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Effects of the Existence and Identity of Major Customers on Supplier Profitability: Is Wal-Mart Different?

Martin L. Gosman
Quinnipiac University

Mark J. Kohlbeck
Florida Atlantic University

ABSTRACT: We investigate how buyer power in the retail market affects suppliers' profitability. Buyer power exists when suppliers depend on a concentrated set of retailers. Further, Wal-Mart, the world's largest retailer, possesses additional buyer power because it has a dominant position in many product supply chains, advanced inventory management practices, and cutting edge technology. We form a sample of firms that supply retailers and utilize the major customer disclosure (SFAS No. 131) to proxy for dependence on major customers and the incremental Wal-Mart effect associated with buyer power. We find that as sales to major customers increase, supplier gross margins and return on assets decrease while their inventory and payables management improves. Wal-Mart is incrementally associated with increasing gross margins, improving cash collections, and extended payment terms with its vendors. Supplier power offsets some of the adverse effects. Our findings provide insight on financial implications of supply-chain dynamics where (1) one firm has an economic dependence upon a major customer, and (2) the major customer is a leading channel member.

Keywords: buyer power; supplier power; major customer disclosures; Wal-Mart.

Data Availability: Data is obtained from the publicly available sources listed in the paper.

INTRODUCTION

Large U.S. retailers becoming increasingly concentrated fuels a debate over the consequences of the buyer power that these large retailers exercise. On the one hand, buyer power allows retailers to reduce prices. For example, New England Consulting estimated that Wal-Mart saved its U.S. customers $20 billion during 2003 (Bianco and Zellner 2003). On the other hand, retail consolidation has left manufacturers with fewer customers, shifting the balance of power from manufacturers toward large retailers. Increasing buyer concentration among large retailers enables these retailers to dictate prices from suppliers, carry fewer inventories, and extend payment periods on amounts owed to suppliers (Kelly and Gosman 2000; Bianco and Zellner 2003). Suppliers that have major retailer

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customers therefore face increased risk and are required to disclose these dependencies (FASB 1997).

While there is no shortage of anecdotal evidence to support adverse supplier effects, these effects rarely have been empirically documented. We first investigate whether dependence on major customer retailers is associated with supplier performance. Prior research on industry buyer power suggests that suppliers relying on major customers may lose financially (lower performance metrics). In retailing, Wal-Mart is a dominant channel member in many supply chains and exercises significant clout over its suppliers. Wal-Mart is also known for its leadership in inventory management and use of technology. Therefore, we also investigate whether having Wal-Mart as a major customer affects suppliers differently from other major customers (i.e., Wal-Mart makes different trade-offs).

We provide empirical evidence using a hand-collected database of publicly held suppliers that identify major customers. Major customers are considered to exist where a single customer represents 10 percent or more of a firm's consolidated revenue (FASB 1997).[1] We use the percentage of sales to major customers to investigate the effects of buyer power on the supply-chain dynamics between suppliers and their major retailer customers. We also consider how the suppliers' countervailing power (measured as supplier size) and sales to Wal-Mart affect these dynamics.

We find decreasing returns on assets as sales to major customers increase. Decreasing gross margins drive this overall result, but suppliers partially compensate for the adverse gross margin consequences by carrying less inventory and extending payment periods to their suppliers. In addition, supplier size mitigates part of the adverse profitability effects of major customers.

Suppliers benefit from their significant Wal-Mart relationships as the adverse major customer performance effects are reduced and in certain cases eliminated. However, the Wal-Mart benefit reflected in gross margins does not flow through to return on assets. The lower return on assets suggests that suppliers incur increases in other costs such as inventory carrying costs, specialized information systems, and advertising that are commonly reflected as operating expenses. The performance effects arising from Wal-Mart as a major customer are more pronounced for smaller suppliers.

We provide evidence on the importance of the current major customer disclosures. First, we show that the major customer disclosure has financial implications consistent with the objectives of SFAS No. 131. We also provide financial-statement-based empirical evidence on how buyer power based on dependence of the supplier on its major customers and that exercised by one prominent retailer affect the supplier—further supporting the need for major customer disclosures.

Second, we provide evidence that the effects of dependence on a major customer can vary significantly with the *identity* of the major customer. We find that not only the magnitude, but also the sign of some major-customer effects on supplier financial performance are different for Wal-Mart than for major customers in general. These results suggest that major-customer disclosures could be more informative if they included the identity as well as the existence of major customers.[2]

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[1] Statement of Financial Accounting Standards No. 131, *Disclosures about Segments of an Enterprise and Related Information* (SFAS No. 131) became effective for fiscal years beginning after December 15, 1997. The previous accounting standard, Statement of Financial Accounting Standards No. 14, *Financial Reporting for Segments of a Business Enterprise*, required similar major customer disclosures (FASB 1976).

[2] One study found that in almost 25 percent of instances where suppliers disclosed the existence of major customers, they did not identify them (Gosman and Kelly 2000).

Third, our study extends the literature on buyer and supplier power research. We use disclosures of a supplier's level of sales to major customers to obtain measures of buyer power and the Wal-Mart effect specific to the supplier. We are therefore able to analyze suppliers over a period of up to 12 years, which captures the effects as the buyer and supplier power levels vary over time, providing stronger evidence. We also investigate supplier power as a countervailing force where mixed evidence has been obtained in the past.

Fourth, we add to the research on supply-chain value and inter-firm relationships. Past research has examined the effect of control problems and familiarity of partners on the structure of the relationship and the selection of partners (for example, see Dekker 2008). We provide empirical evidence on benefits and costs associated with a specific control problem, dependence, and on-going relationships. We also add to the debate on the contribution of customer concentration to supply-chain value.

The remainder of this paper proceeds as follows. Background, theory, and our hypotheses are discussed first. The research design is then developed. Description of the sample firms and the empirical analyses follows. The final section summarizes and concludes.

BACKGROUND, THEORY, AND HYPOTHESES DEVELOPMENT

In this section, we summarize prior research on buyer power and how it relates to our study. We then develop hypotheses on (1) buyer power, and (2) countervailing supplier power.

Prior Research on Buyer Power

Supply-chain economics are examined from both industrial organization and strategic perspectives. One perspective examines the effect of buyer and seller power on firm profitability. Power is defined as the ability of one member of the supply chain channel to induce or influence another member to change its behavior to the benefit of the first member (Gaski 1984).

Porter (1980) and others provide a theoretical basis to expect lower industry profits if the power of either the buyers of the industry's output or suppliers to the industry is high relative to the focal industry. In this vein, early research used industry concentration measures and other aggregate analyses of profitability. For example, Lustgarten (1975) found that buyer (seller) concentration was negatively (positively) correlated with the industry's seller price-cost margins. LaFrance (1979) extended these finding by investigating the interaction of buyer-seller concentration. He found that the negative relationship between buyer concentration and seller's price-cost margins exists only when seller concentration is high (conversely, buyer power has little impact on price-cost margins when the seller market is competitive). Gabel (1983) found that seller profitability rises as buyers are more dispersed (lower buyer power). Analyzing lines of business data generally confirmed these results (Ravenscraft 1983; Cowley 1986). Schumacher (1991) also found that highly concentrated buyers exhibit significant power to impair seller profitability (price-cost margin) across all seller concentration levels.

Research investigating the effect of buyer power on firm-level profitability produced two main findings, both of which are consistent with the industry-level findings. First, buyer power negatively affects supplier profitability (for example, see Etgar 1976; Galbraith and Stiles 1983; Kelly and Gosman 2000).[3] Second, the industry effects from buyer power

[3] In similar contexts, Peters (2000) examined the German automobile industry and found that innovation is negatively affected by buyer concentration, and Chipty (1995) investigated the cable industry and found that larger cable companies can extract better deals from program channel providers.

are stronger than the effects associated with seller power (Cool and Henderson 1998; Schmalensee 1985).

