

VERTICAL INTEGRATION AND INTERNET STRATEGIES IN THE APPAREL INDUSTRY¹

Robert H. Gertner, University of Chicago and NBER

Robert S. Stillman, Lexecon

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Abstract

Is greater vertical scope an impediment to change (inertia of large organizations) or a facilitator of change (avoidance of contract inflexibility)? There is little empirical evidence on this issue. This paper attempts to help fill this void by studying how firms in the apparel industry have adapted to the Internet. We focus on the apparel industry because apparel is one of the leading categories of on-line sales and because of the variance in organizational form that exists within the apparel industry. Some firms such as The Gap are vertically integrated. Many other brands are owned by vendors and sold primarily through department stores and other third-party retailers.

Based on research that included interviews with apparel industry executives, we identify transaction-cost reasons why non-integrated firms in the apparel industry may have been at a relative disadvantage in their ability and incentive to adapt to the Internet. We examine the accuracy of our hypothesis using data from a sample of 30 firms in the apparel industry.

Consistent with our hypothesis, we find that vertically integrated specialty retailers tended to start on-line sales sooner, even after controlling for other factors such as whether a firm had pre-existing catalog operations. This systematic pattern is inconsistent with the null hypothesis that the timing of on-line sales is the product of firm-specific factors that are unrelated to organizational form. We also find that the products of vertically integrated specialty retailers and catalog companies are more available on-line than the products of non-integrated vendors. This too is consistent with our hypothesis about the relationship in the apparel industry between vertical integration and the ability to adapt to large changes in economic conditions.

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I. INTRODUCTION

The popular press sees the Internet as a revolutionary force that is creating a "new economy" governed by "new rules." While this assessment is a bit grandiose, at the very least the Internet is an important new technology that is leading to significant changes in the lives of consumers and in the manner in which businesses operate. The Internet has disrupted the economic system, and firms throughout the economy have been experimenting for the last several years with alternative ways of responding to, and taking advantage of, this profound disruption.

This paper examines how firms in the apparel industry have been adjusting to the Internet. More specifically, we examine the speed with which different firms in the apparel industry began selling on-line and the success they have achieved to date. The apparel industry makes an interesting case study because apparel is one of the leading products sold over the Internet and because there is variance within the apparel industry in organizational form. Some brands are distributed through vertically integrated specialty retailers and catalog companies. Examples include The Gap, The Limited, Abercrombie & Fitch, Eddie Bauer, Lands' End, L.L. Bean and J. Crew. Note that, for each of these firms, there is exclusivity in addition to vertical integration -- the retail stores and catalogs of these vertically integrated companies do not handle brands of other manufacturers ("vendors"). Other apparel brands are distributed primarily on a non-exclusive basis through department stores and other non-integrated retailers. Examples include Tommy Hilfiger, Calvin Klein, Polo Ralph Lauren and Nautica. Many of these brands also operate their own retail stores, but sales through these company stores typically are small relative to sales through department stores and other third-party retailers.

This variance in distribution models allows us to use the apparel industry as a vehicle for exploring the relationship between organizational form and the ability of firms to adjust to changes in economic conditions. The ability to respond to changing economic conditions is a hallmark of economic efficiency, so this is an important topic. Yet economists know relatively

little about the factors that affect the ability to adapt. A common belief is that large bureaucratic organizations suffer from excess inertia and that a significant advantage of small organizations is their flexibility and ability to adapt. Exactly why this should be so, however, is rarely explained, nor have economists developed systematic empirical evidence on the relationship between organizational structure and change. Many long-term relationships are formally governed by contract. Despite the large theoretical literature on contracting costs, the flexibility of contractual relationships has not been compared to the flexibility of integrated organizations. Is greater vertical scope of the firm an impediment to change (organizational inertia) or a facilitator of change (avoidance of contractual inflexibility)? There is little empirical evidence on these important issues.

This paper is an attempt to help fill this void. Our general hypothesis is that, depending on the nature of the required adjustments and the nature of transaction costs, vertically integrated firms may be able to adjust to changes in economic circumstances more effectively than non-integrated firms. The specific version of the hypothesis examined in this paper is that, for transaction-cost reasons described below, vertically integrated firms in the apparel industry have been able to adjust to the Internet more effectively than their non-integrated counterparts.

Our hypothesis about the effects of vertical integration in the apparel industry builds on knowledge of on-line selling of apparel that we have accumulated through company reports, newspaper and trade press articles, consulting reports, phone calls and interviews with company executives. We know from this research that, when a department store sells apparel on-line, it must coordinate activities among many parties that it does not control. In particular, it typically must obtain permission from its vendors and then negotiate brand guidelines that govern how the brand will be presented on-line. Coordination and other transaction costs are also at the bottom of the so-called channel conflict problems that reportedly constrain the Internet strategies of non-integrated vendors. Our research also identifies an externality that may attenuate the incentives of department stores to invest in developing and promoting on-line sales. When department stores generate incremental sales by investing in their on-line stores,

vendors capture a significant share of the gains (unless there are side payments). These factors -- coordination costs, channel conflict and externalities -- are reasons why vertically integrated specialty retailers such as The Gap may invest sooner and more intensively in on-line sales than department stores and largely non-integrated vendors.

We examine the accuracy of these predictions using data from a sample of 30 firms in the apparel industry. Consistent with our hypothesis, we find that vertically integrated specialty retailers tended to start on-line sales sooner, even after controlling for other factors such as whether a firm had pre-existing catalog operations. This systematic pattern is inconsistent with the null hypothesis that the timing of on-line sales is the product of firm-specific factors that are unrelated to organizational form. We find in addition that the products of vertically integrated specialty retailers and catalog companies are more available on-line than the products of non-integrated vendors. This too is consistent with our hypothesis about the relationship in the apparel industry between vertical integration and the ability to adapt to large changes in economic conditions.

We also examine other measures of the current quality and success of on-line selling efforts. In particular, we examine data on web site quality ratings and web site visitors. The direction of these results is consistent with our hypothesis about the effects of vertical integration, but most of these results are statistically insignificant.

Our paper has seven parts and is organized as follows. Following this introduction (Part I), Part II briefly reviews the existing economic literature on vertical integration. This review focuses on the implications of the existing literature on the relationship between organizational form and the ability to adjust to changes in economic conditions. Part III follows with industry background. Part III discusses the current and anticipated volume of on-line sales of apparel. It describes the manner in which on-line sales are expected to complement the apparel industry's existing channels of retail distribution. Part III also discusses the strong economies of scope that appear to exist between catalog operations and on-line sales with respect to order fulfillment.

The complementarity between on-line sales and the other channels of retailing, and the economies of scope on the cost side between catalog operations and on-line sales, suggest that firms that already had stores and/or catalog operations had an advantage in responding to the Internet over firms that did not already have large networks of stores and/or catalog operations. Part IV discusses other factors that may have affected the speed with which apparel firms started on-line sales and the relation of these factors to organizational form. As outlined above, we describe transaction-cost reasons why one might expect vertically integrated specialty retailers to move more quickly in the area of e-commerce than their non-integrated rivals. Part IV includes a discussion of channel conflict -- i.e., the conflict that may exist between a non-integrated vendor and its retail distributors if the vendor tried to sell on-line direct from its own web site.

Our empirical analysis is presented in Parts V and VI. Part V describes how we constructed our sample of apparel firms. Part VI reports and discusses our empirical analysis of the speed and success with which different firms in the sample have adapted to the Internet. Part VII summarizes our principal conclusions.

II. LITERATURE REVIEW

Coase (1937) initiated the theory of the firm by arguing that organizational form is chosen to economize on transaction costs.² The extensive literature that followed has explored the nature of these transaction costs. Williamson (1975) and (1985) categorizes transaction costs by their source and identifies the main sources as asymmetric information, relation-specific investment, bargaining costs and imperfect rationality.³ Williamson's work suggests that

² Coase, "The Nature of the Firm," *Econometrica* 386 (1937).

³ O. Williamson, *Markets and Hierarchies -- Analysis and Antitrust Implications: A Study in the Economics of Internal Organization* (1975); *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting* (1985).

vertical integration should improve the ability to respond to a changing environment, but the exact mechanism is not clear.

Grossman and Hart (1986) and Hart and Moore (1990) develop a theory of vertical integration where the residual control rights associated with ownership affect the incentives to make relation-specific investments.⁴ Their models assume efficient ex post bargaining, so that any organizational structure responds efficiently to a changing environment given investment levels.

Gertner (1999) focuses on how vertical integration affects coordination through different dispute resolution mechanisms.⁵ In an integrated firm, a dispute between two units can be resolved by a manager who has control rights over both units' assets. In contrast, a dispute between units that are independently owned will be resolved according to contractual rules that allocate the control right to one or the other unit. The different dispute resolution mechanisms affect the incentives to share information and thereby impacts efficient coordination. Although beyond the scope of the model, an implication may be that a vertically integrated firm could more easily share the information needed to coordinate an efficient response to a changing environment.

Knez and Simester (1999) study the make-or-buy decisions of a producer of complex, technological products requiring many specialized parts.⁶ They demonstrate that the decision to produce internally depends on the complexity of coordination required in the design and manufacturing of a particular part. This suggests that some coordination problems can be more easily resolved in a vertically integrated firm.

⁴ Grossman & Hart, "The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration," *J. Pol. Econ.* 691 (1986); Hart & Moore, "Property Rights and the Nature of the Firm," *J. Pol. Econ.* 119 (1990).

⁵ Gertner, "Coordination, Dispute Resolution, and the Scope of the Firm, unpublished manuscript, Graduate School of Business, University of Chicago (1999).

⁶ Knez & Simester, "Direct and Indirect Bargaining Cost and the Scope of the Firm," unpublished manuscript, Sloan School of Management, M.I.T. (1999).

III. INDUSTRY BACKGROUND

A. PROJECTIONS

Apparel is one of the most common types of product sold over the Internet. Table 1 presents the results of a monthly survey by the National Retail Federation and Forrester Research of on-line spending by U.S. consumers. The table shows that, among "small ticket" items, apparel was the second leading category for the first nine months of 2000. On-line sales of apparel during this period were estimated at \$1,568 million, just less than the estimated on-line sales of books (\$1,614 million).

Even so, the Internet still accounts for a very small share of total sales of apparel in the United States. Table 2 reports estimates by NPD Group of apparel sales by channel. On-line sales of apparel were approximately \$1 billion in 1999. In contrast, total sales of apparel in the United States during 1999 were \$184 billion. Thus, on-line sales accounted for only about 0.6% of total sales.

The relative importance of on-line sales in the apparel industry is expected to grow. A study by McKinsey & Co. and Salomon Smith Barney estimates that on-line sales of apparel will grow to \$7.8 billion by 2003 -- an estimate that implies a 67% average annual growth rate between 1999 and 2003.⁷ But no one expects on-line sales to come even close to the volume of in-store sales. According to the consulting firm Mainspring, projections for on-line sales of apparel in 2003 range from two to eight percent of total sales.⁸ Brick and mortar stores will remain the principal channel for apparel sales for the foreseeable future.

B. MULTI-CHANNEL RETAILING

⁷ Cited in "Pure Play: A Losing Model?" The Industry Standard 192-93 (Jun. 26, 2000).

⁸ Chu, Standley & Reiss, "Dressed for Success: Apparel Competitors Move Online," Mainspring (Aug. 14, 2000).

