



Why Do Firms Impose Vertical Restraints? Evidence from Franchise Contracts

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Why Do Firms Impose Vertical Restraints? Evidence From Franchise Contracts*

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Abstract

Franchising is a business form in which one firm (the “franchisor”) licenses another firm or individual (the “franchisee”) to operate businesses using the franchisor’s trademarks and proprietary business methods. Vertical restraints—contractual controls imposed by an upstream firm on the operations of a downstream firm, such as price, supplier and customer restrictions—are the essential features of franchise contracts. The presence or absence of particular vertical restraints determine which business decisions the franchisor seeks to control, and which it seeks to delegate to local managers. There are several theories seeking to explain why firms impose vertical restraints. One explanation focuses on agency costs and the role of vertical restraints in restraining franchisee opportunistic behavior. Another emphasizes the role of risk and uncertainty and the need for brand owners to delegate authority to local managers with superior information. Finally, some explanations point to the role of vertical restraints in labor discipline, arguing that firms deploy vertical restraints to target a vulnerable (low-skill, high-turnover, low-wage) workforce for downstream employment. By removing non-labor variables from the franchisee’s profit-maximizing choice set, vertical restraints compel franchisees to focus on minimizing labor costs and extracting labor effort for their profit margins, to the exclusion of alternative profit-maximizing strategies like charging higher prices, substituting cheaper inputs, investing in training, or motivating employees with efficiency wages. Using a data set created from 530 franchise contracts, I examine which franchisor characteristics predict the likelihood of imposing vertical restraints. I find that agency cost, risk, and worker characteristic variables are significantly associated with the likelihood of imposing vertical restraints, but that much of the variation in the likelihood of imposing vertical restraints remains unexplained.

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1 Introduction

Under franchise contracts, a brand owner like McDonald’s, rather than owning and operating its retail business operations, licenses legally independent franchisees to do so, with the right and obligation to use the franchisor’s trademarks and proprietary business methods. Franchisees typically pay a percentage of their sales to the franchisor and sign long-term, highly restrictive contracts that give franchisors substantial control of unit operations.¹ In 2012, the most recent year for which data are available, franchise establishments accounted for 7.3 million jobs in the United States. Franchisors accounted for more than 409,000 establishments, 9.8 percent of all establishments. Sales of franchised chains were about 1.3 trillion dollars in 2012, or 7.8 percent of total U.S. GDP.²

Vertical restraints—contractual controls imposed by an upstream firm on the operations of a downstream firm, such as price, supplier and customer restrictions—are the essential features of franchise contracts. The presence or absence of particular vertical restraints determine which business decisions the franchisor seeks to control, and which it seeks to delegate downstream. Federal courts initially looked skeptically on the imposition of vertical restraints, questioning the legality under antitrust law of big business dominating and controlling small business through restrictive contracts. However, since *Continental Television, Inc. v. GTE Sylvania, Inc.*, franchisors have had wide latitude to impose non-price vertical restraints.³ Since *Leegin Creative Leather Products, Inc. v. PSKS, Inc.*, they have had similar freedom to impose price vertical restraints.⁴ As I show elsewhere, franchising firms waged a decades-long struggle of lobbying and litigation to win the right to impose a wide range of vertical restraints (Callaci, 2018a).

¹The term franchising is sometimes also used to refer to exclusive dealing relationships between manufacturers and distributors. In this paper I use “business format franchising” to refer to the former type, and “product distribution franchising” to refer to the second type. Since business format franchising is the focus of this paper, the term “franchising” when used alone refers also to the former type.

²<https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk>

³*Continental Television, Inc. v. GTE Sylvania, Inc.*, 433 U.S. 36 (1977)

⁴*Leegin Creative Leather Products, Inc. v. PSKS, Inc.*, 551 U.S. 877 (2007)

2 Why Impose Vertical Restraints?

2.1 Agency costs

Franchising is a principal-agent relationship, and most existing theoretical treatments of vertical restraints in franchising focus on agency costs to explain the imposition of vertical restraints. The presence of externalities, for example, drives franchisors to impose vertical restraints because franchisees have incentives to free ride on the value of the franchisor's brand, by shirking, substituting lower-quality inputs, or cannibalizing sales from existing locations rather than seeking new customers. Setting mandatory hours of operation, restricting sources of supply or imposing location restrictions can limit franchisee opportunities for free-riding (Tesler, 1960; Mathewson and Winter, 1984; Blair and Lafontaine, 2010). Meanwhile maximum price controls, a major type of vertical restraint, can eliminate the double marginalization problem, which occurs when franchisors and franchisees both have market power, resulting in a double markup over marginal cost. Maximum prices imposed by the franchisor can bring price and quantity closer to the competitive levels (Spengler, 1950; Blair and Lafontaine, 2010). Under these theories, franchisors with a greater need to control franchisee opportunism, such as franchisees with more valuable brands, are more likely to impose vertical restraints.

2.2 Information, Complexity, and Uncertainty

The quality of franchisor information about unit operations might also influence the decision to impose vertical restraints. We might expect franchises with high outlet operating complexity or difficulty monitoring to impose fewer vertical restraints, relying more on the incentives of residual claimancy alone to motivate franchisees. The risk and incentives model of Prendergast (2002), meanwhile, suggests that risk and uncertainty should drive decisions of whether or not to impose vertical restraints. In Prendergast's model, under conditions of high uncertainty (high variance of output), principals do not know which tasks should

be undertaken or how, and delegate authority to their agents. Under lower levels of uncertainty, principals do not know what tasks should be undertaken and how, and delegate fewer tasks. Vertical restraints, which take discretion away from franchisees rather than leaving them free to make their own decisions, can be seen as alternatives to delegating authority to franchisees. Under Prendergast’s theory, franchisors facing less variable output are more likely to impose vertical restraints.

2.3 Targeting a Vulnerable Workforce

Finally, the decision to impose vertical restraints may be driven in part by labor market considerations. Krueger and Ashenfelter (2017) find a strong empirical relationship between the presence of one type of vertical restraint in franchise contracts, a no-poaching clause, in which franchisees are prohibited from hiring each others’ employees, and industry-level low wages and high employee turnover. They interpret their results as suggesting that the purpose of such contract clauses is to facilitate oligopsony by restricting the mobility of high turnover workers, reducing their wages and increasing the rents available to be shared between franchisors and franchisees.

There may be more to the relationship between vertical restraints and workforce characteristics than Krueger and Ashenfelter’s monopsony results suggest, however. For one thing, vertically dis-integrated organizational structures like franchising, in which independent smaller franchisees stand between larger brands and workers, have created what David Weil (2014) has called “fissured workplaces.” These are workplaces in which the “lead” firm (in this case the franchisor) focuses on the highest value-added activities (in this case licensing the trademark) and outsources low-value added activities to third parties. In fissured workplaces, the legal boundaries of the firm act as barriers excluding workers outside them from gaining access to firm-specific and union rents, internal career ladders, and legal protections (whose coverage remains largely limited to the firm in which the worker has formal employee status). Vertical restraints create fissured workplaces, because without the

ability to control quality through extensive vertical restraints, franchisors would be forced to directly own and operate production units to achieve uniform levels of quality control. Workplace fissuring reduces labor costs, and the ability to fissure the workplace may be another factor driving the use of vertical restraints. The poor quality of franchised jobs, in fact, has long been known. Krueger (1991) finds that wages are lower at franchised outlets than at outlets directly owned by the parent company, and that company-owned restaurants have a steeper tenure-earnings profile. Ji and Weil (2015) find that franchised outlets have more wage and hour violations than company-owned outlets.

