Ties that Truly Bind: Non-competition Agreements, Executive Compensation and Firm Investment

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Abstract

We study the effects of non-competition agreements by analyzing time-series and cross-sectional variation in the enforceability of these contracts across U.S. states. We find that tougher non-competition enforcement promotes executive stability. Increased enforceability also results in reduced executive compensation and shifts its form towards greater use of salary. We further show that stricter enforcement reduces research and development spending and capital expenditures per employee. These results are consistent with a model in which enforceable non-competition contracts encourage firms to invest in their managers' human capital. On the other hand, our findings suggest that these contracts also discourage managers from investing in their own human capital and that this second effect is empirically dominant.

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1 Introduction

For most firms, the human capital of their employees is a core asset, but it is one over which they cannot exercise full ownership. Non-competition agreements (also known as covenants not to compete) are contracts that restrict workers from joining (or forming) a rival company, and they represent one of the most important mechanisms binding employees to a firm. In this paper we make use of time-series and cross-sectional variation in non-competition enforceability across the states of the U.S. to analyze the effects of these agreements. We find that increased enforceability does, in fact, reduce executive mobility. Increased enforceability also results in lower executive compensation and shifts its form towards a heavier reliance on salary. We further show that tougher non-competition enforcement reduces research and development (R&D) spending and capital expenditures per employee. We demonstrate that these findings are consistent with an incomplete-contracting model that has the following three features: enforceable non-competition contracts encourage firms to invest in their managers' human capital, the contracts discourage managers from investing in their own human capital and managers' investments have a greater effect than those of the firm. Our empirical and theoretical results show that non-competition regulations help to determine optimal firm choices on a wide set of issues including executive pay, the stability of the managerial team and firm investment strategy.

The inalienability of human capital (Hart and Moore, 1994, Diamond and Rajan, 2000) is universally accepted in developed economies as a basic personal right. This right, however, restricts the ability of a manager to make certain commitments to a firm; it may be regarded, essentially, as a form of legally-mandated contractual incompleteness. The extent of non-competition enforceability in a jurisdiction determines the scope of this incompleteness. We present a theoretical framework that applies insights from the incomplete contracting literature (e.g. Grossman and Hart, 1986, Hart and Moore, 1990) to study the effects of varying non-competition enforcement. We then test the implications generated by the theory. Although the theory of incomplete contracts is well-developed, there have been relatively few tests of its predictions; our work contributes to the empirical literature on incomplete contracting (Baker and Hubbard, 2003, 2004, and Feenstra and Hanson, 2005).

We consider two contrasting theoretical models. In the first model (Model A), we study the effects of non-competition enforceability on a firm that is deciding whether to make a non-contractible partially firm-specific investment in the human capital of its manager. We show that increased enforceability encourages the firm to invest, which makes it more likely that the manager will remain

with the firm. The firm's investment raises the manager's human capital, and we demonstrate that this implies that the optimal contract will grant the manager a higher expected compensation in a high-enforcement jurisdiction. The optimal contract will also have a greater performance-linked (and smaller fixed) component if enforceability is high. We also show that a firm in the high-enforcement jurisdiction is more likely to choose a form of production that is skill-intensive (such as R&D) because the managers in that jurisdiction have greater human capital. Model A is similar to that of Posner, Triantis and Triantis (2004), though our results on executive compensation and on the optimal form of production are not the focus of their analysis.

We also analyze a second model (Model B) in which, in addition to the firm investment just described, managers also have the option to make a non-contractible investment in their own general human capital. We find that an increase in enforceability makes it less likely that managers will make their investment but, as in Model A, makes it more likely that firms will invest. Model B shares with Model A the implication that a manager in a high-enforcement-jurisdiction firm benefits less from transferring to a new firm and hence is more likely to remain with his current employer. If, however, the manager's investment in his own human capital has a greater effect than the firm's, then Model B yields several predictions that differ from those of Model A. In Model B the manager's human capital will be greater in the low-enforcement jurisdiction, and thus the optimal contract will grant a higher expected compensation with a smaller tilt towards salary in that jurisdiction. Model B also suggests that it is the firm in the low-enforcement jurisdiction that is more likely to undertake skill-intensive production because managers in that area will have more human capital.

We make use of data on state regulations and the Execucomp database of executive compensation to test the predictions of Models A and B by analyzing the effects of non-competition enforceability. We begin by showing that non-competition are quite commonly utilized; we find that 70.2% of firms use them with their top executives. We then perform two types of tests. Our time-series tests consider changes in non-competition enforceability law that took place in Texas, Florida and Louisiana. These tests employ firm fixed effects to analyze the impact of the legal shifts, controlling for all firm-specific variables. Our cross-sectional tests analyze differences in enforceability across all states. We argue that non-competition law is particularly important to firms with substantial within-state competition, since covenants not to compete typically have limited geographic scope and are easiest to enforce in the same legal jurisdiction. We then use the interaction between enforceability and the extent of in-state competition as a measure of the power and relevance of non-competition law for a given firm. We include state fixed effects in our cross-

sectional tests to control for differences between states unrelated to non-competition enforceability, and we also control for industry effects.[1]

Our first finding is that enforceability strongly reduces executive mobility, particularly decreasing the likelihood that a firm will experience a within-industry managerial transfer (either in or out). In a related result, we show that executives in high-enforcement jurisdictions have longer job tenures. Thus, covenants not to compete do serve to attach human capital assets to companies in the way predicted by both Models A and B.

Our analysis of executive compensation shows that it is both lower and more salary-based in high enforcement jurisdictions. These results hold both in time-series specifications with fixed effects at the executive level, and in the cross-sectional regressions. The findings support Model B and suggest that the role of non-competition agreements in discouraging managerial investment may be substantial. In addition, these results indicate that the regulatory environment can have an important effect on compensation levels and complement the recent empirical literature on optimal executive contracts (Gibbons and Murphy 1992a, Kole, 1997, Hermalin and Wallace, 2001, Gillan, Hartzell and Parrino, 2005).

Both Models A and B predict that managers from high-enforcement jurisdictions will benefit less from transferring to a new firm. In support of this prediction, we find that managers in firms in high-enforcement areas receive relatively smaller compensation increases when they transfer firms. These managers also tend to assume lower-ranked positions in their new firms, relative to managers who transfer from low-enforcement areas.

Our work draws a link between managerial incentives and compensation and firm investment strategy (Gibbons and Murphy, 1992b, Oyer, 1998). Models A and B make contrasting predictions about the effects of non-enforceability on the likelihood that firms will engage in skill-intensive production. We use R&D investment as a first proxy for skill-intensive production. Controlling for fixed effects at either the firm (time-series analysis) or industry and state (cross-sectional analysis) levels, we find that non-competition enforceability reduces R&D spending, which is consistent with Model B. When a firm determines its R&D investment policy, the negative incentive effects of non-competition agreements on managerial investments in their own human capital outweigh the positive incentive effects on firm investment in managerial human capital. Our findings indicate that low-enforcement jurisdictions have a comparative advantage in funding R&D. We also make use of the capital-intensity of production as a second proxy for skill-intensive projects. We show

[1] In previous empirical work on non-competition enforceability, Stuart and Sorenson (2002) link non-competition law to local business founding rates and Kaplan and Stromberg (2003) find that venture capitalists frequently require entrepreneurs to sign non-competition agreements.

that firms in low-enforcement states engage in production that is relatively capital-intensive. This result is consistent with Model B as well. Our empirical findings on executive mobility and post-transfer compensation are consistent with the idea (developed in Models A and B) that enforceable non-competition agreements encourage firms to make investments in their managers' human capital. Our results on the level and form of executive compensation and on R&D investment and capital-intensity of production, however, support the argument (analyzed in Model B) that enforceable covenants not to compete discourage managers from investing in their own human capital and that managerial investments have a greater impact than those of firms. Overall, the evidence is that non-competition agreements do bind human capital to firms, but in doing so they change the quality of that capital.

We find no evidence that the enforceability regime affects either firm market to book ratios or profitability. There are two natural explanations for these results. The first is that the negative managerial incentive effects of requiring enforceable covenants not to compete may roughly balance the benefits. (This is consistent with the less than 100% adoption of non-competition contracts that is observed in high-enforcement jurisdictions.) The second is that enforceable non-competition contracts may yield benefits to individual firms but may also generate offsetting negative externalities by restricting labor mobility.

The remainder of the paper is organized as follows. Section 2 describes the theoretical framework. Section 3 details the data, and we outline the empirical strategy in Section 4. The results are analyzed in Section 5, and we conclude in Section 6.

2 Model

Non-competition agreements are contracts signed by employees and firms that prohibit employees from joining (or forming) a competing firm. The agreements usually specify a time period and geographic location within which the employee agrees not to compete with his current employer. Employees from senior managers to salespeople may be required to sign a covenant not to compete, and an agreement accepted at the time of hiring will typically continue to hold throughout the employment relationship and will extend beyond the end of the relationship for a contractually specified period. As we discuss in Section 4, the enforceability of non-competition agreements varies substantially across the states of the U.S. In high-enforceability jurisdictions courts are willing to implement agreements of long duration and wide geographical scope, even if employees entered into such contracts with no reciprocal compensation other than employment. In low-enforceability jurisdictions it can be very difficult to enforce any non-competition agreement at all.

The property rights literature (e.g., Grossman and Hart, 1986, Hart and Moore, 1990, 1994) examines the effects of incomplete contracts on the willingness of economic actors to make investments. In this section, we apply the insights of that literature to study the specific case of one legally mandated form of contractual incompleteness: the refusal of certain jurisdictions to enforce non-competition contracts. We explore the impact of non-competition enforceability on executive mobility, the form and level of executive compensation and the type of production in which firms choose to engage. We present two models. In Model A, we analyze the effects of the enforceability of non-competition contracts on the decision of a firm whether to make an investment in the human capital of its employee. This model is similar to that of Posner, Triantis and Triantis (2004), though we develop results on the level and type of executive compensation and on the mode of production that they do not consider. In Model B, we also allow the manager to make an investment in his own human capital.[2] We provide tests of the implications of these two models in Section 5.

2.1 General Model Framework

We model a labor production game with two companies and a manager. The manager is matched to a company in a labor market, as described below. A matched company-manager pair can then together produce output.

2.1.1 Non-competition Contracts

In the model, a non-competition contract binds a manager not to leave a company for its competitor, without the company's permission. We will consider two equilibria: one in which the companies are located in a jurisdiction in which non-competition contracts are enforced by the courts, and a second in which the companies are located in a jurisdiction in which they are not.

2.1.2 Labor Market

In period zero, the manager is randomly assigned to a company. For convenience, we will refer to the company to which the worker is initially assigned as the firm, and we will refer to the other company as the competitor. The firm may offer the manager a non-competition contract, along with a signing bonus, which the manager is free to accept or reject.

In period one, public information arrives about the quality q of the match between the worker and the firm. The quality $\hat{q}$ of the manager match to the competitor is also revealed in period one.

[2]Models A and B present simplified theoretical frameworks for ideas that are developed in several models of incomplete contracts. For example, Almazan, de Motta and Titman (2003) consider the effects of both firm and employee human capital investments on the formation of industrial clusters. Fulghieri and Sevilir (2006) analyze the relationship between employees' investments in their own human capital and innovation.

After the public information is reported, the manager may receive an offer to join the competitor. In period two, the manager makes a final decision about which company to join (perhaps in exchange for a signing bonus), the company offers him a production contract, production occurs and final payoffs are made. We assume that q and $\hat{q}$ are non-negative and identically distributed, and they may be either correlated or uncorrelated.

2.1.3 Production

The period two profit generated by a company-manager pair depends on the quality q' of the company-manager match and the effort e exerted in period two by the manager. We assume that if a manager has a match of quality q' and exerts effort e then he will generate profit x, where x is a normal random variable with mean $q'e$ and standard deviation σ. The profit x is observable, but effort e is not. Exerting effort is costly to the manager: we assume the manager must bear a cost of e^2 when he exerts effort e. A company without a manager will produce nothing.

2.1.4 Production Contracts and Preferences

After a manager has joined a company in period two, the company may offer him a production contract that links compensation to output. For simplicity, and to generate clear empirical implications, we consider linear contracts of the form $ax + b$. We assume that companies are risk-neutral, while managers are risk-averse with negative exponential utility $U(w) = -exp(-\rho w)$.

2.1.5 Bargaining

In period two, the firm and its competitor both require the services of a single manager, so the manager may bargain over any surplus that will be created by his production. A manager who has not signed an enforceable non-competition contract will negotiate with the company that most values his services. We assume that in this two-party bargaining, the manager will receive a fraction $\theta_m \in (0, 1)$ of the surplus, with the remaining going to the company. For the manager who has signed an enforceable non-competition contract, there are two possible scenarios. In the first, he is valued most by the firm with which he signed the contract, in which case the firm will not release him, since the competitor would not be willing to fully reimburse the firm for its loss of the manager. In the second, the competitor values him more, and the surplus from his transfer must be shared amongst the manager, the firm and the competitor. We assume that in this three-party negotiation, the manager receives $\epsilon_m \in (0, 1)$ of the surplus, the firm receives $\epsilon_f \in (0, 1)$ and the competitor receives the remainder.[3] We assume that both the manager and either company receive

[3]The model is also robust to assuming that the firm receives nothing in this negotiation ($\epsilon_f = 0$).

more of the surplus in the two-party bargaining than in the three-party bargaining: $\theta_m \geq \epsilon_m$ and $(1-\theta_m) \geq max\{\epsilon_f, 1-\epsilon_m-\epsilon_f\}$. At the conclusion of the bargaining, the surplus is divided as described and the manager makes a final match with the company which values him most. This company then has the exclusive right to offer the manager a production contract.