However, buyer concentration levels are not constant. Changes occur as markets consolidate or expand. For example, retail industry consolidation has increased since 1990, particularly with respect to buyer concentration.[4] Kelly and Gosman (2000) investigate the effects of buyer concentration in the retail industry on suppliers to this industry. They document that the number of major customers disclosed by suppliers to the retail industry increased approximately 50 percent between 1993 and 1997 consistent with increased buyer concentration. Further, they found that supplier gross margins were inversely related to the percentage of sales to major customers in 1997, but not in 1993, and the 1997 effect was primarily in competitive industries. Combined, the evidence suggests that increased buyer concentration leads to lower supplier profitability.

The increasing number of major customer relationships is reflective of a power shift toward suppliers' retailer major customers. Gosman et al. (2004) explored this power shift for 34 different retailers that had at least one supplier identified as a major customer. They found that major customer relationships proxy for an unrecorded organizational capital intangible asset that captures the supply-chain effects. In addition, major customers experienced higher and more persistent operating profits compared to other retailers.

Common among these studies is that buyer power is generally derived from the dependence of the supplier on the buyer. We also consider whether a prominent channel member is an additional source of buyer power (Gaski 1984). Overall, Wal-Mart is a dominant retailer in the U.S. with four times the sales of the next largest retailer. Over 82 percent of Americans made at least one trip to Wal-Mart in 2002 (Bianco and Zellner 2003). We investigate whether effects of buyer power associated with Wal-Mart (the Wal-Mart effect) are different from buyer power effects based on other major customers.

Performance Hypotheses

Gosman et al. (2004) found that major customer retailers reported significantly greater profits than their industry peers. They attributed these results to lower SG&A costs and better working capital management. The results are consistent with these retailers exercising buyer power to extract more favorable terms from their suppliers.

Gosman and Kelly (2003) and Gosman and Kohlbeck (2005) examined large retailers' inventory-holding periods and payment practices through use of an excess-days calculation, where this metric was defined as days' sales in inventory less days' purchases in accounts payable. Lower days' sales in inventory and/or higher days' purchases in accounts payable are consistent with the retailer exhibiting greater power *vis-à-vis* its suppliers.[5] These large retailers were found to achieve working capital efficiencies consistent with exercising buyer power.

Wal-Mart was among the retailers exhibiting a sharp decline in excess days, indicating improved working-capital management. The combination of reduced inventory and increased accounts payable enabled Wal-Mart to lower its excess days by 68 percent (from 44 to 14) over the 1995 to 2003 period (Gosman and Kohlbeck 2005). These efficiencies were accompanied by steady increases in Wal-Mart's gross margin percentage.

[4] For example, the sales of four major U.S. retailers (Wal-Mart, Target, Costco, and Best Buy) increased from 16.8 percent to 40.1 percent of GAFO sales (a widely used U.S. government measure of retail sales) between 1992 and 2004.

[5] The changes in days' sales in inventory and days' purchases in accounts payable are also consistent with the buyer's improved efficiency.

Does it follow that the manufacturers supplying major retailer customers are adversely affected? Theory of power in channels of distribution suggests this may be the case. First, major customer retailers can use their buyer power derived from suppliers' dependence on the major customers to extract favorable terms. At the extreme, if the major customer relationship is a zero-sum game, then the major customers gain while the suppliers lose. Second, a significant retailer such as Wal-Mart can induce suppliers to enter into transactions that further favor Wal-Mart compared to other major customers because of its dominant position or that involve a different set of trade-offs among margins and efficiency.[6] Wal-Mart also has developed industry-leading inventory management techniques and information technology that can affect the terms of their transactions with suppliers.

Anecdotal evidence is consistent with this argument. Many large retailers have reduced their inventory investments, extended their accounts payable terms, and generated higher profits from exercising increased power *vis-à-vis* their suppliers (Bianco and Zellner 2003). Manufacturer-suppliers often mention such effects within the risk-factors sections of their SEC Form 10-Ks (see Exhibit 1). Although many supplier comments shown here relate to major retailer customers in general, a few singled out Wal-Mart. For example, Pepsiamericas, a regional bottler of Pepsi, revealed that Wal-Mart accounted for 9.7 percent of its 2004 sales, despite purchasing 11.9 percent of its raw case sales volume (suggesting that it sold product to Wal-Mart at 18 percent less than the average price it charged other customers). Big Smith Brands, a manufacturer of shoes and boots, noted in 1998 that Wal-Mart took 15–25 days longer than its other customers to pay for merchandise.

Research on just-in-time (JIT) adoption provides some evidence of the interaction of customer concentration on supply-chain value and ROA; however, the evidence is mixed. JIT adoption provides for a more integrated supply chain. Balakrishnan et al. (1996) found that JIT adoption improved inventory turnover ratios overall, but that ROA only improved for suppliers with diffuse customer bases. They inferred suppliers had to pass along benefits when customer concentration was higher. With a larger sample, Kinney and Wempe (2002) found improved ROA only for larger firms and no effect from customer concentration.

We develop a series of hypotheses in the following paragraphs based on differing performance metrics that capture the financial statement impact of differing terms individually and overall. Negotiated terms between the supplier and its major customers include sales price, payment timing, inventory levels, and advertising, among other items. These terms will have different impacts across performance metrics.

We first consider supplier gross margins (sales less cost of goods sold). If the supplier depends on one or more major customers, the supplier may be willing to accept lower prices to retain the business or if the supplier expects savings in operating costs such as lower advertising associated with private label brands. Supplier gross margins will therefore suffer if the supplier cannot reduce its own manufacturing costs. Further, if Wal-Mart is the dominant player in the channel and the supplier wants to do business with Wal-Mart (or has to in order to obtain sufficient volume to survive), then Wal-Mart can use its size to force suppliers to accept even lower prices. In addition, Wal-Mart's innovations in inventory management practices and technology increase operating efficiencies where the supplier may benefit in addition to the retailer. Wal-Mart may therefore demand lower prices in exchange for this assistance (consistent with Balakrishnan et al. [1996]). The net effect lowers supplier gross margins. However, this effect may be lessened or not be present for three reasons.

[6] This theory is similar to, but distinct from monopoly or oligopoly theory. U.S. retailing, while concentrated, is not considered either a monopoly or an oligopoly.

EXHIBIT 1
Anecdotal Evidence from Supplier SEC Form 10-Ks of the Effect of Retailer Major Customers

Inventory (Action Products International [2004, 17])
Most of our largest retail customers utilize an inventory management system to track sales of products and rely on reorders being rapidly filled by us ... rather than maintaining large product inventories. These systems put pressure on suppliers like us to promptly fill orders and therefore shift some of the inventory risk from the retailer to the suppliers.

Profitability (Ames True Temper, Inc. [2004, 6])
Home centers and mass merchandisers have consolidated and increased in scale. If ... this trend continues, our customers will likely seek more favorable terms, including pricing, for their purchases of our products, which will limit our ability to raise prices, including to recoup raw material and other cost increases. Sales on terms less favorable to us than our current terms will have an adverse effect on our profitability.

Profitability (Pepsiamericas [2005, F-6])
Wal-Mart Stores ... constituted approximately 11.9% of our raw case sales volume ... and 9.7% of our net sales in the U.S. in 2004.

Inventory and Profitability (Conagra Foods, Inc. [2004, 4])
The company's retail customers, such as supermarkets and warehouse clubs, have consolidated in recent years and consolidation is expected to continue. These consolidations have produced large, sophisticated customers with increased buying power who are more capable of resisting price increases and operating with reduced inventories. If the large size of these customers results in additional negotiating strength or less shelf space for the company's products, the company's profitability could decline.

Receivables (Big Smith Brands, Inc. [1998, 8])
Receivables from Wal-Mart are typically paid in full between 45 and 55 days from purchase. Receivables from the company's remaining domestic customers for all products are generally on thirty-day terms.

Receivables (Mattel, Inc. [2004, 44])
The mass-market retail channel in the U.S. has experienced significant shifts among competitors ... From 2001 through early 2004, four large customers filed for bankruptcy. There is a risk that customers will not pay, or that payment may be delayed, because of bankruptcy or other factors beyond the control of Mattel.

