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Abstract

This study investigates valuation effects of mergers and acquisitions in the freight transportation industry. It is found that mergers and acquisitions create synergistic gains, especially tender offers, consistent with the view that freight transportation mergers and acquisitions occur for synergistic reasons rather than management's desire for empire building or perk consumption. Both target's and bidder's shareholders are better-off, but most of the synergistic gains accrue to the target's shareholders. Targets' valuation effects are greater for vertical rather than horizontal mergers, indicating a positive valuation for firms that control and manage a more extensive supply chain. The bidders' wealth effects are greater for friendly mergers. Overall, the findings have important implications for professional practice and the development of the theoretical literature.

Keywords: Valuation Effects, Mergers, Acquisitions, Freight Transportation

JEL Codes: L91, G34

1. Introduction

Freight transportation facilitates international trade and contributes to value creation in the world economy. During the last few decades, mergers and acquisitions[1] have been featuring prominently across the ocean shipping, rail and trucking sectors of the freight transportation industry. In fact, through mergers and acquisitions many firms have moved towards the physical and economic integration of the sea-land interface by offering door-to-door freight transport and logistics services (e.g., Hesse and Rodrigue, 2004; Fusillo, 2009). Other reasons for the proliferation of mergers and acquisitions in freight transportation include (i) deregulation and the introduction of the Staggers Act (1980) in the US rail industry (Grimm and Harris, 1983; Grimm et al., 1987) (ii) the US Ocean Shipping Reform Act (1998) in the international ocean liner shipping industry and the demotion of the liner conference system (Fusillo, 2009), (iii) changes in the regulatory environment in trucking (Brooks and Ritchie, 2005), (iv) the need for geographical, economic and operational synergies in the context of third-party logistics (Carbone and Stone, 2005), and (v) the potential for market wealth and other economic gains (see Brooks and Ritchie, 2005; Chapin and Schimdt, 1999; Harris and Winston, 1983; Nolan et al., 2010; Syriopoulos and Theotokas, 2007; Samitas and Kenourgios, 2007). Despite the significant number and the considerable amount paid to target companies, little is yet known about the valuation effects of mergers and acquisitions in the freight transportation industry. In addition, freight transport firms have engaged in vertical (between two different modes, adjacent in the supply chain) and horizontal (same mode,

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[1] In the literature the concept 'mergers' differs to the concept 'acquisitions' since the first usually describes a 'friendly' union of two firms of roughly equal size, while the latter contains a more aggressive character of a takeover. In this paper the terms 'mergers' and 'acquisitions' are used interchangeably, an approach that is also frequently adopted in the literature.

parallel supply chain) mergers and acquisitions. It is important to understand how the market values vertical vis-à-vis horizontal mergers in the supply chain.

The aim of this study is to empirically examine the valuation effects of mergers and acquisitions in the freight transportation industry. Freight transportation firms are defined as those entities that deal with the physical movement of freight (transportation) by sea (ocean shipping) and land (rail and truck), and includes the arrangement and offering of incidental services that are associated with freight transportation.

The study chooses to focus on freight transportation for several reasons. First, there has been a trend for increased mergers and acquisitions in freight transport facilitated by the regulatory and strategic changes that occurred in various sectors of this industry. This is evident in the relevant literature which *qualitatively* highlights certain determinants of mergers and acquisitions in freight transport (see Chapin and Schimdt, 1999; Fusillo, 2009; Nolan et al., 2010; Samitas and Kenourgios, 2007; Syriopoulos and Theotokas, 2007). The trend may become more pronounced in the near future following the current economic circumstances that affect the freight transport industry in line with Harford (2005) who indicates that market timing and industry shocks can spur merger waves. Hence a study merger valuation in freight transport can have important implications for professional practice and the development of the theoretical literature.

Second, despite the existence of a voluminous body of literature on the subject area which underpins the scientific and practical interest in the investigation of valuation

effects in mergers and acquisitions (for an extensive review refer to Martynova and Renneboog, 2008), only a small part deals with industry-specific samples, necessitating the importance of undertaking such studies. Industry-specific research can provide the opportunity to control for industry related factors that could affect firm market performance (see DeLong, 2001). For instance, apart from the usual control in event studies (i.e., market model returns) there might be other (risk) factors that are industry specific (e.g., Sweeney and Warga, 1986) and they should be controlled for, in order to obtain uncontaminated valuation effect results. The effort in this study is consistent with this view.

Third, in the spirit of DeLong (2001), by focusing on the freight transportation industry, this study also minimizes the impact of potential inter-industry valuation effects. Prior empirical evidence from the financial economics and the strategic management literature that employ large cross sectional datasets could be driven by some industries that engage in value-maximizing mergers while other industries may engage in value-destructive mergers. In this respect, prior literature provides evidence that firm performance is conditional on observed or unobserved inter-industry effects. For instance, Giroud and Mueller (2009) argue that competition, which is an industry specific characteristic, can mitigate managerial slack. More broadly, Himmelberg et al. (1999) suggest that unobserved inter-industry effects moderate the relation between ownership and firm performance.[2] Therefore, the results of this study should be more robust and immune to

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[2] The freight transportation literature has specific idiosyncratic characteristics that render the thesis of observed/unobserved inter-industry effects valid. For instance, freight transportation firms tend to hold higher value physical assets and operate in a highly competitive environment (particularly after deregulation that occurred since the 1980s) with market uncertainty and extreme volatility culminating into

observed/unobserved firm heterogeneity industry differences found to influence firm performance.

Fourth, little is known about the valuation effects of vertical versus horizontal freight transportation mergers. The physical integration of transport modes enabled companies to vertically integrate and thus manage the processes and service the needs of a more extensive supply chain. However, no study has as yet addressed the merits of a vertical versus a horizontal merger in freight transport. This study contributes to what Bontekoning et al. (2004) called an *emerging field* for transportation research, that is, understanding the economic and financial implications of greater intermodal freight transport integration.

This study contributes to the transportation literature that deals with the valuation effects of mergers and acquisitions. Prior research has been carried out in various transportation modes (e.g. liner shipping, tramp shipping, public transportation, railroad and trucking). Despite their exploratory contributions, prior results are far from being generalizable since in most cases the findings have been constrained by sampling limitations or have applied a case study approach. In addition, in the vast majority of cases, prior studies have not taken into account the so-called vertical freight transportation mergers, that is, mergers between companies operating in different modes of transport but vertically related in the supply chain. Instead, the vast majority of prior studies focused on horizontal freight transportation mergers, that is, mergers of freight transport companies

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high risks (see Behrens and Picard, 2011; Forkenbrock, 2001; Hesse and Rodrigue, 2004 for an economic and spatial analysis of freight transportation characteristics).

serving the same market(s) in parallel (e.g. Brooks and Ritchie, 2005, 2006; Carbone and Stone, 2005; Chapin and Schmidt, 1999; Harris and Winston, 1983; Nagurney, 2009; Samitas and Kenourgios, 2007; Fusillo, 2009). This study builds on and expands this literature by investigating for the first time specific research hypotheses that include valuation (i.e., wealth) effects of the mergers and acquisitions for the economy, as a whole, and for the bidding firms' and target firms' shareholders. Moreover, the study contributes to the literature by investigating valuation effects of merger and acquisition-specific characteristics, namely hostility, tender offers, method of payment, toehold, and vertical and horizontal freight transportation mergers.

