Utilizing cash-to-cash to benchmark company performance

Wesley S. Randall

Department of Aviation and Supply Chain Management, Auburn University, Auburn, Alabama, USA, and

M. Theodore Farris II

Department of Marketing and Logistics, University of North Texas, Denton, Texas, USA

Abstract

Purpose – The purpose of this paper is to show how the cash-to-cash (C2C) metric may be used to benchmark supply chain performance.

Design/methodology/approach – The paper utilizes C2C variables as a means to benchmark company performance.

Findings – Three case studies are offered where firms have benchmarked to: review their internal accounts payable policies; linked results of their benchmarking to profitability to help focus implementation efforts; and served as a call to action to proactively seek improvements with key trading partners. The models developed in this paper provide a benchmark approach to inter-firm supply chain financial management. These models have direct application in a cost conscious economy and represent a non-zero sum gain for cooperating corporations.

Research limitations/implications – C2C variables are readily available for use in benchmarking.

Practical implications – C2C benchmarking allows the firm to identify where to focus improvements with their supply chain trading partners.

Originality/value – C2C has been touted as the first multi-dyadic supply chain metric.

Keywords Supply chain management, Benchmarking, Cash flow

Paper type Case study

1. Introduction

Firms looking to augment their own core competencies, with the competencies of others, increasingly rely on supply chain partners using a process of supply chain integration. Firms accomplished at such supply chain integration generate competitive advantage (Francis, 2008; Lambert *et al.*, 2004; Fugate *et al.*, 2006). The substance of this integration is the ability of these firms to align processes and information flows using supply chain management (SCM) techniques that generates superior competitive advantage (Fugate *et al.*, 2006; Gunasekaran *et al.*, 2008; Bernabucci, 2008). This collaboration trend, combined with the timeless challenge of effective cash flow management, motivates the assessment of cash-to-cash (C2C) strategies, touted as the first multi-dyadic supply chain metric (Hutchison *et al.*, 2007), in a supply chain finance environment. Supply chain professionals need to be aware of the advantages of cash flow maximization as an element of supply chain strategy, and how these techniques provide value to their manufacturing and merchandising partnership (Ambler, 2006; Tsai, 2008; Aberdeen-Group, 2006).

This paper provides a method to utilize C2C variables as a means to benchmark company performance. It offers three case studies where firms have benchmarked to:

(1) review their internal accounts payable policies;

(2) link results of their benchmarking to profitability to help focus implementation efforts; and

(3) serve as a call to action to proactively seek improvements with key trading partners.

2. Benefits of SCM and benchmarking

Effective SCM offers firms additional opportunities to compete through both low cost and differentiation strategies (Porter, 1980; Esper *et al.*, 2007; Towill, 2002; Goldsby *et al.*, 2006). Efficient SCM leads to cost efficiency (Bowersox, 1990; Womack *et al.*, 1990), product differentiation (Towill, 2002; Levitt, 1980; Morash, 2001), and value-added services (Gunasekaran *et al.*, 2008; Lambert and Burduroglo, 2000). World class firms, such as Wal-Mart, Toyota, and Bose, have benchmarked the competition around them, leveraged SCM to create differential advantage and achieved cost and product leadership in comparison to their market peers (Liker and Choi, 2004; Segars *et al.*, 2001; Arnold, 2002; Blanchard *et al.*, 2008). These firms have shown that effective SCM, effective understanding of competitors and sound benchmarking techniques drive processes which lead to cost reduction while at the same time increasing quality (Manning *et al.*, 2008; Choy *et al.*, 2007; Kahn *et al.*, 2006).

Successful benchmarking and performance measurement is a central element generating accountability and performance in SCM (Griffis *et al.*, 2007). To date, supply chain managers have engaged in auditing efforts such as asset utilization, earned value analysis, and activity-based costing using industry benchmarking data (Delpachitra, 2008; Spekman *et al.*, 2002; Lin *et al.*, 2001; LaLonde and Pohlen, 1996). There appears to be a confluence between the trend towards supply chain benchmarking and implementation of SCM techniques, such as C2C. In a period of constrained growth and increasing cost pressure, the examination of this intersection is both timely and important for theory and practice. Supply chain financial techniques, such as C2C, represent increased profit through harvested overlooked finance costs savings.

SCM relies on a total cost approach aimed at gaining efficiency and effectiveness by focusing optimization efforts at increasingly higher level units of analysis (LeKashman and Stolle, 1965). What began as logistical efforts to benchmark activities and capture opportunities to increase efficiency within the firm through cross-functional process control has moved to focus on the integration of inter-firm cross-functional management (de Luca and Atuahene-Gima, 2007; Bowersox and Daugherty, 1987). Catching these opportunities requires effective performance measurement and benchmarking techniques.