These estimates of future on-line sales mean that, for retailers, sales per square foot at their brick and mortar stores will continue to be far more important to company profitability than the success of their on-line stores. As James Zimmerman, chairman and CEO of Federated Department Stores puts it, "We are a department store company. The [Internet] tail will not wag the dog."⁹

But, even though on-line sales will remain small relative to in-store sales, every retailer we have studied (including the few who have not yet launched on-line stores) emphasizes the ways in which the Internet can complement their efforts to make shopping easier and to communicate better with their customers. The apparel retailers we have studied take it as given that the Internet is going to be an important part of their future marketing strategies and the way in which they interact with their customers.

Dan Nordstrom describes the concept of "multi-channel retailing" as follows:

"Consumers ... want options. They may want to peruse the hottest fashion at their local store, but they may ultimately make a purchase through a catalog or on the Web. And if they don't like what they bought online, they may want to be able to return it to a store, not hassle sending it back through the mail."¹⁰

Talbots annual report for 1999 provides additional detail on the relationship between catalog, store and on-line sales:

'[O]ur research tells us that 70% of store customers who receive our catalog were prompted to visit Talbots stores because of the catalog. And a significant number of people who order from talbots.com -- the Company's on-line shopping site -- first browse the catalog before they make their selections."¹¹

⁹ "Federated: Not Planning to Let E-Tail Take Over," WWD (May 24, 1999). In a similar vein, Zimmerman is reported to have told business students at Indiana University about the 10 most important issues he faces. Issues one through eight were, "Grow department store comp-store sales by 3% or more a year. That's the single most critical issue." Issue number nine was, "Open new stores when they do make sense." The Internet ranked only tenth on Zimmerman's list -- "Fully exploit our direct-to-consumer side, including e-commerce opportunities." "Brick and Mortar Man," Cincinnati Post Courier (Oct. 15, 1999).

¹⁰ "Doom and gloom on the e-tail front," Upside Today (Apr. 28, 2000).

¹¹ "Talbots Catalog Sales," Talbots 1999 Annual Report (emphasis in original).

Federated's annual report for 1999 describes how both the department store and direct-to-consumer segments of its business will benefit from multi-channel retail integration. According to Federated, "clicks can help bricks" by driving traffic to stores, reaching and attracting new customers, deepening relationships with existing customers, expanding the range of merchandise offerings, and enhancing gift registry services. "Bricks can help clicks" by leveraging trusted store brands, providing merchandising expertise, building on established vendor relationships, providing immediate access to products, and making merchandise returns more convenient.¹²

Non-integrated vendors also recognize the complementarities that exist between on-line sales and the other retail channels. Industry executives suggested to us that the best Internet strategy for non-integrated vendors may be to build information sites that control the "customer experience," but which then provide links to the sites of their "retail partners" (principally department stores) where the customer can complete his or her purchase. Vendors' have a comparative advantage in presenting their products to consumers in the most effective way. Vendors also would like to use the Internet to communicate with and learn more about consumers who purchase their products. But vendors recognize that they do not have the infrastructure to fulfill on-line orders, nor do they have a large enough network of retail stores to make it easy for customers to exercise their option to return unwanted merchandise. Put differently, they recognize they lack the ability acting alone to realize the full benefits of multi-channel retailing. For these reasons, rather than selling directly from their own sites, it may be more efficient for vendors to provide links to department store web sites where customers can make their on-line purchases. The vendors might provide on-line links to multiple stores, and consumers could choose among these on-line options in the same way that consumers currently choose which brick and mortar stores to patronize.¹³

¹² Federated Department Stores, Inc. 1999 Annual Report at 4.

¹³ This cooperative model of doing business on-line is still in development in the apparel industry. In our sample of apparel firms (described below), we found only one example of

C. ECONOMIES OF SCOPE BETWEEN CATALOG OPERATIONS AND ON-LINE SALES

The complementarity between on-line sales and the other channels of retail distribution ("multi-channel retailing") suggests that catalog firms and firms with stores may have had an advantage over non-integrated vendors in their ability and incentive to begin selling apparel on-line. Non-integrated vendors such as Calvin Klein, Polo Ralph Lauren and Tommy Hilfiger have small networks of retail stores. But they do not have catalogs, and most of their sales are through department stores and other third-party retailers.

There is a related factor that may be even more important in explaining which firms in the apparel industry were most likely to respond early to the opportunities and threats presented by the Internet. This factor is whether a firm had pre-existing catalog operations at the start of the e-commerce age.¹⁴ Firms that operate catalogs can (and do) use the same systems to fulfill on-line orders.¹⁵ The only difference from an order fulfillment perspective is how the orders are received -- i.e., over the Internet versus through a call center or by mail. According to Lands' End, "We've been direct marketing by catalog for more than 25 years. Translating our fulfillment method to the Internet was easy. In fact, once an order arrives at our fulfillment center, there is no immediate way of knowing which sales channel the customer used because the fulfillment process for each is identical."¹⁶ According to J.C. Penney, "There's essentially little difference

(...continued)

links from a vendor's site to the site of a department store "partner." Levi Strauss' web site provides links to J.C. Penney and Macy's, its two largest customers. The other vendors in our sample at this point are merely offering store locator services.

¹⁴ In the empirical analysis below, we treat 1995 as the start of the "e-commerce age." We selected this date because it was the year after Netscape introduced the browser that arguably spawned public access to the World Wide Web.

¹⁵ Order fulfillment covers a range of activities including receiving product from vendors; managing warehouse inventories; answering customer questions through call centers; processing on-line orders; picking product from inventory, packaging the product and then arranging for shipping; and handling mail returns.

¹⁶ "Paging Rudolph," Chain Store Age (Oct. 1, 2000).

between shipping out Web orders and shipping out catalog orders. The fulfillment skills we learned with the catalog business translate well to the Web, so when we decided to go on line, we were able to focus the better part of our energies on building a strong Web infrastructure -- things like site design and server capacity -- rather than on figuring out how to fulfill orders on the Web."¹⁷

The evidence of economies of scope in order fulfillment between catalog operations and on-line sales seems compelling. This theme appears in company statements and various consulting reports. It also was a recurring theme in our interviews with apparel industry executives. It is somewhat less clear, however, whether these economies can be realized effectively by a non-catalog firm through out-sourcing. There are firms, such as Fingerhut (before its acquisition by in 1999 by Federated) and Hanover Direct (a catalog company), that provide fulfillment services to third-party e-retailers.¹⁸ J.C. Penney recently entered the third-party fulfillment business by agreeing to provide fulfillment services for Ann Taylor's new on-line shopping site.¹⁹

The decision by an e-commerce firm whether to make or buy fulfillment services turns in part on scale. Given the prices charged by third-party fulfillment firms (about 10% of sales price²⁰), it is estimated that an e-commerce firm must ship 8,000 to 10,000 packages per day to justify the investment required to build and operate a distribution center.²¹

¹⁷ "Penney's Net Advantage," Chain Store Age (Sep. 1, 2000).

¹⁸ "The Many Channels of Fingerhut," Chain Store Age (Jun. 1, 2000).

¹⁹ "J.C. Penney Co.: Agreement is Set to Handle Orders for anntaylor.com," Wall St. J. (Jun. 14, 2000).

²⁰ Chu, Standley & Reiss, "Dressed for Success: Apparel Competitors Move Online," Mainspring (Aug. 14, 2000).

²¹ Bhise, Farrell, Miller, Vanier & Zainulbhai, "The Duel for the Doorstep," The McKinsey Quarterly, No. 2, 32-41 (2000).

The decision whether to make or buy fulfillment services also turns on concerns about customer service. "Fulfilling customer orders and expectations is no longer an afterthought that happens after the all-important sale. It is a critical component of serving the customer and gaining repeat business and a key business function for any online retailer."²² And, because order fulfillment is so important to customer satisfaction, there are concerns among e-retailers that out-sourcing risks loss of control. SmarterKids.com, which makes educational toys, provides an example. It recently made the investment required to bring fulfillment in-house. The company explained, "Our [fulfillment] partners were very responsive to our needs, but we wanted to bring things under our own roof so we're better able to react to changes in demand."²³ Our interviews with apparel industry executives uncovered similar thinking. There is a minimum order level below which in-house fulfillment is uneconomic. But, in general, there seemed to be a preference for keeping order fulfillment within the company to maintain better control and to avoid risking the loss of customer satisfaction.²⁴

For the reasons explained above, there appear to be strong economies of scope between catalog operations and on-line orders in the area of order fulfillment. There also appears to be a general (though not universal) belief that using third-party order fulfillment specialists is risky, given the importance of order fulfillment to customer satisfaction. These two factors -- scope economies and concerns about out-sourcing -- suggest that apparel firms that

²² "Fulfilling Relationships," Part 1 (retailindustry.about.com/industry/retailindustry/library/weekly/aa000711a.htm) (downloaded Nov. 1, 2000).

²³ "Paging Rudolph," Chain Store Age (Oct. 1, 2000).

²⁴ There are several "pure play" companies that sell apparel on-line including bluefly.com, AndysGarage.com, bargainclothing.com and designeroutlet.com. As the names of a number of these companies suggest, these companies specialize in discount merchandise, which they obtain from manufacturers and/or resellers. The way in which these pure play companies handle order fulfillment lends further support to the view that third-party fulfillment is an imperfect substitute for in-house fulfillment. All of these companies have their own warehouses, arrange shipping themselves, and handle billing internally.

had catalog operations in place at the start of the e-commerce age had an advantage with respect to starting up on-line sales.

IV. THE ORGANIZATIONAL FORM HYPOTHESIS

Firms in the apparel industry that already had stores and/or catalog operations may have had an advantage in developing on-line sales operations over firms that did not already have large networks of stores and/or catalog operations. Our working hypothesis is that organizational form is another and separate factor that has affected the ability and incentive of firms in the apparel industry to adapt to the Internet. More specifically, our working hypothesis is that, even after controlling for other factors (e.g., a network of stores, pre-existing catalog operations), vertically integrated firms in the apparel industry such as The Gap had a greater ability and incentive to adapt to the Internet than non-integrated department stores and vendors. Our reasons for this hypothesis are all based ultimately on transaction costs. For expositional convenience, we divide the reasons into three groups -- coordination costs, externality problems and channel conflict.

A. COORDINATION COSTS

The concept of coordination costs has already surfaced implicitly in our discussion of the alleged disadvantages faced by non-integrated vendors that rely primarily on department stores and other third-party stores for retail distribution. It is widely accepted that there are important complementarities associated with a multi-channel approach to retailing. In a multi-channel, "click and mortar" approach, on-line marketing is coordinated with in-store promotions; on-line purchases can be returned by mail or at the store; stores have kiosks so that customers can make on-line purchases of products that the store does not have in its inventory, etc. Because non-integrated vendors lack a large network of brick and mortar stores (and because they also lack catalog operations), their ability to take advantage of multi-channel complementarities may be constrained.

But note the role of coordination costs in this discussion. If coordination costs were zero, a non-integrated vendor such as Tommy Hilfiger could sell on-line directly from its own web site and negotiate arrangements with its retail distribution partners that addressed the disadvantages to on-line selling that the Tommy brand allegedly faces. If coordination costs were zero, Tommy Hilfiger could negotiate side-deals so that on-line marketing was coordinated with in-store promotions, returns of goods purchased on the Tommy web site could be returned at any department store that carries Tommy merchandise, etc. Alternatively, Tommy Hilfiger could negotiate cooperative arrangements of the type described above in which the Tommy site would provide customer information and control the "customer experience," but would have links to department store sites where the customer would make his or her on-line purchase. Either way, if coordination costs were zero, Tommy Hilfiger could realize all of the benefits of multi-channel retailing. Thus, the fact that the lack of brick and mortar stores is seen as an obstacle to on-line success for non-integrated vendors is evidence that coordination costs matter.

