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The Real Effects of Relational Contracts[†]

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How important are factors such as "firm culture" and "employee engagement" in driving firm performance? Increasing evidence from a wide range of fields suggests that productivity differs widely across firms, even after the inclusion of careful controls for factors such as capital intensity, labor quality, and the structure of demand (see, for example, Chew, Bresnahan, and Clark 1990 and Syverson 2004). Several researchers have suggested that one possible cause of this productivity dispersion is the heterogeneous adoption of managerial practices such as the use of high-powered incentive systems, explicit performance targets, selective recruiting, and skills training (e.g., Kochan et al. 1986; MacDuffie 1995; Ichniowski, Shaw, and Prennushi 1997; Bloom and Van Reenen 2007; Bloom, Sadun, and Van Reenen 2012).

But a long tradition of work in organizational behavior and organizational psychology suggests that the successful adoption of productivity enhancing managerial practices requires complementary changes in the firm's "culture" or in the structure of social relationships within the firm (see, for example, Blader and Tyler 2009; Tyler and Blader 2000; Collins and Smith 2006; Edmonson and Lei 2014; and Gittell 2002). Recently Gibbons and Henderson (2013) have suggested that one way to formalize this insight is through a focus on the role of relational contracts within the firm. They suggest that competitively significant managerial practices rely for their effectiveness on the performance of actions that cannot be specified in advance or contractually verified ex post, citing, for example, Nordstrom's instruction to its sales associates to "use good judgment in all situations." They hypothesize that this implies that the performance effects of management practices will be contingent on the presence of appropriate relational contracts within the firm.

This is an intriguing idea and consistent with a number of qualitative accounts of the role of relational contracts in shaping firm performance (see, for example, Helper and Henderson 2014 and Gittell 2002). In this paper, we explore a related question: do relational contracts have a direct impact on performance? As far as we are aware, this has not been the subject of any systematic empirical test. To this end, we report the first results from a research program designed to be a first step in this direction. We use the quasi-randomized rollout across multiple sites within a single firm of an intervention designed solely to change the nature of the social relationships within the site—an intervention we interpret as changing the relational contracts in place—to ask whether changing relational contracts alone has an effect on performance. Below we present some suggestive evidence from a pilot study suggesting that they do. In a separate paper (Blader, Gartenberg, and Prat 2015), we report findings from a second study that explores the complementarities between managerial practices and relational contracts.

I. Research Site and Design

Our research site is a large US trucking company that operates in the less-than-truckload segment of the industry, transporting shipments that are smaller than a full truckload and larger than individual parcels. The company employs more than 10,000 drivers, nearly all of whom are non-union hourly employees, across about 300

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sites in the United States and Canada. A central feature of these sites—and one that is crucial to our research design—is that they operate essentially independently. This feature allows us to employ research designs that randomize various treatments across sites to unpack the effects of relational contracts.

The company is arguably in the middle of transitioning from one relational contract to another via a decade-long program to roll out Lean Management ("lean"). Lean is a widespread management philosophy, inspired by the Toyota Production System, that encompasses both extensive cultural interventions and a broad array of formal practices. Our company divided their lean rollout into five phases and, at the time of our research, was midway through the first phase.

Critically, this first phase involves no implementation of formal lean practices or changes to employee incentives. Instead, it consists primarily of introducing employees to lean principles, including how "continuous improvement" (the organizing idea behind Lean Management) occurs primarily through teamwork, collective responsibility, and the empowerment of frontline workers. In a relational contract context, this first phase can be interpreted as a costly effort by management to announce a change in the prevailing contract. This effort by the company is consistent with Gibbons and Henderson (2013) and Helper and Henderson (2014), both of which draw on prior research to suggest that the successful implementation of lean techniques requires the development of a complementary set of relational contracts.

For the purpose of our research, therefore, we interpret this first phase as a relational contract intervention. We refer to it as "the lean intervention" or "lean," even though Lean Management, in its fullest sense, is far broader and encompasses an extensive set of formal practices to manage the production process (which had not yet been initiated at our company). For this initial pilot study, we ask: Does the lean intervention alone have a direct effect on performance?

A. *Preliminary Results*

To identify the causal impact of a relational contract on performance, we require a research design that randomly assigns a relational contract intervention to some sites and no intervention to others. A study of this nature is currently underway. Since the results of that study are pending, here we report preliminary findings based on a cross-sectional comparison of sites that had and had not already received the lean intervention when our study commenced. From discussions with management, we believe that this previous assignment of lean can be plausibly considered quasi-random in that, after an initial pilot program in 2011, the lean rollout schedule was chosen solely to reduce the travel burden on the regional lean manager, and not by the anticipated success of lean at any particular site.