This approach is particularly important in times of tightened profits and restricted markets. These supply chain cost reduction strategies require:

> [...] aggressive construction of efficient-scale facilities, vigorous pursuit of cost reductions from experience, tight cost and overhead control, avoidance of marginal customer accounts, and cost minimization in areas like R and D, service, sales force, advertising and so on (Porter, 1980, p. 35).

In low margin, high-volume industries, even minor cost reductions can have significant impact on profitability. As fuel cost rise firms are looking for new ways to offset these

costs and avoid passing them, at least in total, on to the consumer (Katz, 2008; Schaumburg, 2008).

The management of cost requires an awareness of current performance and a direction for the future performance (Francis, 2008; Choy *et al.*, 2007). SCM offers a number of performance measurement and benchmarking tools to assist firms focused on efficient cost reduction (Griffis *et al.*, 2007). Such benchmark programs have been used successfully in various supply chains to drive continuous improvements (Manning *et al.*, 2008; Lapide, 2008). Research suggests an increased focus on benchmarking techniques in supplier relationships (Tsai, 2008). Companies who rely on various performance measurements to benchmark and improve profitability (Griffis *et al.*, 2007; Lapide, 2008) can use augment those efforts with effective C2C management.

C2C addresses one of the greatest difficulties in effective benchmarking within your own industry, the ability to capture useful data, and to act on that data in a cooperative fashion (Lapide, 2008; Hanman, 1997). This paper discusses how firms have used publicly available financial data to benchmark C2C and SCM finance performance.

3. C2C defined

There are three financial variables involved in the C2C calculation. Each of these utilizes publicly available GAAP data found on the balance sheet: inventory, accounts receivable, and accounts payable; and the income statement: revenues and cost of goods sold. To generate a C2C calculation the supply chain professional may standardize the data by converting the financial variables from dollars to days in order to produce a common measure for analysis:

$$\text{Days of inventory}_{(C2C)} = \frac{\text{Inventory (\$)}}{\text{Cost of goods sold (\$)}} \times 365 \tag{1}$$

$$\text{Days of receivables}_{(C2C)} = \frac{\text{Accounts receivable (\$)}}{\text{Net sales (\$)}} \times 365 \tag{2}$$

$$\text{Days of payables}_{(C2C)} = \frac{\text{Accounts payable (\$)}}{\text{Cost of goods sold (\$)}} \times 365 \tag{3}$$

Finally, C2C is calculated using these variables:

$$\text{Cash-to-cash cycle} = \text{Inventory}_{(C2C)} + \text{receivables}_{(C2C)} - \text{payables}_{(C2C)} \tag{4}$$

The C2C calculation standardizes each variable in terms of days. This baseline may be a positive or negative number of days as shown in Figure 1. The number of days indicates how much time capital is expended measured against receipt of funds associated with the exchange. From the individual firm perspective, a positive number is bad for that firm, that number indicates how many days of the firm's capital is expended while awaiting payment from a customer. A negative number shows how many days the firm receives cash from sales before payment to suppliers is required. The goal for most firms is to be close to 0 days (or negative) for C2C, since it reflects firm efficiency and profitability.