The concept of coordination costs also surfaced implicitly in our discussion of the risks to customer satisfaction allegedly associated with out-sourcing of fulfillment services. If coordination and other transaction costs were zero, on-line sellers could use third-party fulfillment specialists without worrying about principal-agent problems and the incentive of the specialist (agent) to deliver fulfillment services at the levels desired by the on-line seller (principal). Thus, the fact that concerns exist about the reliability of third-party fulfillment specialists is additional evidence that coordination costs matter.

With this as background, we now discuss other coordination costs that may put non-integrated department stores at a disadvantage relative to vertically integrated specialty retailers with respect to their ability and incentive to adapt to the Internet. We understand from our interviews that, before a department store can offer a vendor's products for sale on its web site, the creative departments of the store and vendor typically must negotiate a set of brand guidelines that will govern the on-line presentation of the vendor's brand. The creative departments must also negotiate who will shoot the pictures that appear on the web site and

who will have responsibility for the layout of the on-line product description. Once these brand guidelines have been established, it becomes easier for a department store to add additional products from the same vendor; the on-line presentation of the additional products will be governed by the previously negotiated brand guidelines, and job responsibilities will be allocated as before. But, every time the department store wants to add a new vendor to its web site, a new set of negotiations typically is required.

There may be similar discussions from time to time between departments of a vertically integrated firm such as The Gap regarding on-line marketing strategies and product presentation.²⁵ Our hypothesis, however, is that the frequency and costs of these inside-the-firm discussions are considerably lower than the costs of the negotiations required between non-integrated brand-owning vendors and non-integrated, web site-operating department stores.

Department stores face other vendor-related problems that a vertically integrated specialty retailer is unlikely to face. For various reasons, certain vendors reportedly do not allow certain department stores to offer their products for sale on-line:

"Vendors are another problem. Two years after its launch, Nordstrom.com is still trying to convince designers to let the store sell their merchandise online. Kate Spade, for example, won't allow her handbags to be sold on Nordstrom.com. ...

Neiman Marcus has hit the same wall. Karen Katz, president and CEO of Neiman Marcus Direct, which manages the company's catalog and e-commerce divisions, says Neiman-Marcus.com is not permitted to sell Giorgio Armani, Chanel and Estee Lauder because these companies are in the midst of sorting out their own e-commerce strategies."²⁶

²⁵ One of the insights of the modern literature on vertical integration is that integration does not magically eliminate the sources of disputes that arise when firms deal with one another on an arm's length basis. As a first approximation, integration converts inter-firm problems into intra-firm, inter-divisional problems. See, e.g., Katz, "Vertical Contractual Relations," in R. Schmalensee & R. Willig (eds.), *Handbook of Industrial Organization*, Vol. 1 655 (1989).

²⁶ "Saks Shops for Customers Online," *The Industry Standard* 58, 59 (Aug. 28, 2000).

Macy's and J.C. Penney ran into similar problems in 1999 when Levi Strauss experimented with direct sales from its own web site and requested that its retailers cease offering Levi products on-line. Macy's and J.C. Penney are Levi Strauss' two largest customers.²⁷

B. EXTERNALITY PROBLEMS

For the reasons explained above, coordination costs may constrain the ability of both department stores and non-integrated vendors to adapt to the Internet. Channel conflict (discussed below) is another constraint that non-integrated firms in the apparel industry appear to face. In addition, there is an externality problem that would appear to attenuate the incentive of department stores to invest in developing and promoting their on-line businesses.

Neither the department store industry nor the apparel manufacturing industry is perfectly competitive. This means that when a department store's on-line operations generate incremental sales, the profits from the sale are shared with the vendor / brand owner -- a form of externality. The magnitude of this externality is suggested by a recent study by McKinsey & Co. and Salomon Smith Barney of profitability per order in the on-line retail category in the fourth quarter of 1999.²⁸ According to this study, the average gross margin on on-line sales for "apparel manufacturers" was 46%. In contrast, the gross margin for "multilabel apparel retailers" was 9%. These figures suggest that, when a department store's web site generates an incremental sale of \$100, the sale generates \$9 in gross profit for the department store and approximately \$37 (= \$46 - \$9) in gross profit for the vendor / brand owner.

This externality will limit the incentive of retailers to invest in developing and promoting their web sites unless there is some form of co-op funding or restructured pricing. But this

²⁷ As discussed in more detail below, in October 1999, Levi Strauss reversed its decision to sell on-line direct from its own web site, at which point Macy's and J.C. Penney resumed on-line sales of Levi products. Levi's web site now has links that allow on-line shoppers to make purchases from the web site of either department store.

²⁸ "Pure Play: A Losing Model?" The Industry Standard 192-93 (Jun. 26, 2000).

requires negotiation, monitoring, enforcement and other transaction costs. We understand from our interviews that co-op funding does take place and that vendors make payments to department store web site operators in return for premium placement on the web site. Even so, we conjecture that these solutions are imperfect and that an externality problem remains.

The fact that the relationship between vendors and department stores is non-exclusive makes the externality problem even harder to solve. First, because vendors sell through multiple department stores, they would need to negotiate with multiple department stores if they wanted aggregate on-line investment in their brands to be at the optimal levels. Second, because department stores handle multiple brands, the willingness of brand owners to finance department store on-line investments may be dampened by free rider concerns. For example, if Polo Ralph Lauren hypothetically subsidized the development of the Macys.com web site, the vendor might be concerned that other vendors would take a free ride on the improvements in the Macys.com site.

Vertically integrated specialty retailers such as The Gap may face similar externality issues to some degree between their manufacturing and retailing divisions. These problems, to the extent they exist, might show up as transfer pricing problems. Our hypothesis, however, is that the magnitude of any such intra-firm problems is likely to be considerably smaller than the externality problem that exists across firms when the manufacturer and distributor compete in markets that are not perfectly competitive.

The externality problem just described should affect the total amount that department stores are willing to invest in their web sites. The externality problem may also affect the timing of on-line investments. Initial investments in e-commerce are motivated in part by a desire to learn about the on-line channel and to experiment with different concepts of multi-channel retailing. As Dillard's explained when it launched its on-line store in 1999, "We're going to put our toe in the water. We're not going to do much business the first year, but we're going to

learn."²⁹ Thus, initial investments in e-commerce have a significant real option component. The incentive to invest in this option to learn will be attenuated for department stores because of the externality problem that limits their ability to capture the full benefits of their investments in e-commerce.

C. CHANNEL CONFLICT

On October 29, 1999, Levi Strauss announced a reversal of its e-commerce strategy. Rather than continuing to invest in on-line sales of Levi products direct from its own web site, Levi would stop on-line sales to consumers after Christmas 1999 and it would permit on-line sales by retailers beginning with J.C. Penney and Macy's, its two largest customers.³⁰ At the time, many articles appeared that suggested that Levi's decision was driven by concerns about channel conflict. According to these articles, Levi reversed its e-commerce strategy because of complaints from its retailers who were upset that, by selling direct to consumers from its own web site, Levi was competing against them for sales.³¹

There is considerable evidence that many firms in a variety of industries regard channel conflict as a significant issue. Home Depot, for example, has been especially blunt about its views on the subject. In June 1999, Home Depot sent a letter to its vendors that said, "We recognize that a vendor has the right to sell through whatever channel it desires. However, we too have the right to be selective in regard to vendors we select, and we trust that you can

²⁹ "Dillard's Plans to Begin Internet Sales This Summer," Dow Jones News Service (May, 16, 1999).

³⁰ See, e.g., "501 Blues" Business 2.0 53-56 (Jan. 2000) and "Levi Strauss Will Halt Sales On Its Web Site," San Francisco Chronicle (Oct. 29, 1999).

³¹ It should be noted that Levi Strauss denied that frustration on the part of its retailers contributed to its decision to change its e-commerce strategy. When the change was announced in October 1999, the company explained, "during the past year, it became clear to us that the cost of running a truly world-class e-commerce business is unaffordable right now as we look at other competing priorities." "Levi's to quit selling online," San Francisco Examiner (Oct. 29, 1999).

understand that a company may be hesitant to do business with its competitors."³² Liz Claiborne is one example of a vendor in the apparel industry who explicitly cites channel conflict as a reason for not selling on-line. In late 1999, the company stated, "We are currently not selling Liz Claiborne products on-line because we don't want to compete with our retail partners. Instead, we are looking for our retailers to help us tap the potential of this emerging channel of distribution."³³

The reality of channel conflict is also reflected in the manner in which certain manufacturers have begun on-line sales. For example, it appears to be common for manufacturers to assure their retailers that prices on the manufacturer's site will be at or above the suggested retail prices.³⁴ Other manufacturers have responded to channel conflict by limiting the scope of their on-line product offerings, in some cases only offering entirely new products that are not available off-line.³⁵

During our interviews, we heard various views on the significance of channel conflict in the apparel industry. Industry executives agree that channel conflict is a major issue for non-integrated vendors contemplating selling apparel directly from their own web site. But executives of department stores and specialty retailers state, in contrast, that they are not worried at all about the analogous channel conflict that could arise between store managers and the managers of these companies' on-line operations. The executives of the department stores

³² "Internet Channel Conflicts," *Stores* (Dec. 1999).

³³ *Id.*

³⁴ "E-Commerce Report," *New York Times* C-7 (Jan. 3, 2000) (describing Nike's pricing policies); Thunder House, "Strategies for Addressing Channel Conflict on the Web," *Bifocals* (Mar. 1999) (discussing the pricing policies of Estee Lauder and Rubbermaid); "Internet Channel Conflicts," *Stores* (Dec. 1999) (discussing the pricing policies of VF Corporation, an apparel manufacturer). There is also empirical evidence showing that manufacturers' actual on-line pricing practices are consistent with these assurances. See Carlton & Chevalier, "Free Riding and Sales Strategies for the Internet," NBER Working Paper (2000).

³⁵ "New Covenants Ease Online Channel War," *Computerworld* (May 17, 1999); "Doom and gloom on the e-tail front," *Upside Today* (Apr. 28, 2000) (discussing Procter & Gamble's creation of a new line of beauty products for its Reflect.com web site).

and specialty retailers point to the low volume of on-line sales to explain their lack of concern about internal channel conflict. They say they are not worried primarily because the volume of on-line sales to date has been so small that, even if there has been some diversion of sales from the stores, the effects have been nearly imperceptible.

These different views about the significance of channel conflict are consistent with our hypothesis about the effects of vertical integration. On-line sales by department stores and specialty retailers enhance the attractiveness of their total retail operations (multi-channel retailing). This is a benefit to the overall corporation. Eventually there may be some concerns by store managers within these firms about diversion of sales and the effect on their compensation. But our hypothesis is that the costs of resolving such conflicts inside the firm will be relatively low.³⁶ Hence, it is not surprising that executives of department stores and specialty retailers are not especially concerned about internal channel conflict.

The situation is different with respect to on-line sales by non-integrated vendors. The ability of customers to buy Polo Ralph Lauren apparel on-line at polo.com enhances the overall attractiveness of Polo Ralph Lauren's retail operations, which is a long-run competitive threat to department stores and other third party retailers. In deciding whether to offer on-line sales capability, non-integrated vendors need to assess how their department store partners are likely to respond to this threat and whether there should be changes in the terms of the contractual relationship between vendors and department stores. Finding an equilibrium solution to these inter-firm issues is likely to require time, negotiation and experimentation. Taken together, it is not surprising that executives in the apparel industry regard channel conflict between vendors and department stores as a major issue.

