



# Regulation as a Cause of Firm Fragmentation: The Case of the Spanish Construction Industry

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Team members organize their relationships to achieve efficient incentives in accordance with institutional constraints. When these constraints change, the rights and tasks of members are reallocated, generating a new contractual structure [or governance mechanism] that solves more easily the problem of collective action associated with team production. We show how this process has worked in the case of Spanish construction firms, in which more restrictive labor and tax regulations have induced parties to substitute market contracts for labor contracts because of the need to avoid moral hazards. We argue that this explains the increased fragmentation of the Spanish construction industry, and technical change does not seem to account for this process. © 1999 by Elsevier Science Inc.

## I. Introduction

Although construction firms all over the world have traditionally been small,<sup>1</sup> the last few decades have witnessed a dramatic decrease in the average size of Spanish construction firms, in particular, and an increase in their use of subcontracting. The average firm size, measured by the number of employees, decreased 45.77% between 1980 and 1995,<sup>2</sup> and the number of firms rose from 42,385 to 100,009 in the same period—i.e. an increment of 235.95%. Our aim in this paper is to identify the causes of this growing fragmentation and to explain its nature—i.e., to understand why there are many more smaller firms. We hypothesize and test the notion that, even though construction

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<sup>1</sup> See Stinchcombe (1959), Comisaría del Plan de Desarrollo Económico y Social (1967, pp. 19-21), Eccles (1981a, 1981b), Ball (1988), Bröchner (1990), Hillebrandt and Cannon (1990), and Brousseau and Rallet (1995).

<sup>2</sup> This figure does not include building trade firms because statistics have only been available since 1987 [Ministerio de Fomento (1997), p. 25].

technology may have favored this process of fragmentation, variations in regulation are in fact its main cause. In the framework of transaction cost economics [e.g., North (1990); Williamson (1993)], we study how changes in “governance structure” are driven by changes in the “institutional environment.”

Alchian and Demsetz (1972) characterized team production by two features. First, team production is greater than the aggregation of individual products. Second, the contribution of each team member to the team product is costly to ascertain. Thus, assuming utility-maximizing individuals, it is necessary to implement mechanisms that prevent shirking or free riding. Assigning a team member the task of monitoring individual performance can mitigate this kind of behavior. However, it is necessary to motivate the monitor so that he, in turn, does not shirk his functions. The classic capitalist firm solves the problem by allocating the residual rent to the monitor (the entrepreneur) as well as assigning the right to alter the terms of the contract with each participant separately—that is, avoiding the need to change contracts with the rest of the team members. The entrepreneur then holds the rights to evaluate each participant’s marginal productivity, to apportion individual rewards, to alter the team membership, and to sell his own position in the firm. From this point of view, firm fragmentation can be understood as a transfer of the entrepreneur’s rights to other members of the production team, who become entrepreneurs themselves.

The rest of the paper is organized as follows. In the next section, we refer to the physical features of construction technology that are relevant to the analysis. Section III studies the contractual structure and its change over the last decades. Section IV analyzes the extent and nature of the observed process of fragmentation as a reflection of the underlying contractual change. Then, we test an explanation that considers changes in institutional restrictions such as labor and tax regulations for such a process in Section V. Finally, we briefly discuss the main conclusions and economic consequences.

## II. Distinctive Features of Construction Technology

Although construction activity is initiated by a “property developer,” this figure normally hires a “general contractor” to carry out the project.<sup>3</sup> We will focus on firms that play this latter role. Compared with that of manufacturing firms, the activity of these general contractors present several technological peculiarities that will be relevant for our analysis. These are related to the final product, the production process, and the required productive factors:<sup>4</sup>

1. *Product and process.* The final product of the construction activity is immobile and unique. Hence, the production process must follow a specific project, setting up one or more fixed structures at the location where the required transformations take place. The immobility of the final product also determines the fact that the productive factors (labor and capital) must move to the product, rather than the other way round—which is the general case in manufacturing. Additionally, construction firms produce a wide range of final products, which include everything from small domestic repairs to large infrastructure works. Each one of these final

<sup>3</sup> The developer may be a private firm or a public entity that decides to perform a project for private use or else for sale. The role of this figure is to carry out all the necessary preliminary works, such as obtaining licenses and financing.

<sup>4</sup> Such peculiarities are analyzed in further detail in Eccles (1981a, pp. 450–451), Masten et al. (1991, pp. 8–10), González Díaz (1994, pp. 193–197), and Brousseau and Rallet (1995, pp. 11–21).

