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**The Political Economy of Mass Printing: Legitimacy and
Technological Change in the Ottoman Empire**

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Explaining Changes in Organizational Form: The Case of Professional Baseball

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Abstract: The Grossman-Hart-Moore (GHM) property rights model predicts the assignment of residual claims to the party with the largest effect on an asset's value. While plausible, the model has proven relatively hard to test. In this paper, we develop a formal model based on GHM, and use it to analyze an industry that has seen substantial changes in the nature of asset ownership over time: professional baseball. Early in the 20th century, major and minor league baseball teams operated as separate and independent entities. By the middle of the 20th century, the vast majority of minor league teams had become "affiliates" of major league franchises, either through vertical integration or contractual agreements. By the end of the 20th century, full vertical integration had become much less common (and was restricted mostly to the lower minor league classifications), while the nature of contractual claims was essentially split, with major league clubs holding rights over players and coaches and minor league "owners" holding rights over local revenue sources. To explain these changes, we focus on two important functions of minor league baseball: providing local entertainment and training potential major league players. We conclude that as the relative value of these activities changed, so did the structure of ownership.

Key words: Contracts, professional baseball, residual rights, vertical integration
JEL codes: L14, L22, L83

Explaining Changes in Organizational Form: The Case of Professional Baseball

I. Introduction

Firms in a vertical chain may interact in a number of ways. At one extreme is the spot market, where parties engage in arms-length transactions on an “as needed” basis. At the other extreme is full vertical integration, whereby separate vertically related activities are brought under common ownership. Between those two are a variety of potential contract types that specify obligations, terms of compensation, penalties for failure to perform, and so forth.

Since Coase (1937) first addressed the issue, economists have devoted substantial efforts to understanding what forms of relationship will emerge, under what conditions, and why (see the citations at the end of this introduction, for example). In this paper, we contribute to that literature by examining an industry that has seen significant changes over time in the way vertical relationships are organized: professional baseball. In a very simple sense, one can think of professional baseball as consisting of two types of entities: major league baseball (MLB) teams that provide a final product to consumers – “games” and a “championship season” – and minor league teams that provide an input – player selection and development – to MLB teams. The relationship is, in fact, somewhat more complicated: minor league teams also produce games and a championship season, which they sell to smaller (local) audiences.

At various points in time, the relationship between MLB teams and minor league teams has been carried out on an arm’s-length basis, through formal (often very detailed) contracts, and through full vertical integration, with particular organizational forms dominating at particular

times.¹ Our objective in this paper is to investigate why. We offer an explanation based on the Grossman-Hart-Moore (GHM) model, which turns on the idea that optimal effort allocation is achieved by assigning asset ownership to the party with the most influence over an asset's residual value (Grossman and Hart, 1986; Hart and Moore, 1990). While the idea is very plausible, demonstrating it empirically has proven challenging.²

We begin by developing a formal model in which minor league teams engage in two types of activities: provision of entertainment and development of potential major league players. The model generates two important implications regarding organizational form. First, if training potential major leaguers is *not* an important function of the minor league team, the major league franchise and the minor league franchise will operate efficiently as independent entities, with any transactions between them conducted on an arm's-length basis. Second, if training potential major leaguers is an important function of the minor league team, an independent minor league franchise (and arm's-length agreements) will no longer be optimal because contracting for training is costly (i.e., training has many difficult-to-observe elements). Yet full vertical integration may not be optimal either because vertical integration involves centralized control of local decisions. In such a case, a hybrid organizational form that divides training and local marketing functions (assigning the former to MLB franchises and the latter to minor league franchises) will generate the largest surplus.

These predictions provide the basis for a detailed analysis of the history of major league and minor league relations. We find that in the first part of the 20th century, the distinction between major leagues and minor leagues was fuzzier than today – both major league and minor

¹ MLB is more than a century old. There are several excellent histories of baseball. See, for example, Harold Seymour (1960, 1971) or Robert Burke (1994, 2001).

² Among empirical studies that have provided evidence on the applicability of the GHM model are Baker and Hubbard (2003, 2004), Elfenbein and Lerner (2003), Kaplan and Stromberg (2003), Lerner and Merges (1998), and Robinson and Stuart (2007).

league franchises provided a similar, and relatively simple, product, rendering less relevant minor league baseball as a major league training facility. And as the model predicts, minor and major league teams functioned as independent entities, exchanging players on an arm's-length, transaction-by-transaction, basis. However, as the game of baseball became more sophisticated, minor league playing fields served increasingly as training grounds for prospective major leaguers. Correspondingly, organizational form began to change, and the change was accelerated by a sharp decline in minor league attendance in the following decades.³ Arm's length transactions were replaced by formal affiliations, in the form of either contractual "working agreements" or outright ownership (vertical integration). Such arrangements characterized major-minor league interactions through the 1970s. A final change in organizational form was spurred by a renewal in the popularity of minor league baseball in the 1980s and 1990s. While ownership of players and rights regarding training remained in the hands of MLB clubs, activities involving local sources of revenue (such as attendance and concession sales) shifted increasingly to local ownership. In short, the history of major league-minor league relations demonstrates that as the value of residual claims to inputs changed, so did the way the rights to the inputs were organized, as our model predicts.

Our paper thus contributes to the voluminous literature on firm boundaries. Most directly, it develops and tests a model based on the Grossman-Hart-Moore property rights approach. However, the evidence presented also provides insight into other "theories of the firm".⁴ For example, consistent with transaction cost theory (e.g., Williamson 1971, 1973; Joskow 1985;

³ These changes may not have been independent. Fan interest in minor league baseball may have declined as the quality of major and minor league baseball diverged.

⁴ The various theories of the firm are not mutually exclusive. This is apparent in Gibbons (2005) formalization, analysis, and comparison of four different theories of the firm: the transaction cost (he terms it "rent-seeking"), property rights, incentive system, and adaptation models. Gibbons writes, "These four theories are certainly not exclusive; they could all be true" (p. 239).

Klein, Crawford and Alchian 1978; Masten 1984; Monteverde and Teece 1982), we find that vertical integration – outright ownership of minor league teams by major league teams –emerged as a means of ensuring optimal training for potential major leaguers at a time when effective means of contractually-specifying such obligations were weak or non-existent (i.e., contracts were incomplete in this very important respect), leaving room for holdup.⁵ Once contracts developed sufficiently to allow training to be specified in an effective manner (the initial means of doing this was amazingly simple – the major league franchise was given the right to hire the minor league manager and coaches), the use of vertical integration declined, indicating that vertically integrating entailed costs, too.⁶

Furthermore, we find that the means of reallocating residual rights in baseball developed only gradually, consistent with “adaptive” theories of organizations. The idea is that organizational form evolves as uncertainty about the effects diminishes (e.g., Simon 1951; Williamson 1971, 1975; Klein and Murphy 1997).⁷ For example, it took nearly thirty years for the somewhat ad hoc working agreements to develop into the all-encompassing (and still in use) Player Development Contract, and that Contract itself evolved as time passed (as we discuss in detail below).

Finally, a striking aspect of early contracts between major league and minor league teams was that they were of annual duration, and specified very few obligations relative to contracts of

⁵ The extant contractual alternative merely permitted major league franchises to purchase players off a minor league roster for a pre-specified price. This would have been expected to mute the incentive of the minor league team to engage in training beyond a necessary minimum. The problem that may initially have been mitigated by the minor league team’s own desire to attract fans, but was exacerbated as minor league and major league baseball became increasingly poorer substitutes.

⁶ Gibbons (2005, p. 234) observes that, “the cost of control is the loss of initiative,” and a problem with major league teams owning minor league teams was that incentives for effort/information revelation regarding local marketing decisions it muted.

⁷ Whether the resolution of uncertainty increases or decreases the use of vertical integration relative to contracts depends on which better promotes the parties’ relationship – see, e.g., Gibbons (2005, p. 209).

today, yet were renewed year after year.⁸ Both features are consistent with theories of relational contracting (e.g., Baker, Gibbons, and Murphy 2002; Klein 1996; Klein and Leffler 1981; Klein and Murphy 1997; Telser 1981; Williamson 1975, 1985), according to which long-term relationships are supported by reputation, the prospect of repeat dealings, or self-enforcing penalties, rather than – or in addition to – formal contractual provisions. The many attributes over which formal contracts would have had to be written (for example, the many factors that may comprise good training) rendered them necessarily incomplete, but nonetheless “enforceable.”

In sum, the results presented in this paper demonstrate that a multitude of factors affect firm boundaries. The evidence provides perhaps the strongest support for GHM’s proposition that changes in the value of residual claims motivate the re-allocation of rights to those with the greatest influence over the value of those claims.

II. Theoretical Analysis

This section develops a theoretical model of the relationship between the major and minor leagues in professional baseball. Although the model will be tailored to that specific context, it will be apparent that the basic structure could apply to many settings in which the owner of a production process needs to arrange for the supply of an essential input that may be under the control of a different individual or individuals.