2.1.6 Optimal Linear Production Contracts

In time period two, after a final manager-company match has been arranged, the company offers the manager a production contract of the form $ax + b$ to motivate him to exert effort. A higher incentive component a will induce the manager to provide more effort, but it also raises the risk of the manager's compensation. The manager will only accept the production contract if it offers him a non-negative certainty equivalent (for he can always choose not to work for any company at all), so the company may also have to provide a salary component b to convince the manager to participate in production. (Constraining b to be non-negative has no effect on the results.) For a manager and company with a final period two match quality q', we denote by $V_F(q')$ the expected payoff of the company, and we define $EC(q')$ to be the total expected compensation of the manager. The optimal contract maximizes V_F subject to the manager's optimal choice of effort and subject to the manager's agreeing to participate in the company. When the company offers the production contract, the quality of the manager-company match is known, and the contract will be made contingent on this quality, as the following lemma shows.

Lemma 1. *In the optimal linear production contract, the incentive component $a^*(q')$ is increasing in the manager-company match quality q'. The ratio of the optimal salary to the total expected compensation $\frac{b^*(q')}{EC(q')}$ is decreasing in q'. The expected period two manager compensation $EC(q')$ and the expected period two payoff to the company $V_F(q')$ are increasing in q'.*

The effort of higher quality managers is more valuable, so the company offers these managers a greater incentive component in their compensation in order to induce effort. Higher quality managers require less salary, since their better performance raises the incentive-linked portion of their compensation. The company overall does better when the manager-company match is of high quality, since a better match quality leads to greater production for any contract. Expected manager compensation is higher for high quality managers because these managers optimally exert more effort (and take more risk, given the greater incentive component of their pay) and must be compensated for doing so.

2.1.7 Firm and Manager Payoffs

We define $\pi_F(q, \hat{q})$ to be the expected total payoff of a firm without a non-competition agreement that learns in period one that its manager has a match with it of quality q and a match with its competitor of quality $\hat{q}$. This payoff will depend on both the period two expected payoff described in Lemma 1 and on the division of the surplus outlined in Section 2.1.5. The expected total payoff of the manager is set equal to $\pi_M(q, \hat{q})$. We use the notation π_F^{ncc} and π_M^{ncc} for a firm and a manager, respectively, that have signed a non-competition contract. The bargaining and labor-company matching assumptions given earlier yield

$$\pi_F(q, \hat{q}) = (1 - \theta_m) max\{V_F(q) - V_F(\hat{q}), 0\}$$

$$\pi_M(q, \hat{q}) = (1 - \theta_m) min\{V_F(q), V_F(\hat{q})\} + \theta_m max\{V_F(q), V_F(\hat{q})\}$$

$$\pi_F^{ncc}(q, \hat{q}) = V_F(q) + \epsilon_f max\{V_F(\hat{q}) - V_F(q), 0\}$$

$$\pi_M^{ncc}(q, \hat{q}) = \epsilon_m max\{V_F(\hat{q}) - V_F(q), 0\}.$$

2.2 Model A: Firm Investment in Manager Human Capital

Firm investments in manager human capital, which may take the form of training, permitting the manager (at some cost to the firm) to engage in human-capital-improving projects or the revelation of trade secrets, are highly vulnerable to the departure of the manager. This model describes the role of enforceable non-competition contracts in facilitating these investments and thereby building manager human capital.

2.2.1 Firm Investment

We assume that at time period zero, after the firm and manager have agreed on whether a non-competition agreement will be signed, the firm may make an investment in the human capital of its manager (Becker, 1993). (This option is not available to the competitor.) This investment has cost I to the firm and raises the quality of the firm-manager match. Specifically, we presume that the investment raises the firm-manager match quality from q to $q+\lambda$ for some $\lambda > 0$. The investment is partly firm-specific, but may also increase the manager's general human capital: we assume that it raises the quality of the manager's match with the competitor by $\delta\lambda$, for $\delta \in [0, 1)$. The investment is assumed to be non-verifiable by the courts.

2.2.2 Information Structure

At time zero, neither the manager, the firm nor the competitor knows the quality of the manager-company matches. Match quality is publicly revealed in period one, for both the firm and its competitor.

2.2.3 Equilibrium Investment

We now consider the attractiveness of the investment to firms in the non-competition enforcement and non-enforcement jurisdictions. A firm without an enforceable agreement will receive no benefit from its investment if the manager turns out to have a substantially higher quality match with the firm's competitor. In this case, the manager will simply abandon the firm. If the manager and firm have an agreement, however, the firm will not agree to release the manager to be employed by its competitor, unless the firm is compensated for its investment. Moreover, if the manager has a higher match with the firm's competitor and the investment is not entirely firm-specific, then, in the three-party negotiations between the manager, the firm and its competitor, the firm may also be able to extract some of the enhanced value to the competitor generated by its investment. These intuitions are formalized in Lemma 2. Lemma 2 also shows that the net benefit of the investment to a firm and manager who have signed an enforceable non-competition agreement is greater than the benefit to a firm that has not signed such a agreement. This is relevant, because a firm's offer of a non-competition contract to a manager must compensate the manager for all the effects of the contract.

Lemma 2. *The increase in expected firm payoff from making the investment is greater for firms with an enforceable non-competition agreement than for those without such an agreement. Moreover, the joint benefit to the firm and manager who have signed an enforceable agreement is greater than that for a firm without an agreement.*

If the required investment I is very high then firms will not make the investment, irrespective of the non-competition contract regime, while if the required investment is very low the opposite will be true. We consider the more interesting case of an intermediate level of required investment.

Assumption A: *The cost of the investment is greater than the expected benefit to the firm for firms without an enforceable non-competition agreement. The cost of the investment is less than the expected benefit to both the firm and to the firm and manager jointly in firms with enforceable non-competition agreements.*

Assumption A implies that non-competition enforceability is required for investment by the firm.

Result 1A. *In the equilibrium in the enforcement jurisdiction, the firm offers a signing bonus in exchange for a non-competition agreement with the manager. The manager accepts this agreement, and the firm makes the investment in managerial human capital. In the equilibrium in the non-enforcement jurisdiction, the firm does not make the investment.*

2.3 Model B: Manager Investment in Human Capital

A manager who has signed a non-competition agreement that limits his future ability to negotiate a favorable compensation scheme will be less willing to make investments in his own human capital. As a result, firms that require non-competition contracts may discourage human capital investments by their managers and thereby end up with low quality employees. Firms may be willing to accept this cost if firm investments in human capital (which are only made in the presence of non-competition covenants) are relatively more efficient than manager investments. This model explores this trade-off.

2.3.1 Manager and Firm Investment

At time zero, after the firm and manager have determined whether a non-competition contract will be signed, the manager may make an investment in his own human capital. This investment has cost J to the manager and raises the quality of the manager by γ : the investment is in general human capital and improves the manager's quality in the same way for both the firm and its competitor. The investment is assumed to be non-verifiable. If the manager declines to invest in his own human capital, the firm may make an investment, which we assume is the same as the investment described in Model A. For simplicity, we presume that either the manager or the firm may invest (but not both), and the manager is granted the first option to invest. We will assume that manager investment has a greater effect on manager human capital: $\gamma > \lambda$. (Otherwise, this model yields results very similar to those of Model A.)

2.3.2 Equilibrium Investment

In this model, non-competition contracts discourage manager investment, since these agreements transfer much of the benefit of the investment to the firm.

Lemma 3. *The increase in expected manager payoff from making the investment is greater for a manager without an enforceable non-competition agreement than for one with such an agreement.*

As before, we consider the case in which investment is moderately attractive.

Assumption B: *The cost of investment is greater than the expected benefit to the manager for managers with an enforceable non-competition agreement, and the cost of the investment is less than*

the expected benefit to the manager for managers without enforceable non-competition agreements.

We also assume that the net benefit of an investment made by the firm is greater than the net benefit of an investment made by the manager. In other words, managerial investments have a large effect, but they are also very costly and are hence relatively less efficient than firm investments. If this assumption does not hold, then all firms will forgo non-competition agreements and simply allow managers to make their own investments. We focus on the case in which investments made by the firm are relatively attractive.

Assumption C: *The net benefit to the firm and the manager of an investment made by the firm is greater than the net benefit to the firm and the manager of an investment made by the manager.*

These assumptions yield an equilibrium in which the manager invests in the non-enforcement jurisdiction and the firm invests in the enforcement jurisdiction.

Result 1B. *In equilibrium in the enforcement jurisdiction, the firm offers a signing bonus in exchange for a non-competition agreement with a manager. The firm makes an investment and the manager does not. In equilibrium in the non-enforcement jurisdiction, the manager makes an investment and the firm does not.*

2.4 Empirical Implications

We now consider the implications of the two models described above. For all the results below we assume that the necessary conditions for Results 1A and 1B hold.

Result 2. *In both Model A and Model B the firm in the high enforcement jurisdiction is less likely to experience a manager transfer.*

In both models, the firm in the high enforcement jurisdiction is more likely to make an investment that makes the manager more valuable within the firm. Consequently, the result of the bargaining between the firm, the manager and the competitor will more often result in the manager remaining with the firm. In Model B, the manager in the firm in the non-enforcement regime invests in his general human capital, but this has no effect on his relative value to the firm and to its competitor.

We note here that since non-competition agreements can only restrict manager movements to competitors, Result 2 in particular predicts fewer within-industry transfers for the firm in the high enforcement jurisdiction.

We now turn to the question of expected compensation.

Result 3. *In Model A, the manager in the enforcement jurisdiction has higher expected com-*

pensation than the manager in the non-enforcement jurisdiction. In Model B, the manager in the non-enforcement jurisdiction has higher expected compensation.

The intuition for Result 3 is that in both Models A and B the firm invests in the manager's human capital only in the enforcement jurisdiction. In Model B, the managers invests in his own human capital only in the firm in the non-enforcement jurisdiction, and the manager's investment is presumed to have a greater effect than the firm's. As a result, the manager in the enforcement jurisdiction has greater human capital in Model A and less human capital in Model B, relative to the manager in the non-enforcement jurisdiction. Lemma 1 shows that the manager in the enforcement jurisdiction will receive higher expected compensation in Model A and lower expected compensation in Model B. Lemma 1 also shows that the manager in the enforcement jurisdiction will have a compensation contract tilted away from salary in Model A and tilted towards salary in Model B. This intuition is formalized in Result 4.

Result 4. *In Model A, the optimal production contract offers an expected ratio of salary to total compensation that is higher for the manager in the non-enforcement jurisdiction than for the manager in the enforcement jurisdiction. In Model B, the optimal production contract offers an expected ratio of salary to total compensation that is higher for the manager in the enforcement jurisdiction.*

In both models, the firm-specific investments made by firms in the enforcement jurisdiction decrease the relative benefits to managers from transferring to the competitor. Consequently, even though managers from the enforcement jurisdiction may sometimes transfer, their gains from doing so will be relatively small. Formalizing this argument requires the following assumption.

Assumption D: *We presume that $q = \alpha + \beta_1$ and $\hat{q} = \alpha + \beta_2$, where β_j, $j \in \{1, 2\}$ are independent of α and identically distributed. We also assume that α, β_1 and β_2 have log-concave and non-negative continuously differentiable density functions.*

The truncated normal, uniform, exponential and a number of other densities are log-concave (Bagnoli and Bergstrom, 2005).

Result 5. *Under Assumption D, in both Models A and B, the average increase in match quality for managers who transfer companies is higher for managers in the non-enforcement jurisdiction*

For our last empirical implication, we consider a modification to the basic model framework presented above. In particular, in the second period we allow firms to select a skill-intensive mode of production that, for a manager-company match of quality q', generates profits with mean $s(q')e$ rather than $q'e$ as in the basic model. We presume that skill-intensive production is beneficial for high quality managers, but harmful for low quality managers: there is a q_1 such that $s(q') \geq q'$ for

$q' \geq q_1$ and $s(q') \leq q'$ for $q' \leq q_1$. We denote the firm profit from the use of skill intensive production by $W_F(q')$. The firm's overall profit is then given by $max\{V_F(q'), W_F(q')\}$. The previous analysis can be replicated, modifying the assumptions by replacing $V_F(q')$ with $max\{V_F(q'), W_F(q')\}$. Result 6 describes the optimal use of skill-intensive production.

Result 6. *In Model A, the company in the enforcement jurisdiction is more likely to choose skill-intensive production. In Model B, the company in the non-enforcement jurisdiction is more likely to choose skill-intensive production.*

Skill-intensive production will be chosen by companies with high quality managers. In Model A, these companies are in the enforcement jurisdiction, and in Model B the opposite is true.

3 Data

To test the predictions detailed in Section 2, we require data on executive jobs transfers, executive compensation, firm research and development spending and firm capital investment. Our data source for details on executives is Standard and Poor's Execucomp database. Execucomp includes compensation data on the five most highly paid executives for 2,610 large publicly traded U.S. firms. (Execucomp also backfills some data for executives who rise to the top five, so some firms have reported data for more than five executives in a given year.) Data are available for 1992-2004. Executive-specific identifiers allow us to track managers who move from one firm to another.

We supplement the Execucomp data with firm-level data from Compustat on research and development investment and capital expenditures. We proxy for firm age by considering the firm's first appearance in Compustat. We use the location of firms' headquarters in implementing our empirical strategy (as discussed below in Section 4), but Execucomp and Compustat report only the current and not the historical headquarters location. We match the Execucomp data set to the Compact Disclosure database to determine historical headquarters locations. One hundred and thirty (5.0%) of the firms shifted locations during the sample period. Data on state unemployment rates and per capita personal income are provided by the Bureau of Economic Analysis. Our last data source is 10kwizard.com, which provides SEC filings for the sample companies. Summary statistics on these data are reported in Table 1.