- products involves a different kind and number of technologically separable intermediate tasks. The variety of final products and the heterogeneity of the intermediate tasks emphasize two problems. First, direct supervision of the productive process is complicated, given the wide range of workers specializing in several fields, many of them skilled craftspeople. Second, the ability to balance the productive capacity of the firm is hindered, due to the wide differences in both the lead time of each intermediate task and the optimal size of each team [Eccles (1981a), pp. 453–455].
2. *Labor.* The construction industry is labor intensive and requires considerable investments in human capital, especially in craft tasks, such as carpentry, masonry, and painting, among others. However, this labor intensity varies substantially from one construction sector to another. In those such as house building and the building trades, in which craft tasks are the main component of the project, technology implementation is low and the production process is labor intensive. In contrast, civil engineering is more capital intensive, because the tasks involved are more repetitive and easier to mechanize—such as earth movement, where technological advances have been substantial.<sup>5</sup>
  3. *Capital.* The kind of capital resources used in construction are important in determining that entering and leaving the industry is not problematic, especially when we compare the construction firms with manufacturing firms, even though there are some differences among different construction sectors. With regard to entry, investment in facilities is low because the final product and the working center are one and the same. Notwithstanding, there are differences among subsectors. For example, investment requirements are generally reduced in house building and the building trades, which require low mechanization and are labor intensive. The underlying reason behind this is the strong craft component of house building together with the low continuity and wide variety of intermediate tasks. On the contrary, civil engineering is more capital intensive, requiring larger investments. Mechanization is easier because most tasks are repetitive—e.g., earth movement. Additionally, large production capacity is not necessary to compete in this industry. The main reason is that the production process is extremely difficult to standardize because the wide heterogeneity of final products makes scale economies almost irrelevant.<sup>6</sup> However, important economies of scale are reached in administrative services such as technical offices, legal or financial counseling, and public bidding. The financial requirements to enter also differ from civil engineering to house building. As purchasers of the civil engineering services are usually part of public administration, payments are delayed and the cost of each operation is higher than in house building. Consequently, this kind of construction firm requires greater financial strength. However, house purchasers sometimes provide construction firms with advanced financing, or they can obtain this financing on a private basis in the capital market. In addition, each individual operation is smaller. It is therefore not necessary to tie up as much capital in construction as in civil engineering firms. Finally, exit from the construction industry is also easy, mainly because of the relatively minor importance of specific assets. The reason is that assets can be

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<sup>5</sup> See Stinchcombe (1959, p. 168), Thompson (1967, pp. 17–19), Eccles (1981a, pp. 450–451), Ball (1988, p. 89), Bröchner (1990, p. 212), and Masten et al. (1991, p. 10).

<sup>6</sup> In the 1960s and 1970s there was a trend toward adopting building systems based on heavily industrialized methods, but they have not been successful. See Ball (1988, p. 7) and Hillebrandt and Cannon (1990, p. 10).

reutilized at a low cost because they are generally mobile and can be used in a large number of firms and projects.

### III. Contractual Structure

#### *Contractual Problems*

Contracting parties choose the contractual structure that minimizes the total cost of producing a certain output. That is to say, they try to minimize contracting costs, subject to the technological constraints imposed by their activity. Due to the specific features of the product and the production process in construction, the main contractual problem faced by parties is moral hazard. Labor intensity, a high heterogeneity of intermediate tasks, a great variety of final products and crafts, output uniqueness, and geographical dispersion of working centers hinder the entrepreneur's ability to monitor individual performance, especially in team production situations, increasing the risk of shirking. Incentive systems, which link compensation and performance, are then used to overcome such a risk. Short-term incentives—especially piece-rate systems—are facilitated in construction by the separability of different productive stages.<sup>7</sup> This makes objective estimators of individual or group performance easy to establish and capable of being used with employees or subcontractors. Long-term incentives link compensation and performance through worker turnover and dismissal decisions,<sup>8</sup> keeping salaries fixed in the short term.

An additional difficulty in the design of the contractual structure is the high volatility of the work load, due to the immobility and uniqueness of the product and to the discontinuity of the numerous specialties. Hence, workforce adjustments must be made quickly if parties wish to adapt to the needs of the moment.<sup>9</sup> Hiring temporary employees or subcontracting is a frequent solution to this problem in the construction industry.

#### *Changes in the Contractual Solution*

*The Traditional Solution.* In the 1960s and 1970s, general contractors were vertically integrated and did most of the physical construction work themselves. They bought raw materials—cement, asphalt, iron, bricks, windows, bathroom furnishings, etc.—and performed the assembling and construction with their own employees, whether they were carpenters, bricklayers, electricians, or plumbers. Hence, the general contractor took on the typical roles of the entrepreneur as described by Alchian and Demsetz (1972), taking decisions about hiring and firing, performance evaluation, and compensation policy. Indeed, firms with more than 80 workers subcontracted only 7.84% of their activity in 1964.

At that time, temporality in labor was already high, however. Whereas only 7.5% of Spanish employees were temporary in 1967,<sup>10</sup> they represented 39.1% in construc-

<sup>7</sup> For theoretical discussions of piece-rate systems, see Stiglitz (1975, pp. 557–69), Cheung (1983, pp. 10–13), and Fama (1991, p. 26).

<sup>8</sup> This possibility has been analyzed in a team production context by Arruñada and González (1997).

<sup>9</sup> The temporary adjustment may also be due to the high variability of demand or to seasonal variability. We have not explicitly studied this issue because it has a cyclical nature and has probably not changed much over the last few decades.

<sup>10</sup> The figure for the manufacturing industry taken alone was even lower: 4.7%.

tion.<sup>11</sup> The contractual costs due to this high employee turnover were mitigated by the slight importance of firm-specific human capital,<sup>12</sup> and the proliferation of “gangs” (*cuadrillas*). These gangs are teams of workers specialized in any craft and repeatedly contracted as a whole, although each member is hired individually by the general contractor. Internally, the team works autonomously, almost as an independent subcontractor, sometimes with a team leader who acts as an informal “entrepreneur,” and with its own rules of compensation, apportioning, promotion, and firing. The efficiency of the gang system is based on repeated contracting in local markets, where reputation, particularly that of the team’s leader, is most effective as a contractual safeguard [González (1994), pp. 129–133].