We record lean as a binary variable, capturing whether or not the first phase of lean had been initiated at the site at least three months before our data collection. For performance measures, we consider three measures of driver efficiency that directly reflect fuel usage and truck wear-and-tear: (i) Gap Score, the percentage difference between the average actual and "potential" miles per gallon expended on a given route;[1] (ii) Excess Idle Time, a measure of the minutes that an engine idles beyond a designated time period, thereby wasting fuel, and (iii) Total Fuel Lost, an aggregate measure of all the fuel wasted from idling, inefficient shifting, speeding, and gearing. A higher value for any of these measures represents worse performance.

For this analysis, we use data from daily driver routes obtained between September 2013 and April 2014 across 73 lean and nonlean sites and 3,179 individual drivers. These sites comprise the control group of a separate study—discussed below—in which we randomized the public posting of driver performance results across lean and nonlean sites. Because those performance postings affected driving behavior, we exclude the treated sites from this analysis.

The histograms shown in Figure 1 show the average performance in lean and non-lean sites. We can see from these raw comparisons that driver performance in lean sites is consistently more efficient than in non-lean sites.

Why might the lean intervention have this effect? On its face, this result is puzzling since no formal changes to operating practices or incentives were implemented. Our studies suggest that, under the lean relational contract,

[1] The potential miles per gallon is calculated by the truck's on-board computer on the basis of optimal shifting and speed patterns, given weather conditions and route characteristics.

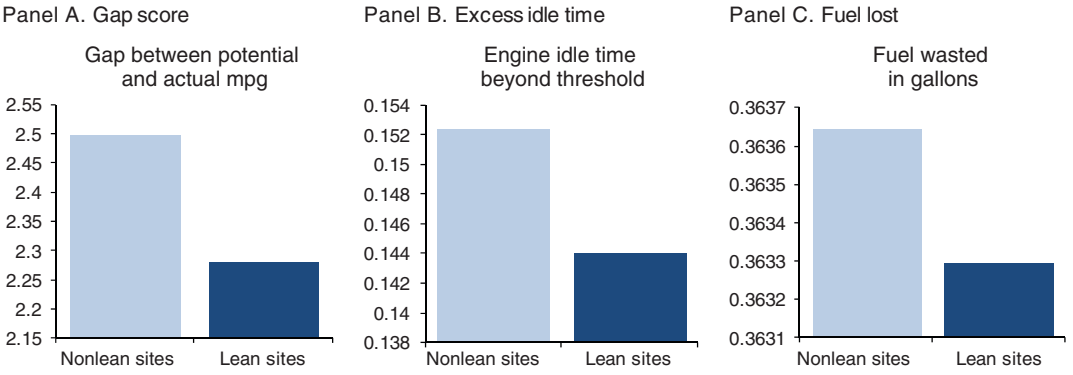

Figure 1. Driver Performance at Lean and Nonlean Sites

drivers adjust their beliefs that the company values and respects, rather than exploits, them. The observed effect is consistent with Halac and Prat's (2014) prediction that workers' belief in the firm's management system is a determinant of both effort and performance.

Interview data obtained from conversations with individual drivers and supervisors are also consistent with this idea. For example, one supervisor noted how lean had changed his leadership style:

> *These guys will do anything for me, and they'll do absolutely nothing for other people. And I learned a lot of that from lean because lean has made me softer, it really has. I used to be hard as rock and now I feel like I'm a sponge … I still have that same pride but it's—my interaction with people is so much different, it's so much different. You're not treating them in a negative way or a negative manner and that's—I was hard as a rock in my numbers produced … and if somebody didn't want to get on board with me on my team in all likelihood it probably wasn't going to be a very good day for that person. Now, it's with everybody being involved instead of just me running the show, it's totally different.*

And a driver noted how lean had changed relationships within the site:

> *I think the meetings and stuff have actually helped just getting people working together. So in the lean team, I think there's actually a good amount of camaraderie going on. So I think that's actually been good. Now some people I didn't really get along [with, we] are working together.*

