The Journal of Entrepreneurial Finance

Volume 12
Issue 1 *Spring 2007*

Article 5

12-2007

An Empirical Analysis of the Financial Impact of Supply Chain Management on Small Firms

James C. Brau
Brigham Young University

Stanley E. Fawcett
Brigham Young University

Ladd Morgan
Brigham Young University

An Empirical Analysis of the Financial Impact of Supply Chain Management on Small Firms[±]

James C. Brau[*]
Brigham Young University,

Stanley E. Fawcett[**]
Brigham Young University

and

Ladd Morgan[***]
Brigham Young University

In this article we test the value proposition hypothesis of supply chain management (SCM) by examining survey results of 570 US managers. First, we find that large firms use SCM initiatives significantly more than small firms. Second, in univariate and multivariate tests, we find that SCM leads to significant improvements in asset utilization, revenue generation, and competitive performance, regardless of firm size. These two major findings suggest that managers at small firms that are not actively engaged in SCM should reevaluate their opportunity to capture the competitive benefits of SCM that many large firms currently enjoy.

[±] The authors acknowledge the financial support of the Marriott School at Brigham Young University and the Center for Advanced Purchasing Studies, the research arm of the Institute for Supply Management. Jim Brau recognizes his Goldman Sachs faculty fellowship. Stan Fawcett recognizes his Staheli Professorship. All three authors recognize a grant from the Marriott School Center for Entrepreneurship. We thank Michael Murff for excellent research support. Above all, we thank the company officers who responded to our survey and made this study possible.

[*] Jim Brau, PhD, CFA, is associate professor of finance and Goldman Sachs Faculty Fellow at the Marriott School at Brigham Young University. His current research interests include entrepreneurial finance and initial public offerings.

[**] Stan Fawcett, PhD, is professor of business management and Staheli Professor of Global Supply Chain Management at the Marriott School at Brigham Young University. His current research interests include supply chain management integration & implementation and international business.

[***] Ladd Morgan worked on this paper as an undergraduate as part of the Brigham Young University student-mentored learning program from 2004–2005. He currently works in New York City for Ernst and Young, LLP.

Global competition is forcing companies to restructure and reengineer their operations to increase organizational effectiveness and satisfy key customers. In the midst of this pursuit of excellence, managers now realize that their companies often lack the resources and competencies needed to compete successfully (Fine (1998), Tyndall (1998)). This realization has led managers to look beyond their companies' organizational boundaries to evaluate how the resources of suppliers and customers can be used to create greater value (Bartholomew (1999), Blackwell (1997), Christopher (1999), Dell (1999)). Efforts to integrate resources across company boundaries to deliver value are known as supply chain management (SCM) initiatives (Ballou (2000), Lambert (1998), Poirier (1999)).

SCM enables a company to focus on its unique competencies and skills. Non-core activities are outsourced to channel members that possess superior capabilities in those areas (Cox (1999), Laseter (1998), Quinn (2000), Rich (1997), Sheridan (1999)). By establishing relationships with other members of the supply chain, companies can lever
age complimentary competencies found throughout the chain to increase performance levels. The objective is to create a competitive "team" of suppliers, finished goods producers, service providers, and retailers capable of delivering the best product/service offerings possible. (Figure 1 depicts a simple supply chain). Theoretically, these allied teams of companies form an integrated supply chain, which competes against other supply chains in today's global economy (Henkoff (1994)).

Why is SCM important? The answer lies in SCM's potential to improve a company's competitiveness and ultimately its profitability. This is the value proposition of SCM (Hadley (2004)). Ample anecdotal evidence that SCM can help a company compete more effectively abounds. For example, IBM saved $3 billion in costs by overhauling its supply chains (Lyons (2003)). SCM initiatives have helped other highly visible companies like Caterpillar, Dell, Honda, Solectron, and Wal-Mart design winning business models that leverage operating efficiency to deliver outstanding products to customers (Siekman (2000)). Robert Moffat, IBM's supply chain czar, emphasized the importance of SCM, saying, "What makes Dell and Wal-Mart successful? It's the business model, and supply chain is an enabler. That's why you're seeing this growing importance of supply chains. People realize this is the weapon of the future." (Lyons (2003)).

Unfortunately, when supply chain strategies are discussed in both the trade press and in academic journals, the emphasis tends to be on large firms like Dell, IBM, and Wal-Mart. Success stories focus largely on the initiatives employed and the benefits attained by Fortune 500 enterprises. Small companies' efforts to utilize SCM for competitive advantage have been largely overlooked (NRC (2000)). Only a few articles in the small business literature specifically address the impact of SCM on small firms and their findings have been somewhat inconsistent. For example, Wynarczyk and Watson (Wynarczyk (2005)) found that supply chain partnerships facilitate more rapid and sustained small to medium enterprise (SME) growth. By contrast, Arend and Wisner (Arend (2005)) found that SCM is negatively associated with SME performance. These two articles illustrate that thus far, the small-firm SCM literature is inconclusive on the impact of SCM initiatives on small firm performance. The intent of our paper is to extend the existing academic literature by specifically testing the value proposition of SCM for small firms. By doing so, we help clarify the opportunities that exist for small firms to leverage SCM for their competitive advantage.

We therefore focus specifically on the engagement of small firms with supply chain practices and the implementation impact of SCM on the competitive and financial performance of small firms (fewer than 500 employees). We do this by comparing the experiences of small

firms with their larger counterparts. By addressing the following four questions, we assess the viability and competitive potential of SCM in small companies:

- Are small firms as actively engaged in SCM initiatives as large firms?
- Do small-firm SCM initiatives improve revenue generation capabilities?
- Do small-firm SCM initiatives improve asset utilization?
- Do small-firm SCM initiatives improve a company's overall competitive position?

Summarizing our key findings, we find that small firms are significantly less engaged in SCM than large firms. However, we find that though their engagement is less, smaller companies often reap superior revenue generation and asset utilization improvements than larger firms by using SCM. Our overall recommendation to small firm managers is that if managers are not already engaged in SCM, they should reassess how the SCM initiatives discussed in our paper may add value to their firm.

I. Theoretical Development: SCM's Impact on Small-Firm Financial Performance

Small firms are a huge portion of the US economy and represent a tremendous opportunity to improve US competitiveness. In the manufacturing sector alone, small firms account for 98 percent of all manufacturers and employ two-thirds of the US's manufacturing workforce. Moreover, small firms tend to create more jobs and generate faster growth rates than larger manufacturers (NRC, 2000 for preceding statistics). Such statistics emphasize the need to understand how to improve the competitiveness of the small firms through supply chain initiatives (Daewoo (2001)).

A. The Ability and Willingness of Small Firms to Adopt SCM

Small firms face unique challenges vis-à-vis large organizations (Walker and Petty (1978), Pettit and Singer (1985), Ang (1991), Ang (1992)). The first, and most visible difference, is in the area of financial resources. Small firms typically operate on very tight budgets and with longer cash-to-cash cycles than Fortune 500 companies. Their small size and difficult operating environment often limits access to capital markets and financial institutions for capital reserves, increasing small firm dependence on trade credit (Petersen and Rajan (1997)). As a result of the financing constraints, small firms generally do not have the financial resources to implement many strategic initiatives. Moreover, demonstrating a short-term positive P&L impact is difficult for many supply chain initiatives (Briscoe (2005), Fawcett (2001)). These limitations make it so SCM initiatives are generally difficult for small firm managers to initially justify and implement.

