Why firms want to organize efficiently and what keeps them from doing so:

Evidence from the for-hire trucking industry *

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Abstract

In this paper we integrate content-based predictions of transaction cost economics with process-based predictions of organizational change. Specifically, we predict that poorly aligned firms (according to transaction cost reasoning) realize lower profits than their better-aligned counterparts, and that these firms will attempt to adapt so as to better align their transactions. We then consider a range of organizational factors that influence the level of "adjustment costs" that constrain such adaptation. We find evidence generally consistent with our predictions in a study of the U.S. for-hire interstate trucking industry. We also find that firms that attempt to adjust rapidly have higher exit rates, consistent with structural inertia theory.

Why firms want to organize efficiently and what keeps them from doing so: Evidence from the for-hire trucking industry

Why, and in what direction, do organizations change? Responses to these questions generally fall into two camps. Adaptation theories of organizational change contend that organizations indeed are able to change in response to their environment or to the choices of organizational decision-makers. This camp encompasses a broad spectrum of beliefs regarding the degree to which such change constitutes rational action (e.g., Lawrence and Lorsch, 1967; Williamson, 1985) as opposed to blind action (Weick, 1979). In its extreme form, the adaptationist view implies that firms can and do adapt nearly frictionlessly, suggesting that if there is a performance penalty associated with misalignment of transactions, misaligned firms will change so as to reduce or eliminate this misalignment. Alternatively, selection-based theories, notably structural inertia theory within organizational ecology, contend that "although … efficiency arguments are plausible, it is not obvious that they are correct" and that inertial forces vitiate organizational change (Hannan and Freeman, 1984: 152). The selectionist view in its extreme form implies that firms can rarely change successfully, and that few firms will successfully realign their improperly governed transactions; instead, if there is a performance penalty associated with misalignment, these firms will be "selected out" of the population.

Recent research provides a middle ground between these two camps by exploring how some firms change under certain environmental conditions (Delacroix and Swaminathan, 1991; Kelly and Amburgey, 1991; Haveman, 1992, 1993). Yet this literature rarely predicts whether change creates beneficial or harmful content effects (Barnett and Carroll, 1995; for an exception see Zajac, Kraatz, and Bresser, 2000). For example, most studies of organizations' expansion of product lines or alteration of publication frequency remain agnostic about the underlying value of these content changes. Evaluation of the content of change is identified *ex post* (if at all) by the organization's post-change performance (Amburgey, Kelly and Barnett, 1993; Baum, 1996). As Barnett and Carroll (1995) argue, this *ad hoc* approach to defining the content of organizational change ignores the potential for applying organization theory to make predictions about the costs and performance effects of the change itself and hence the potential for predicting why and whether firms change.

This paper attempts to address this issue by theoretically linking transaction cost economics (TCE) and the literature on organizational change. We reconcile the two approaches by noting that both allow for costly adaptation, although the two theories accord different weights to these costs. We develop a model of organizational change in which the impetus for change is the inappropriate governance of a core transaction—managers want to organize efficiently to realize survival and performance benefits from doing so. However, firms are constrained in their efforts to realign because of "adjustment costs." Firms with large adjustment costs forestall adaptation whereas firms with small adjustment costs adapt quickly. Thus, adjustment costs, which we predict vary with several organizational features, affect the rate and level of adaptation.

We test the resulting hypotheses in a study of interstate for-hire motor carriers following deregulation of the U.S. trucking industry in 1980. In so doing, we are able to take advantage of the natural experiment associated with a deregulatory "shock," which both ensures unusually high environmental change (and consequently a presumed need for organizational change) and addresses traditional concerns about unobserved organizational heterogeneity in studies that relate a firm's choices to its performance (Hamilton and Nickerson, 2003). To anticipate our results, we predict and find that a motor carrier that does not govern its employment of drivers in accordance with transaction cost principles suffers significantly lower profitability than its better-aligned rivals. We predict and find that such a carrier will reduce its degree of driver misalignment over time – in other words, the carrier adapts toward the TCE-prescribed governance structure. We also predict and find that several organizational features affect the rate of adaptation: firms with large investments in specialized assets adapt less readily than firms that rely on generic assets, and firms with unions adapt less readily than firms without unions. We also find that firms that must replace employee drivers with owner-operators adapt less readily than firms that must replace owner-operators with employee drivers; although this conclusion is tempered by the fact that simulation of our coefficient estimates for the latter oscillate In addition, we find that entrants adapt more quickly than incumbent carriers, and we find evidence of institutional isomorphism in this population – although carriers move systematically to reduce misalignment, they do so less assiduously when this will make their governance of drivers look less like that of nearby, similar carriers. Finally, our results indicate that firms that ultimately

exited adapted more quickly than firms that survived, consistent with structural inertia's claims about the hazards of organizational change (Hannan and Freeman, 1984).

The contributions of this study are threefold. First, it extends the literature on organizational adaptation and selection by theoretically grounding predictions of the direction and incidence of change. Second, it extends the transaction cost empirical literature by explicitly studying the dynamic performance consequences of both inappropriate governance itself, and organizations' attempts to reduce this misalignment. Although there is an extensive empirical literature that supports the structural regularities that TCE theory predicts (Shelanski and Klein, 1995), this literature has been virtually silent on the issue of the performance consequences of alignment (Silverman, 2002). Indeed, some critics of TCE have charged that the lack of research on the performance-alignment relationship is a severe shortcoming of the TCE literature (Winter, 1990; Gulati, 1999). Third, this study overcomes two drawbacks in the prior empirical literature on organizational change. Baum (1996) notes that most studies of change do not control for pre-change performance differences across organizations. To the extent that under-performing organizations are more likely to attempt change (Cyert and March, 1963), a relationship between change and poor post-change performance (i.e., failure) may result from spurious correlation. In addition, Barnett and Carroll (1995) note that most studies of change do not control for the competition experienced by organizations, even though theoretical research on organizational change suggests that competitive pressure is an important stimulus to change (Hannan and Freeman, 1989). By controlling for both competition and pre-change performance, we are able to specify and test more precise models of organizational adaptation and selection than generally found in the literature.

INAPPROPRIATE GOVERNANCE, PERFORMANCE, AND THE IMPETUS FOR ORGANIZATIONAL CHANGE

Transaction cost economics' primary hypothesis is that organizational actors attempt to economize on transaction costs by "assigning transactions (which differ in their attributes) to governance structures (the adaptive capacities and associated costs of which differ) in a discriminating way" (Williamson, 1985: 18). Resting on the behavioral assumptions of bounded rationality and opportunism, TCE asserts that transactions will be organized in governance

structures based on their characteristics – chiefly uncertainty, frequency, and asset-specificity. Of these, the most important is asset-specificity, or the degree of specific investment associated with a transaction. An asset is specific to a particular transaction if its value in its next-best use and user (i.e., in a transaction with a different party) is less than its use in this transaction. The greater the difference between the value of an asset in its first-best and its next-best use, the more specific that asset is to the transaction (Klein, Crawford and Alchian, 1978; Williamson, 1979).

When exchange hazards are negligible – broadly, when the assets supporting a transaction are generic – spot markets offer the least-cost form of governance. Such markets provide strong incentives for effort, and parties incur few if any set-up costs for spot market transactions. At the same time, the reliance on generic assets means that disputes between transacting parties can be resolved at low cost by exiting the exchange. At a high level of hazard – when assets are transaction-specific – hierarchy is the least-cost governance solution. Although hierarchy involves muted incentives and high fixed set-up costs, it can support coordination of investments and activities that are otherwise difficult to coordinate through markets. Within a hierarchy, authority rather than legal recourse ultimately can resolve disagreements, which provides sharper control over specific investments. These different governance arrangements are also supported by different dispute settlement regimes, ranging from court enforced contract law for market governance to internal enforcement for hierarchy (Masten, 1988), and different patterns of claims to assets if an exchange breaks down (Baker, Gibbons & Murphy 2002). In equilibrium, organizational actors are predicted to choose the appropriate organizational form to govern each transaction.

But what happens to an organization whose transactions are not properly aligned with appropriate governance structures? The theory presumes that such an organization will suffer performance consequences. Specifically, TCE "relies in a general, background way on the efficacy of competition to perform a sort between more and less efficient modes and to shift resources in favor of the former…over intervals of five to ten years" (Williamson, 1985: 22-23). Thus, organizations (or other actors) whose transactions are inappropriately governed are more likely to display poor financial performance, and to eventually exit or adapt, than those whose transactions are properly governed.

In a study of 93 sales districts of 11 electronic component manufacturers, Anderson (1988) found that, in uncertain environments, organizations whose integration of their sales forces corresponded more closely to the level of integration predicted by TCE – based on characteristics of the components they sold, on organizational characteristics, and on market characteristics – enjoyed efficiency benefits in terms of sales/selling cost ratio compared to those whose integration corresponded less well.[1] In a previous study of motor carriers, Silverman, Nickerson and Freeman (1997) found that inappropriate governance of certain labor and capital market transactions increased a carrier's failure rate.[2] If it is true that appropriate governance of transactions provides performance benefits, then (all else equal) those organizations conforming to transaction cost prescriptions will enjoy superior performance as compared to those that do not.

Hypothesis 1: Ceteris paribus, those organizations that govern transactions appropriately (i.e., in accordance with transaction cost economic prescriptions) will exhibit higher profitability than those that do not govern transactions appropriately

If a primary goal of an organization is to achieve profitability or, ultimately, survive, then poorly performing organizations will initiate a program of actions to remedy poor performance (March and Simon, 1993: 197). Should poor performance stem from misalignment between organizational form and the underlying activities then actors will initiate a program to redress misalignment. Thus, the performance penalties associated with misalignment will trigger efforts by inappropriately aligned organizations to reduce their degree of misalignment.

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[1] The importance of environmental uncertainty in Anderson's study leaves open the possibility that these findings may reflect institutional isomorphism effects, which are likely to be stronger in uncertain environments, as well as (or instead of) transaction cost economizing. ["In relatively certain sales environments, managers can learn the environment well enough to know when to deviate from the (necessarily crude) industry rule…in relatively uncertain environments, however, it is difficult…to learn the environment will enough to know when to deviate" (Anderson 1988: 611).] In our study, we attempt to control for institutional pressure.

[2] Extant cross-sectional TCE studies have also investigated alignment and comparative negotiation costs (Walker and Poppo, 1991) or customer satisfaction levels (Mohr and Spekman, 1994; Goodman et al., 1995; Poppo and Zenger, 1998) using Likert scales or internal management costs (Masten, Meehan and Snyder, 1991). However, none of these studies link alignment to long-term financial or economic performance. These authors did not study the degree to which carriers adapted over time toward proper governance or the extent to which inappropriate governance affected profitability. In addition, in a study of 28 large petroleum companies, Armour and Teece (1978) found that firms organized in a multidivisional structure, which is predicted to be superior for managing diversified corporations (Williamson, 1975), posted higher rates of return than their non-multidivisional counterparts between 1955 and 1964. These performance benefits disappeared during the 1965-1973 period, by which time virtually all of the firms had adopted the multidivisional form.

Hypothesis 2: Ceteris paribus, organizations will change so as to reduce the degree to which their transactions are inappropriately aligned

Selection, Adaptation, And Constraints On Organizational Change

What prevents an organization whose transactions are inappropriately governed from immediately changing to an appropriate governance form? In their development of structural inertia theory, Hannan and Freeman (1984) propose several forces that constrain adaptation. In fact, adaptationist theories propose a similar range of constraints on adaptation (Baum, 1996), which can be loosely grouped under the term "adjustment costs." Generally speaking, as adjustment costs go up, the rate and overall amount of change decline (Haveman, 1992). For instance, a misaligned firm with high adjustment costs would change slowly and ultimately remain substantially misaligned whereas a similarly misaligned firm with lower adjustment costs would change quickly, with little residual misalignment.

Prior research has implicated several sources of adjustment costs. Sunk investments in durable, idiosyncratic assets raise the cost associated with altering or abandoning the activities in which these assets are used (Hannan and Freeman, 1984; Williamson, 1985).[3] Decisions to replace durable investment by making new investments are based on a comparison of variable cost delivered by the existing assets and total costs of new investments. Existing investments in the short run may yield economic returns in excess of those provided by new investments even though the latter may offer a lower variable cost. Eventually, these existing assets depreciate or competitive pressure will become sufficiently severe so that the expected gain from adapting and investing in new assets exceeds the benefit of stasis. In other words, although in the long run these assets are subject to strategic choice, existing investments constrain managerial choices in the short run. Thus, in the face of a changing environment, a firm with significant investment in durable specialized assets configured for the old environment is likely to adapt more slowly, and less completely (if some assets are indeed long-lived), than a firm without such investments.

[3] The "commitment" literature takes a more sanguine view of this type of adjustment cost (Ghemawat, 1991). In this literature as well, however, such adjustment costs slow the rate and amount of adaptation pursued by a firm.