First, a supplier may have increased leverage in negotiating with *its own* suppliers because suppliers to Wal-Mart or some large retailer may be major customers themselves (a trickle-down, major-customer effect). The supplier relies on the potential increased volume of purchases that it will be making to supply its major customers to extract favorable arrangements with its suppliers. The supplier may be able to offset part of its reduced revenue with concessions from its suppliers.

Second, the sales price is only one of the terms being negotiated. Increased sales prices may be agreed to in exchange for the supplier taking greater responsibility for inventory costs, advertising, anti-theft features, etc. Operating expenses for the supplier may be greater in this case, but gross margins would not be negatively impacted consistent with Wal-Mart interested in a different set of trade-offs than other major customers.

Third, Kulp (2002) showed analytically that better vendor management information systems improved overall supply chain profits, in part by reducing production costs. If retailers provide suppliers with reliable sales and inventory information (as is the case with

Wal-Mart's inventory management system), then overall profits increase. If the supplier shares in this benefit, gross margins may be maintained.

Because of the various forces that are present, theory alone cannot be used to predict whether supplier gross margins will increase, decrease, or not change as sales to major customers increase or whether the association with Wal-Mart is different from other major customers. Empirical evidence is required to determine which force dominates. Our first hypothesis is therefore stated in the null as follows:

H1: Suppliers' gross margins are not associated with the level of sales to major customers (or the level of sales to Wal-Mart after controlling for sales to all major customers).

We then consider the cash conversion cycle—the time it takes the supplier to convert the purchase of inventory to sales in terms of cash. The cash conversion cycle is the sum of days in inventory and receivables less days in accounts payable. The cash conversion cycle captures changes in inventory management and payment periods.

Prior research (Gosman and Kelly 2003) suggests that major customers may use their position as leading retailers to extend payment terms and transfer some inventory risk to the suppliers. Therefore, if the supplier is dependent on a major customer, the supplier may allow its customer to stretch their payments. The cost to the supplier is that the days in receivables are longer because the suppliers are providing these customers additional supplier credit. The supplier may also carry more inventories to satisfy retailers' inventory demands. The cash conversion cycle would therefore lengthen.

The effect of Wal-Mart may be greater. First, Wal-Mart's technological advances over the past decades have improved their inventory ordering and management systems. Just-in-time inventory deliveries require suppliers to carry more inventories. The effect is to increase the suppliers' days in inventory and lengthen the cash conversion cycle. Second, Wal-Mart also could use its dominance to delay its payments to the suppliers even more than other major customers.

Similar to our arguments regarding gross margins, the suppliers may be able to negotiate better terms with *their* suppliers regarding inventory levels and time to pay. Days' sales in inventory can decrease (cash conversion cycle improves) if suppliers are able to transfer some of the inventory risk to their suppliers. While sales to major customers do not directly influence the supplier's days' purchases in accounts payable, the supplier may be able to extract extended credit terms from their suppliers by virtue of having major customers and therefore shorten the cash conversion cycle. The suppliers may also share in the inventory and other efficiencies achieved by Wal-Mart (lower inventory levels are maintained).

Overall, the impact on the cash conversion cycle is uncertain due to the opposing forces. Our second hypothesis is stated in the null as follows:

H2: Suppliers' cash conversion cycles are not associated with the level of sales to major customers (or the level of sales to Wal-Mart after controlling for sales to all major customers).

Finally, we consider a summary measure: return on assets. The effect on return on assets is also uncertain. If suppliers' gross margins decrease in connection with sales to major customers or to Wal-Mart, then so should the return on assets. Likewise, if the supplier must offer extended terms to major customers or to Wal-Mart and/or carry greater

inventory levels, then the supplier asset base will increase and therefore decrease return on assets. However, the direction of the gross margin and cash conversion cycle derivative income effects are uncertain.

The relationship may be mutually beneficial. The major customer gains a more certain product supply at favorable terms. The supplier gains sales volume and increased certainty with respect to production because of the tie-in with the major customer.[7] Return on assets may increase or decrease depending on the extent of the increase in volume and changes in operating expenses.

As discussed above, negotiations involve many terms. Suppliers' operating expenses may increase (decrease) in exchange for higher (lower) prices. For example, manufactures that supply private label brands may accept lower prices because their advertising costs are less. Return on assets may increase if the supplier is able to extend its payment terms and minimize the negative effect on the cash conversion cycle. In addition, technology investments, advertising expenditures, etc., may vary based on cost-sharing agreements.[8]

Wal-Mart may also have differential effects on its suppliers' return on assets. Wal-Mart may use its position to dictate terms that while beneficial to Wal-Mart overall, may have differing effects on suppliers. The effect on supplier return on assets, if any, is uncertain because we cannot determine which of the forces will dominate. Our third hypothesis on supplier return on assets stated in the null is as follows:

H3: Suppliers' return on assets is not associated with the level of sales to major customers (or the level of sales to Wal-Mart after controlling for sales to all major customers).

Countervailing Power Hypothesis

Despite the importance of major customers to a given supplier (dependence) and the position of Wal-Mart in the distribution channel, a suppler may be able to mitigate the ability of the major customers and Wal-Mart to force ''Wal-Mart-friendly'' terms. When one channel member (large retailer) has power over other channel members (suppliers), countervailing power theory concerns the ability of a supplier to inhibit the power of a major customer (Gaski 1984). Countervailing power therefore depends on the existence of power with an opposing channel member and represents the market relationships between the major customer and certain of its suppliers.[9]

The magnitude of the power is a function of its source (Etgar 1976). We assume that suppliers derive their countervailing power from one source.[10] The supplier may be sufficiently large so that the major customer must rely on the supplier for its product as alternative sources are not available or large enough. The countervailing power in this case is

[7] For example, Garan, the maker of Garanimals, became more profitable even though its sales to Wal-Mart exceeded 85 percent of its business in the late 1990s. Garan benefited from certainty concerning production schedules and access to the Wal-Mart customer base.

[8] For example, if the supplier covers more of these costs, then the supplier may be able negotiate a higher sales price thereby increasing the supplier's gross margin.

[9] Bilateral oligopoly theory provides an alternative argument that is consistent with countervailing power (Galbraith and Stiles 1983). A bilateral oligopoly recognizes that optimality requires joint profit maximization (Blair et al. 1989) and would therefore result in the reduction of negative supplier outcomes. However, countervailing power theory is not as restrictive in that the overall market does not have to be an oligopoly in the traditional sense.

[10] A second source, brand value also increases supplier power when it provides nationally branded products that are demanded by consumers. Examples include Coca-Cola, Kellogg cereals, and Tide detergent. We do not consider brand value in our analysis as measures could not be reliably obtained.

based on the supplier's ability to provide a reliable product supply to meet the major customer's demands. Larger suppliers therefore may wield power from the fact that the volume of transactions is substantial and material to the major customer.

Suppliers with sufficient countervailing power would be able to mitigate part or all of the negative effects associated with buyer power. The fourth hypothesis considers supplier countervailing power, and is stated in the alternative, as follows:

H4: Suppliers' countervailing power reduces negative (enhances positive) buyer power/major customer effects on their performance.

RESEARCH METHODOLOGY

To test our hypotheses, we develop models to empirically examine the financial statement effects of having major customers. We use prior research to develop models to investigate gross margin, cash conversion cycle, and return on assets in order to test whether sales to major customers and Wal-Mart influence supplier financial performance. In each model, we include (1) the percentage of sales to all major customers (including Wal-Mart) and (2) the percentage of sales to Wal-Mart to capture the incremental Wal-Mart effect.[11] Supplier size is interacted with the percentage of sales to all major customers and to Wal-Mart to capture countervailing power.

Our first model considers supplier gross margin. Deloof (2003) examined the effect of working capital management on firm profitability, defined as gross profit scaled by nonfinancial assets. Kinney and Wempe (2002) investigated JIT profitability effects. We follow a similar approach to model gross margin and include firm size (natural log of sales), sales growth, and leverage as determinants of gross margin. We also include industry membership to capture industry differences and a trend variable to capture over-time changes. The cash conversion cycle is also included to control for working capital management effects. Although working capital management will not have a direct impact on gross margin, it may affect how the supplier sets/negotiates sales prices.