4 Empirical Strategy

The central empirical challenge is to generate a measure of the enforceability of non-competition agreements across the states of the U.S. To this end, we construct an index of non-competition

enforcement.[4]

4.1 Non-competition Enforcement Index

Malsberger (2004) is the central resource describing non-competition law in the fifty U.S. states and the District of Columbia. We consider twelve questions analyzed by Malsberger for each jurisdiction and assign one point to each jurisdiction for each question if the jurisdiction's enforcement of that dimension of non-competition law exceeds a given threshold. Possible totals therefore range from zero to twelve, and we scale the totals by dividing by twelve to generate a score from zero to one. A complete list of questions, thresholds and state totals is given in the Appendix. Summary statistics on the scores are reported in Table 1. We provide here a broad overview of the basic issues in non-competition law and provide some examples illustrating differences amongst the laws of varying states.

The first question is whether non-competition agreements are generally enforceable in any respect. The focus of our study is on the effects of non-competition agreements signed by executives who are employed by large firms, so we ignore laws that apply to non-competition arrangements concluded in the context of the sale of a business. (Those are permitted to some degree in every jurisdiction.) Almost all states allow some form of covenant not to compete between employers and employees, though California and North Dakota do not. For this question, all jurisdictions save these two are awarded a score of one.

Even though most states allow some form of non-competition agreement, there is great variation in the types of contracts permitted. For example, the nature of what a firm can claim as a legitimate protectable interest depends on the jurisdiction. In some states (e.g., New Hampshire), a firm can restrict an employee from future independent dealings with customers with whom he had direct contact, but cannot prevent him from seeking business from other customers once he leaves the firm. In other states (e.g. Georgia), a non-competition agreement can ban an employee from trading with any current clients of the firm, even if the employee has no contact with the client.

States also have different requirements for the compensation that an employee must receive in order for the non-competition contract to be valid. In some states (e.g. Wisconsin), at-will employment is sufficient consideration. In other states (e.g. Texas) some ancillary compensation must be granted to the employee at the time the agreement is made.

The geographical and time restrictions that are considered reasonable can be quite different in

[4]Our study applies the insight of the law and finance literature (La Porta, Lopez-de-Silanes, Shleifer and Vishny 1997, 1998, 1999, 2000, Beck, Demirguc-Kunt and Levine, 2003) that legal institutions can have a strong effect on the structure and workings of the firm. In our setting, however, regulations vary at the state level within a given country. Recent studies exploiting cross-state analysis include Bebchuk and Cohen (2003) and Wald and Long (2006).

different jurisdictions. In some states (e.g. Missouri), an agreement will be enforced in a region even if the firm has no current business in that area. In other states (e.g. Virginia) the non-competition agreement must usually be restricted to the firm's current markets. Some states (e.g. Pennsylvania) will routinely enforce 3 year covenants, while others (e.g. Florida) presume that covenants more than 2 years in length contracted upon outside a sale-of-business context are unreasonable. State laws also vary in determining whether employees are released from their contracts if they are fired.

In our empirical work we consider the effects of both changes in the regulations of given states over time and cross-sectional differences in state laws. We note here that the enforcement of non-competition agreements is governed by employment law, not corporate law, so the relevant jurisdiction is typically the one in which the employee works (Malsberger, 2004 and Pentelovitch, 2003). Our study analyzes top executives at large firms, who will typically work at headquarters, so it is the headquarters location, not the state of incorporation, that we consider.[5]

4.2 Time-Series Changes in State Laws

While laws governing the enforcement of non-competition agreements are largely static, three states experienced significant shifts in the treatment of covenants not to compete during our sample period of 1992-2004.

4.2.1 Texas

In June 1994 in *Light v. Centel Cellular Co.* the Texas Supreme Court developed a new set of requirements that were needed for enforceability of non-competition agreements. The ruling, in this important case that redefined the legal standards in the state, stated that a covenant not to compete must be "ancillary to or part of an otherwise enforceable agreement" between the employer and the employee. In other words, the employer must offer the employee some specific consideration in exchange for the non-competition agreement, and continued at-will employment does not constitute acceptable consideration. Moreover, it must be that the covenant not to compete is designed to enforce the promises made by the employee as part of the agreement. This latter condition was a new requirement added by the court (Malsberger, 2004), and it serves to make it substantially more difficult to enforce non-competition agreements in Texas.[6] The non-competition enforcement index score for Texas is five before 1994 and three after the decision. The court also ruled that its

[5] As discussed below in Section 4.3 there was some ambiguity during the sample period about which state's law governed cases in which an employee left a firm with a headquarters in one state and moved to a competitor with a headquarters in a different state. This adds noise to our estimation (though no systematic bias), but the state of incorporation, in any case, is rarely of significant importance.

[6] Bundren (2005), Schueler and Solomon (2001) and Fowler (2002) detail the significant effects of the *Light v. Centel* decision on Texas non-competition law.

interpretation of the law applied both retroactively to all agreements previously signed in Texas and prospectively to any future agreements.

4.2.2 Louisiana

The Louisiana Supreme Court radically changed the enforcement of non-competition agreements in the state with its June 2001 ruling in *SWAT 24 Shreveport Bossier, Inc. v. Bond*. The court ruled that Louisiana's statues on covenants not to compete only permitted contracts that restricted employees from setting up their own businesses in competition with a previous employer; employees could not be prohibited from joining a competing firm in which they held no equity interest. From the perspective of a manager of a large corporation, the *SWAT* ruling made non-competition agreements significantly less enforceable in Louisiana; the relevant labor market opportunities for such a manager would typically lie with other large competitors. The ruling applied to all previous covenants not to compete. In 2003, the state legislature altered the law to permit non-competition agreements barring employees from joining other firms in which they have no ownership interest.[7] The non-competition enforcement index score for Louisiana is zero during the period 2002-2003 and four otherwise.

4.2.3 Florida

The change in law in Florida, by contrast with the above two cases, arose from the actions of the state legislature, not a court. In late May, 1996 the state legislature repealed the previous law governing covenants not to compete and replaced it with a new law. In addition to adding clarity to the rules governing non-competition agreements, the new law strengthened employers' positions in three significant ways. First, the 1996 statue prohibits courts from considering the individual hardship that the non-competition agreement will cause the former employee. This represents a dramatic change from the previous law that balanced the interests of the employer and the former employee (Malsberger, 2004). Second, the 1996 law requires courts to modify geographic or time restrictions that are overbroad, rather than simply declaring the covenant unenforceable. Prior law allowed for such modifications, but did not require them. This change made it easier for employers to write highly restrictive covenants without fear of their being overturned in court. Third, under the new law there is a presumption of injury to the firm when a non-competition agreement is violated. This enhances the firm's powers to get an injunction preventing its former employee from working for another company (Gallo and Adler, undated). The non-competition enforcement index

[7] Terrell (2004) discusses the history of Louisiana non-competition law.

score for Florida is seven before the 1996 law and nine afterwards. The new law was specifically stated to apply only to contracts signed after July, 1996 - previous contracts are governed by the law in effect at the time they were signed. The purely prospective change in Florida law differs from the prospective and retroactive changes in the law in Texas and Louisiana. When considering the impact of these various legal changes on executive compensation, we will take into account in our analysis below the fact that the Texas and Louisiana rulings abrogated some past agreements, while the Florida change in statue law served only to expand the scope for future agreements, and had no effect on previous contracts.

We make use of these changes in the legal environment to generate a variable we label *Increased Enforceability*. We assume that the legal changes detailed above affected compensation and firm investment starting in the year following their occurrence. The variable therefore takes the value of one for firms in Florida in 1997-2004, takes the value of negative one for firms in Texas in 1995-2004 and for firms Louisiana in 2002-2003 and is set equal to zero otherwise. Observations from these three states constitute 13% of the data. To avoid any possible selection effects, we only consider the effects of the legal shifts on the large majority (95%) of firms that did not change the state of their headquarters locations throughout the entire sample period. We use a simple three-level ($\{-1, 0, +1\}$) measure of the changes for the results reported in the paper, but a measure based on differences in the non-enforcement index scores yields similar findings. The changes described above can be regarded as exogenous shocks to the legal environment from the perspective of any given firm. All the changes had substantial effects on the enforceability of non-competition agreements. Since these legal changes affected firms in different states at different times, we are able to incorporate firm (or executive) fixed effects into our analysis. In our analysis of the level of R&D spending, for example, we consider the effect of the change in the legal environment on the R&D investment of a given firm. Firms in the states that did not experience any legal shifts serve as controls for any times series variation in compensation levels that occurs national-wide.

Our econometric model considers the effect of *Increased Enforceability* on the following firm characteristics: executive transfers into and out of the firm, executive job tenures, level and composition of executive compensation, firm research and development spending, firm investment and firm performance. The equation estimated is

$$firm\,characteristic_i = F(Increased\,Enforceability, controls_i) + \epsilon_i, \tag{1}$$

where $controls_i$ is a vector of controls for firm i including a firm fixed effect and ϵ_i is an error term. We most often estimate linear models, though we also consider Poisson and logit models. Given the

small number of firm headquarters moves discussed in Section 3, state fixed effects are essentially subsumed by the firm fixed effects and are therefore omitted. We calculate robust standard errors clustered at the state-year level.

In some tests we analyze the characteristics of a given executive (such as growth in compensation) and estimate

$$executive\,characteristic_j = F(Increased\,Enforceability, controls_j) + \epsilon_j, \tag{2}$$

where $controls_j$ is a vector of controls for executive j including an executive fixed effect and ϵ_j is an error term. Under this specification we calculate robust standard errors clustered at the firm level.

4.3 Cross-sectional Variation in State Laws

To supplement the time-series evidence, we also consider cross-sectional variation in legal environments across states. One approach would be to simply use the non-enforcement index scores without any state fixed effects, but that analysis would presume that the differences in, for example, compensation levels between firms in different states are entirely driven by non-competition law. That is clearly not true; states vary in numerous ways, not all of which can be specified, so state fixed effects are required. Just using the non-enforcement index scores along with state fixed effects would essentially replicate the time-series approach described above. Instead, we argue that the level of the non-enforcement index will have a different effect on firms that face different competitive environments. We focus on the extent of in-state competition, since it is in-state competition that is most affected by a covenant not to compete. This is true for two reasons:

1. As discussed above, enforceable non-competition agreements typically have a restricted geographical scope, and this scope is often a state or a part of a state, for example, a county, a city or a 10 or 50 mile radius around the place of business (Malsberger, 2004).

2. During the sample period it was considerably more difficult to enforce a non-competition agreement across state boundaries than within a state. Managers from states with tough non-competition enforceability on several occasions accepted offers from California firms and asked California courts to void their non-competition agreements. California courts typically agreed, arguing that the contracts were not enforceable in California.[8]

[8]The governing case is Application Group v. Hunter Group (1996) in which the Maryland-based employee of a Maryland firm who had signed a non-competition agreement moved to California to work for a California-based competitor. A California court voided the non-competition agreement based on California law. This case also showed

We thus propose the interaction between the non-competition enforcement index and the level of in-state competition as a measure of effect of enforceability. For firms with considerable in-state competition, an increase in the non-competition index will substantially reduce the probability that an executive will leave the firm and join a competitor. For firms with little in-state competition, an increase in enforceability will have little impact, for the two reasons given above. We also incorporate state fixed effects in the analysis to control for state-wide variables other than non-compete enforceability. We are thus comparing the relative effects of non-competition enforcement

We cannot use firm fixed effects in this specification because most states (and hence most firms) experience no time-series variation in the non-competition index. Thus, relative to the time-series variable, the cross-sectional measure sacrifices the precision of firm fixed effects, but makes use of variation in non-compete enforceability across more firms and more states.

The econometric model we use to estimate the cross-sectional effects of differences in state laws is

$$firm\,characteristic_k = F((Enforcement\,score) * (in-state\,competition), controls_k) + \epsilon_k, \quad (3)$$

where *(in-state competition)* is the fraction of total industry sales (excluding those of the firm itself) generated by in-state competitors,[9] $controls_k$ is a vector of controls for firm k including *(in-state competition)* and state and industry fixed effects and ϵ_k is an error term. We calculate robust standard errors clustered at the firm level. The level of the non-enforcement index is almost perfectly collinear with the state fixed effects and is therefore not included in (3). (It is not completely collinear only because of the time-series variation that we analyze in the method described in Section 4.2.) We interpret the coefficient on *Enforcement*(In-state competition)* as a measure of the effects of non-competition enforceability since it reflects the impact of enforceability on the firms within a given state for which it should matter most.

4.3.1 Is the Level of Non-Competition Enforceability Exogenous?

It is clear that a firm can choose the location of its corporate headquarters. Our study of the effects of cross-sectional variation in non-competition enforcement is therefore subject to the following

that courts would not be bound by a choice-of-law provision in the contract asserting under which state law the non-competition agreement was to be enforced. Keener v. Covergys (2003) and Advanced Bionics v. Medtronic (2003) confirmed that state courts have a very limited ability to enforce non-competition agreements when employees move to other states. Cheskin and Lerner (2003) detail the difficulties previous employers face in enforcing non-competition covenants across state lines. It is clear that it is easiest and least costly to enforce non-competition agreements when the executive remains in-state.

[9] Our results are robust to using a measure of competition based on the number of competitors.

objection: perhaps firms that plan to have a corporate policy requiring non-competition contracts locate in jurisdictions that will enforce these contracts. Any results we may find linking non-competition enforceability to, for example, executive mobility may thus be driven simply by sorting in the types of firms that choose to locate in different areas.