Hypothesis 3: The rate and amount of organizational change regarding a particular transaction decreases with the degree to which the transaction is characterized by investment in specific assets

Similarly, long-term contractual commitments can slow the rate of organizational change. Formal contractual commitments constrain an organization from switching to an alternative trading partner or organizational form until contract expiration (Argyres and Liebeskind, 1999), unless the firm is willing to pay appropriate compensation to break its contract (otherwise known as "efficient breach"). Such contractual commitments thus create adjustment costs, which delay organizational change (Bercovitz, 2000). For example, Card (1986) finds that union contract terms raise costs of adjustment, and hence slow adaptation, of airlines' use of mechanics. Informal commitments ("informal contracts"), such as normative standards and political coalitions, also constrain organizations. Hannan and Freeman (1984:149) argue that as normative standards and political coalitions emerge within organizations, an organization's inertia increases, which increases adjustment costs and slows the rate and amount of organizational change.

Hypothesis 4: The rate and amount of organizational change regarding a particular transaction decreases with the degree to which the transaction is characterized by deep contractual commitment

The implication of the foregoing is that a firm whose transactions are inappropriately governed will adapt its organizational structure to reduce misalignment, but that the rate and level of this adaptation will be constrained by the attendant costs of adjustment, which vary with a variety of organizational factors. Firms that do not adjust, or that adjust too quickly in the face of such costs, will either exit or persistently realize low profits.[4]

[4] The above discussion raises a question: why are firms inappropriately governed in the first place? A common concern in research on the performance implications of managers' choices is that apparent misalignments are actually manifestations of unobserved heterogeneity (Shaver, 1998). We control for this in two ways. First we implement a fixed-effects specification in our empirical analysis, which accounts for firm-specific unobservable attributes. Second, we take advantage of a natural experiment: the deregulatory "shock" to the U.S. interstate trucking industry in 1980. Trucking deregulation was a largely unanticipated event that significantly altered the competitive landscape of the industry (Rose 1985; Robyn 1987). Hence, we are able to take advantage of the fact that many previously aligned trucking firms found themselves inappropriately aligned for the unexpectedly deregulated environment after 1980.

THE U.S. INTERSTATE FOR-HIRE TRUCKING INDUSTRY

With the development of larger and more reliable vehicles, the U.S. interstate for-hire trucking industry grew dramatically during the 1920s and early 1930s. Railroads (and incumbent motor carriers), threatened by the increase in the trucking industry during this period, lobbied intensely for regulatory constraints on price and entry at both the state and federal levels (Stigler, 1971). This request was received favorably by the Roosevelt administration, and the interstate for-hire trucking industry was placed under the regulatory supervision of the Interstate Commerce Commission (ICC) in 1935. Charged with the responsibility to "promote market stability," the ICC severely restricted entry of new firms and expansion of existing motor carriers. At the same time, regional price bureaus set route- and freight-specific price floors for motor carriage, thus facilitating cartelization in the industry. Under regulation, motor carriers earned significant rents, a large portion of which were extracted by unionized drivers (Rose, 1987).

This arrangement persisted until the Carter administration pushed regulatory reform through Congress in 1980. The reform legislation essentially deregulated both entry and price, which consequently led to tremendous increases in entry of motor carriers and severe downward pressure on prices (Robyn, 1987; Corsi et al., 1992).[5] Whereas the number of ICC-certified carriers hovered around 16,000 between 1960 and 1975, by the end of 1991 some 47,890 ICC-certified carriers were in operation. Further, the explosion in entry was matched by a similar burst of exits: between 1983 and 1990, nearly 1.5% of motor carriers failed each year, almost double the failure rate of all U.S. businesses during the same time period (American Trucking Associations, 1991). For the first time since 1935, a competitive market penalized inefficient organization and operations.

Appropriate Governance in the Trucking Industry

Three features of trucking firms are salient for the purposes of this study. First, for-hire motor carriage is generally divided into two types. Less-than-truckload (LTL) carriage involves the movement of shipments of under 10,000 pounds (Roadway Express is a familiar example of this type of transport). Truckload (TL) carriage involves the movement of shipments of 10,000

[5] This intensified competition also apparently weakened the ability of unionized drivers to extract rents from carriers. Since deregulation, the union wage premium has dropped dramatically (Rose, 1987), and recent contracts have involved extensive concessions from the Teamsters to motor carriers (Perry, 1986).

pounds or more, directly from origin point to destination point. These two types of carriage require significantly different types of investment and organizational resources. LTL carriage typically uses a hub-and-spoke system to consolidate and distribute freight efficiently from multiple origin points to multiple destinations. This network frequently requires specialized investments in a network of breakbulk facilities—large, specially designed warehouses to allow rapid unloading, sorting, and reloading of freight onto trucks. While breakbulk facilities can be redeployed for other uses such as manufacturing, the idiosyncrasies of their construction have little value outside of LTL carriage, which translates into a high degree of industry-specific and site- or route-specific investment. By contrast, the door-to-door nature of TL carriage obviates the need for much of this investment.

The second feature, related to the first, centers on the different logistics in LTL hauls as compared to TL hauls, a difference that requires different degrees of coordination by motor carriers. At its most basic level, TL carriage requires little more than a truck and a telephone: a dispatcher gets a call from shipper X requesting carriage of freight from point A to point B, and she dispatches a truck and driver to undertake the haul. The driver need not interact with any other co-workers to complete the assignment. For LTL carriage, however, a truck not only carries shipper X's freight, but also carries freight from many other shippers with origins near point C to destinations possibly quite distant from point D. The hub-and-spoke nature of LTL carriage requires the timely coordination of truck arrivals and departures at breakbulk facilities. The late arrival or departure of a truck into or out of a breakbulk facility can cause a costly ripple effect throughout the entire LTL network. Put differently, a problem with one LTL haul imposes externalities on other hauls – externalities that are difficult to foresee (since each LTL haul will impose different externalities depending on what freight it is carrying on a given day) and to measure. The condition that gives rise to these externalities is typically referred to as temporal specificity (Masten et al., 1991). In contrast, TL carriage imposes no such externalities onto other hauls and therefore reflects an absence of temporal specificity. The ability to control and coordinate drivers is therefore significantly more important for LTL than for TL activities.

Third, motor carriers can rely on company drivers (for whom the carrier owns or leases vehicles that the carrier maintains) or on independent owner-operators to haul their freight. A large

number of firms use a mixture of the two employment modes. Much as franchisees in a franchise system are highly motivated to expend effort, owner-operators are believed to be attractive because (among other things) they have strong incentives to work hard – to drive more, take shorter breaks, treat their vehicles more gently, etc. (Nickerson and Silverman, 2003). However, reliance on owner-operators raises control problems for carriers. First, when one haul imposes externalities on another haul, the incentive for an owner-operator to maintain his vehicle diverges from that of the carrier. The owner-operator makes his maintenance decision based only on the cost of his ruined haul, whereas the carrier also considers the costs associated with other hauls that are delayed or otherwise disrupted. Similarly, a carrier that invests in a reputation for on-time delivery risks the loss of this investment—that is, the tarnishing of its reputation—while an owner-operator will not internalize this risk. Thus, the owner-operator will under-invest in vehicle upkeep from the carrier's perspective. This is similar to the problem of shirking on quality inputs in franchising (Lafontaine, 1992). Second, an owner-operator is in a better position than a company driver should his contract with the carrier break down, since he retains ownership of the truck. Consequently, the owner-operator is willing to haggle more fiercely with the carrier, and even to spend effort on unproductive activities that strengthen his bargaining position (Baker and Hubbard, 2003; Nickerson and Silverman, 2003). This temptation will be greater under conditions of temporal specificity, when a carrier requires timely delivery and the next available truck is geographically distant – a condition that is more likely to occur with LTL traffic than with TL traffic, on average, given the coordination challenges of LTL logistics. Third, for trucks that are optimally configured to handle unusual freight characteristics, there will be a thinner market for their use. Conventional TCE concerns arise with such idiosyncratic trucks, as temporal specificity again becomes an issue – the next feasible use for an unusual truck may be extremely distant geographically.[6]

In sum, a carrier must balance the production-related benefits of owner-operators against these transaction cost-related challenges. While carriers that focus on TL may be able to reduce costs effectively by subcontracting, carriers that haul LTL loads are less able to do so; even though subcontractors are ostensibly cheaper in production costs terms, the transaction cost problems

[6] Prior research indicates that temporal specificity exerts a strong influence on the ownership of assets in the transportation industry, including steamship carriers (Pirrong, 1993), truck trailers (Hubbard, 2001), and truck tractors (Nickerson and Silverman, 2003).

associated with this governance form are particularly challenging for LTL carriers. In a cross-sectional study of employment in the interstate for-hire trucking industry, Nickerson and Silverman (2003) find that, consistent with TCE predictions, motor carriers that engage in LTL carriage and/or invest in specific assets such as reputational capital or idiosyncratic equipment tend to hire company drivers rather than owner-operators. (See the Appendix and Nickerson and Silverman (2003) for more details.)[7]

METHODS

Our empirical analysis investigates whether carrier profitability is affected by driver misalignment, and whether carriers adapt their organization to reduce driver misalignment. Our analysis allows us to assess the rate and amount of carrier adaptation with respect to a variety of organizational factors.

Data

Thanks to the reporting demands placed on motor carriers by the Interstate Commerce Commission, the data available for an important segment of the trucking industry is unusually detailed. The ICC has required large motor carriers, private and public, to file detailed annual reports called Form Ms since at least 1944. Since 1980, "large" motor carriers have been defined as those whose annual revenue exceeds $1 million. The Form M provides a comprehensive income statement and balance sheet, as well as a description of operations and organizational structure. This study uses the Form Ms to compile life history information on all large motor carriers that operated in the United States at any time between 1980 and 1991. Our database allows us to generate measures of the degree to which these motor carriers align transactions – notably their truck driver employment relation – according to the prescriptions of TCE. We do not cover the pre-1980 period because it is characterized by rigid price and entry regulation and describes an environment in which competition was severely and artificially curtailed. At the

[7] Although our archival data offer no evidence of how managers of motor carriers thought about this organizational challenge, anecdotal evidence supports the idea that carrier managers recognized the importance of appropriate organization of drivers, took steps to alter organization appropriately, and encountered adjustment costs in doing so. Siegel (1989: 80) recounts one motor carrier's decision to shift from owner-operators to company drivers in the mid-1980s: "[As the business grew,] Hale made certain adjustments. One of them was to limit his dependence on owner-operators. 'We found that there were not enough owner operators to provide consistently good service…. Now, only 6% of the owner-operators who apply for work actually meet our qualifications.' Hale says that making a transition from a 100% owner-operator fleet to a mix of one-third company drivers, two thirds owner operators, was not easy."

start of 1980, 2,552 carriers existed in the ICC's large carrier population. By the end of 1991, entry and exit led to a population of 1,651 large carriers. During the 1980-91 period, the number of small (revenue < $1 million) carriers rose from 15,493 in 1980 to 46,239 in 1991, reflecting the end of regulatory restrictions on entry.

The data used in this study have several limitations that constrain our empirical analysis. Below we describe in detail two significant limitations, addressing their implications and describing our methods for minimizing their effect.

Left-censoring. Although we know the dates of founding for most of the carriers that existed before 1980, we lack detailed information on the entire life-history of the motor carrier sample before that date, and thus our data are "truncated" on the left. The lack of population-wide information for prior years has implications for our study. Such data may introduce a sample-selection bias—the profitability of motor carriers already existing in 1980 may be different from that of later-founded carriers because not all of the carriers "at risk" of poor profitability prior to 1980 are known. We control for left-censoring in our reported models with a categorical variable.

Size Bias. Given that the ICC does not require carriers with revenues below $1 million to file comprehensive Form Ms, we lack information on carriers with revenue below the $1 million floor. Since a truck that is run at average productivity typically generated revenue of between $100K and $130K per year in the mid-1980s, a motor carrier must have 8-10 trucks before it will file a Form M. This limits the generalizability of our results to firms of a minimum size.

Variables, Model Specification, and Estimation

We analyze firm profitability and organizational adaptation by simultaneously estimating two equations via a three-stage-least-squares approach. Profitability is estimated using a linear model. Adaptation is estimated using a partial (dynamic) adjustment model. Below we define our variables, present the empirical specification, and describe how the model allows us to examine our hypotheses. Table 1 lists and defines the variables used in our study. It also provides the predicted sign of the coefficient for each independent variable. Below we briefly discuss the construction of our variables.

<INSERT TABLE 1 ABOUT HERE>

Dependent variables

$\underline{ROA}_{it}$ is an accounting measure that represents annual return on assets for each carrier i in year t. We calculate return on assets by dividing annual earnings before interest, taxes, and depreciation expense by total assets. Ideally, we would use Tobin's q to measure expected returns. However, many of the firms in our database are private, which precludes calculating Tobin's q. In unreported estimations, we replicated our models with return on sales and operating margin, with no substantive change in results.