The metric has been touted as the first multiadic SCM metric because it uses days of accounts receivables to link the financial relationship with customers,
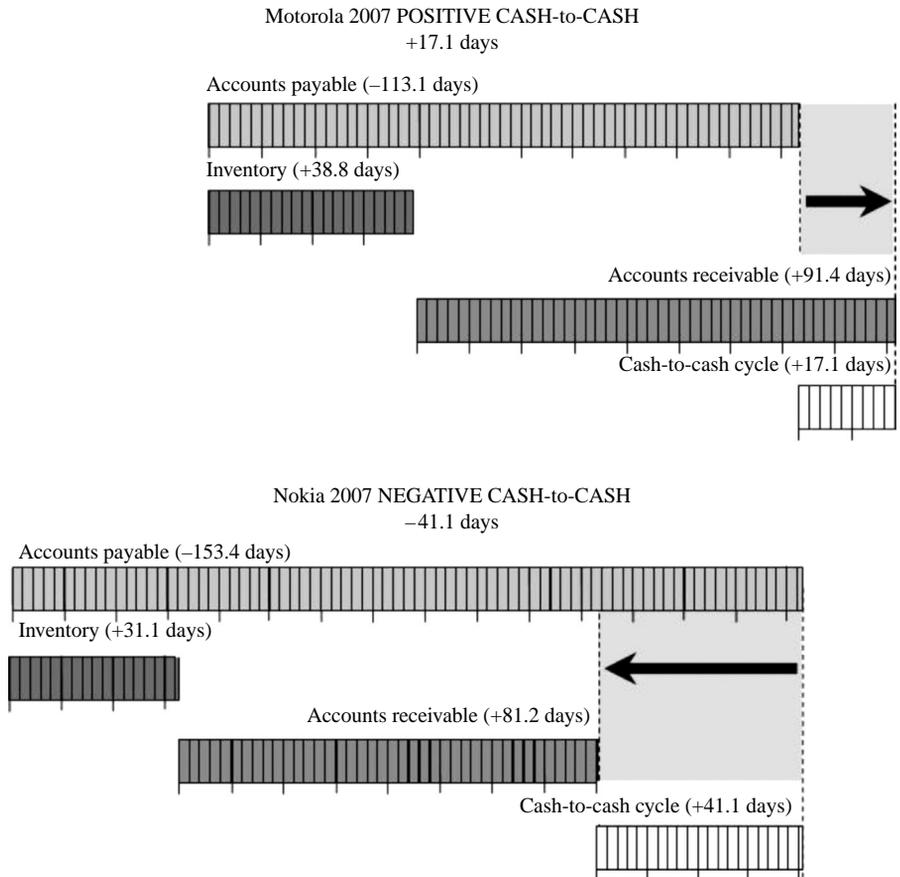
Figure 1.
C2C: positive or negative
examples

the metric uses days of accounts payables to link the financial relation with suppliers, and the metric is bridged by days of inventory within the firm's own operations (Hutchison *et al.*, 2007). The combination of the three measures performance between three firms increases efficiency of integration and alignment of SCM efforts. Dell Computer is recognized as a company which has effectively managed its supply chain to its competitive advantage (Magretta, 1998). In its quarterly and annual financial reports, Dell uses these C2C variables to reflect changes and improvements in its supply chain performance. Investors are readily able to identify changes in these performance areas.

There are three techniques the firm may employ to improve financial metrics associated with C2C. The first technique is to reduce inventory (e.g. use real-time inventory tracking, synchronized supply/demand planning, etc.), the second technique is to reduce accounts receivable (e.g. require full or partial payment at time of order, delay sales commissions until receivables are paid, etc.), and the third is to extend accounts payable (e.g. utilize electronic payments, take advantage of beneficial vendor terms, etc.).

4. C2C benchmarking analysis – three case studies

Benchmarking using C2C variables offer a variety of positive results. The following three case studies reflect how management's attention was guided toward specific opportunities through analysis and comparison of industry or trading partner C2C variables. The first case study shows how C2C benchmarking guided a firm's management to review their payment processes. The second case study shows how a firm conducted an overall C2C assessment then linked increased profitability to changes in individual C2C variables to target where to focus its improvement efforts, and the third case study shows how a firm's C2C benchmarking identified longitudinal C2C improvements by their top customers and suppliers resulting in a call to action to be aware that their trading partners likely would approach the firm seeking improvements and to proactively identify such gain-gain exchange improvements.

4.1 Case study: guiding management to review payment process

In the first case study, a company was benchmarked against 116 competitors in the business services industry as shown in Table I. The case study company was performing better than the industry median with an overall 80.0 days of C2C compared to the industry average of 84.7 days. Initially, some members of the management team did not consider the company's performance using the C2C metric to be a concern until the overall industry improvement was identified. In the preceding five years, the industry had made consistent improvement in C2C performance as shown in Table II. It became evident that the case study firm would lose ground if they did not also continue to improve.

Drilling down to the three variables that make up the C2C metric revealed the company was performing exceptionally well in receivables, getting paid much faster than the industry median. Inventory performance matched the industry average. The benchmarking red flagged on payables. The company was paying far faster than

	Inventory	Payables	Receivables	C2C
1st quartile median	14.1	78.0	59.1	− 4.8
2nd quartile median	30.2	35.9	77.4	62.1
Case study company no. 1	*33.6*	*11.6*	*58.1*	*80.0*
Industry median	*33.6*	*46.8*	*97.9*	*84.7*
3rd quartile median	27.0	27.4	97.2	96.8
4th quartile median	72.2	45.1	158.0	185.1

Table I.
Industry performance business services company (SIC 7373)
$n = 116$ companies

