

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

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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.

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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 k th 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 $p_1 \leq p_2 \leq \dots \leq p_n$. 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 file 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.

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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 uninformed 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,

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

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, $\lim_{n \rightarrow \infty} E(G_n) = 0$.

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

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 $\lim_{n \rightarrow \infty} E(G_n) = 0$, it is sufficient to show that $\lim_{n \rightarrow \infty} E(p_2) = 0$, where p_2 is the second (lowest) price quote from $F_n(p)$. Now

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

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

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

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

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

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

Proof:

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

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

Hence,

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

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

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

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

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:

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

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

Since $n \leq N$, to study the case where $n \rightarrow \infty$ 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 $\lim_{n \rightarrow \infty} E(G_n) = 0$.
- (2) For all $n \geq 2$, $E(R_n) < 1 - \frac{\phi}{I}$, with $\lim_{n \rightarrow \infty} E(R_n) = 1 - \frac{\phi}{I}$.

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	51	ATi Radeon 32MB DDR
2	Palm Vx	52	HP Pavilion 8776c Multimedia PC (AMD Athlon 1Ghz, 128MB, 60GB HD)
3	Nikon Coolpix 990	53	Kodak DC3400
4	Plextor PlexWriter 12/10/32A CD_RW	54	Sony 64MB Flash Memory Stick
5	Kodak DC4800 Zoom	55	Sony Clie PEG_S300
6	Olympus C_3030 Zoom	56	Olympus E_10
7	Palm V	57	Adobe Photoshop W/ImageReady 5.5: Win9X/NT4
8	Canon PowerShot S100	58	PENTIUM III P3 1GHZ FCPGA 256KB L2 CACHE 133MHZ FSB 1GHZ EB
9	Asus A7V (Socket A)	59	Kingston 128MB DRAM DIMM 168_PIN
10	Kodak DC280 Zoom	60	Samsung Syncmaster 950P
11	Palm IIIxe	61	UPG Windows 2000 Professional W2K
12	Sony Cyber Shot DSC_S70	62	Kingston 256MB DRAM DIMM 168_PIN
13	AMD ATHLON_1GHZ 384K CACHE SOCKA PGA 462 TBIRD 1GHZ	63	Windows 2000 Professional W2K
14	ATX ATHLON/DURON SA ATA 100 5USB A7V133/550/SWA	64	Olympus D_460 Zoom
15	Nomad Jukebox Audio Player 6GB Silver	65	Sony VAIO PCG_XG29 (Pentium III 750 MHz, 128MB RAM, 18GB)
16	Sony VAIO PCG_F590 (Pentium III 750 MHz, 128MB RAM, 18GB)	66	WINDOWS 98 SECOND EDITION
17	ATi Radeon 64MB DDR	67	VirusScan 5.0: Win3.x/9X/NT351, OS/2, DOS
18	Linksys EtherFast 4_port Cable/DSL Router	68	Palm M100
19	Palm IIIe	69	C_3040 ZOOM DIGTLCAM 3.34MPIX 16MB 3X OPT ZOOM
20	Plextor PlexWriter 16X/10X40X	70	Compaq iPaq H3630 Pocket PC
21	Olympus D_490 Zoom	71	Asus P4T (Pentium 4 Motherboard)
22	Sonicblue Multimedia Rio PMP300 MP3 Player	72	D_Link MP3/CD Player
23	128MB 16X64 SDRAM PC133 8NS	73	Sony Cyber Shot DSC_P1
24	256MB PC 100 SDRAM	74	Palm VIIx
25	ATi All_in_Wonder Radeon 32MB	75	HP DeskJet 930C
26	Paint Shop Pro 7.0: Win9X/2K/NT4	76	Olympus C_3000 Zoom
27	AMD ATHLON_900 384K CACHE SOCKA PGA462 TBIRD 200MHZ FSB	77	ViewSonic VG150 LCD ViewPanel
28	Canon G1	78	TDK veloCD ReWriter 12X/10X/32X
29	Palm IIIc	79	Linksys EtherFast 1_Port Cable/DSL Router
30	Nikon Coolpix 880	80	Olympus C_2100 Ultra Zoom
31	Sony VAIO PCG_F650 (Pentium III 600 MHz, 64MB RAM, 12.0GB)	81	ETHERFAST WIRELESS AP PLUS CABLE/DSL ROUTER 4PORT SWITCH
32	HP DeskJet 970CXI	82	Iomega Zip USB 100MB External Zip Drive
33	HP Pavilion 6736c Multimedia PC (Celeron 667MHz, 64 MB SDRAM, 20	83	Norton AntiVirus 2001 7.0: Win9X/ME/NT 4 SP4/2K Pro/NT4
34	Abit KT7 (Socket A)	84	Windows Millennium Edition WME
35	UPG_V Windows Millennium Edition from 95/98/98SE WME	85	HP LaserJet 1100xi
36	Samsung SyncMaster 770 TFT	86	Handspring Visor Deluxe (Blue)
37	Dell Dimension 4100 (933 MHz, 17 inch monitor, Office 2000 SBE)	87	Athlon Thunderbird_1000 MHz (200MHz/256K)
38	Sony VAIO PCG_F630 (AMD K6_2 550MHz, 64MB RAM, 12.0GB)	88	Office 2000_Professional Edition
39	Athlon Thunderbird_1200 MHz (200MHz/256k)	89	Abit KT7A (Socket A)
40	Adobe Photoshop 6.0 UPG Win9X/ME/2K/NT4	90	Xircom Rex 6000
41	Rio Volt Portable CD Player	91	Canon PowerShot S10
42	Nikon Coolpix 950	92	Lucent Orinoco RG_1000 Residential Wireless Networking Kit
43	Sony VAIO PCG_XG28 (Pentium III 650 MHz, 128MB RAM, 12.0GB)	93	Samsung SyncMaster 955DF
44	ViewSonic PF790	94	Handspring Visor Edge (Silver)
45	Epson Stylus Photo 1270	95	Creative Labs Sound Blaster Live Value
46	3dfx Voodoo5 5500	96	Apple PowerBook G3/500_DVD (12GB HD)
47	Palm M105	97	Abit KT7_RAID (Socket A)
48	WIRELESS ACCESS POINT WLS NTWK	98	HP LaserJet 2100xi
49	Adobe Acrobat 4.0: Win9X/NT4 SP3	99	Handspring Visor Platinum
50	Compaq Deskpro EX P3/800 10GB	100	Linksys EtherFast Cable/DSL Ethernet