The study is organized as follows. Section 2 provides a review of the relevant freight transportation literature on mergers and acquisitions and develops hypotheses on the basis of prior theoretical findings. Section 3 describes the research methodology which includes the chosen sample and variable construction. Section 4 discusses the results of the multivariate analysis, while section 5 discusses robustness tests. Section 6 highlights the key implications emanating for theory and practice before concluding.

2. Literature review and hypotheses development

2.1. Freight transportation literature on mergers

In the transport literature, prior studies have examined mergers and acquisitions from different perspectives. The perspectives include: (i) the motives and the underlying environmental circumstances leading to mergers and acquisitions (Brooks and Ritchie; 2006; Das, 2011; Federal Maritime Commission, 2001; Fusillo, 2009; Transport Canada,

1996) (ii) the operating-wise implications emanating from mergers and acquisitions (Carbone and Stone, 2005; McMullen and Okuyama, 2000; Nolan et al., 2010) and (iii) the financial and economic implications of mergers and acquisitions (Grimm and Harris, 1983; Panayides and Gong, 2002; Samitas and Kenourgios, 2007; Syriopoulos and Theotokas, 2007). This study aims to build upon and contribute to the third perspective by empirically examining the valuation effects of mergers and acquisitions in freight transportation.

The literature focusing on the financial and economic implications of mergers and acquisitions in freight transportation is relatively limited. In particular, in ocean liner shipping Panayides and Gong (2002) found that the announcement of merger and acquisitions will have a direct positive impact on the stock price of the companies. This finding is supported by Samitas and Kenourgios (2007) who investigated mergers and acquisitions in the tramp shipping industry and found that mergers and acquisitions have a direct positive impact on shipping firms' stock prices and increase financial value.

Levin and Weinberg (1979) used post-merger changes in market shares to measure the effect of rail mergers and found an increase in market share of firms engaged in vertical mergers but not those in parallel mergers. Harris and Winston (1983) investigated the potential benefits of rail mergers via an econometric analysis of network effects on service quality. They found that vertical mergers were more beneficial than horizontal mergers and the main benefit of vertical mergers was improved service and not reduced costs. Chapin and Schmidt (1999) measured the efficiency of US rail firms after

deregulation and found that mergers increase technical efficiency but reduce scale efficiency. They conclude that firms may merge to acquire market power from ownership of track and that increases in efficiency after deregulation was not attributable to mergers per se. Ivaldi and MuCullough (2005) found that consumer surplus in U.S. rail freight markets increased by about 30 per cent between 1986 and 2001 despite dramatic industry consolidation.

Retrospectively, two important issues concerning prior studies on merger and acquisition valuation effects in freight transport can be observed. Most studies carry out either a case-study analysis or provide qualitative findings concentrating on specific transport modes (e.g., liner shipping, tramp shipping, railroad and trucking). In addition, the analysis is usually performed using a short time period. For instance, Brooks and Ritchie (2006) examine maritime transport mergers and acquisitions for the period 1996-2000 providing important insights, albeit of a qualitative nature, in a case by case examination. Syriopoulos and Theotokas (2007) perform a case study analysis of value creation during the announcement of the takeover bids of Stelmar Shipping by OMI Corporation and Overseas Shipholding. Panayides and Gong (2002) using a small sample, examine the stock market reaction to the announcement of mergers and acquisitions in liner shipping during the period 1995-1999. Samitas and Kenourgios (2007) examine the effect of the announcement on stock prices of tramp shipping firms for the period 2000-2007 but their sample is small as it consists of 2 mergers and 13 acquisitions. Park et al. (1999) focus on railroad mergers and examine the effects of mergers on the grain transportation markets in Kansas.

This study contributes to the field by expanding the abovementioned literature with respect to valuation effects of mergers and acquisitions in the freight transportation industry using a large sample covering the period from 1980 to 2009. In addition, recognizing the integration of freight transport firms across the supply chain (see Heaver, 2001; Lai et al., 2004), the sample chosen is not restricted to a sector of freight transport but includes rail, road and water transportation of freight thus facilitating the examination of vertical and horizontal freight transportation mergers.

2.2. Hypotheses development

In order to develop relevant research propositions it is important to consider the theoretical literature and highlight prior evidence on the valuation effects of mergers.

Roll (1986) describes a mechanism through which a merger attempt is initiated. First, the firm identifies potential targets. Then, through a due diligence, the firm acquires information that facilitates the valuation of the target and the estimation of potential economies due to synergies from the merger. Finally, if the sum of the estimated target company value and the estimated merger synergy are larger than the observed market price of the target, a bid is initiated. According to this mechanism, a merger creates economic value (i.e., is economically desirable) if it enables more efficient deployment of the combined assets of the bidder and target firm toward higher-valued uses, that is, if it creates synergistic value. Theoretically, the synergistic value is shared between target's and bidder's shareholders, leaving both of them better off. Based on this background,

previous merger and acquisition literature investigates valuation effects of mergers and acquisitions for (i) the economy as a whole, (ii) the target's shareholders, and (iii) the bidder's shareholders. This approach to examining valuation effects is also adopted in this study.

The literature has examined whether mergers are economically desirable by estimating synergistic gains. Generally, mergers seem to create synergistic value which mainly concentrates on friendly mergers rather than hostile mergers. Particularly, Bradley et al., (1988) using mergers over the period 1963-1984 document that on average successful tender offers create a synergistic value of 7.4%. Bhagat et al. (2005) using more recent mergers confirm that mergers create synergistic value, but somewhat lower compared to earlier mergers. The economy is better off depending on whether the merger takes place outside the surging takeover waves (Harford, 2003; Bhagat et al., 2005). Further, Franks et al. (1991) and Schwert (2000) argue that friendly mergers perform better relative to hostile mergers. Eckbo (2009) reviews a number of studies concluding that mergers on average are economically desirable and that the benefits to the economy vary depending on the merger characteristics. The limited literature on freight transport merger and acquisition valuation suggests that there would be synergistic benefits arising from such activity in the industry (e.g. Levin and Weinberg, 1979; Panayides and Gong, 2002; Samitas and Kenourgios, 2007). This is based on the fact that through a vertical merger entities will lower their dependency and hence their systemic risk on upstream or downstream freight transport partners. According to Williamson (1971; 1975; 1979) and Klein et al. (1978) vertical relations often require contracting parties to invest in

relationship-specific assets that are subject to the dangers of opportunistic behavior. The risk of such behavior is lessened through the vertical merger of the entities which should be favorably viewed by the market. On this basis it is expected that:

H₁: Mergers/acquisitions in freight transportation will exhibit synergistic gains.