³⁶ An example of how internal channel conflict problems might be addressed firms is suggested by the way in which J.C. Penney measures the performance of its store managers. Store managers are evaluated in part based on a store-level profit and loss statement that includes an attribution of income for catalog and on-line sales customers who pick-up merchandise at the manager's store or whose zip code is in the store's "trading area."

V. SAMPLE CONSTRUCTION

Apparel is a very large product category. In selecting a sample of firms in this large industry to study, we began with The Gap because The Gap is widely regarded as one of the leaders in on-line sales of apparel. Thus, our first objective in constructing a sample was to identify vendors and retailers offering merchandise similar to that offered in The Gap. To narrow the field further, we focused on men's wear and women's wear. We excluded children's wear, athletic wear, footwear, intimate apparel and discount stores.

Table 3 describes how we went about identifying firms that met these criteria. As the table indicates, our first step was to identify apparel firms that were identified as competitors of The Gap by Hoover's On-Line that also met our product category criteria. Hoover's On-Line (www.hoovers.com) is a business information "portal" that offers profiles of thousands of public and privately held companies. This first step in the sample construction process generated 24 competitors of The Gap -- eight specialty retailers, eight department stores and eight vendors.

The next step in our process was to consider whether there might be other vendors who should be included in the sample. To investigate this question, we identified designer, jeans and sportswear brands from the Fairchild 100 list of most familiar brands that were not already in the sample. For each brand in this group, we examined its Hoover's On-Line profile to determine whether The Gap was listed as a competitor. This process added two vendors to our sample.

The next step in our sample construction process was to consider whether there might be other specialty retailers who should be included in the sample. To investigate this question, we identified apparel retailers from the Stores List of Top 100 Specialty Stores that were not already in the sample. We then followed the same procedure. We examined the Hoover's On-Line Profile for each such firm to determine whether The Gap was listed as a competitor. This process added three specialty retailers to the sample.

We also considered whether there were other department stores that should be included in the sample. To investigate this question, we first compared a long list of department stores obtained from Hoover's On-Line with a shorter list obtained from the Stores List of Top 100

Retailers. We identified department stores (such as Neiman Marcus) that were on both lists. We then checked the Hoover's On-Line profiles for each firm in this set to determine if The Gap was listed as a competitor. We also called the stores to check whether they carried the brands of the vendors that were in our sample. This research produced no additional department stores that should be added to our sample.

Table 4 lists the 30 firms in our sample and supplies background information that was used in the empirical analysis described below. The table indicates whether the company is selling apparel direct from its own web site and, if so, when on-line sales began.³⁷ The table also shows sales for the most recently available fiscal year, whether the company had catalog operations in 1994 (prior to the start of the e-commerce age), whether the company has catalog operations today and (in many cases) when catalog operations began. The information on when on-line sales and catalog operations began was obtained from web sites, company reports, newspaper articles and phone calls to the companies.

VI. EMPIRICAL ANALYSIS

This section reports the results of our empirical analysis of whether there is a relationship between organizational form and the speed and success with which firms in the apparel industry have adapted to the Internet.

A. SPEED

On-line sales are viewed as a complement to in-store and catalog sales, and all of the apparel retailers we have researched either have begun on-line sales or plan to do so. This,

³⁷ Identifying the year in which on-line sales began required judgment in some cases. J.C. Penney, for example, had a web site during the Christmas season of 1994. But, to place orders, a customer was instructed to call an 800 number. Our rule in constructing Table 4 was as follows. We did not consider on-line sales to have begun unless the site displayed merchandise and it was possible for customers to purchase the merchandise on-line. By this rule, J.C. Penney did not begin on-line sales until 1998.

however, does not mean that faster is necessarily better and, indeed, the firms that have gone slower have their explanations. Saks Fifth Avenue did not launch its on-line store until the fall of 2000. According to an article in the trade press:

"Saks says it waited to launch its site until it was certain that the technology -- enlarge and zoom functions, along with easy checkout and payment -- would work. 'We spent a tremendous amount of time making sure that no one would ever have to use the Back button,' says Denise Incandela, the COO of Saks Direct, which oversees the store's e-commerce offerings."³⁸

Nordstrom.com, which did not launch until October 1998, suggested to us in an interview that one of its concerns was modem speed. Selling apparel on-line requires displaying high quality pictures of the merchandise. Downloading these pictures can become a source of consumer frustration if the consumer has a slow modem.

The Limited is the only specialty retailer in our sample that has not begun on-line sales. The Limited is engaged in e-commerce through its 84% ownership interest in Intimate Brands, which owns Victoria's Secret. But, as of now, The Limited does not offer on-line shopping for its Limited, Express, Lane Bryant or Lerner New York brands. The Limited told us in an interview that it expects to offer on-line shopping for these brands in the relatively near future, but right now it is still in the planning stage. It also says that it regards itself as fortunate for having gone slowly. The Limited claims that, by not "racing ahead," it was able to learn from others about what works on the Internet. And it believes it was able to obtain this learning without suffering any competitive disadvantage. The executive with whom we spoke emphasized the significance of brand names. In his view, because brand names are so important in the sale of apparel, there are no first-mover advantages associated with on-line sales. When The Limited decides to launch on-line sales of Lane Bryant, it will not have to worry that some other on-line firm has already filled this part of the product space. In his view, apparel brands are sufficiently differentiated that first-mover advantages are a non-issue.

³⁸ "Saks Shops for Customers Online," *The Industry Standard* 58, 59 (Aug. 28, 2000).

Justifications such as these for going slow are not obviously wrong. And it may well be that the decision on when to begin on-line sales varies across firms at least in part for firm-specific reasons and judgments that are unrelated to organizational form. However, for the reasons explained below, we believe this explanation is incomplete. The timing of on-line sales in the apparel industry also appears to be the product of systematic factors related to whether a firm is vertically integrated.

The evidence of this relationship is summarized in Tables 5 and 6. Table 5 is a time line that shows, by year, when different companies began selling apparel on-line. The companies that had catalog operations prior to 1995 are marked with an asterisk. As discussed above, because of the economies of scope between on-line sales and catalog operations, one might expect firms with pre-existing catalog operations to be early candidates for on-line sales, regardless of their degree of vertical integration.

Table 5 by itself shows some clear patterns. There are seven specialty retailers in our sample that did not have pre-existing catalog operations. Six of these seven firms are now selling apparel on-line. In contrast, there are two department stores in our sample that did not have catalog operations prior to 1995. Neither of these chains has yet begun on-line sales of apparel. Similarly, there are nine non-integrated vendors in our sample that did not have pre-existing catalog operations. Only three of these nine firms have begun selling apparel on-line.

Table 6 analyzes the data in Table 5 more completely. The top panel of Table 6 reports cumulative frequency distributions and is self-explanatory. The bottom panel reports the results of an ordered logit analysis. The dependent variable in this analysis has four possible scores -- 1 if on-line sales began in or before 1996; 2 if on-line sales began in 1997 or 1998; 3 if on-line sales began in 1999 or 2000; and 4 if on-line sales have not yet begun. There are three explanatory variables -- a dummy variable to indicate if the firm is a specialty retailer (SPCLTY),

a dummy variable to indicate if the firm is a department store (DEPT), and a dummy variable (PRE95CAT) to indicate if the firm had catalog operations prior to 1995.³⁹

In an ordered logit analysis, the score is modeled as a linear combination of the explanatory variables X and a set of cut points c . The probability that observation j has score i equals:

$$\Pr(\text{score}_j = i) = \Pr(c_{i-1} < X_j b + u_j \leq c_i).$$

In an ordered logit analysis, the error term u is assumed to have a logistic distribution. In our case, there are four possible scores, so there are three cut points defining the intervals $(-\infty, c_1)$, (c_1, c_2) , (c_2, c_3) and (c_3, ∞) . We use maximum likelihood methods to estimate the parameters b of the logistic function and the cut points c . Each set of logistic parameters and cut points defines a classification system. The goal is to find the parameter values and cut point values that, when applied to our sample, generate predicted classifications that agree most closely with the actual values of the scores in our sample.⁴⁰

Table 7 reports the results of the ordered logit estimation. The coefficient on SPCLTY is negative and statistically significant. The interpretation of coefficients in an ordered logit model is somewhat complicated.⁴¹ One clear implication, however, is that a negative sign on SPCLTY means that, all else equal, specialty retailers have a higher probability of being in the lowest state -- i.e., the state for firms that began on-line sales in or before 1996. Note that one of the

³⁹ The third type of apparel firms in our sample, for which we did not create a dummy variable, are non-integrated vendors. Given this design of the dummy variables, the coefficients on the dummy variables in our analysis capture the effect of being a vertically integrated specialty retailer (SPCLTY) or department store (DEPT) relative to being a non-integrated vendor. We used non-integrated vendors as the base (instead of department stores) because the sample frequencies in the top panel of Table 6 suggests that, after controlling for pre-existing catalog operations, non-integrated vendors appear to have been faster in launching on-line sales than department stores.

⁴⁰ We estimated the ordered logit model using software from Stata. The Stata manual has a good discussion of ordered logit analysis. See also G. Maddala, *Limited Dependent Variables and Qualitative Variables in Econometrics* 46-49 (1983).

⁴¹ See, e.g., W. Greene, *Econometric Analysis* 674 (2d ed. 1993).

factors held constant in the estimation is whether the firm had catalog operations prior to 1995. Thus, SPCLTY has a negative effect, even after controlling for pre-existing catalog operations.

The bottom panel of Table 6 provides a more useful summary of the ordered logit results. The last two rows of the panel evaluate the estimated model under the assumption that firms had catalog operations prior to 1995 ($PRE95CAT = 1$) and, alternatively, under the assumption that firms did not have pre-existing catalog operations ($PRE95CAT = 0$). Not surprisingly, the predicted cumulative probability distributions under these two assumptions are very similar to the sample cumulative frequency distributions in the two rows in the top panel of Table 6. Because the logistic function is continuous, the estimated distributions show more "weight" in the tails than is observed in the sample distributions, but otherwise the estimated and sample distributions are quite similar.

The first row of the bottom panel of Table 6 evaluates the ordered logit model at the sample mean of the "pre-existing catalog operations" dummy variable. This variable ($PRE95CAT$) is the only explanatory variable in the model that is not related to organizational form. The results in the first row provide a single summary of the incremental effects of organizational form. The results in this row show that, as of each date depicted (1996, 1998 and 2000), specialty retailers were appreciably more likely to have begun on-line sales than either department stores or non-integrated vendors -- even after controlling for pre-existing catalog operations.

The results in Tables 5, 6 and 7 are consistent with our hypothesis concerning the advantages that vertically integrated firms may have in responding to the Internet. Put differently, the results are consistent with our hypothesis that vertically integrated firms in the apparel industry have begun on-line sales earlier because of advantages with respect to coordination costs and investment incentives. The results in Tables 5, 6 and 7 are inconsistent with the null hypothesis that the timing of on-line sales in the industry is due to firm-specific factors that are unrelated to organizational form.