Vertical restraints do more than simply fissure workplaces, lowering costs by excluding workers from firm rents. They also limit the labor relations strategies open to franchisees. Vertical restraints focus the energies of franchisees on labor cost control and the extraction of effort from workers by taking away franchisee discretion in other areas. As the imposition of vertical restraints regarding sourcing, pricing, hours of operation, product selection and other decisions removes items from franchisee discretion, their profit-making options are constrained. As I show elsewhere (Callaci, 2018b), other features of franchise contracts (non-competes, mandatory arbitration, and more) reduce the fallback position of franchisees, inducing them to exert high levels of effort. Vertical restraints focus and direct that franchisee effort towards extracting production worker effort. According to a report by the National Employment Law Project in 2014:

While the [franchisors] claim that they have no influence over wages paid to workers, they control wages by controlling every other variable in the businesses except wages (Ruckelshaus et al., 2014, p. 11).

Supplier restrictions are especially consequential here, since they take away franchisees' ability to control their own non-labor costs, forcing them to focus all the more on restraining labor costs for their margins.

Franchisors that impose extensive vertical restraints may be pursuing a different franchising strategy than those that delegate more authority to franchisees. Franchisors that

delegate more tasks to franchisees rely more on the skills and entrepreneurial abilities and discretion of their franchisees. Franchisees facing few vertical restraints have the freedom to pursue various labor market strategies, including employee skilling or efficiency wage strategies. Franchisors that control most details of franchisee businesses through vertical restraints seem to be relying on their franchisees' role as labor monitor rather than entrepreneur. Franchisor firms pursuing a vertical restraints-intensive strategy would be expected to structure franchise contracts to target workers with low bargaining power, relying on effort-intensive rather than skill-intensive labor strategies. Under what I will call the "targeting a vulnerable workforce" theory of vertical restraints, indicators of low worker bargaining power and skill should be associated with the imposition of vertical restraints.

3 Data

This paper uses a unique data set created from 530 franchise contracts to examine which franchisor and industry characteristics predict the likelihood of imposing vertical restraints. The Federal Trade Commission requires franchisors to furnish prospective franchisees with a Franchise Disclosure Document (FDD), which contains a copy of the contract and detailed information about the franchisor. Some states require franchisors to register with the state and file a copy of their FDD. I acquired all FDDs filed in the State of Wisconsin in 2016 (containing 2015 data), and hand-collected a data set from the FDDs for all 530 franchisors with more than 80 outlets nationwide. I use the cutoff of 80 to ensure my data set includes only mature large chains, excluding fly-by-night chains, small local chains and other marginal operators. The sample contains all of the national US chains and some regional chains as well: the mean franchisor in my data set operates in thirty-seven states and territories.

To analyze what factors are associated with the decision to impose vertical restraints, I collected variables representing six common vertical restraints, a set of variables representing characteristics of each franchisor, and industry-level workforce traits. The vertical restraints

are as follows. The first is the proportion of the franchisee's ongoing purchases that must be made from sources of supply restricted by the franchisor. The other five are dummy variables ($Y=1$) indicating the presence or absence of specific contract terms: whether franchisor approval is required for the site of the business, whether the franchisor prohibits the sale of unapproved products or services, whether the franchisor sets mandatory hours of operation, whether the franchisor sets maximum or minimum prices, and, following Krueger and Ashenfelter, whether the franchisor imposes a no-poaching clause.

I collect franchisor characteristics from the FDDs to examine whether agency costs predict the imposition of vertical restraints. Franchisors with more valuable brands have higher externalities and would be expected to impose more vertical restraints to constrain franchisee moral hazard and free-riding. The number of outlets (Lafontaine, 1992; Lafontaine and Shaw, 1999, 2005; Combs et al., 2009), length of the franchisee training program (Lafontaine, 1992; Lafontaine and Shaw, 1999, 2005), and age of the brand (Lafontaine, 1992; Combs et al., 2009) typically proxy for brand value in the franchising literature. I also include a financial variable, the total assets of the franchisor, to capture brand value. Monitoring costs are another type of agency costs. Number of states with outlets captures the geographical dimension of monitoring costs, as more dispersed production networks are more difficult to surveil (Lafontaine, 1992; Lafontaine and Shaw, 1999, 2005). The size of the average initial franchisee investment, measuring outlet size and complexity, captures another dimension of monitoring costs (Lafontaine, 1992; Lafontaine and Shaw, 2005; Combs et al., 2009). Lafontaine (1992) use proportion of outlets discontinued at the sector level as a measure of risk (variance of output). I use proportion of discontinued outlets over the last three years (or the outlet turnover rate) at the franchisor level.

Descriptive statistics for the vertical restraints are presented in Table 1, and descriptive statistics for franchisor characteristics in Table 2. It is apparent that two of the vertical restraints, site selection and product approval, are imposed by nearly all franchisors and unfortunately do not produce much variation to explain with regression analysis.

4 Which Franchisor Characteristics Predict the Use of Vertical Restraints?

In this section I explore which franchisor characteristics predict the use of vertical restraints in franchise contracts. Rather than create an index of vertical control, I elect to study each vertical restraint separately, because different types of vertical restraints may serve different purposes and have different predictors. The correlation matrix in Table 3 shows that while the correlation coefficients among vertical restraints are generally positive, meaning that franchisors imposing one vertical restraint are likely to impose others, the correlations are quite weak. I deal with this by making each vertical restraint the left hand variable in its own regression.

I estimate the following linear probability model for the five dummy variables representing vertical restraints. The supplier restrictions vertical restraint is a proportion rather than a bivariate outcome, so I use OLS for that particular restraint. Subscripts i vary at the franchisor level.

$$Pr(\text{Vertical Restraint}_i = 1) = \beta_0 + \beta_1 \ln(\text{Outlets}_i) + \beta_2 \text{States}_i + \beta_3 \ln(\text{Age}_i) + \beta_4 \log(\text{Training}_i) + \beta_5 \ln(\text{Investment}_i) + \beta_6 \ln(\text{Assets}_i) + \beta_7 \ln(\text{Turnover}_i)$$

I use the linear probability model (LPM) rather than logit or probit for the ease of interpreting coefficients across regressions with bivariate or proportion left hand side variables. I also prefer the LPM in this case because its more straightforward R^2 calculation, which I rely in the analysis to follow. I take the log of those variables that appear log-normally rather than normally distributed according to visual inspection of the distributions, adding 0.001 to variables with any zero-valued observations. Using multiple proxies for the same underlying theoretical concepts might be expected to throw up problems of collinearity. However, the correlation matrix for franchisor characteristics in Table 4 shows that collinearity among the

franchisor characteristics is modest. To deal with within-industry correlation among error terms, I cluster standard errors at the industry level, using the same detailed NAICS industries used by the Current Population Survey, which is where I get labor market variables used in regressions later in the paper. This yields sixty-nine clusters.

According to the externality and free-riding explanations for vertical restraints, we would expect to see positive signs on the brand value (number of outlets, brand age, and assets) coefficients. If franchisors respond to outlet operating complexity and low-quality information about local production environments by delegating more authority to franchisees, we would expect negative signs on the monitoring cost (number of states with outlets, average initial investment) coefficients. Under the Prendergast theory, we would expect a negative coefficient on the outlet turnover variable, which measures franchise-level risk.

Regression results are presented in Table 5. Significance is conservatively reported for a two-tailed test. Turning to the brand value proxies first, the length of the training program is a particularly strong predictor of vertical restraints, being significantly positively associated with all six vertical restraints. The magnitude is modest, however. For example, an increase in the length of the training program by ten hours is associated with a half percentage point likelihood of imposing a no-poaching agreement. The number of outlets is significantly and positively associated with two of six vertical restraints, while, contrary to the predictions of agency theory, brand age is negatively and significantly associated with four of the six. It could be the case that brand value may capture certain life cycle effects in addition to brand value. Franchisor assets is only significantly associated with two restraints, and it flips signs from no-poaching agreements (negative) to site approval (positive).