Prior literature provides evidence that stock prices of target firms increase significantly upon the announcement of a bid. Eckbo (1983) and Eckbo and Langohr (1989) find positive abnormal returns of 14.08% for target firms acquired during the 1960s-1970s. Using more recent mergers, Schwert (1996), Mulherin and Boone (2000) and Ang and Cheng (2006) not only confirm prior findings, but also demonstrate that target firm prices experience a price run-up prior to merger announcement, consistent with the view that the market anticipates the bids. Target shareholders benefit more when initially the merger is hostile rather than friendly (Servaes, 1991), when the bid is in the form of a tender offer, or when the method of payment is all-cash (Franks and Harris, 1989; Schwert, 1996). Finally, there is no consensus in the literature on whether the target shareholders benefit more from vertical or horizontal mergers (Maquiera et al., 1998; Martynova and Renneboog, 2006). Overall, the empirical literature supports the idea that target shareholders accumulate benefits prior and upon the announcement of the bid and these benefits differ across merger characteristics. Hence, it is expected that:

H₂: The shareholders of the target firm in a freight transportation merger/acquisition will earn positive abnormal returns upon the announcement of the merger/acquisition.

In contrast to the large benefits of target's shareholders, bidder's shareholders experience only negligible returns. Early studies, for instance, document positive abnormal returns that range from 0.1% to 0.2% using mergers during the 1960s-1970s (Asquith et al., 1983; Eckbo, 1983). Similarly, later studies using more recent mergers find insignificant negative abnormal returns ranging from -1.2% to -0.7% (Morck et al., 1990; Chang, 1998; Andrade et al., 2001). The bidder's shareholders benefit more from friendly mergers rather than from hostile mergers (Goergen and Renneboog, 2004). Further, equity financed mergers are associated with negative abnormal returns on the bidder's stocks (Travlos, 1987). Finally, Martynova and Renneboog (2006) find that within industry mergers experience significant positive abnormal returns relative to inter-industry mergers. In summary, the evidence mostly suggests that on average bidder's shareholders earn insignificant abnormal returns upon merger announcements that vary depending on the merger characteristics. On this basis, it is expected that:

H_3: The bidder's shareholders of freight transportation firms will not earn economically significant abnormal returns from a merger/acquisition announcement.

3. Methodology

3.1 Sample

The sample consists of mergers and acquisitions from the Securities Data Corporation's (SDC) database. The focus is on freight transportation firms that announced a merger

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and/or acquisition during the period 1980-2009. Freight transportation firms were selected on the basis of the Standard Industrial Classification (SIC) codes to represent the areas of Railroad, Line Haul Operating (SIC: 4000-4013), Motor Trucking and Storage – Freight (SIC: 4170-4173; 4200-4200; 4210-4219; 4230-4231), Water Transport, Freight and Services (SIC: 4400-4499) and Freight Transportation Arrangements (SIC: 4730-4739). The sample represents companies in sectors that have the potential for vertical merger (e.g., sea-land vertical integration). In accordance with prior literature, the following restrictions are imposed (see, DeLong, 2001, Gaspar et al., 2006). First, there is a requirement that either bidders or targets are publicly listed on *AMEX, NYSE* or *NASDAQ*. Second, mergers for which it is impossible to identify either bidder's or target's *CUSIP* on the *COMPUSTAT-CRSP-MERGED* database are excluded.[3] *CUSIPs* are used to gather financial information from *COMPUSTAT* and stock return data from *CRSP*. Third, mergers should be completed or withdrawn within the sample period. These criteria result in a sample of 285 deals for the bidding firms, from which 59 deals have complete information for both bidder and target firms.

Table 1 presents the distribution of mergers by announcement year. Starting from 1980, the number of mergers remains relatively stable until it reaches its highest levels in the period 1994-1999 (104 mergers or 37% of the sample). This evidence is consistent with the overall trend of mergers documented in other industries as well (see Moeller et al., 2005). Table 1 also reports the total merger value and the average merger value, by year. The largest sums on mergers were offered in 1996 ($21403.12 million or 28% of the

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[3] Data from CRSP are used to calculate abnormal returns around the merger announcement. Therefore, bidders/targets without necessary stock return information were excluded from the sample.

sample), while the largest merger offerings took place in 1980 and 1996 with an average deal value of $1346.10 and $1126.48 million, respectively.

[Insert Table 1]

Table 2 reports the distribution of freight transportation mergers, by sector. Panels A (B) report industry information for bidder (target) firms. The sample consists of acquirer firms that belong in the "Railroads - line haul operating" sector (106 mergers or 37.19% of the sample), the "Motor Trucking and Storage – Freight" sector (106 mergers or 37.19% of the sample), "Water Transport Freight and Services" (48 mergers or16.84% of the sample) and "Freight Transportation Arrangements" (25 mergers or 8.78% of the sample). Targets belong in the "Railroads - Line Haul Operating" sector (73 mergers or 25.61% of the sample), "Motor Trucking and Storage – Freight" (93 mergers or 32.63% of the sample), "Water Transport Freight and Services" (30 mergers or 10.53% of the sample) and "Freight Transportation Arrangements" (25 mergers or 8.78% of the sample).

[Insert Table 2]

3.2 Announcement returns

The study estimates cumulative abnormal returns for target's and bidder's shareholders around the announcement of the merger and acquisition. Particularly, the market model is used to estimate abnormal returns:

$$r_{i,t} = \alpha_i + \beta_i \times r_{m,t} + \varepsilon_{i,t} \qquad (E(\varepsilon_i) = 0, \operatorname{var}(\varepsilon_i) = \sigma^2_{\varepsilon_i})$$

Similar to Schwert (2000), model parameters are as follows: r_i is the firm returns, and r_m is the CRSP value-weighted return of the market over the corresponding period.[4]

Then, abnormal returns (*AR*) are defined as the prediction errors of the market model around the merger announcement:

$$AR_{i,t} = r_{i,t} - \hat{a} - \hat{\beta}_i \times r_{m,t}$$

Finally, cumulative abnormal returns (*CAR*) are derived using a twelve-day window [-10,+1] around the merger or acquisition announcement as follows:

$$CAR_{i,(-10,+1)} = \sum_{t=-10}^{+1} AR_{i,t}$$

3.3 Variable construction

This section describes the measurement of the two set of variables used in the analysis: (i) valuation effects from freight transportation services mergers, as the dependent variables, and (ii) merger-related characteristics, as the key explanatory variables.