The model assumes that minor league teams engage in two activities: provision of entertainment and player development. The entertainment function involves a marketing effort that is state-dependent, reflecting local demand conditions, while the player development

⁸ The early working agreements were annual, although the relationship between a major league franchise and its minor league affiliate might last decades.

function encompasses all baseball-related activities (the selection, training, and evaluation of potential major league players). In the model, either the minor league team or the major league team may control the entertainment and development functions.

We consider three organizational forms, which differ depending on who controls the various inputs. The first is an *independent minor league*, under which the minor league team controls both the marketing (non-baseball) and development (baseball) functions, and owns the contracts of its players.⁹ If after playing for the minor league team, a player turns out to be good enough to make the majors, the interested major league team(s) must negotiate to purchase that player from the minor league team in an arm's-length transaction. Since the player may still have some value to the minor league team, however, there may not exist a price that will be mutually acceptable to the two teams, in which case the player will remain in the minors.¹⁰

The second organizational form is a *contract* between a major and minor league team. We examine two types of contracts. Under the first, the major league team has the right to claim any player on the minor league team for a pre-determined price. In other words, the major league team has a "call option" with respect to all minor league players covered by the contract. The minor league team retains control of all other decisions, including marketing and player training. The second contractual arrangement is like the first, except that the major league team, in addition to having the right to select players at a pre-set price, also assumes control over player training decisions.

The final arrangement involves *vertical integration* between a major and minor league team. Under this arrangement, the parent major league team owns the minor league team and

⁹ The 1903 National Agreement between the major leagues and the minor leagues recognized the right of minor league teams to "reserve" players that they had under contract. The right to reserve players gave the minor league team control over their players' contracts (see the discussion in the text at, and in, fn 18).

¹⁰ There is abundant anecdotal evidence from the early days of baseball of players remaining in the minors well past the time when they were ready for the majors. See our discussion of Lefty Grove, below.

hence controls all baseball and non-baseball decisions. A single decision-maker thus chooses the levels of both marketing and player development, and then assigns the player to the team that maximizes his value after training. In this arrangement, all decisions and “transactions” are internal to the organization.

A. The Model

The formal model makes use of the following notation:

$R(e, \theta)$ = gross revenue generated by the minor league team as a result of its entertainment function;

e = a marketing (non-baseball) input, where $R_e > 0$, $R_{ee} < 0$;

θ = a variable reflecting local market conditions;

k = fixed cost (per player) of operating a minor league team, reflecting, for example, the pro-rated cost of facilities;

t = training input in dollar terms;

$V(t)$ = maximum value of a trained player to a major league team as a function of the training input, where $V' \geq 0$, $V'' \leq 0$;

$\varphi V(t)$ = realized value of a trained player to a major league team;

φ = random variable reflecting a player’s natural (endowed) “ability”, where $\varphi \in [0, 1]$;

$F(\varphi)$ = distribution function of φ , where $F' \equiv f > 0$ is the associated density function, both defined on $[0, 1]$;

W = value of a player to the minor league team.¹¹

The model encompasses three stages. In the first stage, major and minor league teams specify the organizational form that will govern their interaction at subsequent stages. In the second stage, only the minor league team observes the local state of nature, θ . Then the relevant

¹¹ The basic conclusions would not be affected if we allowed W to depend on t .

decision-makers choose e and t to maximize their expected returns. Finally, in the third stage, the random variable defining a player's ability, φ , is realized and the relevant decision-makers decide on the assignment of players. The next section derives the first-best outcome of the model, focusing on stages two and three. Subsequent sections then derive the equilibrium choices under the various organizational forms described above and compare them to the social optimum to determine which form maximizes the value of the overall operation.

B. The Social Optimum

Proceeding in reverse sequence, we first consider the assignment of players. A player's value to a major league team depends on the realization of his ability (φ), and training (t), if relevant, both of which (usually) require playing time in the minors. Once t has been chosen and φ is observed, it is optimal to assign that player to the majors if and only if $\varphi V(t) \geq W$, or if and only if

$$\varphi \geq W/V(t). \quad (1)$$

This represents the player assignment decision. Note that greater investments in player development, when productive (i.e., when $V > 0$), increase the chances that the player will “make it.”

Moving back to stage two, given the optimal assignment of the player based on (1), the expected value of a minor league player prior to training, including his entertainment value to the minor league team and his expected value to the majors,¹² is given by

$$\begin{aligned} & R(e, \theta) + E \max[\varphi V(t), W] - e - t - k \\ &= R(e, \theta) + F(W/V(t))W + \int_{W/V(t)}^1 \varphi V(t) f \varphi d\varphi - e - t - k. \end{aligned} \quad (2)$$

¹² We assume that a player's value to the minors, R , is independent of his training or his realized ability. Although a simplification, this reflects the idea that minor league players have local entertainment value apart from their potential value as major leaguers. In terms of the model, it allows us to treat player development and marketing as separable decisions.

The optimal level of marketing, e , and player development, t , are chosen to maximize this expression. The relevant first order conditions are given, respectively, by¹³

$$R_e - 1 = 0, \quad (3)$$

$$\int_{W/V}^1 \varphi V' f(\varphi) d\varphi - 1 = 0. \quad (4)$$

Condition (3) defines the optimal state-contingent marketing input of the minor league team, $e^*(\theta)$, while condition (4) defines the optimal training input, t . Note that condition (4) describes the case where t^* is strictly positive (i.e., where $V' > 0$). Below we will also consider the case where $t^* = 0$; that is, where training is not valuable as a separate input (i.e., $V' \equiv 0$).

C. Outcome under the Various Organizational Forms

An important factor in determining the optimal organizational form will be the *viability* of the minor league team.¹⁴ By viability, we mean the ability of the minor league team to cover its costs with its own expected revenue. Teams that are not viable will have to be subsidized by a parent major league team (or possibly collectively by all teams). We assume that such subsidization is feasible in the sense that optimal player development and marketing is expected to yield a net social surplus; that is, the maximized value of (2) is non-negative. However, the fact that the minor league team's revenue depends on local conditions makes it costly for the major league team to determine the necessary subsidy.

1. Independent Minor League.

Consider first the case of an independent minor league. As noted, minor league teams are self-sufficient entities under this arrangement, so they make all baseball and non-baseball

¹³ We assume that the second-order conditions hold.

¹⁴ The Coase Theorem dictates that, absent transaction costs and wealth effects, the organizational form will be irrelevant with respect to the decisions at stages two and three, and that those decisions will be efficient (Coase, 1960). We therefore assume (realistically!) that contracting costs preclude this outcome, making the choice of organizational form relevant (Grossman and Hart, 1986). In other words, because contracting is costly, parties are unable to write fully contingent contracts up front that dictate their actions at the various stages.

decisions in stage two, and must cover their costs out of operating revenues and the sale of players to major league teams.

Proceeding in reverse sequence, note that once φ is realized in stage three, the major and minor league teams bargain over the sale of players, given t and φ . We assume that all players who are more valuable to the majors than to the minors (i.e., those for whom (1) holds) are in fact sold (that is, all mutually beneficial transactions occur), and that the price is determined by the generalized Nash bargaining solution:

$$\begin{aligned} p &= W + \alpha[\varphi V(t) - W] \\ &= (1-\alpha)W + \alpha\varphi V(t), \end{aligned} \tag{5}$$

where α is the fraction of the surplus obtained by the minor league team. The two teams thus share the surplus from player sales in proportion to their bargaining abilities.

Moving back to stage two, the minor league team chooses both e and t to maximize its expected return, which is given by

$$R(e, \theta) + F(W/V(t))W + [1-F(W/V(t))]E[p \mid \varphi \geq W/V(t)] - e - t - k.$$

After substituting from (5), this becomes

$$= R(e, \theta) + F(W/V(t))W + \int_{W/V(t)}^1 [(1-\alpha)W + \alpha\varphi V(t)]f(\varphi)d\varphi - e - t - k. \tag{6}$$

Clearly, the team chooses the optimal state-contingent level of marketing effort, $e^*(\theta)$, while the first-order condition for its investment in player development, denoted $\hat{t}$, is

$$\int_{W/V}^1 \alpha\varphi V'(t)f(\varphi)d\varphi - 1 = 0, \tag{7}$$

assuming an interior solution. Comparing this condition to (4) shows that $\hat{t} < t^*$ for $\alpha < 1$. Thus, the minor league team under-invests in player development to the extent that it expects to capture less than the full value of any players it sells to the major league team. Note that this represents a version of the classic holdup problem given that the training expense is sunk at the time

bargaining over player sales occurs (Klein, Crawford, and Alchian, 1978; Williamson, 1975, 1985).

There are, however, two special cases where the independent minor league will produce the efficient outcome. The first is when training is not an important input in preparing a player for the majors (i.e., when $V'=0$). In this case, players with sufficient natural ability, as revealed by their playing experience in the minors, are ready for the majors. In this scenario, one can think of the minors as merely serving a screening function for major league players (i.e., allowing those with greater ability to demonstrate it), but not contributing anything to a player's worth in terms of training. In this setting, the division of the surplus from player sales, as determined by the price, only has distributional effects (i.e., the holdup problem is not present).