	Inventory	Payables	Receivables	C2C
Prior year	33.6	46.8	97.9	84.7
− 2 years	28.1	40.9	99.0	86.3
− 3 years	34.5	46.4	100.1	88.2
− 4 years	38.1	36.7	92.1	93.5
− 5 years	42.2	41.6	98.3	99.0
	− 8.6	+ 5.2	+ 0.4	− 14.3

Table II.
Historical industry improvement for case study company no. 1

what was expected in the industry. As a result of the benchmarking, the firm focused on their accounts payables for improvement opportunities. In one case, it was discovered that an $11 million net 30 day invoice with no early pay discount had been made 19 days too early for no apparent reason. At a WACC of 10 percent, this oversight cost the firm $57,260 in foregone interest. This was just one invoice payment but helped direct management review of the firm's payables process policies.

What was the potential benefit to improving the payables policy? Additional analysis developed an estimate of the value of improvement achieved by reducing any one of the C2C variables by one day as shown in Table III. Reducing average days of inventory by one day would allow the firm to convert one day of inventory assets into cash, thus providing a one-time cash flow equal to one day of cost of goods sold. In addition, since less inventory would be held, there would also be an annual cost savings realized as the firm no longer has to incur carrying charges for the one less day of inventory. Likewise, adding one day of payables frees up funds which otherwise would be paid out and allows the firm to earn interest (or use those funds for other investments). Improving receivables gives a better result than improving payables because the firm is getting paid in terms of one day of revenues instead of paying one day of COGS.

Using the estimate of improvement and combining it with the benchmarking comparison can help guide the firm toward managing the area offering the greatest opportunity.

4.2 Case study: link to profitability guides focus on improvement

In the second case study, a company was benchmarked against 120 competitors in the electric services industry as shown in Table IV. The case study firm ranked 88th overall in C2C performance for the industry out of 120 companies.

The firm's relatively poor performance compared to the industry's overall C2C variables, spurred management interest in how firm profitability related to performance for each of the C2C variables for the prior years for the industry. Figure 2 shows this performance and uses a regression line to summarize the results.

	One-time cash flow ($)	Annual savings ($)
Inventories[a]	5,835,616	1,458,904
Receivables[b]	7,156,164	715,616
Payables[b]	5,835,616	583,562

Notes: [a]25 percent ICC; [b]10 percent WACC

Table III.
Estimate of improvement resulting from changing C2C variable by one day

	Inventory	Payables	Receivables	C2C
1st quartile median	16.3	47.4	41.1	13.1
2nd quartile median	20.2	37.5	43.3	30.6
Industry median	23.5	36.7	46.0	35.2
3rd quartile median	30.4	30.9	45.0	44.5
Case study company no. 2	49.5	37.4	40.5	52.6
4th quartile median	37.8	34.9	63.1	69.1

Table IV.
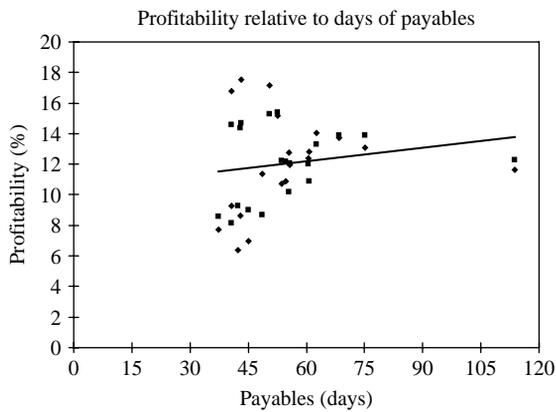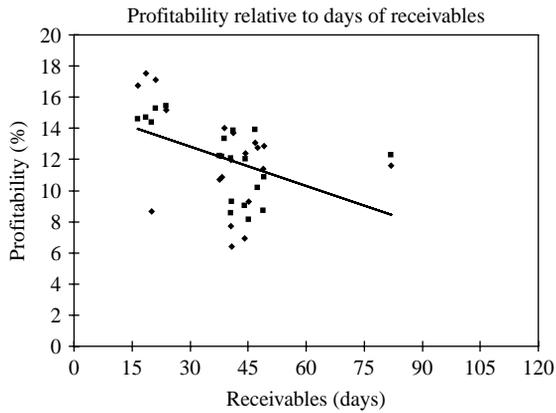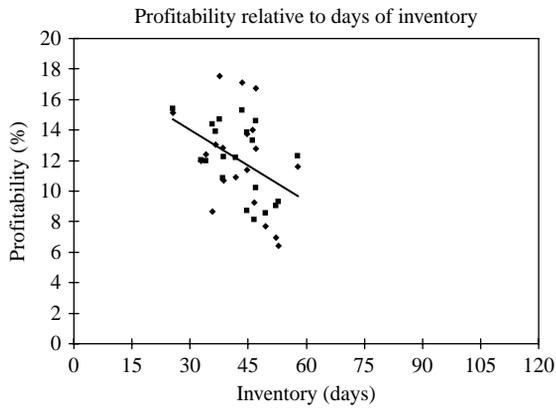Industry performance electric service company (SIC 4911) $n = 120$ companies