We are concerned with the effect on gross margin of having major customers in general and Wal-Mart specifically. The percentage of sales to all major customers disclosed by the supplier is therefore included. After controlling for sales to all major customers, the percentage of sales to Wal-Mart is included to capture the incremental importance of Wal-Mart to the supplier compared to major customers in general. The interactions of supplier size with the percentage of sales to all major customers and to Wal-Mart are then included as proxies for suppliers' countervailing power.

The gross margin model is as follows (firm and time subscripts are suppressed for clarity).

$$\begin{aligned} GM\% = {} & \alpha_0 + \Sigma(\alpha_{1j} INDUSTRY) + \alpha_2 LNSALES + \alpha_3 GROWTH \\ & + \alpha_4 LEVERAGE + \alpha_5 CASH\_CYCLE + \alpha_6 TREND + \alpha_7 MC\% \\ & + \alpha_8 (MC\% * LNSALES) + \alpha_9 WM\% + \alpha_{10} WM\% * LNSALES) + \varepsilon \end{aligned} \quad (1)$$

where *GM%* is the gross margin percentage calculated as gross profit divided by sales, *INDUSTRY* is a vector of industry indicator variables based on two-digit SIC codes,

[11] The total effect associated with Wal-Mart is therefore the combination of the major customer effect and incremental Wal-Mart effect.

LNSALES is the natural log of sales, *GROWTH* is year-to-year sales growth, *LEVERAGE* is long-term debt divided by total assets, *CASH_CYCLE* is the cash conversion cycle calculated as the sum of the days' sales in accounts receivables and days' sales in inventory less days' purchases in accounts payable,[12] *TREND* is a trend variable equal to the year less 1993, *MC%* is the percentage of total sales to all major customers, and *WM%* is the percentage of total sales to Wal-Mart.[13]

In our second model, we investigate working capital management effects by examining the cash conversion cycle that combines the days' sales in accounts receivables, days' sales in inventory, and days' purchases in accounts payable into one measure. The cash conversion cycle measures the number of days from when cash is expended for the purchase of inventory until cash is received from the customer (for example, see Moss and Stine 1993). Lower cash conversion cycle measures indicate an ability to better manage the cash cycle.

Drawing on Deloof (2003), Gaur et al. (2005), Eljelly (2004), and Moss and Stine (1993), we include the natural log of sales, sales growth, leverage, and gross margin as control variables. We again include industry membership and a trend variable as additional control variables.

The cash conversion cycle model is as follows:

$$\begin{aligned} CASH\_CYCLE = {} & \alpha_0 + \Sigma(\alpha_{1j} INDUSTRY) + \alpha_2 LNSALES + \alpha_3 GROWTH \\ & + \alpha_4 LEVERAGE + \alpha_5 GM\% + \alpha_6 TREND + \alpha_7 MC\% \\ & + \alpha_8 (MC\% * LNSALES) + \alpha_9 WM\% \\ & + \alpha_{10} (WM\% * LNSALES) + \varepsilon \end{aligned} \quad (2)$$

where variables are as defined for Equation (1).

We further investigate cash conversion cycle results on an exploratory basis by analyzing the three components that are combined to form the cash cycle metric – days' sales in accounts receivable, days' sales in inventory, and days' purchases in accounts payable. Based on the logic of Equation (2), we form the following three equations to provide additional insight into the working capital management effects.

$$\begin{aligned} DSAR = {} & \alpha_0 + \Sigma(\alpha_{1j} INDUSTRY) + \alpha_2 LNSALES + \alpha_3 GROWTH \\ & + \alpha_4 LEVERAGE + \alpha_5 GM\% + \alpha_6 DSI + \alpha_7 DPAP + \alpha_8 TREND \\ & + \alpha_9 MC\% + \alpha_{10} (MC\% * LNSALES) + \alpha_{11} WM\% \\ & + \alpha_{12} (WM\% * LNSALES) + \varepsilon \end{aligned} \quad (3)$$

$$\begin{aligned} DSI = {} & \alpha_0 + \Sigma(\alpha_{1j} INDUSTRY) + \alpha_2 LNSALES + \alpha_3 GROWTH \\ & + \alpha_4 LEVERAGE + \alpha_5 GM\% + \alpha_6 DSAR + \alpha_7 DPAP + \alpha_8 TREND \\ & + \alpha_9 MC\% + \alpha_{10} (MC\% * LNSALES) + \alpha_{11} WM\% \\ & + \alpha_{12} (WM\% * LNSALES) + \varepsilon \end{aligned} \quad (4)$$

[12] Days' sales in accounts receivables (*DSAR*) is calculated as the average accounts receivable divided by the average daily sales during the year, days' sales in inventory (*DSI*) is calculated as the average inventory divided by the average daily cost of goods sold during the year, and days' purchases in accounts payable (*DPAP*) is calculated as the average accounts payable divided by the average daily purchases during the year.

[13] *MC%* and *WM%* only take a value if the individual percentages of sales to major customers exceed 10 percent. Classifying all other observations as zero adds noise to our analysis and may bias against finding results.

$$DPAP = \alpha_0 + \Sigma(\alpha_{1j} INDUSTRY) + \alpha_2 LNSALES + \alpha_3 GROWTH + \alpha_4 LEVERAGE + \alpha_5 GM\% + \alpha_6 DSAR + \alpha_7 DSI + \alpha_8 TREND + \alpha_9 MC\% + \alpha_{10}(MC\% * LNSALES) + \alpha_{11} WM\% + \alpha_{12}(WM\% * LNSALES) + \varepsilon \quad (5)$$

where variables are as previously defined.

In our next model, the overall impact on financial performance is measured by the supplier's return on assets. A model similar to Equation (1) for the gross margin is used for return on assets. An adverse impact on return on assets could be caused by lower income and/or greater asset base. Gross margins may be lower or supplier operating expenses may be affected by working capital management (for example, inventory carrying costs, increased shared advertising costs) and the numerator in return on assets will decrease. The denominator in return on assets may also increase if receivables and inventories must be greater to support increased sales. The impact is to lower return on assets. Alternatively, return on assets may be greater if assets are lower (less inventory or receivables through improved cash cycle management), gross margins are greater, or other operating expenses are lower (increased efficiencies in working capital management). Our return on assets model is as follows.

$$ROA = \alpha_0 + \Sigma(\alpha_{1j} INDUSTRY) + \alpha_2 LNSALES + \alpha_3 GROWTH + \alpha_4 LEVERAGE + \alpha_5 CASH\_CYCLE + \alpha_6 TREND + \alpha_7 MC\% + \alpha_8(MC\% * LNSALES) + \alpha_9 WM\% + \alpha_{10}(WM\% * LNSALES) + \varepsilon \quad (6)$$

where *ROA* is return on assets calculated as income before extraordinary items divided by average assets, and other variables are as defined in Equation (1).

SAMPLE DESCRIPTION

We form a database of suppliers to the retailing industry. The suppliers must be publicly traded so that financial information including any major customer disclosure is available.[14] Although some manufacturers were initially placed in our database because it is common knowledge that they are among the top suppliers to retailers (for example, Kimberly-Clark, Mattel, and Procter & Gamble), the great majority of suppliers were discovered by searching SEC Form 10-Ks filed by firms with SIC classifications suggestive of manufacturers that sell to retailers.[15] This process identified 333 suppliers to the retail industry, of which 224 disclose major customer information (amount and percent of sales to major customers) in their financial statements for at least one year. Years in which these firms did not disclose

[14] Major customers are considered to exist where a single customer represents 10 percent or more of a firm's consolidated revenue (FASB 1997). The disclosure should include that a major customer exists, the percentage of revenue from each major customer, and the segment reporting the revenue. Missing from the requirements is the identity of the major customer. However, many companies disclose the identity of the major customer, especially with respect to major retailer customers.