3.3.1 Dependent variables: merger valuation effects

Following prior literature (Houston and Ryngaert, 1994), the synergistic value effect (*Synergy*) for each merger is estimated as follows:

$$Synergy_i = \frac{MV_{Bidder,i} \times CAR_{Bidder,i} + MV_{Target,i} \times CAR_{Target,i}}{MV_{Bidder,i} + MV_{Target,i}} \qquad (1)$$

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[4] Note that the estimation period refers to day -301 to day -64 (denoting announcement day, as day 0). Furthermore, the study requires at least 30 day returns available to perform the estimation. As explained in Section 5, our results are robust to alternative definitions of the estimation period.

where, MV_{Bidder} (MV_{Target}) is the market value of the bidder (target) firm eleven-days prior to the merger announcement date, and CAR_{Bidder} (CAR_{Target}) is the cumulative abnormal return of the bidder (target) firm estimated over the [-10,+1] window around the merger announcement. The study also considers separately CAR_{Bidder} (CAR_{Target}) as the market's assessment of merger and acquisition consequences on the bidder's (target's) shareholders wealth.

Panel A of Table 3 reports estimates of synergistic values from freight transportation mergers and wealth effects for both the shareholders of the target and bidder firm. The analysis indicates that freight transportation mergers create synergistic value, with most of these gains accruing to the target's shareholders rather than to the bidder's shareholders. Particularly, mergers exhibit an average synergistic value of 3.3% (p-value<0.05). The average market reaction to merger announcements for targets is 24.5% (p-value<0.01), while the average market reaction for bidders is 2.3% (p-value<0.05).

The results provide support to the research hypotheses of the study that mergers/ acquisitions in freight transportation will exhibit synergistic gains (H_1), that the shareholders of the target firm will earn positive abnormal returns upon the announcement (H_2) and that the bidder's shareholders will not earn economically significant abnormal returns (H_3).

3.3.2 Explanatory variables: merger characteristics

Following prior literature the relation between various merger characteristics and the cross sectional variance of the wealth effects of mergers is examined.

First, the impact of the method of payment (*STOCK*) on wealth effects of mergers is captured using a dummy variable that equals one if the method of payment is stock, and zero otherwise. Following Gaspar et al. (2006) a merger or an acquisition is considered all stock if the field "consideration offered" in SDC does not include cash as keyword. The information asymmetry hypothesis (Myers and Majluf, 1984) posits that the bidder's managers prefer a stock- (cash-) financed offer if they think their firm is overvalued (undervalued). Accordingly, a stock- (cash-) financed offer sends a negative (positive) signal about the bidder's asset in place to the market participants. Consistent with this argument, Travlos (1987) found a negative association between stock-financed mergers and the bidder's announcement returns. Therefore, a negative relation between the method of payment and the market reaction to the bidder's announcement is expected. Furthermore, the market reaction to the bidder's merger announcement is part of the synergistic value, thus, a negative relationship is also expected between the method of payment and synergistic value.

Second, a measure of the nature of the merger in terms of it being horizontal or vertical in the freight transportation chain is also included. Horizontal freight transportation mergers (*HORIZONTAL*) are defined as mergers where bidder and target belong to the same transportation industry sector as in Table 2. We also define vertical freight transportation mergers (*VERTICAL*) using a dummy variable that equals one if the bidder belongs to

one of the four transportation industry sectors while the target belongs to one of the other three transportation industry sectors, thus facilitating the potential for vertical integration in the freight transportation chain as adopted in the literature (e.g. Harris and Winston, 1983). Theoretically, vertical mergers may lead to lower cost of capital and thereby enhance firm value (Stein, 1997). In addition, vertical mergers in freight transportation may be viewed favourably by the market as they enhance the organisation's ability to serve a wider market across the supply chain and fulfil the broader transport needs of that market. In practice, however, horizontal mergers could also enhance firm value in several ways, including economies of scale (Clark, 1988), the replacement of inefficient target management (Jensen and Ruback, 1983) and the increase in the bidder's market power (Berger and Humphrey, 1993). It is evident that there is no clear cut prediction of the relation between horizontal and vertical freight transportation mergers and wealth effects, and consequently the aforementioned relation in the freight transportation mergers is an empirical issue.

Third, merger hostility (*HOSTILITY*) is defined as a dummy variable that equals one if the merger is hostile, and zero otherwise. Following Gaspar et al. (2006), a merger is considered hostile if the "attitude" field in SDC is marked as "unsolicited" or "hostile". Schwert (2000) argues that hostile bids are perceived to threaten the target's management team, leading to excessively defensive reactions. In this respect, Shivdasani (1993) finds that management turnover increases after hostile mergers, consistent with the view that hostility is likely to be motivated by managerial self-interest (Jensen, 1988). Overall, hostile mergers are perceived to hinder the creation of synergistic value while friendly

mergers create synergistic value that is often shared among the target's and the bidder's shareholders (Morck et al., 1989). Thus, the following relationships are tentatively anticipated: (i) a negative relation between hostility and synergistic value, (ii) a positive relation between hostility and target market reaction, and (iii) a negative association between hostility and market's reaction to bidder's merger announcement.

Fourth, following Officer (2003) and Gaspar et al., (2006), toehold (*TOEHOLD*) is also considered. *TOEHOLD* is a dummy variable that equals one if a bidder holds more than 5% of target's common stock at the bid announcement. Toehold may facilitate a subsequent merger by either influencing the target's management decisions or by deterring competition from rival bidders. Betton and Eckbo (2000) document that toeholds are associated with lower offer premiums in winning bids, something that is also likely to benefit bidder's shareholders. Based on prior literature, a positive relation is expected between toehold with synergistic value, and a negative (positive) relation between toehold and the market reaction to target's (bidder's) merger announcement.

Finally, tender (*TENDER*) which is defined as a dummy variable that equals one if the bid is a tender offer, and zero otherwise, is included to control for the mode of acquisition. Gaspar et al. (2006) find that target's gain is larger if the mode of acquisition is tender offer, but find no relation between tender offers and the market reaction to the bidder's merger announcement.

Panel B of Table 3 reports descriptive statistics of the 285 mergers with bidding firm information. About 9.5% of the freight transportation mergers are stock financed. A significant portion of mergers in the sample is horizontal (66%). In relation to merger hostility the sample consists of 4.6%, while a large portion of bidders hold target's stocks prior to the merger (7.4%). Finally, 9.1% of the mode of mergers and acquisition is tender offer.

