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Cash-to-Cash Analysis and Management

Useful Performance Measures for Improving Profitability

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AUGUST 2007 - There is a growing demand among companies for help in managing the cash flow cycle: accounts payable to inventory to accounts receivable. Managers must know their company's cash-to-cash (C2C) position, and not focus solely on bottom-line profits. With financial data and computer technology readily available for assistance, any company, or its business advisor, can easily determine its C2C and develop benchmarks for comparisons. Companies can take a broader view of the supply chain, which will help them in negotiating terms for accounts payable with suppliers and accounts receivable with customers, as well as in balancing supply chain transactions to obtain overall efficiencies and improved profits for all parties. Cash-to-cash analysis represents an excellent opportunity for accountants to expand their portfolio of value-added skills.

Definition of C2C

C2C is a unique financial performance metric that indicates how well an entity is managing its capital. The definition of C2C, or cash conversion cycle, is "the length of time a company's cash is tied up in working capital before that money is finally returned when customers pay for the products sold or services rendered" (Neil C. Churchill and John W. Mullins, "How Fast Can Your Company Afford To Grow?," *Harvard Business Review*, May 2001). Admittedly, this definition ignores depreciation and places income taxes within operating expenses; however, the computation of standardized variables for multiple-company data serves as an excellent benchmark to help guide improvements within an individual company and across the supply chain.

Because typically both purchases and sales are involved in C2C, three key variables are in the calculation: inventory, accounts receivable (A/R), and accounts payable (A/P). A company's historical data are typically used to compute the C2C variables. Experience has shown that using medians may be preferable to using means, in order to avoid an undue influence of outlier data points. These variables must be standardized to a common measure, using the following formulas:

$$\begin{aligned} \text{Inventory(C2C)} &= \text{Inventory/Cost of Goods Sold} \times 365 \\ \text{Receivables(C2C)} &= \text{A/R/Net Sales} \times 365 \\ \text{Payables(C2C)} &= \text{A/P/Cost of Goods Sold} \times 365 \end{aligned}$$

Next, C2C is calculated for the company using these three variables:

$$\text{C2C} = \text{Inventory(C2C)} + \text{Receivables(C2C)} - \text{Payables(C2C)}$$

These equations standardize the data into days. The final C2C figure may be positive or negative. A positive result indicates the number of days a company must borrow or tie up capital while awaiting payment from a customer. A negative result indicates the number of days a company has received cash from sales before it must pay its suppliers for inventory. Ultimately, the goal for most companies is a C2C that is as low (or even negative) as is reasonable for a company in that particular industry. A lower C2C suggests that a company is more efficient in managing its cash flows, because it turns its working

capital over more times per year and generates more sales per dollar invested. It is important to understand that the C2C calculation technique assumes that cycle time may be shortened without a resulting increase in costs or decrease in sales [Luc A. Soenen, "Cash Conversion Cycle and Corporate Profitability," *Journal of Cash Management* 13 (4), 1993].

Businesses may focus on any combination of the three key variables to improve their C2C: reduction of inventory days, reduction of accounts receivable collection days, and expansion of accounts payable days. It is difficult to estimate the effect of a change from adjusting an individual variable, because all three are interrelated, but improving any one will result in a shorter C2C cycle for a company.

Benefits of C2C Analysis

Many managers are aware of the merits of computing C2C. The underlying attraction of reducing the C2C cycle is that it will lead to operational and financial improvements. Each business seeks to obtain a proper mix between the amount of resources deployed to working capital and those to capital investments. Thus, there is an ongoing trade-off between operational decisions to lengthen the C2C cycle (which increases the liquidity required) and financial decisions to shorten the cycle (which decreases the liquidity required).

To stay in business, a company must not only operate at a profit, but decision makers must also manage its cash effectively. The question arises: Are profitability and cash management related? While it is not possible to answer this question definitively for all companies, a review of 12 years of data from the Research Insight 7.6 database of more than 22,000 public companies indicated a direct correlation between shorter C2C cycles and higher profitability for 75% of industries.