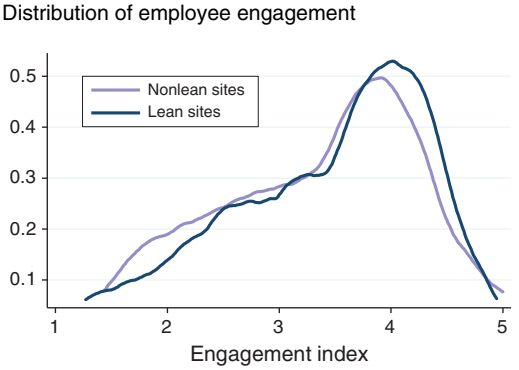

Figure 2. Distribution of Driver Engagement in Lean and Nonlean Sites

For quantitative evidence of this explanation, we worked with the company to administer an employee engagement survey on a subset of sites. The survey was individually identified in order to match responses to driver performance. The survey itself includes 37 questions on employee attitudes scored from 1–5, where 5 is the most positive response. For simplicity, we construct an engagement index that is the average of all 37 questions. Figure 2 shows the distributions of driver engagement for lean and nonlean sites. The distribution of driver engagement is noticeably shifted right for drivers in lean sites and has a smaller left-handed tail.

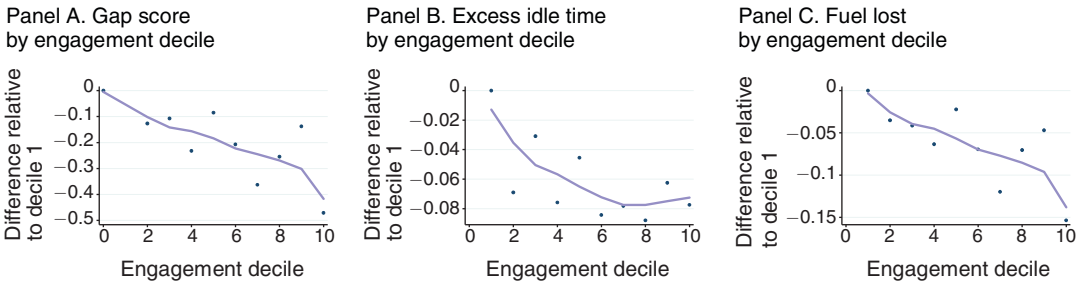

FIGURE 3. DRIVER PERFORMANCE BY ENGAGEMENT DECILE

TABLE 1—LEAN, DRIVER ENGAGEMENT, AND PERFORMANCE

Dependent variable	Gap score		Excess idle time		Fuel lost	
	(1)	(2)	(3)	(4)	(5)	(6)
Lean	−0.2016*	−0.1342	−0.0498**	−0.0315	−0.0890***	−0.0683**
	(0.1148)	(0.1195)	(0.0208)	(0.0232)	(0.0301)	(0.0320)
Engagement index (Z)		−0.0669*		−0.0182**		−0.0206*
		(0.0368)		(0.0073)		(0.0114)
Constant	3.4083***	3.4361***	0.0378	0.0454	0.3808**	0.3893**
	(0.4959)	(0.5415)	(0.0695)	(0.0724)	(0.1476)	(0.1612)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	21,669	21,669	21,669	21,669	21,669	21,669
Adjusted R^2	0.112	0.121	0.067	0.073	0.171	0.177

Notes: OLS estimates. Observations represent city driver-days for the subset of observations with associated survey results. Engagement index is the z-scored average of the 37 survey questions. Controls include demographic measures (race, age, tenure), number of trucks at site, route distance, route potential MPG, and fixed effects for day of week, calendar date, date since EOBR rollout, and region. Errors clustered by site.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Figure 3 shows driver performance by engagement decile, relative to the lowest decile. While purely a correlational result, this figure shows a clear association between driver engagement and performance.

Table 1 shows the association between lean, driver engagement, and performance. Without accounting for engagement, lean sites are associated with better performance. When engagement is included in the model, however, this association attenuates to insignificance.

Together, these results show that the lean intervention is associated with higher employee engagement, which is in turn correlated with better driving performance. Applying a causal interpretation, based on the quasi-random lean assignment, the findings become intriguing for two reasons: first, they imply that relational contracts, *independent of* formal practices, can influence performance. Second, they suggest that relational contracts can, in fact, be changed by managers, albeit in a costly, time-consuming way.

II. Directions for Further Work

These results are intriguing but incomplete. First, we report average differences in

performance levels across two quasi-randomized groups of sites. A more convincing test, currently in process, is to report performance *changes* across randomized groups. Second, a number of important research questions remain unanswered. For example, how do relational contracts interact with formal management practices? How do they interact with other aspects of job design, such as formal incentives, the degree of workplace decentralization, and the nature of actual work performed? How are they related to market conditions, such as the intensity of competition, uncertainty, and technological advancement? Finally, more work is required to understand the contracts themselves. What is the actual underlying mechanism by which they influence productivity? And finally, how can they be credibly altered and sustained? Some of these questions we hope to explore at this site and in other settings. We also hope this work attracts broader interest and other empirical research on the topic.

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