Limited finances drive other resource challenges as well. For example, small firms lack the financial wherewithal to hire prestigious management teams, grow capacity, and invest in technology. Few small companies can afford to employ a deep and talented pool of strategic managers. While the management teams at smaller companies are often capable and passionate, they are often stretched too thin to manage a supply chain transformation. Moreover, a common complaint at small companies is that managers are so busy putting out the fires that arise in day-to-day business that they do not have time to focus on long-term strategic initiatives (Fawcett (2001)). As a result, managers at smaller companies often find it difficult to keep up with the latest management practices and trends. This has been the case with SCM. Five resource-related challenges that typify the small-firm operating environment and hinder the implementation of SCM (APO (2002)) are highlighted below:

1. Managers at small firms lack awareness of leading-edge SCM practices. Managers are so focused on immediate decisions and short-term survival that they do not pursue practices often discussed as core components of SCM.
2. Small firms are slow to implement SCM. While managers recognize the challenges brought on by globalization, disruptive technologies, and intensifying competition, they have been slow to embrace SCM. Managers argue that they lack the know-how, resources, and channel power to effectively pursue SCM.
3. Management of supply chain among small firms is localized. Small firms often operate in fragmented, commoditized industries. They lack geographical reach and understanding. Their perspective of the overall supply chain is constrained. Their power in supply chain relationships—already weak because of their small size—is further marginalized.
4. Managers at small firms are unwilling to share information. SCM best practice is enabled and dependent on the ability to share information among members of the chain; yet, managers at small firms are often reluctant to share vital information. They fear that what little leverage they have will be lost.
5. Small firms still employ a low level of information technology usage for SCM. Modern information technologies are often expensive to buy and difficult to implement. Many managers at small firms view these technologies as too sophisticated and too expensive— they are simply out of reach of their firms.

Another SCM-related difference between small and large firms is the power they possess in supply chain relationships. The fact that asymmetrical power governs many supply chain relationships is a serious impediment to the adoption of collaborative supply chain initiatives by small firms. Most small firms lack the channel power and influence to define their own economic destiny. In the absence of a patented technology or unique product offering, small firms rarely possess power in the supply chain. Their lack of clout leaves them vulnerable, especially when larger, more powerful members of the chain do not adopt a collaborative approach to relationship management. Unfortunately, many larger firms have not abandoned their adversarial approach to relationships with small members of the supply chain (Quayle (2002)). Lacking trust, managers at small firms often look skeptically at "supposedly" collaborative supply chain initiatives with powerful customers or suppliers (Fawcett (2004), Mariotti (1999)). Vulnerability and trust are critical issues in the minds of small-firm managers. Indeed, some managers perceive current supply chain practices hurt small-firm performance (Arend (2005)).

Research suggests that small firms face another type of vulnerability, beyond their lack of channel power. When a supply chain glitch or problem arises, all firms suffer depressed stock prices and profitability. Companies that report supply-chain problems experience seven percent lower sales growth, 11 percent higher costs, and a 14 percent increase in inventories compared to their counterparts that do not experience major supply chain disruptions (Singhal (2002), Singhal (2004)). However, small firms suffer more and longer than larger firms. Average operating income for small firms dropped by 150 percent compared to an 86 percent decline for large companies (Singhal (2002), Singhal (2004)). Because of their limited resources, small firms cannot afford major supply chain disruptions. Interestingly, Singhal's research shows that the negative impacts of supply chain disruptions regardless of the source of the disruption. In other words, when a key supplier or customer causes the problem, the firm

still suffers the negative results. Thus, managers at small firms must carefully evaluate closely-integrated relationships that might lead to disruptions and threaten their existence.

To summarize, small firms are different from large firms in at least three areas that are critical to deciding not just whether to, but also how to, adopt supply chain practices: ability, vulnerability, and risk. These differences suggest that small companies may need to approach SCM strategies differently than large companies. Realistically, the small-firm manager must more carefully evaluate the scope, managerial support, and capability required to successfully implement a specific supply chain initiative. For example, limited resources and managerial reticence suggest that small firms are likely to limit their firm-to-firm collaboration and integration initiatives. Thus, our first hypothesis is,

Hypothesis 1: *Small firms are less likely to pursue expansive, end-to-end supply chain integration strategies than large firms.*

Add risk to scarce managerial resources and it is likely that garnering internal support for extensive supply chain initiatives will be problematic for small firms. The limited channel power of small firms may also reduce their ability to achieve high levels of channel support for collaboration programs initiated by the small firm. Our second and third hypotheses test the levels of managerial support for SCM at small firms:

Hypothesis 2: *Small firms are less likely to achieve high levels of internal managerial support for supply chain initiatives than large firms.*

Hypothesis 3: *Small firms are less likely to achieve high levels of external channel support for supply chain initiatives than large firms.*

Finally, all of these factors imply that managers at small firms are prone to perceive that their companies lack the capability to effectively implement SCM practices up and down the chain. In particular, managers at small firms are likely to view resource and power dependent activities like supplier development, channel alignment, and integration initiatives as the purview of large, powerful companies. Small firms may therefore be less likely to pursue these activities that are popular among larger firms (Nelson (1998), Brady (2003), Fawcett (2004)). We test the preceding logic through hypotheses four through seven:

Hypothesis 4: *Small firms are less likely to engage in supplier and customer development initiatives than large firms.*

Hypothesis 5: *Small firms are less likely to achieve higher levels of alignment up and down the supply chain than large firms.*

Hypothesis 6: *Small firms are less likely to achieve high levels of integration with upstream suppliers than large firms.*

Hypothesis 7: *Small firms are less likely to achieve high levels of integration with downstream customers than large firms.*

B. The Impact of SCM Implementation on Small-Firm Performance

SCM's goal is to increase company and supply chain competitiveness through better coordination of value-added activities. By collaboratively managing the resources of the entire chain, overall costs can be reduced and customer service levels increased (Hadley (2004)). Collaboration may focus on cross-functional process integration within the firm, forward integration with first-tier customers, backward integration with first-tier suppliers, or some

combination of the three (Fawcett (2002)). For example, collaborative planning between a consumer-packaged goods company and a retailer can improve forecast accuracy and align promotional activities. Better planning may result in lower inventory levels, reduced time to market, improved product availability, and customer satisfaction.

SCM has the potential to enhance a company's financial performance in two ways. First, effective SCM drives costs down. Reduced inventory levels, improved throughput, and waste elimination are perhaps the most visible areas for cost savings. However, additional costs savings arise from joint productivity and problem-solving efforts, improved quality, and better-coordinated logistics activities. Second, well-designed supply chains can increase revenues by creating satisfied and loyal customers. Indeed, SCM encourages companies to react with agility to changing consumer concerns, demands, and preferences. Responsiveness is key in today's turbulent market environments. Collaboration can reduce time to market for new products, improve product availability through more responsive delivery systems, and provide customers with unique products and services (Fawcett (2001), Cook (2005)). SCM's ability to simultaneously increase revenues and lower costs creates an ideal formula for competitive success (Lee (2004)).