[15] Our search covered the following 97 four-digit SIC codes: 2000, 2011, 2013, 2015, 2020, 2024, 2030, 2033, 2040, 2050, 2052, 2060, 2086, 2090, 2092, 2200, 2211, 2250, 2253, 2273, 2300, 2320, 2330, 2340, 2390, 2421, 2430, 2511, 2540, 2621, 2670, 2731, 2750, 2771, 2780, 2834, 2840, 2842, 2844, 2851, 2870, 2890, 3021, 3081, 3089, 3100, 3140, 3220, 3221, 3250, 3260, 3290, 3420, 3440, 3460, 3490, 3523, 3540, 3564, 3569, 3579, 3585, 3630, 3634, 3651, 3663, 3690, 3751, 3812, 3823, 3827, 3851, 3861, 3910, 3911, 3942, 3944, 3949, 3950, 3960, 3990, 5045, 5064, 5070, 5090, 5099, 5110, 5122, 5130, 5140, 5190, 5661, 5900, 5912, 5990, 7370, and 7372.

a major customer and the 109 firms that never reported a specific major customer during this time period form our control sample.[16]

Our initial sample consists of 3,864 firm-year observations for which we are able to verify major customer information during the period from 1993 to 2004. We obtain financial data from Compustat. We eliminate 923 supplier-year observations because assets and/or sales information is not available. The remaining 2,941 supplier-year observations (320 suppliers) are included for all years in which financial statement data is available (see Table 1).

The number of firms disclosing major customers increases in the early years of the sample to around 140 firms before a sudden decrease to 114 in 2004 (see Figure 1). The mean percentage of sales to all major customers reported by these firms also increased in the earlier years, but not as dramatically. Average sales to all major customers for our sample firms are approximately 29 percent since 1995. The number of firms disclosing Wal-Mart as a major customer increases steadily over the sample period from 44 to as many as 106 firms out of the 224 studied (see Figure 2). However, the mean percentage of sales to Wal-Mart reported by these firms was rather flat ranging from 19 to 21 percent.

Twelve years of data are available for 133 firms in the sample. Within this subset of firms, few firms disclose either Wal-Mart or another retailer as a major customer in every year the supplier is in the sample. This is consistent with larger firms more likely to survive the full period and the existence of major customers being less likely for larger firms.

Pooled descriptive statistics are presented in Table 2. Comparison of mean and median data for the pooled sample does not indicate that the sample is significantly skewed. The only Pearson correlation coefficients in excess of 0.50 are between (1) days' sales in accounts receivable and inventory and the number of days in the cash conversion cycle, and (2) the percentage of sales to all major customers and the percentage of sales to Wal-Mart. However, the days' variables are not present in the same estimating equation. The relationships among the sales percentages are expected.

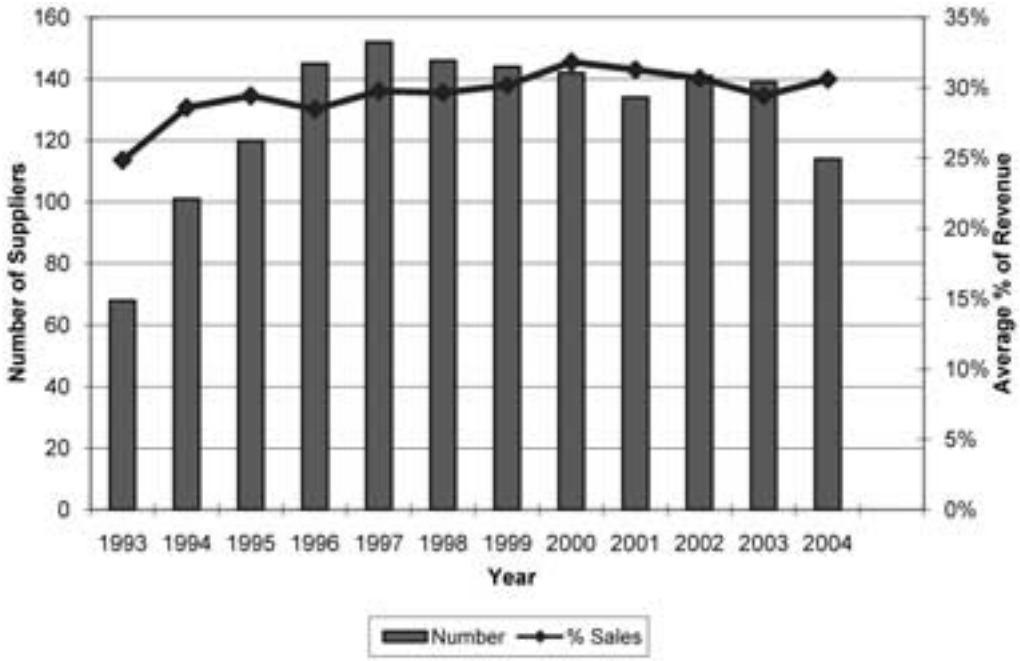
Comparison of observations based on whether the firm disclosed Wal-Mart and/or other retailers as major customers for the year is presented in Table 3. Approximately one-third of the observations are associated with disclosing Wal-Mart as a major customer (the Wal-Mart observations). A similar proportion disclose other retailers as major customers (429 firm-year observations disclose both). The suppliers that disclose other retailers alone or in combination with Wal-Mart as major customers are similar. However, these firms are different from those firms that only disclose Wal-Mart or do not disclose any major customers. Specifically, firms that only disclose Wal-Mart or do not disclose any major customers are larger and more profitable.

TABLE 1
Sample Section

Compustat observations for sample of suppliers from 1993 to 2004	3,864
Eliminate observations with missing assets and/or sales information	923
Sample for financial performance models	2,941

[16] We chose not to include all other firms in these industries as our control sample because inclusion in these industries does not guarantee that the firm supplied retailers. We therefore only include firms where we were confident that the firm supplied retailers. Further, expanding the sample would require verification of the major customer disclosure or lack thereof for an additional 16,000 firm-year observations.

FIGURE 1
Major Customers over Time



EMPIRICAL ANALYSIS

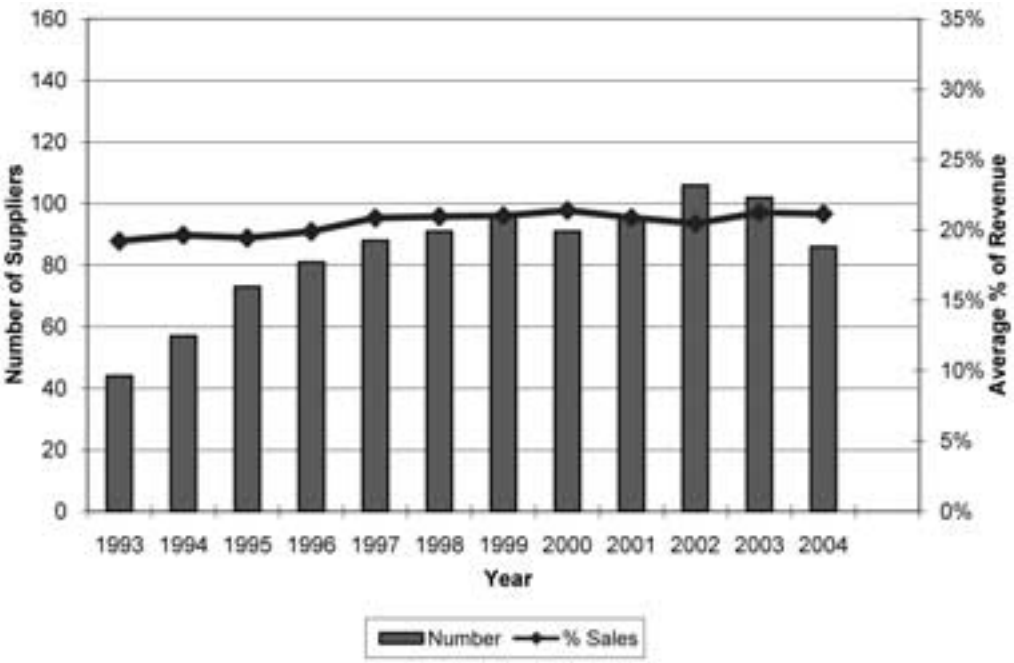
We test our hypotheses using an unbalanced panel data set of approximately 300 firms over 12 years. As a result, the OLS standard errors are likely biased because the residuals may be correlated across firms (cross-sectional dependence) and/or across time (time-series dependence). To address these issues, we estimate Rogers (1993) standard errors that are clustered on both firm and year for our analyses presented in the following sections (Petersen 2009).[17] Reported results are also based on a sample that excludes influential observations with r-students in excess of 3.0 from an initial OLS estimation (Belsley et al. 1980).

