic models:

> "The explosive growth of the Internet promises a new age of perfectly competitive markets. With perfect information about prices and products at their fingertips, consumers can quickly and easily find the best deals. In this brave new world, retailers' profit margins will be competed away, as they are all forced to price at cost." *The Economist*, November 20, 1999, p. 112.

A number of recent studies provide conflicting pictures of the competitiveness of Internet markets.[1] For example, Brynjolfsson and Smith (1999) find that E-commerce markets for books and CDs are far from frictionless, with price ranges of around 30 percent. In contrast, Ellison and Ellison (2001) report price ranges of only 4 percent for computer memory. One potential explanation for the differences stems from the fact that the Brynjolfsson and Smith data were collected several years before that of Ellison and Ellison. If one views price dispersion as a transitory phenomenon, then these differences in price dispersion might reflect the fact that prices are converging to the law of one price as consumer awareness grows and competition intensifies. Indeed, during the time between these two studies, competition intensified and it became more difficult to obtain venture capital through private or public channels.

An alternative view is that price dispersion is a persistent phenomenon and these differences in price dispersion stem purely from differences in the markets for books and computer

[1] See Bakos (2001) and Smith, Bailey, and Brynjolfsson (1999) for excellent surveys of this work.

memory. In fact, economic theory predicts that if price dispersion is an equilibrium phenomenon, price dispersion will not only persist over time, but will critically depend on industry structure. We show in the next section that a number of economic models with rational consumers and firms predict that the level of price dispersion depends on the number of firms listing prices. Even in a naive model where firms randomly select prices from a common distribution, the average difference between the lowest and second lowest (or more generally kth lowest) price is a decreasing function of the number of firms that list prices for that product. Data from price comparison sites, such as the one analyzed in this paper, offer a unique opportunity to quantify the role that the number of firms plays in explaining differences in levels of dispersion for different products.

To address these and other issues, we assembled a data set containing 4 million price observations in the consumer electronics market. These data are daily price quotes from merchants selling the top 1000 products covered by Shopper.com – a leading price comparison site on the Internet. The data span the time horizon from August 2, 2000 through March 31, 2001. The number of firms listing prices for these products varies a great deal – both cross sectionally and over time – thus permitting us to examine the impact of variations in the number of listing firms on various measures of price dispersion. To the best of our knowledge there have been no empirical studies of price dispersion on the Internet that examine how price dispersion varies with market structure nor whether dispersion is decreasing over time (as predicted by the convergence hypothesis).

We find systematic differences in price dispersion depending on the number of firms listing prices for a given product: the level of price dispersion differs in the small and in the large. For example, for products where only two firms list prices, the gap between their prices (which is also the range of prices) averages 22 percent. In contrast, for products where 17 firms list prices (the average in our sample), the gap between the two lowest prices falls to about 3.5 percent, while the range in prices increases to over 35 percent. Furthermore, we

find little support for the notion that prices on the Internet are converging to the "law of one price." At a general level, our results suggest that price dispersion on the Internet is a persistent equilibrium phenomenon and that the number of firms listing prices for a given product plays an important role in determining the level of price dispersion for that product. We show that both of these general findings are consistent with a number of theoretical models of price dispersion.

The remainder of the paper proceeds as follows: Section 2 provides an overview of some theoretical explanations of price dispersion, and shows that an implication of these models is that price dispersion varies systematically in the small and in the large. Section 3 summarizes our data and collection methodology, and highlights differences between the Shopper.com site and competing services (such as shopbots) available on the web. Empirical results are presented in Section 4, while Section 5 concludes by discussing the strengths, limitations, and implications of our study. Appendices are included that formally prove various assertions made in the text (Appendix A), provide a list of products for a given date covered in our study (Appendix B), as well as provide the programming code used to collect the data (Appendix C). All figures and tables referred to in the text are contained at the end of the paper.

2 Theory

According to the convergence hypothesis, price dispersion is a transitory phenomenon and will vanish over time as Internet markets mature. Suppose the prices different firms charge for some homogeneous product are drawn from a distribution, F, with mean μ and variance σ^2. The coefficient of variation, $CV = \sigma/\mu$, has been used by Carlson-Pescatrice (1980) and Sorensen (2000), among others, to measure price dispersion in traditional retail markets. A variety of other measures have been used to assess price dispersion in Internet markets. For instance, Brynjolfsson and Smith (1999) use the range between the lowest and highest price

for a given product as their measure of price dispersion. When the law of one price holds, all firms in the market charge the same price and these measures of price dispersion are all zero.

To the extent that price dispersion is a transitory phenomenon, it would seem natural to examine the coefficient of variation or range in prices over time to test the convergence hypothesis. There is, however, a theoretical difficulty with this approach: The coefficient of variation and range can indicate significant price dispersion even when the underlying data are consistent with competitive behavior.

To see this, consider a shopper who wants to purchase a Mag Innovision LT5330C flat panel monitor. One mouse click on March 26, 2001 brought up the list of prices at Shopper.com displayed in Figure 1. On the surface, one can hardly imagine a more dramatic departure from the law of one price: the lowest listed price is $549, while the highest price is $1,138.34 – a range of over 107 percent of the lowest price. Similarly, the coefficient of variation is 22.4 percent. Yet one could argue that these data are consistent with competitive pricing. Suppose the 11 firms listing prices in Figure 1 are classical Bertrand oligopolists and each has a marginal cost of $549. Given this list of prices, price-conscious consumers will naturally buy from a firm offering the lowest price of $549. While firms charging prices above $549 do not have sales, they have no incentive to gain consumers by pricing at or below their costs of $549. Likewise, since two firms are charging the lowest price in the market, neither can gain by unilaterally raising or lowering its price. Thus, the apparent price dispersion is arguably a fiction: the list of prices comprises an equilibrium in which all transactions take place at the perfectly competitive price ($549).

For this reason, in testing the convergence hypothesis we focus on a measure of price dispersion that alleviates this problem. Suppose the prices charged by $n \geq 2$ firms for a given product are ordered from lowest to highest, so that $p_1 \leq p_2 \leq ... \leq p_n$. We define "the gap", $G = p_2 - p_1$, to be the difference between the two lowest prices. Clearly, the classical

Bertrand model implies that the gap between the two lowest prices is zero in any equilibrium (symmetric or otherwise). Thus, in any competitive equilibrium, price dispersion measured by G is zero (and therefore independent of the number of firms).

Taking these theoretical points into consideration, we may formalize the convergence hypothesis as follows:

Convergence Hypothesis: While price dispersion may be positive at an instant in time, the level of price dispersion (measured by G) decreases over time as Internet markets mature.

A number of papers in the economics literature predict not only that price dispersion will persist in the Internet age, but that the observed levels of dispersion depend on the number of firms listing prices. We term this view the persistence hypothesis, and discuss a variety of different theoretical rationales for price dispersion. One approach (cf. Reinganum (1979), Burdett and Judd (1982), and Gatti (2000)) shows that equilibrium price dispersion can arise if there is a positive marginal cost of obtaining each price quote. This provides an appealing rationale for price dispersion documented in conventional retail markets (see Pratt et al. (1979), Carlson and Pescatrice (1980), Sorensen (2000)) and some electronic markets (see Smith, Bailey, and Brynjolfsson (1999) and Bakos (2001)). These markets share the property that, to obtain an additional price quote, consumers must engage in costly search. In the case of conventional markets, this might entail visiting additional stores or making phone calls to obtain price quotes. In Internet markets, these costs include the hassle of searching for the site of another vendor who sells the product and navigating through the site to find a price quote. As is clear in Figure 1, the data we have assembled is fundamentally different because, for each product and at any instant in time, consumers can obtain an entire list of the prices that different vendors charge for identical electronic products.

Can price dispersion persist on sites like Shopper.com that provide consumers with a *list* of prices different firms charge for the same product? An alternative approach, where some

consumers can search at zero marginal cost by viewing a lists of prices, suggests that the answer is yes. Spulber (1995) shows that equilibrium price dispersion arises when firms are privately informed about their marginal costs even when all consumers can costlessly access the complete list of prices. The Spulber model may be thought of as a first price seller auction. When few firms compete, each firm tends to charge a price that is considerably above its marginal cost. As the number of firms gets large, each firm's markup becomes arbitrarily small and the distribution of prices converges to the distribution of costs. As a consequence, the range in prices is greater when there are a large number of competing firms than when there are a small number of competitors. On the other hand, since the distribution of prices converges to the distribution of marginal costs as the number of competing firms gets large, it follows that the difference between the two lowest prices converges to zero. Thus, in the Spulber model, the gap is larger when few firms compete than when many firms compete.

Price dispersion can also arise in situations where all firms have identical costs, provided there are asymmetries on the consumer side (cf. Shilony, 1979; Varian, 1980; Rosenthal, 1980; and Narasimhan, 1988) or it is costly to post or view prices at an information clearinghouse (Baye and Morgan, 2001). In these models, identical firms sell to two types of consumers: those who consult the listing service, and those who do not.[2] These models all predict dispersed list prices at the clearinghouse under quite different assumptions regarding the number of firms, product homogeneity, firms' decisions to list prices at the clearinghouse, consumers' decisions to utilize the clearinghouse, and the fees charged by the clearinghouse to those consumers and firms who use its services to acquire or transmit price information.[3]

[2] See also Salop and Stiglitz (1977), Stahl (1989), Stahl (2000), and Janssen and Moraga (2001). These models also share the property that some fraction of consumers observe the complete list of prices offered by firms.

[3] Clearinghouse models differ in a number of dimensions. Narasimhan assumes two firms; Baye-Morgan, Shilony, and Rosenthal permit an arbitrary number of firms; Varian assumes free entry. Baye-Morgan assumes the monopoly owner of the clearinghouse charges profit-maximizing access fees to firms and consumers, while the other models assume these fees are exogenous. Shilony, Rosenthal, and Narasimhan assume that some consumers are loyal to a particular firm's product, while Baye-Morgan and Varian assume that all consumers view the firms' products as homogeneous. Baye-Morgan assumes that firms endogenously decide whether

As we show in Appendix A, all of these models predict that the level of price dispersion depends systematically on the number of firms that list prices. In particular, all of these models predict that the expected difference between the lowest two prices is greater in the small than in the large. The models differ with respect to their predictions about the range of prices. The Rosenthal and Shilony models predict that the range of prices is greater in the small, while the Varian and Baye-Morgan models predict that the range of prices is greater in the large. This difference stems from the fact that the Rosenthal and Shilony models assume that any increase in the number of firms is accompanied by an increase in product demand, whereas the other models hold demand fixed.

To summarize, there are a variety of theoretical alternatives to the convergence hypothesis. They share in common the following features:

Persistence Hypothesis: Price dispersion persists over time and depends systematically on the number of firms listing prices for that product. More specifically, price dispersion (measured by the Gap between the two lowest prices for a given product) is greater in the small than in the large.

3 Data

Price comparison services such as Shopper.com, mySimon.com, Pricewatch.com and EvenBetter.com have become a popular and expedient way for consumers to shop and secure the "best" price on the Internet.[4] A product search at any one of these sites will return a listing of prices that different merchants charge for the same product.[5] We focus on Shopper.com, a

or not to list prices at the clearinghouse; Varian, Narasimhan, Shilony, and Rosenthal do not. Shilony, Rosenthal, and Narasimhan assume that the fraction of consumers using the clearinghouse is exogenous; Baye-Morgan and Varian model this as endogenous.

[4] Shopper.com's parent company, Cnet, acquired mySimon.com in March 2000. Nonetheless, Shopper.com and mySimon.com continue to maintain separate web presences and, as discussed below, utilize different technologies for obtaining price information. EvenBetter.com, which specializes in price listings for books, is the basis for the data in Brynjolfsson and Smith (2000). Pricewatch.com, which specializes in computer equipment, is the basis for the data in Ellison and Ellison (2001).

[5] Products with identical manufacturer part numbers.

site that specializes in price comparisons for identical consumer electronics products sold by different firms. It touts the most comprehensive price catalog for these items on the Internet, with over 100,000 products. Moreover, there is considerable firm participation on the site – at any given time, there are more than one million price quotes listed there. Shopper.com generates over 175,000 qualified leads per day to merchants listing prices on its site.[6] Thus, there is also considerable consumer traffic on the site.

Shopper.com is owned and operated by Cnet.com, which is consistently among the most viewed sites on the Internet. Each month over 9 million unique consumers access Cnet.[7] In addition to price information, users of Shopper.com have one-click access to Cnet's extensive database of technical specifications and reviews. The Cnet site is ranked first among consumer electronics shopping sites and tenth among all web sites on the Internet.[8]

Our analysis is based on 4 million daily price observations charged by different merchants for the most popular 1,000 products listed at Shopper.com for the eight month period August 2, 2000 – March 31, 2001.[9] We gathered information from the site once per day by running a program written in the PERL programming language (known hereafter as "the spider"), which downloaded this data. For each of the top 1000 products listed at the site on a given date, the spider collected the product rank for each product and the prices listed by all firms selling that product. The product rank variable consists of a number from 1 to 1000 indicating each product's relative popularity measured by the number of qualified leads for that product in the recent past. The information posted at Shopper.com (including prices) is updated twice each day.[10] Consequently, the products included in our sample as well as

[6] A qualified lead occurs when a consumer "clicks-through" from the Shopper.com site to a merchant's site.

[7] According to a June 2000 study by Media Metrix.

[8] Based on 100hot.com rankings as of January 18, 2001.

[9] With 4 million observations, one might expect firms to occasionally make errors in posting their prices. We sometimes observed prices that appeared to reflect a misplaced decimal, such as a merchant quoting a price of $1000 or $1 instead of $100. While the results presented below are based on the cleaned dataset with outliers omitted, the qualitative results presented below are not affected by the inclusion or exclusion of outliers.

[10] Merchants have the opportunity to update price quotes twice daily – once at 1:00am and again at 2:00pm (Pacific time). Thus, between each price observation that we collect, each firm had at least one

their rank changes over time. Items in our sample include the Palm III and Palm V personal digital assistants, Canon G1 digital camera, Office 2000 software, and the HP Deskjet 930C inkjet printer. A complete list of products and ranks for one date in our sample (March 26, 2001) is included in Appendix B. Appendix C provides the programming code for the spider.

Table 1 provides various summary statistics for our data, including the number of competing firms, price levels, and three different measures of price dispersion (the range, coefficient of variation, and the percentage gap between the lowest two prices). Notice that the percentage gap measure of price dispersion (defined as difference in the lowest two prices relative to the lowest price) is the unit-free analog of the Gap measure defined above. Since all of these measures of dispersion are zero for products sold by a single firm, we distinguish between observations where only a single firm lists a price for a product on a given day (denoted as "Single-Price Listings" in Table 1), and those where two or more firms list prices (denoted as "Multi-Price Listings"). Various measures of price dispersion summarize the set of prices offered for a given product on a given date. Thus, the relevant unit of observation for these measures is what we term a "product date." With daily price observations for 1000 products over an 8 month period, there about a quarter-million product dates. As shown in Table 1, our analysis of price dispersion consists of 214,337 product dates with multi-price listings and 13,743 with single-price listings.

Compared to existing studies, the products in our data set tend to be fairly expensive, with an average price of $513 across all products and dates.[11] The average minimum price is $458, or about 12 percent lower than the average price. Notice that both the average

opportunity to change its price in response to rivals' behavior. An audit of prices on April 27, 2001 revealed that over three-fourths of firms update their price quotes at least once every twenty-four hours.

[11] More formally, the averages referred to in the table are constructed as follows. Let J_{it} denote the set of firms listing a price for product rank i at time t. Let I_t denote the set of product ranks for which 1 or more prices are listed in period t. Let T be the set of time periods. Finally, let p_{jit} denote the price charged by firm j for product rank i at time t. Then the average price in all listings is

$$\frac{1}{\sum_{t\in T}|I_t|}\sum_{t\in T}\sum_{i\in I_t}\left(\frac{\sum_{j\in J_{it}}p_{jit}}{|J_{it}|}\right).$$

Similar methodology was used to construct the other averages.

price and average minimum price tend to be higher for less popular products (those with higher ranks). Products with multiple price listings have a lower average price and average minimum price than those with single price listings. Of course, since the mix of products being offered might differ between single price and multiple price listings, these differences in the levels of prices must be interpreted with caution.

On average, about 17 firms list prices for each product in our sample. Products ranking in the top 250 tend to attract more firms than products not ranked in the top 250. The average range in prices is between $123 and $131, depending upon whether one includes or excludes single-price listings. Levels of price dispersion differ a great deal depending on the measure used. The average range in prices is about 40%, while the average gap between the two lowest prices is only 5%. The coefficient of variation lies between these two measures of dispersion, averaging about 10%. Interestingly, while the average coefficient of variation is invariant to product rank, the average percentage gap between the lowest two prices is smaller for more popular products. One might therefore speculate that product popularity is a key determinant of price dispersion. However, notice that the more popular products also tend to have more price listings, on average. As we shall see below, differences in the number of firms – not product ranks – are the key to explaining differences in price dispersion across products.

There is considerable variation in the number of firms listing prices for products in our data. Table 2 shows that single-firm markets accounted for 13,743, or 6.03 percent, of product dates. Over 80 percent of all product dates have between 2 and 30 prices listed, with the number of listings roughly uniformly distributed over this range. Observations where 31 to 40 firms list prices are more rare, accounting for less than 10 percent of all product dates. Product dates where more than 40 firms list prices account for less than 3 percent of our data.

4 Results

Since the convergence and persistence hypotheses are vacuous in settings where a single firm lists price, the analysis that follows is based on the data for multi-price listings.

Figures 2, 3, and 4 present time series graphs of the average percentage range, average coefficient of variation, and the average percentage gap for the period surveyed. Figures 3 and 4 both share the feature that there is no discernible trend in price dispersion over the survey period. The average coefficient of variation is about 10 percent in both August 2000 and March 2001. Likewise, the average percentage gap is about 5 percent for these months. Figure 2, however, tells a somewhat different story. The average percentage range declines slightly over the period, from about 40% in August 2000 to 37% by March 2001.

Figure 5 presents a time series of the fraction of products for which the percentage gap exceeds 0, 1, 5, and 10 percent. As the figure shows, price dispersion over this period is indeed a pervasive and stable phenomenon. On virtually any date in our sample, there is a strictly positive gap between the lowest two prices for over 90 percent of the 1000 products sampled. About half of all products have a gap of 1 percent or more, about 20 percent of the products have a gap of over 5 percent, and about 10 percent of the products have gaps exceeding 10 percent. Thus, a considerable number of products have economically significant gaps between the two lowest prices, and the distribution of gaps has remained relatively unchanged during the survey period.

In short, while there appears to be slight decline in the average range of prices over our survey period, Figures 3 through 5 provide little support for the convergence hypothesis. If price dispersion stems from the theoretical models underlying the persistence hypothesis, price dispersion should vary systematically with the number of firms listing prices.

Figure 6 plots the average percentage gap across all product dates against the number of firms listing prices for that product. Notice that the average percentage gap declines sharply as the number of firms listing prices increases. For products where only two firms list a

price, the percentage gap averages about 23 percent. As the number of firms listing prices increases, the percentage gap falls dramatically. It is around 4 percent for products where ten firms list prices. When fifteen or more prices are listed, the gap is less than 3 percent.

Figure 7 plots the average range as a function of the number of firms listing prices. As the figure shows, the range is significantly higher when many firms list prices than when few firms list prices. For products where only two firms list a price, the range averages about 23 percent. When five or more firms list prices, the range increases to a neighborhood of 40 percent. Beyond five firms, the range measure fluctuates both up and down as a function of the number of firms listing prices but remains generally higher than when few firms list prices.