We do not view this objection as particularly forceful for two reasons. First, the business location literature has emphasized the effects of natural resources (Ellison and Glaeser, 1999), unionization levels, state taxes (Bartik, 1985), founder's home location, energy costs (Carlton, 1983) and environmental regulation on the siting decisions of firms. The local non-competition enforcement regime has not been proposed as a first-order determinant of firm location, nor do we think it a likely candidate. Moreover, the time-series results in Section 5 show that non-competition enforceability has no effect on value or performance for affected firms, so it seems unlikely that it is driving firm location decisions. We also find no evidence that the time-series changes in enforceability that we observe led to any change in the rate of in- or out-migration of firms to the relevant states.

Second, the sorting argument presumes that differences in non-competition law do have an effect, or else there would be no reason for firms to sort into states based on varying enforceability. That is, the sorting argument can suggest at most that any effects we find are a combination of treatment effects from differences in the laws and sorting effects. Our specification, however, is designed to negate sorting effects. Suppose, for example, that firms that have no interest in non-competition contracts locate in California (a low-enforcement state), while firms that do want non-competition agreements locate in Massachusetts (a high-enforcement state). We make use of state fixed effects in all our cross-sectional regressions that completely net out such effects.

The type of sorting for which we cannot control is sorting that takes place across the enforceability and within-state competition measures simultaneously. If there are firms that are particularly averse to executive mobility, they may locate in states that have both high enforceability and little in-state competition, since these features should reduce managerial transfers. Result 2 predicts that high enforceability reduces executive transfers. Our interaction variable can essentially be thought of as

$$(Enforcement - mean(Enforcement)) * (in-state\,competition - mean(in-state\,competition)).$$

Stability-seeking firms locating in high enforcement, low in-state competition states will generate negative values for this interaction but will presumably have low executive mobility. This would

bias the results away from a finding consistent with Result 2 (since our empirical strategy regards a positive value for the interaction as indicative of high enforceability effects), and similar arguments apply to the other predictions. In other words, any sorting effects are likely to be quite small, and, in any case, will disfavor finding evidence in support of the predictions of the theoretical framework.

The time-series tests offer clear exogenous shocks to individual firms, but the cross-sectional tests provide additional evidence using variation across all states.

5 Results

5.1 Do firms use non-competition agreements for top executives?

To answer this question, we selected a random sample of 500 Execucomp firms and conducted searches in 10kwizard.com of the 10-K, 10-Q and other SEC filings of these firms. For 351 of the firms (70.2%), we found evidence of non-competition agreements between the firm and its top executives. In many cases firms supplied explicit employment agreements detailing the terms of these non-competition covenants. In other cases, the firms simply specified that certain top officers had signed non-competes. Firms need not, of course, disclose this information, so 70.2% should be regarded as a lower bound for the fraction of firms that employ these covenants. This finding is consistent with previous research on the frequency of non-competition provisions in contracts with entrepreneurs (Kaplan and Stromberg, 2003), CEOs (Gillan, Hartzell and Parrino, 2005) and technology sector workers (Jauhiainen, Heilmann and Hurmelinna, 2003). A logistic regression of whether a firm has disclosed the use of non-competition agreements on the level of the enforceability index in the firm's state yields a coefficient estimate of 1.313 with a t-stat of 3.14 (robust standard errors, clustered at the state level). A one-standard deviation increase in the enforceability index from its mean raises the probability of disclosed use of non-competition agreements from 0.705 to 0.754. While this evidence is essentially descriptive, lacking the state and industry (or firm) controls we will use in our formal analysis, it suggests that non-competition agreements are widely used and that their use increases with state enforceability. The choice by firms to use an agreement, however, is endogenous and the relevance of an agreement will vary with the level of enforceability. For example, we find that 58% of the California firms in our sample report using non-competition agreements, despite the extremely limited legal scope of those agreements. (Kaplan and Stromberg, 2003 find a similar fraction in their sample of California entrepreneurs.) The more important question is the extent to which non-competition covenants are enforceable. Consequently, having established the common use of non-competition agreements, our analysis now turns to the central issue of the effects of plausibly exogenous variation in enforceability on employment patterns,

executive compensation and project selection.

5.2 Are non-competition agreements effective?

We apply our empirical strategy to test the predictions listed in Section 2. Result 2 shows that in both Models A and B the frequency of executive job transfers (especially within-industry) is decreasing in the level of non-competition enforceability faced by the firm.[10] To test this prediction, we first analyze the set of job transfers. Execucomp provides information on the top executives, and unique executive identifiers allow us to establish that executives have left one firm and joined another. Using 10kwizard.com searches, we also track all the executives who have left the Execucomp database for other public firms. We exclude all transfers that result from mergers and spin-offs. We also exclude transfers between subsidiaries of the same parent. In total, we find 1,883 transfers between independent firms over the sample period.[11] We define a transfer to be within-industry if it is between two firms that have primary businesses in the same 4-digit industry NAICS code. For firms outside Compustat without NAICS codes, we match industries at the 4-digit SIC code level. We observe 637 within-industry transfers. For each firm we calculate the total number of transfers both into and out of the firm.

The first column of Table 2 reports results for the regression of the number of within-industry transfers on *Increased Enforceability*, firm fixed effects, year fixed effects and a set of controls. The controls include for each firm-year the firm's one- and three-year total returns, the log of firm equity book and market values, the log of firm sales and the log of firm assets. We also include as additional controls the log of the state unemployment rate and the log of the state personal per capita income in the year. This regression explores the effects of time-series changes in state laws (specification (1)). The estimation is via Poisson fixed-effects regression, as it is for all the regressions reported in this table. The coefficients are expressed as intensities, relative to a base level (equivalent to no effect) of one. Reported t-statistics compare coefficients to one. We find that increased enforceability of non-competition agreements significantly (t=-4.01) reduces within-industry transfers, as suggested by Result 2. (Robust t-statistics corrected for clustering at the state-year level are reported.) A shift to a tougher enforcement regime reduces the arrival intensity of within-industry transfers by 48.5%. A change in state law to greater enforceability leads to a

[10] In the theoretical framework, in the enforcement jurisdiction the firm experiences fewer out-transfers and its competitor experiences fewer in-transfers. Overall, there are fewer transfers. Implicitly the model assumes that the firm and its competitor are governed by the same law, but this need not be true in reality. The discussion in Section 4.3, however, shows that the laws of both the previous and new employer are relevant in non-compete cases. That suggests that an increase in enforceability will reduce both out-transfers and in-transfers for a firm.

[11] Due to the nature of the data, we observe fewer transfers in 1992-1993, but this is accounted for by our year fixed effects.

reduction in within-industry transfers that is both economically and statistically significant.[12]

We next consider the impact of cross-sectional variation in the non-competition enforcement index (specification (3)). The second column of Table 2 reports results for the regression of the number of within-industry transfers on *Enforcement*(In-state competition)*, *(In-state competition)*, state, industry and year fixed effects, and the previous set of firm controls, along with log of firm age. (*Log(Firm Age)* and *(In-state competition)* were omitted in the previous regression due to the presence of firm fixed effects - these variables exhibit very little time-series variation for a given firm, especially in the presence of year fixed effects.) Firms that produce more than 90% of their industry's sales (1.9% of the sample) are excluded from this regression (and the analogous regressions throughout the paper) because they face so little within-industry competition that variation in the *(in-state competition)* measure will not reflect substantive differences in the same-industry employment opportunities of their executives. We find that the coefficient on *Enforcement*(In-state competition)* is negative and significant (t=-2.82), providing further support for Result 2. (Robust t-statistics corrected for clustering at the firm level are reported.) Tough enforcement of non-competition agreements serves to particularly reduce within-industry transfers for firms with substantial in-state competition, as hypothesized.[13] A one-standard deviation increase in the interaction between the enforcement index and the level of in-state competition reduces the intensity of the arrival of within-industry transfers by 24.2%.

The third and fourth columns display results from regressing all transfers (within and between industries) on *Increased Enforceability* and *Enforcement*(In-state competition)*, respectively. The effects are economically smaller than for the within-industry regressions (a shift to increased enforcement reduces the arrival intensity of all transfers by 34.4%, and a one-standard-deviation increase in the interaction between the enforcement index and the level of in-state competition reduces the rate of transfers by 10.0% of the mean), but remain statistically significant (t=-2.45 and t=-1.69, respectively). As shown in the fifth and sixth columns of Table 2, however, *Increased Enforceability* and *Enforcement*(In-state competition)* have statistically insignificant effects on the level of between-industry effects. While the group of companies within a firm's industry likely does not perfectly correspond to the firm's set of competitors that can excluded as potential employers

[12]The coefficients (with t-statistics in parenthesis) for the increased enforceability in individual states are as follows: Texas 0.62 (-3.09), Florida 0.33 (-2.89) and Louisiana 0.71 (-0.40). The joint hypothesis that these coefficients are zero may be rejected at the 1% level.

[13]This result is not driven by the California firms. The use of state fixed effects and the zero enforceability score for California imply that California firms do not contribute directly to the estimation of the coefficient on *Enforcement*(In-state competition)*; California firms serve as controls and allow for more precise estimation of the other coefficients. Throughout the empirical results, omitting the California firms has a very minor effect on the coefficient estimates for *Enforcement*(In-state competition)*.

by a non-competition agreement, our empirical findings show that the industry matching performs quite well in describing the scope of covenants not to compete.

The results displayed in Table 2 establish that our measures of *Increased Enforceability* and *Enforcement* capture differences in the legal environment that have an important effect on within-industry executive mobility. Moreover, the results also suggest that our variables are not simply correlated with some endogenous measure of executives' general propensity to move since we show that *Increased Enforceability* and *Enforcement* reduce within-industry, but not between-industry, moves.

Result 2 suggests that executives should have longer job tenures in tough enforcement jurisdictions. Execucomp provides data on the start and departure dates for a subset of managers. We use this data to generate a record of completed job tenure lengths for these executives. For each firm-year we then calculate the average completed job tenure across all executives for whom data is available. (This measure is highly correlated within firms, which we account for through clustering of the standard errors at the firm level.) In the first column of Table 3 we display the results from regressing job tenure length on *Increased Enforceability*, firm fixed effects and the previous set of controls. In support of Prediction 2, the coefficient on *Increased Enforceability* is significant (t=3.14). A switch to a higher enforceability regime increases completed job tenure lengths by 1.15 years, which is 9.0% of the mean. In the second column, we report the results from regressing job tenures on *Enforcement*(In-state competition)* and the usual controls. The coefficient is positive and significant (t=2.16). A one-standard deviation increase in *Enforcement*(In-state competition)* increases job tenures by 10.6% of the mean.

We also analyze the effect of non-competition agreement enforceability on the rate of departures from the firm. We consider than an executive has departed a firm if Execucomp records his leaving date, or if the executive appears as an employee of a different firm. In the third column of Table 3 we report results from regressing the number of departures in each firm-year on *Increased Enforceability*, firm fixed effects and the standard controls. The coefficient is statistically significant, and we find that a shift to a higher enforcement regime reduces the rate of departures by 29% of the mean. In the fourth column we show results from regressing the number of departures on *Enforcement*(In-state competition)* and the usual controls. The coefficient is statistically insignificant. We note here that the *Increased Enforceability* variable measures a change, while the *Enforcement* variable is a level. The departure measure is a change, and the job tenure variable is a level. We would thus expect that *Increased Enforceability* would directly change the rate of departures, but that it would change job tenure lengths only over time. This may explain the much larger economic impact

of *Increased Enforceability* on the departure rate relative to job tenure length. The *Enforcement* variable, by contrast, should be expected to have an effect on observed job tenures (since both are levels), but its effect on the rate of departures might be more difficult to discern. This may explain the significance of *Enforcement*(In-state competition)* in the job tenure regression and its insignificance in the departures regression. Overall the results are supportive of Result 2. Non-competition arrangements clearly reduce executive mobility and increase stability.

5.3 Executive compensation

We now turn to the issue of executive compensation. Result 3 shows that Models A and B provide competing hypotheses about the effect of non-competition agreement enforcement on the level of compensation. We first consider the impact of a shift in legal enforcement. As discussed in Section 4.2, the change in Florida's laws differed from the changes in Texas and Louisiana. In Florida, the law change in 1996 in favor of tougher enforcement was purely prospective and had no effect on pre-existing contracts. In Models A and B, managers who work for the firm in enforcement jurisdiction accept signing bonuses in period zero, while managers who are employed in the non-enforcement jurisdiction receive their compensation at a later period. This suggests that Florida executives may have negotiated higher compensation in 1997 (the year after the law change) in exchange for signing new, more restrictive covenants not to compete. In future years these covenants may have limited growth in compensation. By contrast, the abrogating of all historical contracts that occurred in Texas and Louisiana would be expected to raise salaries immediately. We thus define a new variable *Increased Enforceability'* that is equal to *Increased Enforceability*, except that it is equal to zero for Florida firms in 1997 and takes the value of one for Florida firms from 1998-2004.