In theory, enhanced supply chain competitiveness should translate into greater profitability for members up and down the chain. The question is, "Do small, entrepreneurial firms take full advantage of improved performance and profitability made possible via SCM?" As noted in the preceding section, SCM presents some real and unique implementation challenges for smaller firms. Given these challenges, can small firms achieve the asset-utilization efficiencies and revenue-generating benefits often attributed to SCM?

While the evidence to date is inconclusive, there is reason to believe small firms can prosper in a supply chain environment. For example, active participation in a winning supply chain has the potential for accelerated sales and market share growth. Sales and market share growth are strong motivations to partner with other companies in the chain. Further, supply-chain alliances improve information flows and stabilize demand patterns, enabling the small firm to improve the efficiency of its own operations (Arend (2005)). Alliance relationships also provide small firms access to their partners' skills and resources. Supplier development programs have received widespread attention for their ability to improve the productivity and quality levels of small firms (Nelson (1998), Brady (2003)). For these reasons, we propose that the small firm can improve its financial performance through well-designed and carefully implemented SCM initiatives. Hypotheses eight through ten test the small-firm's ability to profit from better asset utilization, enhanced revenue generation capability, and improved overall competitiveness.

Hypothesis 8: *Small firms are as likely as large firms to achieve improvements in asset utilization performance through supply chain integration.*

Hypothesis 9: *Small firms are as likely as large firms to achieve improvements in revenue generating performance through supply chain integration.*

Hypothesis 10: *Small firms are as likely as large firms to achieve improvements in overall competitive performance through supply chain integration.*

II. Research Methodology

To obtain an accurate view of SCM as it is currently practiced in entrepreneurial ventures, the experience and insight of industry managers engaged in supply chain initiatives was sought. To document how key functional managers view supply chain management, a mail survey methodology was adopted and targeted to three different groups of managers:

purchasers, logisticians, and manufacturing managers. Based on the literature as well as a series of pre-survey interviews, a four-page instrument was developed. The initial survey was reviewed by several practitioners and academics who served as an advisory board. Their feedback was used to modify the survey instrument. A large-scale survey (original) was conducted. Three mailing lists of approximately 1,500 middle and senior level managers were compiled from the membership rosters of the Institute for Supply Management (ISM), the Council of Supply Chain Management Professionals (CSCMP), and APICS (formerly the American Production and Inventory Control Society). After eliminating firms with missing contact information, the mailing lists consisted of 1,329 to ISM, 1,369 to CSCMP, and 1,351 to APICS.

The survey process followed Dillman's Total Design Method (Dillman, 1978). Approximately 100 non-respondents from each group were telephoned to investigate why they had chosen not to participate in the study. Two answers dominated the responses: 1) the manager was too busy and 2) the manager is inundated by surveys and no longer participates in survey studies. Non-respondents were also asked to provide basic demographic data so that respondent and non-respondent profiles could be compared. No differences were found. The original results were reviewed, the survey was modified, and completely new mailing lists were compiled. These mailing lists consisted of 500 names per organization. Based on the original response rate and the reasons for non-participation, a more labor-intensive and costly survey methodology was employed. Each manager was telephoned and asked to participate. Approximately 20 percent of the telephone numbers were inaccurate (resulting in mailing lists of 370 (ISM), 398 (CSCMP), and 328 (APICS). The mailing list was adjusted and the survey sent out. The results from the two mailings were compared and no statistical differences were found.

Table I reports the response rates for the mailings. Overall, we received 588 completed surveys for an average response rate of 11.4 percent. We required respondents provide the number of employees so we could define large and small firms. Eighteen surveys were missing number of employees, resulting in a final sample of 570 firms. Consistent with Small Business Administration definitions and the empirical finance literature (e.g., Brau (2002) and Brau, Brown, and Osteryoung (2004)), we define a small firm as one with less than 500 employees. Our final sample consists of 257 large and 313 small firms with mean sales of $7.06 million and $542,000 respectively.

The survey consisted of more than 170 questions. The goal of the survey was to verify the often-discussed linkage between integration initiatives and both a company's operational and financial performance. Specifically, our inquiries comprised diverse issues including the extent of SCM utilization, key benefits from and obstacles to integration, and the effects of SCM on inventory levels, purchasing and manufacturing costs, sales growth, market share, and return on equity. These aspects are analyzed in our study as variable constructs as shown in Table II. After combining the responses from related questions to create a construct, we standardized all of the means and medians to the survey scale (generally 1-7; the majority of our survey questions measured a degree of intensity on a Likert scale). Survey results indicate that 65 percent of small and 88 percent of large companies engage in some form of SCM. Experience, however, demonstrates that managers have adopted a variety of disparate approaches to SCM implementation (Fawcett (2002)).

Constructs 1-3 concentrate on the extent to which supply chain integration has been implemented by the firm and the internal and external organizational support for the integration. Construct 4 is concerned with the degree of supply chain development practiced by the firm. Constructs 5-7 reflect survey responses to questions regarding specific aspects of the

integration strategy such as customer and supplier alliances and the alignment of supply chain objectives with the company's overall strategic vision. Finally, constructs 8-10 are used in this study as dependent variables displaying the effects of SCM on key business performance metrics including asset utilization, revenue generation, and market share. To test if the constructs are statistically consistent, we construct a Chronbach's Alpha for each construct (with the exception of Construct 4 for which alpha is not suited). Nunnally (1978) sets 0.70 as the statistical cut-off. All of our constructs meet this hurdle, ranging from a low alpha of 0.74 (Construct 7) to a high alpha of 0.92 (Construct 9).

Table III reports the sample summary statistics of the independent constructs for both small firms and large firms. Panel A reports that on average, companies of all sizes are more likely than not to be engaged in supply chain integration activities, there is internal and external support for these activities, and supply chain objectives tend to be aligned with general firm-wide financial objectives. Panels B and C report the descriptive statistics for small and large firms respectively. Comparing the means and medians between small and large firms, we observe that large firms use SCM to a greater extent than small firms. In the next section, we test to see if these differences are statistically significant.

III. Empirical Analysis and Findings

A. Difference Tests: Small Firms versus Large Firms

To determine which factors correlate with improved corporate performance, three separate groups of univariate tests were performed. In Table IV, we analyze the differences in SCM adoption between small and large firms. The first column lists the variable in question; the second column reports the difference in means (small companies minus large companies); the third column is a *p*-value for the pairwise *t*-test with the null hypothesis that the two group means are equal; and the final column is the Wilcoxon rank-sum *p*-value with the null hypothesis that the group medians are equal.

As hypothesized, small firms are significantly less involved in supply chain integration activities than large firms. We specifically evaluated the degree of integration as well as both internal and external support for supply chain initiatives. In each case, small firms report significantly lower levels of supply chain involvement. These findings support Hypotheses 1, 2, and 3. First, large firms exhibit a tendency to explore and implement SC integration strategies that are broader in scope, reaching up and down the supply chain. The interviews supported this finding, suggesting that many small-firm initiatives focus on internal integration or seek to accommodate the SCM initiatives of larger firms. Very few small firm managers feel that their companies have the resources or skills to drive integration more than one tier up the chain.