Panel C of table 3 reports the descriptive statistics of the 59 mergers with bidding, target, and synergistic firm information. About 16.9% of the sample is stock financed, 20.3% concern vertical mergers and 54.2% horizontal mergers. About 18.7% of the sample is hostile mergers, 18.6% of the sample had a toehold and 25.4% adopted tender offer as the mode of acquisition.

[Insert Table 3]

Overall, the characteristics of the freight transportation mergers and acquisitions are not directly comparable with previous studies (like for instance, Schwert, 2000; Gaspar et al., 2006), highlighting in this respect the necessity to analysing separately wealth effects of freight transportation merger and acquisitions.

4. Empirical results

This section presents and discusses results based on multivariate regression analysis on the relation between merger characteristics and wealth effects of freight transportation mergers. The analysis aims to identify the determinants of the valuation effects by focusing on merger related characteristics and controlling for firm-level characteristics.

Table 4 reports estimates of the relation between merger characteristics and synergistic value effects of mergers.[5] Regression model (1) presents estimates of merger characteristics and synergistic value. The results show that tender offers are positively related to synergistic value (p-value<0.10). Particularly, mergers open by prospective bidders to all shareholders of the target firm create on average, 6.7% synergistic value. Most of the rest merger characteristics obey the expected sign, but are statistically insignificant. As an additional analysis, consistent with Schwert (2000), firm-level characteristics are included for both, bidder and target firms. Specifically, characteristics for bidders include the return on equity (*BROE*), the price-earnings ratio (*BPE*), the debt-to-equity ratio (*BDE*) and the natural logarithm of the firm's market value of equity (*BSIZE*). Likewise, these variables are included for the target firm (*TROE*, *TPE*, *TDE* and *TSIZE*).[6] Regression model (2) presents the results. The finding for synergistic gains in the case of tender offers is robust to the inclusion of the firm-level characteristics. In addition, a merger creates synergistic gains the higher the bidder's price-earnings ratio (*BPE*).

[Insert Table 4]

Table 5 reports value effect estimates for bidder and target shareholders, separately. Regression model (1) reports estimates of the relation between merger characteristics and

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[5] The regression standard errors are adjusted using heteroskedasticity-consistent covariance matrix estimator, as suggested by White (1980).

[6] Return on equity is the ratio of earnings to equity (*COMPUSTAT* items 20 / 60). Price-earnings ratio is the year-end stock price to earnings per share (*COMPUSTAT* items 24 / 58). Debt-to-equity ratio is the total debt to total assets (*COMPUSTAT* items 9 / 60). Size is the natural logarithm of market value of equity (*COMPUSTAT* item 6). All firm characteristics are measured during the fiscal year prior to the merger or acquisition announcement.

targets' market reaction while regression model (3) reports estimates between merger characteristics and bidders' market reaction. As an additional analysis, regression models (2) and (4) also include firm-level characteristics for targets and bidders, respectively. Vertical freight transportation mergers in regression model (1) are positively related to the targets' announcement returns, showing a gain of 35.7% (p-value<0.05). This finding also holds true when firm-level characteristics are included in regression model (2). On the other hand, hostility is an important determinant of bidder's announcement returns. Hostile mergers are viewed negatively by the market since relative to friendly mergers, regression model (3) shows that hostile mergers receive on average -6.9% announcement return (p-value<0.05). This finding is robust to the inclusion of firm-level characteristics in regression model (4). Furthermore, return on equity (*BROE*), price-earnings ratio (*BPE*) and size (*BSIZE*) exhibit a statistically significant negative relation to bidder's market reaction. Debt-to-equity ratio (*BDE*) obeys the expected sign, but is statistically insignificant.

[Insert Table 5]

5. Robustness analysis

In order to test the robustness of the findings, additional analysis is performed in the spirit of Tables 4 and 5. First, as explained, the sample spans the four main freight transportation sectors, namely Railroads – Line Haul Operating, Motor Trucking and Storage of Freight, Water Transport, Freight and Services and Freight Transportation Arrangements. To dismiss the eventuality that the results are driven by unobserved idiosyncratic time-invariant transportation sector effects, the analysis is repeated after

including fixed effects for each industry. Untabulated results demonstrate that industry effects are statistically insignificant, thus, the previous findings remain unaltered.[7]

Second, the sample consists of both mergers and acquisitions. To investigate whether mergers and/or acquisitions are affected by different characteristics the analysis is re-run by focusing only on the acquisition sample which comprises about 90% of the sample. Untabulated results show that the relation between synergistic gain and tender offers continues to be positive, albeit statistically insignificant.[8] Results on the relation between target (bidder) abnormal returns with vertical integration (hostility) remain unchanged, and statistically significant.

Third, revised or competing bids for the same target are likely to relate to low abnormal returns because the target's price already incorporates the news that the firm is possibly a takeover target. As a result, multiple bids may affect the relation between target returns and merger characteristics. A similar concern exists for synergistic gains results because target's return is part of the synergistic gains. To address these concerns we exclude two multiple bids from the sample and we rerun the analysis. Untabulated results reveal that our findings are not sensitive to multiple bids.

Finally, we investigate whether our findings are sensitive to alternative parameter estimations of cumulative abnormal returns. Following Moeller et al. (2005) we re-estimate cumulative abnormal returns using as estimation period day -205 to day -11

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[7] All tabulated results are not included due to brevity but are available from the authors upon request.
[8] Only 37 observations survive after this treatment. Thus, the absence of statistical significance is attributed to the loss of regression power.

(denoting announcement day, as day 0) where the evaluation window is as before [-10,+1]. Untabulated results do not alter any of our main findings. Our results remain also qualitatively similar using alternative evaluation event windows such as [-5,+1] and [-3,+1].