The *Increased Enforceability'* variable measures a change, so we study its effect on the change in compensation. We define compensation to be the sum of the following Execucomp data items: Salary, Bonus, Other Annual, Total Value of Restricted Stock Granted, Total Value of Stock Options Granted (using Black-Scholes), Long- Term Incentive Payouts, and All Other Total. We analyze compensation at the individual executive level, and we truncate the growth in compensation at -90% and +900%. (This eliminates 1.5% of the data.) In the first column of Table 4 we report results from regressing compensation growth on *Increased Enforceability'*, executive fixed effects and the previous set of firm controls (specification (2)). We find a negative and significant (t=-2.42) coefficient on *Increased Enforceability'* (robust t-statistics corrected for clustering at the level of the firm are reported). For a given executive, a shift to a tougher enforcement regime reduces compensation growth by 12.8%, which is 39.1% of the mean growth rate. This economically significant decrease

in the growth rate of compensation, using individual executive fixed effects, is strong evidence in support of Model B, indicating that increased enforcement of non-competition agreements reduces compensation growth. The individual fixed effect controls indicate that this finding is evidence in favor of the direct effect of non-competition enforceability on a given executive; there is no selection effect at work in this regression. Regressing log growth rates on *Increased Enforceability'* yields similar (unreported) results in the untruncated sample.

We also consider the effect of the level of *Enforcement* on the level of compensation. Since the *Enforcement*(In-state competition)* variable does not vary within a firm, we are unable to make use of firm (or executive) fixed effects. We regress the log of average compensation across the top five executives for each firm-year on the level variable *Enforcement*(In-state competition)*, *(In-state competition)*, state, industry and year fixed effects and the usual firm controls. As displayed in the second column of Table 4, we find that *Enforcement*(In-state competition)* significantly (t=-3.64) reduces compensation (robust t-statistics corrected for clustering at the level of the firm are reported). A one-standard deviation increase in *Enforcement*(In-state competition)* reduces the log of compensation by 1.2% of the mean. (By comparison, a one-standard deviation increase in three-year total return increases the log of compensation by 0.7% of the mean.) This result provides further cross-sectional support for Model B in addition to the previous time-series evidence: top executive compensation is lower in high-enforcement jurisdictions.

We have shown that compensation is lower in high-enforcement jurisdictions, and we now consider whether the form of compensation differs with non-competition enforceability. Result 4 shows that Model A predicts that salary should constitute a smaller proportion of overall compensation in areas in which covenants not to compete are more strictly enforced, while Model B predicts the opposite. To test the time-series implication of these predictions, we regress via OLS the difference between salary growth and overall compensation growth on *Increased Enforceability'*, executive fixed effects and the standard set of firm controls. As exhibited in the first column of Table 5, we find a positive and significant (t=2.01) coefficient on *Increased Enforceability'*: a shift to greater enforcement of non-competition agreements leads to greater growth in salary relative to other forms of compensation. This fixed effect finding provides evidence for Model B. To test the cross-sectional implications of the predictions arising from Result 4, we regress the log of the ratio of salary to overall compensation on *Enforcement*(In-state competition)*, *(In-state competition)* and the standard controls. Column two of Table 5 shows that we find a positive and significant (t=3.99) coefficient on *Enforcement*(In-state competition)*. The time-series and cross-sectional results provide consistent evidence in favor of Model B.

To further study the question of compensation composition, we consider whether firms provide any options to their executives. For each executive-year, we regress an indicator variable for whether the executive receive any option compensation on *Increased Enforceability'*, executive fixed effects and the standard controls. Since the dependent variable is binary, the estimation is via fixed effects (conditional) logit. As displayed in column three of Table 5, we find no significant effect of *Increased Enforceability'* on options-granting. We also regress the number of top five executives receiving options on *Enforcement*(In-state competition)*, *(In-state competition)* and the previous controls. In column four of Table 5 we report that the coefficient on *Enforcement*(In-state competition)* is insignificant. Thus, although the total value of non-salary compensation (as a proportion of total compensation) is increasing in non-competition enforceability, we do not find evidence that enforceability affects whether or not firms use any options at all. In unreported results, we also find no evidence that the use of restricted stock in executive compensation varies with non-competition enforcement.

The use of reload options in executive compensation received particular attention during our sample period (Dybvig and Loewenstein, 2003). An executive who pays the exercise price for these options by selling currently held shares receives both shares and new reload options with a higher strike price but the same maturity as the original option. Dybvig and Loewenstein (2003) show that, relative to standard options, reload options are more valuable and have higher deltas, but the two options types are otherwise somewhat similar. Reload options are designed to ensure that an executive's exposure to the stock price is not diminished by his selling previously owned shares in order to pay the exercise price on his options.[14] As Result 4 makes clear, Model B suggests that compensating managers in a manner directly tied to stock price performance should be more important in low-enforcement jurisdictions, so we might expect a greater use of reload options in such areas. Model A predicts the opposite.

We regress a binary variable for whether an executive received any reload options in a given year on *Increased Enforceability'*, executive fixed effects and the usual controls. The estimation is by fixed effects logit. As exhibited in column five of Table 5, the coefficient on *Increased Enforceability'* is negative and significant (t=-3.78). This is evidence for a direct effect of enforceability on a given executive. We also regress the number of top five executives who received any reload options in a given firm-year on *Enforcement*(In-state competition)*, *(In-state competition)* and the standard controls. The coefficient on *Enforcement*(In-state competition)* is negative and significant (t=-

[14] Executives commonly liquidate most of the shares they receive upon exercising options (Ofek and Yermack, 2000). Chen (2004) studies the role of options in encouraging executive retention.

2.41). Both findings are consistent with the idea explored in Model B that maintaining a manager's exposure to his firm's stock price through the use of reload options is less important in high-enforcement jurisdictions.[15]

5.4 Post-transfer Compensation

Result 5 states that both Models A and B predict that amongst the set of managers who transfer, managers from the non-enforcement jurisdiction will enjoy greater increases in match quality, due to the largely firm-specific human capital of managers in the enforcement region. To test this prediction, we first make use of compensation as a proxy for firm-manager match quality. We consider all transfers within the Execucomp database (compensation information is not available for managers who transfer out of Execucomp).

The time-series implication of Models A and B is that managers will accumulate relatively more firm-specific human capital after an increase in non-competition enforceability. Testing the time-series implication of Result 5 therefore requires comparing managers who leave their firms before the regulatory shift with those who join their firms after the regulatory shift and then depart for a new firm. There are, however, fewer than fifteen managers in the second group. Consequently, we are only able to test the cross sectional implication of Result 5 that managers that depart firms in high-enforcement jurisdictions will receive relatively low compensation increases at their new companies.

There are 912 transferring executives with compensation data available at both their previous and new firms. For each executive we regress the log of the compensation he receives at his new firm on *Enforcement*(In-state competition)*, *(In-state competition)*, the log of the compensation he received at his previous firm, his compensation rank at his previous firm (all those below the top five are assigned the sixth rank), state and industry dummies for both the previous and new firms and the full set of firm controls. As shown in the first column of Table 6, the coefficient on *Enforcement*(In-state competition)* is negative and significant (t=-3.64). Relative to their previous compensation, executives who transfer from high enforcement jurisdictions receive relatively lower pay increases. This finding supports Result 5. It is also interesting to note that the costs (e.g. renegotiation costs) of moving to a new company may plausibly be higher for executives who have signed non-competition agreements, so they might be expected to switch firms only for very

[15] Dybvig and Loewenstein's (2003) result that reload options are worth more than standard options, combined with our finding that reload options are used more frequently in low-enforcement jurisdictions strengthens our previous result on compensation composition. We showed that non-salary compensation is larger in low-enforcement jurisdictions, using the Execucomp valuation measure that does not distinguish between reload and non-reload options. If reload options were valued properly, we would presumably find an even stronger result linking low-enforcement to high non-salary compensation.

large compensation inducements. Despite this point, executives transferring from high enforcement jurisdictions receive smaller compensation increases upon transferring. That suggests that renegotiation costs are not especially large. (We set these costs equal to zero in the theoretical framework, although the results are not sensitive to this assumption.)

It may be argued that executives transferring from high enforcement jurisdictions are only able to do so when they are fired, and that their lower post-transfer compensation reflects their involuntary termination from their previous firm. Against this point, we first note that in only nine states is a firing considered a justification for releasing an employee from a non-competition covenant. Second, in the second column of Table 6, we report results from repeating the regression in the first column for the subset of managers who are hired as CEOs at their new firms. These managers are presumably much less likely to have been fired from their previous jobs. The coefficient on *Enforcement*(In-state competition)* is significant for this set of managers as well.

As a last test, we consider the compensation rank of a manager as a second proxy for the quality of the manager-firm match. We regress the compensation rank on *Enforcement*(In-state competition)*, *(In-state competition)*, his compensation rank at his previous firm and the previously described set of controls.[16] We report in the third column of Table 6 that the coefficient on *Enforcement*(In-state competition)* is positive and significant (t=3.41). Managers from firms in high-enforcement areas move to higher (i.e., worse) ranked positions in their new firms. This is further evidence in support of Result 5.

5.5 Research and development spending and firm investment

As described in Result 6, Model A predicts that an increase in non-competition enforceability will lead to more skill-intensive production, while Model B predicts the opposite. To test these predictions, we consider two proxies for skill-intensive production: research and development spending and the capital-intensity of production. Research and development (R&D) is clearly an investment that especially benefits from the presence of highly-skilled managers. Model A suggests that the managers in the high-enforcement firm have higher human capital and are thus better suited to making R&D investments. (It is also the case that in Model A the firms in high-enforcement jurisdictions may be more willing to invest in R&D because non-competition agreements can protect the firms from the loss of their investments that would ensue if key managers depart.) Model B, by contrast, indicates that managers in low-enforcement jurisdictions will be more likely to make the investments in their own human capital that make success in R&D more likely. As a result, firms

[16] We estimate the regression by OLS, despite the discrete nature of the dependent variable, because there are four sets of state and industry fixed effects. These can be incorporated into the OLS regression without loss of consistency.

in low-enforcement jurisdictions should be more likely to invest in R&D rather than other projects.

To test these competing hypotheses, we regress the log of one plus research and development spending (research and development spending is zero for many firms) on *Increased Enforceability*, firm fixed effects and the standard firm controls from previous regressions. As reported in the first column of Table 7, we find a negative and significant (t=-2.81) coefficient on *Increased Enforceability*. A shift to tighter enforcement of non-competition agreements reduces the log of one plus research and development investment for a given firm by 4.8% of the mean.

We test the cross-sectional implications of Result 6 by regressing the log of one plus research and development spending (research and development spending is zero for many firms) on *Enforcement*(In-state competition)*, *(In-state competition)*, state and industry fixed effects and the usual set of firm controls. We show in the second column of Table 7 that the coefficient on *Enforcement*(In-state competition)* is negative and significant (t=-2.17). A one-standard-deviation increase in *Enforcement*(In-state competition)* reduces the log of one plus research and development spending by 3.8% of the mean. The time-series and cross-sectional results both provide support for Model B. While high enforceability of non-competition agreements may protect R&D investments, the empirically dominant effect is that non-compete agreements discourage employees from making investments in their own human capital. This places firms that require covenants not to compete at a comparative disadvantage in engaging in research and development, so they pursue less of it.

This result provides a new perspective on Saxenian's (1996) discussion of the differences between the computer industries in California and Massachusetts. Saxenian describes the greater communication amongst Silicon Valley firms relative to those along Massachusetts's Route 128 and argues that this information-sharing advantage led to the success of the California firms. Gilson (1999) and Rajan and Zingales (2001) argue that differences in non-compete enforcement between the California and Massachusetts can explain organizational and cultural differences between firms in the two states. Our empirical analysis indicates that firms in low non-competition enforcement jurisdictions are best suited to make investments in research and development. This suggests that the success of Silicon Valley may in part be linked to California's public policy of not enforcing covenants not to compete. Our empirical findings, however, are not driven simply by a state-to-state comparison; there are, after all, many differences between states that are unrelated to non-competition law. Instead we analyze both time-series variation in the laws of given states and cross-sectional variation in non-competition enforceability interacted with in-state competition, while controlling for state fixed effects.

We also consider the capital intensity of production as a second proxy for skill-intensive pro-

duction.[17] To test the predictions generated by Result 6, we regress the log of one plus the ratio of capital expenditures to the number of employees on *Increased Enforceability*, firm fixed effects and the usual controls. The results, displayed in the third column of Table 7, show that increased non-competition enforceability significantly (t=-4.33) reduces capex per employee. A shift to a regime of greater enforceability leads to a decrease in the log of capex per employee by 5.7% of the mean. We test the cross-sectional implications of Result 6 by regressing the log of one plus the ratio of capital expenditures to the number of employees on *Enforcement*(In-state competition)*, *(In-state competition)*, state and industry fixed effects and the standard set of firm controls. As shown in the fourth column of Table 7, the coefficient on *Enforcement*(In-state competition)* is negative and significant (t=-3.18). A one-standard-deviation increase in *Enforcement*(In-state competition)* reduces the log of the capex per employee by 3.9% of the mean. The time-series and cross-sectional evidence both provide strong support for Model B. Firms in high non-compete enforcement jurisdictions have substantially lower physical capital to labor ratios.

5.6 Firm performance and value

We now consider the net impact of non-competition on firm performance. In both Models A and B, the firm in the enforcement jurisdiction may choose not to require a non-competition contract, so the firm value should be at least weakly higher for firms in high-enforceability jurisdictions. To explore the impact of non-competition enforcement on firm value, we regress the log of the ratio of the firm's equity market value to its equity book value on *Increased Enforceability*, firm and year fixed effects, the log of the book value of debt, the log of sales, the log of assets, the log of the state unemployment rate and the log of the state personal income. The results, exhibited in the first column of Table 8, show that the coefficient on *Increased Enforceability* is insignificant. To study cross-sectional effects, we regress the log of the market to book ratio on *Enforcement*(In-state competition)*, *(In-state competition)*, state, industry and year fixed effects, the log of the firm age and the previous set of firm controls. As shown in the second column of Table 8, the coefficient on *Enforcement*(In-state competition)* is insignificant. We repeat these regressions, replacing the dependent variable with the return on equity (results reported in columns three and four of Table 8) and the return on assets (results not reported) and find insignificant results throughout. The clear conclusion from this evidence is that non-competition enforcement has no significant effect on firm value or profitability.