In the case where player training *does* matter (i.e., $V'>0$), an independent minor league can still achieve the efficient outcome if the minor league team expects to capture all the surplus from its sale of players to major league teams. This would happen, for example, if multiple major league teams competed for its players to the point where $\alpha=1$. As long as there is free entry of minor league teams, however, this outcome seems unlikely. Thus, as a general rule, independent minor league teams will tend to under-invest in player training.

In any case, minor league teams must be financially viable to remain independent. That is, the optimized value of (6) must be non-negative in equilibrium. Viability will become an issue when the entertainment value of minor league players is small. In that case, some sort of subsidy by major league teams becomes necessary. Although this could be accomplished by all major league teams acting collectively, free riding makes this solution unlikely, especially since most (if not all) training is not team-specific and hence is transferable to other teams. That

provides a possible rationale for the emergence of individual contracts between major and minor league teams.

2. Contracts

As noted above, we consider two different types of contracts depending on the allocation of control over certain inputs. Under the first, what we will call a “player assignment agreement,” the minor league team retains control of all decisions in stage two (i.e., the choices of e and, when relevant, t), but the major league team has the right to claim any player for a pre-determined price, P . In exchange, the major league team pays a fee, S , for the right to choose players and, if necessary, to ensure viability of the minor league team. The advantage of this arrangement over the independent minor league is avoidance of the ex post cost of bargaining over the price of player transactions (the holdup problem). In its place, however, is the up-front cost of negotiating the contract, as well as the ex post cost of measuring the minor league team’s revenue shortfall so that the appropriate subsidy can be determined.

Under this arrangement, at the end of stage three the major league team will claim any player for whom $\varphi \geq P/V(t)$, given the realization of φ and the prior choice of t by the minor league team. According to (1), efficiency of this choice requires that $P=W$; that is, the option price must be set equal to the opportunity cost of players to the minor league team. Moving back to stage two, the minor league team will choose e and t to maximize

$$R(e, \theta) + S + F(P/V(t))W + [1-F(P/V(t))]P - e - t - k, \quad (8)$$

taking S and P as given. Clearly, it will make the efficient choice of e , and it will choose t to solve

$$F'V'(P/V^2)(P-W) - 1 \leq 0. \quad (9)$$

Thus, it will only invest a positive amount in player development if $P > W$, or if it expects to receive a share of the surplus from that player. It follows that if player development is an important input in preparing players for the majors, the current contractual arrangement creates a trade-off between incentives for investment in player development ex ante, and efficient assignment of players to the majors ex post. In particular, if P is set so as to ensure efficient assignment of players ($P = W$), then the minor league team will have no incentive to invest in his development; whereas if P is raised above W so as to induce the minor league to invest in development, some players will inefficiently remain in the minors. One might argue that the teams could renegotiate P in the latter case to ensure the correct assignment, but the minor league team would rationally anticipate such a renegotiation and adjust its stage-two investment decisions accordingly.

To avoid the above trade-off, the teams could enter into a different type of contract that, along with the right to choose players, shifts control over player development to the major league team, while leaving control of local marketing with the minor league team. Under this arrangement, what we will call an “assignment and development agreement”, the parent major league team would continue to have the right to claim players for a fixed (pre-determined) price, P , and would still subsidize the minor league team as necessary, but now it would also choose the level of player development. Under this arrangement, the minor league team would choose e to maximize

$$R(e, \theta) + S + F(P/V(t))W + [1 - F(P/V(t))]P - e - k, \quad (10)$$

which yields the efficient choice, $e^*(\theta)$, while the major league team would choose t to maximize

$$\int_{P/V}^1 [\varphi V(t) - P] f(\varphi) d\varphi - t - S. \quad (11)$$

The resulting first order condition is

$$\int_{P/V}^1 \varphi V'(t) f(\varphi) d\varphi - 1 = 0, \quad (12)$$

which yields the efficient choice of t , conditional on P . And since there is no longer a conflict between player development and assignment decisions, we would expect the teams to set the efficient price, $P=W$, so as to maximize the expected value of the contract. The subsidy would then be adjusted accordingly to cover the minor league team's costs (subject to ex post measurement of local revenues). This arrangement therefore (in theory) yields the efficient choice of both marketing and training.

3. Vertical Integration

The final arrangement is *vertical integration* between the major and minor league teams. Under this arrangement, the major league team takes control over all baseball and non-baseball decisions, with the specific decision-makers becoming “employees” of the organization rather than residual claimants. Clearly, management will therefore assign players optimally in stage three, and choose both e and t optimally in stage two, since it internalizes the full value of the combined operation. The costs of this arrangement are, first, the costs of learning the local conditions (the realized value of θ) so as to choose the efficient level of marketing, and second, the costs of monitoring the actions of employees within the organization (agency costs).

D. Comparison of Organizational Forms

Table 1 summarizes the assignment of control over the economic decisions (local business, player development, and player assignment) under the various organizational forms (independent minor league, player assignment agreement, assignment and development agreement, vertical integration). The foregoing analysis suggests the following conclusions regarding the choice among the various forms.

[Table 1 here]

First, when training is not an important input (or equivalently, if major and minor league training needs are identical), an independent minor league system is able to achieve the efficient outcome, provided that minor league teams are viable entities. This is true because independent teams will choose the optimal level of marketing based on local conditions, and ex post transactions will result in the efficient assignment of players. If minor league teams are not viable, some sort of subsidy by major league teams is necessary if the minors are to continue to serve a screening function for players of unknown ability. In this case, a contractual arrangement that allows the parent major league team to claim players at a set price, but which leaves local decisions in the hands of the minor league team (the assignment agreement), also achieves the efficient outcome provided that the price is set properly.

When training for the majors is an important input, neither the independent minor league nor the assignment agreement is optimal, because neither form generally results in efficient player training decisions. This is true because the minor league team does not fully internalize the value of players to the majors under either of these arrangements. In this case, a contract that transfers control of all player development decisions to the parent major league team, while leaving control of local decisions with the minor league team (the assignment and development agreement), is superior and potentially achieves the efficient choice along all dimensions.

Vertical integration, or full ownership of minor league teams, also presumably results in efficient marketing, player development, and player assignment decisions because a single decision-maker internalizes the full value of these inputs. However, because marketing requires local knowledge, the cost of acquiring that knowledge must be incurred, along with the agency costs associated with the employment relationships within the organization. These costs would

have to be weighed against the costs associated with writing and enforcing the relevant contract in order to determine which form is optimal.

In the section that follows, we will examine whether the evidence supports these implications.

III. The Relationship Between the Major and Minor Leagues

We focus our historical discussion on the modern era of professional baseball, which began in 1903 when the National League (NL) and the American League (AL) signed a peace treaty called the National Agreement.¹⁵ The new agreement, which was also signed by the National Association of Professional Baseball Leagues (hereafter referred to as the Minor Leagues), established a hierarchical structure for professional baseball that is similar to the one that exists today.¹⁶ The agreement recognized the NL and AL as separate major leagues and distinguished them from the minor leagues, which were organized into four classifications (A, B, C and D).¹⁷ The agreement also recognized the right of the teams that were a party to the agreement (NL and AL teams and teams belonging to the Minor Leagues) to reserve players they

¹⁵ In 1900, the AL, then considered a minor league, challenged the NL for the supremacy of professional baseball by entering into some of the NL's most profitable territories and raiding the NL rosters of some of their better players. Two prominent examples of players the AL raided from the NL were Napoleon Lajoie and Cy Young (Sullivan, 1990, p. 38). There are several good histories of the minor leagues and their relationship with the major leagues. This section relied heavily on the following: Hoie (2001), Sullivan (1990), Andersen (1975), Zimbalist (1992, Chapter 5), and *Organized Baseball: Report of the Subcommittee on the Study of Monopoly Power of the Committee of the Judiciary*, 1952 (hereafter referred to as the *Report*).

¹⁶ The National Association of Professional Baseball Leagues was organized in 1901 to collectively represent the minor leagues in its dealings with the NL and the AL.

¹⁷ The classifications were based on population size, with Class A teams playing in the larger cities and the lower classifications playing in progressively smaller cities. Initially, the NL and AL were governed by a separate constitution with an independent president to enforce the constitution. The NL and AL were merged in 2000 and the position of league president was abolished. Both leagues are now governed directly by the Commissioner of Baseball (Zimbalist, 2006, p. 159).

had under contract,¹⁸ and established a three-member commission to arbitrate disputes among the three parties (the NL, the AL and the minor leagues).¹⁹

Starting from this point, we review the history of the relationship between the major and minor leagues. In doing so, we identify three sub-eras that coincide roughly with the predominance of (1) independent minor leagues; (2) formal affiliations between major and minor league teams; and (3) the resurgence of independent (in crucial dimensions) minor league teams. In terms of the theory, we will argue that these eras reflect organizational responses to changes in the training function of minor league baseball, and in the economic viability of minor league franchises.