Hypotheses Tests

Our performance models have reasonable explanatory power with adjusted R^2 ranging from 17 percent to 39 percent (Table 4). Gross margins are positively associated with firm size and the length of the cash conversion cycle and are also slightly increasing over the 12-year period (Equation (1)). Shorter cash conversion cycles are associated with larger suppliers, higher growth, and lower leverage (Equation (2)). Longer cash conversion cycles are associated with higher gross margins consistent with the estimation of Equation (1). Larger, growing, and less levered firms report higher returns on assets (Equation (6)). While

[17] Fama and MacBeth (1973) regressions are a common estimation used in academic research; however, this approach only considers the cross-sectional dependence (Petersen 2009).

FIGURE 2
Wal-Mart as a Major Customer over Time



gross margins are increasing over time, we see a negative trend on ROA consistent with the increased costs associated with increasing cash conversion cycles.

We find evidence supporting both dependence of suppliers on major customers and the exercise of countervailing power. As sales to major customers increase, gross margins suffer ($\alpha_7 = -0.286$ in Equation (1), p-value < 0.01), and the cash conversion cycle shortens ($\alpha_7 = -51.32$ in Equation (2), p-value < 0.01), consistent with the major customer compensating the supplier for the lower gross margins (increased efficiencies captured in the shorter cash conversion cycle). The net effect on return on assets ($\alpha_7 = -0.147$ in Equation (6), p-value < 0.05) is smaller than the effect on gross margins. Supplier power mitigates both gross margin and return on assets effects. The adverse gross margin and return on asset effects associated with increasing sales to major customers are reduced as supplier size increases (*MC% * LNSALES*).

Turning to Wal-Mart, we find evidence of differential effects. The incremental effect associated with having Wal-Mart as a major customer offsets both the lower gross margins ($\alpha_9 = 0.282$ in Equation (1), p-value < 0.01), and the related supplier size effect ($\alpha_{10} = -0.048$ in Equation (1), p-value < 0.01). While gross margins suffer with major customers in general, the gross margins are maintained if Wal-Mart is the major customer and there is no evidence of countervailing supplier power (overall Wal-Mart effects are not significant). In terms of gross margins, it appears that substantial Wal-Mart volume is not detrimental. However, we find different evidence related to cash conversion cycle or returns on assets. An incremental Wal-Mart effect for the cash conversion cycle only exists

TABLE 2
Pooled Mean/Median Statistics and Pearson Correlation Matrix

n = 2,941	Mean	Median	*WM%*	*MC%*	*LEVERAGE*	*GROWTH*	*LNSALES*	*ROA*	*CASH_CYCLE*	*DPAP*	*DSI*	*DSAR*	*GM%*
GM%	0.361	0.351	−0.037*	−0.193*	0.010	0.018	0.130*	0.263*	−0.102*	0.272*	0.275*	0.022	1.0
DSAR	52.1	48.8	0.103*	0.121*	−0.027	−0.096*	−0.169*	−0.105*	0.540*	0.298*	0.317*	1.0	
DSI	94.9	86.7	−0.015	−0.110*	0.066*	−0.132*	−0.139*	−0.035	0.837*	0.250*	1.0		
DPAP	41.0	34.8	0.070*	0.023	0.072*	−0.038*	−0.097*	−0.230*	−0.159*	1.0			
CASH_CYCLE	106.0	100.8	−0.003	−0.051*	0.007	−0.131*	−0.139*	0.039	1.0				
ROA	0.023	0.051	−0.040*	−0.104*	−0.183*	0.042*	0.227*	1.0					
LNSALES	5.845	5.786	−0.090*	−0.219*	0.143*	−0.070*	1.0						
GROWTH	0.115	0.051	−0.025	0.010	−0.020	1.0							
LEVERAGE	0.219	0.177	0.054*	−0.063*	1.0								
MC%	0.156	0.109	0.617*	1.0									
WM%	0.070	0.000	1.0										

* Significant at the 0.05 percent level.

Variables Definitions:

GM% = gross margin percentage calculated as gross profit divided by sales;
DSAR = days' sales in accounts receivables calculated as the average accounts receivable divided by the average daily sales during the year;
DSI = days' sales in inventory calculated as the average inventory divided by the average daily cost of goods sold during the year;
DPAP = days' purchases in accounts payable calculated as the average accounts payable divided by the average daily purchases during the year;
CASH_CYCLE = cash conversion cycle calculated as the sum of the days' sales in accounts receivable (*DSAR*) and days' sales in inventory (*DSI*) less days' purchases in accounts payable (*DPAP*);
ROA = return on assets calculated as income before extraordinary items divided by average assets;
LNSALES = natural log of sales;
GROWTH = year-to-year sales growth;
LEVERAGE = long-term debt divided by total assets;
MC% = percentage of total sales to all major customers; and
WM% = percentage of total sales that are made to Wal-Mart.

TABLE 3
Descriptive Statistics for Suppliers Partitioned on Major Customer Information

	Wal-Mart Only (n = 581)			Wal-Mart and Other MCs (n = 429)			Non-WM MCs Only (n = 536)			No MCs (n = 1,395)		
Variables	**Mean**	**Median**	**Standard Deviation**	**Mean**	**Median**	**Standard Deviation**	**Mean**	**Median**	**Standard Deviation**	**Mean**	**Median**	**Standard Deviation**
GM%	0.397***	0.380*	0.142	0.327***	0.301***	0.142	0.317***	0.308***	0.123	0.374	0.377	0.146
DSAR	52.5***	48.8***	32.6	61.1***	57.3***	25.1	53.7***	52.9***	27.6	48.5	44.2	24.2
DSI	98.4	94.5	54.2	86.3***	79.6***	45.4	88.7***	85.9***	46.5	98.4	87.0	55.9
DPAP	42.8*	38.3**	29.5	47.2***	38.0***	44.7	36.1***	31.4***	29.4	40.2	34.3	27.5
CASH_CYCLE	108.0	96.9	69.4	100.3*	97.5	61.0	106.3	109.4	57.8	106.7	97.5	64.5
ROA	0.034	0.051**	0.155	−0.012***	0.032***	0.205	0.002***	0.050	0.232	0.038	0.057	0.154
LNSALES	6.130	6.050	1.703	5.268***	5.250***	1.458	5.426***	5.298***	1.846	6.064	6.053	1.841
GROWTH	0.096	0.042	0.316	0.110	0.036*	0.382	0.144	0.070	0.463	0.113	0.051	0.370
LEVERAGE	0.263***	0.214**	0.272	0.220	0.146*	0.248	0.176***	0.113***	0.217	0.217	0.189	0.193
MC%	0.199	0.170	0.102	0.432	0.390	0.166	0.296	0.230	0.197			
WM%	0.199	0.170	0.102	0.215	0.184	0.109	0.000	0.000	0.000			

*, **, *** The mean (median) is significantly different from the No MCs firms at the 0.10 percent, 0.05 percent, and 0.01 percent levels, respectively, using a t-test of means (Wilcoxon rank sums test).

Variables Definitions:

GM% = gross margin percentage calculated as gross profit divided by sales;
DSAR = days' sales in accounts receivables calculated as the average accounts receivable divided by the average daily sales during the year;
DSI = days' sales in inventory calculated as the average inventory divided by the average daily cost of goods sold during the year;
DPAP = days' purchases in accounts payable calculated as the average accounts payable divided by the average daily purchases during the year;
CASH_CYCLE = cash conversion cycle calculated as the sum of the days' sales in accounts receivable (*DSAR*) and days' sales in inventory (*DSI*) less days' purchases in accounts payable (*DPAP*);
ROA = return on assets calculated as income before extraordinary items divided by average assets;
LNSALES = natural log of sales;
GROWTH = year-to-year sales growth;
LEVERAGE = long-term debt divided by total assets;
MC% = percentage of total sales to all major customers; and
WM% = percentage of total sales that are made to Wal-Mart.