There are two natural explanations for this result. The first is that requiring an enforceable

[17] That physical capital is more complementary to skilled than to unskilled human capital is well established in the literature (see, for example, Goldin and Katz, 1998).

non-competition agreement may yield small (or no) net benefits to a firm. This might arise, for example, if the firm payoff from encouraging managers to invest in their own human capital is substantial. The second explanation is that non-competition agreements may yield sizable benefits to firms but might also create substantial negative externalities. The free flow of managers and intellectual capital across firms may generate positive gains for all the firms in an industry, and particularly for those in the same state. Thus, the positive spillovers from low-enforceability may roughly balance out the disadvantages at the individual firm level. This argument is particularly plausible given that we have shown that low-enforceability encourages R&D, an investment to which positive externalities are commonly attributed (e.g. Hall, 2002).

5.7 Firm Investment versus Managerial Investment

We found support for the importance of both firm investment in firm-specific human capital and managerial investment in general human capital. The reduced mobility and lower post-transfer compensation of executives in high-enforcement jurisdictions are both evidence that non-competition enforceability encourages firm investment, as proposed by both Models A and B. Models A and B differ, however, in their predictions relating enforceability to managerial human capital and hence to executive compensation and firm investment. The findings that managers in low-enforcement areas have higher compensation and receive less of their compensation in the form of salary, and that firms in low-enforcement areas invest more in R&D and capital-intensive production all support Model B. The weight of the evidence, therefore, is that firm investments are important, but that managerial investments in their own human capital have greater empirical relevance.

6 Conclusion

Our study of the time-series and cross-sectional variation in non-competition enforceability across the U.S. states demonstrates the importance of these legal regulations for executive mobility, executive compensation and firm investment. We show that increased enforceability leads to fewer executive within-industry transfers, lower and more salary-based compensation, reduced post-transfer compensation, lower R&D spending and reduced capital expenditures per employee. These findings are consistent with a model that has the following three features: non-competition agreements encourage firm investments in managerial human capital, the agreements discourage managerial investments in their own human capital and managerial investments have a greater impact than firm investments.

A new stream of literature on the theory of the firm has emphasized the important role and

somewhat unstable character of human capital assets. Our results show that non-competition agreements can serve as an effective means for securing employee resources within the boundary of the firm. Our findings also indicate, however, that the human capital of the firm's managers is changed by the presence of covenants not to compete. Overall, we find that the enforceability of non-competition agreements has no net effect on firm value.

This suggests two directions for analysis. First, it would be useful to distinguish between the direct effects on firm value of non-competition enforceability and the spillover effects arising from the restrictions on the free flow of labor (and hence ideas) across firms. These may differ across industries. Second, non-competition enforceability may affect the attractiveness of mergers between firms. Acquirers often list non-competition contracts amongst the assets they are purchasing. The value and meaning of these contracts is clearly dependent on the extent to which covenants not to compete are enforceable and assignable to purchasers. In an economy in which human capital is growing in prominence, determining the socially-optimal level of non-competition enforceability is likely to become increasing important.

Appendix

Proof of Lemma 1. The certainty equivalent to the manager of a contract offering him $ax + b$, given match quality q and effort e is

$$aqe - \frac{\rho a^2 \sigma^2}{2} + b - e^2.$$

Presented with this contract, the manager will thus exert effort $e^*(a, b, q) = \frac{aq}{2}$. The expected value to the company of offering the contract is $(1 - a)qe^*(a, b^*(q), q) - b^*(q)$. Since salary b has no effect on the optimal effort choice, the company will choose b^* to set the manager's certainty equivalent equal to zero: $b^*(q) = \frac{a^2}{2}\left(\rho\sigma^2 - \frac{q^2}{2}\right)$. This yields

$$V_F(q, a) = \frac{(1 - a)aq^2}{2} - \frac{a^2}{2}\left(\rho\sigma^2 - \frac{q^2}{2}\right).$$

Maximizing V_F provides the optimal incentive component

$$a^*(q) = \frac{\frac{q^2}{2}}{\frac{q^2}{2} + \rho\sigma^2},$$

which is increasing in q. The manager's expected compensation is given by

$$EC(q) = a^*(q)qe^*(a^*(q), b^*(q), q) + b^*(q) = \frac{a^*(q)^2}{2}\left(\rho\sigma^2 + \frac{q^2}{2}\right),$$

so the ratio of salary to expected compensation is

$$\frac{b^*(q)}{EC(q)} = \frac{\left(\rho\sigma^2 - \frac{q^2}{2}\right)}{\left(\rho\sigma^2 + \frac{q^2}{2}\right)},$$

which is decreasing in q. Since $a^*(q)$ is increasing in q, so is $EC(q)$. Last, we have

$$V_F(q) = \frac{q^4}{4q^2 + 8\rho\sigma^2},$$

which is increasing in q.

Lemma 2. $E[\pi_F(q + \lambda, \hat{q} + \delta\lambda)) - \pi_F(q, \hat{q})] < E[\pi_F^{ncc}(q + \lambda, \hat{q} + \delta\lambda) - \pi_F^{ncc}(q, \hat{q})]$ and $E[\pi_F(q + \lambda, \hat{q} + \delta\lambda) - \pi_F(q, \hat{q})] < E[\pi_F^{ncc}(q + \lambda, \hat{q} + \delta\lambda) + \pi_M^{ncc}(q + \lambda, \hat{q} + \delta\lambda) - \pi_M^{ncc}(q, \hat{q}) - \pi_F^{ncc}(q, \hat{q})]$.

Proof of Lemma 2.

We begin by proving the first clause of the lemma. We let q and $\hat{q}$ be given. It is sufficient to show that

$$(1-\theta_m)\left(max\{V_F(q+\lambda)-V_F(\hat{q}+\delta\lambda),0\}-max\{V_F(q)-V_F(\hat{q}),0\}\right)\leq \tag{4}$$

$$V_F(q+\lambda)+\epsilon_f max\{V_F(\hat{q}+\delta\lambda)-V_F(q+\lambda),0\}-V_F(q)-\epsilon_f max\{V_F(\hat{q})-V_F(q),0\}, \tag{5}$$

and that this inequality is strict with positive probability.

If $q \geq \hat{q}$ (which occurs with positive probability) then the expression in (5) is equal to $V_F(q+\lambda)-V_F(q)$, while the expression in (4) is equal to $(1-\theta_m)\left(V_F(q+\lambda)-V_F(\hat{q}+\delta\lambda)-V_F(q)+V_F(\hat{q})\right)$. In this case, the inequality is strict, because V_F is strictly increasing.

If $q<\hat{q}$ and $q+\lambda \geq \hat{q}+\delta\lambda$ then the expression in (4) is equal to $(1-\theta_m)\left(V_F(q+\lambda)-V_F(\hat{q}+\delta\lambda)\right)$, while the expression in (5) is greater than $\left(V_F(q+\lambda)-V_F(\hat{q}+\delta\lambda)\right)$. If $q<\hat{q}$ and $q+\lambda \leq \hat{q}+\delta\lambda$, the expression in (4) is equal to zero, while the expression in (5) is non-negative. To prove the second clause of the lemma, repeat this argument with $(\epsilon_f+\epsilon_m)$ replacing ϵ_f.

Assumption A: $I > E[\pi_F(q+\lambda,\hat{q}+\delta\lambda)-\pi_F(q,\hat{q})]$, $I < E[\pi_F^{ncc}(q+\lambda,\hat{q}+\delta\lambda)-\pi_F^{ncc}(q,\hat{q})]$ and $I < E[\pi_F^{ncc}(q+\lambda,\hat{q}+\delta\lambda)+\pi_M^{ncc}(q+\lambda,\hat{q}+\delta\lambda)-\pi_M^{ncc}(q,\hat{q})-\pi_F^{ncc}(q,\hat{q})]$.

Proof of Result 1A. Assumption A show that a firm will make an investment if and only if it has an enforceable non-competition agreement with its manager. The following argument shows that the firm in the high enforcement jurisdiction will offer a signing bonus in exchange for a non-competition agreement and that this offer will be accepted. The signing bonus s^* will be set equal to $s^* = E[\pi_M(q,\hat{q})-\pi_M^{ncc}(q+\lambda,\hat{q}+\delta\lambda)]$ to make the manager indifferent between agreeing and not agreeing to accept the non-competition contract. We have

$$E[\pi_F^{ncc}(q+\lambda,\hat{q}+\delta\lambda)+\pi_M^{ncc}(q+\lambda,\hat{q}+\delta\lambda)] > I + E[\pi_M^{ncc}(q,\hat{q})+\pi_F^{ncc}(q,\hat{q})]$$

$$\geq I + E[\pi_M(q,\hat{q})+\pi_F(q,\hat{q})] = I + s^* + E[\pi_M^{ncc}(q+\lambda,\hat{q}+\delta\lambda)+\pi_F(q,\hat{q})],$$

where the first inequality follows from Assumption A, the second from the fact that $\epsilon_m+\epsilon_f \geq \theta_m$ and the equality from the definition of s^*. This shows that $E[\pi_F^{ncc}(q+\lambda,\hat{q}+\delta\lambda)]-I-s^* > E[\pi_F(q,\hat{q})]$.

Proof of Lemma 3. Formally, we will show that

$$E[\pi_M(q+\gamma,\hat{q}+\gamma)-\pi_M(q,\hat{q})] > E[\pi_M^{ncc}(q+\gamma,\hat{q}+\gamma)-\pi_M^{ncc}(q,\hat{q})] \tag{6}$$

and

$$E[\pi_M(q+\gamma,\hat{q}+\gamma)-\pi_M(q,\hat{q})] > E[\pi_M^{ncc}(q+\gamma,\hat{q}+\gamma)-\pi_M^{ncc}(q+\lambda,\hat{q}+\delta\lambda)]. \quad (7)$$

Assumption A guarantees that the firm will not make an investment in the absence of a non-competition agreement, so showing the above two inequalities is sufficient to prove the lemma.

Inequality (6) follows directly from $\theta_m \geq \epsilon_m$. To show (7), we consider several cases. If $q \geq \hat{q}$ then $\pi_M(q+\gamma,\hat{q}+\gamma)-\pi_M(q,\hat{q}) > 0 = \pi_M^{ncc}(q+\gamma,\hat{q}+\gamma)$. If $q < \hat{q}$ and $q+\gamma > \hat{q}$, then

$$\pi_M(q+\gamma,\hat{q}+\gamma)-\pi_M(q,\hat{q}) \geq \theta_m(V_F(\hat{q}+\gamma)-V_F(\hat{q})) \geq$$

$$\epsilon_m(V_F(\hat{q}+\gamma)-V_F(q+\gamma)) = \pi_M^{ncc}(q+\gamma,\hat{q}+\gamma).$$

If $q < \hat{q}$ and $q+\gamma < \hat{q}$, then if $\pi_M^{ncc}(q+\gamma,\hat{q}+\gamma)-\pi_M^{ncc}(q+\lambda,\hat{q}+\delta\lambda) \leq 0$, the lemma is proved. Otherwise,

$$\pi_M(q+\gamma,\hat{q}+\gamma)-\pi_M(q,\hat{q}) \geq \theta_m(V_F(\hat{q}+\gamma)-V_F(\hat{q})) \geq$$

$$\epsilon_m(V_F(\hat{q}+\gamma)-V_F(q+\gamma)-V_F(\hat{q}+\delta\lambda)+V_F(q+\lambda))$$

$$= \pi_M^{ncc}(q+\gamma,\hat{q}+\gamma)-\pi_M^{ncc}(q+\lambda,\hat{q}+\delta\lambda),$$

where the second inequality follows from $\gamma \geq \lambda$.

Assumption B:

$$J > max\{E[\pi_M^{ncc}(q+\gamma,\hat{q}+\gamma)-\pi_M^{ncc}(q+\lambda,\hat{q}+\delta\lambda)], E[\pi_M^{ncc}(q+\gamma,\hat{q}+\gamma)-\pi_M^{ncc}(q,\hat{q})]\}$$

$$J < E[\pi_M(q+\gamma,\hat{q}+\gamma)-\pi_M(q,\hat{q})]),$$

Assumption C:

$$E[\pi_F^{ncc}(q+\lambda,\hat{q}+\delta\lambda)+\pi_M^{ncc}(q+\lambda,\hat{q}+\delta\lambda)]-I > E[\pi_F^{ncc}(q+\gamma,\hat{q}+\gamma)+\pi_M^{ncc}(q+\gamma,\hat{q}+\gamma)]-J$$

Proof of Result 1B. We consider the following candidate equilibrium. In exchange for a non-competition agreement, the firm in the enforcement jurisdiction offers the signing bonus

$s^{**} = E\left[\pi_M(q+\gamma, \hat{q}+\gamma) - \pi_M^{ncc}(q+\lambda, \hat{q}+\delta\lambda)\right] - J$, which a manager accepts. Assumption B shows that the manager who accepts the non-competition agreement will not make an investment, and Assumption A shows that his firm will. Assumption A shows that the firm in the non-enforcement jurisdiction will not make an investment, and Assumption B shows that the manager who works for this firm will make an investment. To show that the firm in the enforcement regime will offer the signing bonus s^{**}, consider that

$$E[\pi_F^{ncc}(q+\lambda, \hat{q}+\delta\lambda)] - I - s^{**}$$

$$> E[\pi_F^{ncc}(q+\gamma, \hat{q}+\gamma) + \pi_M^{ncc}(q+\gamma, \hat{q}+\gamma) - \pi_M^{ncc}(q+\lambda, \hat{q}+\delta\lambda)] - J - s^{**}$$

$$\geq E[\pi_F(q+\gamma, \hat{q}+\gamma) + \pi_M(q+\gamma, \hat{q}+\gamma) - \pi_M^{ncc}(q+\lambda, \hat{q}+\delta\lambda)] - J - s^{**} = E[\pi_F(q+\gamma, \hat{q}+\gamma)],$$

where the first inequality follows from Assumption C, the second from the fact that $\epsilon_m + \epsilon_f \geq \theta_m$ and the equality from the definition of s^*.