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

101	Handspring Prism	151	Creative Labs Nomad 64 MP3 Player
102	HP ScanJet 6300Cxi	152	Kingston 128MB Flash CompactFlash Card
103	Iomega 250MB USB ZIP Drive	153	Handspring Visor Deluxe (Graphite)
104	Olympus D_360L	154	PENTIUM III P3 933 FCPGA 256KB L2 CACHE 133MHZ FSB 933EB
105	Western Digital Caviar 30.7 EIDE Hard Disk	155	TRANSPARENCY ADAPTER FOR 1200 1200U 1240U 2500 & 636
106	SMC Barricade Broadband Router	156	Sony Clie PEG_S500
107	Atlas Micro PS 5000	157	Norton SystemWorks 2001 4.0: Win9X/ME/NT 4 SP4/2K Pro
108	Abit KT7A_RAID (Socket A)	158	Sony DCR_TRV310
109	Western Digital Caviar 45GB EIDE Hard Disk	159	Canon PowerShot S20
110	RIO 800 MP3 PLAYER RETAIL	160	Dreamweaver 3.0: Win9X/NT4
111	NetGear RT314 Cable/DSL Router	161	Sony MVC_CD1000
112	Palm IIIx	162	Creative Labs Nomad II MG Silver
113	Yamaha CRW2100SZ 16X/10X/40X CD_RW	163	Epson Stylus Color 900
114	Asus AGP_V7700 GeForce2 GTS Pure	164	Nomad Jukebox Audio Player 6GB Blue
115	EASY CD CREATOR V5 CD	165	Flash 4.0: Win9X/NT4
116	ASUS AGP_V6800 GeForce 256 Deluxe	166	IBM Deskstar 75GXP 75GB EIDE
117	U.S. ROBOTICS 56K/14.4K ISA16 V90 W/JUMPERS	167	Sony Cyber Shot DSC_S50
118	SanDisk Corp. 64MB Flash SmartMedia card	168	DI_704 HOMEGATEWAY CBL/XDSL INT SHARING AND FIREWALL ROUTER
119	Casio Cassiopeia E_125	169	VIA KT133 SOCKA UPTO 1.5GB ATX 5PCI AGP4X SND UDMA66 200MHZ
120	Sony Vaio PCG_Z505LE	170	Adobe Acrobat 4.0: upgr Win9X/NT4 SP3
121	PENTIUM III P3 1GHZ 256KB L2 SLOT1 SECC2 100MHZ FSB *SEE NOTES*	171	Palm Vx (Champagne)
122	IBM Deskstar 75GXP 45GB EIDE	172	Compaq Presario 17XL265
123	INTELLIMOUSE EXPLORER CD W9X PS2/USB	173	Audiovox MPDj MP1000
124	WS_FTP Pro 6.6: Win9X/2K/NT4	174	FREEDOM ZOOM 150 APS CAMERA
125	PENTIUM P4 1.5GHZ PGA423 2X64MB PC800 NON_ECC RIMM 400MHZ FSB	175	Palm VII
126	MS Office 2000 Professional 2000: comp V/U Win9X/NT 4	176	Sony Multiscan CPD_G400 (19_Inch Trinitron)
127	STYLUS PHOTO 1280 9PPM USB PARALLEL 2880X720 DPI MICRO PIEZO	177	BH6
128	64MB COMPACT FLASH CARD FOR DIGITAL CAMERAS & PDA S	178	HP Jornada 548
129	TEAC CDW512E 12X/10X/32X CD_RW	179	Rio 600
130	Apple Powerbook G4/400 Titanium	180	Creative Labs 3D Blaster Annihilator 2 MX
131	3dfx Voodoo4 4500 (AGP, 32MB SDRAM)	181	D_Link DWL_1000AP Wireless Access Point
132	COMPAQ IPAQ 3635 POCKET PC 32MB TFT COLOR	182	815E FCPGA/ICP UPTO 512MB ATX 5PCI AGP4X VID SND ATA100 133MHZ
133	Ricoh MP9120A CD_RW/DVD_ROM	183	STYLUS PHOTO 780 INKJETPR 2880X720DPI PC MAC
134	Western Digital 27.3 GB 7200 RPM EIDE	184	Olympus C_2040 Zoom
135	DC4800 EZ 2160X1440 3.1MP 64MB CF 3X/2X USB _ INCLUDES ACCS PACK	185	Sony Vaio SR17 notebook
136	PENTIUM III P3 850MHZ/256K L2 CACHE 100MHZ FSB SLOT1 SECC2	186	IBM ThinkPad T20 (PIII 700MHz, 128 RAM, 12GB HD, Win 98)
137	Sony MVC_FD95 Digital Mavica	187	820 SLOT1 UPTO 512MB RDRAM ATX 5PCI AGP4X SND UDMA66 133MHZ
138	PENTIUM P4 1.3GHZ PGA423 2X64MB PC800 NON_ECC RIMM 400MHZ FSB	188	Apple PowerBook G4/500 Titanium
139	3dfx Voodoo 3 3000	189	Creative Labs Video Blaster WebCam 3
140	Creative Labs Blaster 56K PCI Modem	190	D30 Digital Camera Kit
141	Adobe Photoshop 6.0: Win9X/ME/2K/NT4	191	HP LaserJet 4050N
142	Sony VAIO PCG_SR7K (Pentium III 600 MHz, 128MB RAM, 12GB)	192	IBM Microdrive 1GB
143	PENTIUM III P3 800MHZ/256KB 100MHZ FSB SLOT1	193	Western Digital Caviar 20.5GB EIDE
144	HP CD_Writer Plus 9100i (32X/8X/4X)	194	Sony MVC_FD90 Digital Mavica
145	Sony VAIO PCG_F540 (Pentium III 500 MHz, 64MB RAM, 6.0GB)	195	Best Data Smart One Cable Modem External Cable modem
146	Samsung Syncmaster 750S	196	PC100 Sdram NonEcc 128MB 16x64
147	Casio Cassiopeia EM_500	197	INTELLIMOUSE INTELLIEYE SOLID STATE PS2/USB _ NO MOVING PARTS
148	Plexter PlexWriter 32X/8X/4X CD_RW drive	198	Quicken 2001 Deluxe Win9X/NT4/2K
149	Intuit TurboTax Deluxe 2000: Win9X/ME/NT4/2K	199	Kodak DC290 Zoom
150	UPG_V WINDOWS 98 SECOND EDITION	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	251	NO.45 LG BLACK INK F/DJ 710 750 850 880 895 930 950 970 1120 160
202	HP PhotoSmart S20xi	252	Althon Thunderbird _ 900 MHz (200 MHz/256K)
203	20.4GB DIAMONDMAX PLUS HD INT ATA/66 9MS 7200RPM	253	Samsung SyncMaster 170MP
204	NATURAL KEYBOARD ELITE 2.0 PS2/USB 95/98	254	HP Jornada 720
205	Epson Stylus Photo 2000P	255	VIA KT133 SOCKA UPTO 1.5GB ATX 6PCI CNR AGP4X SND ATA66 200MHZ
206	HIPZIP MP3 PLAYER USB DIGTL PLAYER W/ CLIK DISK	256	INTUOS 9X12 USB SPECIAL EDITION TABLET W/ 4D MOUSE PEN & PENTER C
207	Fujifilm FinePix 4700 Zoom	257	QuickBooks Pro 2001 Win9X/ME/NT4 SP3/2K
208	Canon CanoScan FB 1200S	258	Kingston 128MB DRAM DIMM 168_PIN
209	VIA KT133 SOCKA UPTO 1.5GB ATX 5PCI 1SH AGP4X 200MHZ FSB	259	NATURAL KYBD PRO PS2/USB V1.0 W9X/NT
210	Philips Flat TV	260	MS Works 6.0: Win9X/ME/2K/NT4
211	Brother HL_1240	261	MS Outlook 2000: Win9X/NT4
212	Samsung SyncMaster 753 DF	262	Sony VAIO PCV_J100
213	Sony VAIO PCV_RX360DS	263	Apple iMac DV Special Edition (reviewed model: Graphite)
214	815E FCPGA/ICP UPTO 512MB ATX 5PCI AGP4X VID SND LAN ATA100 133M	264	Apple Studio Display
215	Sony VAIO PCG_C1X PictureBook	265	ATi All_in_Wonder 128 Pro 32MB
216	Pinnacle Systems Studio DV	266	Toshiba Satellite 1755 Laptop 700MHZ/DVD
217	IPAQ PERSONAL MP3 AUDIO PLAYER 64MB MMC/USB CBL/SW JUKEBOX/EARPH	267	MS Money 2001 Deluxe Win9X/NT4/2K
218	DESKTOP THEATER DTT3500 DIGITAL 5 SATELLITES SUBWOOFER DECODER	268	MS FrontPage 2000: Win9X/NT4
219	Creative Labs Sound Blaster Live! Platinum 5.1	269	Sony CyberShot DSC_F505V
220	Fuji FinePix 4900	270	Sony MVC_FD88 Digital Mavica
221	Sony DVP_S7700	271	HP DeskJet 842C
222	SanDisk Corp. 128MB Flash CompactFlash Card	272	Toshiba Satellite 1715XCDS
223	PENTIUM III P3 933MHZ/256KB L2 CACHE 133MHZ FSB SLOT1 SECC2	273	HP Jornada 680
224	XIRCOM REX6000 MICROPDA WITH SERIAL DOCKING STATION	274	Olympus C_2020 Zoom
225	Intel Pocket PC Camera	275	Sony Multiscan CPD_G500 (21_inch Trinitron)
226	Maxtor DiamondMax 80 80GB EIDE	276	PENTIUM III P3 800MHZ/256KB 133MHZ FSB SLOT1 800EB SECC2
227	Nikon Super Coolscan 4000 ED	277	Creative Labs 3D Blaster Annihilator
228	BE6_II	278	K6 2 _ 500 MHz (100MHz)
229	SanDisk Corp. 64MB Flash CompactFlash Card	279	Canon BJC_8200 Photo Printer
230	32X64_7.5 256MB SYNC PC133 168PIN 3.3V 133MHZ DIMM	280	Creative Labs Nomad II
231	BX133_RAID (Socket 370)	281	Sony Spressa i.Link 12X/8X/32X CD_RW
232	AMD DURON_750MHZ 192K CACHE SOCKA PGA462 200MHZ FSB PIB	282	Sony Vaio F610 notebook
233	3Com HomeConnect	283	Epson Perfection 1640SU
234	PENTIUM III P3 800 FCPGA 256KB L2 CACHE 133MHZ 800EB FLIP CHIP	284	Epson Stylus Photo 875DC
235	Toshiba SD_R1002 CD_RW/DVD_ROM	285	PENTIUM P4 1.4GHZ PGA423 2X64MB PC800 NON_ECC RIMM 400MHZ FSB
236	ATX CASE MID TOWER WITH 300W PS(KS282+PP303X) SOLUTION SERIES	286	IBM NetVista A40 (Pentium III, 933 MHz)
237	ViewSonic Corp. GS 790	287	3dfx Voodoo5 5500 AGP
238	IBM Deskstar 75GXP 60GB EIDE	288	PENTIUM III P3 866 FCPGA 256KB L2 CACHE 133MHZ 866EB FLIP CHIP
239	Sony Cyber Shot DSC_S30	289	IBM Thinkpad X20 (Celeron 500 MHz, 64MB RAM, 10GB)
240	IBM T85A (white)	290	Sonicblue Diamond Mako
241	Sony MVC_FD73 Digital Mavica	291	HP LaserJet 2100TN
242	Iomega Zip 250 Internal ATAPI Drive	292	Creative Labs Nomad II _ MP3 player _ stereo _ FM tuner integrat
243	MODEM BLASTER V90 ISA 56KBPS FAX/VOICE CAPABLE V80 V90 & V34	293	Norton Utilities 2001 5.0: Win9X/ME/NT 4 SP4/2K Pro
244	Stowaway Portable Keyboard For Handspring Visor	294	Samsung SyncMaster 900NF
245	Creative Labs Sound Blaster Live MP3+	295	Logitech QuickCam
246	WIRELESS PCCARD WLS NTWK	296	Sony Vaio XG38 notebook
247	Epson Stylus Photo 870	297	BACK_UPS OFFICE 500
248	RADEON VE AGP 32MB DUAL DISPLAY VGA & DVI	298	IBM Microdrive CF+ 340MB
249	Ricoh Media Master MP7120A 12X/10X/32X CD_RW	299	Gigabyte GA_GF2000D
250	Partition Magic 6.0: Win9X/ME/NT4 SP4/2K Pro	300	HP DeskJet 932C