6. Discussion and implications

In terms of wealth effects, the empirical results indicate that freight transportation mergers and acquisitions create synergistic value. In fact, it is found that freight transportation mergers and acquisitions exhibit an average synergistic value of 3.3%. Prior literature outside the freight transportation sector also provides similar results (Bradley et al., 1988). Overall, these results are consistent with the notion that mergers and acquisitions in freight transportation occur for synergistic reasons and not for empire building or perk consumption. This is consistent with findings in the general literature which show that synergy is the primary motive in takeovers with positive total gains (Berkovitch and Narayanan, 1993) and that synergy may be created by economies of scale (Ravenscraft and Scherer, 1989), the redeployment of assets to more profitable uses (Capron, 1999) and exploitation of market power (Anand and Singh, 1997). In the same vein, Fusillo (2009) stated that in water freight transportation, global carriers merge or acquire other companies in order to achieve scale economies and not to eliminate a competitor or for market entry. This finding can be further supported by examining the timing of mergers and acquisitions in freight transportation over the period under examination (1980-2009). In terms of number of announcements, more merger and

acquisitions took place during peak periods in the demand for freight transportation. Similarly, in terms of value, higher value offerings occurred during peak periods. The highest transaction in terms of value of the offerings in the sample occurred in 2006, a period where industry demand was at very high levels and close to its peak. Such evidence is suggestive that mergers and acquisitions occurred as bigger companies aimed during periods of high demand to improve their efficiency and productivity and achieve scale economies in asset utilization in the knowledge that during peak periods they could fully utilize the physical assets (ships, trucks, rail) accruing as a result of the merger. The literature provides support to this inference. Mitchell and Mulherin (1996) and Andrade and Stafford (1999) show that industry characteristics such as capacity utilization are strongly associated with the incidence of mergers, takeovers, and investment.

Synergistic wealth mostly accrues to the shareholders of the target firm, rather than to the shareholders of the bidding firm. Particularly, average market reaction to merger announcements for targets is 24.5%, while average market reaction for bidders is 2.3%. Target's shareholders wealth effect results are consistent with the vast majority of studies (e.g. Campa and Hernando, 2004; Jensen and Ruback, 1983; Mulherin and Boone, 2000), but bidder's shareholders wealth effect results are in contrast. In particular, prior studies find only negligible wealth effects for bidder's shareholders (Asquith et al., 1983; Eckbo, 1983; Morck et al., 1990; Chang, 1998; Andrade et al., 2001). On the contrary, this study's findings, consistent with merger theory suggest that mergers in freight transportation are value-maximizing for bidder's shareholders, as well. A potential explanation of this finding may originate from the characteristics of the freight

transportation industry which include an increase in competition following deregulation of the rail, trucking and shipping sectors[9], high volatility[10] and market uncertainty[11]. In such an environment, however, agency problems are expected to be low due to constant pressure to reduce slack (Giroud and Mueller, 2009). This perspective suggests that decision making (about mergers and acquisitions) should be more efficient, and driven by value-maximizing incentives.

The study supports the notion that freight transportation mergers are value-increasing for target's shareholders. This is in line with the general literature on mergers which suggests that the bidder firm's shareholders will pay a premium in order to incentivize the target firm to surrender ownership of their shares and physical assets (e.g. Asquith et al., 1983; Eckbo, 1983). In the specific case of freight transportation it is recognized that this exists although bidder shareholders do not seem to overpay since bidder and target shareholders recognize that there will be operational and value-maximizing synergies culminating from the merger. Second mergers in an industry which gains efficiencies through vertical integration, as in freight transportation, may represent an important strategic tool to alleviate the risks of cash flow volatility and uncertainty. In fact it has been found that mergers aimed at vertically integrating firms are influenced by cash flow uncertainty, that cash flow volatility increases with the start of merger waves and that firms experience a reduction in cash flow volatility as a result of vertical mergers (Garfinkel and Hankins, 2011). Hence, since vertical mergers and integration may be used to provide operational

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[9] Refer to Brooks and Ritchie (2005), Chapin and Schmidt (1999), and Fusillo (2009).
[10] See Hesse and Rodrigue (2004) for an analysis of the dynamic nature of freight transportation.
[11] For analyses of uncertainty in freight transportation see Tsai et al (2011) for trucking, Xu et al (2011) for dry bulk shipping and, Gorman et al (2011) and Pazour et al (2010) for rail freight distribution.

risk management and hedging benefits in a freight transportation context, the decision is driven by value-maximization and therefore this is reflected in the target's and bidder's shareholder value.

In order to shed further light on the relationship between the wealth effects of mergers and acquisitions and various merger and acquisition characteristics the cross sectional variance of the wealth effects of mergers and acquisitions is examined. Three key findings are documented. The first is that tender offers are positively related to synergistic value. Second that vertical freight transportation mergers and acquisitions are positively related to the target's announcement returns. Third, hostile mergers and acquisitions hamper bidding firm's shareholder wealth.

The finding that tender offers are positively related to synergistic value is theoretically sound and provides confirmation of the results of previous studies outside the freight transportation sector. For instance, Lang, et al. (1989) document that the abnormal returns of tender offers are higher for target, bidder and combined returns when targets experience more growth, as indicated by a high Tobin's q ratio. The finding suggests that when it comes to freight transportation a tender offer is a mode of acquisition that provides better opportunities to evaluate the implications of acquiring physical assets.

The study has found that vertical mergers and acquisitions in freight transport are positively related to the target's announcement returns. The fact that the market values positively the potential to engage in a vertical merger vis-à-vis a horizontal merger

suggests that there are benefits to be had from engaging in the management and control of a more extended supply chain for target firms. The market may expect additional operational related benefits from vertical mergers (e.g. inventory turnover improvements, reduction in supply chain risks, etc) and values positively such moves. Target firms are found to benefit the most in vertical supply chain mergers. The reason for this finding may be related to the fact that bidder firms recognize the value of vertical integration in the supply chain and are therefore willing to pay more to achieve such integration with the target firm. Although bidders are willing to pay more, the findings suggest that they do not overpay as indicated by the statistically insignificant VERTICAL coefficients (BCAR models (3) and (4) in table 5). This finding suggests absence of agency problems relating to empire building and managerial entrenchment since there is no observation of the market assessing vertically integrated mergers and acquisitions as being value destructive.

Finally, a negative relation is found between hostility and the bidder's announcement returns, indicating that hostile takeovers are not viewed favorably by the market. This observation can have three valid, and possibly interrelated, interpretations. First, this finding is supported in the general literature which indicates that many hostile takeovers are rather controversial as they are driven by management and not by shareholder objectives and are therefore negatively viewed by the market as bidding firms tend to overpay for their acquisition targets (see Roll, 1986). Second, when a hostile bid is made, the target share price immediately incorporates the expectation that opposition to the bid may lead to upward revisions of the offer price, possibly ending in overpaying the target firm shareholders (Martynova and Renneboog, 2008). Third, bearing in mind that in freight

transportation the most significant fixed-cost element is the development of fleet capacity (see Behrens and Picard, 2011), a potential hostile takeover may be met with added reservation by shareholders as to the implications that would arise regarding the utilization of additional physical assets. In particular, the overwhelmed uncertainty regarding the successful competition of the merger tends to exacerbate this propensity against hostile takeovers.[12]

7. Conclusion

The study provided analytical evidence on the valuation effects of mergers and acquisitions in a freight transportation context. The study contributes to the literature on mergers and acquisitions in freight transportation as follows:

1. Mergers in freight transportation are found to be value maximizing for bidder firms' shareholders (in addition to target firm shareholders). This finding is in contrast to previous literature that uses aggregate samples and justifies the need to consider sector specific observations. Potential explanations relating to possible reasons for this finding are highlighted.