$\underline{\text{DRIVER MISALIGN}}_{i(t+1)}$: As described above and in the Appendix, Nickerson and Silverman (2003) found that the extent to which a motor carrier relies on company drivers rather than owner-operators is largely dependent on characteristics of the carrier's activities and the assets it employs. Their analysis employed a two-sided Tobit model that estimated the degree of a carrier's reliance on company drivers as a function of (1) the proportion of revenue received from LTL carriage; (2) the carrier's advertising intensity; and (3) several haul characteristics including the average length of haul and average weight of haul; and a series of control variables. The DRIVER MISALIGN variable for this study was constructed by estimating their model for observations in 1991 and applying the resulting coefficients to each year in our sample,[8] and setting DRIVER MISALIGN equal to the absolute value of the residual for each firm-year observation. Thus, DRIVER MISALIGN ranges between 0, which occurs when the proportion of a firm's total miles driven by company drivers conforms perfectly to the proportion predicted by Nickerson and Silverman's model, and 1, which occurs when a firm's reliance on company drivers is diametrically opposite that predicted by transaction cost predictors. This construction of an absolute value is consistent with Anderson (1988).

Independent variables

$\underline{\text{DRIVER MISALIGN}}_{it}$ is constructed as described above. Hypothesis 1 predicts that carrier profitability declines with increasing levels of $\underline{\text{DRIVER MISALIGN}}_{it}$. Therefore, we include

[8] The ICC did not require the majority of motor carriers to report their advertising expenditures until the end of the 1980s. The re-estimation of Nickerson & Silverman's (2003) model in this paper therefore excludes the advertising variable.

this variable in the profit equation and expect its coefficient to be negative.[9] Hypothesis 2 predicts that firms will adapt so as to reduce their misalignment. Therefore, we also include this variable in the adaptation equation and expect its coefficient to be between 0 and 1 – DRIVER MISALIGN$_{it+1}$ will be systematically smaller than DRIVER MISALIGN$_{it}$.

LTL SHARE$_{it}$ is measured as the proportion of carrier i's annual revenue that is derived from LTL carriage. Hypothesis 3 predicts that carriers whose business is more reliant on LTL carriage, with its attendant investment in idiosyncratic assets, will face greater adjustment costs than those whose business is less reliant on LTL carriage. Hence, in the short run LTL SHARE represents a constraint on employment mode choice.[10] We include this variable in the adaptation equation and expect that adaptation will be slower and less complete the more a carrier engages in LTL carriage. We also include this variable in the profit equation to control for any differences in the profitability of LTL vs. TL freight transportation.

UNION$_{it}$, is a categorical variable equal to 1 if carrier i contributes money to a union pension plan in year t, and 0 otherwise. Hypothesis 4 predicts that organizational adaptation decreases as the degree of contractual commitment associated with an organization increases. We interpret unionization as an example of formal contractual commitment – union contracts typically constrain carriers' ability to adapt, and unionized workforces can impose costs on carriers by striking or engaging in work slowdowns, which could delay organizational change. Very few firms in the sample change their union status during the sample period; given our use of fixed-effects models, this precludes us from simply including UNION in our equation and interpreting

[9] To ensure that our results are not driven by our use of the absolute value, in unreported models we replace DRIVER MISALIGN with a spline, consisting of DRIVER MISALIGN UNDER (which equals DRIVER MISALIGN for those observations where the observation's residual is less than 0, and 0 otherwise) and DRIVER MISALIGN OVER (which equals DRIVER MISALIGN for those observations where the observation's residual is greater than 0, and 0 otherwise). This does not change our results.

[10] To evaluate the underlying assumption that LTL SHARE is appropriately treated as a constraint compared to DRIVER MISALIGN, we estimated two elementary adjustment models with random effects. The first model estimated the rate of adjustment for DRIVER MISALIGN and the second model one for the rate of adjustment for LTL SHARE. Both models also included a constant. Random effects allow to us investigate within-firm effects. Comparing the adjustment coefficients from these two models provides a first order sense of how rapidly firms adjust their employment relation and their focus on LTL. If our assumption is correct then both coefficients should be between 0 and 1 and the coefficient for LTL SHARE, which should adjust more slowly than the level of integration, should be larger than the coefficient for DRIVER MISALIGN. Our estimates, which are available from the authors, show that both coefficients are between zero and 1 and that the coefficient for LTL share is nearly twice as large as the coefficient for the level of integration. Thus, coefficient estimates provide support for our assumption.

its coefficient as a conventional independent variable. Instead, we use this variable to divide our sample into unionized and non-unionized sub-samples, and explore differences among the two sub-samples. We expect to find a lower rate and level of adaptation in the union sub-sample than in the non-union sub-sample.

$\underline{\text{OVERINTEG}}_{it}$ is a categorical variable equal to 1 if carrier i's level of integration is greater than that prescribed by TCE, and 0 otherwise. $\underline{\text{UNDERINTEG}}_{it}$ is a categorical variable equal to 1 if carrier i's level of integration is less than that prescribed by TCE, and 0 otherwise. To reduce its misalignment, an over-integrated carrier would have to fire employee drivers. In contrast, an under-integrated carrier would have to stop using owner-operators. We interpret over-integration as generating a higher level of contractual commitment than under-integration, due to the formal and informal constraints associated with employment. Hypothesis 4 thus suggests that OVERINTEG should be negatively related to adaptation, as compared to UNDERINTEG. Since these are categorical variables, and they rarely vary over time for a given carrier, we do not include them in our equation. Instead, we use these variables to construct over- and under-integrated sub-samples, and explore differences among the two sub-samples.

Control variables – organizational characteristics

A carrier's operating costs are likely to affect its profitability. We control for this relationship with $\underline{\text{OP COST}}_{it}$, measured as carrier i's annual operating costs per mile in year t. Larger and older organizations typically are seen as less able or less willing to undertake change, due to greater buffering from the competitive pressures that spark adaptation or to greater bureaucratic rigidities (Delacroix and Swaminathan, 1991; Hannan and Freeman, 1984). We control for firm size in our models of performance and adjustment with $\underline{\text{SIZE}}_{it}$, measured as the natural logarithm of carrier i's revenue at time t. Carrier age essentially is distributed bi-modally with old firms as incumbents and young firms as entrants. We code for these modalities with the categorical variable $\underline{\text{LEFT CENSOR}}_{i}$, which is used to identify those carriers that are incumbents as of 1980.

Leverage, which is one proxy for a firm's slack resources, has been linked theoretically and empirically to profitability. However, theorists disagree on the direction of this relationship, with some predicting that increased leverage will lead to increased profit by encouraging firms to

"soften competition" (Chevalier and Scharfstein 1995), and others predicting that increased leverage will decrease a firm's profitability by encouraging rivals to "toughen" competition (Brander & Lewis 1986). We control for this with $\underline{\text{LEVERAGE}}_{it}$, measured as debt/(debt + equity). In addition, the effect of leverage is exacerbated when an organization's assets are idiosyncratic (Williamson, 1988; Silverman, Nickerson and Freeman, 1997). We control for this with an interaction term, $\underline{\text{LEVERAGE*LTL SHARE}}_{it}$.

Control variables – environmental characteristics

We control for the level of competition with $\underline{\text{COMP}}_{it}$, which is a count of the number of interstate for-hire carriers in the U.S. in year t, discounted by their distance to carrier i and weighted by carrier revenue.[11] Formally:

$$\text{COMP}_{it} = \frac{1}{\sum_{j=1}^{n_t} \ln(\text{REVENUE}_{jt})} \sum_{j=1}^{n_t} \frac{\ln(\text{REVENUE}_{jt})}{\text{DISTANCE}_{ij}}, \quad i \neq j$$

where i and j are carriers, n_t is the number of carriers in each year t, and DISTANCE_{ij} is the spherical distance in miles between carriers' headquarters. Any distance between carriers less than one (for instance, located in the same city) is set to one. We were unable to identify firm locations for approximately 2.4% of our sample, which are excluded in the calculation of COMP. The organizational ecology literature generally predicts that performance decreases with increased competitive pressure. Thus, we expect a negative coefficient for this variable in the profit model. Baum (1996) proposes that increased competition may spur organizations to change. Thus, we expect a higher levels of COMP to be associated with faster and more complete adaptation.

Another environmental effect that may affect firm profitability and adaptation stems from pressures related to institutional isomorphism. Drawing on prevailing conceptions of mimetic isomorphism (e.g., Haunschild & Miner 1997; Henisz & Delios 2001), we consider the possibility that motor carriers are influenced by other motor carriers' decisions about how to organize the driver employment relation. We do this via two variables. First, for each carrier in

[11] In unreported models, we replace COMP with the conventional count measure of density. Our results are not affected by this change.

the population, we construct $\underline{\text{CONFORM}}_{it}$, which is a measure of the degree to which carrier i's level of integration conforms with the average level of integration by geographically proximate, "similar" firms. The primary measure of similarity we use is LTL SHARE. Our reference set of nearby motor carriers is all carriers whose HQs are within a 50-mile radius of the focal carrier's. Formally, our measure of conformity is:

$$\text{CONFORM}_{it} = 1 - \left| \text{INTEG}_{it} - \frac{\sum_{j=1}^{N_t} (1 - \left| \text{LTL SHARE}_{it} - \text{LTL SHARE}_{jt} \right|) \text{INTEG}_{jt}}{N_t} \right|$$

We take one minus the absolute value so that increasing values of the variable will correspond to increasing conformity by carrier i. Institutional theory suggests that a carrier's profitability is dependent on how much it "looks like" other carriers on relevant dimensions; if so, then the coefficient for CONFORM should be positive in the profit model.[12]

Second, we construct INST ISOMORPH as a categorical variable that is equal to 1 when carrier i is both overintegrated (underintegrated) with respect to the transaction cost prescription for integration *and* overintegrated (underintegrated) with respect to its reference set of firms, and 0 otherwise. When INST ISOMORPH is equal to 1, carrier i will increase its conformity to other firms as it reduces its degree of TCE-based misalignment. When INST ISOMORPH is equal to 0, carrier i will decrease its conformity as it reduces its degree of misalignment. If it is true that firms face institutional pressure to resemble other firms, then a carrier should reduce its misalignment more readily when this also brings the carrier closer to what other firms are doing; hence, positive values of INST ISOMORPH should be associated with faster and more complete adaptation.[13]

[12] In unreported models we used alternate constructions of CONFORM, including using different radii as cutoffs and different measures of similarity or prominence to weight the degree of integration. All of these measures generated similar results.

[13] In unreported models we also include CONFORM as a variable in the adaptation model. This variable is not significant, nor does its inclusion change substantially the results of these models.

Finally, we include YEAR# fixed effects to control for variation in macroeconomic conditions, time since deregulation, and any other year-by-year variations in profitability would systematically effect the entire sample of carriers. We also include GSP_{it}, a variable for the change in gross state product in year t for the state in which carrier i has its headquarters, to control for local macroeconomic effects.

Table 2 provides descriptive statistics and correlations for these variables. Of the 16,894 carrier-years in our sample, we have complete data for 5,102 carrier-years, which forms the basis of our empirical analysis. Note that the correlations among the main effects are not problematic; although, as expected, the correlations between main effects and interaction terms are occasionally high.

<INSERT TABLE 2 HERE>

Model Specification and Estimation: Inappropriate Governance, Profitability, and Adaptation

Our simultaneous equation model estimates profitability and the rate and amount of carrier adjustment in DRIVER MISALIGN as a function of our covariates. We estimate this system of equations using STATA's reg3 procedure, a 3SLS estimation approach. (In unreported models, we replicated these estimations via seemingly-unrelated regression and via ivreg, with essentially identical results.) In both models, we include only those variables that exhibit substantive temporal variation. A fixed-effects model assumes that the effects of independent variables are the same for all firms but that the intercept can differ for each firm. This model corrects for potential bias introduced by analyzing panel data in which multiple observations for each organization violates the assumption of independence required for ordinary least squares (OLS) regression. However, a fixed effect model makes it difficult to estimate coefficients for independent variables that do not vary over time. Thus, as discussed below, we re-estimate the model for different sub-samples of our data to evaluate the rate and level of adjustment relating to those variables that do not display much temporal variation. Our fixed-effects profitability equation takes the form:

$$ROA_{it} = \alpha_0 + \alpha_1 * \text{DRIVER MISALIGN}_{it} + \alpha_2 * \text{LTL SHARE}_{it} + \alpha_3 * \text{LEVERAGE}_{it} + \alpha_4 * \text{LEVERAGE}_{it} * \text{LTL SHARE}_{it} + \alpha_5 * \text{SIZE}_{it} + \alpha_6 * \text{OP COST}_{it} + \alpha_7 * \text{COMP}_{it} + \alpha_8 * \text{CONFORM}_{it} + \alpha_9 * \text{GSP}_t + \alpha_\Gamma * \text{YEAR\#} + \varpi_i + \gamma_{it}$$

where γ_{it} is the error term and ϖ_i is a fixed effect. Our profitability model allows us to evaluate Hypothesis 1, which predicts a negative relationship between profitability in the degree to which transactions are misaligned.