Together, Figures 6 and 7 suggest that price dispersion might vary systematically in the small and in the large. However, these graphs fail to take into account systematic variation in the number of firms over time as well as across product ranks. In particular, as we saw in Table 1, the percentage gap is smaller for more popular products, but more popular products tend to have more firms listing prices. To further confound these effects, over the survey period, there was a substantial decline in the number of merchants listing prices on Shopper.com (and by E-retailers generally). Figure 8 displays the average number of firms listing prices for a product on a daily basis during our survey period. As the figure shows, there has been a decline of about 25 percent in the number of listings during our survey period. Figures 7 and 8 together make it difficult to discern whether the slight decline observed in the average range of prices stems from the convergence or persistence hypotheses.

To help disentangle these effects, we use a simple econometric model to examine the relationship between price dispersion and market structure. We report results based not only on the gap measure (which, as noted above, provides a more accurate measure of price dispersion in some environments), but also the coefficient of variation and range measures of

price dispersion. In all cases, we regress price dispersion for a particular product date against a number of dummy variables that capture the effects of differences in market structure across products and across time. These controls are potentially important, since the level of price dispersion arising in the economic models summarized above depends on the relative size of the market and (in the Baye-Morgan model) the number of potential firms. We use dummy variables for product rank to proxy for these cross-sectional effects (since product rank is a rough measure of the popularity of a product) and 229 time dummies (one for each date) to account for potential dynamic effects.

These results are summarized in Tables 3, 4, and 5. In each table, we include results from a variety of specifications that demonstrate a robust relationship between numbers of firms listing prices for a given product and price dispersion. Model 1 presents a very simple specification of the relationship between price dispersion and numbers of price listings with no controls and where numbers of firms listing prices are pooled into three bins. Model 2 uses this same specification but adds product rank dummies. Model 3 uses individual dummies for numbers of firms listing prices, while Model 4 uses this same specification and adds controls for product rank. Finally, Model 5 is the most general specification, since it controls for both product rank and time fixed effects.

The results in Table 3 are supportive of the view portrayed in Figure 6 that the percentage gap is lower when a large number of firms list prices than when a small number of firms do. Models 1 and 2 indicate that, compared to the case where more than 20 firms list prices, the gap is about 13.5 percent higher when fewer than five firms list prices, and about 3.2 percent higher when 5 to 10 firms list prices. Beyond 10 firms, there is little difference in the percentage gaps. Models 3 through 5 show that the results are robust to the bins used to categorize numbers of firms, controls for product rank effects (in Model 4), and potential date effects (in Model 5).

Model 5 of Table 3 permits us to test the convergence hypothesis against the null hypoth-

esis that the coefficients on the date fixed effects are jointly zero (as would be the case under the persistence hypothesis). As Table 3 shows, the p-value for this test is 0.97. Thus, based on the gap measure of price dispersion, we find no evidence for the convergence hypothesis, but considerable evidence in favor of the persistence hypothesis. Note that, while the results indicate that price dispersion is lower for the most popular products (those ranked in the top 100), the economic magnitude of these effects are very small compared to the impact on price dispersion of the number of firms listing prices.

Turning to Table 4, we see that Models 1 and 2 also support the view that price dispersion depends on the number of firms listing prices, where here the coefficient of variation is used as the measure of price dispersion. Compared to the case where more than 20 firms list prices, the coefficient of variation is about 3.1 percent higher when ten or fewer firms list prices. Similar to the results for the gap measure discussed above, there is little difference in the coefficient of variations for products where ten or more firms list prices. Models 3 through 5 offer evidence for the robustness of these results. Furthermore, there is little evidence of any time trend in price dispersion using this measure; we fail to reject the null hypothesis that the coefficients on the date fixed effects are jointly equal to zero (p-value = 0.45). Again, price dispersion is lower for more popular products (those in the top 100) than for less popular products, but these effects are relatively small compared to the impact of variation in the number of price listings.

Finally, Table 5 reports results based on the range measure of price dispersion. These results provide mixed support for the convergence hypothesis. On the one hand, even after controlling for product rank and firm effects, we reject the joint hypothesis that all date fixed effects are zero. This is consistent with the pattern of a slight decreasing trend in the range of prices shown in Figure 2. On the other hand, the fact that price dispersion varies with the number of firms listing prices is more in line with the persistence hypothesis. In Model 5, for instance, the coefficient for "2 Firms" is -0.1904. This means that, controlling

for date and product rank fixed effects, the range in prices is about 19 percent lower when two firms list prices than for products where more than 30 firms list prices. Indeed, when fewer than five firms list prices, the coefficients in Model 5 are more negative than when any larger number of firms list prices. This is consistent with the pattern displayed in Figure 7. Unlike the gap and coefficient of variation measures of price dispersion, where product rank had little quantitative impact on price dispersion, the results in Table 5 show that for the range measure, product rank is an economically important determinant of price dispersion. For instance, products ranked 101-200 display about 5% greater dispersion than those in the top 100.

5 Discussion

While there are many potential explanations for the price dispersion observed in our 4 million observation data set, the data speaks for itself: Dispersion varies significantly in the small and in the large. While there is a slight downward trend in the range of prices during the period of our study, we argued in Section 2 that the range is an inappropriate measure of dispersion to use in testing the convergence hypothesis. Based on what we view as the appropriate measure – the gap between the two lowest prices listed for a given product – we find no evidence for any convergence, nor do we find any evidence for convergence based on the coefficient of variation. Indeed, the levels of price dispersion for the top 1000 consumer electronics products remained relatively stable over an eight month period despite dramatic changes in competitive conditions. While the range in prices is quite large (around 40 percent), the average difference between the lowest two prices listed for a given product is only about 5 percent. Moreover, consistent with a variety of theoretical models that form the basis for the persistence hypothesis, the average gap between the two lowest prices is much greater in the small than in the large. For example, when there are only two firms listing prices, the gap between their prices averages 22 percent. In contrast, when the average

number of firms list prices for a product (about 17 firms), the gap between the two lowest prices averages about 3.5 percent. The combination of stable and ubiquitous price dispersion, along with the finding that price dispersion varies in the small and in the large, is broadly consistent with the persistence hypothesis. This finding suggests that a useful next step is to attempt to discriminate among the many theoretical models that are consistent with the stylized facts reported in this paper.

In concluding, it is useful to highlight some of the strengths and limitations of our study. Key strengths of the data set used in our study are its duration (eight months), its size (4 million price observations), and its composition (1000 different consumer electronics items). The average *low* price for a product in our data set is about $460. In contrast, previous studies of price dispersion on the Internet have focused on price dispersion at an instant in time, and have documented price ranges of up to 30 percent for products such as books and CDs, which typically cost around $15. One might argue that price differences of $4.50 on a $15 item reflect the willingness of some consumers to pay a premium to use a merchant with whom they have an ongoing relationship. It seems less plausible that the price ranges observed in our data set ($135 on a $460 consumer electronics item) are primarily due to such factors. Another possible explanation for the price dispersion documented in previous studies is that there are economies of scale in shipping these products: it may be optimal for consumers to pay above the lowest price for a single item in order to purchase a low-priced *bundle* from a single merchant. This explanation of price dispersion seems less plausible for the products in our data set: Shipping costs are small compared to the average price in our sample, and electronics products (such as digital cameras or personal digital assistants) would seem to be less likely to be purchased in bundles than books or CDs.

An important consideration when analyzing data from price comparison services is the veracity and "seriousness" of the offers listed there. The Shopper.com site has a number of advantages in this regard. First, in contrast to sites relying on shopbot technology,[12] the

[12] A shopbot is an automated search engine that visits multiple E-retailers' sites to collect information

prices listed at Shopper.com are directly inputted by the firms themselves. Moreover, it is not free for firms to list prices on Shopper.com. Specifically, a merchant wishing to list its product pays a one-time, non-refundable fee of $1,000. In addition, at the beginning of each month, it pays additional fee of $100. Merchants who receive over 250 qualified leads in a given month must pay $0.50 per lead for the first 50,000 leads, and $0.60 for each additional lead. In light of Shopper.com's fee structure and the fact that the site generates over 175,000 qualified leads per day, merchants would seem to have a sharp incentive to post serious prices. A firm attempting a bait and switch strategy – listing a low price with no intention of honoring it – is exposed to considerable downside risk in the form of generating numerous qualified leads (costing at least 50 cents each) while generating few sales and presumably alienating potential customers. On the other hand, firms listing artificially high prices are unlikely to generate enough sales from the site to justify the associated fixed fees of listing.

Second, we conducted an audit of prices listed at Shopper.com for ten randomly selected products among the top 1000. Since Cnet updates the prices listed on Shopper.com twice per day while firms are free to update prices at their own sites continuously, one would expect some differences in prices to arise even if, at the time of the listing, all prices listed were 100 percent accurate. In fact, we found that 96 percent of the 171 prices audited were accurate to within $1. Moreover, 100 percent of the low prices were accurate.[13]

about prices and other attributes of consumer goods and services.

Early shopbots suffered from the defect that information listed there was at times irrelevant and inaccurate. When we began our study, we considered using the price listing site mySimon.com, which is based on shopbot technology. We rejected this approach because search results tended to include a great deal of "noise." For example, a product search using the search term "Palm V" returned a list of products including not only our target item, but also a Deluxe Leather Carrying Case, a Palm V HotSync Cradle, a Palm V Travel Charger, and a Palm V modem. For this reason, we began collecting data from the Shopper.com site rather than from shopbots. We note that the technology used by shopbots has dramatically improved in recent months, and it now appears possible to collect accurate price information through mySimon.com and many other shopbots.

[13] The theoretical models discussed in Section 2 operate under the assumption that firms cannot or do not price discriminate. To examine whether this is the case at Shopper.com, we also conducted an audit of ten randomly selected products and compared the price listed on Shopper.com with that obtained by eschewing Shopper.com and going directly to each merchant's site. For the 132 price listings sampled, there were only three cases where prices at the merchant's site were higher than those listed at Shopper.com. In these cases,

Third, there is evidence that consumers can indeed purchase products listed on Shopper.com at the prices listed on the site. We purchased over 30 items (ranging in price from a $30 headset to a $600 flat panel monitor) from a number of different merchants listing prices at Shopper.com. In all cases, the prices we paid and the goods received corresponded to the information posted at the site.[14] This is not surprising, since Shopper.com uses a variety of reputational mechanisms that punishes vendors who might otherwise be tempted to post erroneous information. For these reasons, we think there is strong evidence to suggest that the price quotes contained in our data set are serious.

The primary limitation of our data is that we were unable to obtain data on the actual quantities of goods purchased at the observed prices.[15] Classical Bertrand models predict that all consumers will purchase from the low-priced firm while clearinghouse models predict that a positive fraction of customers will purchase only at the lowest price while other consumers who are brand loyal or uninformed will purchase at higher prices. Lacking quantity data, we cannot assess whether the predicted sensitivity of consumer behavior more closely matches the Bertrand or clearinghouse predictions. In particular, the classical Bertrand model predicts that a consumer's demand for an individual firm's product is perfectly elastic, while clearinghouse models predict that the demand for an individual firm's product is highly elastic, but not perfectly elastic.[16] Some evidence on this issue is contained in Ellison and Ellison (2001), who examine price and quantity data on computer memory chips sold over

prices at the three merchants' sites were higher by only $1.17, $1.83, and $0.11. The lowest prices for these items were, respectively, $214.99, $185, and $40.

[14] Our personal experience, as well as data based on over two years of data on the top 37 products, suggests that shipping costs are fairly constant across firms; see Baye, Morgan, and Scholten (2001).

[15] Other limitations of our data stem from tradeoffs made due to the sheer volume of data being collected. We initially downloaded all of the information listed at the Shopper.com site for a subset of the products, and results were robust to incorporating shipping costs, inventory, reputational ratings, and a variety of other variables. We thus opted to collect the most relevant information on a larger number of products rather than more extensive information on a smaller number. This approach substantially reduced fize sizes (enabling us to more thoroughly analyze the data) and reduced the Spider's demand for bandwidth at Shopper.com's site (reducing the probability of Cnet.com taking action to block us from their site).

[16] To see this, notice that by raising its price slightly above marginal cost, a firm in a clearinghouse model does not lose demand from uninformed or brand-loyal customers. Furthermore, it only loses informed or price-conscious customers if the price increase results in another firm charging the lowest price.

the Internet. Their data consists of prices and quantities from a single vendor that lists its price on Pricewatch.com. They find that consumer's are very price sensitive with an estimated elasticity of demand for the firm's product of -51.8. This is consistent with what one would expect based on clearinghouse models. Our research complements their findings by focusing on the impact of competitive conditions on the level of price dispersion.

References

[1] Bakos, Yannis, "The Emerging Landscape of Retail E-Commerce," *Journal of Economic Perspectives,* (2001), forthcoming.

[2] Baye, Michael R. and John Morgan, "Information Gatekeepers on the Internet and the Competitiveness of Homogeneous Product Markets," *American Economic Review,* forthcoming.

[3] Baye, Michael R., John Morgan, and Patrick Scholten, "Pricing and Reputation on the Internet," *mimeo*, 2001.

[4] Brown, Jeffery R. and Austan Goolsbee, "Does the Internet Make Markets More Competitive? Evidence from the Life Insurance Industry," *NBER Working Paper 7996*, November 2000.

[5] Brynjolfsson, Erik and Michael D. Smith,"The Great Equalizer? Consumer Choice Behavior at Internet Shopbots," *MIT Sloan School of Management Working Paper*, August 1999.

[6] Brynjolfsson, Erik and Michael D. Smith,"Frictionless Commerce? A Comparison of Internet and Conventional Retailers," *MIT Sloan School of Managment Working Paper*, July 2000.

[7] Carlson, John A. and Pescatrice, Donn R., "Persistent Price Distributions," *Journal of Economics and Business* (1980) 33(1), pp. 21-27.

[8] Ellison, Glenn and Sara Fisher Ellison, "Search, Obfuscation, and Price Elasticities on the Internet," *mimeo*, MIT, January 2001.

[9] Gatti, J. Rupert J., "Equilibrium Price Dispersion with Sequential Search," *mimeo*, Cambridge University, November 2000.

[10] Janssen, Maarten and Jose Luis Moraga, "Pricing, Consumer Search and the Size of Internet Markets," *mimeo*, Tinbergen Institute Rotterdam, June 2000.

[11] Narasimhan, Chakravarthi, "Competitive Promotional Strategies," *Journal of Business*, (1988) 61, pp. 427-449.

[12] Pratt, John W., David A. Wise, and Richard Zeckhauser, "Price Differences in Almost Competitive Markets," *Quarterly Journal of Economics* (1979), 93 (2), pp. 189-211.

[13] Reinganum, Jennifer F., "A Simple Model of Equilibrium Price Dispersion," *Journal of Political Economy* (1979) 87, pp. 851-858.

[14] Rosenthal, Robert W., "A Model in Which an Increase in the Number of Sellers Leads to a Higher Price," *Econometrica* (1980) 48(6), pp. 1575-1580.

[15] Salop, Steven C. and Joseph E. Stiglitz, "Bargains and Ripoffs: A Model of Monopolistically Competitive Price Dispersion," *Review of Economic Studies* (1977) 44, pp. 493-510.

[16] Shilony, Yuval, "Mixed Pricing in Oligopoly," *Journal of Economic Theory* (1977) 14, pp. 373-388.

[17] Smith, Michael, Joseph Bailey, and Erik Brynjolfsson, "Understanding Digital Markets: Review and Assessment" in *Understanding the Digital Economy*, Brynjolfsson and Kahin, eds., 1999, MIT Press, Cambridge.

[18] Sorensen, Alan, "Equilibrium Price Dispersion in Retail Markets for Prescription Drugs," *Journal Political Economy* (2000), 108 (4), pp. 833-50.

[19] Spulber, Daniel F., "Bertrand Competition when Rivals' Costs are Unknown," *Journal of Industrial Economics* (1995), 43(1), pp. 1–11.

[20] Stahl, Dale O. II., "Oligopolistic Pricing with Sequential Consumer Search," *American Economic Review* (1989) 79(4), pp. 700-712.

[21] Stahl, Dale O. II., "Strategic Advertising and Pricing in E-Commerce," *Advances in Applied Microeconomics 9,* (2000) 79, pp. 69-100.

[22] Varian, H., "A Model of Sales," *American Economic Review* (1980) 70, pp. 651-659.

Appendix A

This appendix verifies several of the assertions found in the text regarding the clearing-house models. For simplicity, assume unit demand up to a price of unity and that firms produce at zero cost. In the Varian, Rosenthal, and Shilony models, all firms list prices ($N = n$) and the distribution of prices depends on the number of firms, so let $F_n(p)$ denote the cumulative distribution of prices when n firms list their price (with associated density $f_n(p)$), let $\mu_n = \int_0^\infty p dF_n(p)$ represent the mean price when n firms list their price. Let R_n, and G_n denote, respectively, the range and gap when there are n price quotes.

A.1 Varian Model

In the Varian model, the number of consumers is fixed so we may normalize the total number of consumers to be unity. Suppose $I \in (0,1)$ of these consumers are informed (purchase from the firm charging the lowest price) and that $(1-I)$ are uninformed (purchase from a randomly selected firm). Thus, each firm's share of the uniformed consumers is $U = \frac{1-I}{n}$.

It is known that the symmetric equilibrium distribution of prices is given by

$$F_n(p) = 1 - \left(\frac{(1-p)(1-I)}{nIp}\right)^{\frac{1}{n-1}} \text{ on } [L_n, 1],$$

where $L_n = \frac{(1-I)}{nI+(1-I)}$. In the sequel, it is useful to note that μ_n is continuous in n, and furthermore,

$$\begin{aligned}
\lim_{n\to\infty} \mu_n &= \lim_{n\to\infty} \int_{L_n}^1 p dF_n(p) \\
&= \lim_{n\to\infty} \left(pF_n(p) |_{L_n}^1 - \int_{L_n}^1 F_n(p)\, dp \right) \\
&= 1 - \lim_{n\to\infty} \int_{L_n}^1 F_n(p)\, dp \\
&= \lim_{n\to\infty} \int_{L_n}^1 \left(\frac{(1-p)(1-I)}{nIp}\right)^{\frac{1}{n-1}} dp \\
&= 1
\end{aligned}$$

We are now in a position to establish

Proposition 1 *In the Varian model:*

(1) *For all* $n \geq 2$, $E(G_n) > 0$. *Furthermore,* $\lim_{n\to\infty} E(G_n) = 0$.

(2) *For all* $n \geq 2$, $E(R_n) < 1$. *Furthermore,* $\lim_{n\to\infty} E(R_n) = 1$.