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

301	Lucent Orinoco PC Card (Silver)	351	EXPANSION PACK FOR DC4800
302	IPAQ H3635 EXPANSION PCK PCMCIA REQUIRES CONSUMER AUTHORIZATION	352	Apple Power Mac G4 (733 MHz, 256MB, 60GB, DVD_R/CD_RW)
303	FIC AD11 Socket_A AMD 760 DDR ATX	353	Giga_Byte GA_7ZXR (Socket A)
304	Lexar 64MB Flash CompactFlash Card	354	Dazzle Digital Video Creator II
305	ViewSonic ViewPanel VP181	355	AMD ATHLON_950 384K CACHE SOCKA PGA462 TBIRD 200MHZ FSB
306	Casio Cassiopeia E_100	356	IBM TravelStar_20GN 20 GB
307	PENTIUM III P3 750MHZ/256KB /100MHZ FSB SLOT 1 750E COPPERMINE	357	Casio QV_3000EX
308	Maxtor DiamondMax Plus 5120 20.4GB EIDE hard disk	358	ATi TV Wonder USB TV Tuner
309	HP Color LaserJet 4550n	359	AudioCatalyst Workshop 2.0: Win9X/NT4
310	SanDisk Corp. 32MB Flash SmartMedia card	360	Creative Labs Sound Blaster Live
311	HP DeskJet 1220C	361	HP DeskJet 812C
312	PENTIUM III P3 733 FCPGA 256KB L2 CACHE 133MHZ FSB FLIP CHIP	362	Gigabyte GA_71XE (Slot A)
313	HP CD_Writer Plus 9110i (32X/8X/4X)	363	Toshiba Satellite 2800 Celeron 650 MHz 64 MB 6 GB
314	Iomega Zip CD External CD_RW	364	Toshiba Satellite 2805_S202 Laptop PIII/700MHZ
315	HP Color LaserJet 4500DN	365	Pentium 4 _ 1.4 GHz (400Mhz/256K)
316	Archos Jukebox 6000	366	Compaq Presario 305
317	IBM Microdrive 340 MB	367	Flash 5.0: Win9X/2K/NT4
318	Pentium III (FC PGA) _933EB MHz (133MHz/256K)	368	NetGear RT311 DSL & Cable Modem Router
319	Epson Perfection 1240U White	369	EZ CABLE/DSL WIRELESS ROUTER 4_PORT 10/100 BROADBAND
320	HP PhotoSmart 315	370	Norton Internet Security 2001 2.5: Win9X/ME/NT4 SP3/2K Pro
321	WinFax Pro 10.0: Win9X/NT4/2K	371	PALM V ALUMINUM HARD CASE
322	Iomega Zip 250 USB Powered	372	ELSA Gladiac GeForce2 GTS
323	Iomega FotoShow Digital Image Center	373	HomeSite 4.5: Win9X/NT4
324	Sony Vaio PCG_Z505LS	374	ATX MBD PENT S7 VIA 5PCI 2ISA 1AGP 3DM
325	Nikon Coolpix 800	375	Olympus C_2500L
326	Sony 32MB Flash Memory Stick	376	CORDLESS WHEEL MOUSE 3_BUTTON W/ SCROLL WHEEL PS2 RF
327	HP LaserJet 4050	377	Epson Expression 1600 Professional Edition
328	NEC SuperScript 1400	378	ViewSonic Corp. E_790 (76Hz)
329	Western Digital Caviar 20.5GB EIDE	379	QPS Que 12X/10X/32X CD_RW
330	DEVIL S ADVOCATE	380	Sony MVC_FD85 Digital Mavica
331	ADS Pyro Digital Video 1394 (Firewire Card)	381	D_Link USB 4_Port Hub
332	INK JET CARTRIDGE, TRI_COLOR, (CYAN, MAGENTA, YELLOW), NO. 78, 4	382	BLACK INK CARTRIDGE FOR STYLUS 875DC 1270 875DCS
333	Iomega ZipCD	383	HP LaserJet 2100M
334	3Com EtherLink 10/100 PCI Adapter	384	Epson Perfection 640U
335	Apple Power Mac G4 Cube (450 MHz)	385	PcANYWHERE Host 10.0: Win3.x/9X/ME/2K/NT4, DOS
336	Compaq Presario 1200_XL 110	386	Norton Ghost 2001: Win9X/2K/NT4, DOS
337	Pinnacle Systems Inc. Studio DC10plus	387	NVIDIA TNT2 PRO 32MB SDRAM AGP VIDEO CARD
338	Creative Labs PC DVD_RAM (SCSI)	388	Western Digital Caviar WD600AB
339	PENTIUM III P3 733MHZ 256KB L2 133MHZ SLOT1 COPPERMINE .18MU	389	Maxtor External IEEE1394 Hard Disk 80GB
340	Belkin OmniCube 2 Port KVM Switch	390	Pentium III _ 933EB MHz (133MHz/256K)
341	Pentium III _ 700E MHz (100MHz/256K)	391	Epson Perfection 1240U
342	MS Project 2000: Win9X/NT351/2K	392	CleanSweep 2001 5.0: Win9X/ME/2K/NT4
343	Philips Removable disk drive	393	(M_32PE) 32MB SMARTMEDIA CARD WITH OLYMPUS PANORAMA FEATURE
344	Kodak DC215 Zoom	394	STYLUS PHOTO 890 INKJETPR 2880X720DPI PC MAC PAR
345	Althon Thunderbird _ 800 MHz (200 MHz/256K)	395	PC133 Sdram w/Ecc 128MB 16x72
346	Celeron _ 700 Mhz (PPGA)	396	Handspring Visor Edge (Blue)
347	Iomega Predator CD_RW	397	Compaq iPaq (Celeron 500MHz, Legacy_Free)
348	Best Data Cabo MP3_64_MP3 player _ stereo _ microphone integra	398	HP LaserJet 4050TN
349	Intel PC Camera Pro Pack	399	Pentium III _ 800E MHz (100MHz/256K)
350	Athlon Thunderbird _ 1100 MHz (200MHz/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	451	ViaVoice Pro 8.0: Win9X/ME/NT4 SP5/2K
402	Sony VAIO PCG_FX170 (Pentium III 800 MHz, 128MB RAM, 20GB)	452	Adobe Premiere 5.1: Win9X/NT4
403	Microtech IBM Microdrive Roadwarrior Kit 1 GB	453	BACK UPS PRO 500 500VA 5 MIN FULL 7 OUTLETS W/USB PORT
404	PENTIUM III P3 700 FCPGA 256KB L2 CACHE 100MHZ FSB FLIP CHIP	454	64MB SMARTMEDIA BLISTER PKG
405	Apple PowerBook G3/400_DVD	455	Samsung Electronics Co. Ltd. SyncMaster 900 IFT
406	PALMPILOT NETWORK HOTSYSN PALMCONNECT USB KIT	456	Samsung Electronics Co. Ltd. SyncMaster 900 IFT
407	ETHERFAST WIRELESS AP PLUS CABLE/DSL ROUTER WITH PRINTSERVER	457	BP6
408	Fuji FinePix 40i	458	Creative Labs Blaster 48X CD_ROM
409	Sony MultiScan CPD_L181	459	HP PhotoSmart 1215
410	Sony Vaio XG39 notebook	460	LG Electronics Studioworks 995E
411	Pentium III_600E MHz (100MHz/256K)	461	U.S. ROBOTICS 56K MODEM PC CARD WITH X_JACK
412	HP PhotoSmart 215	462	HP OfficeJet T45xi
413	Western Digital 10.2GB EIDE	463	Linksys EtherFast 5_Port 10/100
414	3Com/U.S. Robotics 56K/14.4K V90	464	17IN/16.OV 25MM 1280X1024 66HZ EF70 PERFECT FLAT MPRII ASAR
415	Creative Labs Desktop Theater 5.1 DTT2500 Digital	465	Compaq Presario 1200_XL 106
416	Epson Stylus Color 740i	466	AMD K7_850MHZ ATHLON 128K L1 CACHE SLOTA 200MHZ FSB PIB
417	Easy CD Creator Deluxe 4.0: Win9X/NT4	467	ATi TV Wonder
418	Adobe PhotoDeluxe 4.0: Win9X/NT4 SP5	468	VIA KT133 SOCKA UPTO 1.5GB ATX 5PCI 1ISA AGP4X AMR SND UDMA66 20
419	HP OfficeJet T65	469	WordPerfect Office 2000 Deluxe Ed Linux 2.2
420	Sony Vaio PCG_F680	470	Altec Lansing ACS 48_Speaker(s)_stereo_80 Watt
421	Gateway Performance 1000	471	Handspring VisorPhone
422	HP PhotoSmart P1000	472	PENTIUM III P3 750 FCPGA 256KB L2 CACHE 100MHZ FSB FLIP CHIP
423	LG Electronics Flatron 795FT Plus	473	Athlon K7_800 MHz (200MHz/512K)
424	Kodak DC240 Zoom Digital Camera	474	CORDLESS DESKTOP PRO PS2/AT KYBRD/MSE INTERNET/MULTIMEDIA
425	Yamaha CRW2100EZ (16X/10X/40X)	475	Sony VAIO PCG_FX150K
426	Fujifilm FinePix 2400 Zoom	476	Sony VAIO Slimtop LCD PCV_L640 (128MB RAM, 30GB HD)
427	HP CD_Writer 9500i 12X/8X/32X CD_RW	477	Toshiba Satellite 2210XCDS
428	Apple iBook (Blueberry)	478	SWITCHBOX, OMNIVIEW 4 PORT KVM, CONTROLS FOUR COMPUTERS WITH ONE
429	BLACK INK CARTRIDGE FOR STYLUS COLOR 400/500/600/600Q/700/PHOTO	479	IBM ThinkPad 600 (400 MHz, DVD_ROM)
430	Compaq Presario 1800_XL_280	480	ACT! 2000 5.0: Win9X/2K/NT4
431	Lexmark Z52 Color Jetprinter	481	WIRELESS MOUSE
432	K6 2_550 MHz (100MHz)	482	Sony Vaio F690 notebook
433	MEMORY STICK REFILL PACK 64MB	483	Epson Stylus Color 980
434	Sony VAIO PCG_SR5K (Pentium III 500 MHz, 64MB RAM, 9GB)	484	MS Office 2001 MacOS
435	Toshiba Satellite Pro 4300	485	IBM ThinkPad T20 (P III 650MHz, 128 RAM, 6GB HD, Win 98)
436	Canon Battery pack NB_1L	486	Samsung Electronics Co. Ltd. YEPP!_MP3 player_stereo_7 mW
437	COLOR INK CARTRIDGE FOR STYLUS 400/600/800/850/1520	487	IBM ThinkPad 570E (Pentium III, 500 MHz)
438	Compaq Presario 17XL365	488	Apple PowerBook G3/400_DVD
439	VIA SOCK7 512K CACHE UPTO 256MB BAT 2PCI 2ISA 1SH AGP 100MHZ	489	Pentium II_450 MHz (100MHz/512)
440	Yamaha CRW 2100FXZ Removable disk drive	490	ULTRA100 PCI EIDE CONTROLLER 2CH 100MB/S BUS MASTER 95/98/NT/W2K
441	HP OfficeJet G85	491	IBM Thinkpad 240 (Pentium III 500 MHz, 64MB RAM, 12GB)
442	IBM Deskstar 75GXP 30GB EIDE	492	QuickBooks Pro 2000: Win9X/NT4 SP3
443	Norton SystemWorks 2001 Pro Ed 4.0: Win9X/ME/NT 4 SP4/2K Pro	493	Linksys EtherFast 8_Port 10/100 Switch (wrokgroup model)
444	Acer AcerView 77c	494	Acer Travelmate 350TE
445	Dazzle Digital Video Creator (USB, external)	495	PENTIUM III P3 800 FCPGA 256KB L2 CACHE 100MHZ FSB FLIP CHIP
446	Olympus P_400 Photo Printer	496	Compaq Presario 14XL244
447	HP DeskJet 952C	497	GEFORCE2 MX AGP 4X NVIDIA 32MB SDR DVI_I TWINVIEW
448	INKJET CARTRIDGE, TRI_COLOR, HI_YIELD 30 CC INK, YIELDS 455 PAGE	498	HP LaserJet 3200
449	RAVE MP2300 MP3 PLAYER W/ BUILT IN IOMEGA 40MB CLIK DRIVE	499	AMD DURON_700MHZ 192K CACHE SOCKA PGA462 200MHZ FSB PIB
450	HP CD Writer 8220e	500	HP PhotoSmart P1100xi