Looking at the monitoring cost proxies, we see that the number of states is significantly negatively associated with four of the six vertical restraints. It seems franchisors with dispersed production networks and difficulty monitoring tend to delegate more authority to local managers. However, average initial investment does not have a consistent relationship with vertical restraints. It is positively and significantly associated with site approval and

price controls, but negatively associated with product approval. Finally, the risk variable, average outlet turnover, is significantly negatively associated with mandatory hours of operation and price controls. Where this coefficient is significant, it is in line with the Prendergast model.

The signs on the franchisor characteristics sometimes flip between positive and negative depending on the particular restraint, suggesting that the agency cost and risk and incentives theories may apply to different vertical restraints in different ways. The regressions suggest that measures of brand value do a fair job predicting site selection, purchase restrictions and (somewhat less strongly) product approval. A brand value/externalities theory of vertical restraints is less consistent, however, with the evidence regarding no-poaching agreements, price fixing and hours of operation. The variables capturing difficulty monitoring indicate that franchisors are *less* likely to impose site, purchase, product and hours restrictions when monitoring costs are high. Perhaps it is more profitable to let franchisors make their own decisions when the franchisor has poor quality knowledge about local conditions.

Finally, the coefficients on the risk variable conform to the Prendergast model. We would not expect risk to be associated with no-poaching (which has nothing to do with choice under uncertainty) or site selection (a one-time decision made at the beginning of the relationship). Franchisors behaving according to the Prendergast model would be expected to delegate authority more when it comes to managerial decisions like product offerings, hours of operation, and price: they would delegate when uncertainty is high, and impose vertical restraints when uncertainty is low. That is indeed what we find.

However, the low R^2 , ranging from a low of 0.09 for the no-poaching agreement regression to a high of 0.208 for the percentage of purchases from approved suppliers regression, indicates that most of the explanation for the likelihood of imposing vertical restraints lies with variables outside those included in the regressions.

5 Franchisor Characteristics with Industry Fixed Effects

In this section I run the same regression as in the previous section, only this time with the inclusion of two-digit NAICS industry fixed effects. While the magnitudes of the coefficients are similar between both regressions, in the fixed effect regression, in most cases they are, as would be expected by the inclusion of additional covariates, slightly attenuated. The inclusion of fixed effects also causes the significance of some of the coefficients in the model without fixed effects to disappear. For example, the number of outlets is only a significant predictor of the approved purchases vertical restraint in the fixed effects regression. Still the results are quite similar, indicating that unobserved within-industry heterogeneity is not the dominant contributor to the likelihood of imposing vertical restraints. Reinforcing this conclusion, R^2 is only modestly higher in the fixed effects regression, ranging from a low of 0.110 (no-poaching agreements) to 0.314 (percent of supplies from restricted sources).

While two-digit NAICS industries are broad industrial classifications, using more detailed NAICS industry fixed effects would run the risk of overfitting, given the relatively small number of observations. Moreover using more detailed industry fixed effects would also require the inclusion of fixed effects for many industries with only one or two observations.⁵ However, “fast food” is the largest industry by far in the data set. Franchisors in either the “limited service restaurants” (such as McDonald’s and Taco Bell) or “snack and non-alcoholic beverage bar” (like TCBY Frozen Yogurt or Dunkin’ Donuts) NAICS industries constitute 118 of the 530 franchisors in the data. Table 7 presents the regression without fixed effects, but with the inclusion of a fast food dummy variable.

The fast food dummy is highly significant and of a large magnitude. Fast food franchisors are fourteen percent more likely to impose no-poaching agreements and fifteen percent more likely to impose price controls. Being a fast food franchisor is also associated with an increase

⁵See Table 8 and Table 9 for lists of industries included in the data set.

in the percent of supplies that must be purchases from restricted sources of fifteen percentage points. Much of the variation remains unexplained, but it appears that the fast food dummy by itself explains much of the variation explained by the industry dummies.

6 Introducing Labor Market Variables

What is it about fast food that makes the use of vertical restraints so prevalent? A clue might lie with the fact that fast food has become synonymous with low-wage, low-skilled work. A major early innovation of McDonald's, for example, was introducing an automated system to replaced skilled chefs with unskilled, younger workers. However, McDonald's early attempts at franchising failed due to the lack of vertical control. Under CEO Ray Kroc in the 1960s McDonald's harnessed the power of vertical restraints to expand its fordist system "tailored for unskilled labor" throughout the US (Love, 1995, p. 136). Royle (1999) documents how the same firm, McDonald's, deliberately "recruits an acquiescent workforce" internationally, favoring cheap, unskilled and (what McDonald's perceives as) more pliable labor. In the US, franchisors have long sought young part-time workers in particular. The main franchise lobby group in fact pushed for a youth sub-minimum wage in the 1970s (International Franchise Association, 1979, p. 112). Lafontaine and Sivadasan (2009, p. 119) cite fast food industry insiders as reporting that "labor schedule changes and flexibility in hours per week per worker are among the most important margins that managers have at their disposal to keep production costs down," highlighting the lack of ability to alter other costs and the importance of labor costs to fast food profitability.

To examine whether workforce traits are associated with the decision to impose vertical restraints, I collected industry-level average hourly wage data for 2015 from the Current Employment Statistics (CES) survey and 2015 industry-level average employee turnover (new hire rate, or proportion of workers with less than one year of tenure), age and education (years of schooling) data from the Current Population Survey, and merged these industry-level data

with the data from the franchise contracts.

Tables 8 and 9 list the industry mean value of each workforce characteristic in each CPS and CES industry in the data set. The worker traits are highly collinear with each other, as can be seen in Table 10. Workers who are either young or relatively uneducated tend to also have low tenures at their current jobs and earn low wages. The correlation matrices suggest that the workforce traits together represent a latent variable, low bargaining power. Because of the high collinearity between the workforce traits, I enter them one by one in separate regressions. As we saw in the last section, the franchisor characteristics do not exhibit similar tight correlations with each other, and I therefore enter them together. I estimate the following equation for each of the six dummy variables representing vertical restraints.

To bring worker traits into the analysis, I run the following regression:

$$Pr(\text{Vertical Restraint}_i = 1) = \beta_0 + \beta_1 \ln(\text{Workforce Trait}_j) + \beta_2 \ln(\text{Outlets}_i) + \beta_3 \text{States}_i + \beta_4 \ln(\text{Age}_i) + \beta_5 \log(\text{Training}_i) + \beta_6 \ln(\text{Investment}_i) + \beta_7 \ln(\text{Assets}_i) + \beta_8 \ln(\text{Turnover}_i)$$

Four separate regression tables, one for each of the four collinear j workforce trait variables, are presented in Tables 11-15. That makes 24 separate regression equations. The coefficients on the worker characteristics are almost always of the sign expected under the “targeting a vulnerable workforce” theory. In only one regression out of twenty-four is a workforce characteristic of the unexpected sign, and in that case the coefficient is not statistically significant at any reasonable significance level. Among the worker characteristics, age is the most strongly associated with vertical restraints: it is associated with four of six vertical restraints at the one percent significance level (five of six at the five percent level). The magnitudes are fairly large as well: a ten percent decrease in worker age is associated with a 6 percentage point increase in the likelihood of a franchisor imposing a vertical restraint. Turning to the other workforce characteristics, worker turnover and age are each associated

with three of six vertical restraints at the five percent level. Education is rarely statistically significant, but this may be due to the low variation in this explanatory variable: the mean years of schooling is 11.3 years with a standard deviation of 1.2 years. Overall, these results point to the relative youth and inexperience of the workforce as strongly predictive of the use of vertical restraints, even more so than their turnover and wage levels. Workforce traits indicative of a vulnerable workforce are indeed predictive of the likelihood of franchisors imposing vertical restraints.