2. The magnitude of the created synergies (synergistic value) in the freight transportation context is found to be higher than in studies reporting results on this relationship in the extant literature.

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[12] This explanation predominantly explains why we observe a negative relation between hostility and the bidder's announcement returns in our sample. To investigate this mechanism that works as detriment of bidders' shareholders wealth, we investigate the factors that drive the likelihood of successfully completing a merger deal. In particular, we define a binary variable, *COMPLETION*, that equals one if a merger deal was successfully completed, and zero otherwise. In the same spirit as Model (4) of Table (5), we use a logit model to investigate the relation between *COMPLETION* and the merger characteristics which serve as variables of interests, controlling for firm-level characteristics. From untabulated results that are available from the authors upon request, we observe that hostile merger deals are significantly less likely to be successfully completed than those initiated under a friendly mode (odds ratio 0.05, significant at 1%).

3. There is novel evidence that supports classical merger and acquisition theories. In particular we find that bidder CAR is positive and significant whereas the majority of previous empirical studies report zero or negative CARs.

4. The valuation effect of horizontal vis-à-vis vertical mergers is examined for the first time in the extant literature. Vertical freight transportation mergers are found to be positively related to the target's announcement returns.

5. The empirical assessment of merger and firm-level characteristics and synergistic value provide a more in-depth analysis that comes to validate, for the very first time in a freight transport context, relationships that are also discussed in the general literature.

The results conform to the nature of the freight transportation firm which tends to hold higher value physical assets and operate in an environment characterized by uncertainty and market volatility. This provides support to the motivation for undertaking sector specific merger valuation studies which is further vindicated by the results of the study suggesting, in departure to general non-sector specific studies, that bidders in a freight transportation context have significant gains from mergers and acquisitions. In line with industries holding physical assets, firms in freight transportation tend to engage in mergers to achieve productivity gains and this is supported by an increase in the synergistic value gains from the merged entity. The average productivity of the buyer's and seller's existing assets is an important determinant of the gain to trade, suggesting that firms have differing levels of ability to exploit assets, and that their comparative advantage may provide a motivation for merger in periods of low or high demand, and

thus low or high asset utilization. Therefore, the market for corporate control facilitates the redeployment of assets from firms with a lower ability to exploit them to firms with a higher ability. In this respect, freight transportation mergers create synergistic value, with most of these gains accruing to the target's shareholders rather than to the bidder's shareholders. The above represent important insights for a manager engaged in the operational and strategic growth pf his/her organization. Overall, in contrast to prior evidence outside the freight transportation industry, there is no support to the notion that empire building and perk consumption predominantly drives asset purchases in the freight transportation industry.

Furthermore, results indicate that tender offers are positively related to synergistic value. Vertical freight transportation mergers are likely-wise positively related to the target's announcement returns in line with the theory that suggests a reduction in transaction costs and risk associated with vertical mergers in a freight transportation chain context and that the benefits from enhancing market and operational prospects through an extended supply chain accrue mainly to the target's shareholders, while hostility affects negatively the bidder's announcement returns. In general, the results are specific to the sector of freight transportation, and therefore not contaminated by inter-industry effects.

The study has focused on the short run market perception on the announcement of mergers and acquisitions in freight transportation. A caveat of this approach is whether market expectations are realized. Future research may investigate the determinants of long run returns/operating performance of mergers and acquisitions.

Although this study applies an economic and financial approach in its empirical investigation, one major contribution lies in the multitude of avenues for further research that it opens up and the potential for applying different theories and methodological perspectives.

Future research can adopt additional perspectives to examine the findings in this study. For instance, the finding that vertical mergers are valued more favorably compared to horizontal mergers can be examined by investigating aspects such as inventory turnover improvement and reduction in supply chain risk before and after a vertical merger.

Future research may also aim to examine possible differential valuation effects on whether a merger or acquisition is upstream of downstream in the transportation chain. In addition, another potential avenue for further study emanating from the discussion herewith is the degree to which the need for asset utilization in freight transportation affects merger and acquisition market valuation. In this light it is important to empirically ascertain the sources for synergistic gains that occur from vertical mergers in freight transportation firms and may include economies of scale, asset redeployment and utilization and exploitation of market power for firms operating across and extended supply chain.

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Table 1

Distribution and Value of Freight Transportation Mergers and Acquisitions

This table reports the distribution and the value of 285 freight transportation merger and acquisition offerings, by announcement year.

Year	Number of M&As	%	Cumulative %	Sum value of M&As	%	Cumulative %	Average Deal value
1980	3	0.01	0.01	4038.30	0.05	0.05	1346.10
1981	3	0.01	0.02	529.14	0.01	0.06	176.38
1982	11	0.04	0.06	557.10	0.01	0.07	50.65
1983	15	0.05	0.11	8637.63	0.11	0.18	575.84
1984	10	0.04	0.15	1114.67	0.01	0.19	111.47
1985	4	0.01	0.16	1658.59	0.02	0.21	414.65
1986	5	0.02	0.18	1666.90	0.02	0.23	333.38
1987	8	0.03	0.21	2218.03	0.03	0.26	277.25
1988	6	0.02	0.23	363.80	0.00	0.27	60.63
1989	6	0.02	0.25	296.85	0.00	0.27	49.48
1990	4	0.01	0.26	754.90	0.01	0.28	188.73
1991	8	0.03	0.29	561.92	0.01	0.29	70.24
1992	12	0.04	0.33	1024.01	0.01	0.30	85.33
1993	10	0.04	0.37	149.07	0.00	0.30	14.91
1994	18	0.06	0.43	10139.52	0.13	0.43	563.31
1995	19	0.07	0.50	9306.94	0.12	0.55	489.84
1996	19	0.07	0.56	21403.12	0.28	0.83	1126.48
1997	13	0.05	0.61	462.90	0.01	0.83	35.61
1998	14	0.05	0.66	385.91	0.00	0.84	27.56
1999	21	0.07	0.73	1322.84	0.02	0.86	62.99
2000	7	0.02	0.76	1154.85	0.01	0.87	164.98
2001	10	0.04	0.79	1008.87	0.01	0.88	100.89
2002	6	0.02	0.81	151.60	0.00	0.89	25.27
2003	11	0.04	0.85	1313.70	0.02	0.90	119.43
2004	8	0.03	0.88	553.37	0.01	0.91	69.17
2005	8	0.03	0.91	4222.97	0.05	0.96	527.87
2006	10	0.04	0.94	1137.19	0.01	0.98	113.72
2007	10	0.04	0.98	1140.04	0.01	0.99	114.00
2008	4	0.01	0.99	386.90	0.00	1.00	96.73
2009	2	0.01	1	72.29	0.00	1.00	36.15

Table 2
Distribution of Freight Transportation Mergers and Acquisitions by Industry

This table reports the distribution of 285 freight transportation merger and acquisition offerings during the period 1980-2009, by industry. Panel A reports information for acquirer firms while Panel B presents information for target firms.