Because cash available for operations has a multiplier effect based on cash turnover, C2C also influences the maximum attainable profit for a firm (Peter Skomorowsky, "The Cash to Cash Cycle and Net Income," *The CPA Journal*, January 1988). A shorter C2C cycle results in a higher present value of net cash flows generated by the assets and, ultimately, a higher value for the business.

Financial benefits may be substantial, depending on which C2C variable is improved. Benefits may include: a one-time increase in cash from the conversion of inventories or receivables into cash, or from delay of payment of accounts payable; and reducing significant ongoing expenses such as the weighted-average cost of capital (WACC) and inventory carrying costs (ICC). Each business is unique; however, the following case study may help illuminate how to specifically identify potential cost savings.

Using C2C as a Benchmark

Professionals seeking to improve the supply chain interaction with their suppliers and customers may use C2C as a benchmark to begin investigating opportunities. The process for improvement includes:

- Step 1: Determine C2C variables for the company, as well as for competitors in the same industry.
- Step 2: Benchmark the company's position relative to its industry. Compare company performance and determine where there are large differences from industry leaders.
- Step 3: Quantify the value of changing one day for each variable.
- Step 4: Determine C2C variables for key suppliers and customers.
- Step 5: Identify where there are significant differences between trading partners for offsetting variables (accounts receivable versus accounts payable).
- Step 6: Determine the financial impact of aligning (changing) the offsetting variables and seek a

mutually beneficial improvement with trading partners.

Case Study

In the past, it was difficult to obtain financial data from other companies and devise benchmarks. Today, these data are readily available and computer technology expedites the computation of any public company's C2C (see [Exhibit 1](#)). Data may also be grouped by Standard Industrial Classification (SIC) or North American Industry Classification System (NAICS) codes to allow companies to create industry benchmarks. SIC codes were used in this case study to identify longer historical trends.

Another historical problem was that companies could calculate their C2C, but the result had very little practical application for negotiations with suppliers and customers. Today, companies using C2C data have better negotiating positions with suppliers and customers, because the data are readily available. In supply chain management, C2C also allows companies to begin to examine the supply chain from a broader view, beyond the company-level view. Businesses are viewing C2C as a bridge between inbound material activities with suppliers and outbound sales activities with customers.

To illustrate the application of C2C analysis at the company level, a large international firm in the "Semiconductor, related devices" industry (SIC 3674) was selected, referred to here as Company X. Financial data for 1999 through 2005 were obtained from the Research Insight database, as described above. In order to calculate meaningful benchmark numbers, any companies with incomplete or extreme outlying data were deleted from the dataset.

The first step is to determine Company X's C2C. [Exhibit 2](#) shows Company X's financial data from 1999 through 2005. Next, inventory, accounts receivable, and accounts payable are converted into a common measure of days, using the equations above, as shown in [Exhibit 3](#). These variables are then used to calculate annual C2C.

[Exhibit 4](#) shows that while C2C days remained relatively constant (except for 2004, due to a degradation in accounts payable), the individual variables have changed. Inventory days increased slightly in the most recent years, accounts receivable days steadily decreased, and accounts payable days were mixed but trended downward.

Industry Benchmarks

While analysis of an individual firm's C2C is helpful, industry benchmarks are crucial for a company to evaluate its C2C performance and assess opportunities for improvement. For the semiconductor industry, benchmark data in [Exhibit 5](#) may be examined in multiple ways. Company X is ranked 99 out of 147 companies in this industry for C2C. Company X is performing better than the industry median for inventory and accounts receivable; however, its accounts payable is below the industry median by 21.7 days; that is, the company pays its bills 21.7 days faster than is expected in the industry.

Company X can also be compared against the industry leader, which has a lower inventory by 11.2 days, a shorter accounts receivable by 9.9 days, and a longer accounts payable by 155.3 days. It has an overall C2C advantage of 176.4 days, due largely to its lengthy payables.

Finally, companies in the first quartile of the industry possess a lower inventory by 16.8 days, a shorter accounts receivable by 9.9 days, and a longer accounts payable by 44.8 days, when collectively compared to Company X. First-quartile companies surpass Company X's C2C cycle by 71.5 days. Company X's accounts payable days are negatively impacting its C2C, in comparison to benchmarked industry performance.

