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# What is the "True Cost" of Processing a Freight Bill?

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## 1. Executive Summary

For years, the U.S. transportation sector has been generally characterized by sluggish growth, decreasing profit margins and low economic returns. In 2001, the operating ratio for road motor carriers was only 94.9%.<sup>1</sup> Even during the past decade of strong economic growth, the transportation sector's total return on assets hovered at just around one percentage point above its cost of capital. This lackluster performance was reflected in the performance of sector stocks. While the S&P 500 index rose by 17 percent annually from 1990 to 2000, the transportation index consistently under-performed the benchmark index by 8 percentage points a year.<sup>2</sup>

Given the intensifying competitive pressures since deregulation, transportation sector managers and executives are under significant pressure to manage the cost side of their businesses. To this end, industry professionals are focusing their efforts on reducing operating costs, decreasing capital spending and restructuring their operations.

One area where focused management attention could yield substantial value is the frequently neglected accounts receivable (A/R) function. Few studies currently exist that accurately measure the complete life cycle costs of A/R processing. A recent Ernst & Young (2001) study, based on detailed industry interviews, fills this void by providing finance professionals with rigorous estimates of A/R costs in the transportation industry.

The total life cycle costs associated with managing accounts receivable are quite significant in the transportation industry. Depending on the mode of transportation and invoice value, these costs can consume 2%-4% of the total invoice. A notable finding is that previous industry-wide studies on accounts receivable management costs have concentrated exclusively on administrative cost aspects and have, therefore, underestimated total life cycle A/R costs. Pure processing costs are significant and are estimated at \$3.68 per invoice, regardless of invoice value. However, implicit financial costs, such as receivable carrying costs, can run three or four times higher than processing costs.

In addition to the currently popular outsourced solutions, such as third-party payment providers (3PPs), web-based freight payment management systems provide a prime opportunity to not only reduce life cycle A/R costs by 30% to 50% but to also significantly improve trading partner relationships. The purpose of this paper is to provide transportation companies with concrete data to more clearly understand the true life cycle costs of invoicing and accounts receivable processing.

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<sup>1</sup> Defined as the ratio of operating expenses to operating revenues, the operating ratio is a Standard & Poor's proprietary calculation based on the financials of the 10 largest motor carriers. For further details refer to Standard and Poor's Industry Survey, July 2001, Volume 169, No. 28.

<sup>2</sup> For details see the McKinsey Quarterly "First Class Returns for the Transportation Sector", Volume 3, 2001.

## 2. Ernst & Young Estimates of Accounts Receivable Costs

Accounts receivable (A/R) processing represents a prime opportunity to reduce costs. A recent study by the National Automated Clearing House Association (NACHA) found companies pay anywhere from \$2-\$5 to create and deliver a single paper-based invoice and another \$10 to process the payment once it has been received.<sup>3</sup> However, not factored into these costs is the financing of cash flows while the payment is being processed. Additionally, if any disputes or exceptions arise during the invoice payment process, each side must resolve the exception (generally by telephone conversation and fax), at the cost of up to \$15 per call.

During the Fall of 2001, Ernst & Young performed a study of accounts receivable costs within the transportation sector.<sup>4</sup> All modes of transportation were represented across a carrier group with annualized revenue ranging from \$35.6 million to \$11.9 billion, and average revenue of \$2.1 billion. This study found that costs for processing a single freight invoice represent nearly 2-4% of invoice value. And this was for large, efficient, highly automated operations. In an industry where the operating margins are in the single digits, reducing accounts receivable costs can deliver noticeable improvements to the bottom line.

Total A/R cost has two main sources as shown in Figure 1 below: administrative and financial. In a sense, the two types of costs can just as easily be thought of as the “visible” and the “hidden” costs.

Administrative costs consider the pure processing costs of creating and delivering invoices, receiving payment, applying payment and resolving exceptions or disputes (if any) with the shipper. Administrative costs are quite visible as they include fully loaded costs of personnel in the accounts receivable functional departments as well as general document handling and material costs. They are fixed per transaction and hence invariant to the size of the invoice. As shown in Figure 1 below, the referenced E&Y study estimated administrative costs at approximately \$3.68 per invoice.<sup>5</sup>

Financial costs are less visible as they are generally recognized only at the aggregate enterprise level and not by the individual functional units. Financial costs include two components: days sales outstanding (“DSO”) carrying costs and bad debt expenses.