A. The Early Period: 1903-circa 1930²⁰

In 1903, the game of baseball was still in its formative stages. Equipment was primitive and rule changes were frequent. This was also the so-called “dead ball” era where pitching and defense dominated. Spring training existed primarily as a means of getting a player into condition, rather than as a venue for teaching the nuances of the game (as it is today). It was not unheard of at this time for a player to move from the amateur playing fields directly to the major leagues with little or no minor league seasoning.²¹ This can be seen in Table 2, which lists, for a select number of years (chosen at five year intervals), the total number of players on MLB rosters and the number of players who joined the roster directly from an amateur team (with no

¹⁸ The “reserve clause” in a player’s contract gave his team the option to re-sign him at the end of the contract period, usually one year. If the team exercised the option, the player had to re-sign with that team or drop out of professional baseball. That is, the 1903 National Agreement, and subsequent National Agreements, prohibited teams that were a party to the agreement from signing players who were under contract to another team. As a result, minor league teams had strong property rights over the contracts of the players on their rosters.

¹⁹ The commission included the president of the NL and AL and a third member that was chosen by the two presidents. After the Black Sox scandal in 1920, an independent Commissioner replaced the three-member commission. The Commissioner’s office was also given additional powers to govern the relationships between the two major leagues and between the major leagues and the minor leagues.

²⁰ This section relies primarily on the description of the early period found in the *Report* (1952).

²¹ For anecdotal evidence on this point, see the classic book by Ritter (2010 [1966]), which provides first-hand testimony by some early professional players about their playing days, including the manner in which they were first signed to a professional contract.

time spent in the minor leagues). In the early years of the century, almost ten percent of players made the jump, but that number quickly dwindled to nearly zero by the 1930s, where it has stayed. This suggests that developing players for MLB was a less important function of the minor leagues in this early period, as compared to today.

[Table 2 here]

What the minor leagues did provide was local entertainment.²² Attendance data for the minor leagues is spotty prior to 1947; however, available data are illustrative. For example, five out of eight teams in American Association drew 100,000 fans or more in 1903 (that same year, major league baseball drew 4,735,250 fans, or an average of 295,953 fans per team).²³ In 1913, the attendance was over 100,000 for all eight teams in the American Association, with five teams drawing 175,000 or more. In 1920, 21 of the 24 teams in the American Association, the International League, and the Pacific Coast League drew well over 100,000 fans, with seven teams drawing over 200,000 and three teams drawing over 300,000.

While it entertained local audiences, minor league competition also served to identify players who were capable of playing in the majors. The minor leagues thus served as a de facto scouting operation, locating players that major league franchises eventually signed (after purchasing their contracts from the minor league owners).²⁴ In terms of the model, time in the

²² The number of teams and leagues increased throughout the period. The onset of World War I briefly interrupted the growth of the minor leagues but they regained their popularity after the war ended in 1918. Johnson and Wolf (1997, pp. 133, 193, and 209) provide a description of the popularity and growth of the minor leagues that is consistent with the above characterization

²³ In 1903, the American Association was in Class A, the highest classification of minor league teams at the time. In 1912, the minor leagues were reorganized and the American Association, the International League, and the Pacific Coast League became Class AA teams, the highest classification until 1946 when the classifications were changed and these three leagues became Class AAA leagues. See Johnson and Wolf (1997) for the minor league attendance data for the years cited and see Thorn, et al. (2001, p. 75) for MLB attendance data.

²⁴ MLB franchises purchased players outright in negotiated exchanges, but also assigned rights to picks through a minor league draft (not to be confused with the amateur draft currently operated by MLB).

minors allowed players' to demonstrate their innate ability (ϕ). Players who were thereby revealed to be more valuable to the majors were then sold in arm's-length deals.

This "screening" function of the minors can be seen in Table 3, which presents data on the original source of players on major league rosters from 1905 through 1995.²⁵ As the table shows, through the 1930s, 75 to 85 percent of major league players were initially signed by minor league teams, which then sold them to major league teams. Notable examples of players who were first signed by minor league teams include Ty Cobb, Tris Speaker, Rogers Hornsby, Babe Ruth, and Lefty Grove (Sullivan, 1990, pp. 8 and 84). By the middle of the century and continuing to the present, however, nearly all players were being signed initially by major league teams, who then assigned them to their minor league affiliates.

[Table 3 here]

In terms of the theory, our model predicts that when minor league teams are financially viable and training needs are similar (or unimportant), minor and MLB franchises will deal with each other on an arm's-length basis for the exchange of players. Consistently, the early years of baseball demonstrate exactly that. Training was minimal, allowing some players to step straight into MLB uniforms from amateur playing fields. Minor league teams still signed most players in order to stage games for local audiences, and those players revealed by that experience to be especially talented were then sold to major league franchises. If a major league team valued a player more than the minor league team, it had to bargain with the minor league team over the terms at which the contract would be transferred. In this environment, it was possible that a player who was ready to advance to the major leagues was more valuable to his minor league team, and so he remained in the minors (a situation that is inconceivable today).

²⁵ The source is baseball-reference.com. <http://www.sports-reference.com/termsfuse.shtml>
<http://www.sports-reference.com/termsfuse.shtml> Again, see the data appendix for an explanation of how we constructed Table 3.

A case in point is Lefty Grove. The Baltimore Orioles of the International League (a minor league) purchased his contract from Martinsburg in the Blue Ridge League in 1920 for \$3,500 (Sullivan, 1990, p. 80). In five years with the Orioles, Grove compiled a record of 109 wins and 36 losses. He demonstrated he was ready for the major leagues in his first couple of years with the Orioles (as evinced by the many offers the Orioles received from MLB franchises), but it was not until 1934 that Jack Dunn, the owner of the Orioles, sold his contract to the Philadelphia A's for \$100,600 (Sullivan, 1990, p. 84). During the intervening years, Grove helped the Orioles win the International League pennant and draw between 200,000 and 300,000 fans per year.²⁶

B. The Farm Era: circa 1930 to circa 1980

We refer to the second era, which we date from about 1930 to about 1980, as the “Farm Era.” In terms of its entertainment function, the minor leagues remained very popular during the early years of this period, but then a long decline began in the 1950s. On the field, the game was evolving in ways that made training more important. It was this latter development in particular, we contend, that was responsible for the significant changes in the organizational relationship between the major and minor leagues that evolved during this period. We argue that these changes occurred in two phases.

1. The Early Farm Era: The Beginnings of Affiliation, circa 1930-1962

By 1930, the dead ball era was over. As the game grew more sophisticated, raw talent was no longer sufficient. The minor leagues became the place where young players were taught the game and allowed to develop their skills by competing against better and better players as they moved up the minor league ladder. While the minor leagues continued to provide major league teams the opportunity to evaluate a player's potential to play in the major leagues (i.e., to

²⁶See Johnson and Wolf, (1997) for the standings for the years 1920-1924 and attendance for the years 1921-1924.

reveal his ϕ), they now also contributed to the increasingly important training process (i.e., $V' > 0$).²⁷ Major league teams responded by moving their training sites further south and using this “spring training” time to teach fielding, hitting, running, and sliding skills, rather than just as a venue to work players into shape.²⁸

Some direct evidence for this transformation of the minor leagues can be found in the testimony delivered by Branch Rickey, a pioneer in player development, at the 1951 Hearings on Organized Baseball held by a subcommittee of the House of Representatives. In response to questioning, Mr. Rickey stated

There is not a question but what not only are more players found by the enterprising major-league clubs, I will call them, or by farm clubs, if you wish, but they are given more instruction, more care, and more attention in every way. There is a more rapid development in a farm club, as I say, and the promotion of the players is a quicker thing than it is in independent clubs. It is easily understood, I think, because they are under more instruction and, generally speaking, more competent instruction, both in quantity and in quality.” (1951 Hearings on Organized Baseball 1952, p. 1019 and cited in the Report, 1952, p. 185)

There is also evidence on the increasing importance of player training from statistical trends. For example, as Table 2 showed, by the 1930’s the number of players who were able to jump directly to major league rosters from amateur teams had essentially declined to zero, suggesting that time in minor leagues was becoming increasingly important for players to be ready to step onto a major league field. A second piece of evidence is Stephen Jay Gould’s argument that the decline and disappearance of the .400 hitter after the 1930’s was largely due to

²⁷ Once it became more difficult for a player to jump from the amateur fields to the majors, it also became more difficult to judge whether a player had the potential to make it to the majors at an early stage of his development. Players had to be evaluated on the basis of their ability to “learn the game” and demonstrate their skill by playing against players at progressively higher levels of play.

²⁸ As early as 1914, Branch Rickey, who was then the general manager of the St. Louis Browns, started using batting cages, sliding pits, sprint runways, and “pitching strings” to teach hitting, running, and pitching skills. He even used schoolrooms to teach “baseball theory” (Andersen, 1975, p. 50).

improved and standardized methods of play that “eliminate[d] the rough edges that great players could exploit” (Gould, 2003, p. 163).²⁹

In terms of organizational structure, as the primary role of the minor leagues shifted toward player development, the major leagues sought to acquire more control over the development process. As noted, Branch Rickey was perhaps the first to recognize the importance of player development, and he responded by establishing the “farm system”.³⁰ In 1919 Rickey, then general manager of the St. Louis Cardinals, began to acquire part interest in minor-league teams so that he could assign the newly signed players to teams that he controlled. By 1921 the Cardinals owned a part interest in three teams at different classifications so that the Cardinals could manage the movement of players as the players developed their skills.³¹

Although other major league teams soon began to imitate Rickey, the farm system did not become widespread until the early 1930s. As the data in Chart 1, panel A, indicates, the total number of minor league teams affiliated with major league teams never exceeded 8 until 1932, when 15 major league teams established affiliations with 42 minor league teams.³² From 1932 through the remainder of this period (circa 1950), the major league “farm systems” dominated the minor leagues. By 1936, 107 of 180 minor league teams (59 percent) were affiliated with a major league team. The number of minor league teams more than doubled over the next decade

²⁹ From 1876 to 1930, 34 players hit .400 or better over a season, but after 1930, only Ted Williams accomplished the feat in 1941.