Second, it is easier to generate internal support for SCM at larger firms. Again, the interviews provided some insight into the survey responses. Small-firm managers feel intensely the resource constraints that are part of the small-firm environment. Very few slack resources are available for initiatives that many managers perceive to be too time consuming and cumbersome. The lack of channel power often inhibits the small firm from believing they can change the way business in the chain is conducted. Third, large firms also enjoy greater external support for SC integration. Interestingly, while significant, the gap between large and small firms for this construct is somewhat smaller. Many small firms enjoy relatively high levels of support from first-tier customers that are anxious for their supply base to become more integrated. To summarize, the lower levels of support for SCM at small firms helps explain the limited scope and intensity of small firm integration initiatives.

Focusing on the specific constructs related to supply chain activities like supplier development, channel alignment, and integration initiatives, the findings are surprising. First,

the initial analysis shows a significantly higher level of SC development among small firms. This finding prompted further multivariate analysis, which showed no statistical difference between small and large firms pertaining to the Supply Chain Development construct. This multivariate analysis is discussed further below. Second, the analysis reveals that while differences exist in the other activities in the direction hypothesized, the differences are not statistically significant. Thus, while large firms appear to be more actively engaged in supply chain alignment, supplier integration, and customer integration than small firms, the gap in usage is less than hypothesized, suggesting only limited support for Hypotheses 5, 6, and 7.

Again, the interviews provide some insight into what is happening here. Managers at some small firms feel that company size does not preclude actively pursuing leading edge practice. Thus, regardless of size, some small firms are leaders in lean, quality, and supply chain practice. A second explanation was also evident. Managers at many small firms feel that they cannot drive supply chain integration; however, they feel that their participation in initiatives that are driven by other members of the chain, usually customers, constitutes active involvement in supply chain alignment and integration. Finally, managers at small firms selectively adopt SCM initiatives learned from larger customers and apply them upstream with their own suppliers. Thus, to some extent, supply chain best practice is filtering up the supply chain.

B. Financial Outcome Dependent Variables

As discussed previously, three dependent constructs are used in this study to show the impact of SCM on business performance. Table V contains descriptive statistics for these constructs as well as for several of their component variables. As in Table III, Panel A displays data from the total sample, whereas Panels B and C show a breakdown by small and large firms respectively.

A comparison of financial performance between small and large firms reveals little difference between the two groups. Table VI reports that in pairwise *t*-tests, transportation cost improvement (p=0.041) is statistically greater for larger firms. Of the fourteen other performance measures, no significant differences exist between the small and large samples indicating that the large majority of differences in outcome variables are not attributable to a size effect.

C. Difference Tests Based on SCM Initiatives for the Aggregate Sample

Having established that firm size has insignificant (or minimal) correlation to financial performance for our sample, we conduct a final group of univariate empirical tests to test the SCM value proposition advanced in Hypotheses 8-10. In these tests we differentiate between the mean asset utilization, revenue generation, and competitive performance of companies characterized as high and low in each of the seven aspects of SCM utilization. In this first round of tests, we disregard company size and compare means of the total sample of firm responses to establish that SCM initiatives have a positive impact on the aggregate sample. Table VII reports the results of these difference tests.

Consistent with the SCM value proposition hypothesis, the tests confirm that superior supply chain management practices clearly lead to improved corporate performance. With one exception (Supply Chain Development), all of the SCM variables proved to be significantly positively correlated with improved asset utilization and revenue generation (first two columns) with *p*-values lower than 0.01. Similar results were exhibited with tests using competitive performance as the outcome variable (third column). In the competitive performance tests, only integration strategy and supply chain development were insignificantly related to competitive performance. Contrary to our expectation, we find a negative correlation between the supply chain development construct and financial performance. In the subsequent multivariate tests, however, supply chain development carries a positive (but not significant) coefficient for Asset Utilization and Revenue Generation indicating the univariate finding is not complete.

Of the SCM predictor variables reported in Table VII, supply chain alignment, supplier integration, and customer integration show the greatest correlation to improved financial performance. Of these three variables, customer integration is shown to be most influential in improving competitive performance in general—suggesting that customer relationship management should be regarded as an essential element of a firm's strategic planning.

Table VII also reports that firms with high levels of supplier integration are likely to be more successful in revenue generation (difference: 1.12) and asset utilization (1.05) than their counterparts. This finding is especially consistent with theoretical literature on the subject (SMRG (2005), Krause (1999)). Effective supplier alliances increase revenue by providing opportunities for concurrent product development and preventing stockouts. Concurrent product development leads to improved product quality (an element of the revenue construct) and reduced costs of new product development (asset utilization construct). Two other characteristics of effective alliances, information sharing and collaborative demand forecasting, reduce inventory holding costs and improve asset productivity.

D. Difference Tests Based on SCM Initiatives for the Aggregate Sample

In this section, we examine Hypotheses 8-10. In the previous section, we documented that SCM initiatives positively impact the aggregate sample. In this section, we specifically examine SCM initiatives based on the size of the firm. Tables VIII and IX report difference tests in a similar format as Table VII, with small-firm results in Table VIII and large-firm results in Table IX. The two sub-samples are very consistent with the aggregate sample findings. Generally, SCM initiatives demonstrate significant performance in asset utilization, revenue generation, and competitive performance. The most interesting point here is that the improvements in performance experienced by high-SCM *small* firms match those reported by high-SCM *large* firms. Proactive SCM implementation, regardless of firm size, is the key to improved performance. The aggregate findings of Tables VI through IX provide strong evidence in support of Hypotheses 8-10.

E. Tobit Tests with Financial Performance as the Dependent Variable

Thus far, each of our tests has been univariate in nature. For the next analysis, we conducted Tobit tests to examine the effect of the predictor variables in a multivariate setting. We used Tobit tests rather than ordinary least square regression because each of the dependent variables is truncated at 1 on the left tail. We estimated three models, which are reported in Table X. Each model uses one of the financial performance constructs as the dependent variable.

In Panel A, we tested the effect of SCM on asset utilization. Consistent with the difference tests reported in Tables VII-IX, the coefficients of all of the SCM independent variables are positive and statistically significant beyond the five percent level, with the exception of the supply chain development and customer integration constructs. Panel B reports very similar results with revenue generation as the outcome variable. Panel C indicates a weaker correlation between the SCM predictor variables and competitive performance than the previous two outcome models. The two primary SCM variables that drive competitive performance improvement are Supply Chain Alignment and Customer Integration. Consistent with the findings reported in Tables VI and VII, SCM initiatives are statistically important, even after controlling for company size. In sum, the multivariate results are consistent with the univariate results and indicate strong empirical support for the value proposition hypothesis of supply chain management among both large and small firms.