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<sup>3</sup> These estimate have been corroborated by the Institute of Management and Administration (IOMA) study that estimates that accounts payable department spend \$16.54 on average to process a vendor payments. The Hackett Benchmarking Group and the Controller magazine also estimate that the costs of paying an invoice are between \$10.50-\$11.00 per invoice. For more details of NACHA study refer to article by John Edwards, Line 56, October 15, 2001.

<sup>4</sup> A synopsis of the study participants and key statistics is provided in the appendix.

<sup>5</sup> Although focusing solely on the transport sector this estimate is comparable to the estimates cited earlier in a study by NACHA.

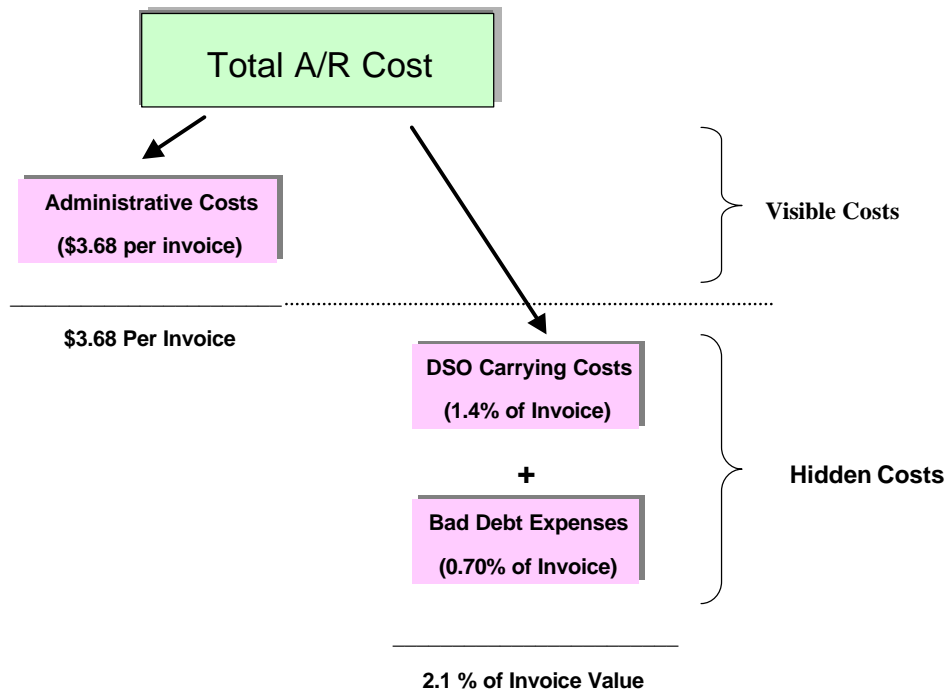


Figure 1

DSO carrying costs are those costs associated with financing each additional day of receivables, and in turn depend on two key parameters - the number of days the invoice is financed and the enterprise's weighted cost of capital. Current estimates of DSO carrying costs are about 1.40% (140 bps) of the invoice value.

The other primary financial cost component is bad debt expense - the pure financial cost of eventually writing off an uncollectible invoice amount. The financial burden of writing off the bad debt is in addition to the time and resources spent in chasing the debt prior to write-off (such as collection notices, calls to the shippers) which have already been included in the administrative costs. Bad debt in the industry is estimated at 0.70% (70 bps) of invoice value.

<sup>6</sup> Although focusing solely on the transport sector this estimate is comparable to the estimates cited earlier in a study by NACHA.

The relative impact of financial and administrative costs varies by invoice value as illustrated graphically in Figure 2 below. For smaller invoices (less than \$100), nearly two-thirds of accounts receivable costs are administrative and one-third are financial. As the invoice value increases (to \$1,500), the administrative processing costs decrease to 10%, while DSO carrying costs and bad debt costs increase to 60% and 30% respectively. This is because administrative costs are fixed per invoice, while bad debt and DSO carrying costs are financial costs and are a “fixed proportion” of invoice value.