Proof:

(1) Since $F_n(p)$ is atomless with positive support, it is clear that $E(G_n) > 0$ for finite n. To show that $\lim_{n\to\infty} E(G_n) = 0$, it is sufficient to show that $\lim_{n\to\infty} E(p_2) = 0$, where p_2 is the second (lowest) price quote from $F_n(p)$. Now

$$\begin{aligned}
\lim_{n\to\infty} E(p_2) &= \lim_{n\to\infty} \left(\int_{L_n}^{1} tn(n-1) f(t) F(t) (1-F(t))^{n-2} dt \right) \\
&= \lim_{n\to\infty} \{ \int_{L_n}^{L_n+\delta} tn(n-1) f(t) F(t) (1-F(t))^{n-2} dt \\
&\quad + \int_{L_n+\delta}^{1} tn(n-1) f(t) F(t) (1-F(t))^{n-2} dt \} \\
&< \lim_{n\to\infty} \{ \int_{L_n}^{L_n+\delta} (L_n+\delta) n(n-1) f(t) F(t) (1-F(t))^{n-2} dt \\
&\quad + \int_{L_n+\delta}^{1} n(n-1) f(t) F(t) (1-F(t))^{n-2} dt \} \\
&= \lim_{n\to\infty} \{ (L_n+\delta) \left(1 - \left((1-F(L_n+\delta))^n + nF(L_n+\delta)(1-F(L_n+\delta))^{n-1} \right) \right) \\
&\quad + \left((1-F(L_n+\delta))^n + nF(L_n+\delta)(1-F(L_n+\delta))^{n-1} \right) \} \\
&= \delta
\end{aligned}$$

for all $\delta > 0$. Since $E(p_2) - E(p_1) < \delta$, it follows that

$$\lim_{n\to\infty} E(G_n) = \lim_{n\to\infty} (E(p_2) - E(p_1)) = 0.$$

(2) Clearly, for all finite n, $E(R_n) \leq 1 - L_n < 1$. Part (1) implies that $\lim_{n\to\infty} E(p_1) = 0$, so it is sufficient to show that $\lim_{n\to\infty} E(p_n) = 1$, where p_n is the highest price quote from $F_n(p)$. This follows immediately from the fact that $\lim_{n\to\infty} \mu_n = 1$. *Q.E.D.*

A.2 Rosenthal/Shilony Models

In the Rosenthal and Shilony models, the total number of consumers is $I + nU$, where $I > 0$ consumers purchase from the firm charging the lowest price and U consumers are

brand-loyal and purchase so long as the firm to whom they are attached does not price above the choke price. Our formal analysis focuses on the Rosenthal model; the analysis for Shilony is similar and thus omitted.

It is known that the symmetric equilibrium distribution of prices is given by

$$F_n(p) = 1 - \left(\frac{(1-p)U}{Ip}\right)^{\frac{1}{n-1}} \text{ on } [L,1],$$

where $L = \frac{U}{I+U}$. In the sequel, it is useful to note that μ_n is continuous in n, and furthermore,

$$\begin{aligned}
\lim_{n\to\infty} \mu_n &= \lim_{n\to\infty} \int_L^1 p dF_n(p) \\
&= \lim_{n\to\infty} \left(pF_n(p)|_L^1 - \int_L^1 F_n(p)\, dp \right) \\
&= 1 - \lim_{n\to\infty} \int_L^1 F_n(p)\, dp \\
&= \lim_{n\to\infty} \int_L^1 \left(\frac{(1-p)U}{Ip}\right)^{\frac{1}{n-1}} dp \\
&= 1
\end{aligned}$$

We are now in a position to establish

Proposition 2 *In the Rosenthal model:*

(1)*For all* $n \geq 2$, $E(G_n) > 0$. *Furthermore,* $\lim_{n\to\infty} E(G_n) = 0$.

(2) For all $n \geq 2$, $E(R_n) > 0$. *Furthermore,* $\lim_{n\to\infty} E(R_n) = 0$.

Proof:

(2) Clearly $E(G_n) > 0$ for finite n. To show that $\lim_{n\to\infty} E(G_n) = 0$, it is sufficient to establish that $\lim_{n\to\infty} E(p_1) = 1$ since $E(p_1) < E(p_2) \leq 1$. Since F_n is atomless on $[L,1]$, it follows that for all $\varepsilon \in (0,1)$:

$$\begin{aligned}
E(p_1) &= \int_L^{1-\varepsilon} tnf_n(t)(1-F_n(t))^{n-1} dt + \int_{1-\varepsilon}^1 tnf_n(t)(1-F_n(t))^{n-1} dt \\
&> \int_L^{1-\varepsilon} Lnf_n(t)(1-F_n(t))^{n-1} dt + \int_{1-\varepsilon}^1 (1-\varepsilon) nf_n(t)(1-F_n(t))^{n-1} dt \\
&= L(1-F_n(1-\varepsilon))^n + (1-\varepsilon)(1-(1-F_n(1-\varepsilon))^n)
\end{aligned}$$

Hence,

$$\begin{aligned}\lim_{n\to\infty} E(p_1) &> \lim_{n\to\infty} \left(L\left(1-F_n\left(1-\varepsilon\right)\right)^n + \left(1-\varepsilon\right)\left(1-\left(1-F_n\left(1-\varepsilon\right)\right)^n\right)\right) \\ &= 1-\varepsilon\end{aligned}$$

for all $\varepsilon > 0$, so $\lim_{n\to\infty} E(p_1) = 1$.

(2) This follows immediately from part (1) and the fact that $\lim_{n\to\infty} E(p_n) = 1$. *Q.E.D.*

A.3 Baye-Morgan Model

In the Baye-Morgan model, the number of consumers is fixed so we may normalize the total number of consumers to be unity. Suppose $I \in (0,1)$ of these consumers are informed (purchase from the firm listing the lowest price) and that $(1-I)$ are uninformed (purchase from a randomly selected firm). Thus, each firm's share of the uniformed consumers is $U = \frac{1-I}{n}$. In the event that no firms list prices, all consumers purchase from a firm chosen at random. Again, we assume that firms have zero fixed and marginal cost and that consumers have unit demand up to a price of unity. There is, however, a cost $\phi > 0$ for a firm to list its price on the Internet.

Note that in the Baye-Morgan model, there is a distinction between the number of competing firms (N) and the number of firms listing prices on the Internet (n), as the probability a given firm decides to list its price is endogenously determined and given by

$$\alpha_N = 1 - \left(\frac{N\phi}{(N-1)I}\right)^{\frac{1}{N-1}}.$$

Notice that $\alpha \in (0,1)$ whenever $0 < \phi < \frac{N-1}{N} I$. Conditional on listing its price on the Internet, a firm prices according to the equilibrium price distribution

$$F_N(p) = \frac{1}{\alpha_N}\left(1 - \left(\frac{\left(1-\alpha_N\right)^{N-1} I + N\phi + (1-I)(1-p)}{NIp}\right)^{\frac{1}{N-1}}\right).$$

on $p \in [L_N, 1]$ where

$$L_N = \left(\frac{N^2 \frac{\phi}{N-1} + (1-I)}{(N-1)I + 1}\right)$$

Notice that while the distribution of prices depends on the total number of competing firms (N), it is independent of the actual number (n) of firms listing prices on the Internet. In fact, the distribution of prices is non-degenerate even when the total number of potential firms is arbitrarily large:

$$\begin{aligned}\lim_{N\to\infty} F_N(p) &= \lim_{N\to\infty} \frac{1}{\alpha_N}\left(1-\left(\frac{(1-\alpha_N)^{N-1} I + N\phi + (1-I)(1-p)}{NIp}\right)^{\frac{1}{N-1}}\right) \\ &= \frac{\ln\phi - \ln I - \ln p}{\ln\phi - \ln I} \\ &= F^*(p)\end{aligned}$$

on $p \in \left[\frac{\phi}{I}, 1\right]$.

Since $n \leq N$, to study the case where $n \to \infty$ while holding fixed N,we restrict attention to the limit distribution, $F^*(p)$. We are now in a position to establish

Proposition 3 *Based on $F^*(p)$ in the Baye-Morgan model:*

(1) *For all $n \geq 2$, $E(G_n) > 0$, with $\lim_{n\to\infty} E(G_n) = 0$.*

(2) *For all $n \geq 2$, $E(R_n) < 1 - \frac{\phi}{I}$, with $\lim_{n\to\infty} E(R_n) = 1 - \frac{\phi}{I}$.*

Proof:

(1) Notice that F^* is non-degenerate, atomless, and independent of n; hence the expected difference between the lowest and second lowest prices is positive. Since the expectation of the second-lowest order statistic converges to the lower support of the distribution, the result follows.

(2) Since F^* is non-degenerate, atomless, and independent of n, the expected difference between the lowest and highest prices is less than the support of the distribution. Furthermore, since the expected lowest and highest price converge, respectively, to the lower and upper support of the distribution, the result follows. *Q.E.D.*

Appendix B: Top 1000 Product Descriptions by Rank for March 26, 2001

1 Compaq iPaq H3650 Pocket PC
2 Palm Vx
3 Nikon Coolpix 990
4 Plextor PlexWriter 12/10/32A CD_RW
5 Kodak DC4800 Zoom
6 Olympus C_3030 Zoom
7 Palm V
8 Canon PowerShot S100
9 Asus A7V (Socket A)
10 Kodak DC280 Zoom
11 Palm IIIxe
12 Sony Cyber Shot DSC_S70
13 AMD ATHLON_1GHZ 384K CACHE SOCKA PGA 462 TBIRD 1GHZ
14 ATX ATHLON/DURON SA ATA 100 5USB A7V133/550/SWA
15 Nomad Jukebox Audio Player 6GB Silver
16 Sony VAIO PCG_F590 (Pentium III 750 MHz, 128MB RAM, 18GB)
17 ATi Radeon 64MB DDR
18 Linksys EtherFast 4_port Cable/DSL Router
19 Palm IIIe
20 Plextor PlexWriter 16X/10X40X
21 Olympus D_490 Zoom
22 Sonicblue Multimedia Rio PMP300 MP3 Player
23 128MB 16X64 SDRAM PC133 8NS
24 256MB PC 100 SDRAM
25 ATi All_in_Wonder Radeon 32MB
26 Paint Shop Pro 7.0: Win9X/2K/NT4
27 AMD ATHLON_900 384K CACHE SOCKA PGA462 TBIRD 200MHZ FSB
28 Canon G1
29 Palm IIIc
30 Nikon Coolpix 880
31 Sony VAIO PCG_F650 (Pentium III 600 MHz, 64MB RAM, 12.0GB)
32 HP DeskJet 970CXI
33 HP Pavilion 6736c Multimedia PC (Celeron 667MHz, 64 MB SDRAM, 20
34 Abit KT7 (Socket A)
35 UPG_V Windows Millennium Edition from 95/98/98SE WME
36 Samsung SyncMaster 770 TFT
37 Dell Dimension 4100 (933 MHz, 17 inch monitor, Office 2000 SBE)
38 Sony VAIO PCG_F630 (AMD K6_2 550MHz, 64MB RAM, 12.0GB)
39 Athlon Thunderbird _ 1200 MHz (200MHz/256k)
40 Adobe Photoshop 6.0 UPG Win9X/ME/2K/NT4
41 Rio Volt Portable CD Player
42 Nikon Coolpix 950
43 Sony VAIO PCG_XG28 (Pentium III 650 MHz, 128MB RAM, 12.0GB)
44 ViewSonic PF790
45 Epson Stylus Photo 1270
46 3dfx Voodoo5 5500
47 Palm M105
48 WIRELESS ACCESS POINT WLS NTWK
49 Adobe Acrobat 4.0: Win9X/NT4 SP3
50 Compaq Deskpro EX P3/800 10GB
51 ATi Radeon 32MB DDR
52 HP Pavilion 8776c Multimedia PC (AMD Athlon 1Ghz, 128MB, 60GB HD
53 Kodak DC3400
54 Sony 64MB Flash Memory Stick
55 Sony Clie PEG_S300
56 Olympus E_10
57 Adobe Photoshop W/ImageReady 5.5: Win9X/NT4
58 PENTIUM III P3 1GHZ FCPGA 256KB L2 CACHE 133MHZ FSB 1GHZ EB
59 Kingston 128MB DRAM DIMM 168_PIN
60 Samsung Syncmaster 950P
61 UPG Windows 2000 Professional W2K
62 Kingston 256MB DRAM DIMM 168_PIN
63 Windows 2000 Professional W2K
64 Olympus D_460 Zoom
65 Sony VAIO PCG_XG29 (Pentium III 750 MHz, 128MB RAM, 18GB)
66 WINDOWS 98 SECOND EDITION
67 VirusScan 5.0: Win3.x/9X/NT351, OS/2, DOS
68 Palm M100
69 C_3040 ZOOM DIGTLCAM 3.34MPIX 16MB 3X OPT ZOOM
70 Compaq iPaq H3630 Pocket PC
71 Asus P4T (Pentium 4 Motherboard)
72 D_Link MP3/CD Player
73 Sony Cyber Shot DSC_P1
74 Palm VIIx
75 HP DeskJet 930C
76 Olympus C_3000 Zoom
77 ViewSonic VG150 LCD ViewPanel
78 TDK veloCD ReWriter 12X/10X/32X
79 Linksys EtherFast 1_Port Cable/DSL Router
80 Olympus C_2100 Ultra Zoom
81 ETHERFAST WIRELESS AP PLUS CABLE/DSL ROUTER 4PORT SWITCH
82 Iomega Zip USB 100MB External Zip Drive
83 Norton AntiVirus 2001 7.0: Win9X/ME/NT 4 SP4/2K Pro/NT4
84 Windows Millennium Edition WME
85 HP LaserJet 1100xi
86 Handspring Visor Deluxe (Blue)
87 Athlon Thunderbird _ 1000 MHz (200MHz/256K)
88 Office 2000 _ Professional Edition
89 Abit KT7A (Socket A)
90 Xircom Rex 6000
91 Canon PowerShot S10
92 Lucent Orinoco RG_1000 Residential Wireless Networking Kit
93 Samsung SyncMaster 955DF
94 Handspring Visor Edge (Silver)
95 Creative Labs Sound Blaster Live Value
96 Apple PowerBook G3/500_DVD (12GB HD)
97 Abit KT7_RAID (Socket A)
98 HP LaserJet 2100xi
99 Handspring Visor Platinum
100 Linksys EtherFast Cable/DSL Ethernet

Appendix B (Continued): Top 1000 Product Descriptions by Rank for March 26, 2001

101 Handspring Prism
102 HP ScanJet 6300Cxi
103 Iomega 250MB USB ZIP Drive
104 Olympus D_360L
105 Western Digital Caviar 30.7 EIDE Hard Disk
106 SMC Barricade Broadband Router
107 Atlas Micro PS 5000
108 Abit KT7A_RAID (Socket A)
109 Western Digital Caviar 45GB EIDE Hard Disk
110 RIO 800 MP3 PLAYER RETAIL
111 NetGear RT314 Cable/DSL Router
112 Palm IIIx
113 Yamaha CRW2100SZ 16X/10X/40X CD_RW
114 Asus AGP_V7700 GeForce2 GTS Pure
115 EASY CD CREATOR V5 CD
116 ASUS AGP_V6800 GeForce 256 Deluxe
117 U.S. ROBOTICS 56K/14.4K ISA16 V90 W/JUMPERS
118 SanDisk Corp. 64MB Flash SmartMedia card
119 Casio Cassiopeia E_125
120 Sony Vaio PCG_Z505LE
121 PENTIUM III P3 1GHZ 256KB L2 SLOT1 SECC2 100MHZ FSB *SEE NOTES*
122 IBM Deskstar 75GXP 45GB EIDE
123 INTELLIMOUSE EXPLORER CD W9X PS2/USB
124 WS_FTP Pro 6.6: Win9X/2K/NT4
125 PENTIUM P4 1.5GHZ PGA423 2X64MB PC800 NON_ECC RIMM 400MHZ FSB
126 MS Office 2000 Professional 2000: comp V/U Win9X/NT 4
127 STYLUS PHOTO 1280 9PPM USB PARALLEL 2880X720 DPI MICRO PIEZO
128 64MB COMPACT FLASH CARD FOR DIGITAL CAMERAS & PDA S
129 TEAC CDW512E 12X/10X/32X CD_RW
130 Apple Powerbook G4/400 Titanium
131 3dfx Voodoo4 4500 (AGP, 32MB SDRAM)
132 COMPAQ IPAQ 3635 POCKET PC 32MB TFT COLOR
133 Ricoh MP9120A CD_RW/DVD_ROM
134 Western Digital 27.3 GB 7200 RPM EIDE
135 DC4800 EZ 2160X1440 3.1MP 64MB CF 3X/2X USB _ INCLUDES ACCS PACK
136 PENTIUM III P3 850MHZ/256K L2 CACHE 100MHZ FSB SLOT1 SECC2
137 Sony MVC_FD95 Digital Mavica
138 PENTIUM P4 1.3GHZ PGA423 2X64MB PC800 NON_ECC RIMM 400MHZ FSB
139 3dfx Voodoo 3 3000
140 Creative Labs Blaster 56K PCI Modem
141 Adobe Photoshop 6.0: Win9X/ME/2K/NT4
142 Sony VAIO PCG_SR7K (Pentium III 600 MHz, 128MB RAM, 12GB)
143 PENTIUM III P3 800MHZ/256KB 100MHZ FSB SLOT1
144 HP CD_Writer Plus 9100i (32X/8X/4X)
145 Sony VAIO PCG_F540 (Pentium III 500 MHz, 64MB RAM, 6.0GB)
146 Samsung Syncmaster 750S
147 Casio Cassiopeia EM_500
148 Plextor PlexWriter 32X/8X/4X CD_RW drive
149 Intuit TurboTax Deluxe 2000: Win9X/ME/NT4/2K
150 UPG_V WINDOWS 98 SECOND EDITION
151 Creative Labs Nomad 64 MP3 Player
152 Kingston 128MB Flash CompactFlash Card
153 Handspring Visor Deluxe (Graphite)
154 PENTIUM III P3 933 FCPGA 256KB L2 CACHE 133MHZ FSB 933EB
155 TRANSPARENCY ADAPTER FOR 1200 1200U 1240U 2500 & 636
156 Sony Clie PEG_S500
157 Norton SystemWorks 2001 4.0: Win9X/ME/NT 4 SP4/2K Pro
158 Sony DCR_TRV310
159 Canon PowerShot S20
160 Dreamweaver 3.0: Win9X/NT4
161 Sony MVC_CD1000
162 Creative Labs Nomad II MG Silver
163 Epson Stylus Color 900
164 Nomad Jukebox Audio Player 6GB Blue
165 Flash 4.0: Win9X/NT4
166 IBM Deskstar 75GXP 75GB EIDE
167 Sony Cyber Shot DSC_S50
168 DI_704 HOMEGATEWAY CBL/XDSL INT SHARING AND FIREWALL ROUTER
169 VIA KT133 SOCKA UPTO 1.5GB ATX 5PCI AGP4X SND UDMA66 200MHZ
170 Adobe Acrobat 4.0: upgr Win9X/NT4 SP3
171 Palm Vx (Champagne)
172 Compaq Presario 17XL265
173 Audiovox MPDj MP1000
174 FREEDOM ZOOM 150 APS CAMERA
175 Palm VII
176 Sony Multiscan CPD_G400 (19_Inch Trinitron)
177 BH6
178 HP Jornada 548
179 Rio 600
180 Creative Labs 3D Blaster Annihilator 2 MX
181 D_Link DWL_1000AP Wireless Access Point
182 815E FCPGA/ICP UPTO 512MB ATX 5PCI AGP4X VID SND ATA100 133MHZ
183 STYLUS PHOTO 780 INKJETPR 2880X720DPI PC MAC
184 Olympus C_2040 Zoom
185 Sony Vaio SR17 notebook
186 IBM ThinkPad T20 (PIII 700MHz, 128 RAM, 12GB HD, Win 98)
187 820 SLOT1 UPTO 512MB RDRAM ATX 5PCI AGP4X SND UDMA66 133MHZ
188 Apple PowerBook G4/500 Titanium
189 Creative Labs Video Blaster WebCam 3
190 D30 Digital Camera Kit
191 HP LaserJet 4050N
192 IBM Microdrive 1GB
193 Western Digital Caviar 20.5GB EIDE
194 Sony MVC_FD90 Digital Mavica
195 Best Data Smart One Cable Modem External Cable modem
196 PC100 Sdram NonEcc 128MB 16x64
197 INTELLIMOUSE INTELLIEYE SOLID STATE PS2/USB _ NO MOVING PARTS
198 Quicken 2001 Deluxe Win9X/NT4/2K
199 Kodak DC290 Zoom
200 ELSA GLADIAC GeForce2 Ultra