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

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601	D_Link iShare Cable/DSL Router and Firewall	651	Kingston 64MB Flash CompactFlash Card
602	Compaq Armada M300 (Pentium III, 500 MHz)	652	Epson Stylus Color 3000
603	SONICWALL SOHO2 10U INET SECURITY APPLIANCE	653	Compaq Presario Portable 17XL360 Pentium III 600 MHz 64 MB 10 GB
604	Gigabyte GA_5AX (Socket 7)	654	Lexar 64MB Flash CompactFlash Card
605	Samsung SyncMaster 570s	655	72Pin Simm NonParity Edo 32MB
606	CORDLESS MOUSEMAN WHEEL 4_BUTTON PS2/SERIAL	656	ATI All_in_Wonder 128
607	Compaq TFT8000	657	Althon Thunderbird_850 MHz (200 MHz/256K)
608	PC66 Sdram NonEcc 128MB 16x64	658	Apple iBook Special Edition (Graphite)
609	ATX P S7 5PCI 2ISA 1AGP 1MB L2 33	659	Maxtor DiamondMax Plus 40 41 GB
610	FAX MACHINE, FAX_560, FAX/TELEPHONE/COPIER, 512K MEMORY, 50 SHEE	660	PORTABLE MP3 PLAYER WITH 16MB RAM
611	ROLLER COASTER TYCOON ALL AGES 95/98	661	Sony VAIO PCG_Z505JE (Pentium III 500 MHz, 64MB RAM, 9GB)
612	Apple Power Mac G4 (Dual 500 MHz, 256MB SDRAM, 40GB HD)	662	INTELLIMOUSE PS2/SERIAL 2_BUTTON SCROLL 95/98/WME/NT
613	IBM T85A (black)	663	Toshiba Tecra 8100 Series 12CF3
614	Pentium III (FC PGA)_866EB MHz (133MHz/256K)	664	Iomega Clik PC Card Drive
615	Pentium III (FC PGA)_800EB MHz (133MHz/256K)	665	64MB MMC CARD MULTILINGUAL PACKAGING
616	FASTTRAK100 ATA/100 RAID CARD 100MB/SEC BURST DTR	666	CELERON 633MHZ 128K L2 CACHE PGA370 PROCESSOR 3 YR WARRANTY
617	Seagate TapeStor Travan 20 10/20GB TR_5 tape drive	667	3Com Palm V/Vx Modem
618	HP OfficeJet G95	668	OnStream D130 15/30GB ADR tape drive
619	HP DeskJet 950C	669	Pentium III (FC PGA)_733EB MHz (133MHz/256K)
620	BLACK CARTRIDGE DESKJET 850C 1600/DJ710C/750/755C/855/1120CXI	670	72Pin Simm NonParity Edo 64MB
621	Pentium III (FC PGA)_800E MHz (100MHz/256K)	671	Acer AcerView 99C
622	Fireworks 3.0: Win9X/NT4 SP3	672	815E PRO FCPGA UPTO 512MB ATX 6PCI 1SH CNR AGP4X SND VID 133MHZ
623	V90 DIGITAL VOICE RECORDER	673	Apple iMac DV SE (500 MHz, Snow)
624	Creative Labs Sound Blaster PCI128 sound card	674	Maxtor DiamondMax 60
625	Adobe Illustrator 8.0: Win9X/NT4/NT Svr 4	675	Olympus C_2000 Zoom
626	AMD ATHLON 1.2GHZ 384K CACHE SOCKA PGA462 TBIRD 200MHZ	676	IMAGEMATE USB COMPACT FLASH READER MULTILINGUAL PACKAGING
627	440BX DUAL SLOT1 UPTO 1GB ATX 4PCI 2ISA AGP 100MHZ P2BD	677	AMD ATHLON_850 384K CACHE SOCKA PGA462 TBIRD 200MHZ FSB
628	Athlon K7_750 MHz (200MHz/512K)	678	D_Link Network adapter Plug_in module Ethernet
629	Compaq Presario 1800 XL_190	679	CDRW VELOCD 16X10X40X INT ATAPI DRV 32X RIP
630	COLOR INK CARTRIDGE F/ STYLUS COLOR 440/640/740/740I/1160	680	INK JET CARTRIDGE, TRI_COLOR, (CYAN, MAGENTA, YELLOW), NO. 78, 9
631	Creative Labs PC_DVD Encore 12X w/ Dxr3 Removable disk drive	681	Apple iMac (350 MHz, Indigo)
632	WizCom QuickLink Pen Text Scanner	682	Sony VAIO PCG_F580 (Pentium III 650 MHz, 64MB RAM, 12.0GB)
633	Panasonic LF_D103U	683	Toshiba SD_R1002 4X/4X/24X/4X CD_RW/DVD_ROM
634	QPS Que! 8X/4X/32X FireWire CD_RW	684	TONER CARTRIDGE ULTRAPRECISE FOR LASERJET 1100 1100A 3200 SERIES
635	WINDOWS 2000 SERVER 5C W2K	685	Gateway Select 1000 (17_inch monitor)
636	Ricoh AP204 Color Printer	686	Duron_850 MHz (200/MHz/192K)
637	USB INTERNAL BUS PORT PCI CARD 2USB PORTS 12MBPS PLUG&PLAY	687	Apple Power Mac G4 (533 MHz, 128MB, 40GB, CD_RW)
638	CELERON 600MHZ 128K L2 CACHE PGA370 PROCESSOR 3YR WARRANTY	688	Seagate Cheetah X15 18.4GB Ultra 160 (68 pin)
639	16X64_8 128MB SYNC PC100 168PIN 3.3V 100MHZ DIMM	689	PhotoSuite Platinum Ed Win9X/NT4 SP3
640	HP LaserJet 3100XI	690	Dreamweaver Fireworks Studio 4.0: Win9X/ME/2K/NT4
641	Gigabyte GA_7ZX (Socket A)	691	QuickBooks 2001 Win9X/ME/NT4 SP3/2K
642	Nikon Coolscan III (PC)	692	128MB RDRAM RIMM 800MHZ
643	Corel Draw 10: CLP Choice upgr lic Win98/ME/NT4/2K	693	HP LaserJet 1100se
644	Pentium III_600EB MHz (133MHz/256K)	694	Toshiba PDR_M70
645	SLATE GRAPHIRE 4X5 USB TABLET W/PEN CORDLESS MOUSE & POWERSUITE	695	Mag Technology 800 V
646	DC3400EZ DIGITAL CAMERA 32MB CARD 4 NIMH BATTERIES	696	HP OmniBook 6000 (Pentium III 700 MHz, 128MB RAM, 12GB)
647	Creative Labs 3D Blaster Savage4	697	Rand McNally StreetFinder GPS (Palm III)
648	TV TUNER CARD INT PCI VGA 10X7 NTSC PAL S/W	698	Brother MFC_9600 (with video capture)
649	Casio Cassiopeia EM_500 Sky Blue	699	Canon Powershot Pro70
650	Lexar 64MB Flash SmartMedia card	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	751	Plextor PlexWriter 12X/4X/32X CD_RW (Internal)
702	WINGMAN INTERCEPTOR JOYSTICK 9_BUTTON 3 HAT SWITCHES THROTTLE	752	PNY Technologies 256MB DRAM DIMM 168_PIN
703	NEC MultiSync FP950	753	HP DeskJet 970Cse
704	Compaq Presario 17XL260	754	PRO PC CAMERA _NORTH AMERICA
705	Epson Stylus Color 1520	755	MS Picture It Publishing Platinum Ed 2001 Win9X/ME/NT4 SP4/2K
706	STD YLD BLACK INK CART 3200 5700 5770 7000 7200 Z11 Z51/52 45	756	2930U KIT SCSI PCI 1CH CB MAN EZ SCSI 95/98/NT WKST ONLY
707	Sony CPD E200/L	757	HP LaserJet 2100 se
708	Epson Stylus Color 777	758	Sony DVD Discman PBD_V30
709	TURBOTAX 2000 CD W9X/NT	759	THINKPAD A21P P3_850 32GB 128MB 15_TFT 16MB 8X_DVD 56K 98
710	D850GB SINGLE P4 PGA423 DUAL RDRAM CNR 5PCI 400MHZ ATA/100	760	WINDOWS NT WORKSTATION 4.0 W/SVC PK NT4
711	Althon Thunderbird_950 MHz (200 MHz/256K)	761	INK JET CARTRIDGE, COLOR, HI RESOLUTION, STANDARD YIELD, 275 PAG
712	Sony VAIO PCG_Z505JS (Pentium III 650 MHz, 128MB RAM, 12GB)	762	PNY Technologies 128MB DRAM DIMM 168_PIN
713	Umax Astra 3400	763	TONER FOR HL_1240/1250/1270N & MFC_8300/8600/8700 HIGH YIELD
714	KDS Radius S_3F (with speakers)	764	PYRO IEEE 1394 DRIVE KIT TO CONVERT YOUR DRIVE TO FIREWIRE