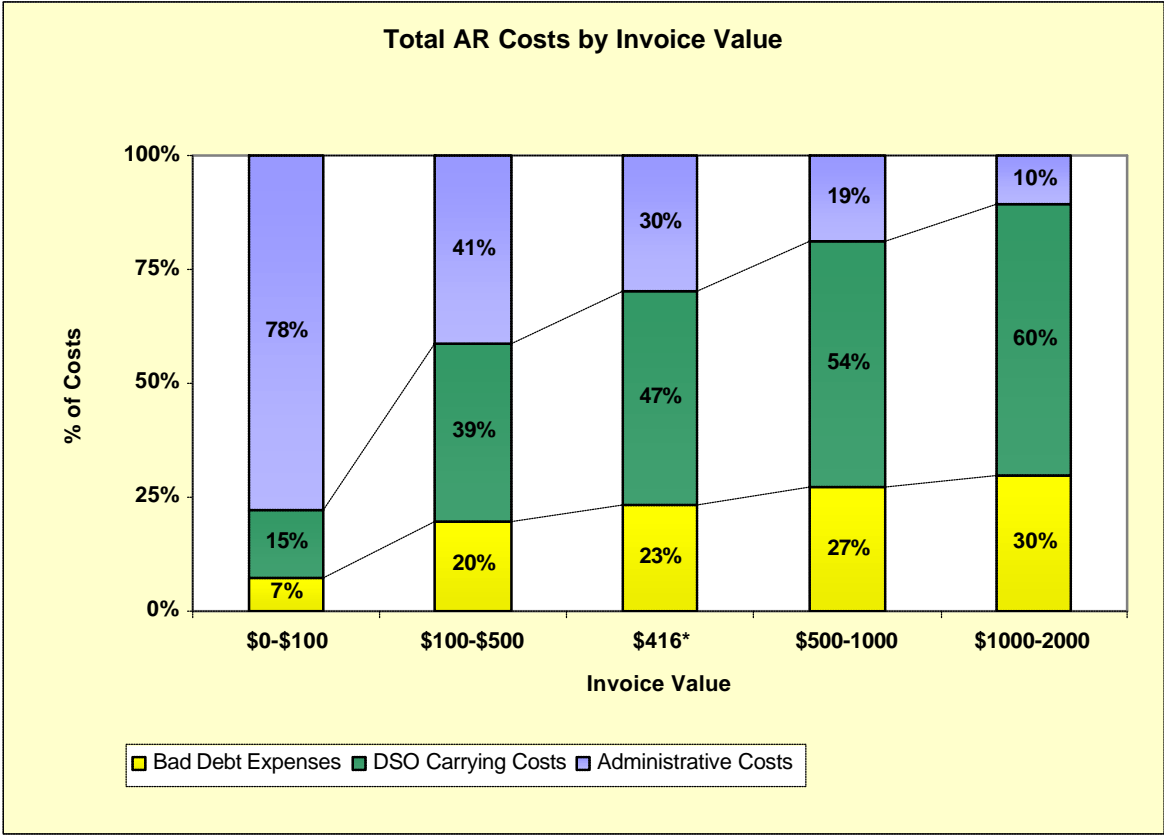


Figure 2

Figure 3 illustrates the dollar impacts of Administrative and Financial cost elements on the fully allocated costs of various invoice values. The cost of managing a single accounts receivable transaction can range from between 2%-4% of invoice value. As Figure 3 clearly illustrates, on a percentage basis, accounts receivable costs are much higher for transportation modes with lower invoice values, such as Less Than Truckload (LTL) and Air Express, than for Ocean and Rail, where invoice values are generally large (several thousand dollars).