Figure 2.
Relationship of
profitability to C2C
performance for case
study company no. 2

Using the overall industry to form a basis, it was determined that for this industry there was a direct relationship between profitability and performance for all variables. This is not the case for all industries (88 of 116 industries studied reflected a direct relationship between C2C improvement and higher profitability) making it important to identify if improvement in C2C impacts profitability. For the case study company's industry, the steepest slope, representing the strongest tie to improved profitability, came from reducing days of inventory and, benchmarked relative to industry performance, was the worst performance area of the case study company. The second greatest opportunity could be found in improving receivables, that is, getting paid faster, followed by paying later. This approach further validated the estimates found in Table V, which follows the same format as Table III. Reducing inventories resulted in the highest annual improvement for the firm. Armed with this information, the case study firm began to focus on improving its inventory policies.

4.3 Case study: benchmarking C2C improvement of trading partners
In the final case study, a company was benchmarked against 147 competitors in the semiconductor industry as shown in Table VI. The case study firm ranked 99th in C2C performance for the industry.

While the firm had an overall C2C performance of 83.5 days, over the prior five years it had fluctuated 19.7 percent between a low of 80.8 days and a high of 96.7 days. Seeking the cause of this fluctuation, the firm completed a longitudinal analysis of its top trading partners.

Figure 3 shows that over the previous five years the firm's top five customers had all improved their own C2C performance. Figure 4 shows that the top five customers achieved this, in part, through extending their payables. While these top five customers had yet to directly impact the case study firm, management viewed this as an indication that they were a potential future target.

Over the same period, the case study firm could see that it had done little to improve payables to their top five suppliers. It became evident that while the case study firm

	One-time improvement ($)	Annual improvement ($)
Inventories[a]	19,838,000	5,952,000
Receivables[b]	26,773,000	2,677,000
Payables[b]	19,838,000	1,984,000

Notes: [a]30 percent ICC; [b]10 percent WACC

Table V.
Estimate of improvement resulting from changing C2C variable by one day

	Inventory	Payables	Receivables	C2C
1st quartile median	68.0	82.1	39.3	19.5
2nd quartile median	75.7	58.3	48.7	65.5
Industry median	87.3	59.0	51.7	80.1
Case study company no. 3	83.1	49.0	49.4	83.5
3rd quartile median	89.2	51.9	53.6	89.3
4th quartile median	135.7	43.4	59.9	137.6