IV. Conclusion

For over a decade, academics, managers, and consultants have advocated supply chain management for its promise to increase profitability, return on capital, and revenues. Today, however, many companies have yet to develop workable SCM strategies. Most of the highly publicized success stories focus on SCM strategies among Fortune 500 multi-national companies. Many managers at smaller companies approach SCM with caution because discussions of SCM typically focus on resource-intensive initiatives and channel power. Small firms tend to have neither. Thus, there exists a tendency to view proactive SCM as the domain of large companies with deep pockets and abundant channel power. Our research findings support the belief that large firms are more likely than small firms to engage in supply chain integration. However, our comprehensive survey of companies from 2 to 250,000 employees affords new evidence that, properly implemented, SCM boosts financial performance in companies of all sizes.

In this study we have examined SCM in a small-firm, as well as a large-firm environment. We have identified through theory, supply chain management variables that should impact the financial performance of a company and then empirically tested them. Through this analysis, we found empirical support for the relevance of 1) integration strategy; 2) internal integration support; 3) external integration support; 4) supply chain alignment; 5) supplier integration; and 6) customer integration. We also found that small firms can and do successfully implement these initiatives to improve their operational, financial, and competitive performance; however, small firms use SCM less than large firms. The main implication of our study is that small firms should become more active in supply chain management to capture the financial benefits associated with SCM.

This is a vital implication for the small-firm manager who has responsibility for defining and implementing the small firm's business model and competitive strategy. Small firms that avoid the demands and rigors of SC strategies risk creating a dangerous cycle of dependency. By avoiding SCM and the closer relationships that SC integration implies, the small firm takes an important competitive tool out of its toolbox. Without the closer

relationships, the small firm must compete at arms length with less information and fewer shared resources than competitors who participate more actively in SC initiatives. The small firm often finds it must compete solely on the basis of price. This is especially true in today's world where parity along key competitive dimensions characterizes the marketplace. Quality, delivery speed, and responsiveness are all prerequisites to participate in a winning supply chain. Absent truly unique innovation, the only differentiator left is price. When small firms have to compete on price, the outcome is squeezed margins. Thinner margins reduce the small firm's ability to implement future strategic initiatives. The outcome: not just greater emphasis on price competition but also the creation in the minds of customers that the small firm is merely a non-strategic commodity supplier. Managers should do everything they can to avoid this position. Our findings suggest that one approach to avoiding this cycle of price dependency is to proactively and selectively implement closer SC relationships.

We conclude by recognizing that several challenges face small entrepreneurial firms as they develop appropriate SCM strategies. Most firms, and small firms in particular, quickly realize the road to successful integration is fraught with discouraging obstacles. Data from our survey show lack of adequate information systems, inconsistent SCM goals and procedures among company divisions, and lack of bargaining power either as a buyer or seller elude effective SCM initiatives. But despite these dilemmas, we are encouraged by our findings. An investment in superior technology, customer and supplier development, and dedicated oversight of firm-wide supply chain goal-setting by senior management has the potential to reap generous financial benefits over time for *both* large and small firms.

REFERENCES

Ang, J., 1991, Small business uniqueness and the theory of financial management, Journal of Small Business Finance 1, 1-13.

Ang, J., 1992, On the theory of finance for privately held firms, Journal of Small Business Finance 1, 185-203.

Richard J Arend, and J. D. Wisner., 2005, Small business and supply chain management: is there a fit? Journal of Business Venturing 20, 403-436.

Asia Pacific Organization, 2002, Asian Cases on Supply Chain Management for SMEs, Report of the Symposium on Supply Chain Management for Small and Medium Enterprises.

Ballou, R., M. Stephen, and A. Mukherjee, 2000, New managerial challenges from supply chain opportunities, Industrial Marketing Management 29, 7-18.

Bartholomew, D., 1999, What's really driving apple's recovery? Industry Week, March 15, 34-40.

Blackwell, R. D., 1997, From Mind to Market: Reinventing the Retail Supply Chain (HarperBusiness: New York).

Brady, D., 2003, Will Jeff Immelt's new push pay off for GE? Business Week October 13, 94-98.

Brau, J., 2002, Do banks price owner-manager agency costs? An examination of small business borrowing, Journal of Small Business Management 40, 273-286.

Brau, J., R. Brown, and J. Osteryoung, 2004, Do venture capitalists add value to small manufacturing firms? An empirical analysis of venture and non-venture capital backed initial public offerings, Journal of Small Business Management 42, 78-92.

Briscoe, J. A., S. E. Fawcett, and R. H. Todd., 2005, The Implementation and Impact of ISO 9000 Among Small Manufacturing Enterprises, Journal of Small Business Management July, 309-331.

Christopher, M. and L. Ryals, 1999, Supply chain strategy: Its impact on shareholder value, International Journal of Logistics Management 10, 1-10.

Cox, A., 1999, Power, value and supply chain management, Supply Chain Management: An International Journal 4, 167-175.

Cook, M., P. Mukharji, L. Kiefer, and M. Pertruzzi, 2005, Working your assets to boost your growth, Supply Chain Strategy 1, 4-6.

Daewoo, P. and H. A. Krishnan, 2001, Supplier selection practices among small firms in the United States: Testing three models, Journal of Small Business Management, 39, 259-271.

Dell, M. and C. Fredman, 1999, Direct from Dell: Strategies that Revolutionized an Industry (Harper Business: New York, NY).

Dillman, A., 1978, Mail and Telephone Surveys: The Total Design Method John Wiley and Sons: New York.

Fawcett, S. E. and G. N. Magnan, 2004, Ten Guiding Principles of High-Impact Supply Chain Management, Business Horizons 47, 67-74.

Fawcett, S. E. and G. N. Magnan, 2001, Achieving World-Class Supply Chain Alignment: Benefits, Barriers, and Bridges (National Association of Purchasing Management, Phoenix, AZ).

Fawcett, S. E. and G. N. Magnan, 2002, The Rhetoric and Reality of Supply Chain Integration, International Journal of Physical Distribution and Logistics Management 32, 339-361.

Fine, C. H., 1998, Clockspeed. (Perseus Books: Reading, MA).

Hadley, S., 2004, Making the supply chain management business case, Strategic Finance 85, 28-35.

Henkoff, R., 1994, Delivering the goods, Fortune, November 28, 64-78.

Krause, D., and R. Handfield., 1999, Developing a world-class supply base. Tempe, Ariz.: National Association of Purchasing Managers Center for Advanced Purchasing Studies.

Lambert, D. M., Cooper, M. C. and Pagh, J. D., 1998, Supply chain management: implementation issues and research opportunities, International Journal of Logistics Management 9, 1-19

Laseter, T. M., 1998, Balanced Sourcing, (Jossey-Bass Publishers: San Francisco).

Lee, H. L., 2004, The triple-A supply chain, Harvard Business Review. October, 2-11.

Lyons, D., 2003, Back on the chain gang, Forbes October 13, 114-123.

Mariotti, J.L., 1999, The trust factor in supply chain management., Supply Chain Management Review 35, 70–77.

National Research Council, 2000, Surviving Supply Chain Integration: Strategies for Small Manufacturers, Committee on Supply Chain Integration, Commission on Engineering and Technical Systems, 166.

Nelson, D., R. Mayo, and P. E. Moody, 1998, Powered by Honda, (John Wiley and Sons: New York, NY).

Nunnally, J. C., 1978, Psychometric Theory. (McGraw-Hill Book Company: New York).