Our adaptation equation is a fixed-effects discrete partial-adjustment model similar to those employed by Haveman (1992, 1993). The model takes the form:

$$\text{DRIVER MISALIGN}_{i(t+1)} = \delta_0 + \delta_1 * \text{DRIVER MISALIGN}_{it} + \delta_2 * ROA_{it} + \delta_3 * \text{LTL SHARE}_{it} + \delta_4 * \text{LEVERAGE}_{it} + \delta_5 * \text{SIZE}_{it} + \delta_6 * \text{COMP}_{it} + \delta_7 * \text{INST ISOMORPH}_{it} + \delta_8 * \text{DM}*ROA_{it} + \delta_9 * \text{DM*LTL SHARE}_{it} + \delta_{10} * \text{DM*LEVERAGE}_{it} + \delta_{11} * \text{DM*SIZE}_{it} + \delta_{12} * \text{DM*COMP}_{it} + \delta_{13} * \text{DM*INST ISOMORPH} + \eta_i + \nu_{it}$$

where η_i is a firm fixed effect and ν_{it} is a normally distributed error term.[14] In addition to our dependent variables, we specify DRIVER MISALIGN_{it} and DM*ROA_{it} as endogenous variables in this system of equations.

We evaluate Hypotheses 2, 3, and 4 with coefficients estimated by the partial adjustment model. Our independent variables are a subset of previously defined variables and those variables interacted with DRIVER MISALIGN_{it}, which we indicate with the prefix DM applied to the variable's name. The above model evaluates the extent to which carrier attributes at time t affect both the rate and level of adjustment in DRIVER MISALIGN at time t+1. To better understand the range of potential parameter estimates, consider the model with no interaction terms. If adaptation is unconstrained, then a carrier would quickly reorganize so as to be perfectly aligned in t+1 regardless of its degree of misalignment at time t. Hence, the coefficient for DRIVER MISALIGN_{it} would equal 0. Conversely, if adaptation is highly constrained, then a carrier at

[14] As Haveman (1993:37-38) notes, although the equation that derives directly from theories of change is defined in terms of rate of change (i.e., the dependent variable is dY(t)/dt), "this equation cannot be tested directly. Instead, it must be integrated to produce a form of the model that includes terms that are directly observable." Following Haveman's integration approach, we get a reduced-form model that can be estimated with panel data.

time t+1 would continue to be as misaligned as it was at time t. Hence, the coefficient for DRIVER $MISALIGN_{it}$ would equal 1. Thus, the closer the coefficient for DRIVER $MISALIGN_{it}$ is to 0, the faster adaptation occurs. Also, a positive coefficient for LTL SHARE (or SIZE, LEVERAGE, etc.) in a model that excludes the interaction terms would indicate that the long-run *level* of misalignment is larger, the more heavily a carrier concentrates on LTL carriage (or the greater is its size, etc.). In the full model with interaction terms, positive coefficients for the interaction terms indicate slower *rates* of adjustment whereas negative coefficients indicate faster rates of adjustment. To ease the interpretation of coefficients and reduce potential multicollinearity, we means-center our variables in the adaptation models. Below we identify those coefficient estimates that are significant and then graphically simulate their effect on the rate and amount of change in DRIVER MISALIGN.

Results

Table 3 presents three models containing the estimates of the profitability and adaptation models for large interstate motor carriers. The primary differences among the three models are that we successively add terms to the adaptation model, which results in few changes to our profitability model.[15] Indeed, R^2 (0.45), the χ^2 statistic (between 4185 and 4187), and virtually all coefficients remain essentially unchanged across all three models. Hence, we first discuss results from all three profitability models and then discuss the adaptation results.

<INSERT TABLE 3 HERE>

In all three profitability models, the coefficient estimates for DRIVER MISALIGN, which are stable at -0.021 or -0.022, are negative and significant. This provides support for hypothesis 1: after controlling for a wide range of firm and environmental characteristics, the more a carrier deviates from transaction cost prescriptions for organizing its employment relationship, the lower is its profitability. These coefficient estimates indicate that a firm whose misalignment is one standard deviation above the mean will earn a ROA of 1.2 percentage points lower than an

[15] We additionally ran several robustness checks on our analysis. One concern is firms likely to exit in the next period may have especially high profitability in the current period. We corrected for possible sample selection bias due to attrition, following the 2SLS procedure devised by Lee (1983). Our results were qualitatively unchanged. We also re-ran our model including lagged ROA in the profitability model to account for serial correlation. Again are results were qualitatively unchanged.

otherwise identical firm whose misalignment is one standard deviation below the mean (that is, 4.6% vs. 5.8%). This is substantial considering that the carriers in our sample have an average return on assets of roughly five percent.

Several other firm characteristics also have an effect on ROA. Notably, OP COST is negatively related to ROA, although weakly statistically significant. The greater a carrier's operating cost per mile, the lower is its return on assets. A carrier whose operating cost is one standard deviation above the mean will earn an ROA of about one percentage point lower than an otherwise identical carrier whose operating cost is one standard deviation below the mean. This is consistent with conventional economic predictions that firms with inefficient operations will underperform relative to their efficient rivals. We note that one-standard-deviation changes in DM and OP COST have similar-sized effects on ROA, which highlights the economic importance of efficient governance. SIZE is positively related to ROA; consistent with prior research on other types of organizations, larger motor carriers enjoy greater profitability than their smaller counterparts. A carrier whose revenue is one standard deviation above the mean will enjoy an ROA of about one percentage point higher than an otherwise identical carrier whose revenue is one standard deviation below the mean. LEVERAGE is negatively related to ROA, although the exact mechanism behind this relationship is not clear. Highly-levered firms may attract aggressive actions by rivals who hope to drive them out of business (Chevalier & Scharfstein 1996). Alternatively, high leverage may be an indication of past poor performance (Hambrick & D'Aveni 1988), possibly signaling that the carrier possesses poor management. Consistent with Williamson (1988) and Silverman et al. (1997), LTL SHARE*LEVERAGE is also negatively related to performance. The more idiosyncratic a firm's assets, the worse its performance is affected by increased leverage. Finally, the coefficient for the remaining firm control, LTL SHARE, is insignificant.

In addition, some environmental characteristics also affect carrier profitability. GSP is positively associated with ROA. Not surprisingly, when the economy grows more rapidly, motor carriers enjoy higher levels of profitability. The coefficients for CONFORM and COMP are insignificant. Neither the presence of rivals nor the degree to which a carrier's organization of

its driver force resembles that of nearby, similar rivals influences ROA, after controlling for the other effects in the model.

We now turn to the adaptation models. In Model 1, DRIVER MISALIGN is positive and significant. At 0.380, its coefficient is significantly different from both 0 and 1. This coefficient estimate indicates that carriers do adapt to reduce their driver misalignment, albeit gradually. This result is consistent with hypothesis 2: carriers adapt so as to reduce the degree to which they deviate from transaction cost prescriptions for organizing its employment relationship. This result also lends support to our assumption that the observed misalignment in the deregulated trucking industry is not a result of unobserved heterogeneity (see footnote 4). If firms that we perceive as misaligned were in fact properly aligned given some unobserved characteristic, then the coefficient for DRIVER MISALIGN should be close to 1.

Model 2 introduces several other firm and environmental characteristics that we expect to influence the amount of adaptation. Given the structure of our reduced-form model, *positive* coefficient estimates for these characteristics indicate a *lower* amount of ultimate adjustment whereas *negative* coefficients indicate a *greater* amount of adjustment. When we include these variables, the coefficient for DRIVER MISALIGN increases in magnitude but remains significantly different from both zero and one. Thus, Model 2 supports hypothesis 2 even after controlling for these other characteristics. LTL SHARE is positively related to DRIVER MISALIGN_{t+1}. Thus, firms that focus more heavily on LTL carriage undertake a lower amount of change than those that focus more on TL carriage. This provides initial support for Hypothesis 3; carriers whose operations rely on more idiosyncratic assets undertake less change than those whose operations rely on more generic assets. Finally, the coefficient for INST ISOMORPH is negative and significant. This implies that a carrier will reduce its misalignment more when doing so will enable its organization of drivers to resemble that of nearby, similar carriers. Consistent with institutional theory, then, a carrier will reduce misalignment more when institutional pressure is pushing it in the same direction as TCE efficiency prescriptions. The other independent variables have no effect on adaptation in this model.

One challenge in interpreting Model 2 is that its use of main effects for the variables does not consider how these covariates – except for DRIVER MISALIGN – may affect the *rate* of adaptation. In Model 3 we investigate both rate and level of adaptation through interaction terms between DRIVER MISALIGN and other relevant characteristics of carrier j. In this model, the interaction terms demonstrate how various characteristics affect the rate of adjustment, and the main effects, in conjunction with the interaction terms, demonstrate how these characteristics affect the long-run level of adjustment by carrier j. Given the structure of our reduced-form model, positive coefficient estimates for the interaction terms indicate a slower rate of adjustment whereas negative coefficients indicate a faster rate of adjustment. The χ^2 and adjusted R^2 statistics decline somewhat for Models 2 and 3, which suggest the terms added in these models do not add much explanatory power. This is driven, at least in part, by the increased endogeneity in each model (as described in our methods section, we account for such endogeneity by declaring in our econometric specification those variables that are endogenous across our system of equations). However, since Model 3 is consistent with our theory, we are interested in the statistical significance of our coefficient estimates rather than the overall fit of the model.

In this model, the coefficient for DRIVER MISALIGN remains significant and essentially unchanged compared to Model 2, again consistent with hypothesis 2. However, given the specification of this model, determining the overall rate of adjustment involves assessing coefficients from both DRIVER MISALIGN and the interaction terms simultaneously. To facilitate this, we calculate simulated responses for our carriers based on the coefficients estimated in Model 3. To evaluate a mean carrier's characteristic response, we assume that driver misalignment at year = 0 is 1 – the maximum possible level of misalignment given the construction of DRIVER MISALIGN – and simulate the mean carrier's dynamic response for the ensuing years.[16] Figure 1, which displays the effect of our parameter estimates on the rate and amount of change in DRIVER MISALIGN, reports the baseline characteristic response for the average firm in our sample. This figure indicates that the typical carrier does adapt its

[16] Although setting the initial misalignment to one is admittedly arbitrary, any reasonable value for initial misalignment will yield identical characteristic responses once appropriately scaled. Also, since we means-center our data in the adaptation models, DRIVER MISALIGN asymptotes to zero. However, this asymptote should be thought of as the long-term mean level of driver misalignment.

organizational structure by reducing misalignment, which is consistent with hypothesis 2. Visual inspection indicates that adaptation takes about three to four years.

In this model, the coefficient for LTL SHARE remains significant, positive, and essentially unchanged, again indicating that a greater focus on LTL freight is associated with less overall change. Of particular interest, the coefficient for DM*LTL SHARE is positive and significant. This coefficient implies that the more a carrier focuses on transporting LTL freight, the more *slowly* it will adjust. Figure 2 compares the adaptation of fully LTL to fully TL carriers with all other parameters reflecting the average firm. The top curve in Figure 2 displays carrier adaptation for the mean carrier except that is fully dedicated to LTL carriage whereas the bottom curve displays carrier adaptation for the mean carrier except that it is a fully TL carrier. LTL firms adapt more slowly and less completely than TL firms. Along with the coefficient estimates for LTL SHARE, this provides further evidence in support of Hypothesis 3: the more a carrier focuses on LTL carriage, which is characterized by investments in idiosyncratic assets, the more slowly it will adapt the organization of its driver force.

The coefficient for ROA is now positive and significant, indicating that carriers with higher levels of ROA do not adjust their level of misalignment as much as those firms with lower ROA. In addition, the coefficient for DM*ROA is positive and weakly significant. Figure 3 displays carrier adaptation for carriers with different levels of profitability. The top curve displays carrier adaptation when ROA is one standard deviation above the mean whereas the bottom curve displays carrier adaptation when ROA is one standard deviation below the mean. This Figure, along with the coefficient estimates for ROA, indicates that firms that enjoy higher profits adapt more slowly and less completely than those with lower profits. These ROA results are consistent with insights from the behavioral theory of the firm (March and Simon, 1993), in that successful performance appears to diminish the need (or desire) of a firm to pursue organizational change as assiduously as those firms whose performance is less satisfactory.

The coefficient for SIZE is now significant and negative, indicating that larger firms reduce their driver misalignment more completely than smaller firms. The coefficient for DM*SIZE is not significant. Figure 4, which displays the effect of carrier size on adjustment, suggests that

deviation above or below the mean carrier size yields little difference in the rate or level of adaptation. Taken together, these indicate that although the overall reduction in misalignment increases with carrier size in a statistically significant sense, this reduction is not economically significant.