Appendix B (Continued): Top 1000 Product Descriptions by Rank for March 26, 2001

201 PC100 Sdram w/ECC 128MB 16x72
202 HP PhotoSmart S20xi
203 20.4GB DIAMONDMAX PLUS HD INT ATA/66 9MS 7200RPM
204 NATURAL KEYBOARD ELITE 2.0 PS2/USB 95/98
205 Epson Stylus Photo 2000P
206 HIPZIP MP3 PLAYER USB DIGTL PLAYER W/ CLIK DISK
207 Fujifilm FinePix 4700 Zoom
208 Canon CanoScan FB 1200S
209 VIA KT133 SOCKA UPTO 1.5GB ATX 5PCI 1SH AGP4X 200MHZ FSB
210 Philips Flat TV
211 Brother HL_1240
212 Samsung SyncMaster 753 DF
213 Sony VAIO PCV_RX360DS
214 815E FCPGA/ICP UPTO 512MB ATX 5PCI AGP4X VID SND LAN ATA100 133M
215 Sony VAIO PCG_C1X PictureBook
216 Pinnacle Systems Studio DV
217 IPAQ PERSONAL MP3 AUDIO PLAYER 64MB MMC/USB CBL/SW JUKEBOX/EARPH
218 DESKTOP THEATER DTT3500 DIGITAL 5 SATELLITES SUBWOOFER DECODER
219 Creative Labs Sound Blaster Live! Platinum 5.1
220 Fuji FinePix 4900
221 Sony DVP_S7700
222 SanDisk Corp. 128MB Flash CompactFlash Card
223 PENTIUM III P3 933MHZ/256KB L2 CACHE 133MHZ FSB SLOT1 SECC2
224 XIRCOM REX6000 MICROPDA WITH SERIAL DOCKING STATION
225 Intel Pocket PC Camera
226 Maxtor DiamondMax 80 80GB EIDE
227 Nikon Super Coolscan 4000 ED
228 BE6_II
229 SanDisk Corp. 64MB Flash CompactFlash Card
230 32X64_7.5 256MB SYNC PC133 168PIN 3.3V 133MHZ DIMM
231 BX133_RAID (Socket 370)
232 AMD DURON_750MHZ 192K CACHE SOCKA PGA462 200MHZ FSB PIB
233 3Com HomeConnect
234 PENTIUM III P3 800 FCPGA 256KB L2 CACHE 133MHZ 800EB FLIP CHIP
235 Toshiba SD_R1002 CD_RW/DVD_ROM
236 ATX CASE MID TOWER WITH 300W PS(KS282+PP303X) SOLUTION SERIES
237 ViewSonic Corp. GS 790
238 IBM Deskstar 75GXP 60GB EIDE
239 Sony Cyber Shot DSC_S30
240 IBM T85A (white)
241 Sony MVC_FD73 Digital Mavica
242 Iomega Zip 250 Internal ATAPI Drive
243 MODEM BLASTER V90 ISA 56KBPS FAX/VOICE CAPABLE V80 V90 & V34
244 Stowaway Portable Keyboard For Handspring Visor
245 Creative Labs Sound Blaster Live MP3+
246 WIRELESS PCCARD WLS NTWK
247 Epson Stylus Photo 870
248 RADEON VE AGP 32MB DUAL DISPLAY VGA & DVI
249 Ricoh Media Master MP7120A 12X/10X/32X CD_RW
250 Partition Magic 6.0: Win9X/ME/NT4 SP4/2K Pro
251 NO.45 LG BLACK INK F/DJ 710 750 850 880 895 930 950 970 1120 160
252 Althon Thunderbird _ 900 MHz (200 MHz/256K)
253 Samsung SyncMaster 170MP
254 HP Jornada 720
255 VIA KT133 SOCKA UPTO 1.5GB ATX 6PCI CNR AGP4X SND ATA66 200MHZ
256 INTUOS 9X12 USB SPECIAL EDITION TABLET W/ 4D MOUSE PEN & PNTER C
257 QuickBooks Pro 2001 Win9X/ME/NT4 SP3/2K
258 Kingston 128MB DRAM DIMM 168_PIN
259 NATURAL KYBD PRO PS2/USB V1.0 W9X/NT
260 MS Works 6.0: Win9X/ME/2K/NT4
261 MS Outlook 2000: Win9X/NT4
262 Sony VAIO PCV_J100
263 Apple iMac DV Special Edition (reviewed model: Graphite)
264 Apple Studio Display
265 ATi All_in_Wonder 128 Pro 32MB
266 Toshiba Satellite 1755 Laptop 700MHZ/DVD
267 MS Money 2001 Deluxe Win9X/NT4/2K
268 MS FrontPage 2000: Win9X/NT4
269 Sony CyberShot DSC_F505V
270 Sony MVC_FD88 Digital Mavica
271 HP DeskJet 842C
272 Toshiba Satellite 1715XCDS
273 HP Jornada 680
274 Olympus C_2020 Zoom
275 Sony Multiscan CPD_G500 (21_inch Trinitron)
276 PENTIUM III P3 800MHZ/256KB 133MHZ FSB SLOT1 800EB SECC2
277 Creative Labs 3D Blaster Annihilator
278 K6 2 _ 500 MHz (100MHz)
279 Canon BJC_8200 Photo Printer
280 Creative Labs Nomad II
281 Sony Spressa i.Link 12X/8X/32X CD_RW
282 Sony Vaio F610 notebook
283 Epson Perfection 1640SU
284 Epson Stylus Photo 875DC
285 PENTIUM P4 1.4GHZ PGA423 2X64MB PC800 NON_ECC RIMM 400MHZ FSB
286 IBM NetVista A40 (Pentium III, 933 MHz)
287 3dfx Voodoo5 5500 AGP
288 PENTIUM III P3 866 FCPGA 256KB L2 CACHE 133MHZ 866EB FLIP CHIP
289 IBM Thinkpad X20 (Celeron 500 MHz, 64MB RAM, 10GB)
290 Sonicblue Diamond Mako
291 HP LaserJet 2100TN
292 Creative Labs Nomad II _ MP3 player _ stereo _ FM tuner integrat
293 Norton Utilities 2001 5.0: Win9X/ME/NT 4 SP4/2K Pro
294 Samsung SyncMaster 900NF
295 Logitech QuickCam
296 Sony Vaio XG38 notebook
297 BACK_UPS OFFICE 500
298 IBM Microdrive CF+ 340MB
299 Gigabyte GA GF2000D
300 HP DeskJet 932C

Appendix B (Continued): Top 1000 Product Descriptions by Rank for March 26, 2001

301 Lucent Orinoco PC Card (Silver)
302 IPAQ H3635 EXPANSION PCK PCMCIA REQUIRES CONSUMER AUTHORIZATION
303 FIC AD11 Socket_A AMD 760 DDR ATX
304 Lexar 64MB Flash CompactFlash Card
305 ViewSonic ViewPanel VP181
306 Casio Cassiopeia E_100
307 PENTIUM III P3 750MHZ/256KB /100MHZ FSB SLOT 1 750E COPPERMINE
308 Maxtor DiamondMax Plus 5120 20.4GB EIDE hard disk
309 HP Color LaserJet 4550n
310 SanDisk Corp. 32MB Flash SmartMedia card
311 HP DeskJet 1220C
312 PENTIUM III P3 733 FCPGA 256KB L2 CACHE 133MHZ FSB FLIP CHIP
313 HP CD_Writer Plus 9110i (32X/8X/4X)
314 Iomega Zip CD External CD_RW
315 HP Color LaserJet 4500DN
316 Archos Jukebox 6000
317 IBM Microdrive 340 MB
318 Pentium III (FC PGA) _ 933EB MHz (133MHz/256K)
319 Epson Perfection 1240U White
320 HP PhotoSmart 315
321 WinFax Pro 10.0: Win9X/NT4/2K
322 Iomega Zip 250 USB Powered
323 Iomega FotoShow Digital Image Center
324 Sony Vaio PCG_Z505LS
325 Nikon Coolpix 800
326 Sony 32MB Flash Memory Stick
327 HP LaserJet 4050
328 NEC SuperScript 1400
329 Western Digital Caviar 20.5GB EIDE
330 DEVIL S ADVOCATE
331 ADS Pyro Digital Video 1394 (Firewire Card)
332 INK JET CARTRIDGE, TRI_COLOR, (CYAN, MAGENTA, YELLOW), NO. 78, 4
333 Iomega ZipCD
334 3Com EtherLink 10/100 PCI Adapter
335 Apple Power Mac G4 Cube (450 MHz)
336 Compaq Presario 1200_XL 110
337 Pinnacle Systems Inc. Studio DC10plus
338 Creative Labs PC DVD_RAM (SCSI)
339 PENTIUM III P3 733MHZ 256KB L2 133MHZ SLOT1 COPPERMINE .18MU
340 Belkin OmniCube 2 Port KVM Switch
341 Pentium III _ 700E MHz (100MHz/256K)
342 MS Project 2000: Win9X/NT351/2K
343 Philips Removable disk drive
344 Kodak DC215 Zoom
345 Althon Thunderbird _ 800 MHz (200 MHz/256K)
346 Celeron _ 700 Mhz (PPGA)
347 Iomega Predator CD_RW
348 Best Data Cabo MP3_64 _ MP3 player _ stereo _ microphone integra
349 Intel PC Camera Pro Pack
350 Athlon Thunderbird _ 1100 MHz (200MHz/256K)
351 EXPANSION PACK FOR DC4800
352 Apple Power Mac G4 (733 MHz, 256MB, 60GB, DVD_R/CD_RW)
353 Giga_Byte GA_7ZXR (Socket A)
354 Dazzle Digital Video Creator II
355 AMD ATHLON_950 384K CACHE SOCKA PGA462 TBIRD 200MHZ FSB
356 IBM TravelStar 20GN 20 GB
357 Casio QV_3000EX
358 ATi TV Wonder USB TV Tuner
359 AudioCatalyst Workshop 2.0: Win9X/NT4
360 Creative Labs Sound Blaster Live
361 HP DeskJet 812C
362 Gigabyte GA_71XE (Slot A)
363 Toshiba Satellite 2800 Celeron 650 MHz 64 MB 6 GB
364 Toshiba Satellite 2805_S202 Laptop PIII/700MHZ
365 Pentium 4 _ 1.4 GHz (400Mhz/256K)
366 Compaq Presario 305
367 Flash 5.0: Win9X/2K/NT4
368 NetGear RT311 DSL & Cable Modem Router
369 EZ CABLE/DSL WIRELESS ROUTER 4_PORT 10/100 BROADBAND
370 Norton Internet Security 2001 2.5: Win9X/ME/NT4 SP3/2K Pro
371 PALM V ALUMINUM HARD CASE
372 ELSA Gladiac GeForce2 GTS
373 HomeSite 4.5: Win9X/NT4
374 ATX MBD PENT S7 VIA 5PCI 2ISA 1AGP 3DM
375 Olympus C_2500L
376 CORDLESS WHEEL MOUSE 3_BUTTON W/ SCROLL WHEEL PS2 RF
377 Epson Expression 1600 Professional Edition
378 ViewSonic Corp. E 790 (76Hz)
379 QPS Que 12X/10X/32X CD_RW
380 Sony MVC_FD85 Digital Mavica
381 D_Link USB 4_Port Hub
382 BLACK INK CARTRIDGE FOR STYLUS 875DC 1270 875DCS
383 HP LaserJet 2100M
384 Epson Perfection 640U
385 PcANYWHERE Host 10.0: Win3.x/9X/ME/2K/NT4, DOS
386 Norton Ghost 2001: Win9X/2K/NT4, DOS
387 NVIDIA TNT2 PRO 32MB SDRAM AGP VIDEO CARD
388 Western Digital Caviar WD600AB
389 Maxtor External IEEE 1394 Hard Disk 80GB
390 Pentium III _ 933EB MHz (133MHz/256K)
391 Epson Perfection 1240U
392 CleanSweep 2001 5.0: Win9X/ME/2K/NT4
393 (M_32PE) 32MB SMARTMEDIA CARD WITH OLYMPUS PANORAMA FEATURE
394 STYLUS PHOTO 890 INKJETPR 2880X720DPI PC MAC PAR
395 PC133 Sdram w/Ecc 128MB 16x72
396 Handspring Visor Edge (Blue)
397 Compaq iPaq (Celeron 500MHz, Legacy_Free)
398 HP LaserJet 4050TN
399 Pentium III _ 800E MHz (100MHz/256K)
400 Intel Network adapter External

Appendix B (Continued): Top 1000 Product Descriptions by Rank for March 26, 2001

401 Sony MVC_FD91 Digital Mavica
402 Sony VAIO PCG_FX170 (Pentium III 800 MHz, 128MB RAM, 20GB)
403 Microtech IBM Microdrive Roadwarrior Kit 1 GB
404 PENTIUM III P3 700 FCPGA 256KB L2 CACHE 100MHZ FSB FLIP CHIP
405 Apple PowerBook G3/400_DVD
406 PALMPILOT NETWORK HOTSYNC PALMCONNECT USB KIT
407 ETHERFAST WIRELESS AP PLUS CABLE/DSL ROUTER WITH PRINTSERVER
408 Fuji FinePix 40i
409 Sony MultiScan CPD_L181
410 Sony Vaio XG39 notebook
411 Pentium III _ 600E MHz (100MHz/256K)
412 HP PhotoSmart 215
413 Western Digital 10.2GB EIDE
414 3Com/U.S. Robotics 56K/14.4K V90
415 Creative Labs Desktop Theater 5.1 DTT2500 Digital
416 Epson Stylus Color 740i
417 Easy CD Creator Deluxe 4.0: Win9X/NT4
418 Adobe PhotoDeluxe 4.0: Win9X/NT4 SP5
419 HP OfficeJet T65
420 Sony Vaio PCG_F680
421 Gateway Performance 1000
422 HP PhotoSmart P1000
423 LG Electronics Flatron 795FT Plus
424 Kodak DC240 Zoom Digital Camera
425 Yamaha CRW2100EZ (16X/10X/40X)
426 Fujifilm FinePix 2400 Zoom
427 HP CD_Writer 9500i 12X/8X/32X CD_RW
428 Apple iBook (Blueberry)
429 BLACK INK CARTRIDGE FOR STYLUS COLOR 400/500/600/600Q/700/PHOTO
430 Compaq Presario 1800 XL_280
431 Lexmark Z52 Color Jetprinter
432 K6 2 _ 550 MHz (100MHz)
433 MEMORY STICK REFILL PACK 64MB
434 Sony VAIO PCG_SR5K (Pentium III 500 MHz, 64MB RAM, 9GB)
435 Toshiba Satellite Pro 4300
436 Canon Battery pack NB_1L
437 COLOR INK CARTRIDGE FOR STYLUS 400/600/800/850/1520
438 Compaq Presario 17XL365
439 VIA SOCK7 512K CACHE UPTO 256MB BAT 2PCI 2ISA 1SH AGP 100MHZ
440 Yamaha CRW 2100FXZ Removable disk drive
441 HP OfficeJet G85
442 IBM Deskstar 75GXP 30GB EIDE
443 Norton SystemWorks 2001 Pro Ed 4.0: Win9X/ME/NT 4 SP4/2K Pro
444 Acer AcerView 77c
445 Dazzle Digital Video Creator (USB, external)
446 Olympus P_400 Photo Printer
447 HP DeskJet 952C
448 INKJET CARTRIDGE, TRI_COLOR, HI_YIELD 30 CC INK, YIELDS 455 PAGE
449 RAVE MP2300 MP3 PLAYER W/ BUILT IN IOMEGA 40MB CLIK DRIVE
450 HP CD Writer 8220e
451 ViaVoice Pro 8.0: Win9X/ME/NT4 SP5/2K
452 Adobe Premiere 5.1: Win9X/NT4
453 BACK UPS PRO 500 500VA 5 MIN FULL 7 OUTLETS W/USB PORT
454 64MB SMARTMEDIA BLISTER PKG
455 Samsung Electronics Co. Ltd. SyncMaster 900 IFT
456 Samsung Electronics Co. Ltd. SyncMaster 900 IFT
457 BP6
458 Creative Labs Blaster 48X CD_ROM
459 HP PhotoSmart 1215
460 LG Electronics Studioworks 995E
461 U.S. ROBOTICS 56K MODEM PC CARD WITH X_JACK
462 HP OfficeJet T45xi
463 Linksys EtherFast 5_Port 10/100
464 17IN/16.OV 25MM 1280X1024 66HZ EF70 PERFECT FLAT MPRII ASAR
465 Compaq Presario 1200_XL 106
466 AMD K7_850MHZ ATHLON 128K L1 CACHE SLOTA 200MHZ FSB PIB
467 ATi TV Wonder
468 VIA KT133 SOCKA UPTO 1.5GB ATX 5PCI 1ISA AGP4X AMR SND UDMA66 20
469 WordPerfect Office 2000 Deluxe Ed Linux 2.2
470 Altec Lansing ACS 48 _ Speaker(s) _ stereo _ 80 Watt
471 Handspring VisorPhone
472 PENTIUM III P3 750 FCPGA 256KB L2 CACHE 100MHZ FSB FLIP CHIP
473 Athlon K7 _ 800 MHz (200MHz/512K)
474 CORDLESS DESKTOP PRO PS2/AT KYBRD/MSE INTERNET/MULTIMEDIA
475 Sony VAIO PCG_FX150K
476 Sony VAIO Slimtop LCD PCV_L640 (128MB RAM, 30GB HD)
477 Toshiba Satellite 2210XCDS
478 SWITCHBOX, OMNIVIEW 4 PORT KVM, CONTROLS FOUR COMPUTERS WITH ONE
479 IBM ThinkPad 600 (400 MHz, DVD_ROM)
480 ACT! 2000 5.0: Win9X/2K/NT4
481 WIRELESS MOUSE
482 Sony Vaio F690 notebook
483 Epson Stylus Color 980
484 MS Office 2001 MacOS
485 IBM ThinkPad T20 (P III 650MHz, 128 RAM, 6GB HD, Win 98)
486 Samsung Electronics Co. Ltd. YEPP! _ MP3 player _ stereo _ 7 mW
487 IBM ThinkPad 570E (Pentium III, 500 MHz)
488 Apple PowerBook G3/400_DVD
489 Pentium II _ 450 MHz (100MHz/512)
490 ULTRA100 PCI EIDE CONTROLLER 2CH 100MB/S BUS MASTER 95/98/NT/W2K
491 IBM Thinkpad 240 (Pentium III 500 MHz, 64MB RAM, 12GB)
492 QuickBooks Pro 2000: Win9X/NT4 SP3
493 Linksys EtherFast 8_Port 10/100 Switch (wrokgroup model)
494 Acer Travelmate 350TE
495 PENTIUM III P3 800 FCPGA 256KB L2 CACHE 100MHZ FSB FLIP CHIP
496 Compaq Presario 14XL244
497 GEFORCE2 MX AGP 4X NVIDIA 32MB SDR DVI_I TWINVIEW
498 HP LaserJet 3200
499 AMD DURON_700MHZ 192K CACHE SOCKA PGA462 200MHZ FSB PIB
500 HP PhotoSmart P1100xi