Costs of Accounts Receivables (\$)							
Invoice Size	% of Transactions	Administrative Costs	Financial Costs			TOTAL	
			DSO carrying	Bad Debt Expenses	Total	\$	% of invoice
\$0-\$100	60%	\$3.68	\$0.70	\$0.35	\$1.05	\$4.73	9.5%
\$100-\$500	15%	\$3.68	\$3.50	\$1.75	\$5.25	\$8.93	3.6%
\$416 *	-	\$3.68	\$5.82	\$2.91	\$8.74	\$12.42	3.0%
\$500-1000	9%	\$3.68	\$10.50	\$5.25	\$15.75	\$19.43	2.6%
\$1000-2000	4%	\$3.68	\$21.00	\$10.50	\$31.50	\$35.18	2.3%
Costs of Accounts Receivables (%)							
\$0-\$100	60%	78%	15%	7%	22%	100%	
\$100-\$500	15%	41%	39%	20%	59%	100%	
\$416*	-	30%	47%	23%	70%	100%	
\$500-1000	9%	19%	54%	27%	81%	100%	
\$1000-2000	4%	10%	60%	30%	90%	100%	

\* Average value of freight invoice (all modes of transport)

Figure 3

### 3. Administrative Costs

Transportation carriers incur administrative costs throughout the life cycle of an accounts receivable transaction. Figure 4 illustrates the major processes and sub-processes in the accounts receivables function. Each of these major processes is discussed in detail below:

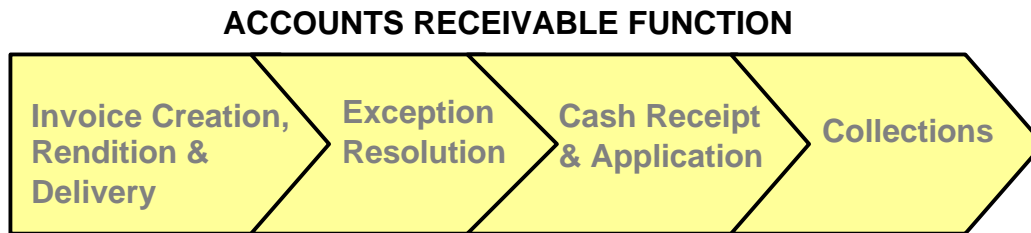


Figure 4

#### A. Invoice Creation, Rendition & Delivery

This process includes all activities required to prepare, create and deliver an invoice to a shipper for services rendered. According to the earlier-referenced NACHA study, it costs a company anywhere from \$2-\$5 to complete this activity. This study found an average cost of \$1.16 per invoice with a range between \$0.62 and \$2.78 per invoice. This process has three major sub-processes:

##### 1. Data Entry for Billing:

This includes all activities required to collect, compile and enter the data necessary to calculate the amount owed to the carrier for providing a specific set of transportation services. Detailed shipment data must be gathered from the shipper's Bill of Lading and input into the carrier's billing system. In addition, when the freight payer requires additional support documentation such as Proof Of Delivery (POD) notice, Signature and Tally sheet, additional permit documents, etc., the carrier must copy, scan or image these support materials and then make them available on the carrier's web site or as hard copy attachments to the invoice.



## 2. Rating

This includes all activities required to keep the contracts or rate sheets current, identify which contract/rate sheet is in force with each particular shipper, ensure that each shipper is billed per the terms of that contract/rate sheet and actually calculate the total invoice amount based on the proper contract/rate sheet and the specifics of the shipment being rated.<sup>7</sup> The primary administrative costs for Data Entry and Rating are EDI charges, personnel time, and document handling costs.

## 3. Invoice Rendition and Delivery:

This includes all activities required to actually generate a well-formatted invoice and delivery of that invoice to the correct billing address. Delivery can be accomplished via surface mail, fax, email attachments or EDI (x10 transaction sets). Paper invoices are still the most common method of submitting a request for payment to the shipper with the subject carriers submitting on average 54% of invoices via paper. The carrier incurs paper costs, printing costs, envelope stuffing costs and postage.

## B. Exception Resolution:

Once the invoice has left the carrier's facility, the carrier has no view into how the shipper is processing the invoice. Often the carrier's first clue that there is a problem is either receipt of a short-pay or not receiving payment at all before the payment due date. Once such an exception arises, the carrier's A/R department either attempts to resolve the differences with the shipper's A/P department or the shipper simply short-pays. Even when resolution is attempted, in many cases neither the A/P clerk nor the A/R clerk are knowledgeable of the details of "the deal" struck between the Transportation Services Purchaser and the Transportation Services Seller. This adds to the cost of exception resolution as each party checks back through their organization to the knowledgeable party to determine the true contractual arrangements.