*Present-Day Solution.* This contractual structure of the industry has changed substantially since the 1960s. The late 1970s, and especially the 1980s, witnessed a dramatic growth in subcontractors specializing in certain activities (such as the laying of foundations, building structures, earth moving, and masonry) that were traditionally performed by the general contractor. Subcontractors, who had been used in the past to cover peaks in demand, began to permanently substitute the resources—both capital and labor—conventionally supplied by large general contractors. As a result, big firms subcontracted 31.27% of their activity in 1995, from a mere 7.84% in 1964.<sup>13</sup> General contractors then focused on coordinating the works and obtaining contracts from public and private developers. Hence, they progressively substituted white collar workers for blue collar workers. The latter are employed by smaller, more specialized independent firms or they become self-employed and are hired by their former employers. The percentage of white collar workers rose from 7.92% in 1974 to 29.39% in 1995.<sup>14</sup>

#### IV. The Extent and Nature of Fragmentation

##### *Fragmentation in Figures*

Parallel to these changes, industry data show a modification in the distribution of firms. The number of legally independent units engaged in construction grew 207% (258% in

<sup>11</sup> Comisaría del Plan de Desarrollo Económico y Social (Commissariat of the Plan of Economic and Social Development) (1967, p. 45).

<sup>12</sup> There is supporting empirical evidence that seniority bonuses are not linked to seniority in the firm itself but rather to seniority in the construction industry as a whole. A sophisticated device has been engineered to avoid the legal obligation to pay seniority bonuses within each firm. See González Díaz (1994, pp. 233–234).

<sup>13</sup> Data come from *Estructura de la Construcción* (Structure of Construction), [Ministerio de Fomento (Department of Housing and Works) (1997, p. 69)] and *Estadística Anual de la Industria Española de la Construcción* (Annual Statistics of the Spanish Construction Industry) [Ministerio de la Vivienda (Department of Housing) (1966)]. As the methodology changed in 1974, we have homogenized the information following the original rules. To calculate “total output” (the denominator of the ratio measuring subcontracting) we have considered the works made by the firm as a general contractor and subcontractor together. The numerator does not present any problem—both methodologies only consider production activities, that is, they do not include “other services,” such as advertising or technical and legal consulting. Finally, in 1995 we have taken firms with more than 100 workers because this figure is the closest to the 1964 data (more than 80 workers). Even if we consider in 1995 firms with more than 50 workers, subcontracting is 27.58 percent, so the difference with respect to 1964 is still substantial.

<sup>14</sup> The 1974 data are for firms employing over 80 workers [Ministerio de la Vivienda (Department of Housing) (1975), No. 1014], and the 1995 data are for firms with more than 100 workers [Ministerio de Fomento (1997), p. 75]. The figure for firms with over 50 workers in 1995 is 25.70%.

TABLE 1. Summary of the Evolution of Size and Number of Firms\*

Firm Size (No. of Workers)	1970		1992†	
	Firms	Workers	Firms	Workers
1–10	52,572	188,794	264,684	596,554
% of total	73.53	18.54	93.56	51.97
11 and over	18,927	829,739	18,204	551,291
% of total	26.47	81.46	6.44	48.03
Total	71,499	1,018,533	282,888	1,147,845

Source: Based on Ministerio de la Vivienda (Department of Housing) (1972) and original time series from MOPTMA (Department of Housing and Works) (1994).

\*The number of self-employed workers and their employees have been distributed by size according to the distribution existing in 1990, because statistics for later years were not available. In 1990, 2.60% of the self-employed workers have more than 10 employees, which represented 18.08% of all the people employed by self-employed workers.

†Firms from 1 to 9 workers and 10 and over.

the case of house building) between 1980 and 1992.<sup>15</sup> At the same time, the average number of employees per firm decreased almost 29%. The average size of firms decreases even if this is measured by output. The data indicate an accumulated increase of 9.48% of the *own output* of the firm between 1980 and 1992, smaller than the 48.78% of accumulated increase in the apparent productivity of the workers.<sup>16</sup> Additionally, the number of self-employed workers grew 48.47% in the same period,<sup>17</sup> so that 37.49% of the population working in the construction industry were self-employed in 1992, accounting for 21.26% of the output.<sup>18</sup>

This trend toward fragmentation started in the 1970s. Although there are no consistent historical series for this decade, a few studies carried out in the early 1970s provide some basis for comparison. According to the former Spanish Department of Housing [Ministerio de la Vivienda (1972)], firms with over 10 employees accounted for 81.6% of employment in construction in 1970. Such a figure was down to 48.03% in 1992, and firms with less than 10 workers were the main source of employment that year. Table 1 summarizes the fragmentation process.<sup>19</sup>

Although the fragmentation process is also observed in manufacturing, it is not as

<sup>15</sup> See MOPTMA (Department of Works and Housing) (1994).

<sup>16</sup> We term "own output" the output measured after subtracting the amount of subcontracting. With this measure of the firm we avoid the bias that the high intensity of subcontracting in the construction industry causes in total output. The reduction in the output of firms shows that the observed fragmentation is not a simple process of substitution of capital for labor.

<sup>17</sup> Instituto Nacional de Estadística, *Encuesta de Población Activa* (Labor Force Survey) (1964–1993).

<sup>18</sup> MOPTMA (Department of Housing and Works) (1994).