Appendix B (Continued): Top 1000 Product Descriptions by Rank for March 26, 2001

501 SanDisk Corp. 16MB Flash SmartMedia card
502 Toshiba Satellite 2805_S402 Laptop PIII/850MHZ
503 Epson PhotoPC 3000Z
504 U.S. ROBOTICS CABLE 10BT LAN CMX USER MANUAL PNP
505 Duron _ 700 MHz (200MHz/192K)
506 Visioneer OneTouch 8650
507 ATi Xpert 2000 32MB (DVD_Video Playback)
508 HP ScanJet 3300Cxi
509 HP ScanJet 6350Cxi
510 Sonicblue Multimedia Rio 500 (purple)
511 BROADBAND IEEE 802.11B WIRELESS GATEWAY 3PORT 10/10 SWITCH
512 USB/SMARTMEDIA FLASH CARD READER
513 PALMV HOTSYNC CRADLE FOR PC W/ CABLE FOR PALM V
514 Psion Series 5mx
515 NVIDIA GEFORCE2 GTS AGP4X 32MB DDR SGRAM VIDADPT
516 Norton SystemWorks 2000 Std 3.0: Win9X
517 LIGHTBOOK 30+ LCD PROJECTOR LB30+ 300 ANSI LUMENS 800X600 9LBS
518 PENTIUM III P3 850 FCPG 256KB L2 CACHE100MHZ FLIP CHIP
519 IBM Workpad Z50
520 GIGASET 2420 BASIC SYSTEM DSKPHNE HNDSET CHRGR _ CORDLESS
521 PENTIUM III P3 667 FCPGA 256KB L2 CACHE 133MHZ FSB FLIP CHIP
522 ATI Radeon Mac Edition 32MB DDR (AGP)
523 Apple Power Mac G4 (466 MHz, 128MB, 30GB, CD_RW)
524 Pentium 4 _ 1.5 GHz (400Mhz/256K)
525 LP350V DLP PROJECTOR 1300 LUMNS 6.7 LBS 1024X768
526 Memory Stick _ FDD flash memory adapter _ Flash : Memory Stick _
527 Fujifilm FinePix 1400 Zoom
528 ZIP 100MB PC CARTRIDGE 10_PK PRE_FORMATTED FOR PC
529 Vadem Clio C1050
530 Dreamweaver 4.0: Win9X/ME/NT4 SP5/2K
531 AMD ATHLON_800 384K CACHE SOCKA PGA462 TBIRD 200MHZ FSB
532 Creative Labs 3D Blaster RIVA TNT2
533 Toshiba SD M1402 Removable disk drive
534 Apple iBook Special Edition (Graphite)
535 Sonicblue Viper II
536 Creative Labs FPS2000
537 NEC MultiSync LCD1810
538 2 CD's to 1 Soundcard Splitter MPC Cable
539 PROCONNECT 2PORT COMPACT KVM SWITCH KIT PS2 W/ CABLES
540 HP LaserJet 3150xi
541 IBM Thinkpad A20m (Pentium III 700 MHz, 64MB RAM, 12GB)
542 SIDEWINDER PRECISION PRO V2.0 USB/GAMEPORT * TC3 *
543 BLACK INK CARTRIDGE F/ STYLUS COLOR 740/740I/1160
544 Micro Solutions Backpack CD Rewriter
545 Western Digital Caviar 20.4GB EIDE hard disk
546 Gigabyte GA_7DX AMD 761
547 Adobe Photoshop 5.0: Win9X/NT4, MacOS7.5
548 Epson Stylus Color 880
549 Duron _ 800 MHz (200/MHz/192K)
550 Creative Labs Blaster CD_RW Removable disk drive
551 QuarkXPress 4.1: Win9x/NT351
552 64MB SMART MEDIA 3.3V CARD
553 Panasonic PV_SD4090
554 CELERON 800MHZ 128K L2 CACHE PGA370 PROCESSOR 3YR WARRANTY
555 PENTIUM III P3 866MHZ/256KBL2 CACHE 133MHZ FSB SLOT1 SECC2866EB
556 DAZZLE HOLLYWOOD: 1394 DV ANALOG VIDEO CAPTURE
557 CAMBRIDGE SOUNDWORKS SPEAKERS DTT2500 5 SATELLITES SUBWOOFER
558 Lexar 128MB Flash CompactFlash Card
559 Apple Studio Display (15_in. flat panel)
560 TRACKMAN MARBLE FX 4_BUTTON TRACKBALL PS2/SERIAL
561 HP LaserJet 1100Axi
562 Acer TravelMate 602 TER
563 APC SMART UPS 700
564 Apple AirPort 1.2
565 CELERON 700MHZ 128K L2 CACHE PGA370 PROCESSOR 3YR WARRANTY
566 Acer AcerPower Se APSe_T800A
567 Adobe PageMaker Plus 6.5: Win95/NT4
568 3Com AirConnect Wireless Network Starter Kit
569 Sony VAIO PCG_F560 (Pentium III 600 MHz, 64MB RAM, 9.0GB)
570 Epson Stylus Photo 1200
571 Pentium _ 233 MHz (MMX)
572 AMD DURON_650MHZ 192K CACHE SOCKA PGA462 200MHZ FSB PIB
573 RIM 957 Blackberry Wireless Handheld
574 Compaq Presario 7AP170 Athlon 900 MHz 128 MB 40 GB
575 KB Gear Little Tikes JamCam, Jr.
576 Pentium III (FC PGA) _ 850E MHz (100MHz/256K)
577 K6 2 _ 533 MHz (100MHz)
578 CAT2924 24_PORT 10/100 SWITCH (ENTERPRISE EDITION)
579 EVERGREEN SPECTRA 400MHZ PROCESSOR UPGRADE SOLUTION
580 Memory adapter _ Flash : CompactFlash Card / 96 MB
581 Pentium III _ 800EB MHz (133MHz/256K)
582 Epson Perfection 1640SU
583 HP OfficeJet K60
584 SIDEWINDER FORCE FEEDBACK WHEEL 1.0 USB PORT 95/98
585 EKTANAR DIGITAL CAMERA LENS KIT FOR DC4800
586 Samsung SyncMaster 700NF
587 Canon CanoScan N1220U
588 PALM V TRAVEL KIT INCLUDES CABLE/AC/PLUG ADAPTERS
589 HP Omnibook 6000 (PIII, 700MHz, 128MB RAM, 18GB HD, Win2000)
590 D_Link DMP_100 MP3 Player
591 Kodak DC3200 Zoom
592 RAVE MP2200 MP3 PLAYER DIGITAL MEDIA PLAYER
593 HP PhotoSmart P1100
594 PC100 Sdram NonEcc 64MB 8x64
595 SIDEWINDER FORCE FEEDBACK PRO NO RETURNS AFTER 04/26/01*
596 Visioneer OneTouch 8100
597 Canon MultiPass C635
598 Novatel Minstrel S Plug_on module Fax / modem
599 Duron _ 750 MHz (200/MHz/192K)
600 Canon BJC_S450

Appendix B (Continued): Top 1000 Product Descriptions by Rank for March 26, 2001

601 D_Link iShare Cable/DSL Router and Firewall
602 Compaq Armada M300 (Pentium III, 500 MHz)
603 SONICWALL SOHO2 10U INET SECURITY APPLIANCE
604 Gigabyte GA_5AX (Socket 7)
605 Samsung SyncMaster 570s
606 CORDLESS MOUSEMAN WHEEL 4_BUTTON PS2/SERIAL
607 Compaq TFT8000
608 PC66 Sdram NonEcc 128MB 16x64
609 ATX P S7 5PCI 2ISA 1AGP 1MB L2 33
610 FAX MACHINE, FAX_560, FAX/TELEPHONE/COPIER, 512K MEMORY, 50 SHEE
611 ROLLER COASTER TYCOON ALL AGES 95/98
612 Apple Power Mac G4 (Dual 500 MHz, 256MB SDRAM, 40GB HD)
613 IBM T85A (black)
614 Pentium III (FC PGA) _ 866EB MHz (133MHz/256K)
615 Pentium III (FC PGA) _ 800EB MHz (133MHz/256K)
616 FASTTRAK100 ATA/100 RAID CARD 100MB/SEC BURST DTR
617 Seagate TapeStor Travan 20 10/20GB TR_5 tape drive
618 HP OfficeJet G95
619 HP DeskJet 950C
620 BLACK CARTRIDGE DESKJET 850C 1600/DJ710C/750/755C/855/1120CXI
621 Pentium III (FC PGA) _ 800E MHz (100MHz/256K)
622 Fireworks 3.0: Win9X/NT4 SP3
623 V90 DIGITAL VOICE RECORDER
624 Creative Labs Sound Blaster PCI128 sound card
625 Adobe Illustrator 8.0: Win9X/NT4/NT Svr 4
626 AMD ATHLON 1.2GHZ 384K CACHE SOCKA PGA462 TBIRD 200MHZ
627 440BX DUAL SLOT1 UPTO 1GB ATX 4PCI 2ISA AGP 100MHZ P2BD
628 Athlon K7 _ 750 MHz (200MHz/512K)
629 Compaq Presario 1800 XL_190
630 COLOR INK CARTRIDGE F/ STYLUS COLOR 440/640/740/740I/1160
631 Creative Labs PC_DVD Encore 12X w/ Dxr3 Removable disk drive
632 WizCom QuickLink Pen Text Scanner
633 Panasonic LF_D103U
634 QPS Que! 8X/4X/32X FireWire CD_RW
635 WINDOWS 2000 SERVER 5C W2K
636 Ricoh AP204 Color Printer
637 USB INTERNAL BUS PORT PCI CARD 2USB PORTS 12MBPS PLUG&PLAY
638 CELERON 600MHZ 128K L2 CACHE PGA370 PROCESSOR 3YR WARRANTY
639 16X64_8 128MB SYNC PC100 168PIN 3.3V 100MHZ DIMM
640 HP LaserJet 3100XI
641 Gigabyte GA_7ZX (Socket A)
642 Nikon Coolscan III (PC)
643 Corel Draw 10: CLP Choice upgr lic Win98/ME/NT4/2K
644 Pentium III _ 600EB MHz (133MHz/256K)
645 SLATE GRAPHIRE 4X5 USB TABLET W/PEN CORDLESS MOUSE & POWERSUITE
646 DC3400EZ DIGITAL CAMERA 32MB CARD 4 NIMH BATTERIES
647 Creative Labs 3D Blaster Savage4
648 TV TUNER CARD INT PCI VGA 10X7 NTSC PAL S/W
649 Casio Cassiopeia EM_500 Sky Blue
650 Lexar 64MB Flash SmartMedia card
651 Kingston 64MB Flash CompactFlash Card
652 Epson Stylus Color 3000
653 Compaq Presario Portable 17XL360 Pentium III 600 MHz 64 MB 10 GB
654 Lexar 64MB Flash CompactFlash Card
655 72Pin Simm NonParity Edo 32MB
656 ATI All_in_Wonder 128
657 Althon Thunderbird _ 850 MHz (200 MHz/256K)
658 Apple iBook Special Edition (Graphite)
659 Maxtor DiamondMax Plus 40 41 GB
660 PORTABLE MP3 PLAYER WITH 16MB RAM
661 Sony VAIO PCG_Z505JE (Pentium III 500 MHz, 64MB RAM, 9GB)
662 INTELLIMOUSE PS2/SERIAL 2_BUTTON SCROLL 95/98/WME/NT
663 Toshiba Tecra 8100 Series 12CF3
664 Iomega Clik PC Card Drive
665 64MB MMC CARD MULTILINGUAL PACKAGING
666 CELERON 633MHZ 128K L2 CACHE PGA370 PROCESSOR 3 YR WARRANTY
667 3Com Palm V/Vx Modem
668 OnStream DI30 15/30GB ADR tape drive
669 Pentium III (FC PGA) _ 733EB MHz (133MHz/256K)
670 72Pin Simm NonParity Edo 64MB
671 Acer AcerView 99C
672 815E PRO FCPGA UPTO 512MB ATX 6PCI 1SH CNR AGP4X SND VID 133MHZ
673 Apple iMac DV SE (500 MHz, Snow)
674 Maxtor DiamondMax 60
675 Olympus C_2000 Zoom
676 IMAGEMATE USB COMPACT FLASH READER MULTILINGUAL PACKAGING
677 AMD ATHLON_850 384K CACHE SOCKA PGA462 TBIRD 200MHZ FSB
678 D_Link Network adapter Plug_in module Ethernet
679 CDRW VELOCD 16X10X40X INT ATAPI DRV 32X RIP
680 INK JET CARTRIDGE, TRI_COLOR, (CYAN, MAGENTA, YELLOW), NO. 78, 9
681 Apple iMac (350 MHz, Indigo)
682 Sony VAIO PCG_F580 (Pentium III 650 MHz, 64MB RAM, 12.0GB)
683 Toshiba SD_R1002 4X/4X/24X/4X CD_RW/DVD_ROM
684 TONER CARTRIDGE ULTRAPRECISE FOR LASERJET 1100 1100A 3200 SERIES
685 Gateway Select 1000 (17_inch monitor)
686 Duron _ 850 MHz (200/MHz/192K)
687 Apple Power Mac G4 (533 MHz, 128MB, 40GB, CD_RW)
688 Seagate Cheetah X15 18.4GB Ultra 160 (68 pin)
689 PhotoSuite Platinum Ed Win9X/NT4 SP3
690 Dreamweaver Fireworks Studio 4.0: Win9X/ME/2K/NT4
691 QuickBooks 2001 Win9X/ME/NT4 SP3/2K
692 128MB RDRAM RIMM 800MHZ
693 HP LaserJet 1100se
694 Toshiba PDR_M70
695 Mag Technology 800 V
696 HP OmniBook 6000 (Pentium III 700 MHz, 128MB RAM, 12GB)
697 Rand McNally StreetFinder GPS (Palm III)
698 Brother MFC_9600 (with video capture)
699 Canon Powershot Pro70
700 Dragon NaturallySpeaking Preferred USB 5.0: Win98/ME/NT4 SP6/2K

Appendix B (Continued): Top 1000 Product Descriptions by Rank for March 26, 2001

701 MP3 PLAYER 32MB USB W/VOICE RECORDING AND HEADPHONES
702 WINGMAN INTERCEPTOR JOYSTICK 9_BUTTON 3 HAT SWITCHES THROTTLE
703 NEC MultiSync FP950
704 Compaq Presario 17XL260
705 Epson Stylus Color 1520
706 STD YLD BLACK INK CART 3200 5700 5770 7000 7200 Z11 Z51/52 45
707 Sony CPD E200/L
708 Epson Stylus Color 777
709 TURBOTAX 2000 CD W9X/NT
710 D850GB SINGLE P4 PGA423 DUAL RDRAM CNR 5PCI 400MHZ ATA/100
711 Althon Thunderbird _ 950 MHz (200 MHz/256K)
712 Sony VAIO PCG_Z505JS (Pentium III 650 MHz, 128MB RAM, 12GB)
713 Umax Astra 3400
714 KDS Radius S_3F (with speakers)
715 Samsung SyncMaster 240T
716 Agfa ePhoto Agfa CL18
717 Samsung Electronics Co. Ltd. SyncMaster 170 T
718 Sony Cyber Frame
719 OPTRA E312L LASERPR 10PPM 600DPI 2MB USB
720 Plextor Corp. PlexWriter Removable disk drive
721 Dragon NaturallySpeaking Preferred 5.0: Win98/2K/ME/NT4 SP6
722 Samsung SyncMaster 955SL
723 Samsung SyncMaster 150MP
724 Kingston 256MB DRAM DIMM 168_PIN
725 Epson Stylus Photo 750
726 HP DeskJet 990Cse
727 AutoCAD LT 2000i Win9X/NT4
728 Sharp Mobilon TriPad PV_6000
729 ETHERFAST CABLE/DSL VOICE ROUTER
730 I_Jam I_JAM IJ_50 _ MP3 player _ stereo
731 PcANYWHERE Host & Remote 9.2: Win9X/NT4/2K
732 3dfx Voodoo3 3500 (AGP)
733 SGI Silicon Graphics 1600SW
734 ATi Rage Fury Pro (TV out)
735 Brother Multi_Function Center MFC_7150C
736 HP LaserJet 5000N
737 IEEE 1394 FIREWIRE PCI CARD
738 INK JET CARTRIDGE, 5_COLOR, CYAN/LT CYAN, MAGENTA/LT MAGENTA, YE
739 Altec Lansing ADA 890 _ Speaker(s) _ AC_3 (Dolby Digital) _ 120
740 HP Color LaserJet 4550
741 WINDOWS NT SERVER 4.0 5C W/NT OPTION PK & SVR PK NT
742 ATi Xpert 2000
743 BLACK CARTRIDGE FOR DESKJET 680C 690C 695C DESKWRITER 600
744 AGE OF EMPIRES V1.0 SINGLE ONLINE_DOC
745 Iomega Zip 100 Internal ATAPI Drive
746 Creative Labs Sound Blaster 16 WavEffects
747 VISUAL BASIC PROFESSIONAL ED 6.0 W/PLUS PACK 95/98/WME/NT/W2K
748 ATi All_in_Wonder 128 (PCI)
749 Umax Astra 2100U
750 SYNCMASTER 800TFT 18.1IN LCD .28MM 12X10 75Z TCO99
751 Plextor PlexWriter 12X/4X/32X CD_RW (Internal)
752 PNY Technologies 256MB DRAM DIMM 168_PIN
753 HP DeskJet 970Cse
754 PRO PC CAMERA _ NORTH AMERICA
755 MS Picture It Publishing Platinum Ed 2001 Win9X/ME/NT4 SP4/2K
756 2930U KIT SCSI PCI 1CH CB MAN EZ SCSI 95/98/NT WKST ONLY
757 HP LaserJet 2100 se
758 Sony DVD Discman PBD_V30
759 THINKPAD A21P P3_850 32GB 128MB 15_TFT 16MB 8X_DVD 56K 98
760 WINDOWS NT WORKSTATION 4.0 W/SVC PK NT4
761 INK JET CARTRIDGE, COLOR, HI RESOLUTION, STANDARD YIELD, 275 PAG
762 PNY Technologies 128MB DRAM DIMM 168_PIN
763 TONER FOR HL_1240/1250/1270N & MFC_8300/8600/8700 HIGH YIELD
764 PYRO IEEE 1394 DRIVE KIT TO CONVERT YOUR DRIVE TO FIREWIRE
765 36IN FD TRINITRON WEGA STEREO COLOR TV S_VIDEO RCA RF INPUTS
766 HP PSC 500 Printer/Scanner/Copier
767 INTELLIMOUSE OPTICAL PS2/USB 95/98/NT
768 Compaq Matrox G450
769 Kodak DC3800 Zoom
770 Apple Power Mac G4 (400 MHz, 64MB SDRAM, 20GB HD)
771 LP435Z DLP PROJECTOR 1000 LUMEN ***WHILE SUPPLIES LAST***
772 NEC MultiSync LCD2010
773 Kodak DC5000
774 GPS/STREETFINDER BUNDLE 2000
775 Matrox Millennium G400
776 UPG_V WINDOWS 95 W/INTERNET EXPLORER 4.0 95
777 ViewSonic Corp. VG 175
778 Kodak Smart Picture Frame
779 MS Encarta Reference Suite 2001 Win9X/NT4 SP3
780 SanDisk Corp. 64MB Flash CompactFlash Card
781 Pentium II _ 333 MHz (66MHz/512)
782 Mitsubishi Leonardo
783 A/C ADAPTOR/BATTERY CHARGER (EH_21) FOR COOLPIX 880
784 Guillemot Hercules 3D Prophet II GTS
785 KS188+PP303X ATX FULL TOWER CASE 300W PS VALUE LINE BEIGE
786 LP340V DLP PROJECTOR 1300 LUMNS SVGA 800X600 6.7 LBS
787 MS Visio 2000 Professional Win9X/NT4 SP3
788 Iomega Zip 100 Parallel Port Drive
789 3Com Fast EtherLink XL
790 HP PhotoSmart C200xi
791 INTUOS 4X5 SERIAL TABLET FOR PC WITH INTUOS PEN & PAINTER CLASSI
792 D_Link Network adapter Plug_in card Ethernet
793 Apple Power Mac G4 (Dual_450 MHz, 128MB SDRAM, 30GB HD)
794 PENTIUM III P3 533MHZ 512KB L2 CACHE 133MHZ FSB SLOT1 KATMAI
795 Olympus DS_150 Digital Voice Recorder
796 INTEL DELUXE PC CAMERA USB I/F NORTH AMERICA
797 Creative Labs WebCam Go Plus
798 KDS VS_7E
799 Compaq Presario Portable 18_XL380 Pentium III 700 MHz 128 MB 20
800 Sonicblue Rio MP3 500 _ MP3 player _ stereo