Workforce traits appear to have a consistent relationship across vertical restraints. However, workforce characteristics seem to be particularly relevant to three restraints: no-poaching agreements, restrictions on hours, and restrictions on suppliers. Three of four worker characteristics (all but education) are significantly associated with mandatory hours of operation at the one percent level. Four of the four worker characteristics are significantly associated with supplier restrictions at the ten percent level, all but age are significant at the five percent level. Franchisors hiring in industries characterized by inexperienced, high-turnover and low-wage workers tend especially to control the franchisee's hiring decisions, hours of operation, and their non-labor inputs more than franchisors in other industries.

Worker characteristics are more weakly associated with product restrictions and price fixing, and site approval is only associated with worker age. However, the weak relationships of workforce characteristics with product restrictions and site approval may simply reflect the extremely low variation in those variables: ninety percent of franchise agreements contain a product restriction clause, and eighty-one percent contain a site approval clause (see Table 1).

7 LASSO regression results

The LPM regressions in the previous section are intended as descriptive prediction exercises rather than causal analyses. Another useful methodology for prediction is the LASSO model.

LASSO models are typically used on large data sets with very large numbers of predictors, using regularization to prevent overfitting by trading off a small increase in bias for a large decrease in variance. Conventional models overfit because adding additional regressors tends to mechanically reduce variance even if the regressors are not truly explanatory. With many regressors included, some of the regressors will, by chance, fit the realized data and decrease variance even if they have no association in the true data generating process. LASSO, an example regularization, penalizes the addition of regressors, and so the model will admit only regressors that substantially explain the outcome well enough to overcome the penalty for adding additional regressors. Compared to OLS, LASSO changes the tradeoff between bias (finding a regressor significant when in reality it is not) and variance (failing to fit the observed data) towards accepting more residual variance rather than assigning importance to an irrelevant regressor.

While the data in this paper do not present the problem of a large number of predictors that LASSO models are designed to solve, LASSO's ability to perform variable selection nonetheless serves as a useful check on the LPM models in the previous section. Using cross-validation to tune the model parameters, I run six LASSO models, regressing each vertical restraint on the full set of franchisor characteristics and workforce traits. As an atheoretical prediction methodology, LASSO more or less blindly drops variables in groups of highly collinear variables, so too much should not be read into LASSO's choice of one variable over another in a group of collinear variables. More important is which group is selected by the LASSO procedure—brand value, monitoring costs, risk, or low worker bargaining power?

Results of the LASSO variable selection exercise are presented in Table 15. The LASSO results largely confirm the LPM models in the previous section. Once again, the brand value measures do not always agree with each other, or even with themselves across vertical restraints. As with the LPM results, geographic dispersion tends to be negatively associated with vertical restraints, while outlet complexity flips signs depending on the restraint.

Once again, Prendergast holds up relatively well. Franchise chains exposed to higher risk

tend to impose vertical restraints on hours and prices, which are the two vertical restraints most reflective of day-to-day business decisions. However product approval, which had been associated with risk in the LPM model, is dropped from the LASSO model. The fast food dummy is retained by the LASSO procedure as a predictor of purchase restrictions and hours restrictions, but it is dropped from the other models when included alongside worker characteristics. Finally, as in the LPM regressions, workforce traits are widely predictive of vertical restraints, with at least one having a relationship of the expected signs with each vertical restraint, with the exception of the product approval vertical restraint. The one anomaly is that years of schooling has a positive sign in the mandatory hours of operation model. When all workforce characteristics are included together in the LASSO regression, however, the regularization procedure does not always pick age, the best performer in the LPM regressions, from among the collinear workforce characteristics.

8 Discussion and conclusion

The literature offers several explanations for the imposition of vertical restraints in franchise contracts. Franchisors impose them to constrain franchisee free-riding and opportunistic behavior (the agency cost theory), to control franchisee decision-making under conditions of low uncertainty (the Prendergast model), or to fissure the workplace and induce franchisees to extract high effort levels from the vulnerable workforce targeted by the franchisor (the targeting a vulnerable workforce theory). Until now, to my knowledge, no study has specifically examined which factors predict the likelihood of imposing vertical restraints. This paper contributes to the analysis of vertical restraint by conducting such a prediction exercise. It finds no clear evidence in support of the agency cost theory, but some evidence in favor of the Prendergast model and the targeting a vulnerable workforce theories.

My results do not show causality in any statistical sense. Nonetheless, they do uncover, for the first time, an empirical relationship between workforce characteristics and vertical re-

straints. It will take further research, including additional data collection, to more precisely determine the nature of this connection and the direction of causal arrows. For example, a limitation of the descriptive, predictive regressions in this paper is the possibility of endogeneity issues, in particular omitted variables. The relationship between workforce traits and vertical restraints may be capturing the relationship between omitted industry-level variables that tend to vary together with the workforce traits. The low R^2 points to the likely influence of omitted variables.

These results suggest that franchisors write franchise contracts in anticipation of the kind of worker they anticipate hiring. In particular, they suggest that in industries like fast food, they write highly restrictive contracts that are tailored to a high-turnover, low-skill, low-wage workforce by steering franchisees toward a high-monitoring, high-effort labor strategy. This strategy uses the incentives of franchisee residual claimancy combined with vertical restraints to focus franchisee attention on monitoring and effort extraction. However, this intense monitoring would, in turn, be likely to reduce the wage premium that must be paid to workers to induce effort, resulting in even lower wages. But then vertical restraints would not only take advantage of low wages, but also contribute to causing them, so wages could be on the left hand side as a dependent variable. Unfortunately, while my data contain franchisor-level contract terms and characteristics, they only contain industry-level worker characteristics. Establishing the impact of vertical restraints on wages requires franchisor-level wage data, suggesting an avenue for further research.

9 Tables

Table 1: Descriptive statistics, vertical restraints

Statistic	N	Mean	St. Dev.	Min	Max
No poach (Y = 1)	529	0.552	0.498	0	1
Site approval (Y = 1)	530	0.819	0.385	0	1
Purchase restrictions (Proportion of total)	498	0.468	0.351	0	1
Product approval (Y = 1)	530	0.908	0.290	0	1
Mandatory hours (Y = 1)	529	0.643	0.480	0	1
Price fixing (Y = 1)	529	0.442	0.497	0	1

Table 2: Descriptive statistics, franchisor characteristics

Statistic	N	Mean	St. Dev.	Min	Max
Outlets	528	761	1,811	80	27,129
No. states & territories	529	37	11	1	55
Brand age	530	27	18	0	103
Training program (hours)	527	152	182	0	1,360
Franchisee investment (dollars)	523	1,527,062	6,139,976	8,468	76,558,688
Franchisor assets (000s dollars)	520	1,559,183	8,702,563	3	161,184,000
3-yr outlet turnover rate	517	0.20	0.27	0	4.16

Table 3: Correlation matrix, vertical restraints

	No-poach	Site	Purchases	Product	Hours	Price
No-poach	1	-0.001	0.156	0.250	0.112	0.072
Site	-0.001	1	0.161	0.072	0.288	0.226
Purchases	0.156	0.161	1	0.096	0.185	0.145
Product	0.250	0.072	0.096	1	0.205	0.133
Hours	0.112	0.288	0.185	0.205	1	0.198
Price	0.072	0.226	0.145	0.133	0.198	1