³⁰ Rickey also established the first nationwide scouting system in order to sign players who were still amateurs (Andersen, 1975, p. 183). Some major league teams had informal “working agreements” with minor league teams during the early period, but they were used to get around the roster limits and not for the purpose of developing players (Hoie, 2001, p. 493).

³¹ The three teams were Ft. Smith of the Class D Western Association, Huston of the Class A Texas League, and Syracuse of the Class AA International League (Hoie, pp. 492-493). There is some dispute over which team the Cardinals purchased an interest in first (for a complete discussion, see Andersen, pp. 83-92).

³² The Cardinals had the most affiliates, with 11, while both the Yankees and the Tigers had the next highest, with 5 affiliates (baseball-reference.com). For some reason, baseball-reference.com does not recognize Ft. Smith as an affiliate of the Cardinals. However, Branch Rickey, in his 1951 testimony before the House Subcommittee on the Study of Monopoly Power, clearly states that the Cardinals did purchase a half-interest in Ft. Smith (Report, 1952, p. 63).

or so, reaching a maximum total of 448 teams in 1949, of which 236 (53 percent) were major league affiliates.

[Chart 1 here]

Broadly speaking, these affiliations took one of two forms. The first was through so-called “working agreements,” which were short-term contracts between an individual major league and an individual minor league team. Early on, these agreements were far from standardized and took many forms, depending on the particular decisions the major league team sought to control. Initially, many of these working agreements merely gave the major league team the right to sign any player on the minor league roster at the end of the season in return for a fixed payment (what we called above a “player assignment agreement”). As time passed, however, agreements expanded to grant the major league team greater control over the choice of the manager and coaches of the minor league team. Still others gave the major league team the right to dictate certain aspects of spring training. (Thus, they came to resemble what we called the “assignment and development agreement.”)

The second form of affiliation was direct ownership of minor league clubs by major league franchises (vertical integration). Under this arrangement, the major league club not only controlled player development but also local business decisions (e.g., ticket pricing). As the data in Table 4 show, direct ownership by major league teams accounted for between one-third and one-half of all affiliations between the 1930s and 1950s, with the rest accounted for by working agreements.³³ Although our model predicts that the use of vertical integration as the means of

³³ Here we use the data on minor league affiliates found in Hoie (2001) because we want to examine separately the trends in minor league affiliates that are owned by major league teams and affiliates that are governed by working agreements. The data from baseball-reference, used above, just lists the total number of minor league affiliates (by team) and does not separate out those that were owned by major league teams and those that were governed by a working agreement. See Appendix A for a complete explanation of the different data sets used to identify minor league affiliates over time.

affiliation may cede too much control to the major league team (most importantly, in terms of local marketing decisions), we suggest that the decision to vertically integrate during this time was a rational response to several factors.

[Table 4 here]

First, it reflected the primitive nature of the early working agreements, which limited their effectiveness in overcoming the holdup problem³⁴, and, more importantly, in allowing major league teams to control the training of young players. It may also have reflected a general uncertainty regarding the factors necessary to prepare players effectively for the majors. Did effective training, for example, only require choice of the managers and coaches, or did it also necessitate control over facilities, scheduling, off-field monitoring of players, etc.? Given this uncertainty (coupled with the growing importance of training and player evaluation), it may simply have been easier for teams to assume control over all decisions in order to ensure optimal development of their most important assets.

Yet the trend reversed itself, and contracts increasingly replaced vertical integration as the 1950s progressed (see Table 4). One reason for this change is the concomitant decline in minor league attendance. As Chart 2 shows, attendance at minor league parks began to fall precipitously in the 1950s, bottoming out in the 1960s. The fall was dramatic – between 1950

³⁴ Several histories of the minor leagues have pointed out the potential hold-up problem with working agreements. For example, in *Bush League*, Robert Obojski (1976, p. 41) states, “And all too often when Rickey turned over a hot prospect of his to a minor league team for seasoning, the minor team’s general manager would double-cross him and sell his discovery to another team in the majors. ‘That kind of thing drove me mad,’ declared Rickey, ‘I pondered long on it, and finally concluded that, if we were too poor to buy, we would have to raise our own.’” Also see the histories of the minor leagues by Sullivan (1990, p. 97) and Andersen (1975, p. 84). Apparently, Rickey’s attempt to solve the hold-up problem by buying partial interest in several minor league teams did not work completely. The Cardinals had a significant minority ownership of Syracuse of the International League but when “Rickey tried to secure Jim Bottomley in 1921, Syracuse owner E. C. Landgraf balked. He explained ...that he was considering selling the first baseman to the highest bidder.” (Sullivan 1990, p. 85) Although Rickey was ultimately able to acquire Bottomley, he concluded that the only way to resolve the hold-up problem at the time was to buy controlling interest in minor league teams (Sullivan 1990, p. 98).

and 1963 (the absolute nadir), minor league attendance fell by 75 percent.³⁵ Citing a study done for the 1951 Congressional Hearings, Zimbalist reports' that "...two thirds of minor league teams operated at a loss in 1950" (Zimbalist, 1992, pp. 109-110). By contrast, attendance in the major leagues increased over the same period (Chart 2). As minor league teams struggled financially (and many went bankrupt – see Chart 1), we suggest that it became increasingly important to provide the correct incentives for local activities, which vertical integration failed to do.

[Chart 2 here]

2. Standardization of Affiliation: The Player Development Contract, 1962-1980

By the late 1950s, it was clear that the minor leagues could not survive without direct financial assistance from the major leagues. Since the minor leagues were now playing a key role in developing players for the majors, however, MLB created a Player Development Fund and paid a fee to each minor league that finished the season, in an effort to stabilize the minor leagues (Johnson and Wolf, 1997, p. 411). Still, major league teams may have wanted more control over operations in return for their financial support, thus causing some to continue to own minor league teams outright. (We will say more about patterns of ownership in Section IV below.)

Given the hodge-podge of organizational forms that had emerged during this middle period, it became clear by the 1960s that a more formal plan was needed to save a sufficient number of minor league clubs to fulfill the essential player development function.³⁶ In 1962,

³⁵ Ticket prices were rising in MLB over the period, but we do not know whether that was so for minor league baseball. Note in Chart 2 the strike years of 1981 and 1994.

³⁶ In 1961 there were 147 minor league teams. As shown in Chart1, major league teams had an affiliation with 129 (88%), with just 18 (12%) being independently owned. The major league team owned only 21 (16%) of the 129 affiliated teams and had "working agreements" with 108 (84%). Again, the Cardinals had more minor league affiliates than any other major league team. By 1950, very few players were entering the major leagues without some minor league seasoning.

MLB therefore replaced the many team-specific working agreements with a common “Player Development Contract” (PDC), which rationalized the minor league system and increased the extent to which MLB subsidized minor league franchises. The minor league classifications B, C and D were eliminated and each major league team was required to financially support five minor league teams in the classifications (AAA, AA and A) that remained (Hoie, 2001, p. 494).³⁷

The PDC also formalized the major leagues’ control over player development function – in addition to owning the player contracts, major league teams chose (and employed) the managers and coaches, and dictated how the players were to be trained. The standardized PDC thus replaced the various forms of working agreements that had emerged. At the same time, major league teams divested direct ownership of minor league teams in the upper divisions, so that by the end of this era, most major league teams had sold off ownership at this level.³⁸ We suggest that this reflects the emergence of the PDC, which, by standardizing the rights of major league clubs over the training function of the minors, allowed them to shift the marketing function back to local decision-makers.

In summary, during this middle era the game of baseball became more sophisticated on the field, thus raising the importance of the minors as a training ground. Consistent with the model’s predictions, the organizational form correspondingly changed, with increasing control over minor league baseball decisions being assumed by major league teams. During the early stages of the period, this control took a variety of forms ranging from simple working

³⁷ In particular, the PDC required major league teams to pay the salaries of the players on their minor league affiliates when they exceeded certain amounts (\$800 per month for AAA, \$150 per month for AA, and \$50 a month for A teams). The contract also specified the major league team’s responsibility for travel, equipment and meal money (Zimbalist, 1992, p. 112). A copy of the 1962 PDC can be found in the *Senate Hearings on Professional Sports Antitrust Bill – 1964 Hearings Before the Subcommittee on Antitrust and Monopoly, Committee on the Judiciary, United States Senate, 88th Congress, 1964*, pp. 1192-1197.