As in Model 2, the coefficient for INST ISOMORPH is negative and significant, again indicating that a carrier will reduce its misalignment more when doing so will enable its organization of drivers to resemble that of nearby, similar carriers. The coefficient for DM*INST ISOMORPH is negative, but is not significant. As Figure 5 indicates, carriers that increase their resemblance to neighbors when they reduce misalignment, undertake more adaptation than those that decrease their resemblance to neighbors when they reduce misalignment.

Finally, the coefficients for LEVERAGE and COMP, Figures 6 and 7, respectively, remain insignificant in this model, and the coefficients for DM*LEVERAGE and DM*COMP are positive and significant. This result for DM*LEVERAGE indicates that highly levered carriers adjust at a slower rate than less levered firms. The result for DM*COMP suggests the curious effect that competition slows the rate of adjustment. However, at 0.000, this coefficient is not economically significant.

Our analysis thus far has not evaluated the effect on adaptation of contractual commitment (H4), nor of several time-invariant characteristics of interest. As noted above, we interpret unionization as one proxy for formal contractual commitments, and "over-integration," defined as misalignment that entails excessive reliance on company drivers, to involve deeper informal contractual commitments than "under-integration," or misalignment that entails excessive reliance on owner-operators. We are also interested in the control variable LEFT CENSOR, which identifies incumbents and entrants and indirectly proxies for age. As described above, we can not directly incorporate these variables into our model because their effect is absorbed by the fixed effects—union status and over v. under-integrated status for each firm vary little across time and firm; our data are effectively bi-modal in terms of age, with entrants under ten years old and most incumbents more than 35 years old; and LEFT CENSOR does not vary. We analyze the effect of these variables by separating our data sample into appropriate sub-samples and re-

estimating the partial-adjustment model for each sub-sample. Table 4 presents our results for each pair of sub-samples. Since we are primarily interested in the effects that these variables have on the rate and amount of adjustment, we present results for only the partial adjustment equation and not the profitability equation. Results for the profitability estimations for these sub-samples are available upon request.

<INSERT TABLE 4 HERE>

We evaluate the effect of union status by re-estimating the partial-adjustment model first for the sub-sample of non-unionized carriers (Model 4) and then for sub-sample of union carriers (Model 5). The coefficient magnitudes and levels of statistical significance indicate that non-union carriers are substantially different from union carriers. The most striking difference is that the coefficient for DRIVER MISALIGN is substantially smaller for non-union compared to union carriers. This difference indicates that non-union carriers adapt their organizational structures quickly whereas unionized carriers adjust their structures slowly. Figure 8 displays the adaptation response for a typical carrier with a union compared to one that has no union, which highlights the different rate at which the two prototypical carriers adapt. This result is consistent with Hypothesis 4 with respect to union relationships. Although there is evidence that union power in the trucking industry declined precipitously post-deregulation, both in terms of wage premia (Rose, 1987) and in terms of "givebacks" on other contractual provisions (Perry, 1986), our results suggest that union carriers were more constrained in their adaptation than those without unions.

These models indicate several other differences between unionized and non-unionized carriers' adaptation processes. We discuss two of them. Non-unionized carriers' adaptation is not significantly influenced by any other firm or environmental characteristic included in our model. In contrast, unionized carriers' adaptation is affected by LTL SHARE; the more that a unionized carrier relies on LTL freight, the less overall adaptation it undertakes. This may indicate that the constraints associated with idiosyncratic assets are compounded by other constraints on the organization, such as the presence of union contracts. Similarly, whereas unionized carriers' adaptation is affected by INST ISOMORPH – unionized carriers adapt more rapidly and more

completely when doing so enables them to conform more closely to geographically proximate firms – non-union carriers' adaptation is not. This may indicate that unionized carriers are better able to persuade unionized employees to allow organizational changes when they can invoke similarities to other organizations, whereas non-union carriers face fewer persuasion challenges.

Turning to our other measure of contractual commitment, Model 6 reports coefficient estimates for the sub-sample of under-integrated carriers and Model 7 reports coefficient estimates for the sub-sample of over-integrated carriers. The levels of significance for coefficient estimates are vastly different between the two models. Again, the most striking difference between the two sub-samples relates to the coefficient for DRIVER MISALIGN. For over-integrated carriers, the coefficient for DRIVER MISALIGN is significant and positive. For under-integrated carriers, the coefficient for DRIVER MISALIGN is barely significant and is surprisingly negative. As Figure 9 shows, this leads to a response curve that oscillates (with the amplitude diminishing over time). We interpret this response to indicate that under-integrated carriers adapt very quickly. This rapid speed of adjustment in conjunction with the small N in this subsample and the structure of our econometric model may have led to the unanticipated negative coefficient estimate. To the extent that these results indicate a faster adaptation rate for under-integrated carriers, they provide some additional support for Hypothesis 4.

It is interesting that several other differences between under-integrated and over-integrated carriers' adaptation processes mirror those of the non-union and union sub-samples. In particular, over-integrated carriers' adaptation is reduced by increased reliance on LTL carriage and is increased by institutional isomorphism, whereas under-integrated carriers' adaptation is unaffected by these. This may indicate that informal constraints associated with over-integration operate similarly to the formal constraints of unionization in the adaptation process.

We now turn our attention to two control variables. Model 8 presents the results of the model for the sub-sample of entrants, and Model 9 does so for incumbents. As displayed in Figure 10, which compares the mean firm as an entrant and an incumbent, entrants adjust their driver misalignment somewhat faster than incumbents. Once again, the coefficient estimates indicate differences between incumbents and entrants that largely parallel those of prior sub-samples. In

particular, increased LTL carriage is associated with less adaptation and institutional isomorphism is associated with more adaptation for incumbent carriers, while newly-founded carriers' adaptation is unaffected by these features. To the extent that older firms are characterized by deeper internal constraints (due to bureaucratization, political agreements, etc.), this may indicate that such constraints operate much like formal and informal contractual constraints in the adaptation process. [17]

Finally, we compare the dynamic response of carriers that survived through 1991 to that of carriers that exited by 1991. To do so, we estimate the partial adjustment model first for the sub-sample of survivors (Model 10) and then for the sub-sample of exiters (Model 11), and present the adaptation responses for the mean carrier in Figure 11. Here again, we find substantial differences in the magnitudes and statistical significance of coefficient estimates. Of particular interest, exiters' adaptation rate is notably faster than that of survivors, although survivors ultimately adapt as much as exiters. Put differently, motor carriers that ultimately exited tended to undertake far more rapid change than firms that ultimately survived. This finding is consistent with recent ecological research suggesting that the more an organization attempts to change during a given time period, the higher its risk of failure (Barnett and Freeman 2001). It is also consistent with prior economic research on adjustment costs, which both assumes theoretically (Hause and du Rietz 1984) and typically finds empirically (Hammermesh, 1995) that adjustment costs increase exponentially as a function of the amount of adjustment attempted (Nickerson & Zenger 2002). This does not imply that motor carriers would be better off undertaking no change – as noted earlier, firms that remain misaligned will face reduced profitability, all else equal. Rather, we interpret this result as additional evidence of 1) the importance of adjustment costs as a constraint on the amount of organizational change that can be safely pursued during a given amount of time, and 2) the risk associated with pursuing "excessive" change in the face of such costs.

[17] One concern about this comparison is that the sub-samples of unionized and over-integrated carriers might be essentially identical. This is not the case. Of the 4,728 carriers that are over-integrated, 2,335 are unionized and 2,393 are non-unionized. Similarly, of the 374 carriers that are under-integrated, 161 are unionized and 213 are non-unionized. The cross tabulations comparing union/non-union carriers with entrants/incumbents and entrants/incumbents and over-integrated/under-integrated also are fully populated indicating that are subpopulation results are not the result of substantially overlapping sub-populations

Although the exiter vs. survivor results are by no means definitive, they do suggest that from a carrier's perspective, a key managerial challenge is to choose an appropriate path of adaptation with respect to carrier attributes. Adapting rapidly increases the risk that a firm will fail, thus exiting the market. Adapting slowly or not at all leads to a risk of earning consistently low profits, which places pressure on managers to better align the organization of its drivers. Our paper suggests that understanding how carrier attributes affect the costs and risks of organizational adaptation is central to achieving long-run superior profits by navigating between exit and low profitability.

We note one other difference in coefficient estimates between the exiter and survivor subsamples. As indicated by the significant, negative coefficients for INST ISOMORPH and DM*INST ISOPMORPH in the exiter model, the extent to which exiters change more completely and more rapidly when doing so brings them into closer conformance with geographically proximate firms. In contrast, survivors' change was unaffected by isomorphic pressures. These results raise the possibility that firms that succumb to isomorphic pressure – and thus attempt to change more rapidly or more completely than they should – increase their risk of failure. Although this is admittedly highly speculative, it suggests a way in which institutional isomorphism may be detrimental to an organization.

Finally, in virtually all of these simulations of carriers' dynamic response functions, it takes approximately 3-5 years for adaptation to be completed. Given our theory, this length of time suggests that adjustment costs are substantial and increase with increases in the rate of adjustment. It is interesting that strategic planning in firms has historically entailed planning over a three- to five-year time period (Jaques et al. 2001), which may imply that such planning horizons are derived from adjustment costs rather than from socially constructed views of what "strategic plans" should look like. This 3- to 5-year period for completing organizational change may also suggest limits on recent prescriptions to undertake frequent, rapid, and endemic change (Eisenhardt and Brown 1997) at least as it applies to changes in organizational structure. Future research may shed light on this.

DISCUSSION AND CONCLUSION

This paper was motivated by our desire to generate content-based predictions about why organizations want to organize efficiently and why it is difficult to do so. Our theoretical story is straightforward: firms want to organize efficiently because they reap performance benefits from doing so, but firms that are inefficiently organized can not immediately shift to efficient organization because of adjustment costs associated with such shifts – adjustment costs that vary with characteristics of the relevant transactions. We examined organizational alignment of a core transaction—the driver employment relation—in the for-hire interstate trucking industry. Taking advantage of a natural experiment in this industry, deregulation, we found empirical evidence consistent with our predictions. Our analysis showed that misaligned firms underperform relative to better-aligned rivals. These findings are consistent with our first hypothesis, which asserts that those organizations that govern transactions in accordance with transaction cost economic prescriptions will exhibit higher profitability than those that do not govern transactions appropriately. These results persist even though we empirically examine alternative explanations stemming from variation in production costs and institutional isomorphism.

For our sample of carriers, our analysis indicates that these firms systematically adapt their organizational structures in the direction of reducing transaction costs, which provides support for our second hypothesis. We further found that the rate and amount of such adaptation is constrained by organizational features that we predicted raise the cost of adjusting a firm's governance structure. The rate and amount of adaptation declined with the share of hauls that are LTL, which, we maintain, indicates the presence of specific investments. As predicted by our third hypothesis, specific investments appear to slow and lessen the amount adaptation. Finally, we found strong results for our fourth hypothesis, which predicted that contractual commitments generate inertia that slows and limits adjustment. Unionized firms adapted less quickly and completely compared to non-unionized carriers. Over-integrated carriers adapted less quickly and completely compared to under-integrated carriers, consistent with this hypothesis; although, a literal interpretation of the coefficient estimates for under-integrated firms indicates a pattern of vacillation. We interpret these two results to indicate that contractual commitments do generate inertia that slows and limits adjustment. In general, it took carriers about three to five years to substantially adjust their organizational structure in the direction predicted. We conclude from

our theory and analysis that change is costly. Our key conclusion is that change in a transaction cost economizing direction be desirable but that managers must balance the benefits from the rate at which the organization changes against the costs of adjustment.

Several of our findings resonate with prior research in the organization theory literature. Carriers with higher profitability adapted more slowly and less completely than carriers with low profitability, which is consistent with a behavioral theory of the firm. Also, firms are slower to change the organization of their driver force when such changes will result in their looking less like nearby, similar firms in terms of their organization of drivers, which is consistent with institutional theory. Consistent with ecological predictions, those firms that exited adapted more quickly than did survivors.

Our paper makes several contributions to the literatures on organizational choice and change. In addition to using TCE to inform the literature on organizational change, this paper is among the first to extend our understanding of TCE by exploring the actions over time of inappropriately aligned organizations. Our finding that misaligned firms attempt to adapt towards TCE-prescribed alignment complements the cross-sectional empirical TCE literature. In particular, it provides some evidence as to how the empirical regularities identified by cross-sectional studies arose in the first place. Heterogeneity in transaction alignment may be due to heterogeneity in path-dependent firm attributes that affect adjustment costs and hence constrain an organization's ability to keep all transactions in alignment at all times. These findings suggest that linking transaction cost economics and structural inertia theory potentially offers a more complete and predictive theory of environmentally induced organizational change than either literature alone. Indeed, an important lesson of our paper is that farsighted managers should consider an enlarged view of the costs and competencies of alternative organizational modes so as to incorporate in their organizational decisions the implications of adjustment costs associated with different organizational forms. Finally, our analysis accounts for pre-change performance of organizations, as well as the level of competition they face. As such, this analysis specifies change processes in greater detail than much prior research (Baum 1996), and begins to answer the call for research that can bridge content and process models of organizational change (Barnett and Carroll, 1995).