B. PRODUCT COVERAGE

When a firm in the apparel industry begins selling on-line, the number of products that it offers at the start typically is relatively small. This appears to be true regardless of organizational form. Ann Taylor, for example, is a specialty retailer that began on-line sales in the fall of 2000. At its launch, anntaylor.com offered only 25 SKUs. Similarly, the department store Neiman Marcus launched its web site in October 1999 and offered only 500 SKUs on-line. This on-line offering was tiny relative to the "tens of thousands" of SKUs reportedly available in its stores.⁴²

As an on-line seller gains experience, it typically adds SKUs to its on-line store. But this process takes time. J.C. Penney, for example, began rudimentary sales through the Internet in 1994; users could learn a little about the product on the J.C. Penney web site and were then instructed to call an 800 number to place an order. It was not until 1998 that J.C. Penney began on-line sales as we define it -- on-line display of merchandise plus the ability of customers to buy on-line. And, based on an interview with J.C. Penney, it was not until the Christmas season of 1999 that J.C. Penney could offer on-line product coverage that matched its in-store and catalog product coverage. The executive from J.C. Penney with whom we spoke emphasized that "content management" is a significant issue -- i.e., getting merchandise displayed and keeping the web site current.

Our hypothesis about vertical integration implies that specialty retailers have advantages in extending the scope of their on-line product offerings. Specialty retailers do not have to negotiate with vendors over whether a brand can be sold on-line and, if so, the guidelines for the brand's on-line presentation. In addition, the incentive of specialty retailers to invest in content management systems is not attenuated by the externality problem discussed above -- the difficulty that department stores have in capturing the full gains from incremental sales.

⁴² "Saks Shops for Customers Online," *The Industry Standard* 58, 61 (Aug. 28, 2000).

One way to examine product coverage systematically would be to compare the number of SKUs available on-line in a given product category with the number of SKUs in the category available in the typical brick and mortar store. If we had such data, we could examine whether the on-line stores of specialty retailers display a higher percentage of their in-store SKUs. Unfortunately, we have been unsuccessful in our efforts to obtain data on in-store SKUs by product category from the companies in our sample.

There is, however, a simpler point to be made with respect to product coverage. We know that a customer who is used to buy Gap merchandise at Gap stores can buy on-line nearly everything that he or she can buy in the Gap stores. Table 8 shows that the same is generally true for all of the specialty retailers and catalog companies in our sample. Their on-line product selection typically is the same or greater than the product selection available in their stores or through their catalogs.

A customer who is used to buying Nautica merchandise at a department store may have more difficulty buying Nautica merchandise on-line. First, his or her favorite department store may not have an on-line store. May Department Stores is one of Nautica's biggest customers. None of the May department store chains is selling on-line. Second, even if his or her favorite department store is selling on-line, the department store's on-line store may offer only a limited selection of Nautica apparel. As shown in Table 9, this is the situation (as of this writing) for Nordstrom and Nordstrom.com. Table 9 also identifies situations where a brand's merchandise is available in the store, but not available at all for on-line purchases. Third, the customer trying to buy Nautica apparel on-line will not receive much assistance from Nautica's web site. Nautica's web site does not offer on-line sales. It is an informational site that describes its product line. And it currently has no links that would help the customer find a place to buy Nautica products on-line. Instead, the site merely offers a store locator function.

This difference in on-line availability of merchandise from vertically integrated specialty retailers such as The Gap and non-integrated vendors such as Nautica fits our hypothesis about the effects of vertical integration. Why have department stores been relatively slow to launch

on-line sales? Our hypothesis is that at least part of the reason is higher coordination costs and externality effects. Why have non-integrated vendors been reluctant to sell directly to consumers over the Internet? Our hypothesis points at least in part to channel conflict concerns -- concerns that we suggest are largely a non-issue when they arise inside of a firm. Why have most vendors not created links to sites where their merchandise can be purchased on-line? We suspect that this is another manifestation of coordination costs -- coordination costs avoided by specialty retailers whose sites combine both product information (displayed in a way that promotes the brand) and the opportunity to make on-line purchases.

C. WEB SITE RATINGS

We hypothesize that the incentive of department stores to invest in developing and promoting their on-line businesses may be attenuated by externality problems. Similarly, the investment incentive of the non-integrated vendors that have begun on-line sales may be reduced (relative to the incentive of specialty retailers) by the difficulties non-integrated vendors may have in capturing the full benefits of multi-channel retailing. One way these effects on investment incentives might manifest themselves is in the quality of these firms' on-line businesses. As a result of lower investment, the web sites of department stores and non-integrated vendors might have fewer functions, customer service might be a little poorer, etc.

To examine this possibility, we analyzed data on the e-commerce ratings assigned to firms in our sample by Gomez.com, a company that specializes in reviewing e-commerce operations. Gomez publishes reviews quarterly and has a special section on apparel firms. The Gomez reviews are prepared by company employees based on examination of web sites, performance monitoring of secure and non-secure pages, and customer service interaction over the telephone and through the Internet. The Gomez analysts rate e-commerce businesses based on up to 150 subjective criteria. The specific criteria used in rating apparel sites include whether the site provides an on-line fit guide, a virtual changing room, and an on-line gift

registry. The general criteria relate to ease of use, customer confidence, on site resources, and relationship services.⁴³

Gomez recently reduced the number of apparel firms that it covers. As a result, its report for Fall 2000 covers only eight of the firms in our sample. Gomez, however, provided us with historical data on its ratings of apparel sites for Fall 1999, Spring 2000 and Summer 2000 -- periods when its coverage was broader. Table 10 lists the data on Gomez ratings that we received and shows, for each quarter, the mean and median ratings for specialty retailers, department stores and non-integrated vendors. The ratings shown are the Gomez "overall scores," which have a theoretical range between 0 (the worst) and 10 (the best). Note that Gomez did not report ratings for all of the firms in our sample that had on-line businesses.

Table 10 shows that the median rating for specialty retailers was greater than the median for either department stores or vendors in each quarter shown. The mean rating for specialty retailers was greater than the mean for vendors in all three quarters and greater than the mean for department stores in two of the three quarters shown.

To examine these data more systematically, we pooled the data and estimated a simple regression model. The dependent variable was the Gomez rating. The explanatory variables were dummy variables indicating if the firm was a vendor or department store; dummy variables for the Fall 1999 and Spring 2000 seasons (to control for time-related fixed effects in the Gomez ratings⁴⁴); and a dummy variable to indicate if the company began on-line sales prior to 1999. We included this last dummy variable to allow for the possibility that new on-line businesses may suffer from start-up problems that hurt their quality ratings.

⁴³ www.gomez.com/scorecards/methodology.cfm?topcat_id=19.

⁴⁴ The analyst from Gomez who provided us with these data cautioned us that scores were not directly comparable across time. For example, if a company received a "6" in Fall 1999 and a "5" in Summer 2000, the company's site actually might have improved. The decline in rating might be because Gomez was using stricter criteria in Summer 2000 than it had been using in Fall 1999. We have included the dummy variables for the Fall 1999 and Spring 2000 seasons as a means of controlling for this effect.

Table 11 reports the results of this regression analysis. The table reports two specifications -- with and without the dummy variable that flags older sites. The table also reports the results under two methods of estimation -- ordinary least squares ("OLS") and generalized least squares ("GLS"). The GLS results take account of the fact that 36 of the 39 observations come from 12 firms, for which we have three observations each. This structure suggests that the error term for firm i in period t has two components -- a component that captures observation-specific effects and a component that captures group effects common to each firm i . The GLS estimation takes this structure into account and, as expected, produces larger estimates of the standard errors than in the OLS estimation.⁴⁵

The signs of the results in Table 11 are consistent with our hypothesis about the possible effects of vertical integration on the quality of web sites. Even after controlling for whether on-line sales began before 1999, the coefficients on the vendor and department store dummy variables are negative. The department store result, however, is statistically insignificant even in the OLS analysis. The result for vendors is likewise insignificant once we estimate the model using GLS and allow for the two-component structure of the error term.

D. WEB SITE VISITORS

We also analyzed data on web site visitors as another possible method of examining whether better investment incentives led vertically integrated specialty retailers to produce higher quality e-commerce sites. The data for this analysis were provided by PC Data On-Line

⁴⁵ We estimated this variance-component model in SAS, using program code provided in an unpublished 1989 manuscript by Brent Moulton of the U.S. Bureau of Labor Statistics entitled "Using SAS to Estimate a Regression with Two Variance Components." The program has two main steps. In the first part, the sample data are used to estimate the variances of the observation-specific component and the group component. Moulton describes three estimators of these variances. We used Henderson's fitting-of-constants estimator, which is an unbiased estimator. Henderson, "Estimation of Variance and Covariance Components," *Biometrics* 226 (1953). The second step in the program involves using these variance estimates to transform the original variables so that error terms for the transformed variables have a constant variance and are distributed independently. The transformation used in this part of the program was developed in Fuller & Battese, "Estimation of Linear Models with Crossed-Error Structure," *J. Econometrics* 67 (1974).

("PC Data"), one of several companies in the business of tracking Internet activity. PC Data provided the estimated number of unique web visitors per month for the months of December 1999, May 2000 and September 2000. If a consumer visits a web site once or 10 times during a month, he or she is counted as one unique visitor for that month. We were told by PC Data that unique web visitors is the most commonly used measure of web site popularity in the e-commerce community.

PC Data's estimates of web site visitors are based on a panel of 120,000 households in the United States, each of whom has loaded software that allows PC Data to track their Internet activity. The weights that PC Data uses to extrapolate from its panel are based on a comparison of the demographic characteristics of its panel with separately obtained information on the distribution of characteristics of the U.S. Internet population.

Table 12 lists the data on unique web visitors provided by PC Data. Table 13 builds on these data and shows, for each month, the mean and median number of unique visitors for specialty retailers, department stores and vendors. In general, the mean and median number of visitors to the web sites of specialty retailers have been greater than the mean and median number of visitors to the web sites of department stores and non-integrated vendors.

These simple summary statistics are consistent with our hypothesis about the effects of vertical integration. But there is a risk that these results are misleading. Figures 1, 2 and 3 plot visits relative to company sales for December 1999, May 2000 and September 2000 respectively. Different symbols are used to mark specialty retailers, department stores and vendors. Several things about these plots stand out. First, there are two clear outliers -- J.C. Penney and The Gap. The number of unique visitors to these two sites is many times the number of visitors to any other site.⁴⁶ Second, there is considerable variance across apparel

⁴⁶ The number of visitors shown for The Gap is the sum of the visitors to The Gap's three on-line sites -- gap.com, bananarepublic.com and oldnavy.com. The sales figure for The Gap shown in the plots is measured on a comparable basis. The sales figure shown for The Gap is total company sales, which is the sum of sales at The Gap, Banana Republic and Old Navy.

firms with respect to annual sales. This is important, because one would expect the number of web site visitors to be related in part to the size of the firm's customer base. Third, in each plot, there is a cluster of specialty retailers with annual sales between \$500 million and \$1 billion that have a consistently higher number of visitors than other companies of comparable size. The firms in this group are the catalog companies -- Eddie Bauer, J. Crew, Lands' End and L.L. Bean. Catalog companies should have an easier time attracting customers to their on-line stores, independent of the quality of their sites, because of the self-selected nature of their customers. The customers of catalog companies have already revealed themselves to be amenable to the kind of "no-touch, distance shopping" that characterizes on-line sales.

We have run a regression analysis in an attempt to control for these various additional factors. In conducting this analysis, we used two treatments of the extreme observations for J.C. Penney and The Gap. In some models, we used the observations for J.C. Penney and The Gap in the estimation, but flagged them with dummy variables. In other models, we simply excluded them from the analysis. We also used two treatments for sales -- including sales as a continuous variable and, alternatively, creating a sales category variable (SMALL) which had a value of 1 if annual sales were less than \$5 billion and 0 otherwise. We also created a dummy variable to flag the four catalog companies.