Proof of Result 2. In Model A only the firm in the enforcement jurisdiction makes a firm specific investment. We denote the underlying probability measure by P. The probability that the manager transfers from the non-enforcement firm is $P(\hat{q} > q)$. The probability that the manager transfers from the enforcement firm is $P(\hat{q} + \delta\lambda > q + \lambda) \leq P(\hat{q} > q)$.

In Model B, the firm makes the investment in the enforcement regime and the manager makes the investment in the non-enforcement regime. In the enforcement regime, the probability of transfer is $P(\hat{q} + \delta\lambda > q + \lambda)$. In the non-enforcement regime, the probability of transfer is $P(\hat{q} + \gamma > q + \gamma) \geq P(\hat{q} + \delta\lambda > q + \lambda)$.

Proof of Result 3.

We use the notation $y \geq_{FOSD} z$ to denote that y dominates z in the sense of first-order stochastic dominance (FOSD). In Model A, the quality of the manager in the enforcement jurisdiction is $max\{q+\lambda, \hat{q}+\delta\lambda\}$ and the quality of the manager in the non-enforcement jurisdiction is $max\{q, \hat{q}\}$. It is clear that for all $k \geq 0$, $k \leq max\{q, \hat{q}\} \Rightarrow k \leq max\{q+\lambda, \hat{q}+\delta\lambda\}$, so

$$max\{q+\lambda, \hat{q}+\delta\lambda\} \geq_{FOSD} max\{q+\lambda, \hat{q}+\delta\lambda\}. \tag{8}$$

Lemma 1 shows that expected compensation is increasing in quality, which completes the proof of the first statement of Result 3.

In Model B, the quality of the manager in the non-enforcement jurisdiction is given by $max\{q+\gamma, \hat{q}+\gamma\}$. The quality of the manager in the enforcement jurisdiction is given by $max\{q+\lambda, \hat{q}+\delta\lambda\}$. The fact that $\gamma > \lambda$ shows that

$$max\{q+\gamma, \hat{q}+\gamma\} \geq_{FOSD} max\{q+\lambda, \hat{q}+\delta\lambda\}. \tag{9}$$

The second statement of Result 3 follows from Lemma 1. We note here that in both models the firm in the enforcement jurisdiction sets the period zero signing bonus awarded to its manager equal to the expected period two signing bonus realized by the manager in the non-enforcement jurisdiction, since the production contract is designed to grant the manager zero expected utility.

Given Assumption D, Results 3, 4 and 6 are also true conditional on the manager remaining with the firm. The proof is available upon request.

Proof of Result 4. Lemma 1 shows that the ratio of salary to total compensation is decreasing in managerial quality. The result follows from (8) and (9).

Proof of Result 5. We require a preliminary lemma to prove this result. For any random variable y, we denote its density by f_y and its cumulative distribution function by F_y. We use the notation $y =_D z$ to denote that y and z are equal in distribution, and we denote the distribution of y conditional on an event A by $(y|A)$.

Lemma 4. If the random variable c has a log-concave density function, then for all $a > 0$, $(c+a)$ dominates c in the sense of the monotone likelihood ratio property (MLRP), which we denote by $(c+a) \geq_{MLRP} c$.

Proof of Lemma 4. The log-concavity of f_c implies that for any y, $\frac{dlogf_c(y-a)}{dy} \geq \frac{dlogf_c(y)}{dy}$ which implies that $\frac{f_c'(y-a)}{f_c(y-a)} \geq \frac{f_c'(y)}{f_c(y)}$. This last inequality implies that $\frac{f_c(y-a)}{f_c(y)}$ is increasing in y.

We define $z = \beta_2 - \beta_1$. In Model A, the increase in match quality for managers who transfer from the enforcement firm is given by

$$(\hat{q}+\delta\lambda-q-\lambda|\hat{q}+\delta\lambda \geq q+\lambda) =_D (z-(1-\delta)\lambda|z-(1-\delta)\lambda \geq 0). \tag{10}$$

The increase in match quality for managers who transfer from the non-enforcement firm is $(\hat{q}-q|\hat{q} \geq q) =_D (z|z \geq 0)$.

Assumption D and Miravete (2001) Corollary 2 shows that z has a log-concave density function. Lemma 4 shows that $z \geq_{MLRP} z-(1-\delta)\lambda$ and hence $(z|z \geq 0) \geq_{MLRP} (z-(1-\delta)\lambda|z-(1-\delta)\lambda \geq 0)$.

In Model B, the increase in match quality for managers who transfer from the enforcement firm is given by (10). The increase in match quality for managers who transfer from the non-enforcement

firm is $(\hat{q}+\gamma-q-\gamma|\hat{q}+\gamma \geq q+\gamma) =_D (z|z \geq 0)$. The result follows from the argument given in the case of Model A.

Proof of Result 6. It is clear that skill-intensive production will be employed if and only if $q' \geq q_1$. The result follows from (8) and (9).

Questions and Thresholds

The following twelve questions from Malsberger (2004) are used to evaluate the level of non-competition agreement enforceability in each state. Each state is granted one point for each question concerning which its laws lie above the threshold.

Question 1. Is there a state statue of general application that governs the enforceability of covenants not to compete?

Threshold 1. States that enforce non-competition agreements outside a sale-of-business context receive a score of one.

Question 2. What is an employer's protectable interest and how is it defined?

Threshold 2. States in which the employer can prevent the employee from future independent dealings with all the firm's customers, not merely with the customers with whom the employee had direct contact, receive a score of one.

Question 3. What must the plaintiff be able to show to prove the existence of an enforceable covenant not to compete?

Threshold 3. Laws that place greater weight on the interests of the firm relative to those of the former employee are above the threshold. For example, a law that requires that the contract be reasonably protective of the firm's business interests and only meet the condition of not being unreasonably injurious to the employee's interests would receive a score of one.

Question 4. Does the signing of a covenant not to compete at the inception of the employment relationship provide sufficient consideration to support the covenant?

Threshold 4. States for which the answer to Question 4 is clearly "Yes" are above the threshold.

Question 5. Will a change in the terms and conditions of employment provide sufficient consideration to support a covenant not to compete entered into after the employment relationship has begun?

Threshold 5. States for which the answer to Question 5 is clearly "Yes" are above the threshold.

Question 6. Will continued employment provide sufficient consideration to support a covenant not to compete entered into after the employment relationship has begun?

Threshold 6. States for which the answer to Question 6 is clearly "Yes" are above the threshold.

Question 7. What factors will the court consider in determining whether time and geographic restrictions in the covenant are reasonable?

Threshold 7. Jurisdictions in which courts are instructed not to consider economic or other hardships faced by the employee are above the threshold.

Question 8. Who has the burden of proving the reasonableness or unreasonableness of the covenant not to compete?

Threshold 8. States in which the burden of proof is clearly placed on the employee are above the threshold.

Question 9. What type of time or geographic restrictions has the court found to be reasonable? Unreasonable?

Threshold 9. Jurisdictions in which three-year statewide restrictions have been upheld receive a score of one.

Question 10. If the restrictions in the covenant not to compete are unenforceable because they are overbroad, are the courts permitted to modify the covenant to make the restrictions more narrow and to make the covenants enforceable?

Threshold 10. States for which the answer to Question 10 is clearly "Yes" are above the threshold.

Question 11. If the employer terminates the employment relationship, is the covenant enforceable?

Threshold 11. States for which the answer to Question 11 is clearly "Yes" are above the threshold.

Question 12. What damages may an employer recover and from whom for breach of a covenant not to compete?

Threshold 12. If, in addition to lost profits, there is a potential for punitive damages against the former employee, the state receives a score of one. States that explicitly exclude consideration of the reasonableness of the contract from the calculation of damages are also above the threshold.

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Non-competition Enforceability Index

State	Score	State	Score
Alabama	5	Missouri	7
Alaska	3	Montana	2
Arizona	3	Nebraska	4
Arkansas	5	Nevada	5
California	0	New Hampshire	2
Colorado	2	New Jersey	4
Connecticut	3	New Mexico	2
Delaware	6	New York	3
District of Columbia	7	North Carolina	4
Florida 1992-1996	7	North Dakota	0
Florida 1997-2004	9	Ohio	5
Georgia	5	Oklahoma	1
Hawaii	3	Oregon	6
Idaho	6	Pennsylvania	6
Illinois	5	Rhode Island	3
Indiana	5	South Carolina	5
Iowa	6	South Dakota	5
Kansas	6	Tennessee	7
Kentucky	6	Texas 1992-1994	5
Louisiana 1992-2001, 2004	4	Texas 1995-2004	3
Louisiana 2002-2003	0	Utah	6
Maine	4	Vermont	5
Maryland	5	Virginia	3
Massachusetts	6	Washington	5
Michigan	5	West Virginia	2
Minnesota	5	Wisconsin	3
Mississippi	4	Wyoming	4

Table 1: Summary Statistics

Variable	Mean	Median	Standard Deviation
Increased Enforceability	0.07	0	0.25
Enforceability	0.32	0.33	0.18
In-state Competition	0.10	0.01	0.18
1 year total return	123.74	12.72	8,884.51
3 year total return	13.04	11.29	33.63
Firm Age	21.23	16.00	15.53
Book Value	1,538.43	369.21	4,650.71
Sales	3,312.71	760.75	9,850.77
State Unemployment Rate	5.56	5.40	1.50
State Personal Income per Capita	27,371.04	26,862.00	5,327.60
Within-industry transfers	0.03	0	0.18
All transfers	0.08	0	0.32
Executive Job Tenure	14.69	9.00	12.82
Compensation Level	2,173,953.72	932,828.00	6,606,673.16
Compensation Growth	0.33	0.10	1.01
Salary/Compensation	0.38	0.34	0.2344
Options Granted?	0.73	1.00	0.45
Reload Options Granted?	0.02	0	0.13
Research and Development Spending	123.40	14.68	502.22
Capex per Employee	325,226.73	13,131.31	5,176,368.54

Book Value, Market Value, Sales, Assets and Research and Development Spending are expressed in millions of dollars. Compensation growth is truncated at -90% and +900%.

Table 2: Executive Mobility

Dependent Variable	Within-ind. transfers	Within-ind. transfers	All transfers	All transfers	Between-ind. transfers	Between-ind. transfers
# Obs.	*20,965*	*20,474*	*20,965*	*20,474*	*20,965*	*20,474*
Increased Enforceability	0.5105**		0.6562**		0.7674	
	(-4.01)		(-2.45)		(-1.03)	
Enforce*(In-state Comp.)		0.0123**		0.1888*		1.3342
		(-2.82)		(-1.69)		(0.20)
In-state Competition		7.7964**		2.4823**		1.172
		(4.01)		(2.80)		(0.32)
1 year total return	1.0000	1.0000	1.0000	1.0000	0.9995173	0.9991
	(-0.14)	(1.12)	(-0.45)	(-0.05)	(-0.86)	(-1.27)
3 year total return	0.9973	0.9928**	0.99653**	0.9929**	0.996321*	0.9937**
	(-1.47)	(-3.59)	(-2.34)	(-7.30)	(-1.75)	(-3.38)
Log (Firm Age)		1.1946**		1.2609**		1.3033**
		(2.54)		(5.87)		(4.58)
Log (Book Value)	0.9774	1.0752	1.0198	1.0123	1.0225	0.9701
	(-0.18)	(0.66)	(0.28)	(0.24)	(0.29)	(-0.47)
Log (Market Value)	0.9952	0.9932	0.9219	0.9433	0.9056187	0.9219
	(-0.05)	(-0.10)	(-1.29)	(-1.55)	(-1.35)	(-1.54)
Log (Sales)	1.2497*	1.2975**	1.0627	1.2233**	0.929854	1.1748**
	(1.75)	(3.07)	(0.71)	(4.19)	(-0.59)	(2.04)
Log (Assets)	1.0451	0.9684	1.1941	1.1236*	1.310974*	1.2347**
	(0.23)	(-0.29)	(1.63)	(1.92)	(1.91)	(2.34)
Log (State Unemployment)	0.8093	0.8510	0.9774	1.0639	1.080183	1.1564
	(-0.50)	(-0.39)	(-0.10)	(0.25)	(0.28)	(0.44)
Log (State Personal Income)	18.9327*	155.6014**	7.9192**	4.7673	3.726545	0.547
	(1.70)	(1.97)	(2.02)	(1.07)	(0.99)	(-0.31)
Estimation Method	*Poisson*	*Poisson*	*Poisson*	*Poisson*	*Poisson*	*Poisson*
Firm Fixed Effects?	Yes	No	Yes	No	Yes	No
State Fixed Effects?	No	Yes	No	Yes	No	Yes
Industry Fixed Effects?	No	Yes	No	Yes	No	Yes
Clustering	State-Year	Firm	State-Year	Firm	State-Year	Firm
R^2	0.19	0.04	0.22	0.09	0.22	0.09

The regressions are estimated via Poisson fixed effects as described, with t-statistics (comparing coefficients to one) reported in parentheses using robust "sandwich" standard errors. We report a pseudo R^2 measure for the Poisson model.