Appendix B (Continued): Top 1000 Product Descriptions by Rank for March 26, 2001

801 Western Digital Caviar 400BB 40GB
802 Linksys EtherFast LAN
803 TURBOCHIP 233 233MHZ PROCESSOR UPG FOR PENTIUM 75 AND HIGHER
804 Fujitsu LifeBook S_4542 (Windows 98)
805 Acer AcerView F51 LCD Monitor
806 Nikon Coolscan IV ED
807 Linksys Network adapter External Ethernet
808 Pentium II _ 400 MHz (100MHz/512)
809 Casio EM 500SB
810 Guillemont 3D Prophet II MX
811 UPG COREL WORDPERFECT OFFICE 2000 WIN95/NT SINGLE 1_DOC
812 Genealogy.com Family Tree Maker Deluxe 8.0: Win9X
813 Compaq Presario Portable 12XL325 Pentium III 650 MHz 64 MB 6 GB
814 Matrox Marvel G400_TV (NTSC)
815 Adobe Illustrator 9.0: Win9X/NT4/2K
816 ViewSonic G790
817 Abit KA7_100 (Slot A)
818 MP3 PLAYER 64MB USB W/VOICE RECORDING AND HEADPHONES
819 128MB PICTURE CARD _ CF COMPACTFLASH ATA COMPATIBLE
820 Samsung Electronics Co. Ltd. SyncMaster 700 IFT
821 Samsung Electronics Co. Ltd. SyncMaster 700 IFT
822 Psion Revo
823 Logitech QuickCam Pro
824 Acer TravelMate 351TEV
825 WHEEL MOUSE OPTICAL USB PS/2 3_BUTTON + WHEEL
826 Compaq Deskpro EN SFF 6600 Model 10000 Pentium III 600 MHz 64 MB
827 Linksys EtherFast Workgroup
828 WINDOWS 2000 SERVER 10C W2K
829 3dfx Voodoo 3 2000 (PCI)
830 Western Digital 45 GB
831 24X/6X/4X REWRITABLE 4X DVD EIDE CDRW /DVD ROM COMBO DRIVE KIT
832 FINAL FANTASY VII
833 Apple iMac DV SE (500 MHz, Graphite)
834 GEFORCE2 GTS 4X/2X AGP 32MB SGRAM DDR VGA ONLY 200/333 MHZ
835 Memory Stick _ Memory USB adapter _ Flash : Memory Stick
836 HP DeskJet 1220Cxi
837 Epson Stylus Color 1160
838 IBM ThinkPad 600
839 ViewSonic G810
840 WHEEL MOUSE OPTICAL ENG. 95/98/WME/NT
841 Sony DCR_TRV900
842 Plextor PlexWriter RW 20X/4X/2X CD_RW drive
843 Mitsubishi Diamond Pro 900u
844 64MB 8X64 SDRAM PC133 8NS
845 128MB SMARTMEDIA 3V .
846 Celeron _ 600 Mhz (PPGA)
847 SOUND BLASTER LIVE SC X_GAMER 5.1
848 EROUTER SERVER 4_PORT 10/100 SWITCH DSL/CABLE MODEM
849 Peachtree Complete Accounting 8.0: Win9X/NT4 SP3/2K
850 TONER CARTRIDGE 6 000 PAGES FOR SUPERSCRIPT 870 1_PK
851 Iomega Zip 250 Parallel Port Drive
852 Sony Digital Photo Printer
853 PENTIUM III P3 600MHZ 512KB L2 CACHE 100MHZ FSB KATMAI
854 HP CD Writer 8230e
855 IBM TravelStar 32GH 32 GB
856 NI_MH/NI_CD BATTERY CHARGER 4AA NI_MH BATTERIES
857 HP ScanJet 5200Cxi
858 RECHARGEABLE BATTERY FOR VAIO SERIES NOTEBOOK
859 REX 6000 MICROPDA PORTABLE ORGANIZER
860 Cisco 2611 Dual Ethernet Router
861 Smart and Friendly Inc. SpeedWriter Removable disk drive
862 TEAC Floppy Drive 235HF Removable disk drive
863 NEC LCD1525V Flat Panel LCD
864 Pioneer DV_414
865 27IN FD TRINITRON WEGA STEREO TV/MONITOR VGA S_VID RCA RF 2 TUNE
866 Sony Glasstron PLM_A35 PC Video Headset
867 PENTIUM III P3 667MHZ 256KB L2 133MHZ FSB SLOT1 COPPERMINE .18MU
868 KDS VS_21E
869 ATi Rage Fury
870 BLACK INK CART FOR STYLUS COLOR 440/640/660/670/750/1200
871 HP DeskJet 1220Cse
872 SMART_UPS 1400NET 1400VA LINE INTLAN 7.4MIN_FULL 6_OUTLETS W/SW
873 Apple iMac (350 MHz, Blueberry)
874 HP OfficeJet G85XI
875 FS108 10/100 8 PORT DUAL SPEED SWITCH RJ_45 W/ UPLINK BUTTON
876 Norton Personal Firewall 2001 2.5: Win9X/ME/NT4 SP3/2K
877 CORDLESS FREEDOM PRO _ RF W/ SER/PS2 MOUSEMAN & SPLIT KEYBOARD
878 Hi_Val RealMagic
879 D_Link DSC_350
880 NetGear Home Phoneline 10X USB
881 HP PhotoSmart 1218
882 EPSON STYLUS COLOR 777 & 777I BLACK INK CARTRIDGE
883 Dragon NaturallySpeaking Std 5.0: Win98/2K/ME/NT4 SP6
884 NEC MultiSync FE700
885 Compaq Armada M700 (400 MHz, Windows 98)
886 HP DeskJet 895Cxi
887 Xircom RealPort 2 CardBus Ethernet 10/100
888 Casio QV 3000 ProPack
889 PENTIUM III P3 500 FCPGA 256KB L2 CACHE 100MHZ FLIP CHIP
890 Sony VAIO PCG_505VX
891 Olympus D_340R
892 Pentium II _ 300 MHz (66MHz/512)
893 LP335 DLP PROJECTOR 1000 LUMEN XGA **WHILE SUPPLIES LAST**
894 ATi Rage Fury Maxx
895 Compaq Aero 1550
896 CAMERA SUPPLY, DK_110 POWER SUPPLY KIT, INCLUDES POWER ADAPTER,
897 IBM WorkPad 30X
898 EZ CONNECT 11MBPS WIRELESS BUNDLE 1 ACCESS POINT 1 PCCARD
899 IBM ThinkPad 570E (Pentium III, 450 MHz)
900 64MB COMPACT PICTURE CARD FOR DC25 120 200 200 210 210P 220 240

Appendix B (Continued): Top 1000 Product Descriptions by Rank for March 26, 2001

901	3D BLASTER ANNIHILATOR 2 ULTRA
902	QUAKE II AGES 17 AND UP 95/98/WME
903	TDK veloCD ReWriter 32X/8X/4X CD_RW
904	Epson PhotoPC 850Z
905	BLACK INK CARTRIDGE FOR STYLUS COLOR 900 AND 980
906	Visioneer PaperPort OneTouch 7600 USB
907	CORDLESS I_TOUCH PS2/AT KYBRD RF INTERNET/MULTIMEDIA
908	RECHARGABLE BATTERY FOR VAIO DOUBLE CAPACITY LITHIUM ION
909	KS180+PP303X 10BAY ATX FULL TWR CASE 300W PS BEIGE
910	HP CD_Writer 9600se 12X/8X/32X CD_RW
911	IBM Thinkpad T Series (Pentium III, 750MHz, 128MB RAM, 20GB)
912	Toshiba Satellite 1625CDT
913	KDS VS_19sn
914	Apple Cinema Display (22_inch flat panel)
915	MidiLand S4 8200 _ Speaker(s) _ AC_3 (Dolby Digital) _ 200 Watt
916	Nikon D1 Pro
917	Kodak DVC 325
918	AGE OF EMPIRES RISE OF ROME EXPANSION CD W9X/NT
919	Yamaha CRW 4416 16X/4X/4X CD_RW drive (PC or Mac)
920	Samsung SyncMaster 1200NF
921	Sony VAIO PCG_F590K (Pentium III 750 MHz, 128MB RAM, 18GB)
922	ATI TV Wonder
923	Pentium _ 200 MHz (MMX)
924	PALM PORTABLE KEYBOARD FOR III/IIIXE/VII/M100
925	FL_40 EXT DEDICATED FLASH FOR C_2500L/C3000L HOT SHOE DESIGN CON
926	Pentium III (FC PGA) _ 700E MHz (100MHz/256K)
927	Celeron _ 533 MHz (PPGA)
928	Brother MFC 9200C
929	MOUSEMAN WHEEL OPTICAL USB/PS2 4 BUTTON + WHEEL
930	32X/10X/4X REWRITABLE INT SCSI SPRESSA CD_RW W/SW_SUITE CBLS DIS
931	D_Link Network adapter Plug_in module Ethernet, Fast Ethernet
932	ALL IN WONDER RADEON PCI 32MB SDR TVOUT RETAIL
933	Lexmark Color JetPrinter Z22
934	29160 KIT U160 LVD SCSI PCI 1CH MAN NT NET UX EZ SCSI
935	32IN FD TRINITRON WEGA STEREO COLOR TV S_VIDEO RCA RF INPUTS
936	Western Digital Caviar WD200BB 20 GB
937	IBM NetVista A20 6269 Pentium III 733 MHz 64 MB 10 GB
938	Acer TravelMate 738 TLV
939	Lexmark Optra E312
940	TRGpro
941	COLOR INK CARTRIDGE FOR THE 900 AND 980 SERIES
942	COLOR INK CARTRIDGE FOR STYLUS COLOR 750
943	IBM T55D (black)
944	HP ScanJet 6300Cse White
945	HP OfficeJet T45
946	Epson PhotoPC 650
947	Palm M505
948	D_Link Network adapter External Ethernet
949	K6 2 _ 450 MHz (100MHz)
950	Bryce 4.0: CLP Choice lic Win95/NT4 SP3, MacOS7.5.5
951	24X/4X/4X CD REWRITER BACKPACK PARALLEL PORT WIN 95 98 NT4 W/SW
952	Sony Cyber Shot DSC_D770
953	SIMCITY 3000 CD W9X
954	Nexian HandyGPS
955	Sony Vaio PCG_Z505JSK
956	Seagate Barracuda ATA II 30.6 GB
957	Epson Stylus Color 860 (USB/Parallel)
958	PRESARIO 5BW120 CEL 600 15.0GB 64MB 40X W/MOUSE/KB/4 USB/W98SE
959	Compaq Presario 1200_XL 125
960	Creative Labs Sound Blaster 16 PCI (Retail)
961	QV3000 3.34MP DIGITAL CAMERA W/ IBM 340MB MICRODRIVE
962	RIO 600 32MB BACKPACK RETAIL
963	Eudora Email 5.0: Win9X/2K/NT4, MacOS8.1
964	ViewSonic OptiQuest Q95
965	WordPerfect Office Std Ed 2000: Win9X/NT4
966	NetGear RM356 56K Router
967	Okidata Microline 320 Turbo
968	CDR RECORDER MEDIA 650MB 74MIN SILVER BRANDED 100PK CAKEBOX
969	E_VECTRA SF P3_600EB 8.4GB_HD 128MB SDRAM 24X W2K (EOL 10/1/00)
970	Umax UGate_3000
971	IBM ThinkPad T21 2647 Pentium III 800 MHz 128 MB 20 GB
972	PENTIUM III P3 550 FCPGA 256KB L2 CACHE 100MHZ FLIP CHIP .18MU
973	ATI Xpert 98
974	TONER CARTRIDGE FOR LJ 5P 5MP 6P 6MP
975	XIRCOM REX5001 SILVER INCLUDES SERIAL DOCKING STATION
976	PENTIUM III 1GHZ WITH VC820 128MB RDRAM 133MHZ FSB GIGAMINE
977	Minolta Dimage Scan Dual II
978	Umax Astra 2200
979	Linksys Instant Wireless WDT11
980	VT 2461 2.4GHZ CORDLESS PHONE W/CID HS JACK ITAD HS SKRPHN
981	Cisco Cisco 1720 USB, Ethernet
982	42IN 1.08MM 852X480 PLASMA FLAT PANEL DISPLAY/TV REMOTE BNC
983	Quicken 2001 Home & Business Win9X/NT4/2K
984	Sony MVC_FD83 Digital Mavica
985	AVERKEY IMICRO PC/MAC_TO_TV SCAN CONVERTER 1024X768 NO FLICKER
986	MULTI_FLASH BRACKET SK_E900 FOR COOLPIX 990/950/900
987	Creative Labs Video Blaster MovieMaker (USB, external)
988	NO 10 LG BLACK INK CART 2000C DESIGNJET 500/800 SERIES
989	Microtek ScanMaker 4700
990	29160N KIT U160 LVD SCSI CARD PCI W/50PIN EXT CONN
991	Creative Labs Blaster 8432 CD_RW Drive
992	Fuji FinePix 1400 ZOOM
993	Sony Vaio PCG_F690K
994	REMOVABLE CARTRIDGE, ZIP PC, 250MB, PRE_FORMATTED FOR PC, 4 PER
995	DV500+ DUAL STREAM NATIVE DV W/ ANALOG&DV I/O ADOBE PREMIERE 6.
996	Creative Labs 3D Blaster Annihilator2 Ultra
997	ELSA GLADIAC MX
998	Princeton EO 700 monitor
999	Creative Labs Sound Blaster Live! MP3+ 5.1
1000	HP ScanJet 5370CXI

Appendix C: PERL Script Program

```
#!/usr/princeton/bin/perl
package Spider;
use Exporter ();
@ISA = qw(Exporter);
@EXPORT = qw(http getrank gettag getinfo getarchive);
$datafile = '/u/peterlee/cnet1000/data.raw';
open (DATA, ">> $datafile");
sub http  {                                          ## downloads pages
  my $url = $_[0];
  my $page = $_[1];
  use LWP::Simple;
  $content = get($url);
  unless (defined $content) {
    print "ERROR: Bad url for $page\n"; }
  return $content;
}
sub getrank  {                                       ## gets rank info
  my $rankhtml = $_[0];
  $rankhtml =~ m#Manufacturer(.*)#si;
  $rankhtml = $1;
  @lines = split /<tr/, $rankhtml;                   ## creates array of
                                                     ## items ranked
  for ($n = 1; $n <= 100; $n++)  {                   ## creates a hash table
                                                           ## of the rank
info    $lines[$n] =~ m{
                 <font\ size=2.*> (\d+)            # rank
                 .*<a\ href="(.*)">                          # url
                 (.*)</a></b></font>                         # item

               }six;
    $rank{rank}[$n] = $1;
    $rank{url}[$n] = "void URL";
    if (defined $2)
      { $rank{url}[$n] = "http://shopper.cnet.com$2"; }
    $rank{item}[$n] = $3;
  }
  return %rank;
}
sub getinfo  {
  my $info = $_[0];
  @info = split /<td>/, $info;
  my $num = @gotinfo;
  @gotinfo = "" x $num;
  $int = 0;
  $price = 0;
    if ($info[2] =~ m#<b>\$(.*)</b>#s) {$price = $1;}
  push @gotinfo, $price;
  $codedate = 'voidcodedated';
  $month = (1..12)[(localtime)[4]];
  $day   = (0..31)[(localtime)[3]];
  $year  = (1900..3000)[(localtime)[5]];
  $datecoded = "$month/$day/$year";
  push @gotinfo, $datecoded;
  return @gotinfo;
}
close DATA;
```

Figure 1: Screenshot from Shopper.com

Mag Innovision LT530C More product info

Shopping List: Add to my list | View my list | What's Shopping List?

ADVERTISEMENT

Manufacturer:	Mag Technology USA Inc.
Part Number:	LT530C
List Price:	N/A
Lowest Price:	**$549.00** price drop alert

Pricing and availability are updated twice daily. To view latest information click on the prices below.