715	Samsung SyncMaster 240T	765	36IN FD TRINITRON WEGA STEREO COLOR TV S_VIDEO RCA RF INPUTS
716	Agfa ePhoto Agfa CL18	766	HP PSC 500 Printer/Scanner/Copier
717	Samsung Electronics Co. Ltd. SyncMaster 170 T	767	INTELLIMOUSE OPTICAL PS2/USB 95/98/NT
718	Sony Cyber Frame	768	Compaq Matrox G450
719	OPTRA E312L LASERPR 10PPM 600DPI 2MB USB	769	Kodak DC3800 Zoom
720	Plextor Corp. PlexWriter Removable disk drive	770	Apple Power Mac G4 (400 MHz, 64MB SDRAM, 20GB HD)
721	Dragon NaturallySpeaking Preferred 5.0: Win98/2K/ME/NT4 SP6	771	LP435Z DLP PROJECTOR 1000 LUMEN ***WHILE SUPPLIES LAST***
722	Samsung SyncMaster 955SL	772	NEC MultiSync LCD2010
723	Samsung SyncMaster 150MP	773	Kodak DC5000
724	Kingston 256MB DRAM DIMM 168_PIN	774	GPS/STREETFINDER BUNDLE 2000
725	Epson Stylus Photo 750	775	Matrox Millennium G400
726	HP DeskJet 990Cse	776	UPG_V WINDOWS 95 W/INTERNET EXPLORER 4.0 95
727	AutoCAD LT 2000i Win9X/NT4	777	ViewSonic Corp. VG 175
728	Sharp Mobilon TriPad PV_6000	778	Kodak Smart Picture Frame
729	ETHERFAST CABLE/DSL VOICE ROUTER	779	MS Encarta Reference Suite 2001 Win9X/NT4 SP3
730	I_Jam I_JAM IJ_50_MP3 player_stereo	780	SanDisk Corp. 64MB Flash CompactFlash Card
731	PcANYWHERE Host & Remote 9.2: Win9X/NT4/2K	781	Pentium II_333 MHz (66MHz/512)
732	3dfx Voodoo3 3500 (AGP)	782	Mitsubishi Leonardo
733	SGI Silicon Graphics 1600SW	783	A/C ADAPTOR/BATTERY CHARGER (EH_21) FOR COOLPIX 880
734	ATi Rage Fury Pro (TV out)	784	Guillemot Hercules 3D Prophet II GTS
735	Brother Multi_Function Center MFC_7150C	785	KS188+PP303X ATX FULL TOWER CASE 300W PS VALUE LINE BEIGE
736	HP LaserJet 5000N	786	LP340V DLP PROJECTOR 1300 LUMENS SVGA 800X600 6.7 LBS
737	IEEE 1394 FIREWIRE PCI CARD	787	MS Visio 2000 Professional Win9X/NT4 SP3
738	INK JET CARTRIDGE, 5_COLOR, CYAN/LT CYAN, MAGENTA/LT MAGENTA, YE	788	Iomega Zip 100 Parallel Port Drive
739	Altec Lansing ADA 890_Speaker(s)_AC_3 (Dolby Digital)_120	789	3Com Fast EtherLink XL
740	HP Color LaserJet 4550	790	HP PhotoSmart C200xi
741	WINDOWS NT SERVER 4.0 5C W/NT OPTION PK & SVR PK NT	791	INTUOS 4X5 SERIAL TABLET FOR PC WITH INTUOS PEN & PAINTER CLASSI
742	ATi Xpert 2000	792	D_Link Network adapter Plug_in card Ethernet
743	BLACK CARTRIDGE FOR DESKJET 680C 690C 695C DESKWRITER 600	793	Apple Power Mac G4 (Dual_450 MHz, 128MB SDRAM, 30GB HD)
744	AGE OF EMPIRES V1.0 SINGLE ONLINE_DOC	794	PENTIUM III P3 533MHZ 512KB L2 CACHE 133MHZ FSB SLOT1 KATMAI
745	Iomega Zip 100 Internal ATAPI Drive	795	Olympus DS_150 Digital Voice Recorder
746	Creative Labs Sound Blaster 16 WavEffects	796	INTEL DELUXE PC CAMERA USB I/F NORTH AMERICA
747	VISUAL BASIC PROFESSIONAL ED 6.0 W/PLUS PACK 95/98/WME/NT/W2K	797	Creative Labs WebCam Go Plus
748	ATi All_in_Wonder 128 (PCI)	798	KDS VS_7E
749	Umax Astra 2100U	799	Compaq Presario Portable 18_XL380 Pentium III 700 MHz 128 MB 20
750	SYNCMaster 800TFT 18.1IN LCD .28MM 12X10 75Z TCO99	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	851	Iomega Zip 250 Parallel Port Drive
802	Linksys EtherFast LAN	852	Sony Digital Photo Printer
803	TURBOCHIP 233 233MHZ PROCESSOR UPG FOR PENTIUM 75 AND HIGHER	853	PENTIUM III P3 600MHZ 512KB L2 CACHE 100MHZ FSB KATMAI
804	Fujitsu LifeBook S_4542 (Windows 98)	854	HP CD Writer 8230e
805	Acer AcerView F51 LCD Monitor	855	IBM TravelStar 32GH 32 GB
806	Nikon Coolscan IV ED	856	NI_MH/NI_CD BATTERY CHARGER 4AA NI_MH BATTERIES
807	Linksys Network adapter External Ethernet	857	HP ScanJet 5200Cxi
808	Pentium II_400 MHz (100MHz/512)	858	RECHARGEABLE BATTERY FOR VAIO SERIES NOTEBOOK
809	Casio EM 500SB	859	REX 6000 MICROPDA PORTABLE ORGANIZER
810	Guillemont 3D Prophet II MX	860	Cisco 2611 Dual Ethernet Router
811	UPG COREL WORDPERFECT OFFICE 2000 WIN95/NT SINGLE 1_DOC	861	SanDisk and Friendly Inc. SpeedWriter Removable disk drive
812	Genealogy.com Family Tree Maker Deluxe 8.0: Win9X	862	TEAC Floppy Drive 235HF Removable disk drive
813	Compaq Presario Portable 12XL325 Pentium III 650 MHz 64 MB 6 GB	863	NEC LCD1525V Flat Panel LCD
814	Matrox Marvel G400_TV (NTSC)	864	Pioneer DV_414
815	Adobe Illustrator 9.0: Win9X/NT4/2K	865	27IN FD TRINITRON WEGA STEREO TV/MONITOR VGA S_VID RCA RF 2 TUNE
816	ViewSonic G790	866	Sony Glasstron PLM_A35 PC Video Headset
817	Abit KA7_100 (Slot A)	867	PENTIUM III P3 667MHZ 256KB L2 133MHZ FSB SLOT1 COPPERMINE .18MU
818	MP3 PLAYER 64MB USB W/VOICE RECORDING AND HEADPHONES	868	KDS VS_21E
819	128MB PICTURE CARD _CF COMPACTFLASH ATA COMPATIBLE	869	ATi Rage Fury
820	Samsung Electronics Co. Ltd. SyncMaster 700 IFT	870	BLACK INK CART FOR STYLUS COLOR 440/640/660/670/750/1200
821	Samsung Electronics Co. Ltd. SyncMaster 700 IFT	871	HP DeskJet 1220Cse
822	Psion Revo	872	SMART_UPS 1400NET 1400VA LINE INTLAN 7.4MIN_FULL 6_OUTLETS W/SW
823	Logitech QuickCam Pro	873	Apple iMac (350 MHz, Blueberry)
824	Acer TravelMate 351TEV	874	HP OfficeJet G85XI
825	WHEEL MOUSE OPTICAL USB PS/2 3_BUTTON + WHEEL	875	FS108 10/100 8 PORT DUAL SPEED SWITCH RJ_45 W/ UPLINK BUTTON
826	Compaq Deskpro EN SFF 6600 Model 10000 Pentium III 600 MHz 64 MB	876	Norton Personal Firewall 2001 2.5: Win9X/ME/NT4 SP3/2K
827	Linksys EtherFast Workgroup	877	CORDLESS FREEDOM PRO _RF W/ SER/PS2 MOUSEMAN & SPLIT KEYBOARD
828	WINDOWS 2000 SERVER 10C W2K	878	Hi_Val RealMagic
829	3dfx Voodoo 3 2000 (PCI)	879	D_Link DSC_350
830	Western Digital 45 GB	880	NetGear Home Phoneline 10X USB
831	24X/6X/4X REWRITABLE 4X DVD EIDE CDRW /DVD ROM COMBO DRIVE KIT	881	HP PhotoSmart 1218
832	FINAL FANTASY VII	882	EPSON STYLUS COLOR 777 & 777I BLACK INK CARTRIDGE
833	Apple iMac DV SE (500 MHz, Graphite)	883	Dragon NaturallySpeaking Std 5.0: Win98/2K/ME/NT4 SP6
834	GEFORCE2 GTS 4X/2X AGP 32MB SGRAM DDR VGA ONLY 200/333 MHZ	884	NEC MultiSync FE700