*,** Indicates significance at the 10% and 5% levels, respectively.

Table 3: Executive Tenure

Dependent Variable	Tenure	Tenure	Departures	Departures
# Obs.	*5,765*	*5,628*	*20,965*	*20,474*
Increased Enforceability	1.1518**		-0.0804**	
	(3.14)		(-2.26)	
Enforce*(In-state Comp.)		28.8326**		-0.3899
		(2.16)		(-1.43)
In-state Competition		-5.7817		0.1720*
		(-1.39)		(1.80)
1 year total return	0.0000	0.0000	0.0000	0.0000
	(0.80)	(0.07)	(-0.68)	(0.36)
3 year total return	-0.0258**	-0.0220**	-0.0012**	-0.0017**
	(-5.55)	(-3.59)	(-5.17)	(-4.66)
Log (Firm Age)		3.8960**		0.0151*
		(6.57)		(1.70)
Log (Book Value)	1.5278**	1.7951**	-0.0015	-0.0090
	(4.97)	(3.08)	(-0.08)	(-0.69)
Log (Market Value)	1.3284**	1.4268**	-0.0535**	-0.0489**
	(5.17)	(3.39)	(-4.03)	(-4.10)
Log (Sales)	0.3079	0.0289	-0.0247	0.0095
	(1.14)	(0.05)	(-1.41)	(0.90)
Log (Assets)	-0.0110	-1.0732	0.0581**	0.0759**
	(-0.03)	(-1.31)	(2.55)	(5.51)
Log (State Unemployment)	0.6330	1.1743	-0.1256**	-0.0916*
	(1.04)	(0.59)	(-2.83)	(-1.87)
Log (State Personal Income)	-3.8089**	11.2703	0.5187**	0.4501
	(-2.69)	(1.01)	(2.92)	(1.61)
Estimation Method	*OLS*	*OLS*	*OLS*	*OLS*
Firm Fixed Effects?	Yes	No	Yes	No
State Fixed Effects?	No	Yes	No	Yes
Industry Fixed Effects?	No	Yes	No	Yes
Clustering	State-Year	Firm	State-Year	Firm
R^2	0.52	0.56	0.24	0.09

The regressions are estimated via ordinary least squares (OLS) as described, with t-statistics reported in parentheses using robust "sandwich" standard errors.

*,** Indicates significance at the 10% and 5% levels, respectively.

Table 4: Executive Compensation

Dependent Variable	Compensation growth	Log of Compensation level
# Obs.	*74,068*	*16,337*
Increased Enforceability'	-0.1282**	
	(-2.42)	
Enforce*(In-state Comp.)		-1.3745**
		(-3.64)
In-state Competition		0.3954**
		(2.90)
1 year total return	0.0000	0.0000**
	(1.52)	(2.17)
3 year total return	0.0030**	0.0018**
	(6.37)	(7.62)
Log (Firm Age)		-0.0488**
		(-3.24)
Log (Book Value)	-0.0482	-0.0636**
	(-1.54)	(-3.68)
Log (Market Value)	0.1283**	0.2265**
	(5.13)	(15.28)
Log (Sales)	0.0298	0.0426**
	(0.96)	(2.14)
Log (Assets)	-0.0629	0.2434**
	(-1.22)	(9.35)
Log (State Unemployment)	0.1287*	-0.0172
	(1.89)	(-0.31)
Log (State Personal Income)	-0.0983	0.3254
	(-0.33)	(0.99)
Unit of Observation	Exec	Firm
Estimation Method	*OLS*	*OLS*
Exec/Firm Fixed Effects?	Exec	No
State Fixed Effects?	No	Yes
Industry Fixed Effects?	No	Yes
Clustering	Firm	Firm
R^2	0.28	0.68

The regressions are estimated via ordinary least squares (OLS) as described, with t-statistics reported in parentheses using robust "sandwich" standard errors.

*,** Indicates significance at the 10% and 5% levels, respectively.

Table 5: Form of Executive Compensation

Dependent Variable	Salary growth - Comp. growth	Log of $\frac{Salary}{Compensation}$	Options granted?	Options granted?	Reload options?	Reload options?
# Obs.	*73,899*	*16,337*	*74,997*	*16,337*	*74,997*	*16,337*
Increased Enforceability'	0.1087**		0.1531		-2.1948**	
	(2.01)		(1.34)		(-3.78)	
Enforce*(In-state Comp.)		1.4298**		-1.4920		-0.7784**
		(3.99)		(-1.36)		(-2.41)
In-state Competition		-0.4670**		0.6005*		0.1831*
		(-3.64)		(1.70)		(1.92)
1 year total return	0.0000	0.0000**	0.0000	0.0000	-0.0008	0.0000
	(-1.51)	(-2.43)	(1.08)	(0.70)	(-0.61)	(-1.28)
3 year total return	-0.0032**	-0.0021**	0.0003	-0.0012*	0.0122**	-0.0001
	(-6.76)	(-8.34)	(0.41)	(-1.88)	(3.05)	(-0.50)
Log (Firm Age)		0.0928**		-0.0483		0.0018
		(6.61)		(-1.21)		(0.10)
Log (Book Value)	0.0449	0.0713**	0.3349**	-0.0372	0.0226	-0.0014
	(1.40)	(4.03)	(6.04)	(-0.78)	(0.10)	(-0.08)
Log (Market Value)	-0.0964**	-0.2139**	0.1977**	0.1836**	1.1227**	0.0442**
	(-3.81)	(-14.22)	(4.64)	(4.93)	(4.91)	(3.43)
Log (Sales)	-0.0125	0.0575**	0.2278**	0.0242	0.1358	-0.0099
	(-0.39)	(3.16)	(3.49)	(0.55)	(0.39)	(-0.63)
Log (Assets)	0.0750	-0.1518**	-0.2679**	0.0352	-0.4136	0.0117
	(1.42)	(-5.32)	(-3.11)	(0.62)	(-1.01)	(0.49)
Log (State Unemployment)	-0.0845	0.0529	0.4402**	0.3172*	0.9119	-0.0382
	(-1.22)	(0.98)	(2.48)	(1.70)	(1.46)	(-0.69)
Log (State Personal Income)	-0.0004	-0.2426	-2.1383**	-0.9975	0.3784	-0.2351
	(0.00)	(-0.76)	(-2.80)	(-0.90)	(0.13)	(-0.70)
Unit of Observation	Exec	Firm	Exec	Firm	Exec	Firm
Estimation Method	*OLS*	*OLS*	*Logit*	*OLS*	*Logit*	*OLS*
Exec/Firm Fixed Effects?	Exec	No	Exec	No	Exec	No
State Fixed Effects?	No	Yes	No	Yes	No	Yes
Industry Fixed Effects?	No	Yes	No	Yes	No	Yes
Clustering	Firm	Firm	No	Firm	No	Firm
R^2	0.28	0.49	0.16	0.18	0.23	0.15

The regressions are estimated via ordinary least squares (OLS) or fixed effect (conditional) logistic regression (Logit), as described, with OLS t-statistics reported in parentheses using robust "sandwich" standard errors. Reported R^2 for Logit specifications is McFadden's pseudo R^2.

*,** Indicates significance at the 10% and 5% levels, respectively.

Table 6: Post-transfer Compensation

Dependent Variable	Log (compensation) at new firm	Log (compensation) at new firm	Rank at new firm
# Obs.	*912*	*226*	*770*
Enforce*(In-state Comp.)	-5.4246**	-23.1126**	10.2763**
	(-3.64)	(-2.72)	(3.41)
In-state Competition	1.6212**	3.5369	-2.4636**
	(3.04)	(1.26)	(-2.47)
Log (compensation) at previous firm	0.4433**	0.8267**	-0.3122**
	(7.03)	(2.69)	(-2.89)
Previous rank	0.0096	0.2181**	0.0291
	(0.27)	(2.61)	(0.56)
1 year total return	0.0020*	0.0038**	-0.0002
	(1.95)	(2.10)	(-0.11)
3 year total return	-0.0044	-0.0204**	0.0027
	(-1.36)	(-3.79)	(0.80)
Log (Firm Age)	-0.0601	0.1425	-0.0935
	(-0.82)	(0.39)	(-0.71)
Log (Sales)	0.1953**	0.0322	-0.1683
	(2.50)	(0.13)	(-1.22)
Log (Book Value)	-0.0174	0.8468	-0.1065
	(-0.22)	(1.45)	(-0.69)
Log (Market Value)	0.1936**	0.2479	-0.4274**
	(2.44)	(0.77)	(-3.10)
Log (Assets)	-0.1667*	-0.9175	0.5397**
	(-1.81)	(-1.50)	(2.85)
Log (State Unemployment)	-0.1516	1.6047	-0.3987
	(-0.29)	(1.39)	(-0.80)
Log (State Personal Income)	-0.6366	0.1914	1.9311**
	(-0.73)	(0.09)	(2.40)
Estimation Method	*OLS*	*OLS*	*OLS*
Sample	All	CEOs at at new firm	All
State Fixed Effects?	Yes	Yes	Yes
Industry Fixed Effects?	Yes	Yes	Yes
R^2	0.55	0.97	0.51

The regressions are estimated via ordinary least squares (OLS) as described, with t-statistics reported in parentheses using robust "sandwich" standard errors.

*,** Indicates significance at the 10% and 5% levels, respectively.

Table 7: Research and Development and Capital Expenditures

Dependent Variable	Log of R&D Spending	Log of R&D Spending	Log of Capex per Employee	Log of Capex per Employee
# Obs.	*10,608*	*10,351*	*18,939*	*18,456*
Increased Enforceability	-0.1369**		-0.1383**	
	(-2.81)		(-4.33)	
Enforce*(In-state Comp.)		-1.8772**		-1.4907**
		(-2.17)		(-3.18)
In-state Competition		0.4495		0.4584**
		(1.58)		(2.74)
1 year total return	0.0000	0.0000**	0.0000*	0.0000
	(-1.14)	(-2.24)	(-1.66)	(-1.58)
3 year total return	-0.0016**	-0.0036**	0.0014**	0.0006**
	(-5.72)	(-5.78)	(7.52)	(2.48)
Log (Firm Age)		0.0865**		-0.1341**
		(2.49)		(-6.67)
Log (Book Value)	-0.0380**	-0.0356	0.0764**	0.0863**
	(-2.76)	(-1.04)	(5.34)	(3.62)
Log (Market Value)	0.0790**	0.2269**	0.0958**	0.1871**
	(5.62)	(7.38)	(7.38)	(11.76)
Log (Sales)	0.0748**	-0.0567	-0.0377	-0.1700**
	(3.68)	(-1.45)	(-1.26)	(-5.54)
Log (Assets)	0.4390**	0.6122**	0.0463**	0.0114
	(16.69)	(10.79)	(1.97)	(0.29)
Log (State Unemployment)	-0.1830**	-0.0222	-0.0411	-0.0405
	(-4.02)	(-0.23)	(-0.86)	(-0.61)
Log (State Personal Income)	-0.0220	0.2684	0.2903*	0.6910*
	(-0.12)	(0.43)	(1.67)	(1.80)
Estimation Method	*OLS*	*OLS*	*OLS*	*OLS*
Firm Fixed Effects?	Yes	No	Yes	No
State Fixed Effects?	No	Yes	No	Yes
Industry Fixed Effects?	No	Yes	No	Yes
Clustering	State-Year	Firm	State-Year	Firm
R^2	0.98	0.88	0.87	0.71

The regressions are estimated via ordinary least squares (OLS) or fixed effect (conditional) logistic regression (Logit), as described, with OLS t-statistics reported in parentheses using robust "sandwich" standard errors. Reported R^2 for Logit specifications is McFadden's pseudo R^2.

*,** Indicates significance at the 10% and 5% levels, respectively.

Table 8: Firm Performance

Dependent Variable	Log of Market to Book Ratio	Log of Market to Book Ratio	Return on Equity	Return on Equity
# Obs.	*20,875*	*20,384*	*17,746*	*17,313*
Increased Enforceability	-0.0417		-4.2798	
	(-1.01)		(-0.57)	
Enforce*(In-state Comp.)		-0.0771		2.6021
		(-0.18)		(0.04)
In-state Competition		0.1282		-62.3172
		(0.89)		(-1.32)
Log (Firm Age)		-0.0919**		-288.9220
		(-5.34)		(-1.34)
Log (Debt)	0.0001	-0.0322**	260.1298	13.7342
	(0.02)	(-4.47)	(1.20)	(1.46)
Log (Sales)	0.2686**	0.1847**	-289.8920	2.9834
	(7.52)	(8.24)	(-1.28)	(0.26)
Log (Assets)	-0.3381**	-0.0843**	-18.0083	159.1344
	(-9.47)	(-3.50)	(-1.03)	(1.21)
Log (State Unemployment)	-0.1334**	-0.1462**	24.6577	
	(-2.01)	(-2.19)	(0.55)	
Log (State Personal Income)	0.4343*	0.8900**		
	(1.69)	(2.31)		
Estimation Method	*OLS*	*OLS*	*OLS*	*OLS*
Firm Fixed Effects?	Yes	No	Yes	No
State Fixed Effects?	No	Yes	No	Yes
Industry Fixed Effects?	No	Yes	No	Yes
Clustering	State-Year	Firm	State-Year	Firm
R^2	0.64	0.31	0.52	0.06

The regressions are estimated via ordinary least squares (OLS) as described, with t-statistics reported in parentheses using robust "sandwich" standard errors.

*,** Indicates significance at the 10% and 5% levels, respectively.