	Store	Gómez Merchant Review	Price	State	CLICK TO CALL	Shipping	In Stock	Last Updated
Buy Info	LA Computer Center CNET Certified Store More company info	★★★	$549.00	CA	800-400-5886	3.75+	YES Ship the same day	3/24/2001
Buy Info	Compu America More company info	★★★	$549.00	CA	800-533-9005	Starts at $9.95	In Stock	3/24/2001
Buy Info	PCNation.com CNET Certified Store More company info	★★☆	$645.45	IL	800-969-5255	16.00	Y	3/23/2001
Buy Info	COMPUTERS 4sure.com CNET Certified Store *Value, Selection, Satisfaction* More company info	★★★	$677.99	CT	888-212-0837	12.50	YES	3/26/2001
Buy Info	TelekomNet CNET Certified Store More company info	★★☆	$685.90	MA	877-346-9500	$20.92	YES	3/23/2001
Buy Info	Micro Warehouse CNET Certified Store More company info	★★★	$699.95	NJ	800-397-8508	Overnight: $9.95+	Y	3/23/2001
Buy Info	Multiwave Direct More company info	★★★	$700.88	CA	800-234-3358	see site	YES	3/24/2001
Buy Info	firstsource.com CNET Certified Store More company info	★★☆	$704.02	CA	800-858-9866	9.95+	54	3/25/2001
Buy Info	Soft4U.com CNET Certified Store More company info	★★★	$717.56	CA	877-276-3848	$29.90+	Yes	3/23/2001
Buy Info	Page Computer CNET Certified Store More company info	★★★	$849.00	CA	888-557-2557	14.31	yes	3/24/2001
Buy Info	State Street Direct CNET Certified Store More company info	★★★	$1138.34	NH	800-222-4070	$15.58	In stock	3/25/2001

Re-sort By Price / Sponsor

Figure 2: Average Percentage Range Over Time

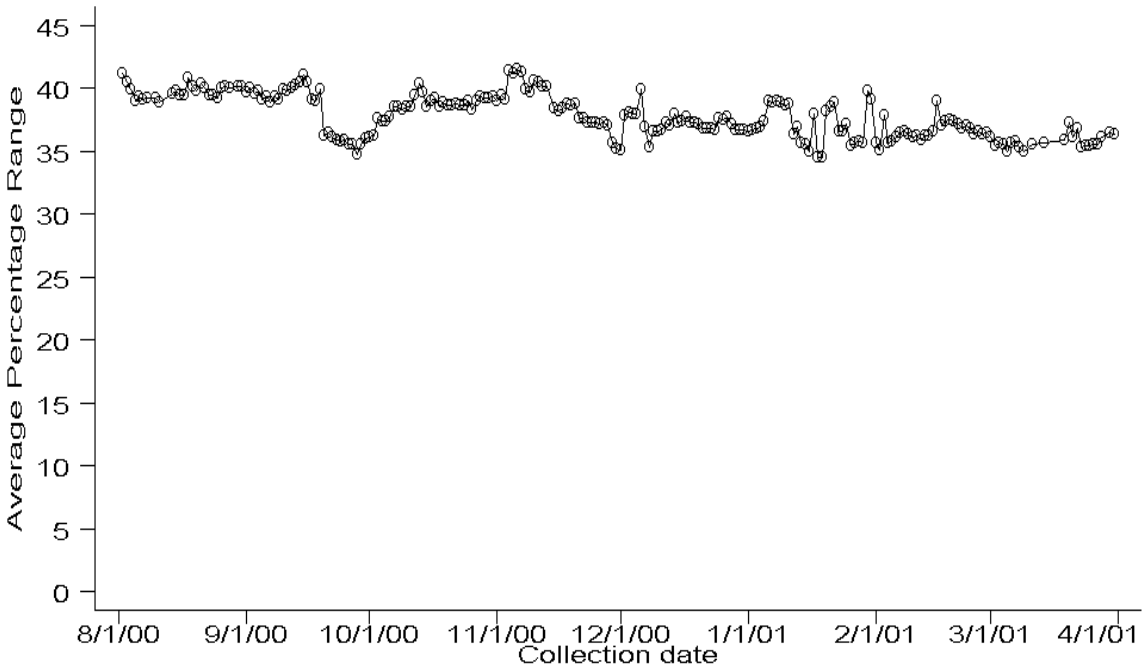

Figure 3: Average Coefficient of Variation Over Time

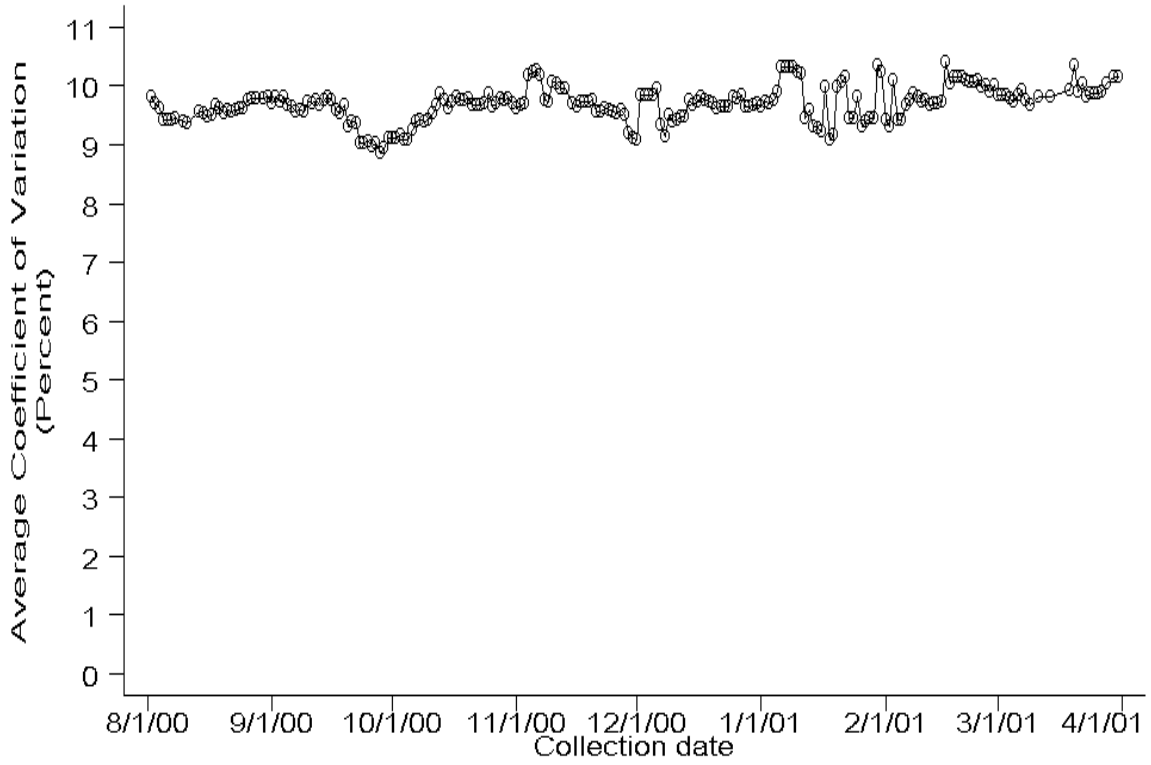

Figure 4: Average Percentage Gap Over Time

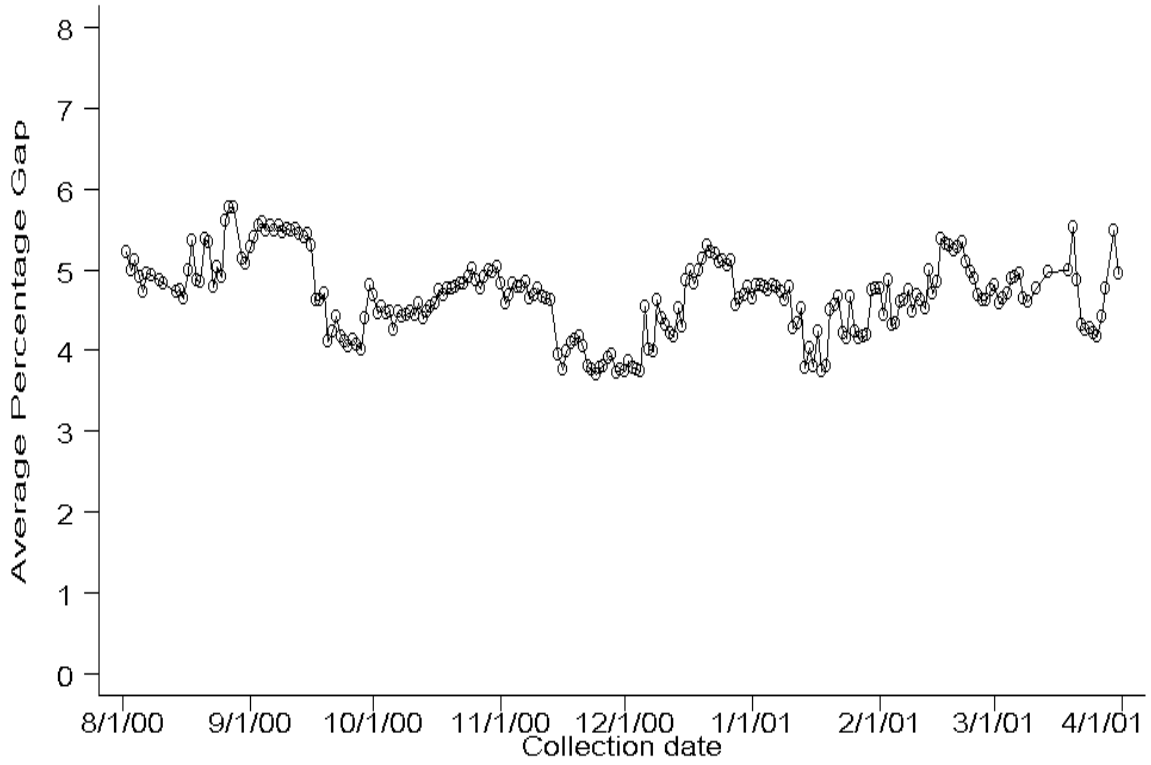

Figure 5: Percentage of Products with Various Percentage Gaps

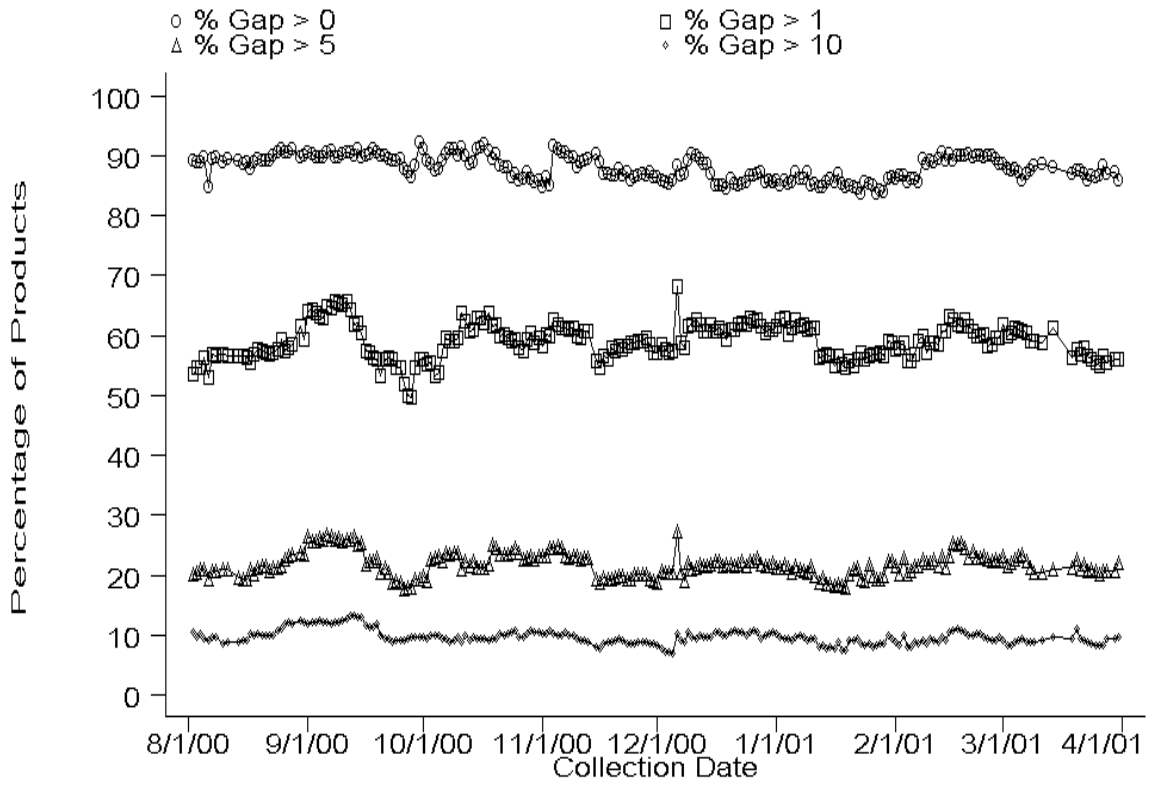

Figure 6: Average Percentage Gap by Number of Firms

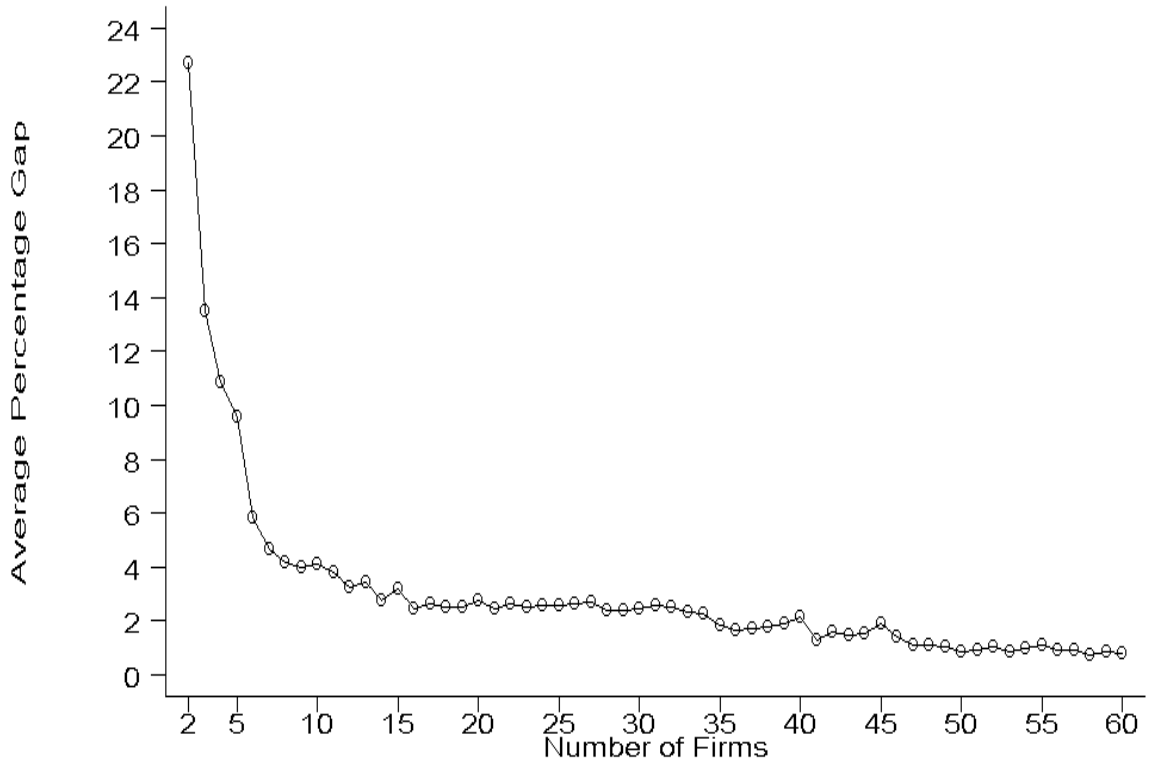

Figure 7: Average Percentage Range by Number of Firms

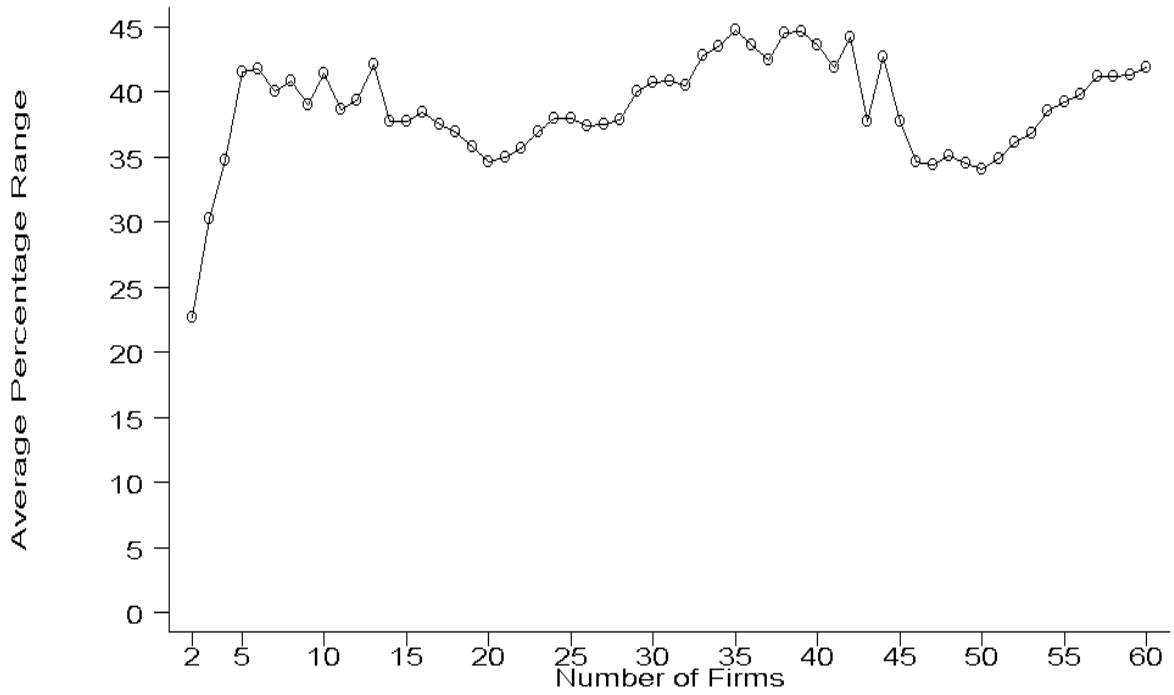

Figure 8: Average Number of Firms Listing Prices Over Time

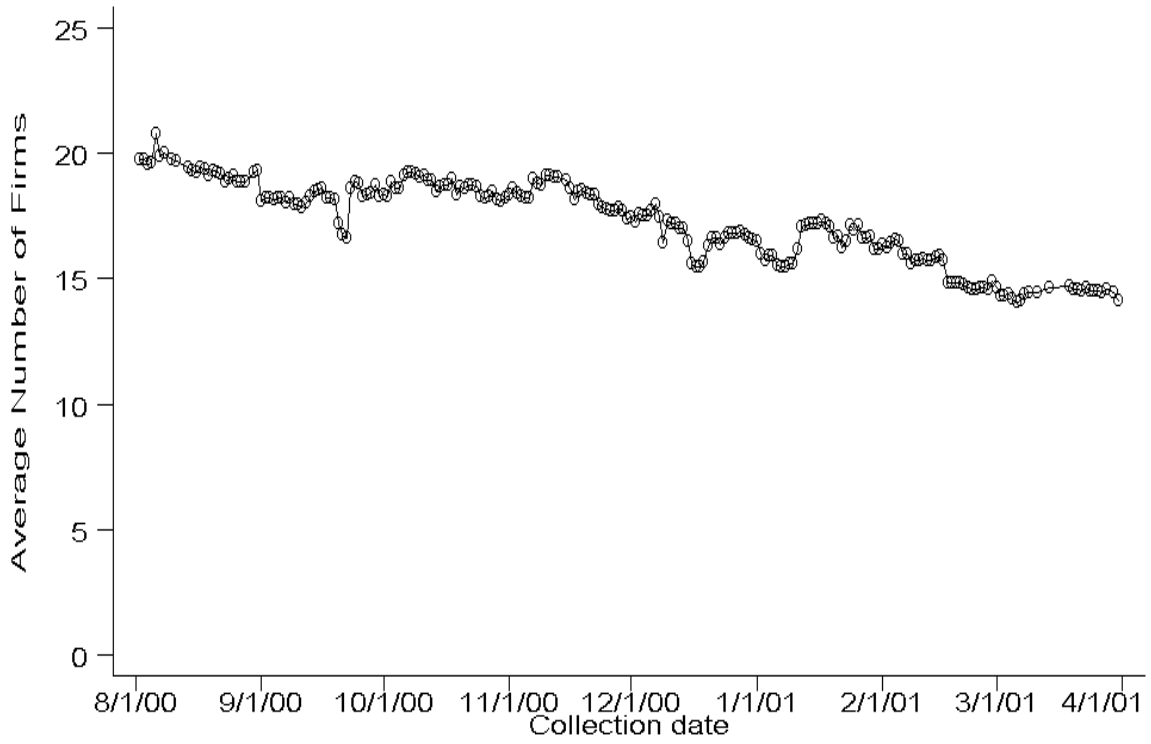

Table 1: Summary Statistics

	All Product Ranks	Product Ranks 1 - 250	Product Ranks 251 - 500	Product Ranks 501 - 750	Product Ranks 751 - 1000
Total Number of Prices					
Multi-Price Listings	3,925,947	1,202,912	960,709	904,256	858,070
Single-Price Listings	13,743	2,846	3,416	3,785	3,696
Average Price in					
All Listings	$513.23	$472.73	$494.91	$529.60	$555.64
	(882.8)	(665.2)	(838.3)	(1,039.6)	(941.7)
Multi-Price Listings	$491.64	$461.07	$476.41	$486.56	$543.08
	(760.8)	(590.7)	(706.1)	(820.0)	(892.0)
Average Minimum Price in					
All Listings	$457.62	$417.94	$442.78	$475.77	$493.93
	(818.7)	(611.9)	(781.3)	(980.0)	(855.4)
Multi-Price Listings	$432.47	$403.40	$420.97	$428.91	$477.09
	(678.2)	(525.1)	(630.9)	(733.7)	(792.4)
Average Number of Firms in					
All Listings	17.27	21.17	16.90	15.91	15.12
	(11.7)	(14.1)	(10.8)	(10.4)	(10.0)
Multi-Price Listings	18.32	22.23	17.91	16.97	16.10
	(11.3)	(13.7)	(10.3)	(9.9)	(9.6)
Price Dispersion Measures					
Total Observations in					
Multi-Price Listings	214,337	54,108	53,633	53,299	53,297
Single-Price Listings	13,743	2,846	3,416	3,785	3,696
Average Range of Prices in					
All Listings	$123.43	$123.88	$117.21	$118.78	$133.87
	(239.5)	(202.5)	(220.5)	(249.3)	(278.3)
Multi-Price Listings	$131.35	$130.40	$124.67	$127.22	$143.15
	(244.9)	(205.7)	(225.3)	(256.0)	(285.5)
Average Coefficient of Variation in					
All Listings	9.10%	9.06%	9.15%	9.10%	9.10%
	(8.0)	(7.2)	(7.9)	(8.4)	(8.6)
Multi-Price Listings	9.69%	9.54%	9.73%	9.75%	9.74%
	(7.9)	(7.1)	(7.8)	(8.3)	(8.5)
Average Gap in Low Prices					
All Listings	4.39%	3.79%	4.03%	4.71%	5.03%
	(16.2)	(20.4)	(9.9)	(15.4)	(17.3)
Multi-Price Listings	4.67%	3.99%	4.29%	5.04%	5.38%
	(16.7)	(20.9)	(10.2)	(15.9)	(17.8)

Note: Standard deviations are in parentheses.