Table 4: Correlation matrix, franchisor characteristics

	Outlets	States	Brand age	Training	Investment	Assets	Turnover
Outlets	1	0.379	0.317	0.139	-0.021	0.083	-0.096
States	0.379	1	0.231	-0.013	0.061	0.089	0.024
Brand age	0.317	0.231	1	0.229	0.103	0.132	-0.064
Training	0.139	-0.013	0.229	1	0.067	-0.059	-0.161
Investment	-0.021	0.061	0.103	0.067	1	0.046	-0.085
Assets	0.083	0.089	0.132	-0.059	0.046	1	0.054
Turnover	-0.096	0.024	-0.064	-0.161	-0.085	0.054	1

Table 5: Vertical restraints regressed on franchisor characteristics

	<i>Dependent variable:</i>					
	No-poach (1)	Site (2)	Purchases (3)	Product (4)	Hours (5)	Price (6)
ln(Outlets)	0.017 (0.025)	0.055*** (0.018)	0.087*** (0.018)	0.020* (0.012)	0.056 (0.036)	0.011 (0.019)
No. states	-0.004 (0.003)	-0.006*** (0.002)	-0.008*** (0.002)	-0.003*** (0.001)	-0.008*** (0.003)	-0.001 (0.002)
ln(Brand age)	-0.023 (0.021)	-0.030 (0.020)	0.032 (0.020)	-0.038** (0.015)	-0.046 (0.028)	-0.124*** (0.032)
ln(Franchisee training)	0.052*** (0.016)	0.024*** (0.008)	0.039*** (0.008)	0.054*** (0.011)	0.042*** (0.012)	0.037*** (0.006)
ln(Franchisee investment)	-0.020 (0.042)	0.076*** (0.012)	0.006 (0.012)	-0.045*** (0.007)	0.046* (0.025)	0.060*** (0.020)
ln(Franchisor Assets (thousands))	-0.027*** (0.006)	0.016** (0.006)	-0.003 (0.006)	0.002 (0.006)	0.001 (0.010)	0.015 (0.009)
ln(Outlet turnover)	-0.006 (0.017)	-0.003 (0.013)	0.014 (0.013)	-0.014* (0.008)	-0.040** (0.020)	-0.044*** (0.011)
Constant	0.954** (0.386)	-0.417*** (0.152)	-0.010 (0.150)	1.315*** (0.102)	-0.100 (0.275)	-0.363 (0.260)
Observations	498	499	469	499	498	498
R ²	0.091	0.199	0.132	0.208	0.124	0.124
Adjusted R ²	0.078	0.188	0.118	0.196	0.111	0.112
χ ² (df = 7)	47.601***	110.838***	66.154***	116.207***	65.824***	65.987***

Notes: *p<0.1; **p<0.05; ***p<0.01.

Dep vars = (L to R), franchisee prohibited from hiring workers from other franchisees (Y = 1), franchisor site approval required (Y = 1), the proportion of franchisee operating purchases from restricted sources, franchisee can only sell approved products (Y = 1), franchisor sets mandatory hours of operation (Y = 1), franchisor sets max or min resale price maintenance (Y = 1). Franchisee training = length of training program (hours), Franchisee investment = average franchisee initial investment, Outlet turnover = the proportion of system outlets that closed or changed hands over the last three years. Std. errors clustered at the CPS industry level.

Table 6: Vertical restraints regressed on franchisor characteristics, two-digit NAICS industry fixed effects

	<i>Dependent variable:</i>					
	No-poach (1)	Site (2)	Purchases (3)	Product (4)	Hours (5)	Price (6)
ln(Outlets)	0.014 (0.025)	0.040* (0.021)	0.051** (0.023)	0.018* (0.011)	0.044 (0.034)	-0.009 (0.021)
No. states	-0.003 (0.002)	-0.004** (0.002)	-0.005** (0.002)	-0.003** (0.001)	-0.007** (0.003)	0.001 (0.002)
ln(Brand age)	-0.021 (0.025)	-0.026 (0.018)	0.015 (0.013)	-0.041** (0.016)	-0.041 (0.029)	-0.132*** (0.024)
ln(Franchisee training)	0.047*** (0.015)	0.029*** (0.011)	0.034*** (0.010)	0.053*** (0.010)	0.043*** (0.012)	0.028*** (0.007)
ln(Franchisee investment)	-0.028 (0.051)	0.043** (0.022)	-0.053* (0.030)	-0.041*** (0.009)	0.016 (0.023)	0.020 (0.027)
ln(Franchisor Assets (thousands))	-0.026*** (0.007)	0.018** (0.008)	0.0004 (0.006)	0.004 (0.005)	0.002 (0.012)	0.022*** (0.008)
ln(Outlet turnover)	-0.002 (0.018)	-0.002 (0.013)	-0.002 (0.016)	-0.010 (0.008)	-0.036** (0.018)	-0.050*** (0.011)
Constant	1.139 (0.705)	-0.343 (0.506)	0.949* (0.491)	1.417*** (0.128)	0.715*** (0.210)	0.630* (0.348)
Observations	498	499	469	499	498	498
R ²	0.110	0.268	0.314	0.236	0.194	0.179
Adjusted R ²	0.075	0.239	0.285	0.206	0.162	0.146
χ ² (df = 19)	58.186***	155.830***	176.475***	134.336***	107.387***	97.924***

Notes: *p<0.1; **p<0.05; ***p<0.01.

Dep vars = (L to R), franchisee prohibited from hiring workers from other franchisees (Y = 1), franchisor site approval required (Y = 1), the proportion of franchisee operating purchases from restricted sources, franchisee can only sell approved products (Y = 1), franchisor sets mandatory hours of operation (Y = 1), franchisor sets max or min resale price maintenance (Y = 1). Franchisee training = length of training program (hours), Franchisee investment = average franchisee initial investment, Outlet turnover = the proportion of system outlets that closed or changed hands over the last three years.

Std. errors clustered at the CPS industry level.

Table 7: Vertical restraints regressed on franchisor characteristics, fast food dummy

	<i>Dependent variable:</i>					
	No poach (1)	Site (2)	Purchases (3)	Product (4)	Hours (5)	Price (6)
Fast food	0.140** (0.059)	0.103*** (0.032)	0.317*** (0.034)	-0.002 (0.018)	0.147*** (0.040)	0.148*** (0.033)
ln(Outlets)	-0.004 (0.021)	0.039* (0.020)	0.036* (0.020)	0.020* (0.012)	0.034 (0.032)	-0.012 (0.022)
No. states	-0.002 (0.002)	-0.004*** (0.002)	-0.004** (0.002)	-0.003*** (0.001)	-0.006** (0.003)	0.001 (0.002)
ln(Brand age)	-0.023 (0.025)	-0.031 (0.020)	0.028** (0.012)	-0.038** (0.015)	-0.046 (0.030)	-0.125*** (0.031)
ln(Franchisee training)	0.047*** (0.014)	0.021* (0.011)	0.026** (0.010)	0.054*** (0.011)	0.036*** (0.011)	0.031*** (0.006)
ln(Franchisee investment)	-0.023 (0.045)	0.074*** (0.019)	0.001 (0.024)	-0.045*** (0.007)	0.043* (0.022)	0.056** (0.023)
ln(Franchisor Assets (thousands))	-0.026*** (0.008)	0.016** (0.008)	-0.001 (0.006)	0.002 (0.006)	0.002 (0.010)	0.016* (0.009)
ln(Outlet turnover)	-0.010 (0.018)	-0.006 (0.014)	0.005 (0.013)	-0.014* (0.008)	-0.045** (0.019)	-0.048*** (0.011)
Constant	1.028** (0.507)	-0.363 (0.264)	0.150 (0.259)	1.314*** (0.109)	-0.021 (0.249)	-0.284 (0.292)
Observations	498	499	469	499	498	498
R ²	0.103	0.210	0.252	0.208	0.138	0.137
Adjusted R ²	0.088	0.197	0.239	0.195	0.124	0.123
χ ² (df = 8)	53.979***	117.723***	136.174***	116.211***	73.809***	73.372***

Notes: * p<0.1; ** p<0.05; *** p<0.01.