<sup>19</sup> Henceforth, we are only going to measure the size of the firm by the number of employees—like, for example, Hillebrandt and Cannon (1990, p. 4) and Ball (1988, p. 123)—rather than by the output. There are two main reasons for this. First, we do not have a good deflator to neutralize inflation in the 1980s, which is especially high in house building. Between 1987 and 1992, the rise in the average price of new houses was 53.66% greater than average inflation (IPC, Índice de precios al consumo; or Consumer Price Index), and was 35.62% larger than the deflator of the gross domestic product [MOPTMA (1996), p. 13]. Second, Spanish statistics—based on accounting records—underestimate subcontracting, because they fail to identify as such the frequent practice of purchasing raw materials including the labor required to install them [Carreras Yañez (1992), p. 233].

TABLE 2. Fragmentation Indicators of Manufacturing and Construction

Year	No. of Firms		Average Size		Percentage of Employment in Firms with $\leq 10$ Workers of Total Employment	
	Manufacturing	Construction	Manufacturing	Construction	Manufacturing	Construction
1989	217,461	203,582	12.09	7.30	15.5	24.2
1992	224,760	234,873	11.76	6.54	16.5	28.0
Annual average rate of variation 1989–1992 (%)	1.11	4.88	-0.91	-3.60	2.03	4.93

Source: Instituto de Estudios Fiscales (Institute of Tax Studies) (1992, 1995).

strong as in the construction industry (Table 2).<sup>20</sup> Indeed, although the average annual increase in the number of firms between 1989 and 1992 was 4.88% in the construction industry, it was only 1.11% in manufacturing. Additionally, the mean annual rate of decrease in the average size of the firms was four times higher in construction than in manufacturing. Finally, firms with 10 employees or less hired a clearly higher percentage of workers in construction than in manufacturing. Furthermore, the annual rate of increase of such a figure was greater in construction (4.93%) than in manufacturing (2.03%).

#### *The Nature of Fragmentation*

From a legal point of view, fragmentation means both an increase in the number of autonomous and legally independent units and a reduction in their average size. This is also the way the statistics of the industry represent reality. However, this does not necessarily imply any substantial economic change, at least in the incentives of the parties. What then is the economic rationale behind this fragmentation?

The fragmentation process can be interpreted as a *qualitative* change in contractual patterns: The relationships among the owners of productive resources have been organized less and less by contracts inside the firm (employment relationships) and more by contracts between legally independent firms (market relationships).<sup>21</sup> Considering the view of Alchian and Demsetz (1972) of the classic firm, this qualitative change of contracts is a transfer of the entrepreneur's rights to other members of the team, who become entrepreneurs themselves. Thus, from this point of view, *firm* fragmentation is interpreted as *team* fragmentation.

The fragmentation of the industry has two different components, namely, the increase in the number of firms and the decrease in their average size. Considering only the increase in the number of firms, we could conclude that the statistical change is the result of a strong growth of the construction market, which has attracted new firms to the industry (increasing the available productive resources). However, (a) the increase in the number of firms has been accompanied by a decrease in their average size. This would not make any sense if the changes in the industry were simply a response to

<sup>20</sup> Data from the Instituto de Estudios Fiscales (Institute of Tax Studies) (1992 and 1995). Information, available only since 1989, is based on value added tax statements and withholdings of personal income tax.

<sup>21</sup> See Demsetz (1988, pp. 147–148) for an analysis of the difficulties in distinguishing between internal and external relationships from an economic point of view.

market expansion. Furthermore, (b) the expansion of the market does not *necessarily* require an increase in the number of firms: The incumbent firms could have grown at the same rate as the market.<sup>22</sup> Additionally, there is no evidence of market growth in this period, at least in some construction sectors, such as house building, in which fragmentation has been very high.<sup>23</sup>

Utility-maximizing parties choose the solution that minimizes total (production and transaction) costs, subject to the range of contracting possibilities. We argue that fragmentation, therefore, results from a trade-off of costs and benefits. It has been chosen since it is better able to solve the problem of collective action associated with team production because institutional changes have made traditional solutions impossible. Substituting market contracts for labor contracts—i.e., fragmentation—can be an efficient way of adjusting the old incentive scheme to a new institutional environment. This argument is examined in the following section.

### **The Institutional Restrictions Hypothesis**

We therefore hypothesize that the cause of observed fragmentation is changes in institutional restrictions, mainly labor and tax regulation. These have produced a change in contractual patterns because traditional contracts would now lead to suboptimal results. After describing these changes, we will show that the empirical evidence supports this institutional explanation.

#### *Labor Regulation*

Labor regulation affects fragmentation if it modifies the relative costs of internal—i.e., employment—and external contracting. Labor regulation introduced in the last 25 years has hindered private labor arrangements because it prevented the parties from freely assigning some rights (mainly to compensating individual performance, hiring, firing, and discipline), which were traditionally assigned to the entrepreneur. These new rules can be grouped into two categories:

1. Collective bargaining. This kind of regulation—especially the centralization of bargaining and the compulsory extension of the agreements to all the firms in the industry—has blocked some of the mechanisms of labor adjustment traditionally employed in Spain.<sup>24</sup> Indeed, there is a sustained increase in the minimum wages established in collective bargaining in the construction industry. Such a raise brings these minimum wages nearer to the workers' real earnings in the labor market. Whereas the difference between the estimation of real earnings and the agreed minimum wage for an unskilled laborer in construction was more than 28% in 1975, it had decreased to 1.6% in 1986, and has not changed since then.<sup>25</sup> Hence, employees' compensation is determined almost completely by labor regulation. Additionally, collective bargaining also has reduced flexibility in working hours, resting times, and piece-rate compensation. For example, the maximum overtime

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<sup>22</sup> It is not the aim of our paper to study the effects of market growth on vertical integration. For a discussion of this problem, see, for example, Stigler (1951) and Wieland (1993).