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Appendix: Calculation of residuals from Nickerson and Silverman (2003)

In a cross-sectional study of the U.S. interstate for-hire trucking industry, Nickerson and Silverman (2003) investigate whether transaction cost economics (TCE) principles can explain the varied use of company drivers and owner-operators. They find that the more that motor carriers engage in LTL carriage rather than TL carriage, the more they rely on company drivers rather than owner-operators. In addition, the more that carriers invest in firm-specific reputational capital, the more they rely on company drivers rather than owner-operators. Finally, carriers whose hauls are likely to require idiosyncratic vehicles (e.g., very light or very heavy hauls) tend to hire company drivers rather than owner operators. According to Nickerson and Silverman, and as described in the body of this paper (pp. 10-12), these results are consistent with TCE predictions. Nickerson and Silverman test their predictions by estimating the model:

$$\begin{aligned}\text{COMPANY DRIVER MILES}_i = {} & \beta_0 + \beta_1 * \text{LTL SHARE}_i + \beta_2 * \text{ADVERTISING}_i \\ & + \beta_3 * \text{SHORT HAUL}_i + \beta_4 * \text{LONG HAUL}_i \\ & + \beta_5 * \text{LIGHT WEIGHT}_i + \beta_6 * \text{HEAVY WEIGHT}_i \\ & + \beta_7 * \text{HAULS}_i + \beta_8 * \text{UNION}_i \\ & + \beta_\Phi * \text{FREIGHT}_{\iota\Phi} + \beta_\vartheta * \text{REGION}_{\iota\vartheta} + \varepsilon_i.\end{aligned}$$

where the variables are defined as shown in Table A-1. They also used an alternative dependent variable, COMPANY TRUCKS, which is calculated as the proportion of a carrier's trucks and tractors that were company-owned as of the first day of business in 1991. Results were essentially equivalent for both dependent variables. Here we employ COMPANY DRIVER MILES, because it is more consistent with our unit of analysis, which is the carrier-year.

The dependent variable of this model is a proportion. As such, it is bounded at 0 and 1 by definition, and nearly two-thirds of the observations in the sample are censored at either 0 or 1. To correct for censoring, Nickerson and Silverman use a two-sided Tobit model to generate their results; in unreported models they use grouped-data logistic analysis, with essentially identical results (2003: 108). The sign and significance of Nickerson and Silverman's results are presented in the fourth column of Table A-1.

For the purposes of this study, the most important element in Nickerson and Silverman's model is the residual or error term, ε_i. Given the coefficients estimated for the above model, it is feasible to construct the residual for each carrier i in a given year. We interpret this as the degree to which carrier i's governance of its driver force deviates from the prescriptions of TCE. If TCE is correct in its prescriptions, and if the theory has any consequence, then we expect larger deviations to be associated with diminished performance. This approach is conceptually consistent with that of Anderson (1988), who investigates the performance consequence of deviations in firms' integration of their sales force from the level of integration predicted by TCE. Anderson finds that deviation from the predicted level is negatively associated with efficiency in unpredictable selling environments, but not in predictable selling environments. In this study, then, we construct an explanatory variable, DRIVER MISALIGN, which (following Anderson 1988) is operationalized as the absolute value of the residual. Taking the absolute value of the residual implicitly assumes that "over-integration" and "under-integration" of the employment relation is equivalent. While this assumption greatly facilitates our analysis, we also explore this issue in our adaptation models.

Table A-1

Variable	Definition	Predicted sign	Result
COMPANY DRIVER MILES$_i$	Proportion of a carrier i's miles driven by company drivers in 1991.	Dependent variable	Dependent variable
LTL SHARE$_i$	Proportion of annual revenue received from LTL hauls for carrier i.	+	+
ADVERTISING$_i$	Advertising expenditures as a percentage of total revenue for carrier i.	+	+
HAUL LENGTH$_i$	Average haul length for carrier i, in hundreds of miles.	NA[a]	NA[a]
SHORT HAUL$_i$	Median HAUL LENGTH for sample minus HAUL LENGTH$_i$, if HAUL LENGTH$_i$ < median HAUL LENGTH, else 0. Reported in hundreds of miles.	+	Insig
LONG HAUL$_i$	HAUL LENGTH$_i$ minus median HAUL LENGTH for sample, if HAUL LENGTH$_i$ > median HAUL LENGTH, else 0. Reported in hundreds of miles.	+	Insig
HAUL WEIGHT$_i$	Average haul weight for carrier i, in tons.	NA[b]	NA[b]
LIGHT WEIGHT$_i$	Median HAUL WEIGHT for sample minus HAUL WEIGHT$_i$, if HAUL WEIGHT$_i$ < median HAUL WEIGHT, else 0. Reported in tons.	+	+
HEAVY WEIGHT$_i$	HAUL WEIGHT$_i$ minus median HAUL WEIGHT for sample, if HAUL WEIGHT$_i$ > median HAUL WEIGHT, else 0. Reported in tons.	+	+
HAULS$_i$	Total number of hauls by carrier i, divided by 100,000.		Insig
UNION$_i$	1 if carrier i contributes to union pension plan, else 0.		Insig
REGION#$_i$	A set of nine regional categorical variables		Sig
FREIGHT#$_i$	A set of 17 freight categorical variables		Sig

[a] This variable is not included in the analysis. It is used in the construction of other explanatory variables.

Table 1: Variable Definitions

Variable	Definition	Predictions	
Dependent variables		Profit	Adapt
ROA_{it}	EBITDA / assets	DepVar	
Driver $Misalign_{i(t+1)}$	absolute value of (COMPANY DRIVER MILES – predicted COMPANY DRIVER MILES) for carrier i for year t+1 (see Appendix for more details on COMPANY DRIVER MILES)		DepVar
Independent and control variables			
Driver $Misalign_{it}$	absolute value of (COMPANY DRIVER MILES – predicted COMPANY DRIVER MILES) for carrier i for year t (see Appendix for more details on COMPANY DRIVER MILES)	H1: -	H2: >0 and < 1
LTL SHARE	proportion of revenue received from LTL hauls for carrier i.in year t		H3: +
UNION	1 if carrier i contributes to union pension plan; 0 otherwise		H4: +
OVERINTEG	1 if carrier i's COMPANY DRIVER MILES > predicted COMPANY DRIVER MILES for year t, 0 otherwise		H4: +
OP COST	carrier i's average operating cost per mile for year t		
SIZE	natural log of revenue for carrier i for year t		
LEFT CENSOR	1 if carrier i existed before 1980; 0 otherwise		
LEVERAGE	debt/(debt+equity) for carrier i at end of year t-1		
LEVERAGE*LTL	product of LEVERAGE and LTL SHARE		
COMP	sum of log of carrier j revenue divided by the spherical distance between carrier j and i where $i \neq j$ for each year t / 1000		
CONFORM	Degree to which carrier i's level of driver integration resembles that of all competitors within 100 miles in year t, weighted measure (see CONFORM equation in text)		
INST ISOMORPH	1 if carrier i can simultaneously increase its conformity to competitors within 100 miles and reduce its degree of TCE-based misalignment in year t, else 0		
YEAR#	1 if t = 19#; 0 otherwise		
GSP_t	% change in U.S. Gross State Product between t-1 and t (year-end)		

Table 2: Correlations and Summary Statistics

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	MISALIGN																	
2	CONFORM	-0.1704																
3	ROA	-0.0632	0.0166															
4	SIZE	-0.0163	-0.0705	0.0622														
5	LTL SHARE	-0.2623	-0.2069	-0.026	0.1784													
6	LEVERAGE†	0.0142	0.001	-0.2849	-0.0123	-0.0308												
7	LEV.*LTLSHARE†	-0.1929	-0.1479	-0.1733	0.1346	0.7571	0.368											
8	COMP	0.0295	-0.1258	0.0069	0.0177	0.0004	-0.007	-0.0152										
9	DM*CONFORM	0.8011	0.375	-0.0411	-0.0468	-0.3075	0.0008	-0.225	-0.0477									
10	DM*ROA	0.1164	-0.0022	0.8253	0.0624	-0.0252	-0.2974	-0.1345	0.0027	0.1084								
11	DM*SIZE	0.5575	-0.1519	0.0138	0.7418	0.0425	-0.0052	0.0336	0.0417	0.4211	0.1272							
12	DM*LTL SHARE	0.1057	-0.242	-0.0207	0.2892	0.7971	-0.0197	0.6106	0.044	0.0026	0.0202	0.3361						
13	DM*LEVERAGE†	0.5296	-0.1066	-0.3171	-0.0248	-0.1594	0.6063	0.0917	0.0168	0.4054	-0.2968	0.2786	0.0314					
14	DM*COMP	0.9109	-0.2046	-0.0583	-0.0032	-0.2292	0.0136	-0.1741	0.3843	0.6877	0.105	0.5263	0.1147	0.4883				
15	INS ISOMORPH	0.4356	-0.3028	-0.061	0.0359	0.2549	0.0094	0.1996	0.0542	0.2711	0.0575	0.2925	0.3123	0.2232	0.4151			
16	GSP	-0.0079	0.0371	0.0734	0.017	0.078	-0.0099	0.0377	-0.0579	0.0076	0.0746	0.0215	0.0477	-0.0153	-0.0281	0.0544		
17	OP COST	-0.0733	-0.1635	-0.0574	0.125	0.6358	-0.0187	0.4823	-0.1271	-0.1289	-0.0387	0.0763	0.616	-0.0559	-0.0996	0.1976	0.0647	
	Mean	0.5084	0.5895	0.0522	2.1994	0.4038	0.5525	0.2171	0.8578	0.2893	0.0234	1.1114	0.1751	0.2830	0.4379	0.8722	0.0740	2.5140
	S. D.	0.2944	0.2083	0.1694	1.4186	0.3916	0.4966	0.2744	0.1986	0.1952	0.1009	1.0093	0.1964	0.3118	0.2776	0.3339	0.0390	1.6150
	Min.	0	0	-3.3002	-1.9479	0	-18.462	-2.9312	0.2766	0	-2.7628	-1.1726	0	-1.0070	0	0	-0.135	0.3440
	Max.	1	1	2.0576	7.7407	1	11	2.2605	1.1045	1	0.8932	6.0553	0.8036	9.9502	1.1017	1	0.3000	9.9800

†Note: Book equity can be negative.

Table 3: Profitability and Adaptation Models

PROFITABILITY MODELS	Model 1		Model 2		Model 3	
DRIVER MISALIGN	-0.022	**	-0.021	**	-0.021	**
	(0.008)		(0.007)		(0.007)	
LEVERAGE	-0.046	**	-0.046	**	-0.046	**
	(0.004)		(0.004)		(0.004)	
LTL SHARE	0.007		0.007		0.008	
	(0.009)		(0.009)		(0.009)	
LEVERAGE*LTL SHARE	-0.034	**	-0.033	**	-0.034	**
	(0.012)		(0.012)		(0.012)	
SIZE	0.004	**	0.004	**	0.004	**
	(0.001)		(0.001)		(0.001)	
COMP	0.001		0.001		0.000	
	(0.010)		(0.010)		(0.010)	
GSP	0.133	*	0.133	*	0.133	*
	(0.057)		(0.057)		(0.057)	
OP COST	-0.003	+	-0.003	+	-0.003	+
	(0.001)		(0.001)		(0.001)	
CONFORM	-0.006		-0.006		-0.006	
	(0.009)		(0.009)		(0.009)	
YEAR DUMMIES	YES		YES		YES	
Constant	0.100	**	0.100	**	0.101	**
	(0.016)		(0.016)		(0.016)	
R^2	0.45		0.45		0.45	
χ^2	4185		4187		4187	
ADAPTATION MODELS						
DRIVER MISALIGN	0.380	**	0.451	**	0.471	**
	(0.047)		(0.061)		(0.062)	
ROA			0.022		0.071	*
			(0.016)		(0.031)	
SIZE			-0.001		-0.004	*
			(0.001)		(0.001)	
LTL SHARE			0.014	*	0.015	*
			(0.006)		(0.007)	
LEVERAGE			-0.006		0.013	
			(0.004)		(0.011)	
COMP			0.011		0.011	
			(0.008)		(0.009)	
INST ISOMORPH			-0.029	**	-0.037	*
			(0.011)		(0.015)	
DM*ROA					0.596	+
					(0.323)	
DM*SIZE					0.005	
					(0.006)	
DM*LTL SHARE					0.102	**
					(0.026)	
DM*LEVERAGE					0.060	*
					(0.030)	
DM*COMP					0.000	*
					(0.000)	
DM*INST ISOMORPH					-0.030	
					(0.027)	
Constant	0.000		0.000		0.006	*
	(0.002)		(0.002)		(0.003)	
R^2	0.84		0.84		0.83	
χ^2	26917		26490		24778	
N	5102		5102		5102	