Dep vars = (L to R), franchisee prohibited from hiring workers from other franchisees (Y = 1), franchisor site approval required (Y = 1), the proportion of franchisee operating purchases from restricted sources, franchisee can only sell approved products (Y = 1), franchisor sets mandatory hours of operation (Y = 1), franchisor sets max or min resale price maintenance (Y = 1). Franchisee training = length of training program (hours), Franchisee investment = average franchisee initial investment, Outlet turnover = the proportion of system outlets that closed or changed hands over the last three years. Std. errors clustered at the GPS industry level.

Table 8: CPS industries with industry average workforce traits

CPS Industry	N	Tenure	Age	Education
Restaurants and Other Food Svcs	147	0.286	31.997	10.272
Traveler Accommodation	39	0.179	41.219	10.922
Construction	34	0.133	42.808	10.581
Other Amusements and Recreation	29	0.198	37.463	11.450
Svcs to Buildings	23	0.156	44.156	9.916
Other Schools, Instruction, and Education Support Svcs	16	0.185	42.383	13.758
Real Estate	16	0.127	48.709	12.549
Automotive Repair and Maintenance	15	0.153	42.291	10.403
Individual and Family Svcs	15	0.176	44.418	13.005
Mgmt, Tech, and Scientific Consulting	13	0.159	45.514	14.389
Nail Salons and Other Personal Care	12	0.127	41.928	11.351
Auto Equipment Rental and Leasing	8	0.167	42.117	11.765
Furniture Stores	8	0.174	43.233	11.707
Printing and Rltd Support	8	0.122	45.521	11.389
Business Support Svcs	7	0.236	39.734	12.124
Employment Svcs	7	0.303	40.223	11.663
Architectural Engineering and Rltd	6	0.134	44.646	14.038
Health and Personal Care Stores	6	0.197	39.324	12.152
Used Merchandise Stores	6	0.217	44.857	10.941
Beauty Salons	5	0.132	41.668	11.403
Landscaping Svcs	5	0.105	39.735	9.661
Travel Arrangements and Reservations	5	0.120	45.838	12.954
Waste Mgmt and Remediation	5	0.138	43.982	10.564
Accounting, Tax Prep, and Bookkeeping	4	0.147	46.205	13.784
Auto Parts and Tire Stores	4	0.165	41.517	10.823
Radio, TV, and Computer Stores	4	0.195	35.683	12.310
Sporting Goods, Camera, and Hobby Stores	4	0.229	37.340	11.889
Dry Cleaning and Laundry Svcs	3	0.167	44.932	9.990
Gasoline Stations	3	0.245	37.799	10.646
Groceries and Rltd Wholesale	3	0.119	42.982	11.120

Insurance Carriers and Rltd	3	0.114	45.263	13.325
Misc Manufacturing	3	0.162	44.686	11.387
Misc Retail Stores	3	0.198	40.204	11.693
Offices of Optometrists	3	0.108	42.702	12.998
Offices of Chiropractors	3	0.138	42.617	14.302
Other Direct Selling Ests	3	0.234	43.055	11.867
Other Health Care Svcs	3	0.162	42.457	13.059
Other Personal Svcs	3	0.190	40.756	11.678
Other Professional Svcs	3	0.123	42.543	13.475
Pharmacies and Drug Stores	3	0.141	39.305	12.701
Specialty Food Stores	3	0.178	39.751	10.806
Child Day Care Svcs	2	0.206	39.094	11.713
Computer Systems Design and Rltd	2	0.171	41.926	14.392
Electronic and Precision Equipment Repair	2	0.139	43.495	12.188
Florists	2	0.103	48.846	10.931
Investigation and Security Svcs	2	0.191	43.600	11.563
Investments	2	0.119	45.010	14.339
Personal and Household Goods Repair and Maintenance	2	0.147	49.523	11.109
Shoe Stores	2	0.318	29.860	11.214
Advertising and Rltd	1	0.193	40.654	13.666
Auto Dealers	1	0.180	42.866	11.402
Barber Shops	1	0.053	43.703	10.788
Commercial and Industrial Machinery Repair	1	0.158	43.176	10.426
Elementary and Secondary Schools	1	0.107	45.591	14.040
Furniture Wholesale	1	0.117	45.500	11.635
Gift, Novelty, and Souvenir Shops	1	0.193	47.617	12.066
Household Appliance Stores	1	0.085	42.268	11.156
Jewelry, Luggage, and Leather Stores	1	0.166	43.795	12.083
Motor Vehicle Parts Supplies Wholesale	1	0.140	45.847	11.489
Offices of Dentists	1	0.123	42.512	13.381
Offices of Other Health Practitioners	1	0.112	47.701	15.013
Other Admin and Support	1	0.172	43.903	12.353
Other Consumer Goods Rental	1	0.147	39.085	11.217

Outpatient Care Centers	1	0.176	42.390	13.829
Periodical, Book, and Directory Publishers	1	0.117	45.596	14.139
Recreational Vehicle Parks and Camps	1	0.195	38.201	10.990
Specialized Design Svcs	1	0.139	43.930	13.745
Truck Transportation	1	0.165	46.620	10.500
Vending Machine Operators	1	0.250	44.191	10.727
Warehousing and Storage	1	0.186	39.983	10.616

Source: Flood, et al. (2018).

Table 9: CES industries with industry average hourly wages

CES industry	N	wage
Limited Service Restaurants	78	10.880
Snack and Non-Alcoholic Beverage Bars	40	12.210
Hotels and Motels	39	16.210
Full Service Restaurants	29	13.930
Fitness and Recreational Sports Centers	24	15.980
Education and Health Svcs	17	25.240
Janitorial Svcs	15	13.820
Offices of Real Estate Agents and Brokers	15	26.160
Svcs for the Elderly and Persons with Disabilities	14	14.040
Plumbing, Heating, and Air Conditioning Contractors	11	27.540
Administrative Management and General Management Consulting Svcs	10	42.890
Other Personal Care Svcs	10	19.010
Automotive Equipment Rental and Leasing	8	20.090
Printing and Rltd Support Activities	8	22.730
Business Service Centers	7	19.480
Barber Shops and Beauty Salons	6	17.370
Building Inspection Svcs	6	27.640
Used Merchandise Stores	6	13.310
Automotive Mechanical and Electrical Repair	5	20.220
Auto Oil Change Shops and All Other Auto Repair	5	14.680
Landscaping Svcs	5	17.400
Other Building Equipment Contractors	5	28.360
Other Health and Personal Care Stores	5	19.280
Residential Remodelers	5	23.960
Travel Agencies	5	26.310
Accounting and Bookkeeping Svcs	4	31.080
All Other Amusement and Recreation Industries	4	16.170
Automotive Parts and Accessories	4	17.910
Carpet and Upholstery Cleaning	4	17.690
Electronics Stores	4	24.850