<sup>23</sup> For a further discussion on market expansion and fragmentation in the Spanish construction industry, see González (1994, pp. 162–214).

<sup>24</sup> See Malo de Molina (1983, pp. 9–32) and García and Gómez (1993, pp. 30–31).

<sup>25</sup> See SEOPAN (1987, pp. 76–77).



- was reduced from 250 hours per year in 1970 to 80 hours per year in the mid-1990s, and the compulsory extra payment of overtime in addition to an ordinary working hour has increased from 30% to 75% in the same period of time.
2. Job security. Even if Spanish labor norms have traditionally hindered dismissals, explicit costs have substantially increased over the last 20 years.<sup>26</sup> First, the maximum dismissal payment notably increased in 1976. Until then, the *Ley del Contrato de Trabajo* (Labor Contract Act) established a maximum of 1 year of salary for unfair dismissal. Such a limit was raised dramatically to 5 years of salary in 1976 with the *Ley de Relaciones Laborales* (Labor Relationships Act), and it was reduced to 3.5 years in 1980 with the *Estatuto de los Trabajadores* (Statute of Workers Act)—still way over the limit in force before 1976.<sup>27</sup> Second, dismissal costs not only depend on the established payments, but also on the likelihood of a judicial sentence favoring the employee in case of individual dismissal.<sup>28</sup> Such frequency went from 70.42% in 1977 to almost 90% in the first half of the 1980s, and then it started a gradual decrease until it reached 71.32% in 1992 [*Ministerio de Trabajo y Seguridad Social* (Department of Labor and Social Security) (1983–1992)]. A final factor influencing dismissal cost is that the employer must obtain an administrative authorization for collective dismissal. In practice, reaching a previous agreement with the employees happens to be particularly important for obtaining the authorization.

*Influence on Contractual Structure.* These changes in labor market regulation have substantially limited the rights previously allocated to the entrepreneur, forcing a departure from the standard assignment of the classical firm. Particularly, they constrain the entrepreneur's rights to ascribe individual compensations linked to the estimated individual contributions and to alter team membership. The optimal nature of this allocation of rights in the classical firm consisted of giving the monitor the suitable tools to control collective action. By restricting these rights, the monitor loses much of his capacity to control this kind of behavior and in many cases is no longer the optimal solution for team production.

We see fragmentation as an adaptive reaction to this constraint. Exercising the final entrepreneurial right to sell one's own position in the firm attenuates this loss of efficiency. The classic firm is then divided into smaller organizations in which many new entrepreneurs arise at all the stages of the production chain. That is to say, it is not only the general contractor who splits, but subcontractors, especially the larger ones, who also adopt a similar strategy. The predivision entrepreneurs do not necessarily disappear, but they reduce the scope of their activities, focusing on their core competencies. Usually, they are transformed into sophisticated intermediaries, whose new role is to coordinate the new entrepreneurs with their own activity. The evaluation and compensation functions are now played more directly by the market and the price mechanism.

The private optimality of this restructuring of entrepreneurial functions depends to a large extent on whether the new small entrepreneurs can perform their functions in a better way than a single centralized entrepreneur. There are several reasons for

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<sup>26</sup> See Malo de Molina (1983), Segura et al. (1991), García and Gómez (1993), and Jimeno and Toharia (1993) for a detailed analysis of the changes in Spanish labor regulation.

<sup>27</sup> The changes in labor regulation of 1984 did not change this limit. They introduced a new kind of contract with almost no costs of termination, although the use of such contracts was subject to the fulfillment of some requirements, basically causal temporality.

<sup>28</sup> See Jimeno and Toharia (1993, pp. 250–2) for a detailed study of the different components of dismissal costs.

thinking that they can effectively do so. First, labor market regulation is easily avoided because the exchange of labor is accomplished in many cases under the cover of a commercial or mercantile contract. This means that labor exchange is governed by civil law as opposed to labor law. Likewise, potential conflicts are judged by civil courts rather than labor courts. Furthermore, in new firms this regulation is less restrictive because they are smaller in size and, normally, job security laws are more flexible concerning small firms than larger ones (firms employing over 50 or 25 workers, depending on specific rules).<sup>29</sup> Consequently, contractors in small firms formalize their relationship less often and enjoy more flexible labor rules. Second, rent-seeking costs are lower because entrepreneurial allocation decisions are less influenced by the employees due to (a) rents generated by these decisions being smaller<sup>30</sup> and (b) unions being weaker, as they are generally less protected by regulation in small firms.<sup>31</sup> Third, weak unions also reduce the threat of opportunistic recontracting.<sup>32</sup> There is a new postcontractual opportunistic risk, however. At the lowest level of the subcontracting structure, many employees accept work *ex-ante* as self-employed workers, but testifying before a court they claim *ex-post* to have been working as employees.<sup>33</sup> Finally, the predivision entrepreneur exercises the controlling role through market contracts, which, especially under these conditions, are thought to provide higher powered incentives than the hierarchical ones.<sup>34</sup>

*Empirical Evidence.* Available data support our hypothesis. If fragmentation is a response to changes in labor market regulation, we should find a positive correlation between fragmentation intensity and the difficulties in controlling each construction sector. The underlying argument is that the importance of constraints imposed by the new regulation on labor control mechanisms depends on the shirking opportunities in each activity: Labor market regulation has a greater effect on those sectors in which control is more difficult.