³⁸ A representative of the Cardinals suggested that the Cardinals started shed their minor league teams in the 1950’s because they “...had outlived their usefulness and became a financial burden.” (Andersen, 1975, p. 256, citing an article by Jack Long in the June 24, 1972 issue of *Sporting News* quoting the Cardinal official.)

agreements that only granted player assignment rights all the way to vertical integration. By the 1960s, however, teams had gained sufficient understanding of the player development function that a standardized contract, the PDC, could be agreed upon. This contractual innovation allowed major league teams to cede control of marketing back to local decision-makers while retaining control of player development. By the end of this middle period, the vast majority of minor league teams were affiliated with major league teams by PDCs, with some residual use of outright ownership.

C. Modern Era: circa 1980s to Present

By the early 1980s, minor league attendance was growing again, signaling the start of a new era – see Chart 2. The value of minor league franchises rose dramatically in the decades that followed. Zimbalist (1992, p. 112) reports that franchises that were selling for as little as \$5,000 in the late 1970s were being sold for several million dollars in the 1990s. Another shift in organizational form followed. Under the terms of a new seven-year agreement signed in 1991³⁹, major league teams substantially reduced subsidies to minor league teams.⁴⁰ The agreement was renegotiated again in 1998. Under the terms of this latest agreement, not only did minor league teams not receive subsidies, but also they were required to pay a fixed percentage of their total net season ticket revenue (starting at 3.5 percent in 1998 and rising to 4.5 percent in 2002 and thereafter) to the Major Leagues Central Fund (Article VII, Section F of the 1998 Professional

³⁹ The agreement that governs the relationship between MLB and the National Association (the minors) is called the Professional Baseball Agreement. Article VII spells out each party's commitment to the Player Development Contract and Section F of Article VII specifies the National Association's payment to MLB. Rule 56 of The Major League Rules contains the details of the Player Development Contract.

⁴⁰ Under the new agreement, major league teams assumed complete responsibility for player salaries and meal money, while the minor league teams paid a larger share of travel expenses. Perhaps more significantly, the new agreement ended MLB's television subsidy to the minor leagues. In addition, the minors were required to pay a minimum annual fee that increased to \$2 million in 1994. The revenue for this fee was generated by a percentage tax on the net season ticket revenue of each minor league team. The tax was based on a sliding scale that started at 5% and declined as the minor league team's revenue increased above certain benchmarks. Our information is based on Zimbalist's (1992, p. 115) summary of the key financial aspects of the 1991 agreement.

Baseball Agreement).⁴¹ Indeed, Section 6(l) of Rule 56 (the Player Development Contract) of the Major League Rules states that major league teams do not have “...any obligation or responsibility to the Minor League Club ...with respect to their operations or employees.” The same section of Rule 56 states that minor league teams do not have “any obligation or responsibility to the Major League Club...with respect to their operations or employees.”⁴² Notably, however, major league teams retained complete control over the player development aspects of their minor league affiliates through the PDC,⁴³ even as those affiliates once again became independent entities.

It is notable that although the minors have again become viable in economic terms, as they were in the early decades of the twentieth century, the organizational relationship between the major and minor leagues did *not* revert back to what it was in the earlier period. This we contend, reflects the fundamental change in the nature of the game on the field, which had so transformed the role of the minor leagues that the early structure —consisting of independent minor league teams that owned and sold players to major league teams in arm’s-length transactions—was completely unsuited to the modern game. In its place arose a hybrid organizational structure that separated control over player development and entertainment decisions in a way that maximized the surplus from the relationship.

⁴¹ Rule 56 (The Player Development Contract) of the Major League Rules sets out a further division of responsibilities. The minor league teams are responsible for paying most of their travel and road expenses during the season, and they share the equipment costs. The authors will provide a copy of the 1998 Professional Baseball Agreement and specific Major League Rules that apply to the Player Development Contract upon request.

⁴² This section of Rule 56 appears in both the 1991 and the 1998 versions of the Player Development Contract, as described in the Major League Rules. MLB and the minor leagues signed a new Professional Baseball Agreement in 2011. We do not have a copy of this agreement, or the Major League Rules that govern the agreement, but it is our understanding that the responsibilities of each party are similar to listed in the 1998 Agreement. Benjamin Hill, a reporter for MLB.com, reports that the only significant change in the agreement is “...a slight increase in the tax that Minor League Teams pay to Major League Baseball” (Hill, 2011).

⁴³ The major league teams employ the managers, the coaches, and the trainers and pay their salaries. They have complete control over player movement among the various minor league classifications and they control spring training activities and pay for those expenses. Under the terms of the PDC, Major League Baseball sets the standards for travel by minor league teams during the season (Major League Rule 57) and they set standards for minor league playing facilities (Major League Rule 58).

IV. Patterns of Ownership of Minor League Teams

This section offers some further evidence in favor of the model by examining historical patterns in the ownership of minor league teams. As discussed above, vertical integration has always been a substitute for other contractual relationships – it was used as far back as the 1930s and continues to be used today. However, a major change has occurred in the types of teams that were fully owned. In the mid-twentieth century, ownership was concentrated among the higher levels of the minor leagues – where training and player evaluation were most important. This can be seen in Table 5. In 1951 (the top panel of the table), major league teams owned more than half of the teams in the upper classifications (AAA, AA and A) as compared to less than one-third in the lower classifications (B, C and D) (*Report*, 1952, p. 188).

[Table 5 here]

In 1990, by contrast, the pattern was precisely the reverse, as the bottom of Table 5 shows. Less than 10 percent of minor league teams in the higher levels were fully owned, as compared to 35 percent of the short season and rookie league teams.⁴⁴ Major league teams now own all of the low-rookie league teams and several of the high-rookie league teams. As discussed above, sophisticated contracts allow training to be adequately provided without outright ownership of teams. But rookie league teams tend to be located in smaller towns and to draw smaller audiences.⁴⁵ Nonetheless, first-year players, especially those with no college experience, need leagues in which to compete if they are to advance. The rookie leagues are thus

⁴⁴ See Hoie (2001, 494-495). The only exceptions among the higher divisions are the AAA and AA teams owned by the Atlanta Braves, and the AAA team owned by the Cleveland Indians.

⁴⁵ In 1996, Johnson and Wolf (1997, p. 634) report attendance for only two (Appalachian and Pioneer) out the four (Appalachian, Pioneer, Arizona, and Gulf Coast League) Rookie Leagues. The average attendance for these two leagues in 1996 was 45,315. The teams in the Appalachian and the Pioneer Leagues are located in smaller cities. The teams in the Arizona and Gulf Coast Leagues are in larger cities but they play in the spring training facilities of their parent major league team.

primarily a training expense. These are teams that would not survive without very large subsidies, and outright ownership may be the simplest form of subsidization. By contrast, many AAA and AA franchises today draw substantial crowds, so that full ownership by a major league franchise is no longer optimal – local ownership has both the incentive and information to make better decisions regarding local inputs, and those decisions are much more valuable than they were several decades ago.

V. Conclusion

What is a firm and where are its boundaries? The evolution of the relationship between minor league and major league franchises in professional baseball provides a unique opportunity to explore this question. We employ the Grossman-Hart-Moore property rights model as our lens – it predicts the assignment of residual claims to the party whose actions have the largest effect on an asset's value. The evidence we uncover in this analysis supports that prediction. In the early part of the 20th century, minor league baseball was sufficiently popular – both in an absolute sense and relative to major league baseball – that minor league franchises operated as fully independent (of MLB) entities. They signed and owned players who competed for local fans, and then sold those who were good enough to MLB teams. By the 1930s, the growing importance of player training inspired major league franchises to take more direct control of player contracts, and in order to do so, they began both to purchase minor league teams and to enter into agreements that gave them exclusive rights to the players on a minor league team's roster. When the popularity of minor league baseball rose again in the 1980s, MLB franchises began to sell off their ownership interest in minor league teams to independent owners – retaining rights to player contracts (and to hire and employ coaching staff and direct all on-field

activities), while leaving rights to make the increasingly valuable local decisions (regarding ticket prices, for example) with local ownership

In short, arm's length agreements, short-term contracts, long-term contracts, and full vertical integration have characterized the major and minor league relationship at various points in time. The multiplicity and richness of this set of organizational forms illustrates (once again) the truth of Coase's (1937, 392) dictum that "it is not possible to draw a hard and fast line which determines whether there is a firm or not."

Data Appendix

Number of Minor League Affiliates

We use three sources for data on the number of minor league affiliates. *Baseball-Reference.com* lists the number of affiliates by major league team and by minor league classification (AAA, AA, etc.) team from 1919 to the present. We use this data to examine the trend in the number of minor league affiliates (See Chart 1). *Baseball-Reference.com* does not identify whether the minor league affiliates are owned by the major league team or affiliated by a “working agreement.” To examine the trend in ownership vs. working agreements (See Table 4) we used data found in Hoie (2001), which provides a list of the total number of minor league teams, the total number of minor league teams affiliated with major league teams, and the total number of minor league teams that are owned by major league teams from 1936 to 1978.⁴⁶ By subtracting the total number of teams owned by the major league from the total number of minor league teams affiliated with a major league team, we were able to determine the total number of minor league teams that were affiliated with a major league team by a working agreement for the years 1919 to 1976. The third source that we use is data found in the Report (*Report*, 1952) on Congressional Hearings held in 1951. The data reports the total number of minor league affiliates that are owned by major league teams and the number of minor league teams that are affiliated by a working agreement for the year 1951 by minor league classification.⁴⁷ We updated this information for 1990, using *Baseball America, 1990 Directory*, which lists each minor league

⁴⁶ This source lists the total number of minor league teams and the total number of minor league teams affiliated with major league teams through the year 2000 but for some reason it stops listing the total number of minor league teams owned by major league teams in 1976.