Note: $n = 147$ companies
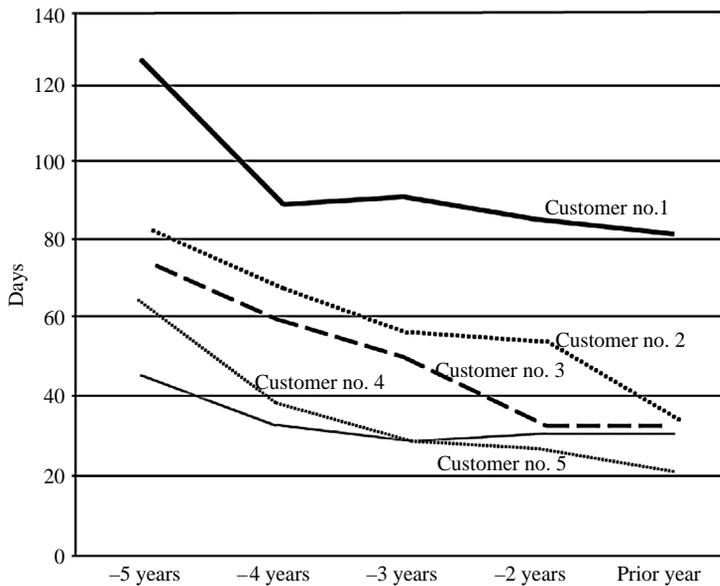
Table VI.
Industry performance semiconductor company (SIC 3674)
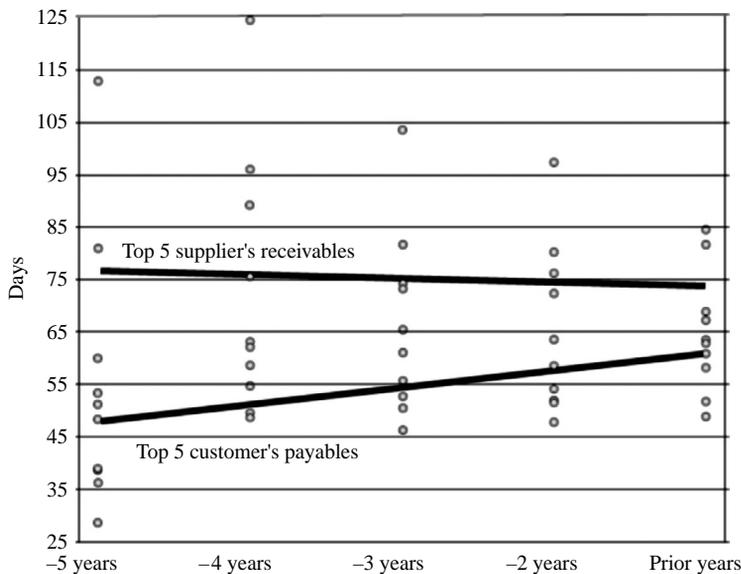
had not managed its C2C variables in the past, they needed to begin to proactively
identify and quantify (similar to Tables III and V) gain-gain exchange improvements.
As a part of managing the supply chain, the firm found benchmarking customer and
supplier C2C performance identified pending problems.

In each of the three case studies cited, the case study firms utilized publicly available financial data as a means of benchmarking C2C performance of the industry and significant suppliers and customers in order to help direct the focus of managerial attention to improving key areas.

5. Managerial implications

The implications to management are five-fold. First, one of the greatest difficulties of effective benchmarking within your own industry is the ability to capture useful data. The C2C variables utilize publicly available GAAP financial data found in the basic balance sheet and income statement. Subsequently, as long as a pool of competitors are publicly traded, SEC reporting requirements make the data available to conduct C2C benchmarking which likely is representative of the industry.

Second, through the use of benchmarking C2C, specific performance by companies may be identified and compared against industry performance.

The third implication of this benchmarking process is that management may identify where best to focus improvements and quantify potential benefits ahead of time for their firm or for their trading partners.

The fourth implication is that by analyzing industry performance and correlating performance for each variable against changes in profitability as a benchmark, a firm may determine which changes to the C2C variables will offer the greatest impact to profitability.

Finally, as a part of SCM initiatives, firms may also benchmark changes in C2C performance by key customers and suppliers to identify trends by these key trading partners which will impact the supply chain. Some of these changes may benefit the trading partner but may be detrimental to the overall supply chain. Effective SCM should seek to benefit all trading partners; supply chain finance techniques such as C2C provide a mechanism to do so. Early identification of supplier and customer changes may influence how the overall supply chain is managed.

6. Limitations

There are two limitations of the use of C2C as a benchmarking tool. First, calculating C2C uses data from publicly traded companies which legally must release financial data to the public. This may limit the benchmarking of private firms due to the inability to gather the data. In many cases, if there are enough public firms, performance by private firms may be inferred but cannot be considered conclusive.

The second limitation is that financial data are reported in aggregate. Most firms have multiple product lines, operating units, or divisions. Owing to aggregate reporting, financial data may not reflect an accurate picture of specific products for direct comparison. As such, the C2C benchmarking may not be precise but does provide a starting point from which to guide and direct further investigation.

7. Future research

The use of C2C as a supply chain metric continues to evolve. Future research should investigate C2C performance over entire supply chain networks to determine if overall supply chain profitability is tied to overall supply chain C2C performance. In doing so, it may be possible to benchmark types of supply chains so they can more effectively compete.

As firms consider the C2C performance with key trading partners additional opportunities may develop from which to guide overall supply chain finance effort. Shared relationships may develop that encourage inherent advantages of cooperative SCM among trading partners. For example, one firm may have a lower weighted average cost of capital than its trading partner. By adjusting accounts payables and accounts receivables between the trading partners, the supply chain can benefit from the lower cost of capital and each firm may increase their profitability. Similar opportunities may also result from differences in inventory carrying cost. Future research should consider how the supply chain can benefit from these opportunities.