Non-Store Retailers	4	25.830
Painting and Wall Covering Contractors	4	22.060
Remediation and Other Waste Svcs	4	25.290
Temporary Help Svcs	4	16.700
Automotive Body, Interior and Glass Repair	3	21.960
Chiropractors	3	22.710
Dry Cleaning and Laundry Svcs	3	12.210
Employment Placement Agencies	3	25.820
Exterminating and Pest Control Services	3	21.940
Finish Carpentry Contractors	3	24.800
Floor Covering Stores	3	21.790
Furniture Stores	3	20.140
Gasoline Stations with Convenience Stores	3	12.530
Grocery and Rltd Products Wholesale Trade	3	22.630
Marketing Consulting Svcs	3	36.560
Offices of Optometrists	3	22.250
Pharmacies and Drug Stores	3	23.160
Sign Manufacturing	3	21.370
Specialty Food Stores	3	14.840
All Other Home Furnishings Stores	2	16.750
Child Day Care Svcs	2	14.070
Direct Property and Casualty Insurance Carriers	2	33.780
Electronic Equipment Repair and Maintenance	2	25.800
Florists	2	12.820
General Automotive Repair	2	20.210
Hobby, Toy, and Game Stores	2	13.580
Household Goods Repair and Maintenance	2	18.500
Investment Advice	2	48.670
Medical Laboratories	2	27.570
Nail Salons	2	12.650
Other Building Finishing Contractors	2	26.260
Other Computer Related Svcs	2	40.580
Pet and Pet Supplies Stores	2	17.190

Pet Care Svcs	2	15.280
Photo Graphic Svcs	2	17.580
Shoe Stores	2	17.110
Sporting Good Stores	2	16.420
All Other Miscellaneous Ambulatory Health Care Svcs	1	27.950
All Other Miscellaneous Store Retailers	1	17.630
All Other Personal Svcs	1	15.650
All Other Specialty Trade Contractors	1	25.060
Amusement Parks and Arcades	1	13.120
Claims Adjusting	1	32.320
Commercial Machinery Repair and Maintenance	1	25.390
Cosmetics Stores	1	16.930
Direct Mail Advertising	1	25.870
Electrical Contractors and Other Wiring Installation Contractors	1	28.940
Free Standing Ambulatory Surgical and Emergency Centers	1	31.910
Furniture and Furnishings Wholesale Trade	1	24.790
General Rental Centers	1	23.340
Gift, Novelty, and Souvenir Stores	1	14.310
Glass and Glazing Contractors	1	25.330
Household Appliance Stores	1	18.770
Interior Design Svcs	1	29.290
Jewelry, Luggage and Leather Goods Stores	1	19.700
Lessors of Mini Warehouses and Self Storage	1	18.040
Misc Professional and Technical Svcs	1	31
Motor Vehicle Supplies and New Parts Merchant Wholesalers	1	24.200
Offices of Dentists	1	30.170
Offices of Real Estate Appraisers	1	26.160
Offices of Specialty Therapists	1	27.400
Other Individual and Family Svcs	1	19.980
Other Svcs to Buildings and Dwellings	1	18.560
Other Support Svcs	1	24.260
Periodical Publishers	1	37.240
RV Parks and Recreational Camps	1	15.270

Security and Amored Car Svcs	1	14.270
Security Systems Svcs	1	24.650
Siding Contractors	1	22.820
Used Car Dealers	1	20.560
Used Household and Office Goods Moving	1	20.020
Waste Collection	1	21.200

Source: Bureau of Labor Statistics (2018).

Table 10: Correlation matrix, industry workforce traits

	Wage	New hire rate	Age	Education
Wage	1	-0.692	0.688	0.572
New hire rate	-0.692	1	-0.896	-0.393
Age	0.688	-0.896	1	0.515
Education	0.572	-0.393	0.515	1

Table 11: Vertical restraints regressed on industry average mean worker age, franchisor characteristics

	<i>Dependent variable:</i>					
	No poach (1)	Site (2)	Purchases (3)	Product (4)	Hours (5)	Price (6)
ln(Mean age)	-0.765*** (0.175)	-0.341** (0.148)	-1.152*** (0.122)	-0.072 (0.057)	-0.468*** (0.153)	-0.632*** (0.165)
ln(Outlets)	-0.016 (0.027)	0.040** (0.019)	0.032* (0.017)	0.017 (0.012)	0.035 (0.032)	-0.017 (0.021)
No. states	-0.001 (0.002)	-0.004*** (0.002)	-0.003** (0.002)	-0.003** (0.001)	-0.006** (0.003)	0.001 (0.002)
ln(Brand age)	-0.024 (0.028)	-0.031 (0.019)	0.030** (0.014)	-0.038** (0.015)	-0.047* (0.028)	-0.125*** (0.031)
ln(Franchisee training)	0.042*** (0.011)	0.020* (0.012)	0.023*** (0.008)	0.053*** (0.011)	0.035*** (0.010)	0.028*** (0.006)
ln(Franchisee investment)	-0.045** (0.018)	0.065*** (0.019)	-0.028* (0.017)	-0.047*** (0.007)	0.031 (0.022)	0.039 (0.032)
ln(Franchisor Assets (thousands))	-0.023*** (0.009)	0.017** (0.008)	0.003 (0.006)	0.003 (0.006)	0.004 (0.011)	0.018** (0.009)
ln(Outlet turnover)	-0.013 (0.019)	-0.006 (0.014)	0.002 (0.016)	-0.015* (0.008)	-0.045** (0.019)	-0.050*** (0.011)
Constant	4.149*** (0.762)	1.006 (0.720)	4.770*** (0.577)	1.615*** (0.282)	1.856*** (0.636)	2.275*** (0.909)
Observations	498	499	469	499	498	498
R ²	0.125	0.211	0.288	0.209	0.138	0.147
Adjusted R ²	0.111	0.198	0.276	0.196	0.124	0.133
χ ² (df = 8)	66.604***	118.212***	159.248***	116.811***	73.761***	79.292***

Notes: * p<0.1; ** p<0.05; *** p<0.01.

Dep vars = (L to R), franchisee prohibited from hiring workers from other franchisees (Y = 1), franchisor site approval required (Y = 1), the proportion of franchisee operating purchases from restricted sources, franchisee can only sell approved products (Y = 1), franchisor sets mandatory hours of operation (Y = 1), franchisor sets max or min resale price maintenance (Y = 1). Avg worker age is measured in years. It varies at the industry level, all other variables at the franchisor level. Franchisee training = length of training program (hours), Franchisee investment = average franchisee initial investment, Outlet turnover = the proportion of system outlets that closed or changed hands over the last three years. Std. errors clustered at the CPS industry level.

Table 12: Vertical restraints regressed on industry average worker new hire rate, franchisor characteristics

	<i>Dependent variable:</i>					
	No poach (1)	Site (2)	Purchases (3)	Product (4)	Hours (5)	Price (6)
ln(New hire rate)	0.188** (0.076)	0.093 (0.076)	0.390*** (0.108)	0.028 (0.026)	0.245*** (0.074)	0.146 (0.098)
ln(Outlets)	0.003 (0.026)	0.048** (0.019)	0.054*** (0.021)	0.018 (0.012)	0.037 (0.031)	-0.001 (0.022)
No. states	-0.002 (0.002)	-0.005*** (0.002)	-0.006*** (0.002)	-0.003*** (0.001)	-0.006** (0.003)	-0.0001 (0.002)
ln(Brand age)	-0.026 (0.029)	-0.032* (0.019)	0.024* (0.014)	-0.039*** (0.015)	-0.050* (0.029)	-0.127*** (0.031)
ln(Franchisee training)	0.044*** (0.011)	0.021* (0.011)	0.023** (0.010)	0.052*** (0.011)	0.031*** (0.011)	0.031*** (0.007)
ln(Franchisee investment)	-0.032* (0.018)	0.070*** (0.021)	-0.017 (0.024)	-0.047*** (0.008)	0.030 (0.021)	0.050* (0.028)
ln(Franchisor Assets (thousands))	-0.025*** (0.009)	0.017** (0.008)	0.002 (0.006)	0.003 (0.006)	0.004 (0.011)	0.017* (0.009)
ln(Outlet turnover)	-0.011 (0.019)	-0.006 (0.014)	0.003 (0.015)	-0.015* (0.008)	-0.047** (0.019)	-0.048*** (0.012)
Constant	1.473*** (0.298)	-0.160 (0.402)	1.044*** (0.396)	1.392*** (0.139)	0.578** (0.258)	0.041 (0.494)
Observations	498	499	469	499	498	498
R ²	0.102	0.204	0.233	0.209	0.145	0.131
Adjusted R ²	0.088	0.191	0.220	0.196	0.131	0.117
χ ² (df = 8)	53.848***	113.896***	124.429***	116.719***	77.890***	69.898***

Notes: * p<0.1; ** p<0.05; *** p<0.01.