To test this hypothesis, we have estimated the monitoring difficulties in each construction sector. For this purpose, we have taken Eccles' idea of complexity in the internal organization of activities as the starting point. This is related to the variety of final products, the number of intermediate tasks, and the difficulty of balancing the optimal capacity in each task [Eccles (1981a), pp. 453–455]. According to this argument, the organization of a firm is more complex and there are more monitoring problems because (a) the variety of final products is greater, (b) the intermediate activities are more dissimilar, and/or (c) the optimal size of each activity is more difficult to balance in order to avoid having idle resources. Our estimations have been made starting from the analysis of 18 Spanish construction firm cases, representing the four construction sectors.<sup>35</sup> Table 3 shows the results.

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<sup>29</sup> See the references quoted in footnote 26 for the Spanish case, Bettio and Villa (1989) for Italy and OECD (1992), in general.

<sup>30</sup> See Milgrom (1988) and Milgrom and Roberts (1988) for an application of rent-seeking arguments to organizational decisions.

<sup>31</sup> For example, in Spain it is not necessary to have a personnel representative in firms with under 10 employees. Works committee are only compulsory for firms employing more than 50 workers.

<sup>32</sup> Theoretical and empirical support to this argument are found, respectively, in Lyons and Sekkat (1991) and Brønars and Deere (1993), and references quoted there.

<sup>33</sup> See Sinclair and Dunford (1997).

<sup>34</sup> See Williamson (1985, pp. 135–156; 1996, pp. 103–105).

<sup>35</sup> See González (1994, pp. 106–161).

TABLE 3. Estimations of Monitoring Difficulty by Sectors in Construction\*

	<i>House Building</i>	<i>Civil Engineering Building</i>	<i>Combined Housing and Civil Engineering</i>	<i>Building Trade</i>
Dimensions of monitoring†				
Variety of output	++	++	++++	+
Number of intermediate tasks	+++	+	+++	+
Task heterogeneity (team balancing)	+++	++	+++	+
Overall monitoring difficulty (column average)	(High)	(Medium)	(Maximum)	(Low)

Source: Based on the analysis of 18 Spanish construction firm cases, representing the four construction sectors. Control difficulty: +: low; ++: medium; +++: high; ++++: maximum.

\*According to CNAE (National Standard Industrial Classification).

†See Eccles (1981a, pp. 453–455).

We have related such estimations with fragmentation indicators in Table 4. Supporting our hypothesis, it is easy to see the positive correlation between the fragmentation indicators and the estimations of monitoring difficulties across different activities in construction. Fragmentation is higher in housing and in the combined activity of housing and civil engineering where it is more difficult to monitor the behavior of contractors due to the output variety or the heterogeneity of intermediate tasks. Conversely, fragmentation is low in firms specializing in civil engineering, in which monitoring problems seem to be smaller. Finally, the fact that the building trade breaks with this trend toward fragmentation is also in line with our hypothesis. There are two reasons. First, this kind of activity is less sensitive to labor market regulation because the activity is easier to monitor. This greater monitoring ease is due to (a) each firm normally being specialized in one kind of work so that the output is homogeneous, (b) the activities being geographically concentrated, and (c) the activities hardly being composed by other intermediate tasks. Second, these activities are the easiest to externalize by general contractors because they are technologically separable—which facilitates the sale of the entrepreneurial rights to these activities. This externalization has

TABLE 4. Comparison Between Monitoring Difficulty and Fragmentation

	<i>House Building</i>	<i>Civil Engineering Building</i>	<i>Combined Housing and Civil Engineering</i>	<i>Building Trade</i>
Fragmentation	High	Low	Highest	Lowest
Average size 1980–1992	–3.57%	–0.62%	–10.11%	0.39%
No. of firms 1980–1992	8.25%	4.78%	8.55%	4.71%
Overall monitoring difficulty	(High)	(Medium)	(Maximum)	(Low)

Source of fragmentation: Elaboration from the data of MOPTMA (Department of Housing and Works) (1994). Real values. Source of monitoring difficulty: Table 3.

developed the market of the building trade, which has facilitated the growth and proliferation of these firms.

It is noteworthy that the reaction of contractors to changes in the initial labor conditions does not necessarily lead to fragmentation. The decline of construction unionism in the United States is an example. Unions gradually started to impose working conditions on contractors, reducing the flexibility in working hours, salary, and labor mobility. Consequently, union contractors have begun to operate nonunion subsidiaries—called “double-breasted” operations—which has provoked a reduction in the market share of union contractors in favor of open-shop contractors [Northrup (1992, 1995)]. Although union labor relations are conducted under a legal framework that is not comparable to the Spanish legal framework, the economic interpretation of this reaction is almost the same. The contract that becomes inefficient in the face of changes in the initial conditions—in this case the union contract—is substituted for a more efficient one: the nonunion contract. This substitution is not possible in the Spanish case because conditions arranged in collective agreements are compulsory for all firms.