8. Conclusion

It is important for supply chain professionals to consider how a systems approach to SCM may embrace C2C management strategies to increase overall competitive advantage for the supplier networks. As SCM attempts to increase the efficiency in which goods flow through the channel, so to can the efficiency of C2C flows be improved. The key contribution of this paper is the use of C2C as a benchmarking technique to help further supply chain research and practice. Firms that adopt supply chain financial benchmarking programs generate greater profits, and do so through a process that drives increased inter-firm integration and collaboration.

Effective application of fundamental supply chain techniques, such as C2C benchmarking, provides supply chain professionals an additional mechanism to affect profitability. C2C works because it is highly coherent with the fundamental tenets of SCM, make decisions at the aggregate, open up the flow of information, and encourage commitment among partners to make decisions that result in the best value for the customer while improving partner profitability. In *The Practice of Management* (Drucker, 1954) suggested that when the firm takes care of its customers by providing superior value, profits will take care of themselves. The use of supply chain benchmarks, such as C2C, extends that axiom. This case study has shown when the firm, and its partners, provides their customer superior value, profits, for the firm and its partners, will take care of themselves.

References

Aberdeen-Group (2006), *Supply Chain Finance Benchmark Report: The New Opportunity to Improve Financial Metrics and Create a Cost-Advantage Supply Chain*, Aberdeen-Group, Boston, MA.

Ambler, T. (2006), "The new dominant logic of marketing views of the elephant", in Lusch, R.F. and Vargo, S.L. (Eds), *The Service Dominant Logic of Marketing: Dialogue, Debate, and Directions*, M.E. Sharpe, Armonk, NY, pp. 449-62.

Arnold, S.J. (2002), "Lessons learned from the world's best retailers", *International Journal of Retail & Distribution Management*, Vol. 30 Nos 11/12, pp. 562-70.

Bernabucci, R.J. (2008), "Supply chain gains from integration", *Financial Executive*, Vol. 24 No. 3, pp. 46-8.

Blanchard, C., Comm, C.L. and Mathaisel, D.F.X. (2008), "Adding value to service providers: benchmarking Wal-Mart", *Benchmarking: An International Journal*, Vol. 15 No. 2, pp. 166-77.

Bowersox, D.J. (1990), "The strategic benefits of logistics alliances", *Harvard Business Review*, July/August, pp. 2-9.

Bowersox, D.J. and Daugherty, P.J. (1987), "Emerging patterns of logistical organization", *Journal of Business Logistics*, Vol. 8 No. 1, p. 46.

Choy, K.L., Chow, H.K.H., Lee, W.B. and Chan, F.T.S. (2007), "Development of performance measurement system in managing supplier relationship for maintenance logistics providers", *Benchmarking: An International Journal*, Vol. 14 No. 3, pp. 352-68.

de Luca, L.M. and Atuahene-Gima, K. (2007), "Market knowledge dimensions and cross-functional collaboration: examining the different routes to product innovation performance", *Journal of Marketing*, Vol. 71 No. 1, pp. 95-112.

Delpachitra, S. (2008), "Activity-based costing and process benchmarking: an application to general insurance", *Benchmarking: An International Journal*, Vol. 15 No. 2, pp. 137-47.

Drucker, P.F. (1954), *The Practice of Management*, Harper & Row, New York, NY.

Esper, T.L., Fugate, B.S. and Davis-Sramek, B. (2007), "Logistics learning capability: sustaining the competitive advantage gained through logistics leverage", *Journal of Business Logistics*, Vol. 28 No. 2, pp. 57-81.

Francis, J. (2008), "Benchmarking: get the gain without the pain", *Supply Chain Management Review*, Vol. 12 No. 3, pp. 22-9.

Fugate, B., Sahin, F. and Mentzer, J.T. (2006), "Supply chain management coordination mechanisms", *Journal of Business Logistics*, Vol. 27 No. 2, p. 129.

Goldsby, T.J., Griffis, S.E. and Roath, A.S. (2006), "Modeling lean, agile, and leagile supply chain strategies", *Journal of Business Logistics*, Vol. 27 No. 1, p. 57.

Griffis, S.E., Goldsby, T.J., Cooper, M. and Closs, D.J. (2007), "Aligning logistics performance measures to the information needs of the firm", *Journal of Business Logistics*, Vol. 28 No. 2, pp. 35-56.

Gunasekaran, A., Lai, K. and Edwin Cheng, T.C. (2008), "Responsive supply chain: a competitive strategy in a networked economy", *Omega*, Vol. 36 No. 4, pp. 549-64.