The primary source of direct administrative costs in exception resolution involves personnel time to call shippers to check on the status of invoice payments, and in researching of disputes, as well as the telephone charges to support faxes and phone calls. A Gartner Group study on B2B Electronic Invoicing and Payments done in 2000 reported an exception handling cost of *\$2.66 per exception* item. Our study was able to document a solid *\$0.58 per invoice*, which reflects both the cost structure and exception rates of the study population.

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<sup>7</sup> When this process is done manually, different rating clerks can rate the same type of shipment under different contract interpretations, leading to downstream disputes when the shipper is trying to determine why they are being charged two different amounts for the same service.

C. Cash Receipt and Application:

This process includes all activities associated with receiving cash and posting it against the correct open items. Consequently this process includes receiving, batching, totaling and depositing check payments, electronically receiving remittance advices and reconciling with the actual cash received, posting the payments (whether received electronically or in paper form), and reconciling any differences between remittance instructions and actual open item amounts. The primary source of administrative cost is the personnel and management time required to manage these processes. In addition, when remittances are received via EDI, the carrier absorbs the delivery side of the EDI VAN charges (typically \$0.25 per remittance instruction). If the remittance advices are received through the carrier's bank as part of the ACH message, then the carrier pays the bank charges associated with the service of forwarding the remittance advices to the carrier. Our study documented a cost of \$0.30 per invoice for cash application across the mix of paper and EDI payments.

D. Collections:

Overdue accounts, which are transferred to the collections department, require constant follow-up from credit department personnel before they are handed to a collections agency or eventually written off. The primary administrative costs are again personnel related to the numerous follow up phone calls. There are also material costs associated with printing, stuffing and mailing the multiple reminder notices and balance due statements. Our study documented an average cost of \$1.28 per invoice for collections costs across all invoices – disputed and non-disputed.

E. Administrative Cost Summary

The diagram below illustrates the components of the administrative costs incurred in traditional invoice management. In addition to the transaction specific costs, our study found that it costs carriers about \$0.21 per invoice for credit reviews (at time of initial decision to do business with the shipper and then for periodic credit reviews). Finally, we also found the average invoice absorbs \$0.15 for paper.

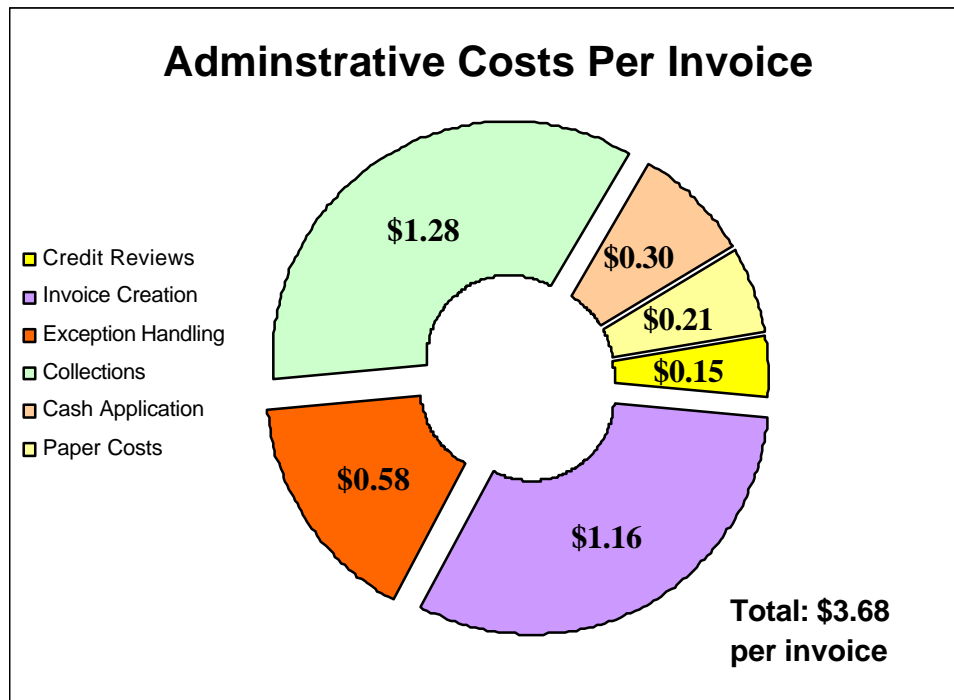


Figure 5

As shown in Figure 5 above, Collections is the single biggest component of administrative costs, averaging nearly \$1.28 per invoice. This is due to the fact that once an account or invoice goes to collections it usually requires multiple reminders and numerous follow-up calls from collection personnel before the shipper finally settles the overdue amount.