	Standard Industrial Code (SIC)	Number of acquisitions	%	Cumulative %
Panel A: Acquirer firms				
Railroads, Line Haul Operating	4000-4013	106	37.19	37.19
Motor Trucking and Storage- Freight	4170-4173, 4200-4200, 4210-4219, 4230-4231	106	37.19	74.38
Water Transport, Freight and Services	4400-4499	48	16.84	91.22
Freight Transportation Arrangements	4730-4739	25	8.78	100.00
Panel B: Target firms				
Railroads, Line Haul Operating	4000-4013	73	25.61	25.61
Motor Trucking and Storage- Freight	4170-4173, 4200-4200, 4210-4219, 4230-4231	93	32.63	58.24
Water Transport, Freight and Services	4400-4499	30	10.53	68.77
Freight Transportation Arrangements	4730-4739	25	8.77	77.54
Other		64	22.46	100

Table 3

Summary Statistics for Freight Transportation Mergers and Acquisitions

This table presents summary statistics and information for freight transportation merger and acquisition offerings during the period 1980-2009. Panel A present summary statistics on synergistic value (Synergy), value effects for target's shareholders (TCAR) and value effects for bidder's shareholders (BCAR). Panel B reports summary statistics on various merger-related characteristics. All the variables are defined in the Appendix. T-statistic is in parenthesis below the coefficient. *, ** and *** denotes 10%, 5% and 1% level of significance, respectively.

Panel A: Value effects of freight transportation mergers and acquisitions

Variable	Number of Firms	Mean	Standard Deviation	Median
SYNERGY	59	0.033** (2.13)	0.119	0.021
TCAR	59	0.245*** (5.91)	0.318	0.217
BCAR	285	0.023** (2.17)	0.188	0.003

Panel B: Merger-related characteristics (Bidder Sample)

STOCK	285	0.095	0.293	0.000
VERTICAL	285	0.133	0.341	0.000
HORIZONTAL	285	0.660	0.475	1.000
HOSTILITY	285	0.046	0.209	0.000
TOEHOLD	285	0.074	0.261	0.000
TENDER	285	0.091	0.288	0.000

Panel C: Merger-related characteristics (Target and Synergistic Sample)

STOCK	59	0.169	0.393	0.000
VERTICAL	59	0.203	0.406	0.000
HORIZONTAL	59	0.542	0.502	1.000
HOSTILITY	59	0.187	0.393	0.000
TOEHOLD	59	0.186	0.392	0.000
TENDER	59	0.254	0.488	0.000

Table 4

Synergy and Merger and Acquisition Characteristics

This table reports estimates of the relation between wealth effects of freight transportation merger and acquisition offerings during the period 1980-2009. All variables are defined in the Appendix. Model (1) reports estimates of synergistic value (Synergy) with merger and acquisition characteristics. Model (2) reports estimates of value effects for bidder's shareholders (BCAR) with merger and acquisition characteristics. Model (2) reports estimates of the value effects for target's shareholders (TCAR) with merger and acquisition characteristics. T-statistic is in parenthesis below the coefficient. *, ** and *** denotes 10%, 5% and 1% level of significance, respectively.

Variables	Model (1) Synergy	Model (2) Synergy
Constant	Yes	Yes
STOCK	-0.045	-0.016
	(-0.97)	(-0.42)
VERTICAL	0.034	0.015
	(0.57)	(0.35)
HORIZONTAL	-0.016	-0.025
	(-0.32)	(-0.58)
HOSTILITY	-0.035	-0.033
	(-0.73)	(-0.78)
TOEHOLD	0.065	0.05
	(1.14)	(0.85)
TENDER	0.067*	0.084*
	(1.78)	(1.81)
TROE		0.16
		(1.08)
TPE		0.001**
		(2.13)
TDE		-0.046
		(-1.40)
TSIZE		-0.004
		(-0.37)
BROE		0.031
		(0.011)
BPE		0.002*
		(1.73)
BDE		0.013
		(0.22)
BSIZE		-0.017
		(-1.50)
R-Squared	0.177	0.480
Number of observations	59	54

Table 5

Target's Returns, Bidder's Returns and Merger and Acquisition Characteristics

This table reports estimates of the relation between wealth effects of freight transportation merger and acquisition offerings during the period 1980-2009. All variables are defined in the Appendix. Model (1) reports estimates of synergistic value (Synergy) with merger and acquisition characteristics. Model (2) reports estimates of value effects for bidder's shareholders (BCAR) with merger and acquisition characteristics. Model (2) reports estimates of the value effects for target's shareholders (TCAR) with merger and acquisition characteristics. T-statistic is in parenthesis below the coefficient. *, ** and *** denotes 10%, 5% and 1% level of significance, respectively.

Variables	Model (1) TCAR	Model (2) TCAR	Model (3) BCAR	Model (4) BCAR
Constant	Yes	Yes	Yes	Yes
STOCK	-0.094	-0.04	0.004	0.012
	(-0.76)	(-0.33)	(0.079)	(0.25)
VERTICAL	0.357**	0.438**	0.038	(-0.012)
	(2.19)	(2.23)	(0.56)	(-0.41)
HORIZONTAL	0.056	0.12	-0.021	-0.006
	(0.73)	(1.12)	(-0.78)	(-0.28)
HOSTILITY	0.038	0.066	-0.069**	-0.058**
	(0.45)	(0.79)	(-2.47)	(-2.30)
TOEHOLD	-0.034	-0.06	0.017	0.033
	(-0.39)	(-0.60)	(0.58)	(1.17)
TENDER	0.009	0.063	0.022	0.050
	(0.10)	(0.62)	(0.63)	(1.52)
TROE		0.44		
		(1.35)		
TPE		0.009		
		(0.14)		
TDE		-0.034		
		(-0.52)		
TSIZE		-0.075		
		(-1.70)		
BROE				-0.189*
				(-1.64)
BPE				0.001***
				(3.00)
BDE				-0.014
				(-0.89)
BSIZE				-0.014**
				(-2.52)
R-Squared	0.176	0.343	0.019	0.205
Number of observations	59	56	285	275