Hanman, S. (1997), "Benchmarking your firm's performance with best practice", *International Journal of Logistics Management*, Vol. 8 No. 2, pp. 1-18.

Hutchison, P.D., Farris, M.T. II and Anders, S.B. (2007), "Cash-to-cash analysis and management", *CPA Journal*, Vol. 77 No. 8, pp. 42-7.

Kahn, K.B., Maltz, E.N. and Mentzer, J.T. (2006), "Demand collaboration: effects on knowledge creation, relationships, and supply chain performance", *Journal of Business Logistics*, Vol. 27 No. 2, pp. 191-221.

Katz, J. (2008), "Welcome back US manufacturing", *Industry Week*, Vol. 257 No. 8, pp. 34-8.

LaLonde, B.J. and Pohlen, T.L. (1996), "Issues in supply chain costing", *International Journal of Logistics Management*, Vol. 7 No. 1, pp. 1-12.

Lambert, D.M. and Burduroglo, R. (2000), "Measuring and selling the value of logistics", *International Journal of Logistics Management*, Vol. 11 No. 1, p. 1.

Lambert, D.M., Knemeyer, A.M. and Gardner, J.T. (2004), "Supply chain partnerships: model validation and implementation", *Journal of Business Logistics*, Vol. 25 No. 2, pp. 21-42.

Lapide, L. (2008), "Learning from others", *Supply Chain Management Review*, Vol. 12 No. 1, pp. 8-9.

LeKashman, R. and Stolle, J.F. (1965), "The total cost approach to distribution", *Business Horizons*, Vol. 8 No. 4, p. 33.

Levitt, T. (1980), "Marketing success through differentiation of anything", *Harvard Business Review*, Vol. 58, pp. 83-91.

Liker, J.K. and Choi, T.Y. (2004), "Building deep supplier relationships", *Harvard Business Review*, Vol. 82 No. 12, p. 104.

Lin, B., Colins, J. and Su, R.K. (2001), "Supply chain costing: an activity-based perspective", *International Journal of Physical Distribution & Logistics Management*, Vol. 31 Nos 9/10, p. 702.

Magretta, J. (1998), "The power of virtual integration: an interview with Dell Computer's Michael Dell", *Harvard Business Review*, Vol. 76 No. 2, p. 72.

Manning, L., Baines, R. and Chadd, S. (2008), "Benchmarking the poultry meat supply chain", *Benchmarking: An International Journal*, Vol. 15 No. 2, pp. 148-65.

Morash, E.A. (2001), "Supply chain strategies, capabilities, and performance", *Transportation Journal*, Vol. 41 No. 1, p. 37.

Porter, M.E. (1980), *Competitive Strategy*, The Free Press, New York, NY.

Schaumburg, T. (2008), "What's so bad about inventory?", *Progressive Grocer*, Vol. 87 No. 7, pp. 100-2.

Segars, A.H., Harkness, W.J. and Kettinger, W. (2001), "Process management and supply-chain integration at the Bose corporation", *Interfaces*, Vol. 31 No. 3, pp. 102-14.

Spekman, R.E., Spear, J. and Kamauff, J. (2002), "Supply chain competency: learning as a key component", *Supply Chain Management Review*, Vol. 7 No. 1, p. 41.

Towill, D. (2002), "The supply chain strategy conundrum: to be lean or agile or to be lean and agile?", *International Journal of Logistics: Research and Applications*, Vol. 5 No. 3, pp. 300-8.

Tsai, C. (2008), "On supply chain cash flow risks", *Decision Support Systems*, Vol. 44 No. 4, pp. 1031-42.

Womack, J.P., Jones, D.T. and Roos, D. (1990), *The Machine that Changed the World: The Story of Lean Production*, Rawson Associates, New York, NY.

About the authors
Wesley S. Randall is an Assistant Professor at Auburn University. He received the BS from the US Air Force Academy, an MPA from Valdosta State University, an MMS from Marine Command and General Staff College and a PhD from the University of North Texas. Prior to pursuing his PhD, he was a US Air Force officer with 21 years of service in various acquisitions and logistics positions. Wesley S. Randall is the corresponding author and can be contacted at: wsr0001@auburn.edu

M. Theodore Farris II is an Associate Professor at the University of North Texas in Denton, Texas. He was named a 2008 Austrian-American Fulbright Scholar in Logistics. He received a BS from Arizona State University, an MBA from Michigan State University, an MABA and a PhD from the Ohio State University. Prior to pursuing his PhD, he was employed by the IBM Corporation, and Intel Corporation.