⁴⁷ The total number of minor league affiliates by minor league classification reported by *Baseball-Reference.com* for 1951 is not exactly the same as reported in the *Report* on the 1951 Congressional Hearings but it is tolerably close and it shows a similar pattern ownership and working agreements by minor league classification for 1951. The data found in the article by Hoie (2001) reports the same number of minor league teams owned by major league teams but they report a smaller number of teams affiliated with major league teams (172 vs. 195). Again, the difference is not large and the pattern of ownership vs. working agreements is similar.

team by minor league classification. The description of the minor league team identifies their major league affiliation, as well as the owner(s) of the team. With this information we were able to identify the minor league teams that were owned by a major league team and the minor league teams that were independently owned and affiliated with a major league team by a working agreement (See Table 5).

Attendance Data

The major league attendance data used in Chart 2 is from the Biz of Baseball website (http://bizofbaseball.com/index.php?option=com_content&view=article&id=4190&Itemid=185) and the minor league attendance data used in the chart is from Hoie (2001, p. 496).

Source of Players Entering the Major Leagues

After reading the history of both the major leagues and the minor leagues, it was our sense that in the early period (circa 1903 to circa 1930) most of the players who made it to the major leagues entered professional baseball by signing their first contract with a minor league team. As time progressed (circa 1930), major league teams took a more direct role in scouting amateur players and signing them to their first professional contract. To verify this impression we examined how major league players entered professional baseball from circa 1905 to circa 1995 (Table 3).

The source that we used for a player's first contract is Baseball-Reference.com, which lists the transactions that the player was involved in during his major league career.⁴⁸ Below, we list the procedures that we use to select our sample of players and the criteria we use to determine if a major league player entered professional baseball by signing his first contract with a minor league team or whether a player signed his first professional contract with a major league team.

⁴⁸ Baseball-Reference.com gets the information on a player's transactions from Retrosheet.org, which is a non-profit organization founded in 1989 for the purpose of providing play-by-play accounts of major league games. It is not entirely clear what source Retrosheet.org uses for the transaction data. We used the Baseball-Reference.com as our source because it was a more convenient source for drawing our sample of players.

1. To select our sample of players we examined the rosters of every major league team in ten-year intervals, starting in 1905. For the early years of the “farm era” we chose five-year intervals because this was a transition period when major league teams were starting to develop their own scouting bureaus. As a result, we selected a sample of players from the rosters of every major league team for the following years: 1905, 1915, 1935, 1940, 1945, 1950, 1955, 1960, 1965, 1975, 1985 & 1995.
2. We selected every position player on a major league roster in these years if he had 150 at bats or more. We selected a pitcher if he pitched 150 innings or more.
3. In addition to recording some general information for the player (his team and position) and some player performance information (e.g., at-bats, or innings pitched, in the year chosen, career at-bats or career innings pitched, and the number of years in the majors), we listed two important pieces of information: the year of the player’s debut in the major league and the first transaction listed for the player, including the year of that transaction.
4. As noted above, Baseball-Reference.com (and Retrosheet.org) lists the major league transactions for each player, starting with the first transaction with a major league team. Typically, there were three ways that a player would enter the major league in the early years. One, the player was signed as an amateur free agent by the major league team. Two, a player was drafted from a minor league team under the minor league draft rules that were in effect at the time he was drafted. These players usually entered professional baseball by signing their first professional contract with a minor league team, which held title to the player under the reserve rule. The major league team that drafted the player at the end of the minor league season had to compensate the minor league team that held his contract according to the amount specified under

the Minor League Draft Rules. And three, the major league team purchased a player's contract directly from the minor league team that signed the player and had title to his contract.⁴⁹

If a player entered the major leagues through the minor league draft or his contract was purchased directly from a minor league team, we classified that player as "Minor League Sourced" in Table 3. If the first transaction listed for a player indicated that he was signed as an amateur free agent by a major league team, we classified that player as "Major League Sourced" in Table 3.⁵⁰

5. During the earlier years of our sample, there were a number of cases where it was not clear whether a player signed his first contract with a minor league team or with a major league team. We classified these cases as ambiguous and did not include them in our sample.⁵¹ We did not observe any obvious patterns for the ambiguous cases and we do not believe that eliminating them from our sample biases our results.

The Number of Players Who Entered the Majors Directly From Amateur Teams

To determine the number of players who entered the majors directly from the amateur ranks (Table 2), we employed the same data set that we used to determine the source of major league

⁴⁹ On occasion, a major league team would trade one or more player to a minor league team for one of the players that the minor league team had under contract. We classified these players as being purchased from the minor league team.

⁵⁰ Major League Baseball limits the number of players that a major league team can control by setting roster limits and limits on the number of players that the major league team can option out to a minor league team. During the early years (circa 1903 to circa 1930), only a handful of players signed by the major league teams could be optioned out. As a result, a player who signed as amateur free agent with a major league team went directly into the major leagues without a stop in the minor leagues or he was optioned out to a minor league team for later recall. In both cases we list the player as being "Major League Sourced" in Table 3. During the Farm Era (beginning circa 1930), the major league team would sign amateur free agents and assign them to a minor league team that they owned or had a working agreement with. We classified those players as being "Major League Sourced" in Table 3. In 1962, MLB adopted the Amateur Free Agent Draft. Again, we classified players selected in this draft as "Major League Sourced" in Table 3.

⁵¹ A typical case occurred when Baseball-Reference.com listed the date of a player's first transaction as one or more years after he made his debut in the major leagues. In several cases Baseball-Reference.com did not list any transaction for a player on a major league roster.

talent (see above). The following criteria were used to establish that a player entered the majors directly from an amateur team.

1. Starting in 1905, we examined the roster of each major league team in ten year intervals through 1995.
2. We examined each player whose first transaction was listed in Baseball-Reference.com as a free agent signing by a major league team.
3. The year listed for the first transaction (free agent signing) had to be the same as the year the player made his first debut. In a couple of cases, a player signed his contract after the season of the previous year in which he made his debut. In these cases we checked Baseball-Reference.com for the player's minor league experience to verify that he did not play in the minors prior to making his major league debut. We also checked the player's biography at the SABR Biography Project, which was linked through the player's page in Baseball-Reference.com, to verify that he entered the major league directly from the amateur ranks.
4. The position player had to play a minimum of thirty percent of the team games that were remaining when he made his debut. A pitcher had to appear in a significant number of games.
5. We did not include a couple of players who played in the negro leagues prior to signing with a major league team or one player who played professional ball in Japan.

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Table 1

Assignment of control over economic decisions under the various organizational forms

Organizational form	Local business	Player development	Player assignment
Independent minors	m	m	negotiated
Assignment agreement	m	m	M
Assignment and development agreement	m	M	M
Vertical integration	M	M	M

m=minor league team; M=major league team.

Table 2

Number of major league players acquired directly from amateur teams

	total players	number from amateur teams	
1905	132	12	9%
1915	149	8	5%
1925	88	3	3%
1935	60	1	2%
1945	82	1	1%
1955	165	5	3%
1965	216	1	0%
1975	321	1	0%
1985	317	1	0%
1995	342	0	0%

Source: Baseball-Reference.com (See the Data Appendix for more detail on how the data was gathered.)

Table 3
Source of Players on Major League Rosters

	Minor League- sourced	%	Major League- sourced	%	Total
1905	100	76%	32	24%	132
1915	131	88%	18	12%	149
1925	76	86%	12	14%	88
1935	50	83%	10	17%	60
1945	35	43%	47	57%	82
1955	16	10%	149	90%	165
1965	3	1%	213	99%	216
1975	2	1%	319	99%	321
1985	3	1%	314	99%	317
1995	2	1%	340	99%	342

Source: (Baseball-Reference.com (See the Data Appendix for more detail on how the data was gathered.)