Table 2: Frequency Distribution of the Number of Firms Listing Prices

Number of Firms	Frequency	Percent	Number of Firms	Frequency	Percent
1	13743	6.03	41	687	0.30
2	8791	3.85	42	548	0.24
3	8615	3.78	43	375	0.16
4	7363	3.23	44	294	0.13
5	7325	3.21	45	263	0.12
6	6972	3.06	46	224	0.10
7	6649	2.92	47	268	0.12
8	6708	2.94	48	296	0.13
9	5723	2.51	49	298	0.13
10	5924	2.60	50	309	0.14
11	5949	2.61	51	332	0.15
12	5967	2.62	52	334	0.15
13	6085	2.67	53	328	0.14
14	5814	2.55	54	309	0.14
15	5898	2.59	55	296	0.13
16	5751	2.52	56	237	0.10
17	6185	2.71	57	236	0.10
18	6044	2.65	58	189	0.08
19	6154	2.70	59	141	0.06
20	6441	2.82	60	132	0.06
21	6408	2.81	61	72	0.03
22	6426	2.82	62	67	0.03
23	6834	3.00	63	31	0.01
24	6877	3.02	64	39	0.02
25	6265	2.75	65	26	0.01
26	6404	2.81	66	8	0.00
27	6231	2.73	67	2	0.00
28	5853	2.57	68	3	0.00
29	5292	2.32	69	0	0.00
30	4655	2.04	70	0	0.00
31	4132	1.81	71	0	0.00
32	3379	1.48	72	0	0.00
33	3046	1.34	73	0	0.00
34	2721	1.19	74	0	0.00
35	2341	1.03	75	0	0.00
36	1879	0.82	76	1	0.00
37	1592	0.70	77	0	0.00
38	1391	0.61	78	1	0.00
39	1074	0.47	79	0	0.00
40	831	0.36	80 or more	2	0.00

Table 3: Impact of the Number of Firms Listing Prices on the Percentage Gap

Dependent variable: Percentage Gap. The sample is drawn from Shopper.com for the period 2 August, 2000 to March 31, 2001. Each model estimates an OLS regression of the dependent variable on market and product variables obtained from Shopper.com. Coefficients on the date fixed effects are suppressed. Asymptotic t-statistics are reported in parentheses to the right.

	Model 1		Model 2		Model 3		Model 4		Model 5	
Dummy Variable for:	**Coefficient**	**t-Statistic**	**Coefficient**	**t-Statistic**	**Coefficient**	**t-Statistic**	**Coefficient**	**t-Statistic**	**Coefficient**	**t-Statistic**
Number of Firms Listing Prices										
Between 2 and 4 Firms	0.1362	(49.9)	0.1352	(48.8)						
Between 5 and 10 Firms	0.0316	(45.8)	0.0308	(44.8)						
Between 11 and 20 Firms	0.0058	(22.5)	0.0051	(18.8)						
2 Firms					0.2074	(33.2)	0.2052	(32.6)	0.2063	(104.2)
3 Firms					0.1151	(34.5)	0.1126	(33.5)	0.1142	(57.1)
4 Firms					0.0892	(25.4)	0.0871	(25.0)	0.0887	(41.8)
5 Firms					0.0760	(25.1)	0.0736	(24.5)	0.0752	(35.3)
6 Firms					0.0389	(27.6)	0.0366	(25.8)	0.0381	(17.6)
7 Firms					0.0268	(29.4)	0.0249	(26.8)	0.0264	(12.0)
8 Firms					0.0223	(27.3)	0.0204	(24.6)	0.0220	(10.0)
9 Firms					0.0203	(24.2)	0.0183	(21.5)	0.0200	(8.6)
10 Firms					0.0212	(24.8)	0.0190	(22.0)	0.0206	(8.9)
11 Firms					0.0187	(22.8)	0.0166	(20.1)	0.0182	(7.9)
12 Firms					0.0131	(18.4)	0.0114	(15.6)	0.0131	(5.7)
13 Firms					0.0145	(16.0)	0.0128	(13.8)	0.0145	(6.3)
14 Firms					0.0080	(12.7)	0.0064	(9.5)	0.0077	(3.3)
15 Firms					0.0122	(11.5)	0.0103	(9.6)	0.0115	(5.0)
16 Firms					0.0048	(7.9)	0.0031	(4.8)	0.0044	(1.9)
17 Firms					0.0065	(11.0)	0.0045	(7.1)	0.0060	(2.6)
18 Firms					0.0058	(10.1)	0.0040	(6.4)	0.0057	(2.5)
19 Firms					0.0058	(10.6)	0.0036	(6.2)	0.0054	(2.4)
20 Firms					0.0079	(13.2)	0.0056	(8.9)	0.0074	(3.3)
21 Firms					0.0046	(9.5)	0.0025	(4.7)	0.0040	(1.8)
22 Firms					0.0066	(11.1)	0.0042	(6.7)	0.0057	(2.5)
23 Firms					0.0055	(10.0)	0.0032	(5.6)	0.0046	(2.1)
24 Firms					0.0064	(10.7)	0.0042	(6.8)	0.0056	(2.6)
25 Firms					0.0063	(10.3)	0.0042	(6.8)	0.0051	(2.3)
26 Firms					0.0066	(11.5)	0.0046	(7.8)	0.0059	(2.6)
27 Firms					0.0073	(12.7)	0.0056	(9.4)	0.0063	(2.8)
28 Firms					0.0045	(8.8)	0.0029	(5.5)	0.0036	(1.5)
29 Firms					0.0046	(8.8)	0.0030	(5.5)	0.0038	(1.6)
30 Firms					0.0052	(9.3)	0.0032	(5.5)	0.0037	(1.4)
Product Rank Categories										
Product Ranks 101 - 200			0.0235	(11.0)			0.0231	(10.8)	0.0228	(14.7)
Product Ranks 201 - 300			0.0084	(12.5)			0.0083	(12.2)	0.0079	(5.1)
Product Ranks 301 - 400			0.0081	(11.7)			0.0080	(11.2)	0.0076	(4.9)
Product Ranks 401 - 500			0.0096	(11.7)			0.0089	(10.8)	0.0086	(5.5)
Product Ranks 501 - 600			0.0114	(11.8)			0.0108	(11.2)	0.0104	(6.7)
Product Ranks 601 - 700			0.0129	(11.5)			0.0121	(10.8)	0.0117	(7.5)
Product Ranks 701 - 800			0.0189	(13.1)			0.0175	(12.1)	0.0171	(10.9)
Product Ranks 801 - 900			0.0144	(12.5)			0.0135	(11.6)	0.0130	(8.3)
Product Ranks 901 - 1000			0.0121	(11.9)			0.0110	(10.7)	0.0106	(6.7)
Intercept	0.0236	(180.2)	0.0121	(29.2)	0.0196	(98.2)	0.0101	(23.6)	0.0092	(7.2)
Number of Date Fixed Effects	0		0		0		0		229	
Number of Observations	214,337		214,337		214,337		214,337		214,337	
R^2	0.06		0.07		0.08		0.08		0.08	
Null Hypotheses:										
All Date Fixed Effects are Zero p-value									0.97	
All Number of Firm Effects are Zero p-value	0.00		0.00		0.00		0.00		0.00	

Table 4: Impact of the Number of Firms Listing Prices on Coefficient of Variation

Dependent variable: Coefficient of Variation. The sample is drawn from Shopper.com for the period 2 August, 2000 to March 31, 2001. Each model estimates an OLS regression of the dependent variable on market and product variables obtained from Shopper.com. Coefficients on date fixed effects are suppressed. Asymptotic t-statistics are reported in parentheses to the right.

	Model 1		Model 2		Model 3		Model 4		Model 5	
Dummy Variable for:	**Coefficient**	**t-Statistic**	**Coefficient**	**t-Statistic**	**Coefficient**	**t-Statistic**	**Coefficient**	**t-Statistic**	**Coefficient**	**t-Statistic**
Number of Firms Listing Prices										
Between 2 and 4 Firms	0.0304	(35.0)	0.0305	(35.1)						
Between 5 and 10 Firms	0.0305	(56.7)	0.0305	(56.7)						
Between 11 and 20 Firms	0.0078	(24.8)	0.0079	(24.8)						
2 Firms					0.0212	(12.7)	0.0211	(12.6)	0.0210	(21.7)
3 Firms					0.0320	(22.7)	0.0318	(22.5)	0.0317	(32.5)
4 Firms					0.0327	(24.2)	0.0326	(24.0)	0.0324	(31.3)
5 Firms					0.0409	(30.8)	0.0407	(30.4)	0.0406	(39.1)
6 Firms					0.0381	(28.2)	0.0379	(28.0)	0.0379	(35.8)
7 Firms					0.0288	(23.8)	0.0286	(23.6)	0.0284	(26.4)
8 Firms					0.0212	(16.4)	0.0209	(16.1)	0.0209	(19.5)
9 Firms					0.0181	(14.9)	0.0177	(14.6)	0.0177	(15.5)
10 Firms					0.0198	(16.0)	0.0194	(15.6)	0.0193	(17.2)
11 Firms					0.0139	(13.5)	0.0135	(13.1)	0.0134	(11.9)
12 Firms					0.0140	(14.0)	0.0138	(13.7)	0.0138	(12.3)
13 Firms					0.0165	(16.3)	0.0163	(16.1)	0.0163	(14.7)
14 Firms					0.0087	(9.4)	0.0086	(9.2)	0.0085	(7.5)
15 Firms					0.0044	(5.0)	0.0043	(4.8)	0.0042	(3.7)
16 Firms					0.0042	(4.0)	0.0041	(3.9)	0.0040	(3.5)
17 Firms					0.0028	(3.1)	0.0027	(2.9)	0.0026	(2.4)
18 Firms					0.0011	(1.3)	0.0010	(1.3)	0.0010	(0.9)
19 Firms					-0.0016	(2.2)	-0.0018	(2.4)	-0.0018	(1.6)
20 Firms					-0.0052	(8.2)	-0.0055	(8.5)	-0.0055	(5.0)
21 Firms					-0.0042	(6.6)	-0.0045	(6.9)	-0.0045	(4.1)
22 Firms					-0.0040	(6.5)	-0.0044	(6.9)	-0.0044	(4.1)
23 Firms					-0.0040	(6.3)	-0.0043	(6.7)	-0.0044	(4.1)
24 Firms					-0.0023	(3.7)	-0.0027	(4.3)	-0.0028	(2.6)
25 Firms					-0.0028	(4.5)	-0.0032	(5.0)	-0.0033	(3.0)
26 Firms					-0.0035	(5.6)	-0.0038	(6.0)	-0.0037	(3.4)
27 Firms					-0.0046	(8.1)	-0.0048	(8.4)	-0.0047	(4.3)
28 Firms					-0.0031	(5.0)	-0.0034	(5.3)	-0.0034	(3.0)
29 Firms					-0.0001	(0.2)	-0.0004	(0.7)	-0.0004	(0.4)
30 Firms					0.0003	(0.5)	-0.0001	(0.1)	-0.0001	(0.1)
Product Rank Categories										
Product Ranks 101 - 200			0.0064	(9.7)			0.0070	(10.5)	0.0070	(9.3)
Product Ranks 201 - 300			0.0031	(4.9)			0.0037	(5.8)	0.0037	(4.9)
Product Ranks 301 - 400			0.0027	(4.2)			0.0031	(4.6)	0.0031	(4.0)
Product Ranks 401 - 500			0.0030	(4.5)			0.0035	(5.0)	0.0035	(4.6)
Product Ranks 501 - 600			0.0039	(5.7)			0.0042	(6.0)	0.0042	(5.4)
Product Ranks 601 - 700			0.0012	(1.8)			0.0016	(2.3)	0.0016	(2.1)
Product Ranks 701 - 800			0.0025	(3.6)			0.0030	(4.2)	0.0030	(3.9)
Product Ranks 801 - 900			0.0016	(2.4)			0.0022	(3.1)	0.0022	(2.9)
Product Ranks 901 - 1000			0.0002	(0.4)			0.0007	(1.1)	0.0008	(1.0)
Intercept	0.0856	(585.1)	0.0831	(212.3)	0.0876	(369.9)	0.0849	(221.8)	0.0850	(135.7)
Number of Date Fixed Effects	0		0		0		0		229	
Number of Observations	214,337		214,337		214,337		214,337		214,337	
R^2	0.03		0.03		0.03		0.03		0.03	
Hypotheses:										
All Date Fixed Effects are Zero p-value									0.45	
All Number of Firm Effects are Zero p-value	0.00		0.00		0.00		0.00		0.00	

Table 5: Impact of the Number of Firms Listing on Percentage Range

Dependent variable: Percentage Range. The sample is drawn from Shopper.com for the period 2 August, 2000 to March 31, 2001. Each model estimates an OLS regression of the dependent variable on market and product variables obtained from Shopper.com. Coefficients on date fixed effects are suppressed. Asymptotic t-statistics are reported in parentheses to the right.

	Model 1		Model 2		Model 3		Model 4		Model 5	
Dummy Variable for:	**Coefficient**	**t-Statistic**	**Coefficient**	**t-Statistic**	**Coefficient**	**t-Statistic**	**Coefficient**	**t-Statistic**	**Coefficient**	**t-Statistic**
Number of Firms Listing Prices										
Between 2 and 4 Firms	-0.1001	(29.26)	-0.0999	(28.95)						
Between 5 and 10 Firms	0.0188	(6.40)	0.0184	(6.34)						
Between 11 and 20 Firms	-0.0107	(5.57)	-0.0105	(5.47)						
2 Firms					-0.1907	(29.66)	-0.1943	(29.85)	-0.1904	(37.93)
3 Firms					-0.1156	(21.47)	-0.1200	(22.09)	-0.1154	(22.74)
4 Firms					-0.0700	(12.22)	-0.0742	(12.91)	-0.0702	(13.03)
5 Firms					-0.0027	(0.40)	-0.0072	(1.08)	-0.0026	(0.48)
6 Firms					-0.0002	(0.03)	-0.0043	(0.65)	0.0001	(0.02)
7 Firms					-0.0179	(3.00)	-0.0216	(3.61)	-0.0175	(3.12)
8 Firms					-0.0098	(1.18)	-0.0142	(1.72)	-0.0089	(1.60)
9 Firms					-0.0283	(4.35)	-0.0327	(5.05)	-0.0276	(4.65)
10 Firms					-0.0034	(0.43)	-0.0078	(0.99)	-0.0031	(0.52)
11 Firms					-0.0309	(5.51)	-0.0355	(6.30)	-0.0309	(5.30)
12 Firms					-0.0247	(4.52)	-0.0284	(5.19)	-0.0231	(3.97)
13 Firms					0.0034	(0.60)	-0.0001	(0.02)	0.0046	0.80
14 Firms					-0.0403	(8.28)	-0.0438	(8.93)	-0.0399	(6.77)
15 Firms					-0.0407	(6.89)	-0.0441	(7.43)	-0.0402	(6.84)
16 Firms					-0.0338	(4.56)	-0.0367	(4.96)	-0.0327	(5.51)
17 Firms					-0.0431	(6.94)	-0.0466	(7.48)	-0.0419	(7.29)
18 Firms					-0.0483	(8.83)	-0.0514	(9.36)	-0.0460	(7.90)
19 Firms					-0.0604	(11.91)	-0.0645	(12.62)	-0.0587	(10.17)
20 Firms					-0.0714	(19.74)	-0.0758	(20.64)	-0.0701	(12.36)
21 Firms					-0.0684	(20.13)	-0.0733	(21.15)	-0.0685	(12.06)
22 Firms					-0.0609	(18.02)	-0.0659	(19.14)	-0.0615	(10.84)
23 Firms					-0.0489	(11.82)	-0.0537	(12.84)	-0.0496	(8.97)
24 Firms					-0.0380	(9.94)	-0.0431	(11.07)	-0.0388	(7.04)
25 Firms					-0.0383	(10.16)	-0.0430	(11.18)	-0.0401	(7.02)
26 Firms					-0.0439	(12.19)	-0.0486	(13.28)	-0.0445	(7.87)
27 Firms					-0.0423	(12.76)	-0.0461	(13.73)	-0.0436	(7.63)
28 Firms					-0.0387	(10.66)	-0.0423	(11.55)	-0.0403	(6.88)
29 Firms					-0.0174	(4.41)	-0.0218	(5.47)	-0.0197	(3.22)
30 Firms					-0.0104	(2.69)	-0.0152	(3.89)	-0.0142	(2.20)
Product Rank Categories										
Product Ranks 101 - 200			0.0425	(12.26)			0.0500	(14.25)	0.0490	(12.47)
Product Ranks 201 - 300			0.0239	(7.91)			0.0323	(10.48)	0.0312	(7.90)
Product Ranks 301 - 400			0.0257	(7.80)			0.0340	(10.15)	0.0328	(8.30)
Product Ranks 401 - 500			0.0217	(6.16)			0.0306	(8.60)	0.0295	(7.44)
Product Ranks 501 - 600			0.0319	(8.90)			0.0408	(11.15)	0.0395	(9.95)
Product Ranks 601 - 700			0.0167	(4.96)			0.0266	(7.71)	0.0253	(6.37)
Product Ranks 701 - 800			0.0191	(5.94)			0.0296	(9.01)	0.0282	(7.08)
Product Ranks 801 - 900			0.0117	(3.56)			0.0224	(6.69)	0.0211	(5.28)
Product Ranks 901 - 1000			0.0080	(2.43)			0.0185	(5.49)	0.0172	(4.32)
Intercept	0.3891	(442.01)	0.3690	(200.46)	0.4177	(271.37)	0.3929	(200.60)	0.3903	(119.94)
Number of Date Fixed Effects	0		0		0		0		229	
Number of Observations	214,337		214,337		214,337		214,337		214,337	
R^2	0.01		0.01		0.01		0.01		0.01	
Null Hypotheses:										
All Date Fixed Effects are Zero p-value									0.00	
All Number of Firm Effects are Zero p-value	0.00		0.00		0.00		0.00		0.00	