835	Memory Stick _Memory USB adapter _Flash : Memory Stick	885	Compaq Armada M700 (400 MHz, Windows 98)
836	HP DeskJet 1220Cxi	886	HP DeskJet 895Cxi
837	Epson Stylus Color 1160	887	Xircom RealPort 2 CardBus Ethernet 10/100
838	IBM ThinkPad 600	888	Casio QV 3000 ProPack
839	ViewSonic G810	889	PENTIUM III P3 500 FCPGA 256KB L2 CACHE 100MHZ FLIP CHIP
840	WHEEL MOUSE OPTICAL ENG. 95/98/WME/NT	890	Sony VAIO PCG_505VX
841	Sony DCR_TRV900	891	Olympus D_340R
842	Plextor PlexWriter RW 20X/4X/2X CD_RW drive	892	Pentium II_300 MHz (66MHz/512)
843	Mitsubishi Diamond Pro 900u	893	LP335 DLP PROJECTOR 1000 LUMEN XGA **WHILE SUPPLIES LAST**
844	64MB 8X64 SDRAM PC133 8NS	894	ATi Rage Fury Maxx
845	128MB SMARTMEDIA 3V .	895	Compaq Aero 1550
846	Celeron_600 Mhz (PPGA)	896	CAMERA SUPPLY, DK_110 POWER SUPPLY KIT, INCLUDES POWER ADAPTER,
847	SOUND BLASTER LIVE SC X_GAMER 5.1	897	IBM WorkPad 30X
848	EROUTER SERVER 4_PORT 10/100 SWITCH DSL/CABLE MODEM	898	EZ CONNECT 11MBPS WIRELESS BUNDLE 1 ACCESS POINT 1 PCCARD
849	Peachtree Complete Accounting 8.0: Win9X/NT4 SP3/2K	899	IBM ThinkPad 570E (Pentium III, 450 MHz)
850	TONER CARTRIDGE 6 000 PAGES FOR SUPERSRIPT 870 1_PK	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	951	24X/4X/4X CD REWRITER BACKPACK PARALLEL PORT WIN 95 98 NT4 W/SW
902	QUAKE II AGES 17 AND UP 95/98/WME	952	Sony Cyber Shot DSC_D770
903	TDK veloCD ReWriter 32X/8X/4X CD_RW	953	SIMCITY 3000 CD W9X
904	Epson PhotoPC 850Z	954	Nexian HandyGPS
905	BLACK INK CARTRIDGE FOR STYLUS COLOR 900 AND 980	955	Sony Vaio PCG_Z505JSK
906	Visioneer PaperPort OneTouch 7600 USB	956	Seagate Barracuda ATA II 30.6 GB
907	CORDLESS I TOUCH PS2/AT KYBRD RF INTERNET/MULTIMEDIA	957	Epson Stylus Color 860 (USB/Parallel)
908	RECHARGABLE BATTERY FOR VAIO DOUBLE CAPACITY LITHIUM ION	958	PRESARIO 5BW120 CEL 600 15.0GB 64MB 40X W/MOUSE/KB/4 USB/W98SE
909	KS180+PP303X 10BAY ATX FULL TWR CASE 300W PS BEIGE	959	Compaq Presario 1200_XL 125
910	HP CD_Writer 9600se 12X/8X/32X CD_RW	960	Creative Labs Sound Blaster 16 PCI (Retail)
911	IBM Thinkpad T Series (Pentium III, 750MHz, 128MB RAM, 20GB)	961	QV3000 3.34MP DIGITAL CAMERA W/ IBM 340MB MICRODRIVE
912	Toshiba Satellite 1625CDT	962	RIO 600 32MB BACKPACK RETAIL
913	KDS VS_19sn	963	Eudora Email 5.0: Win9X/2K/NT4, MacOS8.1
914	Apple Cinema Display (22_inch flat panel)	964	ViewSonic OptiQuest Q95
915	Midiland S4 8200_Speaker(s)_AC_3 (Dolby Digital)_200 Watt	965	WordPerfect Office Std Ed 2000: Win9X/NT4
916	Nikon D1 Pro	966	NetGear RM356 56K Router
917	Kodak DVC 325	967	Okidata Microline 320 Turbo
918	AGE OF EMPIRES RISE OF ROME EXPANSION CD W9X/NT	968	CDR RECORDER MEDIA 650MB 74MIN SILVER BRANDED 100PK CAKEBOX
919	Yamaha CRW 4416 16X/4X/4X CD_RW drive (PC or Mac)	969	E_VECTRA SF P3_600EB 8.4GB_HD 128MB SDRAM 24X W2K (EOL 10/1/00)
920	Samsung SyncMaster 1200NF	970	Umax UGate_3000
921	Sony VAIO PCG_F590K (Pentium III 750 MHz, 128MB RAM, 18GB)	971	IBM ThinkPad T21 2647 Pentium III 800 MHz 128 MB 20 GB
922	ATI TV Wonder	972	PENTIUM III P3 550 FCPGA 256KB L2 CACHE 100MHZ FLIP CHIP .18MU
923	Pentium_200 MHz (MMX)	973	ATI Xpert 98
924	PALM PORTABLE KEYBOARD FOR III/IIIxE/VII/M100	974	TONER CARTRIDGE FOR LJ 5P 5MP 6P 6MP
925	FL_40 EXT DEDICATED FLASH FOR C_2500L/C3000L HOT SHOE DESIGN CON	975	XIRCOM REX5001 SILVER INCLUDES SERIAL DOCKING STATION
926	Pentium III (FC PGA)_700E MHz (100MHz/256K)	976	PENTIUM III 1GHZ WITH VC820 128MB RDRAM 133MHZ FSB GIGAMINE
927	Celeron_533 MHz (PPGA)	977	Minolta Dimage Scan Dual II
928	Brother MFC 9200C	978	Umax Astra 2200
929	MOUSEMAN WHEEL OPTICAL USB/PS2 4 BUTTON + WHEEL	979	Linksys Instant Wireless WDT11
930	32X/10X/4X REWRITABLE INT SCSI SPRESSA CD_RW W/SW_SUITE CBL5 DIS	980	VT 2461 2.4GHZ CORDLESS PHONE W/CID HS JACK ITAD HS SKRPHN
931	D_Link Network adapter Plug_in module Ethernet, Fast Ethernet	981	Cisco Cisco 1720 USB, Ethernet
932	ALL IN WONDER RADEON PCI 32MB SDR TVOUT RETAIL	982	42IN 1.08MM 852X480 PLASMA FLAT PANEL DISPLAY/TV REMOTE BNC
933	Lexmark Color JetPrinter Z22	983	Quicken 2001 Home & Business Win9X/NT4/2K
934	29160 KIT U160 LVD SCSI PCI 1CH MAN NT NET UX EZ SCSI	984	Sony MVC_FD83 Digital Mavica
935	32IN FD TRINITRON WEGA STEREO COLOR TV S_VIDEO RCA RF INPUTS	985	AVERKEY IMICRO PC/MAC_TO_TV SCAN CONVERTER 1024X768 NO FLICKER
936	Western Digital Caviar WD200BB 20 GB	986	MULTI_FLASH BRACKET SK_E900 FOR COOLPIX 990/950/900
937	IBM NetVista A20 6269 Pentium III 733 MHz 64 MB 10 GB	987	Creative Labs Video Blaster MovieMaker (USB, external)
938	Acer TravelMate 738 TLV	988	NO 10 LG BLACK INK CART 2000C DESIGNJET 500/800 SERIES
939	Lexmark Optra E312	989	Microtek ScanMaker 4700
940	TRGpro	990	29160N KIT U160 LVD SCSI CARD PCI W/50PIN EXT CONN
941	COLOR INK CARTRIDGE FOR THE 900 AND 980 SERIES	991	Creative Labs Blaster 8432 CD_RW Drive
942	COLOR INK CARTRIDGE FOR STYLUS COLOR 750	992	Fuji FinePix 1400 ZOOM
943	IBM T55D (black)	993	Sony Vaio PCG_F690K
944	HP ScanJet 6300Cse White	994	REMOVABLE CARTRIDGE, ZIP PC, 250MB, PRE_FORMATTED FOR PC, 4 PER
945	HP OfficeJet T45	995	DV500+ DUAL STREAM NATIVE DV W/ ANALOG&DV I/O ADOBE PREMIERE 6.
946	Epson PhotoPC 650	996	Creative Labs 3D Blaster Annihilator2 Ultra
947	Palm M505	997	ELSA GLADIAC MX
948	D_Link Network adapter External Ethernet	998	Princeton EO 700 monitor
949	K6 2_450 MHz (100MHz)	999	Creative Labs Sound Blaster Live! MP3+ 5.1
950	Bryce 4.0: CLP Choice lic Win95/NT4 SP3, MacOS7.5.5	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 {
    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 {
    my $rankhtml = $_[0];
    $rankhtml =~ m#Manufacturer(.*)#si;
    $rankhtml = $1;
    @lines = split /<tr/, $rankhtml;