The results of this regression analysis are summarized in Table 14. The dummy variables for non-integrated vendors (VENDOR) and for department stores (DEPT) capture incremental effects relative to the results if the firm were a specialty retailer. The signs on the VENDOR and DEPT coefficient estimates are all negative, which is the direction implied by our hypothesis about the effects of vertical integration. The estimates for VENDOR, however, are always statistically insignificant, and they are insignificant for DEPT in three of four models. Note that the models in Table 14 were estimated using OLS, which does not allow for the

possible correlation in the errors for individual firms across months. As a result, the standard errors in Table 14 may be understated.^{47 48}

VII. CONCLUSIONS

Economists know relatively little about the factors that affect the ability of firms to adapt to changes in their economic environment. For example, is greater vertical scope an impediment to change (organizational inertia) or a facilitator (avoidance of contract inflexibility)? It is often said that small organizations are more flexible and better able to adapt. But there is little empirical evidence on this issue.

This paper attempts to help fill this void by studying how firms in the apparel industry have adapted to the Internet. As discussed above, the apparel industry is a good one to study for this purpose because apparel is one of the leading products sold over the Internet and because there is variance within the apparel industry in organizational form.

Based on research that included interviews with apparel industry executives, we identified several reasons why non-integrated firms in the apparel industry may have been at a relative disadvantage in their ability and incentive to adapt to the Internet. We discussed the coordination costs that department stores must incur when they want to offer a brand on-line. We discussed the difficulty that department stores may have in capturing the full benefits of their

⁴⁷ We experimented with the GLS estimation method used above in connection with the Gomez data on web site ratings. Unfortunately, the variance estimators we used produced a negative estimate of the variance of the group component of the total variance. Given that the coefficients of interest are nearly always statistically insignificant using the OLS estimates of the standard errors (which tend to underestimate the true standard error), we dropped the analysis at this point.

⁴⁸ Most of the coefficient estimates of interest in Table 14 are statistically insignificant. There is another reason to discount this part of the analysis. We have used dummy variables for J.C. Penney, The Gap and the catalog companies. This is not far different from simply excluding these observations. But, if we actually excluded J.C. Penney, The Gap and the catalog companies, the only specialty retailers that would remain would be American Eagle Outfitters, Abercrombie & Fitch and Talbots. This strikes us as a very small sample on which to base conclusions about the overall effects of vertical integration in the apparel industry.

investments in e-commerce because a significant share of the profits from incremental sales are captured by vendors. We discussed how channel conflict appears to constrain the Internet strategies of non-integrated vendors. We also discussed how coordination costs are at the bottom of the difficulty that non-integrated vendors have in realizing the full advantages of multi-channel retailing.

These observations are reasons why vertically integrated firms in the apparel industry may have been able to adapt faster and more effectively to the Internet. We examined the accuracy of this prediction using data from a sample of 30 firms in the apparel industry. Consistent with our hypothesis, we find that vertically integrated specialty retailers tended to start on-line sales sooner, even after controlling for other factors such as whether a firm had pre-existing catalog operations. This systematic pattern is inconsistent with the null hypothesis that the timing of on-line sales is the product of firm-specific factors that are unrelated to organizational form. We find in addition that the products of vertically integrated specialty retailers and catalog companies are more available on-line than the products of non-integrated vendors. This too is consistent with our hypothesis about the relationship in the apparel industry between vertical integration and the ability to adapt to large changes in economic conditions.

**NRF/Forrester Survey of On-Line
Purchases by U.S. Consumers**

**Cumulative, January-September 2000
(\$ 000)**

Small-ticket items:

Books	\$1,613,521
Apparel	1,568,399
Software	1,280,201
Health and beauty	1,146,581
Music	1,180,437
Toys/videogames	1,020,019
Office supplies	1,051,207
Videos	789,245
Jewelry	629,423
Flowers	478,788
Linens/home décor	538,265
Sporting goods	543,370
Footwear	424,823
Tools and hardware	401,361
Small appliances	388,845
Garden supplies	<u>154,716</u>
Total small-ticket items	\$13,209,201

Big-ticket items:

Air tickets	\$5,073,282
Computer hardware	2,863,727
Hotel reservations	2,745,114
Consumer electronics	1,523,698
Car rental	1,325,850
Food/beverages	1,078,762
Furniture	355,735
Appliances	205,197
Other	<u>2,932,716</u>
Total big-ticket items	\$18,104,081

Total online sales **\$31,313,282**

Source: National Retail Federation (www.nrf.com)

1999 U.S. Apparel Sales by Channel

<u>Category</u>	<u>Sales (\$ mm)</u>	<u>%</u>
Store	162,976	88.6%
Catalog	17,226	9.4%
On-Line / Internet	1,125	0.6%
Not Reported	<u>2,535</u>	<u>1.4%</u>
Total	183,859	100.0%

Note: Total may not sum due to rounding.

Source: NPD Group, Inc.
www.retailindustry.about.com/industry/library/weekly/aa022200a.htm

Sample Selection Process

Focused on apparel companies with merchandise similar to that found in The Gap

1	Gap	Specialty retailer
2	Abercrombie & Fitch	Specialty retailer
3	American Eagle Outfitters	Specialty retailer
4	Benetton	Specialty retailer
5	Calvin Klein	Vendor
6	Dillard's	Department store
7	Esprit de Corp.	Vendor
8, 9	Federated (Bloomingdale's, Macy's)	Department store
10	Guess?	Vendor
11	J. Crew	Specialty retailer
12	J.C. Penney	Department store
13	L.L. Bean	Specialty retailer
14	Lands' End	Specialty retailer
15	Levi Strauss	Vendor
16	May	Department store
17	Nautica	Vendor
18	Nordstrom	Department store
19	Phillips Van-Heusen	Vendor
20	Polo	Vendor
21	Saks	Department store
22	Spiegel (Eddie Bauer)	Specialty retailer
23	Target	Department store
24	The Limited	Specialty retailer
25	VF Corp. (Lee, Wranglers)	Vendor

Excluded: children's wear
athletic wear
footwear
intimate apparel
discount stores

Are there other vendors that should be in the sample?

Identified designer, jeans and sportswear brands from the Fairchild 100 (Dec. 15, 1999) that were not already in the sample. For each such candidate, examined the Hoover's On-Line Profile to see if The Gap was listed as a competitor.

26	Tommy Hilfiger	Vendor
27	Bugle Boy	Vendor

Are there other specialty retailers that should be in the sample?

Identified apparel retailers among the Stores List of Top 100 Specialty stores that were not already in the sample. For each such candidate, examined the Hoover's On-Line Profile to see if The Gap was listed as a competitor.

28	Ann Taylor	Specialty retailer
29	Talbot's	Specialty retailer
30	Wet Seal	Specialty retailer

Excluded: discount stores

Apparel Firms in the Sample

<u>Company</u>	<u>URL</u>	<u>Direct Sales of Apparel from Web Site?</u>	<u>Year in Which On-Line Sales Began</u>	<u>Sales (\$ mm)</u>	<u>Fiscal Year End Date</u>	<u>Catalog Sales in 1994?</u>	<u>Catalog Sales Today?</u>	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
<u>Specialty Retailers:</u>								
1	Abercrombie & Fitch	abercrombie.com	Yes	1999	\$ 10,421	Jan-00	No	Yes
2	American Eagle Outfitters	ae.com	Yes	1998	\$ 832	Jan-00	No	Yes, Spring 1998
3	Ann Taylor	anntaylor.com	Yes	Fall 2000	\$ 1,085	Jan-00	No	No
4	Benetton / UCB	theex.it	Yes	Summer 2000	\$ 1,217	Dec-99	No	No
5	Gap	gap.com, bananarepublic.com, oldnavy.com	Yes	Nov-97	\$ 11,635	Jan-00	No	Yes, 1997
6	J. Crew	jcrew.com	Yes	Jul-97	\$ 717	Jan-00	Yes	Yes, 1983
7	L.L. Bean	llbean.com	Yes	Nov-96	\$ 1,070	Feb-99	Yes	Yes, 1925
8	Lands' End	landsend.com	Yes	Jul-95	\$ 1,320	Jan-00	Yes	Yes, 1975
9	The Limited	limited.com	No		\$ 9,723	Jan-00	No	No
10	Spiegel / Eddie Bauer	eddiebauer.com	Yes	Sep-96	\$ 1,790	Dec-99	Yes	Yes, 1945
11	Talbots	talbots.com	Yes	Nov-99	\$ 1,291	Jan-00	Yes	Yes, 1948
12	Wet Seal	wetseal.com, blueasphalt.com, contempo-casual.com	Yes	Sep-99	\$ 524	Jan-00	No	Yes, 1998
<u>Vendors:</u>								
13	Bugle Boy	bugleboy.com	Yes	Jul-98	\$ 520	Aug-98	No	No
14	Calvin Klein		No		\$ 175	Dec-99	No	No
15	Esprit de Corp.	esprit.com	Yes	Nov-98	\$ 350	Dec-99	No	No
16	Guess?	guess.com	Yes	Mar-99	\$ 600	Dec-99	No	No
17	Levi Strauss	levi.com	No		\$ 6,000	Nov-99	No	No
18	Nautica	nautica.com	No		\$ 621	Feb-00	No	No
19	Phillips-Van Heusen	pvh.com	No		\$ 1,272	Jan-00	No	No
20	Polo Ralph Lauren	polo.com	Yes	Nov-00	\$ 1,949	Mar-00	No	No
21	Tommy Hilfiger	tommy.com	No		\$ 1,977	Mar-00	No	No
22	VF Corp.	vfc.com	No		\$ 5,552	Dec-99	No	No

<u>Company</u> (1)	<u>URL</u> (2)	<u>Direct Sales of Apparel from Web Site?</u> (3)	<u>Year in Which On-Line Sales Began</u> (4)	<u>Sales (\$ mm)</u> (5)	<u>Fiscal Year End Date</u> (6)	<u>Catalog Sales in 1994?</u> (7)	<u>Catalog Sales Today?</u> (8)
<u>Department Stores:</u>							
23	Dillard's dillards.com	Yes	Fall 1999	\$ 8,677	Jan-00	Yes	Yes, since at least 1970
	Federated						
24	Bloomingdales bloomingdales.com	Yes	1997	\$ 1,788	Jan-00	Yes	Yes, 1990
25	Macy's macys.com	Yes	1998	\$ 8,686	Jan-00	Yes	Yes, 1970
26	May maycompany.com	No		\$ 13,866	Jan-00	No	No
27	Nordstrom nordstrom.com	Yes	Oct-98	\$ 5,124	Jan-00	Yes	Yes, 1994
28	JC Penney jcpenny.com	Yes	1998	\$ 32,510	Jan-00	Yes	Yes, 1962
	Saks						
29	Saks Fifth Avenue saksfifthavenue.com	Yes	Fall 2000	\$ 2,418	Jan-00	Yes	Yes, 1962
30	Target Dept. Stores marshallfields.com, daytons.com, hudsons.com	No		\$ 3,074	Jan-00	No	No

Time Line of When Apparel Firms Began On-Line Sales Direct from Their Own Web Site

	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>	Not Selling Directly from Web Site
Specialty Retailers	Eddie Bauer* Lands' End*	L.L. Bean*	Gap J. Crew*	American Eagle Outfitters	Abercrombie & Fitch Talbot's* Wet Seal	Ann Taylor Benetton	The Limited
Department Stores			Bloomingdale's*	J.C. Penney* Macy's* Nordstrom*	Dillard's*	Saks Fifth Avenue*	May Target Dept. Stores
Vendors				Esprit* Bugle Boy	Guess?	Polo Ralph Lauren	Calvin Klein Levi Strauss Nautica Phillips-Van Heusen Tommy Hilfiger VF Corp.