Petersen, M.A. and R.G. Rajan, 1997, Trade credit: Theories and evidence Review of Financial Studies 10, 661-691.

Pettit, R.R. and R.F. Singer, 1985, Small business finance: A research agenda, Financial Management 14, 47-60.

Poirier, C., 1999, Advanced Supply Chain Management. Berrett-Koehler Publishers: San Francisco.

Quayle, M., 2002, Supplier development and supply chain management in small and medium size enterprises, International Journal of Technology Management, 23, 172-188.

Quinn, F. J., 2000, The clockspeed chronicles, Supply Chain Management Review 3, 60-64.

Rich, N. and Hines, P., 1997, Supply-chain management and time-based competition: The role of the supplier association, International Journal of Physical Distribution and Logistics Management 27, 210-225.

Sheridan, J. H., 1999, Managing the chain, Industry Week, September 6, 50-66.

Siekman, P., 2000, New victories in the supply-chain revolution, Fortune October 30, T208C-T208HH.

Singhal, V.R. and K. B. Hendricks., 2002, How Supply Chain Glitches Torpedo Shareholder Value, Supply Chain Management Review Jan/Feb, 18-33.

Singhal, V.R. and K.B. Hendricks, 2004, The Weakest Link: New Study Quantifies Financial Fallout from Supply-Chain Malfunctions. The Georgia Tech Research News. gtresearchnews.gatech.edu/newsrelease/supply.htm.

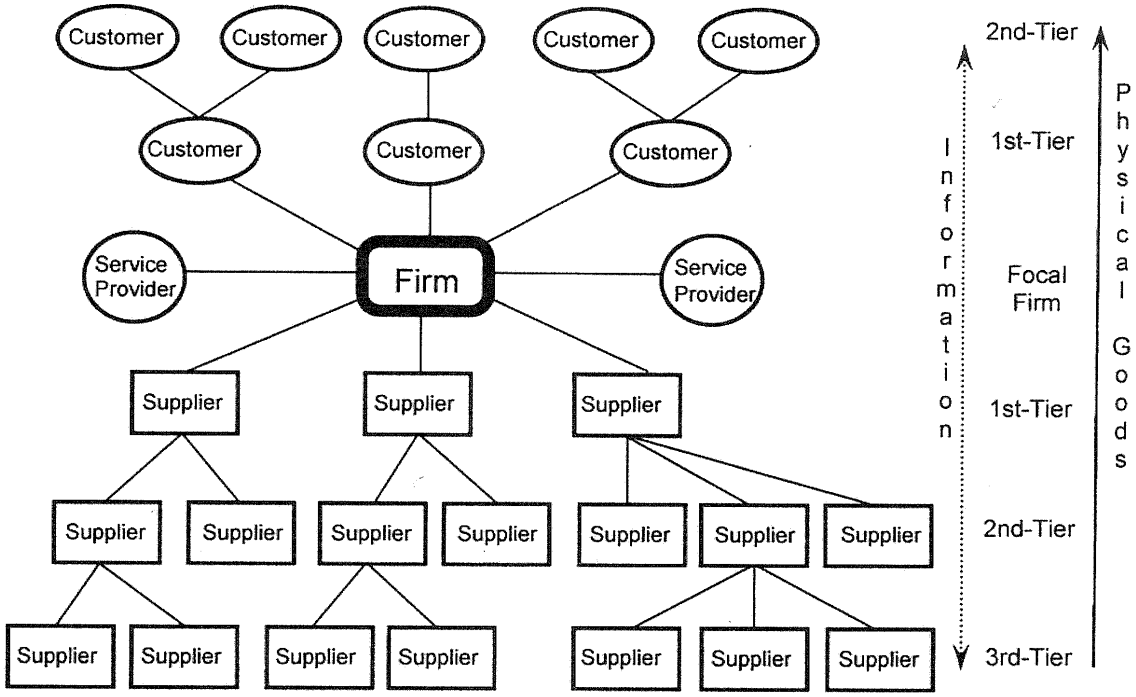
Supply Management Research Group., 2005, Japan's Keiretsu as a Strategic Relationship with Suppliers The value chain of the new Keiretsu in evolution (Center for Strategic Supply Research; Phoenix, AZ).

Tyndall, G. R. and Kamauff, G. W., 1998, Global Supply Chain Management (John Wiley and Sons: New York).

Walker, E.W. and J.W. Petty, 1978, Financial differences between large and small firms, Financial Management 7, 61-68.

Wynarczyk, P. and R. Watson, 2005, Firm Growth and Supply Chain Partnerships: An Empirical Analysis of U.K. SME Subcontractors, Small Business Economics, 24, 39-51.

Figure 1
A Simplified Supply Chain



A distinction is made between materials suppliers and service providers. These two types of suppliers are managed differently, often by separate functional areas. Materials suppliers are managed by purchasing while service providers such as distributors and carriers are managed by logistics, marketing, or purchasing.

Table I
Survey Samples and Response Rates

Original:			
	Adjusted Sample Size	Completed Surveys	Response Rate
ISM	1,329	96	7.2%
CSCMP	1,369	129	9.4%
APICS	1,351	109	8.1%
Pre-Notification:			
	Adjusted Sample Size	Completed Surveys	Response Rate
ISM	370	84	22.7%
CSCMP	398	76	19.1%
APICS	328	94	28.7%
Total	5,145	588	11.4%
# of employees missing		18	
Final sample		570	
Large firms (> 500 employees)		257	
Small firms (≤ 500 employees)		313	

ISM stands for Institute for Supply Management.
CSCMP stands for Council of Supply Chain Management Professionals.
APICS stands for the former American Production and Inventory Control Society.

Table II
SCM and Financial Outcome Constructs

How extensively is your firm **engaged in the following integration** efforts?

Construct 1(α=0.81): Integration Strategy = Cross-functional process integration within the firm + Forward integration with valued first-tier customers + Backward integration with important first-tier suppliers + Complete forward and backward supply chain integration

Indicate the level of **organizational support** for supply chain integration initiatives.

Construct 2(α=0.78): Internal Integration Support = Logistics management support + Marketing management support + Manufacturing management support + Purchasing management support + Information systems support + Top management support

Construct 3(α=0.87): External Integration Support = 1st-Tier supplier management support + 2nd-Tier supplier management support + Service supplier management support + 1st-Tier customer management support + 2nd-Tier customer management support

Construct 4(α=n/a): SC Development = Is your firm engaged in **supplier** development? + Is your firm engaged in **customer** development (customization, key account management, joint research)?

Indicate the extent to which you agree with each of the following statements as they relate to your firm's supply chain:

Construct 5(α=0.87): SC Alignment = A common set of operating policies are shared by members of the supply chain + Information systems are highly integrated throughout the supply chain + My firm understands clearly the competitive imperatives throughout the supply chain + Operating goals are consistent among supply chain members + Strategic objectives are closely aligned among members of the supply chain + Value-added resources are shared among supply chain members

Construct 6(α=0.80): Supplier Integration = Adequate information systems linkages exist with suppliers + High levels of trust have been achieved with tier 1 suppliers + My firm aggressively helps 2nd tier and other upstream suppliers improve performance + Supplier alliances operate under principles of shared rewards and risks + Supplier performance is closely monitored and is the basis for future business + Suppliers are carefully screened and assessed before they are selected

Construct 7(α=0.74): Customer Integration = Adequate information systems linkages exist with customers + Customer alliances operate under principles of shared rewards and risks + Customer relationships are evaluated on the basis of their profitability + High levels of trust have been established with important customers + My firm aggressively seeks to understand our customers' customers requirements + My firm has adopted a key account approach to managing its best customers + My firm regularly solicits customer input

To what extent has supply chain integration **improved your firm's performance** in the following areas?