Invoice creation is another significant component of invoice processing costs. It is notable that payment application is approximately \$0.30 per invoice, reflecting the shift from check payments to electronic payments such as ACH. In our interview sample approximately 28% of carriers' invoices were paid through an electronic system.<sup>8</sup>

<sup>8</sup> For a more general survey on the use of electronic payment systems refer to the Gartner Group B2B Electronic Invoicing and Payments Report (21st December, 2000).

## 4. Financial Costs – Carrying Costs

In addition to the administrative costs of processing a freight bill, there is the cost of financing the receivable until the payment is received from the shipper. On average, it takes an additional 37 days for a freight bill to be paid after shipment delivery or the service event being completed, whichever is first.<sup>9</sup> Most carriers do not explicitly consider the carrying cost of financing each additional day of DSO (Day Sales Outstanding).<sup>10</sup> Also, most carriers have 15-net-30 day terms with their shippers, and even taking the payment terms into account there is a week's delay in receiving payment. Our study found invoices for commercial accounts were paid on average in 35 days while government accounts were paid on average in 49 days. The effective DSO may be even higher than carriers' internal metrics suggest by a day or two, depending on how effectively carriers invoice, and whether they count their DSO from the time of invoicing or from time of delivery. Carriers may effectively invoice a day or two after delivery, but may not be including this additional time in their DSO calculations.

The reason that carriers do not factor in carrying costs of DSOs is due to widespread misperception of the true “cost of funds” by carriers within the transportation industry. Carriers often perceive that their cost of funds is in the 6-10% range. This reflects that their frame of reference is tied to the current short-term fund rates and not the enterprise weighted average costs of capital (WACC) that should be used to discount accounts receivable carrying costs.<sup>11</sup> WACC factors debt structure, risk premiums, return on commercial paper and return on equity into total funding cost. In this broader view, freight carriers DSO carrying cost is between 12-15%.<sup>12</sup>

Figure 6 illustrates that the carrying cost is a function of both carrier size and the number of days the receivable is financed. In the normal range of DSOs, large carriers experience a financing cost of 0.99% to 1.48% of invoice value. Within the same DSO range, a smaller carrier will experience a financing cost of between 1.23% and 1.85%.

<sup>9</sup> There is a 50-50 split between carriers that bill on pick-up and those that bill on delivery.

<sup>10</sup> DSO is defined as average accounts payable (dollars) outstanding divided by monthly sales (dollars). This gives an indication of how many days it takes the average invoice to be financed before the shipper pays.

<sup>11</sup> Another approach to triangulate the cost of funds for freight carriers is by computing the implicit discount rate from factoring services. While factoring or discounting of trade receivables might not be relevant to all carriers, factoring firms charge from 2-4% a month for factoring transport sector receivables.

<sup>12</sup> The enterprise WACC based on the Capital Asset Pricing Model (CAPM) is obtained by computing the weighted average of debt and equity returns. Current short term borrowing costs for the transport industry is in the region of 10.5%- 11.5%. The cost of equity from the CAPM model is estimated to be about 13.8% for large carriers and 18% for small carriers. Transportation stocks are cyclical and hence there is a larger premium (higher beta) to hold transportation stocks than the market indices. Combining the returns on equity with the return on debt, the weighted average rate of return on capital (WACC) is estimated 15% for small carriers (< \$1B in sales revenue) and 12% for large carriers (>\$ 1B in sales revenue).

CARRYING COST OF DSO*				
DSO Outstanding (Days)	Weighted Average Cost of Funds (%)			
	larger carriers 12 %	medium carriers 13%	smaller carriers 14%	smaller carriers 15%
15	0.49%	0.53%	0.58%	0.62%
21	0.69%	0.75%	0.81%	0.86%
30	0.99%	1.07%	1.15%	1.23%
37	1.22%	1.32%	1.42%	1.52%
45	1.48%	1.60%	1.73%	1.85%
60	1.97%	2.14%	2.30%	2.47%

\* Carrying costs as a % of invoice value.