### *Tax Regulation*

The tax system influences the contractual structure of the firm because taxes are one of the costs that parties are interested in minimizing. They are, therefore, willing to adopt structures to reduce the tax burden. We argue that small firms have enjoyed the benefit of a more favorable taxation system, which has contributed to the split of big firms to gain access to such advantages.

*Changes in Tax Regulation.* The reform initiated in 1977 to transform the Spanish tax system from one based on product taxation into one based on personal taxation totally altered the tax burden on citizens and legal entities.<sup>36</sup> There are three main changes. First, the introduction of taxes on all kinds of incomes and on added value has increased the burden of taxation, rising from 24% of gross national product in 1980 to 35.2% in 1992—an increment of 46.6%, the highest in the OECD countries in that period.<sup>37</sup> Second, reforms of tax fraud and tax prosecution laws have reduced tax evasion. In addition, the social security system has been substantially developed since the passing of the Social Security Act in 1974. Both the covered population and the thresholds for qualifying for social benefits have been lowered, especially in reforms enacted during the mid-1980s.<sup>38</sup> During this decade, public healthcare insurance was generalized, unemployment insurance benefits and family allowances were extended, and nontaxpaying allowances were introduced.

<sup>36</sup> See, for example, Fuentes Quintana (1978) and Albi Ibañez and García Ariznavarreta (1993, pp. 61–69).

<sup>37</sup> The burden of taxation is the percentage of total tax revenues of the Gross National Product. See Gago Rodríguez and Álvarez Villamarin (1995, p. 83–84).

<sup>38</sup> Basically, *Ley 31/1984, de 2 de agosto, de protección por desempleo* (Protection of Unemployment Act); *Ley 26/1985, de 31 de julio, de medidas urgentes para la racionalización de la estructura y de la acción protectora de la Seguridad Social* (Urgent Policies for the Rationalization of the Social Security Structure and Benefits Act); *Ley 14/1986, de 25 de abril, General de Sanidad* (Public Health Act); and *Ley 26/1990, por la que se establecen en la Seguridad Social prestaciones no contributivas* (Introduction of Non-taxpaying Allowances in the Social Security Benefits Act).

*Influence on Firm Size.* Tax increases motivate a reduction in firm size.<sup>39</sup> Clearly, it makes investments in tax avoidance more profitable.<sup>40</sup> This effect occurs whatever the organization size. However, it is generally easier to reduce the tax burden in small firms:

1. Capacity of fraud. Large firms face more difficulties in defrauding, due to the monitoring and bonding arrangements needed in fraudulent schemes. In large firms, especially when there is a separation of ownership and control, many people must be in agreement for those schemes to be successful, which raises the cost of the collusion among the participants.<sup>41</sup> Conversely, in small enterprises the number of participants is substantially lower, some even involving a single person, and so it is less expensive to reach and maintain a fraudulent arrangement in terms of collusion costs. In addition, small firms are organized as limited liability companies with insignificant invested capital, which eases the nonpayment of debts, primarily noncommercial and mostly tax-related—tax and labor liabilities, especially social security contributions. (This situation does not raise the cost of debt financing, however, as bank debt is fully guaranteed by mortgages on the land and the buildings being constructed). Several empirical studies have confirmed the ease of hiding income and inflating costs in small enterprises. This is particularly true among self-employed workers,<sup>42</sup> although other small corporations do not have special problems in carrying out similar procedures either.<sup>43</sup>
2. Tax benefits and allowances. Among OECD countries, Spain is one of the most generous providers of government help to small firms.<sup>44</sup> These schemes include tax advantages—such as reduced tax rates, slip system book keeping and presumptive or index taxation—and various grants and allowances for R&D, advising, and technical assistance. Furthermore, the self-employed workers have the benefit of more flexible social security rates, which allows them to choose a minimum contribution lower than that of employees.<sup>45</sup> The relevance of these benefits to firm fragmentation can be inferred from the fact that several OECD countries have excluded fragmented firms from the benefits of government schemes, after observing that firm divisions were only motivated by tax considerations.<sup>46</sup>

Contracting parties consider both advantages—capacity for fraud and tax benefits—when choosing their contractual structure. One solution is establishing small independent firms instead of developing only one larger organization. Another way is to split a group of employees, who could either become self-employed or could establish a new small enterprise. In their new situation, the former employees can easily enjoy the tax benefits of small firms and the ability to defraud in small business. Either of these solutions yields the observed fragmentation.

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<sup>39</sup> About the relationship between the tax system and firm size, see, for example, Zimmerman (1983), Blau (1987), Omer et al. (1993), McDonald et al. (1994), and OECD (1994).

<sup>40</sup> According to Blades' definition, ". . . tax avoidance is the use of legal means to minimize tax liability, whereas tax evasion is the use of illegal practices to escape from legitimate tax demands. . ." [taken from McDonald et al. (1994), p. 49].

<sup>41</sup> See Tirole (1989, pp. 239–243) and the references therein.

<sup>42</sup> See Blau (1987, p. 459), Pissarides and Weber (1989, p. 28), and OECD (1992, p. 178–182).

<sup>43</sup> For the Italian case, see McDonald et al. (1994).

<sup>44</sup> OECD (1992, p. 175) and OECD (1994, p. 7 of the Spanish translation).