A comparison of these results to the top half of the industry would reveal that Company X holds inventory too long, its collection of receivables could be improved, and its payables to suppliers could be lengthened considerably. Uncovering these facts can help Company X explore actions that could adjust its C2C relative to the better performers in the industry.

Overall, these benchmark results suggest that Company X's C2C could be improved. The initial emphasis should be on increasing accounts payable days to fall in line with industry performance. These changes must be balanced with continued effort to maintain or improve accounts receivable and inventory days.

Supply Chain Analysis

A broader supply chain view of Company X's C2C position can be ascertained by examining its five largest suppliers and customers. Even if Company X elects not to change its C2C mix, it is still going to be impacted by the actions of its suppliers and customers and their efforts to improve their own C2C positions.

The summarized C2C performance of Company X's top suppliers and customers over the most recent four years is presented in [Exhibit 6](#) and [Exhibit 7](#). (Complete data for the suppliers and customers are available from the authors upon request.) It should be noted that Company X represents only one customer/supplier to each of these firms. Most of the suppliers had significant improvements in their C2C. Overall, these suppliers reduced their C2C by 27.3% in the time period examined, which was accomplished primarily by reductions in inventory and accounts receivable.

Changes in the average supplier's accounts receivable correspond to changes in Company X's accounts payable. Over the four-year period, suppliers' accounts receivable improved an average of 21.8%. This improvement was at the expense of Company X and its own C2C position, as evidenced by the decrease in accounts payable days. The accounts receivable variables for Company X's five largest suppliers averaged 84.3, 81.5, 68.6, 51.7, and 43.7 days, in comparison to Company X's 2005 accounts payable of 49.0 days. This indicates that Company X may be able to extend its accounts payable days to these suppliers.

[Exhibit 7](#) reflects the C2C improvement by Company X's customers. The average customer C2C decreased 33.4% (39.5%, if the outlier Customer A is not considered). Over the four-year period, the average customers' accounts payable extended 2.5 days. With the exception of Customer A (whose C2C degraded in 2005 due to significant inventory problems), all of the companies presented showed an improvement in their C2C over this time period. This improvement directly affects Company X and its accounts receivable.

Overall, Company X's suppliers significantly improved their accounts receivable, while Company X's customers improved their accounts payable. These changes had a direct impact on Company X financially. Both contributed to the declining C2C position for Company X, which was able to mitigate some of these changes by improving its inventory days.

Payback Analysis for C2C Improvements

For Company X, there are benefits to be realized from examining its C2C and seeking improvements. [Exhibit 8](#) presents the paybacks.

Analysis of Company X's C2C variables reflects that one day of Company X's inventory is valued at \$15.3 million. Reducing inventories by one day of supply represents a one-time conversion of \$15.3

million in cash. In addition, assuming an inventory carrying cost of 25% per year, the reduction in inventory will reduce annual inventory carrying cost expenses by \$3.8 million each year. Similarly, Company X has daily receivables revenues of \$36.7 million. If the company can speed up its receivables by one day, it will result in a one-time infusion of over \$36.7 million. The annual benefit of converting a day of receivables into cash, assuming a weighted-average cost of capital of 12%, would be to generate (or avoid) \$4.4 million in interest annually. Company X should consider the benefits in aligning its payables to better match industry performance, which is a median 21.7 days longer than Company X's performance. Extending payables by one day would result in a one-time cash retention of \$15.3 million, which can also generate (or avoid) \$1.8 million in interest annually. The upside potential of this change is a cash infusion of more than \$332 million (21.7 days x \$15.3 million) and annual ongoing savings (or interest avoidance) of over \$39 million (21.7 days x \$15.3 million x 12% cost of capital).

A Competitive Environment

It is not enough for a company to formulate a cash-to-cash analysis; it must also utilize data and technology to improve its C2C efficiency and, thus, profitability. Management must understand the role of the C2C variables (inventory, accounts receivable, and accounts payable) and their leverage points, and regularly monitor all changes, internally and externally, with respect to its suppliers and customers. Also, it is important to calculate competition and industry C2C benchmarks to help improve company performance. C2C analysis can also provide a basis for identifying areas of opportunity to guide strategic goals for improvement.

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