TABLE 4
Financial Performance Models

Equation (1): $GM\% = \alpha_0 + \Sigma(\alpha_{1j} INDUSTRY) + \alpha_2 LNSALES + \alpha_3 GROWTH + \alpha_4 LEVERAGE + \alpha_5 CASH\_CYCLE + \alpha_6 TREND + \alpha_7 MC\% + \alpha_8 (MC\% * LNSALES) + \alpha_9 WM\% + \alpha_{10} (WM\% * LNSALES) + \varepsilon$

Equation (2): $CASH\_CYCLE = \alpha_0 + \Sigma(\alpha_{1j} INDUSTRY) + \alpha_2 LNSALES + \alpha_3 GROWTH + \alpha_4 LEVERAGE + \alpha_5 GM\% + \alpha_6 TREND + \alpha_7 MC\% + \alpha_8 (MC\% * LNSALES) + \alpha_9 WM\% + \alpha_{10} (WM\% * LNSALES) + \varepsilon$

Equation (6): $ROA = \alpha_0 + \Sigma(\alpha_{1j} INDUSTRY) + \alpha_2 LNSALES + \alpha_3 GROWTH + \alpha_4 LEVERAGE + \alpha_5 CASH\_CYCLE + \alpha_6 TREND + \alpha_7 MC\% + \alpha_8 (MC\% * LNSALES) + \alpha_9 WM\% + \alpha_{10} (WM\% * LNSALES) + \varepsilon$

		Equation (1) (*GM%*)		Equation (2) (*CASH_CYCLE*)		Equation (6) (*ROA*)	
Variables		**Estimated Coefficient**	**t-statistic**	**Estimated Coefficient**	**t-statistic**	**Estimated Coefficient**	**t-statistic**
n		2,931		2,923		2,883	
LNSALES		0.009***	5.43	−5.49***	8.59	0.013***	8.67
GROWTH		0.021	1.59	−16.22***	5.90	0.043***	3.87
LEVERAGE		−0.014	1.29	12.37***	3.18	−0.154***	12.89
CASH_CYCLE		0.001***	8.84			0.000	0.58
GM%				65.55***	9.12		
TREND		0.001**	1.96	−1.38***	5.21	−0.001***	3.11
MC%	H1 H2 H3	−0.286***	6.46	−51.32***	2.67	−0.147**	2.46
*MC% * LNSALES*	H4	0.041***	4.90	−0.44	0.13	0.028***	2.81
WM%	H1 H2 H3	0.282***	3.50	−49.10	1.39	−0.009	0.09
*WM% * LNSALES*	H4	−0.048***	3.17	15.42**	2.49	−0.001	0.07
Adjusted R^2		33.0%		39.4%		17.7%	
Wal-Mart Effect							
$\alpha_7 + \alpha_9$		−0.004	0.07	−100.42***	3.38	−0.156*	1.75
$\alpha_8 + \alpha_{10}$		−0.007	0.48	14.98***	2.95	0.027*	1.86

*, **, *** p-value indicates significance at the 0.10 percent, 0.05 percent, and 0.01 percent levels, respectively, using two-tailed significance tests based on Rogers (1993) standard errors.

Variables Definitions:
CASH_CYCLE = cash conversion cycle calculated as the sum of the days' sales in accounts receivable (*DSAR*) and days' in sales inventory (*DSI*) less days' purchases in accounts payable (*DPAP*);
GM% = gross margin percentage calculated as gross profit divided by sales;
ROA = return on assets calculated as income before extraordinary items divided by average assets;
INDUSTRY = vector of industry indicator variables based on two-digit SIC codes;
LNSALES = natural log of sales;
GROWTH = year-to-year sales growth;
LEVERAGE = long-term debt divided by total assets;
TREND = trend variable equal to the year less 1993;
MC% = percentage of total sales to all major customers; and
WM% = percentage of total sales that are made to Wal-Mart.
Industry variables are suppressed for brevity.

for larger firms that supply Wal-Mart (α_{10} = 15.42 in Equation (2), p-value < 0.05) suggesting that Wal-Mart, compared to other major customers, may selectively impose terms that lengthen the cash conversion cycle on its larger suppliers. The Wal-Mart effects are not significantly different from the non-Wal-Mart major customers for return on assets.

We investigate the cash conversion cycle results by estimating separate equations for its three components (Table 5). Overall, we find that the cash conversion cycle results are primarily driven by days' sales in inventory and days' purchases in accounts payable. Suppliers carry less inventory and extend payment periods with their vendors as sales to major customers increase.

The incremental Wal-Mart effect on the cash conversion cycle is more complicated and provides evidence of differing strategies. As sales to Wal-Mart increase, days' sales in accounts receivable decrease and days' purchases in accounts payable increase (more so than with other major customers); however, the impact on the cash conversion cycle is partially offset by an increase in days' sales in inventory such that Wal-Mart has no overall impact on days' sales in inventory. These latter results are consistent with Kulp (2002) who finds that suppliers are more likely to take on inventory management when information flow is improved as would be the case with Wal-Mart's inventory management system. The incremental impacts for days' sales in accounts receivable and days' purchases in accounts payable measures are less as supplier size increases, but still exist overall.

Combined, our results indicate that the suppliers' financial performance is affected by having dependence on major customers in general and Wal-Mart specifically. The negative gross margin effect as sales to major customers increase dominates the benefits associated with lower cash conversion cycles. For the average firm in our sample, gross margins and return on assets are associated with decreases of 4.5 percent and 2.3 percent, respectively.[18] Suppliers with major customers also decrease the cash conversion cycle by an average eight days (mean percentage of sales to major customers of 0.156 times the estimated *MC%* coefficient of −51.32 in Equation (2)) by carrying fewer receivables and extracting extended payment periods from their suppliers. However, larger suppliers are able to mitigate much of the profitability effects (countervailing power).

Results differ when Wal-Mart is the major customer with respect to gross margins and the effect of larger suppliers on the cash conversion cycle (the overall effect on *ROA* is the same as for non-Wal-Mart major customers). First, the adverse gross margin and any differential effect based on supplier size is eliminated for suppliers with Wal-Mart as a major customer. These results are consistent with Wal-Mart not extracting all benefits created in the supply chain through improved inter-firm relationships (similar to Kinney and Wempe's [2002] results for JIT adopters). Second, the cash conversion cycle lengthens as supplier size increases, suggesting that Wal-Mart may provide terms that improve the cash conversion cycle to help support smaller suppliers. The lack of differential return on assets for Wal-Mart suppliers is consistent with these suppliers incurring other costs (e.g., increased expense sharing) in exchange for not reducing the gross margins. In contrast, it appears that non-Wal-Mart major customers focus on reducing their purchase prices, negatively affecting supplier gross margins. Our results therefore suggest different emphases between Wal-Mart and other major customers when negotiating supplier terms.

[18] The decreases in gross margin and return on assets are based on the product of the mean percentage of sales to major customers of 15.6 percent (Table 2) and the coefficients for MC% in Table 4 for Equations (1) and (6), respectively.