Table 4: Adaptation Models of Various Subsamples

	Model 4 Nonunion	Model 5 Union	Model 6 Under	Model 7 Over	Model 8 Entrant	Model 9 Incumbent	Model 10 Survivor	Model 11 Exiter
DRIVER MISALIGN	0.202 **	0.611 **	-0.808 +	0.426 **	0.424 **	0.474 **	0.504 **	0.327 **
	(0.075)	(0.081)	(0.432)	(0.058)	(0.072)	(0.099)	(0.065)	(0.122)
ROA	0.005	0.063	-0.141	0.035 +	0.041 +	0.094 +	0.036	0.116
	(0.033)	(0.049)	(0.826)	(0.020)	(0.025)	(0.055)	(0.027)	(0.073)
SIZE	-0.001	-0.006 **	-0.028	-0.003 *	-0.005 **	-0.002	-0.003 *	-0.001
	(0.002)	(0.002)	(0.024)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
LTL SHARE	0.004	0.030 **	0.094	0.020 *	0.012	0.016 +	0.009	0.021 +
	(0.008)	(0.011)	(0.075)	(0.009)	(0.009)	(0.009)	(0.008)	(0.012)
LEVERAGE	-0.005	0.017 *	0.062	0.006	0.006	0.013	-0.001	0.017
	(0.015)	(0.008)	(0.121)	(0.009)	(0.007)	(0.015)	(0.010)	(0.013)
COMP	0.011	0.000	0.247	0.012	0.017	-0.005	0.012	0.002
	(0.013)	(0.013)	(0.187)	(0.009)	(0.012)	(0.014)	(0.011)	(0.013)
CONFORM	-0.003	-0.082 **	0.132	-0.033 *	-0.005	-0.055 **	-0.014	-0.065 *
	(0.016)	(0.028)	(0.164)	(0.015)	(0.022)	(0.019)	(0.016)	(0.028)
DM*ROA	0.100	-0.718	-0.672	0.369	-0.377	0.596	0.154	0.596
	(0.324)	(0.790)	(2.294)	(0.297)	(0.587)	(0.390)	(0.256)	(0.508)
DM*SIZE	0.007	0.012	-0.069	0.011 *	0.012	0.009	0.006	0.012
	(0.007)	(0.016)	(0.065)	(0.005)	(0.009)	(0.008)	(0.008)	(0.009)
DM*LTL SHARE	0.006	0.037	-0.077	0.047 *	0.068 *	0.099 *	0.067 *	0.124 *
	(0.041)	(0.044)	(0.244)	(0.021)	(0.032)	(0.042)	(0.027)	(0.059)
DM*LEVERAGE	0.005	-0.102	0.187	0.037	-0.067	0.054	0.038 +	0.072
	(0.035)	(0.110)	(0.318)	(0.026)	(0.095)	(0.033)	(0.023)	(0.068)
DM*COMP	0.000	0.000	0.001	0.000	0.000	0.000 +	0.000 **	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
DM*CONFORM	0.002	-0.110 *	-0.020	0.001	0.005	-0.079 *	-0.013	-0.082 +
	(0.032)	(0.054)	(0.333)	(0.025)	(0.052)	(0.035)	(0.032)	(0.047)
Constant	0.003	0.009 +	-0.286 **	0.002	0.001	0.009 *	0.002	0.011 *
	(0.003)	(0.005)	(0.111)	(0.002)	(0.003)	(0.004)	(0.003)	(0.005)
R^2	0.86	0.80	0.02	0.84	0.84	0.83	0.83	0.86
χ^2	15202	9912	169	24653	13475	12329	14530	12298
N	2606	2496	374	4728	2622	2480	3106	1996

** $p < 0.01$, * $p < 0.05$, + $p < 0.10$

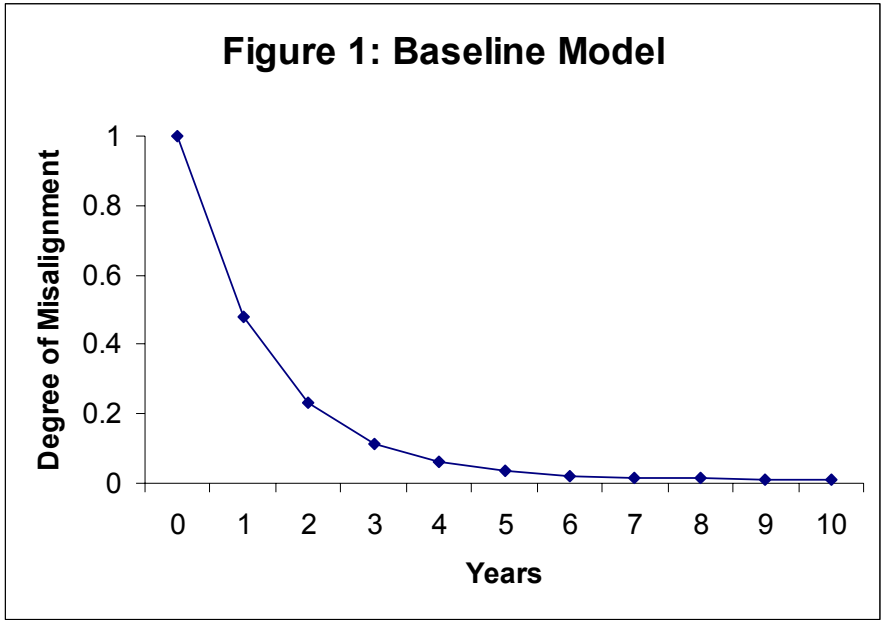
Figure 1: Baseline Model
Degree of Misalignment
1
0.8
0.6
0.4
0.2
0
0 1 2 3 4 5 6 7 8 9 10
Years

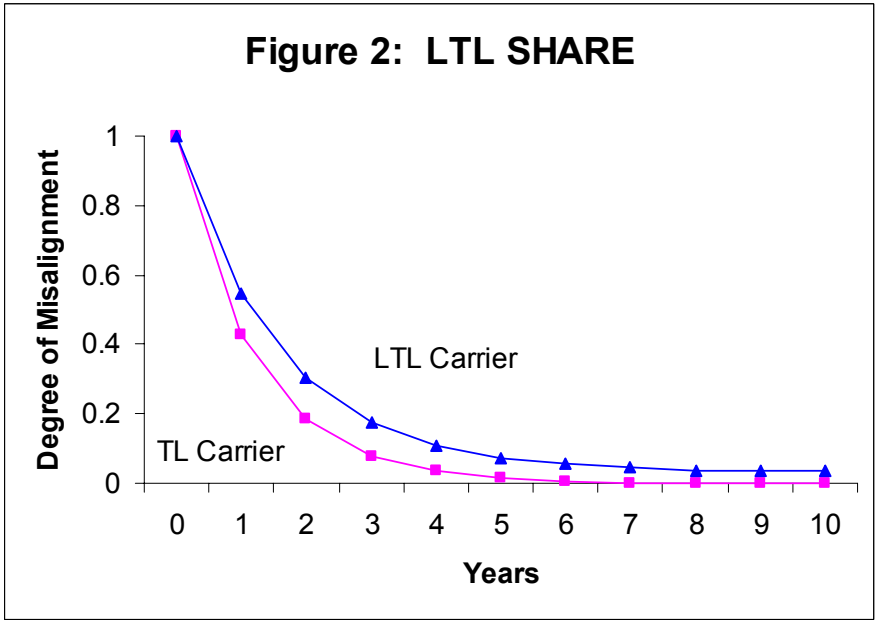
Figure 2: LTL SHARE
Degree of Misalignment
1
0.8
0.6
0.4
0.2
0
LTL Carrier
TL Carrier
0 1 2 3 4 5 6 7 8 9 10
Years

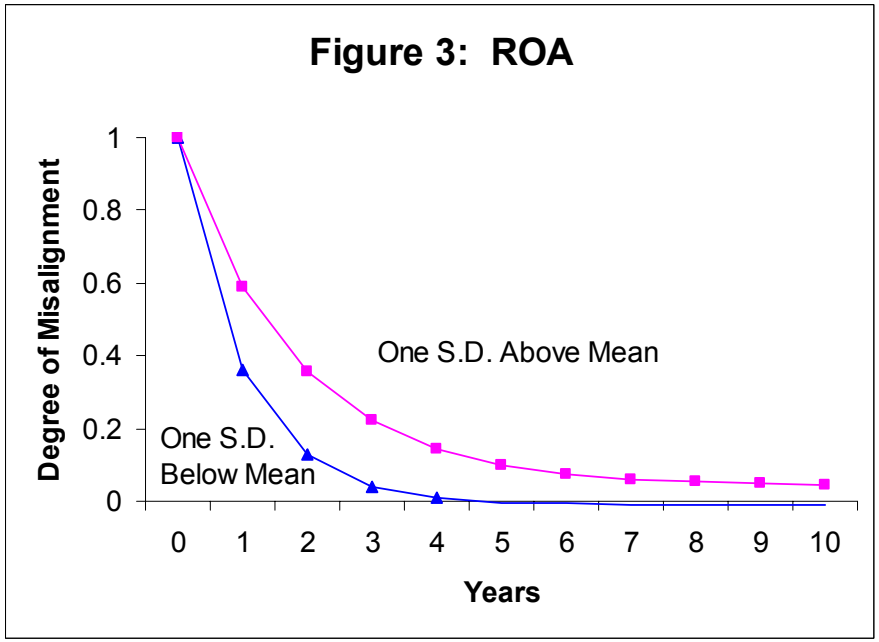
Figure 3: ROA
Degree of Misalignment
1
0.8
0.6
0.4
0.2
0
One S.D. Above Mean
One S.D.
Below Mean
0 1 2 3 4 5 6 7 8 9 10
Years

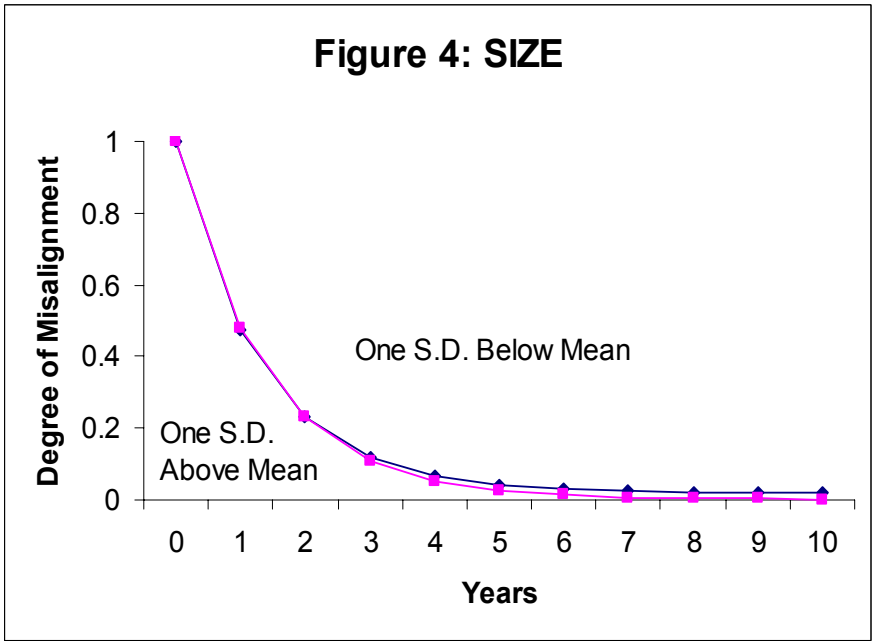
Figure 4: SIZE
Degree of Misalignment
1
0.8
0.6
0.4
0.2
0
One S.D. Below Mean
One S.D.
Above Mean
0 1 2 3 4 5 6 7 8 9 10
Years

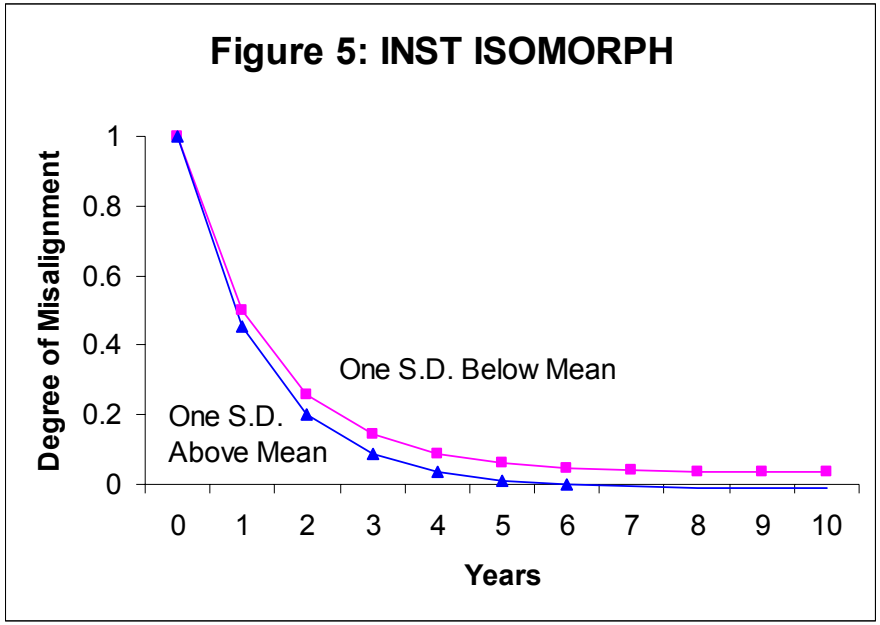
Figure 5: INST ISOMORPH
Degree of Misalignment
1
0.8
0.6
0.4
0.2
0
One S.D. Below Mean
One S.D.
Above Mean
0 1 2 3 4 5 6 7 8 9 10
Years