Table 4
Full Ownership versus Working Agreements

Year	Total Minor League Clubs	Affiliated with Majors	Owned by Majors	Working Agreement*	% Owned	% Wk. Agr.
1936	184	116	38	78	33%	67%
1937	251	154	39	115	25%	75%
1938	267	162	49	113	30%	70%
1939	292	152	48	104	32%	68%
1940	310	146	61	85	42%	58%
1941	304	147	62	85	42%	58%
1942	206	116	46	70	40%	60%
1943	66	42	23	19	55%	45%
1944	70	57	21	36	37%	63%
1945	85	68	33	35	49%	51%
1946	316	197	79	118	40%	60%
1947	388	247	103	144	42%	58%
1948	438	280	125	155	45%	55%
1949	448	243	116	127	48%	52%
1950	446	210	99	111	47%	53%
1951	371	172	75	97	44%	56%
1952	324	166	65	101	39%	61%
1953	292	152	50	102	33%	67%
1954	269	156	49	107	31%	69%
1955	243	155	40	115	26%	74%
1956	217	150	33	117	22%	78%
1957	200	153	32	121	21%	79%
1958	173	157	34	123	22%	78%
1959	150	132	30	102	23%	77%
1960	152	126	18	108	14%	86%
1961	147	129	21	108	16%	84%
1962	134	121	22	99	18%	82%
1963	130	114	22	92	19%	81%
1964	136	108	19	89	18%	82%
1965	136	110	28	82	25%	75%
1966	138	116	32	84	28%	72%
1967	141	118	36	82	31%	69%
1968	152	119	39	80	33%	67%
1969	155	128	46	82	36%	64%
1970	153	120	39	81	33%	68%
1971	155	127	45	82	35%	65%
1972	148	125	49	76	39%	61%
1973	147	117	38	79	32%	68%
1974	145	113	27	86	24%	76%
1975	137	109	26	83	24%	76%
1976	148	106	24	82	23%	77%
1977	150	113	23	90	20%	80%
1978	156	118	24	94	20%	80%

Source: Derived from Tables in Bob Hoie, "The Minor Leagues," J. Thorn, et.al., *Total Baseball (7th Ed)*, pp. 496-497

* The number of minor league clubs with working agreements is derived by subtracting the number of minor league clubs owned from the number of minor league clubs affiliated.

Table 5

The Organizational Structure of the Minor Leagues by Classification

1951

Classification of Minor-League Teams*	Teams Owned by Major Leagues	Teams with Working Agreements With Major Leagues	Total Number of affiliated Teams
AAA	12	7	19
AA	7	7	14
A	14	10	24
B	14	24	38
C	10	32	42
D	18	40	58
All Classifications	75	120	195

Source: Report (1952), p. 188

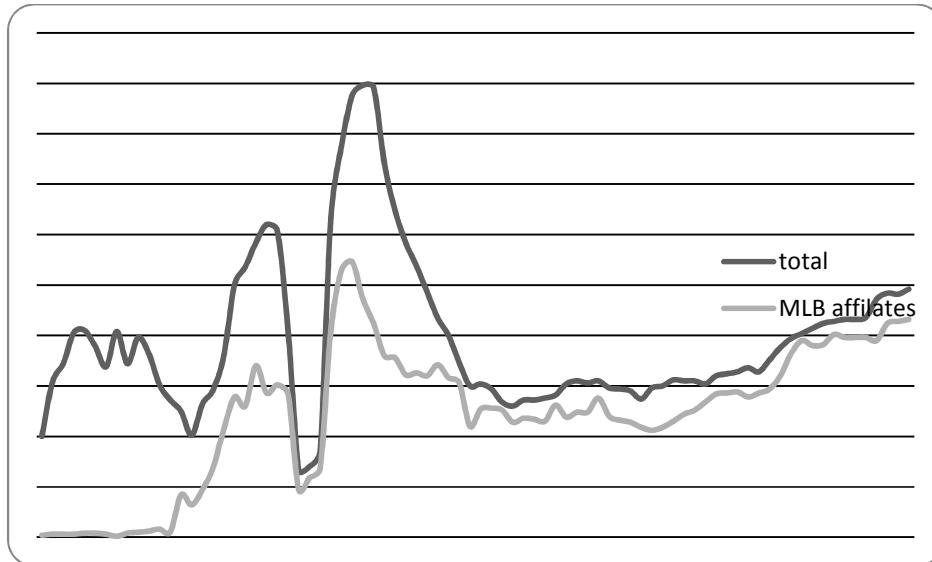
1990

Classification of Minor-League Teams*	Teams Owned by Major Leagues	Teams with Working Agreements With Major Leagues	Total Number of affiliated Teams
AAA	1	24	25
AA	1	24	25
A	6	46	52
rookie/short	17	35	54
All Classifications	25	129	154

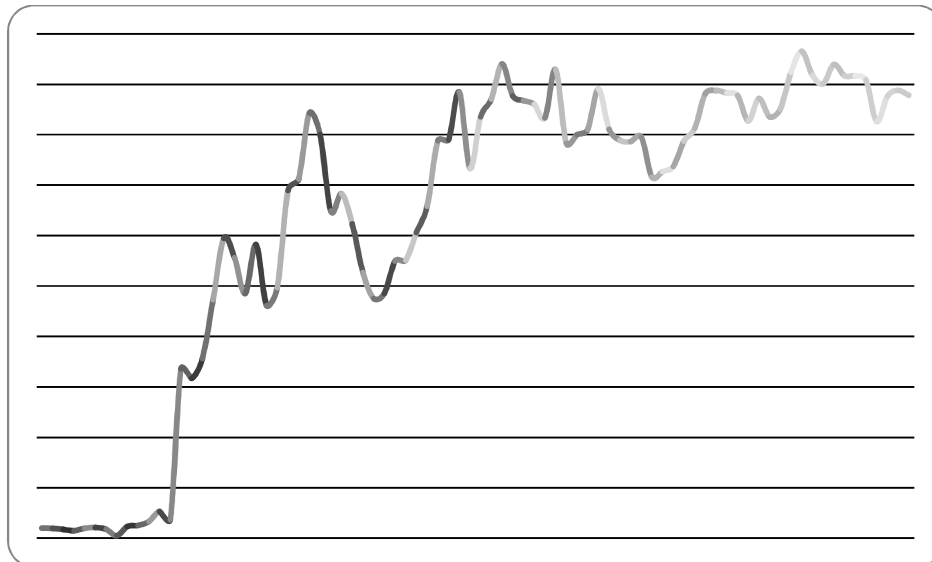
Source: *Baseball America, Directory (1990)*. (See the Data Appendix for more detail on the data collection.)

CHART 1
(1919-2000)

A. Total number of teams and number of MLB affiliates

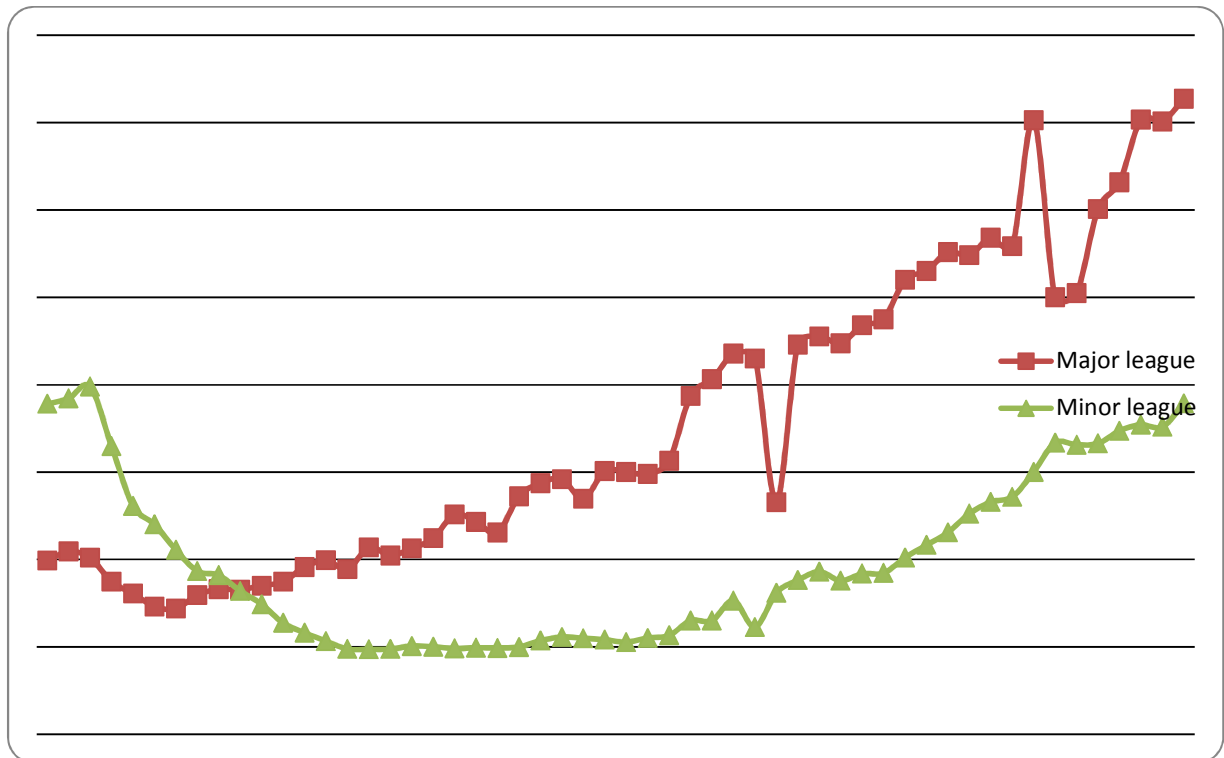


B. Proportion of Minor League Teams that were MLB affiliates



Source: Baseball-Reference.com (see the Data Appendix for a description of the data)

CHART 2
Minor League Attendance
 (1947-2000)



Source: Bizofbaseball.com for major league attendance and Hoie (2001, p. 496). See the Data Appendix for a more complete citation of the sources.