TABLE 5
Cash Cycle Components

Equation (3): $DSAR = \alpha_0 + \Sigma(\alpha_{1j} INDUSTRY) + \alpha_2 LNSALES + \alpha_3 GROWTH + \alpha_4 LEVERAGE + \alpha_5 GM\% + \alpha_6 DSI + \alpha_7 DPAP + \alpha_8 TREND + \alpha_9 MC\% + \alpha_{10}(MC\% * LNSALES) + \alpha_{11} WM\% + \alpha_{12}(WM\% * LNSALES) + \varepsilon$

Equation (4): $DSI = \alpha_0 + \Sigma(\alpha_{1j} INDUSTRY) + \alpha_2 LNSALES + \alpha_3 GROWTH + \alpha_4 LEVERAGE + \alpha_5 GM\% + \alpha_6 DSAR + \alpha_7 DPAP + \alpha_8 TREND + \alpha_9 MC\% + \alpha_{10}(MC\% * LNSALES) + \alpha_{11} WM\% + \alpha_{12}(WM\% * LNSALES) + \varepsilon$

Equation (5): $DPAP = \alpha_0 + \Sigma(\alpha_{1j} INDUSTRY) + \alpha_2 LNSALES + \alpha_3 GROWTH + \alpha_4 LEVERAGE + \alpha_5 GM\% + \alpha_6 DSAR + \alpha_7 DSI + \alpha_8 TREND + \alpha_9 MC\% + \alpha_{10}(MC\% * LNSALES) + \alpha_{11} WM\% + \alpha_{12}(WM\% * LNSALES) + \varepsilon$

	Equation (3) (*DSAR*)		Equation (4) (*DSI*)		Equation (5) (*DPAP*)	
Variable	**Estimated Coefficient**	**t-statistic**	**Estimated Coefficient**	**t-statistic**	**Estimated Coefficient**	**t-statistic**
n	2,919		2,912		2,902	
LNSALES	−0.82***	3.48	−3.48***	6.40	0.96***	3.60
GROWTH	−4.87***	4.18	−12.30***	5.20	−3.37***	3.21
LEVERAGE	1.49	0.90	16.81***	5.08	11.27***	6.39
GM%	−12.06***	3.87	85.79***	13.79	33.30***	11.27
DSAR			0.28***	6.77	0.17***	7.78
DSI	0.06***	6.56			0.05***	5.53
DPAP	0.17***	7.95	0.26***	7.17		
TREND	−0.29***	2.66	−0.80***	3.66	0.23**	2.39
MC%	9.48	1.04	−48.98***	3.53	22.66***	2.94
MC% * *LNSALES*	−1.94	1.17	−0.25	0.10	−3.47**	2.54
WM%	−43.32***	2.89	49.68*	1.85	62.82***	4.19
WM% * *LNSALES*	9.47***	3.62	−3.09	0.69	−10.54***	4.10
Adjusted R^2	38.3%		41.0%		31.6%	
Wal-Mart Effect						
$\alpha_7 + \alpha_9$	−33.84***	2.92	0.70	0.10	85.48***	6.33
$\alpha_8 + \alpha_{10}$	7.53***	3.77	−3.34	0.87	−14.01***	6.22

*, **, *** p-value indicates significance at the 0.10 percent, 0.05 percent, and 0.01 percent levels, respectively, using two-tailed significance tests based on Rogers (1993) standard errors.

Variables Definitions:

DSAR = days' sales in accounts receivables calculated as the average accounts receivable divided by the average daily sales during the year;

DSI = days' sales in inventory calculated as the average inventory divided by the average daily cost of goods sold during the year;

DPAP = days' purchases in accounts payable calculated as the average accounts payable divided by the average daily purchases during the year;

INDUSTRY = vector of industry indicator variables based on two-digit SIC codes;

(*continued on next page*)

TABLE 5 (continued)

LNSALES = natural log of sales;
GROWTH = year-to-year sales growth;
LEVERAGE = long-term debt divided by total assets;
GM% = gross margin calculated as gross profit divided by sales;
TREND = trend variable equal to the year less 1993;
MC% = percentage oftotal sales to all major customers; and
WM% = percentage of total sales that are made to Wal-Mart.
Industry variables are suppressed for brevity.

Sensitivity Analysis

We perform a number of sensitivity tests and find that our financial performance results are robust. Across our models, the potential exists that our results are due to some factor not captured in our models. We therefore include variables capturing the competitive nature of each industry (Herfindahl Index based on sales), whether the major customer relationship was new in the year, and the length of the major customer relationship. While each of these variables influence our operating metrics, our reported results are not affected. We also include indicator variables rather than the percentage of sales to major customers and to Wal-Mart and exclude the industry effects. Our results are unaffected with the exception that the Wal-Mart mitigation results weaken in the gross margin, cash conversion cycle, and days' purchases in accounts payable.

The research design and related discussion suggest that endogeneity may be a problem when estimating the financial performance models. For example, cash conversion cycle explains gross margin and *vice versa*. We therefore consider a simultaneous equation approach to determine if our results differ when we directly model these relationships and estimate a two-stage least-squares estimation of a system consisting of Equations (1), (2), and (6). In the first stage, we estimate modifications of Equations (1) and (2) where we replace the endogenous variables that appear on the right-hand side (gross margin and cash conversion cycle) with instrumental variables. Days' sales in accounts receivable, days' purchases in accounts payable, return on sales, sales as a percentage of industry sales, average gross margin percentage for each industry, inventory turnover ratio, and a Herfindahl Index for each industry are included as instrumental variables. The partial explanatory powers for the instruments in the first stage models are 9 percent (41 percent) for the gross margin (cash conversion cycle) model, suggesting we have identified reasonable instrumental variables. We also perform an over-identifying restriction test that indicates our instruments are appropriate. The Hausman test rejects the null of no endogeneity bias indicating a problem may exist; we therefore estimate the second stage regressions. However, inferences based on our reported results are not affected with respect to either coefficient magnitude or significance level.[19]

We estimate the financial performance models over various subsamples of the data to more fully understand whether our results are a function of the specific observations. First, we use a constant sample where the firm must be present in each of the 12 years of the investigation period (n = 1,596). Second, we separately examine firms with positive (n = 2,224) and negative income (n = 717). Third, we exclude the 441 observations that always reported Wal-Mart as a major customer. Finally, we focus on 880 observations where

[19] We also use two stage least-squares to estimate a system consisting of Equations (1), (3), (4), (5), and (6) with similar results.

the firm started disclosing larger retailers as major customers during the period examined. We found no differences in the results that would affect our inferences.

Finally, we focus on firms that reported (1) any major customer at least once during the sample period and (2) Wal-Mart as a major customer at least once during the sample period. In this analysis, the years in which the firm did not report a major customer (or Wal-Mart as a major customer) form the control observations. This analysis provides a within-firm across-time comparison. A within-firm sample provides certain advantages over the sample used in our primary tests as the firm serves as its own control. In this way, differences between Wal-Mart and non-major customer firm observations are controlled for. In both samples, we find results consistent with those reported indicating that the effects previously discussed at least partially relate to changes in the proportion of sales to major customers and Wal-Mart.

SUMMARY AND CONCLUSION

Many question the wisdom of recent retail consolidation. Most research takes a perspective of the retailer's shareholder to provide evidence of value creation or loss. We take a significantly different path and focus on the effect of increasing buyer concentration on the suppliers to the retail industry and the importance of the major customer disclosures. Increasing concentration creates dependence on a few large retailers. We use major customers as a proxy for supplier dependence and sales to Wal-Mart, the largest retailer in the world, to provide evidence of the effect of a prominent channel member on the suppliers, independent of their dependencies on other major customers. We also control for suppliers' countervailing power.

We investigate suppliers' financial performance to gain insight on buyer and supplier power in the retailing industry. While having major customers may provide other value within the supply chain, we find that gross margins and return on assets are negatively impacted as sales to major customers increase. However, larger suppliers are able to mitigate part of the effect. Suppliers are also able to reduce the adverse effect by carrying less inventory and extracting extended payment periods from their own suppliers. The magnitude and direction of these effects depend on the major customer. We find that suppliers benefit from their significant Wal-Mart relationships compared to other major customer relationships as the negative effects are reduced and in certain cases eliminated. The benefit from Wal-Mart is more pronounced for smaller suppliers.

We document the importance of current significant customer disclosures. Specifically, we show that the major customer disclosure has financial implications consistent with the objectives of SFAS No. 131. We provide financial-statement-based empirical evidence on how suppliers are affected by buyer power based on their dependence on their major customers and that incrementally exercised by a prominent retailer (the Wal-Mart effect)—further supporting the need for major customer disclosures. Related, our analysis suggests that knowing the identity of the major customer (which is not always disclosed) may be important in understanding the financial effects on suppliers from their major customer relationships.

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