Dep vars = (L to R), franchisee prohibited from hiring workers from other franchisees (Y = 1), franchisor site approval required (Y = 1), the proportion of franchisee operating purchases from restricted sources, franchisee can only sell approved products (Y = 1), franchisor sets mandatory hours of operation (Y = 1), franchisor sets max or min resale price maintenance (Y = 1). New hire rate is the proportion of workers with less than one year of tenure. It varies at the industry level, all other variables at the franchisor level. Franchisee training = length of training program (hours), Franchisee investment = average franchisee initial investment, Outlet turnover = the proportion of system outlets that closed or changed hands over the last three years. Std. errors clustered at the CPS industry level.

Table 13: Vertical restraints regressed on industry average hourly wage, franchisor characteristics

	<i>Dependent variable:</i>					
	No poach (1)	Site (2)	Purchases (3)	Product (4)	Hours (5)	Price (6)
ln(Avg Hrly Wage)	-0.164** (0.072)	-0.108 (0.092)	-0.271** (0.126)	-0.009 (0.024)	-0.270*** (0.073)	-0.110 (0.106)
ln(Outlets)	0.001 (0.027)	0.044** (0.020)	0.059*** (0.021)	0.019 (0.012)	0.029 (0.031)	-0.0002 (0.023)
No. states	-0.002 (0.002)	-0.005*** (0.002)	-0.006*** (0.002)	-0.003*** (0.001)	-0.006** (0.003)	-0.0001 (0.002)
ln(Brand age)	-0.026 (0.029)	-0.032* (0.019)	0.026* (0.015)	-0.038** (0.015)	-0.051* (0.030)	-0.127*** (0.031)
ln(Franchisee training)	0.047*** (0.011)	0.021* (0.011)	0.031*** (0.011)	0.053*** (0.011)	0.033*** (0.011)	0.033*** (0.007)
ln(Franchisee investment)	-0.035* (0.018)	0.066*** (0.024)	-0.017 (0.027)	-0.046*** (0.008)	0.022 (0.020)	0.050* (0.028)
ln(Franchisor Assets (thousands))	-0.024*** (0.009)	0.017** (0.008)	0.002 (0.006)	0.002 (0.006)	0.006 (0.011)	0.017* (0.009)
ln(Outlet turnover)	-0.008 (0.019)	-0.004 (0.015)	0.011 (0.015)	-0.014* (0.008)	-0.044** (0.019)	-0.045*** (0.012)
Constant	1.657*** (0.373)	0.044 (0.534)	1.139** (0.550)	1.353*** (0.173)	1.058*** (0.276)	0.109 (0.641)
Observations	498	499	469	499	498	498
R ²	0.101	0.206	0.186	0.208	0.152	0.128
Adjusted R ²	0.086	0.193	0.172	0.195	0.138	0.114
χ ² (df = 8)	52.914***	115.358***	96.415***	116.265***	82.238***	68.452***

Notes: * p<0.1; ** p<0.05; *** p<0.01.

Dep vars = (L to R), franchisee prohibited from hiring workers from other franchisees (Y = 1), franchisor site approval required (Y = 1), the proportion of franchisee operating purchases from restricted sources, franchisee can only sell approved products (Y = 1), franchisor sets mandatory hours of operation (Y = 1), franchisor sets max or min resale price maintenance (Y = 1). Average hourly wage varies at the industry level, all other variables at the franchisor level. Franchisee training = length of training program (hours), Franchisee investment = average franchisee initial investment, Outlet turnover = the proportion of system outlets that closed or changed hands over the last three years. Std. errors clustered at the CPS industry level.

Table 14: Vertical restraints regressed on industry average education, franchisor characteristics

	<i>Dependent variable:</i>					
	No poach (1)	Site (2)	Purchases (3)	Product (4)	Hours (5)	Price (6)
ln(Avg years schooling)	-0.467** (0.226)	-0.065 (0.380)	-0.664* (0.390)	0.013 (0.087)	-0.125 (0.405)	-0.240 (0.284)
ln(Outlets)	0.010 (0.026)	0.054*** (0.016)	0.076*** (0.020)	0.020* (0.012)	0.054 (0.036)	0.007 (0.019)
No. states	-0.003 (0.002)	-0.006*** (0.001)	-0.007*** (0.002)	-0.003*** (0.001)	-0.008*** (0.003)	-0.001 (0.002)
ln(Brand age)	-0.028 (0.029)	-0.031* (0.018)	0.024 (0.015)	-0.038** (0.015)	-0.047 (0.029)	-0.127*** (0.033)
ln(Franchisee training)	0.048*** (0.011)	0.024** (0.010)	0.033*** (0.012)	0.054*** (0.011)	0.040*** (0.011)	0.035*** (0.006)
ln(Franchisee investment)	-0.030* (0.018)	0.075*** (0.025)	-0.008 (0.029)	-0.045*** (0.007)	0.044* (0.026)	0.054** (0.025)
ln(Franchisor Assets (thousands))	-0.027*** (0.009)	0.016* (0.008)	-0.002 (0.006)	0.002 (0.006)	0.001 (0.010)	0.015 (0.009)
ln(Outlet turnover)	-0.007 (0.019)	-0.003 (0.016)	0.012 (0.014)	-0.014* (0.008)	-0.041** (0.020)	-0.044*** (0.011)
Constant	2.250*** (0.661)	-0.238 (1.159)	1.824* (1.079)	1.278*** (0.262)	0.246 (1.091)	0.301 (0.940)
Observations	498	499	469	499	498	498
R ²	0.099	0.199	0.164	0.208	0.124	0.126
Adjusted R ²	0.084	0.186	0.150	0.195	0.110	0.112
χ ² (df = 8)	51.939***	111.002***	84.181***	116.220***	66.170***	67.162***

Notes: * p<0.1; ** p<0.05; *** p<0.01.

Dep vars = (L to R), franchisee prohibited from hiring workers from other franchisees (Y = 1), franchisor site approval required (Y = 1), the proportion of franchisee operating purchases from restricted sources, franchisee can only sell approved products (Y = 1), franchisor sets mandatory hours of operation (Y = 1), franchisor sets max or min resale price maintenance (Y = 1). Average years of schooling varies at the industry level, all other variables at the franchisor level. Franchisee training = length of training program (hours), Franchisee investment = average franchisee initial investment, Outlet turnover = the proportion of system outlets that closed or changed hands over the last three years. Std. errors clustered at the CPS industry level.

Table 15: LASSO model variable selection

	No Poach	Site	Purchase	Products	Hours	Price
Outlets	0	0	0	0	+	0
No. states	-	0	0	-	-	0
Brand age	-	0	0	-	-	-
Franchisee training	+	+	+	0	+	0
Franchisee investment	-	0	-	-	+	+
Franchisor assets	0	0	0	0	+	0
Outlet turnover	0	0	0	0	-	-
Fast food	0	0	+	0	+	0
Age	-	-	-	0	0	-
Worker turnover	0	0	0	0	+	0
Avg hourly wage	0	-	0	0	-	0
Education	0	0	0	0	+	0

Note: 0 indicates a variable was dropped by the LASSO regularization procedure. + or - indicate the sign of the variables that were selected by LASSO regularization.

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