Figure 6

Another way to understand the interaction illustrated in Figure 6 is to note that for a small carrier if the DSOs can be dropped from 45 days to even 15 days, the financing cost falls by 1.22% of the invoice value (1.85% minus 0.62%). Even a large carrier would see a drop 0.99% of invoice value. Therefore, DSO reduction provides a powerful tool for reducing the carrier's cost structure.

## 5. Financial Costs – Bad Debt Expenses

Often carriers do not include bad debt expenses in their costs of accounts receivable. Currently, freight carrier bad debt write-offs range from between 0.05% to 1.0% of total sales,<sup>13</sup> with average bad debt expenses of approximately 0.7% (70 bps). One explanation for not including bad debt expenses in the accounts receivable costs is that bad debt expenses are treated as normal business losses, part of the risk undertaken to attract, service and maintain customers. Rigorous due diligence on account set-up and the continual monitoring of account portfolios through sources such as Dun & Bradstreet can help to mitigate the possibility of bad debts.

Recently, many shippers have been relying on third party payment providers (3PPs) to serve as intermediaries between them and their carriers in an effort to reduce the administrative costs of processing freight invoices. However, these shippers may not have considered the independent risk that such outsourcing might impose. Two recent instances of 3PPs shutting down unexpectedly are of Computrex and United Traffic Management Systems. On December 19th, 2001 Computrex, a Lexington, Kentucky-based freight payment and auditing service filed for bankruptcy after 25 years in operations. This news stunned a few hundred carriers that were collectively owed over \$25 million by Computrex as well as the shippers who had paid \$25 million to Computrex for the carrier payments. Also, on March 4th, 2002 United Traffic Management Systems, a freight payment bureau based in Irving, Texas closed its doors owing shippers (such as Pier1 Imports and others) a reported \$3.2 million. The collapse of Computrex and United Traffic Management Systems highlights to shippers the additional financial risk of using some third party payment firms.

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<sup>13</sup> Bad debt expenses generally apply to commercial shippers, but not to the government. While the government may pay slowly, they are generally not considered a credit risk.

## 6. Current A/R and Payment Processing Solutions

Companies can select from among several solutions that aim to lower the life cycle cost of accounts receivable in the transportation sector. The most visible solutions may be traditional third party payment providers (3PPs). Third party payment vendors develop solutions that are typically aimed at the shippers' payables problem and not the carriers' receivables problem. Such outsourced payables solutions providers typically bill the shipper either a percent of the payment processed, or a per invoice fee. These solutions generally address the shippers' administrative costs through an economies of scale process. Many of these solutions do not yet address either the carriers' administrative or financing costs. In fact, some of these solutions may add another layer of complexity for the carrier when trying to resolve payment issues as the 3PP often has to communicate with the Shipper for guidance on how to resolve large issues.

For freight carriers, the solutions to accounts receivable and payment processing have primarily been software solutions. Such software solutions can significantly automate the processing of BOLs, and the generation of freight invoices (X04s, X10s, X14s etc). However, one drawback of these solutions, from an industry standpoint, is that carriers need to develop communications interfaces with every shipper. The implementation and operating costs of these solutions are not inconsequential. In addition, these solutions ship messages back and forth with the result that shipper and carrier can still be working off of different views of the transaction – a common cause of disputes.

The explosive growth of the Internet has provided the Carrier with a new communications platform that can be harnessed to lower the costs of document management, shipping information exchange, invoice delivery and accounts receivable status tracking. The Internet has four main advantages over traditional paper, fax and private network systems:

- ❖ Inter-business communication costs have dropped substantially, allowing cost-effective, completely electronic, collaborative communications to occur
- ❖ Information can be electronically exchanged between a much larger group of trading partners
- ❖ System-to-system electronic exchange of data significantly reduces the likelihood for error as there is little manual data re-entry required
- ❖ Transactions can be conducted faster, and at a fraction of their current cost

In an attempt to lower the costs of invoice delivery, some carriers are trying to implement EBPP (electronic bill presentment and payment) extensions to their web-status tracking systems. However, each carrier quickly faces the issue that his customers may not prefer to access multiple systems to get their bills. Quick to identify an opportunity, EBPP aggregators have developed web-based bill presentment solutions focusing exclusively on carriers. However, these solutions are primarily focused on speeding the delivery of the invoice into the same old business processes at the Customer.