Notes: * indicates that the firm had catalog operations prior to 1995.

Target Dept. Stores is made up of Marshall Field's, Dayton's and Hudson's.

Analysis of the Year in Which On-Line Selling Began

Cumulative Frequency of On-Line Sales Starting <=												
Frequency Distribution	1996			1998			2000			Total		
	<u>Specialty Retailers</u>	<u>Dept Stores</u>	<u>Vendors</u>	<u>Specialty Retailers</u>	<u>Dept Stores</u>	<u>Vendors</u>	<u>Specialty Retailers</u>	<u>Dept Stores</u>	<u>Vendors</u>	<u>Specialty Retailers</u>	<u>Dept Stores</u>	<u>Vendors</u>
Catalog before 1995	3 60.0%	0 0.0%	0 0.0%	4 80.0%	4 66.7%	1 100.0%	5 100.0%	6 100.0%	1 100.0%	5	6	1
No catalog before 1995	0 0.0%	0 0.0%	0 0.0%	2 28.6%	0 0.0%	1 11.1%	6 85.7%	0 0.0%	3 33.3%	7	2	9

Estimated Cumulative Probability of On-Line Sales Starting <=												
Ordered Logit Analysis	1996			1998			2000					
	<u>Specialty Retailers</u>	<u>Dept Stores</u>	<u>Vendors</u>	<u>Specialty Retailers</u>	<u>Dept Stores</u>	<u>Vendors</u>	<u>Specialty Retailers</u>	<u>Dept Stores</u>	<u>Vendors</u>			
Evaluated at PRE95CAT = 0.4 (sample mean)	7.8%	0.3%	1.1%	71.8%	8.8%	25.8%	96.3%	49.4%	77.8%			
Evaluated at PRE95CAT = 1 (catalog before 1995)	57.7%	4.9%	15.7%	97.6%	60.9%	84.9%	99.8%	94.0%	98.3%			
Evaluated at PRE95CAT = 0 (no catalog before 1995)	1.3%	0.1%	0.2%	28.5%	1.5%	5.2%	80.1%	13.3%	35.5%			

Ordered Logit Estimation Results

<u>Dependent Variable</u>		<u>Frequency Distribution</u>			
<u>Category</u>	<u>Score</u>	<u>Sample</u>	<u>Model Classifications</u>		
on-line in or before 1996	1	10%	11%		
on-line in 1997 or 1998	2	30%	28%		
on-line in 1999 or 2000	3	30%	29%		
not on-line	4	30%	31%		

<u>Parameter Estimates</u>					
<u>Variable</u>		<u>Coefficient Estimate</u>	<u>Robust Standard Error</u>	<u>Z</u>	<u>P-Value</u>
Catalog operations before 1995	PRE95CAT	-4.64	1.59	-2.92	0.004
Specialty retailer	SPCLTY	-1.99	1.01	-1.98	0.048
Department store	DEPT	1.28	1.25	1.02	0.306
Cut 1		-6.318			
Cut 2		-2.913			
Cut 3		-0.598			

<u>Goodness of Fit Statistics</u>	
N	30
Chi-Squared (3)	9.88
P-Value on Chi-Squared	0.020
Pseudo R-Squared	0.328

On-Line Product Selection of Specialty Retailers

	<u>When Did On-Line Sales Begin?</u>	<u>Description of On-Line Product Offering</u>
<u>Specialty Retailers:</u>		
Abercrombie & Fitch	1999	118 SKUs. Complete product line available on-line.
American Eagle Outfitters	1998	188 SKUs. Everything in catalog is available on line. On-line store is meant to mimic physical store.
Eddie Bauer	Sep-96	806 SKUs. Entire catalog available on-line. More available on-line than in stores.
Gap	Nov-97	270 SKUs. More items on-line than in the stores.
J. Crew	Jul-97	353 SKUs. The stores contain 60% of the merchandise sold on-line and in the catalog.
L.L. Bean	Nov-96	The catalog and on-line offerings are the same.
Lands' End	Jul-95	Catalog and on-line selection are the same. Outlet stores may have some items not in catalog/on-line.
Talbots	Nov. 1999	Almost everything in the catalog is on-line. More in the catalog than in store.

Comparison of Department Stores' In-Store vs. On-Line Product Offerings of Apparel, Selected Brands

Department Store	Brands				
	Calvin Klein	Levi Strauss	Nautica	Polo Ralph Lauren	Tommy Hilfiger
Dillard's dillards.com	Yes Yes, 2	Yes No	Yes Yes, 17	Yes Yes, 15	Yes Yes, 28
Bloomingdale's bloomingdales.com	Yes Yes, 61	Yes No	Yes Yes, 7	Yes Yes, 73	Yes Yes, 9
Macys macys.com	Yes Yes, 57	Yes Yes, 42	Yes Yes, 8	Yes Yes, 41	Yes No
Nordstrom nordstrom.com	Yes Yes, 18	Yes No	Yes Yes, 4	Yes Yes, 59	No No
JC Penney jcpenny.com	Yes Yes, 115	Yes Yes, 300+	No No	No No	No No
Saks saksfifthavenue.com	Yes Yes, 8	No No	No No	Yes Yes, 19	No No

Note: Based on research conducted August - November 2000.

Overall Scores Assigned by Gomez to On-Line Apparel Sites

<u>Company</u>	<u>URL</u>	<u>When Did On-Line Sales Begin?</u>	<u>Gomez Overall Rating</u>		
			<u>Fall 1999</u>	<u>Spring 2000</u>	<u>Summer 2000</u>
<u>Specialty Retailers:</u>					
Abercrombie & Fitch	abercrombie.com	1999	3.71	3.62	4.26
American Eagle Outfitters	ae.com	1998	4.14	4.68	4.67
Eddie Bauer	eddiebauer.com	Sep-96	6.53	7.36	7.04
Gap	gap.com	Nov-97	7.25	6.13	6.08
J. Crew	jcrew.com	Jul-97	4.52	5.05	5.84
L.L. Bean	llbean.com	Nov-96	5.94	6.30	6.86
Lands' End	landsend.com	Jul-95	6.71	7.22	6.63
Mean			5.54	5.77	5.91
Median			5.94	6.13	6.08
<u>Vendors:</u>					
Bugle Boy	bugleboy.com	Jul-98	3.28	3.99	4.74
Guess?	guess.com	Mar-99	4.52	4.70	5.37
Mean			3.90	4.35	5.06
Median			3.90	4.35	5.06
<u>Department Stores:</u>					
Dillard's	dillards.com	Fall 1999		4.61	
Bloomingdale's	bloomingdales.com	1997		5.94	5.81
Macy's	macys.com	1998	5.01	6.37	6.11
Nordstrom	nordstrom.com	Oct-98	5.19	6.89	4.67
JC Penney	jcpenny.com	1998	4.69	6.00	5.90
Mean			4.96	5.96	5.62
Median			5.01	6.00	5.86

**Regression Analysis of Gomez Scores Assigned to On-Line Apparel Sites
in Fall 1999, Spring 2000 and Summer 2000**

Coefficient Estimates, Standard Errors and T-Statistics

	<u>Estimation Method</u>		<u>Dummy for Vendor</u>	<u>Dummy for Department Stores</u>	<u>Dummy for On-Line Sales Before 1999</u>	<u>Adjusted R-Squared</u>	<u>N</u>
1	OLS	coeff	-1.307	-0.182		0.129	39
		se	0.483	0.379			
		t	-2.706	-0.480			
2	GLS	coeff	-1.307	-0.291			
		se	0.732	0.543			
		t	-1.786	-0.536			
<hr/>							
3	OLS	coeff	-0.915	-0.253	1.097	0.247	39
		se	0.475	0.353	0.436		
		t	-1.926	-0.717	2.516		
4	GLS	coeff	-0.906	-0.263	1.123		
		se	0.685	0.487	0.577		
		t	-1.323	-0.540	1.946		

Estimated Unique Visitors to Sites Offering On-Line Sales of Apparel

<u>Company</u> (1)	<u>URL</u> (2)	<u>When Did On-Line Sales Begin?</u> (3)	<u>Estimated Unique Web Site Visitors</u>		
			<u>Dec-99</u> (4)	<u>May-00</u> (5)	<u>Sep-00</u> (6)
<u>Specialty Retailers:</u>					
Abercrombie & Fitch	abercrombie.com	1999	551	796	743
American Eagle Outfitters	ae.com	1998	297	518	574
Eddie Bauer	eddiebauer.com	Sep-96	494	602	1,234
Gap	gap.com	Nov-97	1,454	2,565	1,592
	bananarepublic.com		370	341	526
	oldnavy.com		673	1,220	1,724
			<u>2,497</u>	<u>4,126</u>	<u>3,842</u>
J. Crew	jcrew.com	Jul-97	750	675	642
L.L. Bean	llbean.com	Nov-96	561	556	1,211
Lands' End	landsend.com	Jul-95	681	712	1,638
Talbots	talbots.com	Nov-99			152
<u>Vendors:</u>					
Bugle Boy	bugleboy.com	Jul-98		111	176
Esprit de Corp.	esprit.com	Nov-98	181	188	158
Guess?	guess.com	Mar-99	137	169	286
<u>Department Stores:</u>					
Dillard's	dillards.com	Fall 1999	176	164	368
Bloomingdale's	bloomingdales.com	1997	148	240	198
Macy's	macys.com	1998	569	566	688
Nordstrom	nordstrom.com	Oct-98	408	419	1,257
J.C. Penney	jcpenny.com	1998	2,452	2,009	3,021

Source: PC Data On-Line

**Mean and Median Number of Unique Visitors
to On-Line Apparel Sites, by Type of Company**

	<u>N</u>	<u>Mean</u>	<u>Median</u>
<u>December 1999 Visits (000)</u>			
Specialty Stores	7	833	561
Department Stores	5	751	408
Vendors	<u>2</u>	159	159
<u>May 2000 Visits (000)</u>			
Specialty Stores	7	1,141	675
Department Stores	7	680	419
Vendors	5	156	169
<u>September 2000 Visits (000)</u>			
Specialty Stores	7	1,255	977
Department Stores	5	1,106	688
Vendors	3	207	176