    for ($n = 1; $n <= 100; $n++) {
        info    $lines[$n] =~ m{
            <font\ size=2.*>&nbsp;(\d+)&nbsp;          # 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?](#)

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		Price	State		Shipping	In Stock	Last Updated
Buy Info	LA Computer Center 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 More company info	★★☆	\$645.45	IL	800-969-5255	16.00	Y	3/23/2001
Buy Info	Value, Selection, Satisfaction More company info	★★★	\$677.99	CT	888-212-0837	12.50	YES	3/26/2001
Buy Info	TelekomNet More company info	★★☆	\$685.90	MA	877-346-9500	\$20.92	YES	3/23/2001
Buy Info	Micro Warehouse 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 More company info	★★☆	\$704.02	CA	800-858-9866	9.95+	54	3/25/2001
Buy Info	Soft4U.com More company info	★★★	\$717.56	CA	877-276-3848	\$29.90+	Yes	3/23/2001
Buy Info	Page Computer More company info	★★★	\$849.00	CA	888-557-2557	14.31	yes	3/24/2001
Buy Info	State Street Direct 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

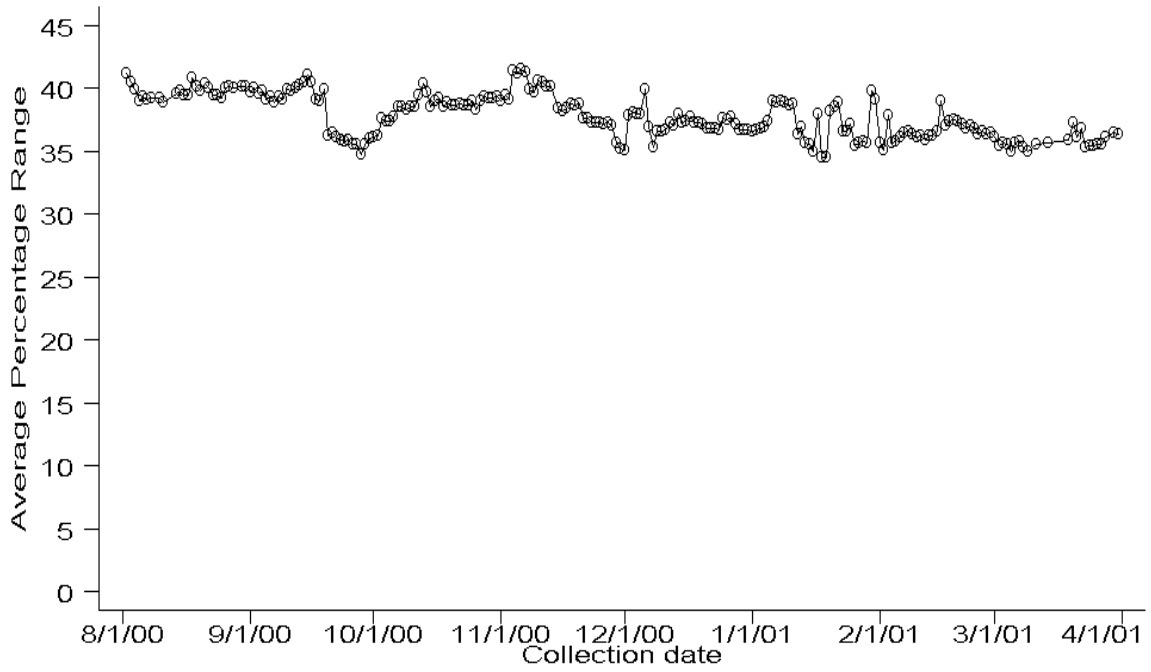


Figure 3: Average Coefficient of Variation Over Time

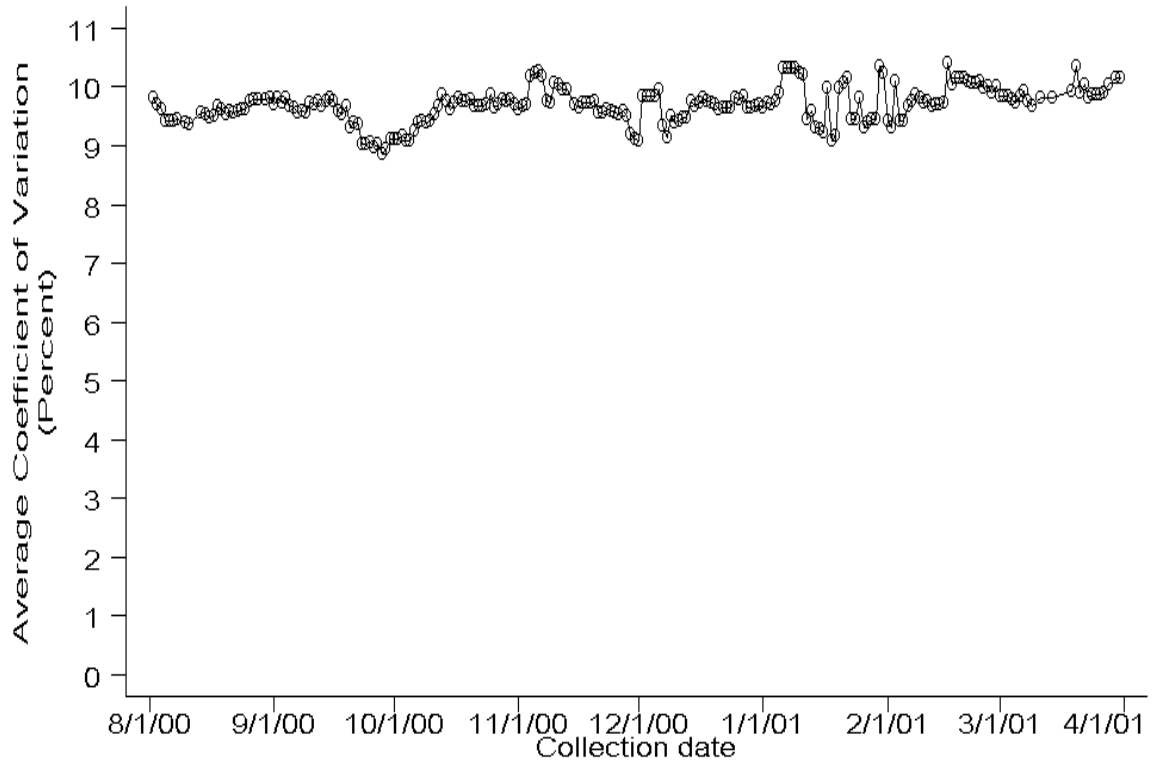


Figure 4: Average Percentage Gap Over Time

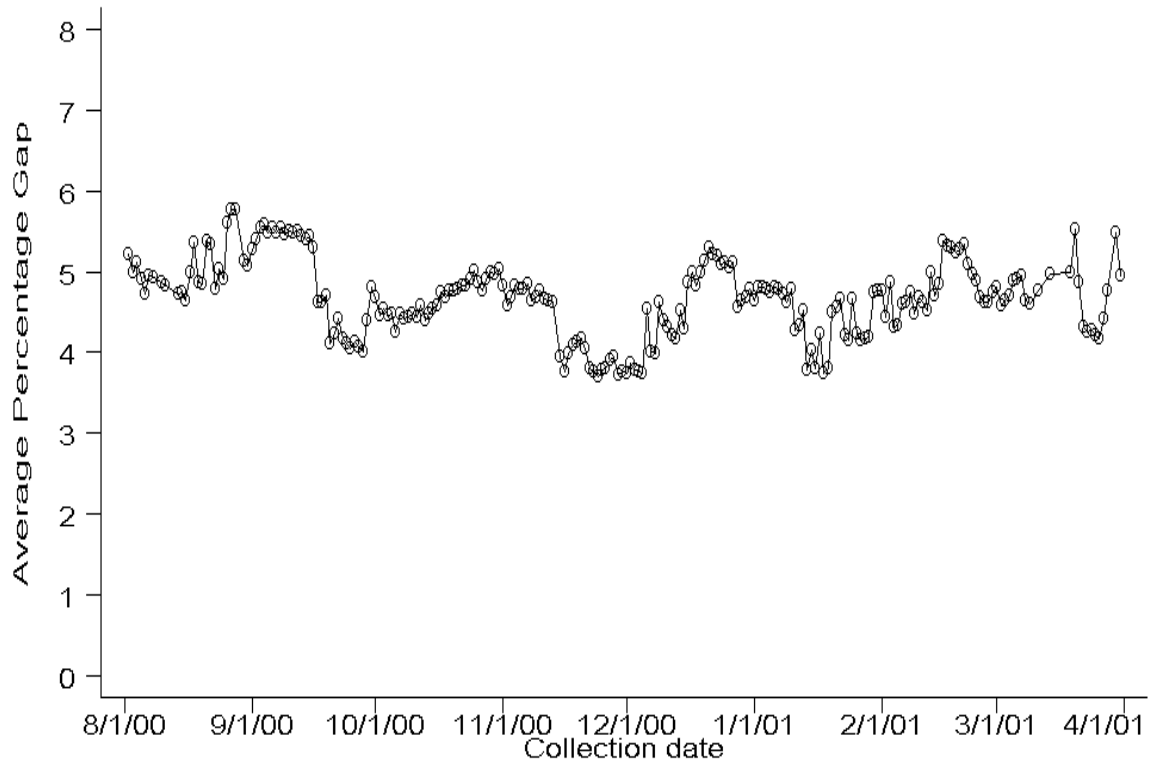


Figure 5: Percentage of Products with Various Percentage Gaps

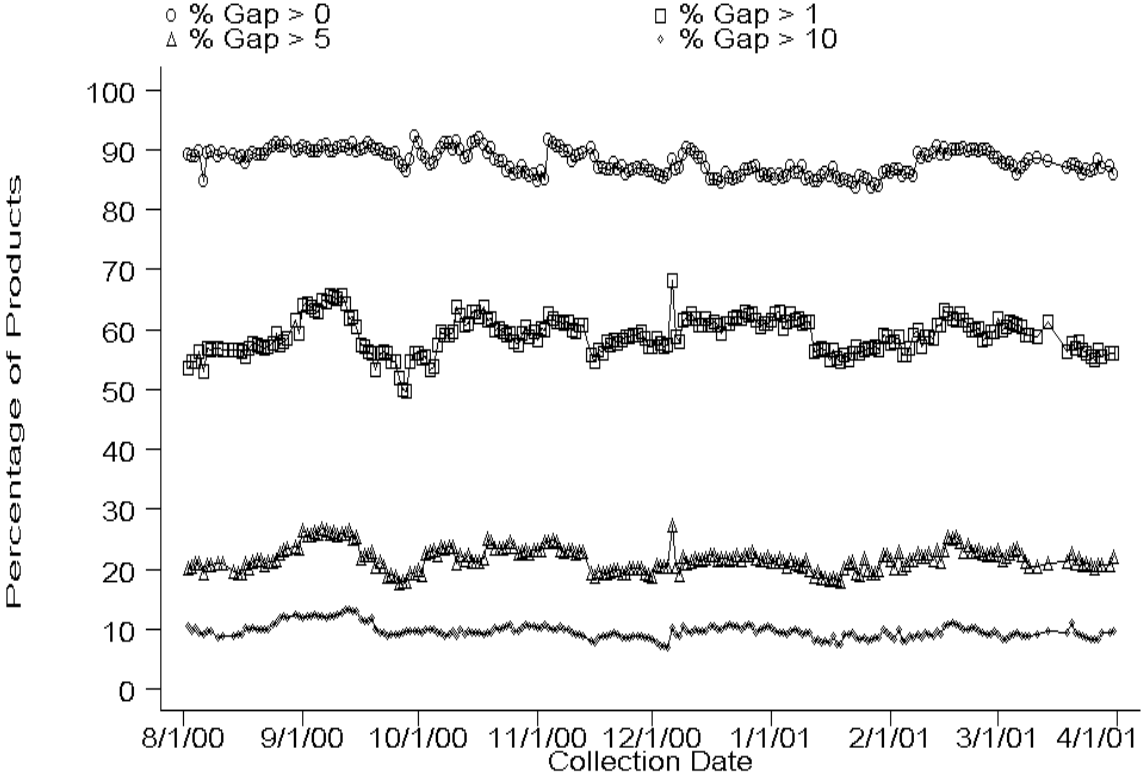


Figure 6: Average Percentage Gap by Number of Firms

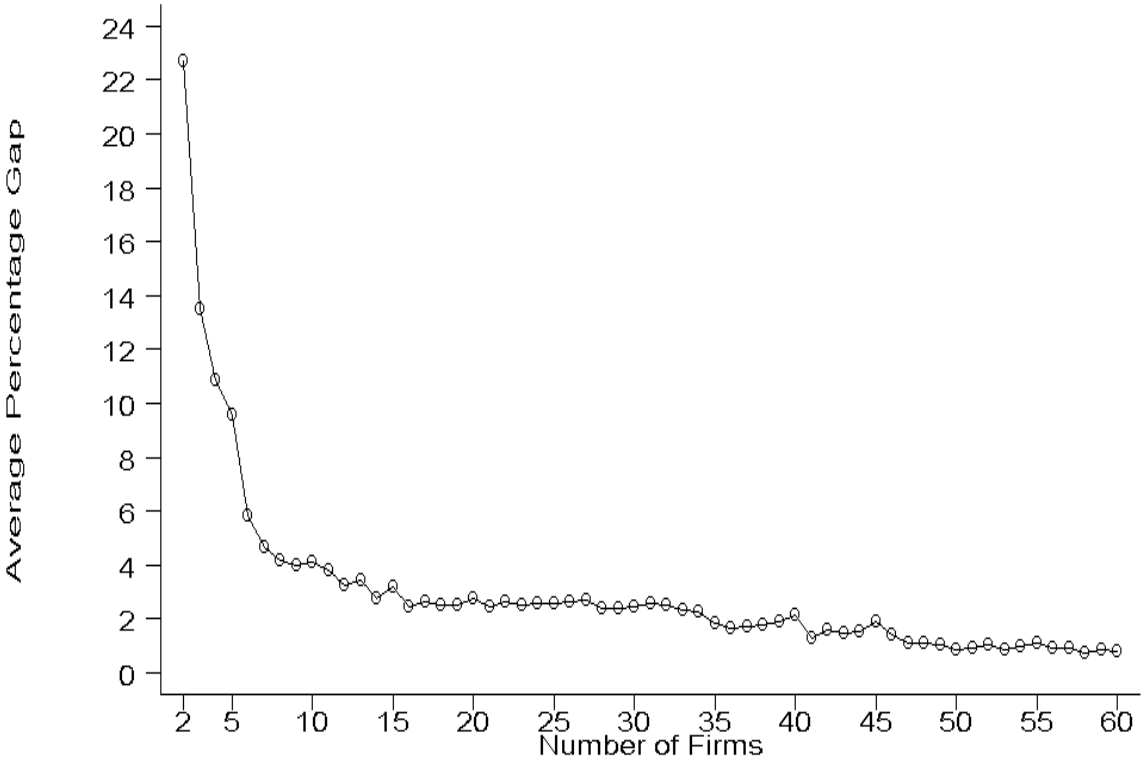


Figure 7: Average Percentage Range by Number of Firms

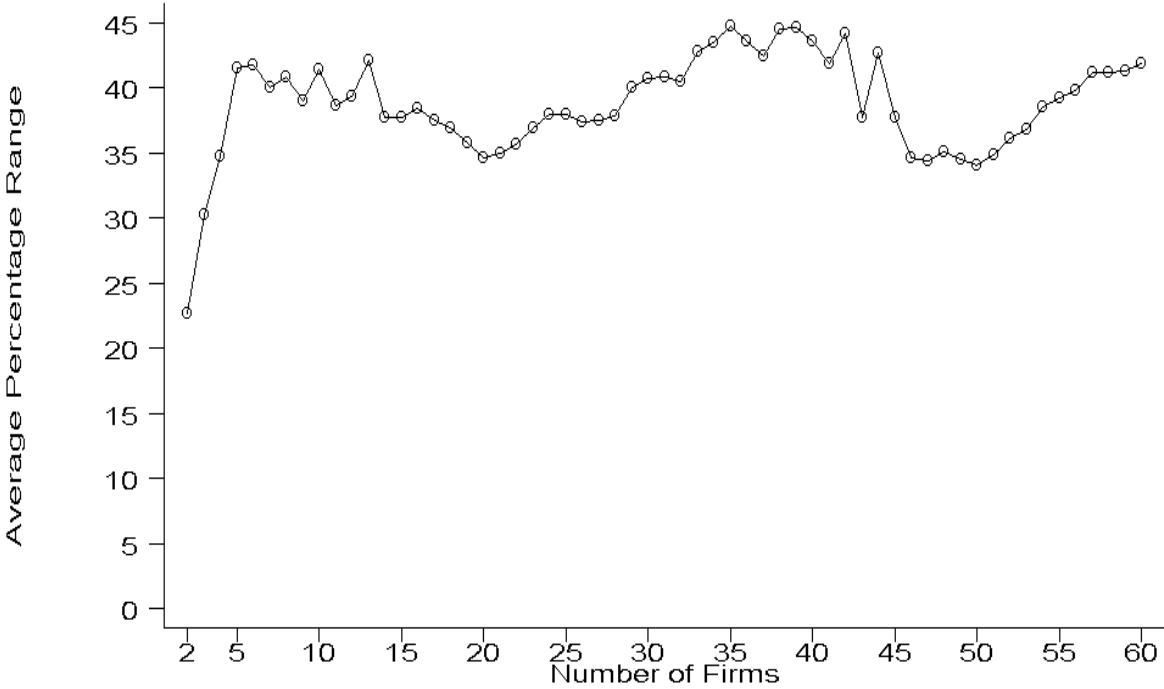


Figure 8: Average Number of Firms Listing Prices Over Time

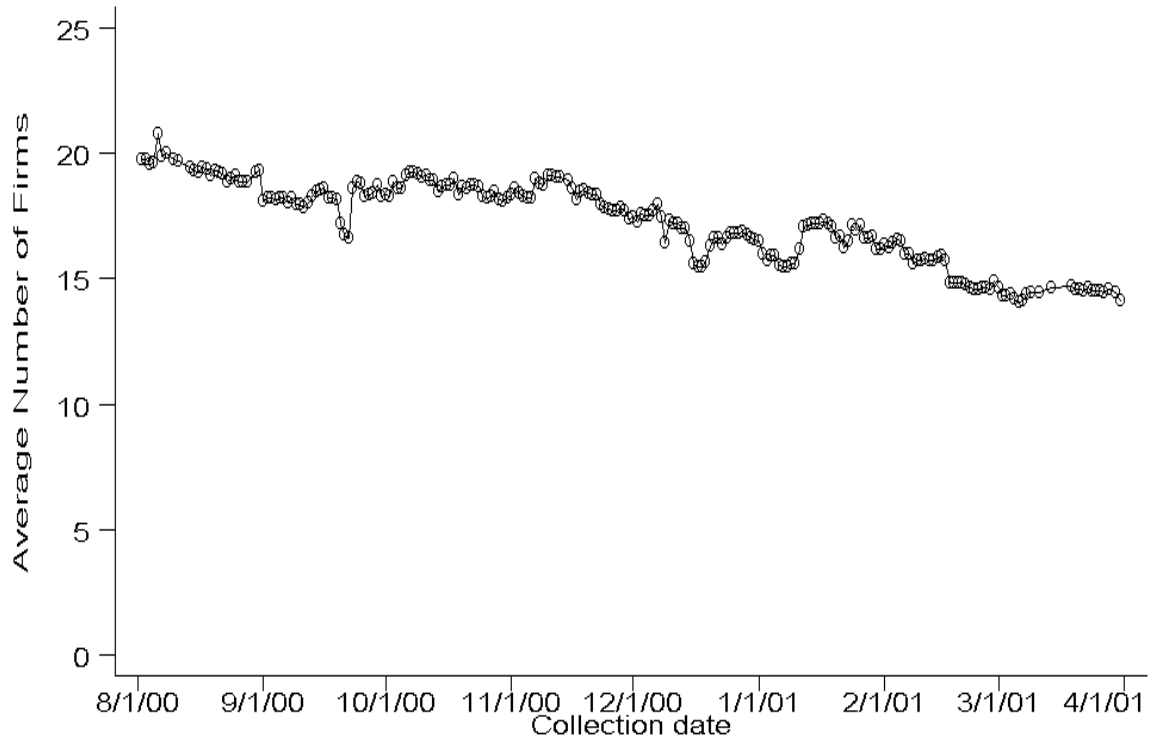


Table 1: Summary Statistics