Construct 8(α=0.87): Asset Utilization Performance = Cost of purchased items + Firm profitability + Inventory costs + Overall product cost + Productivity + The cost of new product development + Transportation costs

Construct 9(α=0.92): Revenue Generating Performance = Ability to handle unexpected challenges + Market penetration + On-time delivery/Due-date performance + Order fulfillment lead times + Overall customer satisfaction + Overall product quality + Product innovation lead times + Responsiveness to customer requests

Indicate **your firm's position relative to leading competitors** in your primary industry along the following dimensions.

Construct 10(α=0.87): Competitive Performance = Sales growth in the last three years + Market share growth in the last three years + Growth in Return on Assets (ROA) in the last three years + Overall competitive strength

Table III
Descriptive Statistics for Independent Variables

Variable	N	Mean	Median	Std Dev	Minimum	Maximum
Panel A. Total Sample Supply Chain and Firm Descriptives						
Number of employees	570	8,635	700	24,230	2	250,000
Annual sales ($ thousands)	526	4,172	200	32,263	0.1	712,000
Integration Strategy	484	4.15	4.25	1.28	1	7
Internal Integration Support	531	4.87	5.00	1.04	1	7
External Integration Support	502	4.16	4.20	1.23	1	7
Supply Chain Development	545	1.26	1.00	0.35	1	2
Supply Chain Alignment	540	3.84	3.83	1.15	1	6.8
Supplier Integration	531	4.17	4.33	1.02	1	6.5
Customer Integration	527	4.58	4.57	0.89	1	6.7
Panel B. Small Firm Supply Chain and Firm Descriptives						
Number of employees	257	205	175	149	2	500
Annual sales ($ thousands)	233	542	35	4,025	0.1	45,000
Integration Strategy	199	3.82	4.00	1.32	1.00	7.00
Internal Integration Support	234	4.66	4.83	1.11	1.00	7.00
External Integration Support	224	4.00	4.00	1.32	1.00	7.00
Supply Chain Development	243	1.31	1.00	0.36	1.00	2.00
Supply Chain Alignment	242	3.78	3.83	1.21	1.00	6.67
Supplier Integration	234	4.11	4.17	1.11	1.33	6.33
Customer Integration	237	4.52	4.57	0.93	1.71	6.71
Panel C. Large Firm Supply Chain and Firm Descriptives						
Number of employees	313	15,556	4,000	31,049	520	250,000
Annual sales ($ thousands)	293	7,059	1,000	42,892	0.3	712,000
Integration Strategy	285	4.37	4.50	1.20	1.00	7.00
Internal Integration Support	297	5.03	5.17	0.96	1.67	7.00
External Integration Support	278	4.29	4.20	1.14	1.00	7.00
Supply Chain Development	302	1.23	1.00	0.34	1.00	2.00
Supply Chain Alignment	298	3.88	4.00	1.10	1.00	6.83
Supplier Integration	297	4.23	4.33	0.95	1.00	6.50
Customer Integration	290	4.62	4.71	0.86	1.00	6.57

Table IV
Difference Tests Based on Large Versus Small Firms

Variable	Difference in Means (Small - Large)	Pair Wise t-test *p*-value	Wilcoxon *p*-value
Number of employees	-15,352	0.000	0.000
Annual sales ($ thousands)	-6,517	0.010	0.000
Integration Strategy	-0.55	0.000	0.000
Internal Integration Support	-0.38	0.000	0.000
External Integration Support	-0.29	0.009	0.028
Supply Chain Development	0.08	0.008	0.004
Supply Chain Alignment	-0.10	0.312	0.352
Supplier Integration	-0.12	0.193	0.340
Customer Integration	-0.11	0.169	0.124

Table V
Financial Outcome Variables

Variable	*N*	Mean	Median	Std Dev	Minimum	Maximum
Panel A. Total Sample Financial Measures						
Relative 3 year sales growth	554	4.96	5	1.31	1	7
Relative 3 year market share growth	553	4.85	5	1.28	1	7
Relative 3 year growth in ROA	546	4.77	5	1.26	1	7
Relative competitive strength	554	5.06	5	1.19	1	7
Cost of purchased item improvement	520	4.58	5	1.46	1	7
Inventory cost improvement	520	4.47	5	1.52	1	7
Firm profitability improvement	521	4.51	5	1.36	1	7
Firm quality improvement	520	4.15	4	1.47	1	7
Overall product cost improvement	521	4.37	5	1.33	1	7
Productivity improvement	520	4.32	5	1.38	1	7
New product development cost improvement	508	3.43	4	1.50	1	7
Transportation cost improvement	520	3.88	4	1.56	1	7
Asset utilization	496	4.20	4.3	1.08	1	7
Revenue generation	500	4.33	4.5	1.15	1	6.9
Competitive performance	546	4.91	5	1.07	1	7
Panel B. Small Firm Financial Measures						
Relative 3 year sales growth	246	5.03	5	1.23	1	7
Relative 3 year market share growth	246	4.88	5	1.21	1	7
Relative 3 year growth in ROA	245	4.81	5	1.29	1	7
Relative competitive strength	247	5.09	5	1.15	1	7
Cost of purchased item improvement	229	4.52	5	1.47	1	7
Inventory cost improvement	229	4.38	5	1.63	1	7
Firm profitability improvement	228	4.48	5	1.46	1	7
Firm quality improvement	229	4.19	4	1.54	1	7
Overall product cost improvement	229	4.28	4	1.37	1	7
Productivity improvement	231	4.30	5	1.44	1	7
New product development cost improvement	223	3.5	4	1.6	1	7
Transportation cost improvement	228	3.7	4	1.5	1	7
Asset utilization	214	4.16	4.3	1.16	1	7
Revenue generation	220	4.35	4.5	1.23	1	6.9
Competitive performance	245	4.95	5	1.04	1	7
Panel C. Large Firm Financial Measures						
Relative 3 year sales growth	308	4.90	5	1.38	1	7
Relative 3 year market share growth	307	4.83	5	1.33	1	7
Relative 3 year growth in ROA	301	4.73	5	1.25	1	7
Relative competitive strength	307	5.03	5	1.21	1	7
Cost of purchased item improvement	291	4.63	5	1.46	1	7
Inventory cost improvement	291	4.53	5	1.43	1	7
Firm profitability improvement	293	4.53	5	1.28	1	7
Firm quality improvement	291	4.12	4	1.42	1	7
Overall product cost improvement	292	4.43	5	1.30	1	7
Productivity improvement	289	4.33	5	1.34	1	7
New product development cost improvement	285	3.3	4	1.4	1	7
Transportation cost improvement	292	4.0	4	1.6	1	7
Asset utilization	282	4.24	4.3	1.02	1	6.1
Revenue generation	280	4.31	4.5	1.09	1	6.3
Competitive performance	301	4.88	5	1.10	1	7