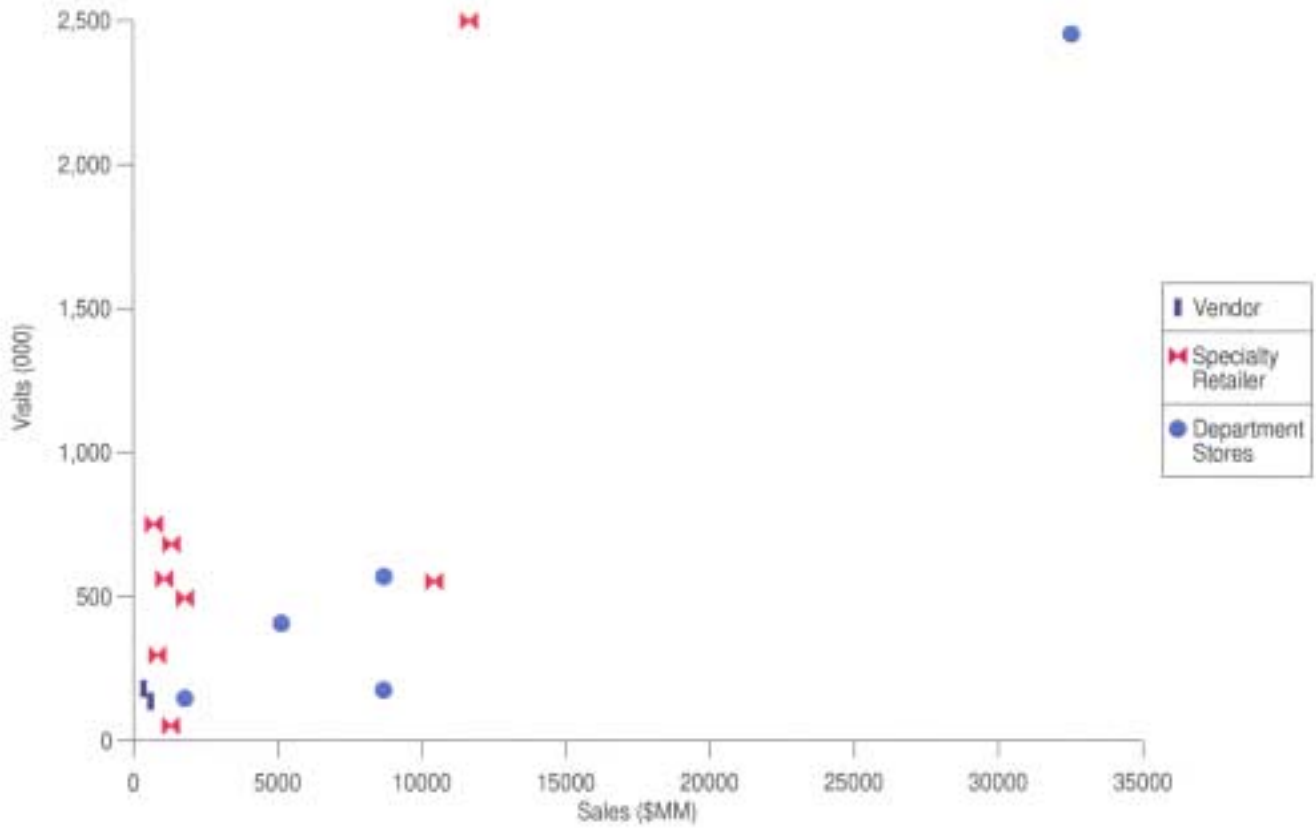
**Regression Analysis of Estimated Unique Web Visitors (in 000s) to On-Line Apparel Sites
in December 1999, May 2000 and September 2000**

OLS Coefficient Estimates, Standard Errors and T-Statistics

		Dummy for <u>Vendor</u>	Dummy for Department <u>Stores</u>	Continuous Measure of Sales (\$ mm)	Dummy for Sales < \$5 Billion	Dummy for On-Line Sales Before <u>1999</u>	Dummy for <u>J.C. Penney</u>	Dummy for <u>The Gap</u>	Dummy for Catalog <u>Companies</u>	Adjusted <u>R-Squared</u>	<u>N</u>
<u>Using dummy variables for The Gap and J.C. Penney</u>											
1	coeff	-160.6	-195.6	52.6		263.9	603.8	2,500.5	372.8	0.901	46
	se	175.5	155.7	22.3		144.1	641.0	290.9	163.7		
	t	-0.92	-1.26	2.35		1.83	0.94	8.60	2.28		
2	coeff	-190.0	-276.0		-456.9	231.6	1,888.5	2,606.8	388.4	0.906	46
	se	160.4	159.2		161.1	129.2	197.9	244.7	158.9		
	t	-1.19	-1.73		-2.84	1.79	9.54	10.65	2.44		
<u>Excluding The Gap and J.C. Penney from the analysis</u>											
3	coeff	-158.0	-198.6	51.9		260.1			367.6	0.581	40
	se	135.3	120.1	17.2		111.2			126.2		
	t	-1.17	-1.65	3.01		2.34			2.91		
4	coeff	-186.8	-278.2		-451.6	228.4			383.0	0.625	40
	se	120.4	119.6		121.0	97.0			119.3		
	t	-1.55	-2.33		-3.73	2.35			3.21		

Figure 1

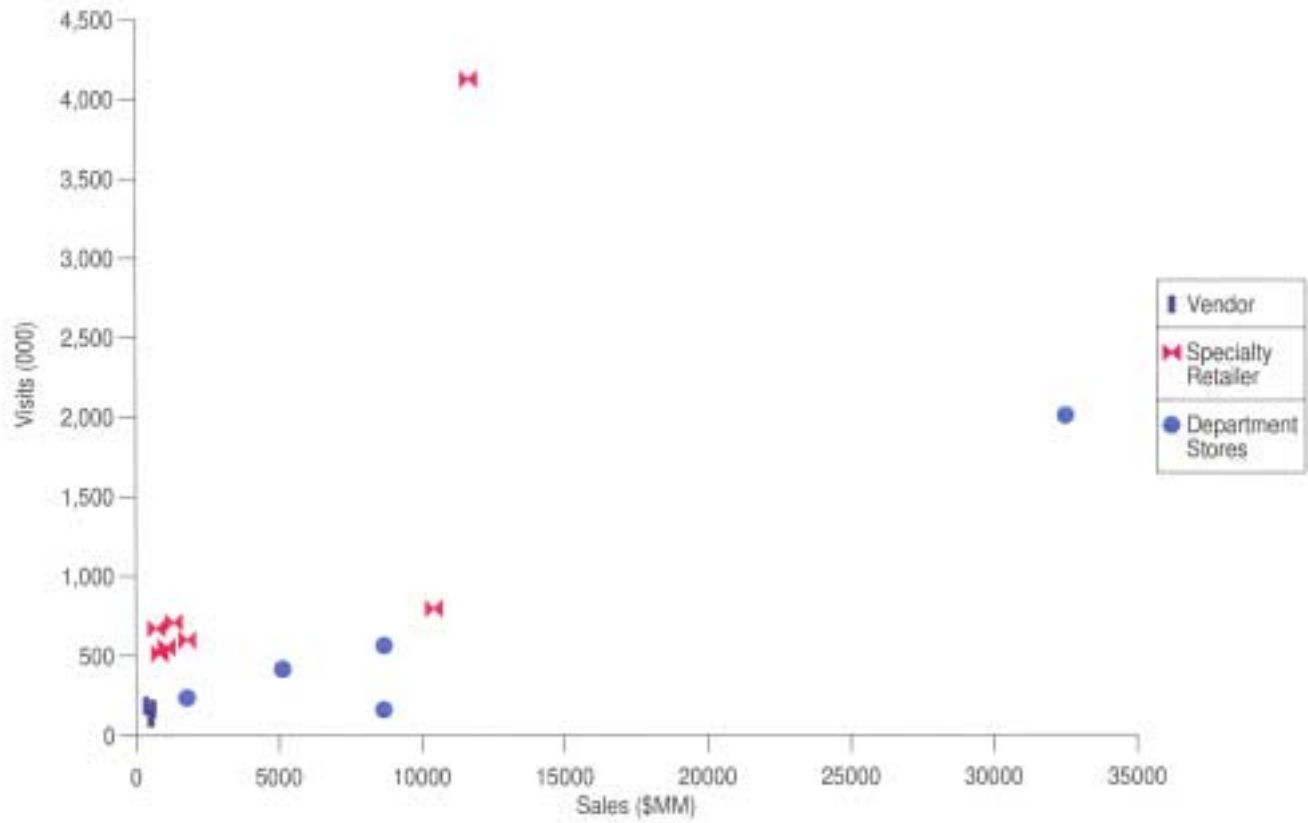
Estimated Unique Visitors to On-Line Apparel Sites in December 1999 vs. 1999 Company Sales



Sources: PC data On-Line; company financial statements.

Figure 2

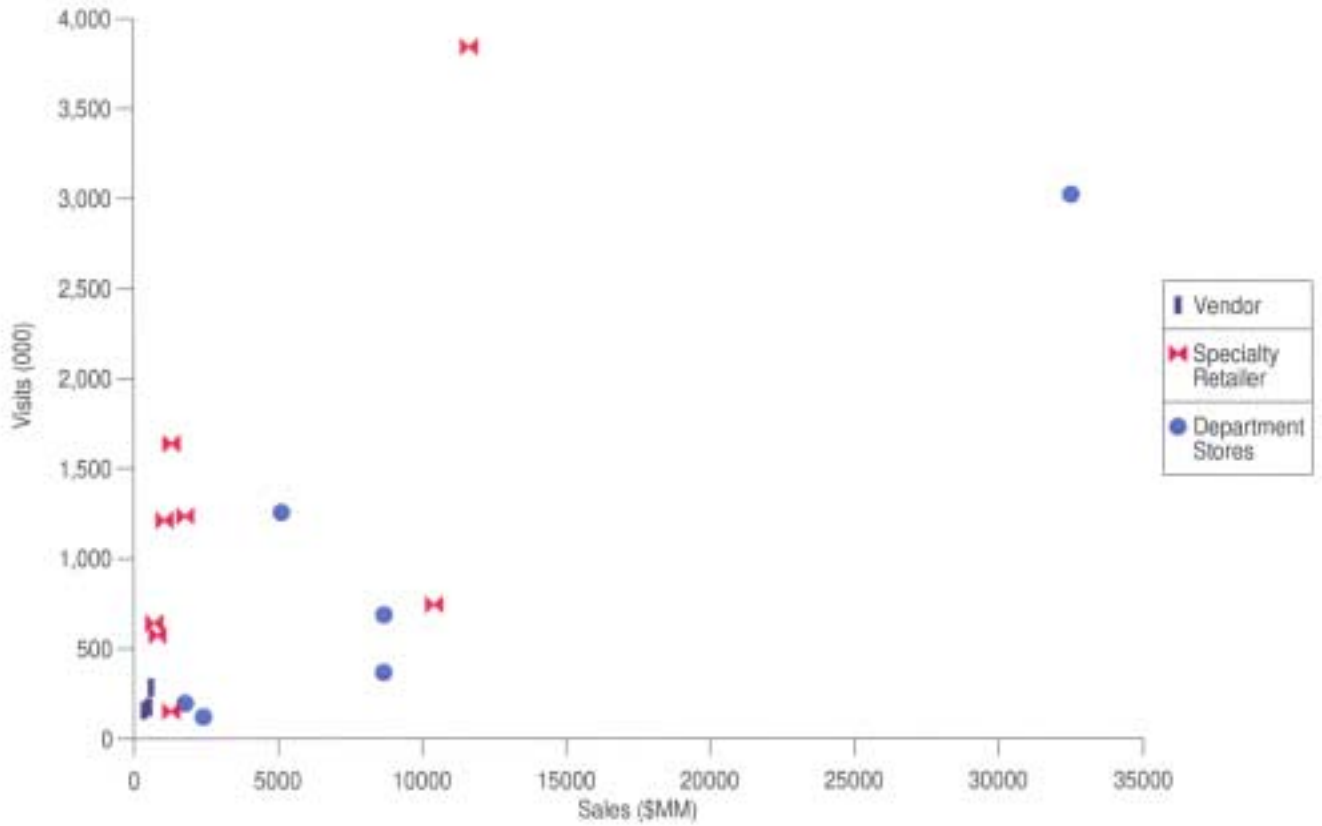
Estimated Unique Visitors to On-Line Apparel Sites in May 2000 vs. 1999 Company Sales



Sources: PC data On-Line; company financial statements.

Figure 3

Estimated Unique Visitors to On-Line Apparel Sites in September 2000 vs. 1999 Company Sales



Source: PC data On-Line; company financial statements.