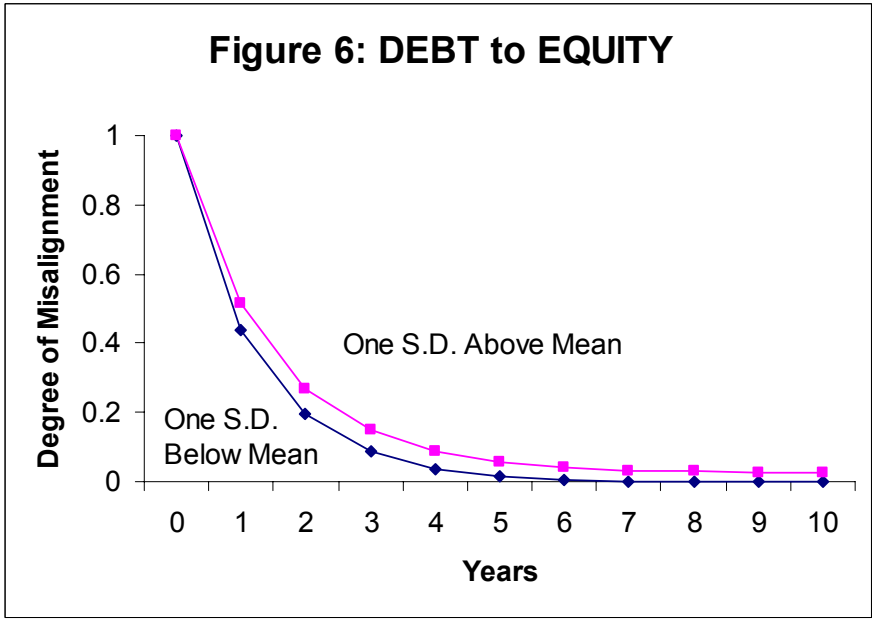
Figure 6: DEBT to EQUITY
Degree of Misalignment
1
0.8
0.6
0.4
0.2
0
One S.D. Above Mean
One S.D.
Below Mean
0 1 2 3 4 5 6 7 8 9 10
Years

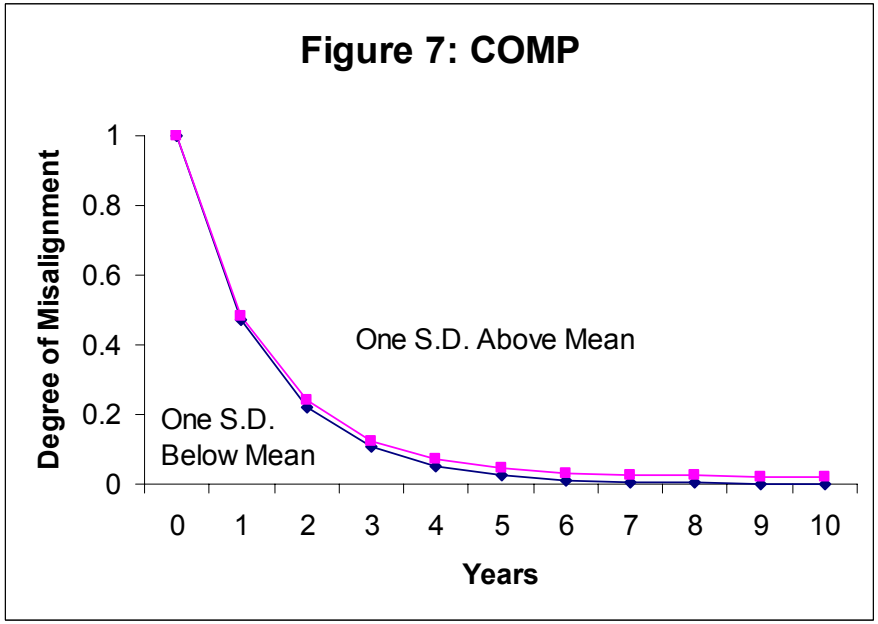
Figure 7: COMP
Degree of Misalignment
1
0.8
0.6
0.4
0.2
0
One S.D. Above Mean
One S.D.
Below Mean
0 1 2 3 4 5 6 7 8 9 10
Years

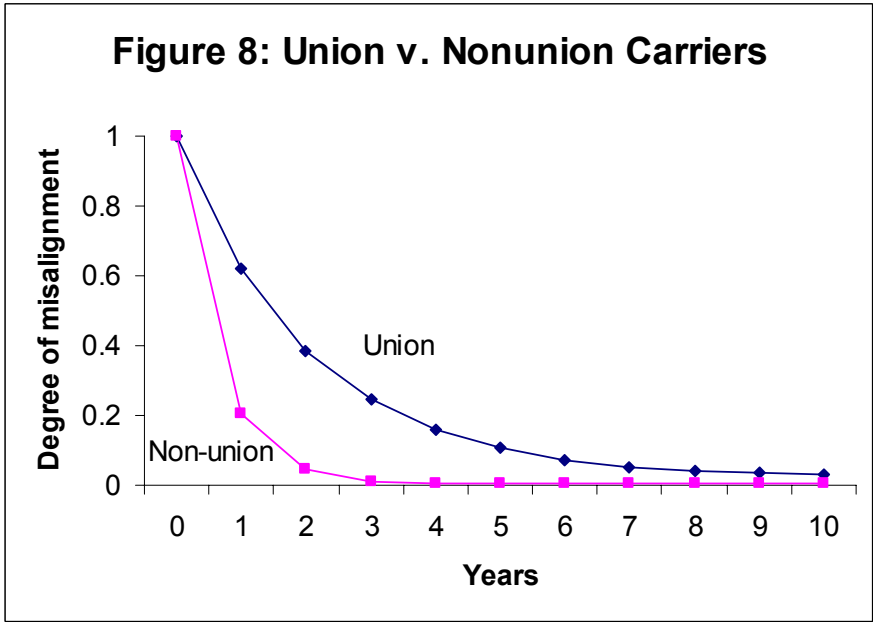
Figure 8: Union v. Nonunion Carriers
Degree of misalignment
1
0.8
0.6
0.4
0.2
0
Union
Non-union
0 1 2 3 4 5 6 7 8 9 10
Years

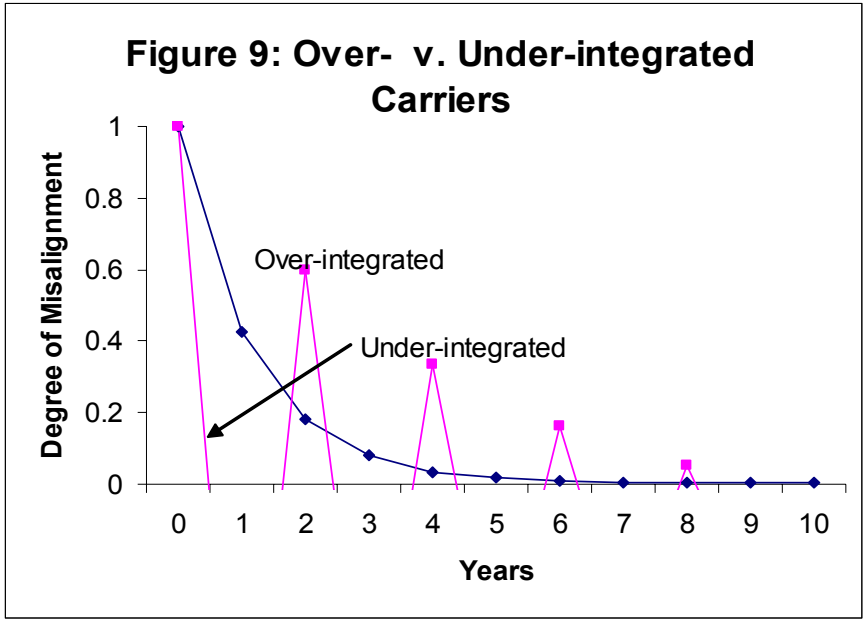
Figure 9: Over- v. Under-integrated Carriers
Degree of Misalignment
1
0.8
0.6
0.4
0.2
0
Over-integrated
Under-integrated
0 1 2 3 4 5 6 7 8 9 10
Years

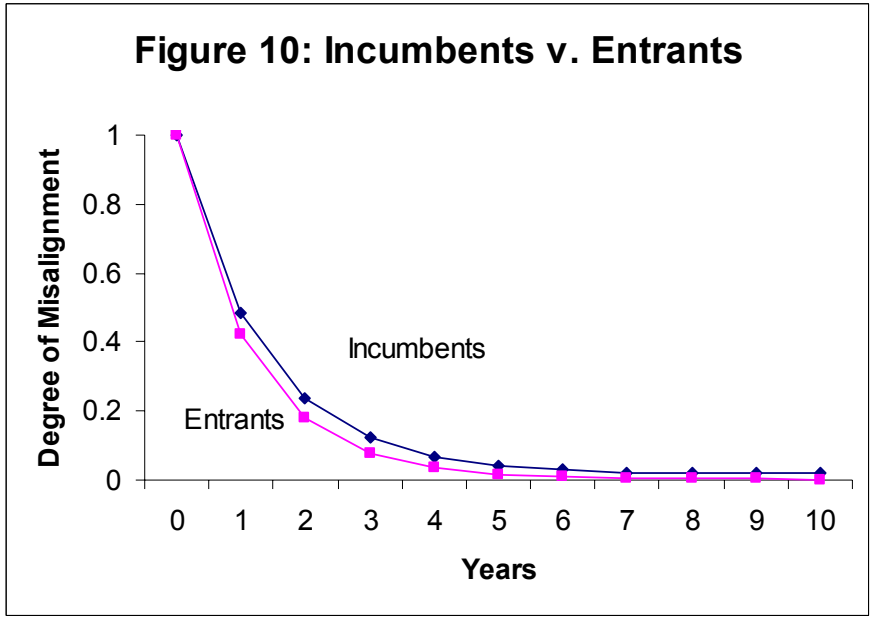
Figure 10: Incumbents v. Entrants
Degree of Misalignment
1
0.8
0.6
0.4
0.2
0
Incumbents
Entrants
0 1 2 3 4 5 6 7 8 9 10
Years

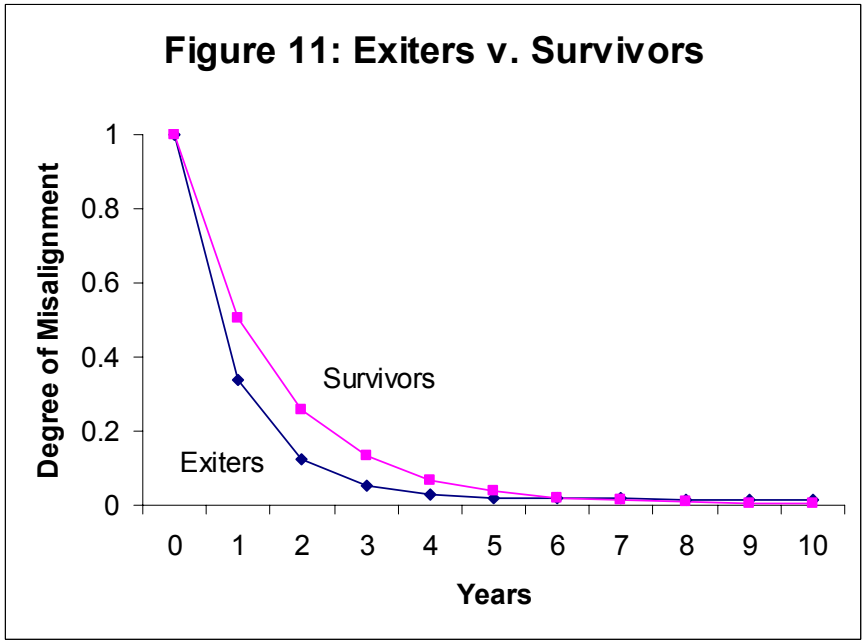
Figure 11: Exiters v. Survivors
Degree of Misalignment
1
0.8
0.6
0.4
0.2
0
Survivors
Exiters
0 1 2 3 4 5 6 7 8 9 10
Years