	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 (882.8)	\$472.73 (665.2)	\$494.91 (838.3)	\$529.60 (1,039.6)	\$555.64 (941.7)
Multi-Price Listings	\$491.64 (760.8)	\$461.07 (590.7)	\$476.41 (706.1)	\$486.56 (820.0)	\$543.08 (892.0)
Average Minimum Price in					
All Listings	\$457.62 (818.7)	\$417.94 (611.9)	\$442.78 (781.3)	\$475.77 (980.0)	\$493.93 (855.4)
Multi-Price Listings	\$432.47 (678.2)	\$403.40 (525.1)	\$420.97 (630.9)	\$428.91 (733.7)	\$477.09 (792.4)
Average Number of Firms in					
All Listings	17.27 (11.7)	21.17 (14.1)	16.90 (10.8)	15.91 (10.4)	15.12 (10.0)
Multi-Price Listings	18.32 (11.3)	22.23 (13.7)	17.91 (10.3)	16.97 (9.9)	16.10 (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 (239.5)	\$123.88 (202.5)	\$117.21 (220.5)	\$118.78 (249.3)	\$133.87 (278.3)
Multi-Price Listings	\$131.35 (244.9)	\$130.40 (205.7)	\$124.67 (225.3)	\$127.22 (256.0)	\$143.15 (285.5)
Average Coefficient of Variation in					
All Listings	9.10% (8.0)	9.06% (7.2)	9.15% (7.9)	9.10% (8.4)	9.10% (8.6)
Multi-Price Listings	9.69% (7.9)	9.54% (7.1)	9.73% (7.8)	9.75% (8.3)	9.74% (8.5)
Average Gap in Low Prices					
All Listings	4.39% (16.2)	3.79% (20.4)	4.03% (9.9)	4.71% (15.4)	5.03% (17.3)
Multi-Price Listings	4.67% (16.7)	3.99% (20.9)	4.29% (10.2)	5.04% (15.9)	5.38% (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.

Dummy Variable for:	Model 1		Model 2		Model 3		Model 4		Model 5	
	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.

Dummy Variable for:	Model 1		Model 2		Model 3		Model 4		Model 5	
	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.

Dummy Variable for:	Model 1		Model 2		Model 3		Model 4		Model 5	
	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										0.00
p-value										
All Number of Firm Effects are Zero										0.00
p-value										