*Even the most basic business-to-business buying transaction requires a lot of paper shuffling, a lot of legwork, a lot of labor, a lot of coordination and associated costs. The Internet, however, can allow money flows to be handled much more efficiently. The next step in the logistics revolution will be integrating the flow of money in business transactions with the movement in goods and information.*

*Bob Bernabucci, (January 2000),  
President, UPS Capital Corp.*

State of the art Internet-based payment solutions can provide carriers with sophisticated collaborative tools for document management, payment processing and exception handling. Shippers and carriers can feed documents directly to the solution provider, through EDI or web interfaces. When the carrier's invoice matches with the shipper's, and proper notification has been provided regarding required physical supply chain events, the carrier is paid automatically. When matches fail, state of the art electronic payment solutions provide real-time collaboration capability for shippers and carriers to resolve exceptions. Through use of the collaborative workspaces and their automatic invoice payment capability, such web-based solutions can lower the financial and the administrative costs associated with accounts receivable. Estimates from the current study suggest that implementation of such solutions can allow carriers to reduce life cycle A/R costs between 1.6%-2.8% of invoice value.



## 7. Conclusion

With over \$450 billion in revenues in 2000, the commercial freight sector accounts for nearly 5% of the U.S. gross domestic product. Rising cost pressures and the slowing economy have put significant pressure on the already slim profit margins of the transportation industry. Managers and executives in the logistics sector are instituting financial belt-tightening procedures and searching for “hidden fat” in their departmental budgets. Without exception, accounts receivable processing is a major pain point for financial controllers at freight carriers. However, finance professionals in the transportation sector can now rely on more specific estimates of invoicing and payment processing costs.

General studies on accounts receivable (not focused on the transportation sector) have concentrated exclusively on the aspects of administrative costs and have hence underestimated A/R costs. The Ernst & Young study estimates the combined administrative and financial cost of a freight invoice to be \$12.42 for the average invoice.<sup>14</sup> While pure administrative costs are significant at \$3.68 per invoice, this paper has demonstrated that the bulk of the costs are often the implicit financial costs, running as high as 85% of the total A/R cost. Accounts receivable costs can consume from 2%-4% of an invoice’s total, depending on transportation mode and invoice value.

As the Internet continues to change the B2B landscape, web-based payment solutions provide prime opportunities for carriers to improve relationships with their trading partners and save time and money. Especially with dual Internet and EDI interfaces, these systems do not require expensive integration with existing ERP systems or payment systems. In the commercial freight industry, where operating margins linger near 5%, electronic payment solutions delivering savings of 1%-3% of invoice value can significantly impact the bottom line.

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<sup>14</sup> This is based on the an average invoice value of \$416, based on nearly 3.2 million shipments processed through U.S. Bank’s PowerTrack electronic payment solution in 2000, which is a much larger sample of carriers than in the E&Y study.

## 8. Appendix- Carrier Participants Selected Statistics

Carrier Participants – Selected Statistics		
	Average	Range
Number of Carrier Participants	12	
Publicly Listed	4	
Modes of Transportation	Rail, Air Express, LTL, TL, Flatbed, Specialized, Heavy Haul, Intermodal	
Annual Revenue (\$ Millions)	\$2,140	\$33.5 - \$11,880
- % from Government	8%	0% - 30%
Number of Invoices (000)	1,754	500 – 5,000
- % Paper	53.7%	40% - 70%
Average Invoice Value	\$1,019	\$70 - \$2,399
DSO (days)	37	23 - 90
Weighted Average Cost of Capital (WACC)	13.8%	12% - 15%
Bad Debt Expense (% of Revenue)	0.70%	0.05% - 1.0%
Payments Received Through EFT (%)	28%	10% - 60%
Cost per Invoice Processed:		
- Administrative	\$3.68	\$1.98 - \$7.84
- Total	\$28.80	\$2.83 - \$68.80
Total Cost as Percent of Invoice Value	2.40%	1.91% - 4.04%

Figure 7

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