Table VI
Difference Tests Based on Firm Size

Variable	Difference in Means (Small - Large)	*p*-value
Relative 3 year sales growth	0.13	0.2419
Relative 3 year market share growth	0.05	0.6440
Relative 3 year growth in ROA	0.08	0.4552
Relative competitive strength	0.06	0.5783
Cost of purchased item improvement	-0.11	0.3950
Inventory cost improvement	-0.15	0.2773
Firm profitability improvement	-0.04	0.7249
Firm quality improvement	0.07	0.5991
Overall product cost improvement	-0.15	0.2086
Productivity improvement	-0.03	0.8337
New product development cost improvement	0.20	0.1473
Transportation cost improvement	-0.28	0.0412
Asset utilization	-0.08	0.4496
Revenue generation	0.04	0.6832
Competitive performance	0.08	0.4141

Table VII
Difference Tests Based on SCM Initiatives for Aggregate Sample

	Asset utilization	Revenue generation	Competitive performance
Integration Strategy			
Low	3.95	4.09	4.83
High	4.57	4.69	4.96
Difference (High - Low)	0.62***	0.60***	0.13
Internal Integration Support			
Low	3.78	3.90	4.79
High	4.59	4.70	5.00
Difference (High - Low)	0.81***	0.80***	0.21**
External Integration Support			
Low	3.81	3.98	4.83
High	4.61	4.70	5.00
Difference (High - Low)	0.80***	0.72***	0.17*
Supply Chain Development			
Low	4.34	4.48	4.97
High	3.98	4.12	4.85
Difference (High - Low)	-0.70***	-0.39***	-0.12
Supply Chain Alignment			
Low	3.75	3.81	4.73
High	4.67	4.87	5.08
Difference (High - Low)	0.92***	1.06***	0.35***
Supplier Integration			
Low	3.70	3.79	4.76
High	4.75	4.91	5.06
Difference (High - Low)	1.05***	1.12***	0.30***
Customer Integration			
Low	3.85	3.88	4.66
High	4.57	4.81	5.16
Difference (High - Low)	0.72***	0.93***	0.50***

***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 levels.

Table VIII
Difference Tests Based on SCM Initiatives for Small Firms

	Asset utilization	Revenue generation	Competitive performance
Integration Strategy			
Low	4.07	4.24	4.93
High	4.52	4.81	4.96
Difference (High - Low)	0.45***	0.57***	0.03
Internal Integration Support			
Low	3.73	3.94	4.79
High	4.64	4.79	5.10
Difference (High - Low)	0.91***	0.85***	0.31**
External Integration Support			
Low	3.73	3.86	4.80
High	4.64	4.90	5.09
Difference (High - Low)	0.91***	1.04***	0.29**
Supply Chain Development			
Low	4.34	4.60	5.09
High	3.96	4.11	4.83
Difference (High - Low)	-0.38**	-0.49***	-0.26**
Supply Chain Alignment			
Low	3.75	3.85	4.72
High	4.65	4.94	5.19
Difference (High - Low)	0.90***	1.09***	0.47***
Supplier Integration			
Low	3.69	3.76	4.68
High	4.69	4.98	5.21
Difference (High - Low)	1.00***	1.22***	0.53***
Customer Integration			
Low	3.88	3.89	4.72
High	4.50	4.93	5.18
Difference (High - Low)	0.62***	1.04***	0.46***

***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 levels.

Table IX
Difference Tests Based on SCM Initiatives for Large Firms

	Asset utilization	Revenue generation	Competitive performance
Integration Strategy			
Low	3.85	3.97	4.74
High	4.60	4.62	4.96
Difference (High - Low)	0.75***	0.65***	0.22*
Internal Integration Support			
Low	3.82	3.64	4.60
High	4.42	4.51	4.76
Difference (High - Low)	0.60***	0.87***	0.16
External Integration Support			
Low	3.88	4.07	4.85
High	4.59	4.56	4.93
Difference (High - Low)	0.71***	0.49***	0.08
Supply Chain Development			
Low	4.35	4.41	4.89
High	4.00	4.13	4.87
Difference (High - Low)	-0.35***	-0.28**	-0.02
Supply Chain Alignment			
Low	3.75	3.77	4.74
High	4.68	4.81	5.01
Difference (High - Low)	0.93***	1.04***	0.27**
Supplier Integration			
Low	3.71	3.82	4.82
High	4.80	4.85	4.95
Difference (High - Low)	1.09***	1.03***	0.13
Customer Integration			
Low	3.82	3.86	4.61
High	4.62	4.73	5.15
Difference (High - Low)	0.80***	0.87***	0.54***

***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.10 levels.

Table X
Tobit Models of SCM Initiatives on Financial Performance Measures

Panel A. Dependent variable = Asset Utilization			
Variable	Estimated Coefficient	Chi-Sq *p*-value	Variance Inflation
Intercept	0.48	0.221	0.00
Size (0=small)	-0.15	0.104	1.04
Integration Strategy	**0.11**	**0.014**	**1.60**
Internal Integration Support	**0.19**	**0.001**	**1.76**
External Integration Support	**0.10**	**0.044**	**1.81**
Supply Chain Development	0.19	0.170	1.17
Supply Chain Alignment	**0.17**	**0.011**	**2.94**
Supplier Integration	**0.32**	**0.000**	**2.48**
Customer Integration	-0.04	0.597	2.18
Adjusted R^2	**0.41**	**0.000**	

Panel B. Dependent variable = Revenue Generation			
Variable	Estimated Coefficient	Chi-Sq *p*-value	Variance Inflation
Intercept	0.17	0.680	0.00
Size (0=small)	**-0.31**	**0.001**	**1.04**
Integration Strategy	**0.08**	**0.089**	**1.59**
Internal Integration Support	**0.19**	**0.001**	**1.75**
External Integration Support	0.05	0.283	1.80
Supply Chain Development	0.19	0.187	1.17
Supply Chain Alignment	**0.20**	**0.002**	**2.91**
Supplier Integration	**0.28**	**0.000**	**2.49**
Customer Integration	**0.15**	**0.049**	**2.16**
Adjusted R^2	**0.44**	**0.000**	

Panel C. Dependent variable = Competitive Performance			
Variable	Estimated Coefficient	Chi-Sq *p*-value	Variance Inflation
Intercept	**3.55**	**0.000**	**0.00**
Size (0=small)	-0.12	0.281	1.05
Integration Strategy	-0.04	0.519	1.62
Internal Integration Support	-0.02	0.825	1.76
External Integration Support	0.05	0.395	1.83
Supply Chain Development	-0.12	0.474	1.18
Supply Chain Alignment	**0.18**	**0.027**	**3.07**
Supplier Integration	**-0.30**	**0.001**	**2.64**
Customer Integration	**0.47**	**0.000**	**2.24**
Adjusted R^2	**0.12**	**0.000**	

Variance inflation factors and Adjusted R^2s are from unreported OLS regressions.