<sup>45</sup> However, the superiority of each system depends on the evaluation made by the employees regarding the marginal social security benefits they receive—unemployment insurance and higher retirement annuity.

<sup>46</sup> See OECD (1994, pp. 89–90).

TABLE 5. Firm Population Growth\*

	1991 (%)	1992 (%)
Agriculture and fishing	20.46	14.64
Manufacturing	12.80	13.63
Construction	19.32	21.15
Services	16.45	17.30
Economy as a whole	16.67	17.22

Source: Instituto de Estudios Fiscales (Institute of Tax Studies) (1994, 1995).

\*Ratio of net growth of the number of firms—foundations minus liquidations—to the number of firms in the previous year.

In line with the importance of the tax system in fragmentation, the rapid growth of self-employment in the United Kingdom is also explained in this sense.<sup>47</sup> During the 1970s, in attempts to enforce tax payments by self-employed subcontractors, the government forced the self-employed workers to prove that their self-employment was in fact genuine and not a camouflaged employee arrangement. However, it removed these requirements in the 1980s, thus easing the move to self-employment. Furthermore, the differences between the employment rights and benefits associated with employee and self-employed status were gradually decreasing—in fact, the United Kingdom is among the OECD countries with the greatest social benefits for the self-employed and lowest contributions (taxation and social security). Finally, in 1983 the United Kingdom Enterprise Allowance Scheme was introduced to aid unemployed people to set up in business on their own, creating an important effect because of the high volume of invested resources—in fact, it figures among the largest schemes of this type in any OECD country. Together, all these measures contribute to the rapid growth of self-employment in the United Kingdom in the 1980s.

#### *Low Costs of Firm Creation*

To be significant, these advantages have to weigh favorably against the costs of fragmentation, and this is really where construction seems to differ from other activities. Labor and tax advantages of small enterprises are common to all industries, but construction is peculiar in its cost of establishing new firms. This cost is unusually small because, first, the essential resource necessary to create a small construction firm is the technical capability for a particular building activity. Many technicians and even workers (craftsmen) in the industry are in possession of these abilities so they can create their own firm.<sup>48</sup> Financial resources are not a constraint because the product is a good real warranty for debt. Second, specificity of human capital is low compared with other industries, which facilitates the mobility of labor. Consequently, business ventures, mainly by the construction workers themselves, are relatively riskless, enhancing the continuous incorporations and liquidations of firms. It is not coincidence that the

<sup>47</sup> See OECD (1992, pp. 172–173) for further details.

<sup>48</sup> For example, a study in Asturias, Spain, of 150 construction firms that was designed to improve industry competitiveness has highlighted the lack of management training in small entrepreneurs because their backgrounds were working as *foremen, bricklayers, or carpenters* (i.e. craftsmen) [Fundación Laboral de la Construcción (Labor Foundation of the Construction Industry) (1997)].

number of incorporations minus the number of liquidations is the highest in the economy (Table 5).

## VI. Concluding Remarks

Altering the membership of the team, estimating the marginal productivity of each participant, and apportioning individual rewards are three of the main tasks of the entrepreneur in the classic firm. Our analysis of Spanish construction firms shows that when the institutional constraints—labor and tax regulations—limiting these functions change, it may be efficient for the entrepreneur to transfer his monitoring position to other team members who are in a better position to perform those tasks. The observed fragmentation of the firms is really a qualitative change in the contractual structure: The same economic activity is now governed by a different organizational mode. The relationships between those possessing such factors are organized less and less by contracts *inside* the firm (employment relationships), which are substituted by contracts *between* legally independent firms (market relationships).

We find that changes in regulation over the last two decades are related to the decrease in the average size of the firm. These changes have affected both the labor market and the tax burden, which modify the relative costs for different kinds of contractual relationships and consequently the contractual structure chosen by contractors. Fragmentation, which is also facilitated by the low cost of firm creation in the construction industry, is the consequence. First, labor regulation has increasingly restricted the variability of wages and the classic ways of adjusting labor resources. Hence, the ability of the entrepreneur to link individual compensation and performance, both in the short and the long run, decreases. This is particularly important in construction because this incentive pattern is very useful in solving moral hazard problems, which are enhanced by the peculiar production technology of building—characterized by the geographical dispersion of the working centers, the heterogeneity of the intermediate activities and crafts, and the variety of the final products. Because market relationships remain unchanged, transforming labor contracts into commercial contracts—i.e., the fragmentation process—is a way of maintaining the safeguards and incentive systems that contractors consider optimal in the new regulatory environment. Consistent with our argument, we find, indeed, a greater degree of entrepreneurial fragmentation precisely in the building activities where direct supervision and, more importantly, the avoidance of moral hazard is more difficult.

Second, changes in tax regulation have increased the burden of taxation, making it profitable for the interested parties to invest more in implementing devices to reduce their tax burden. The fragmentation of large firms into legally independent units is an effective solution, even when these smaller units are not organizationally autonomous. Small firms and the self-employed enjoy some tax advantages and, possibly more important, find it easier to evade taxes and regulations. Again, the consequences of the changes in regulation are especially intense in the construction industry because of the small specificity of the human capital—the core resource in construction—and the low cost of firm creation.

These changes in contractual structure and subsequent fragmentation create private and social costs and inefficiencies. Even if these are beyond the purpose of this paper, they should not escape unnoticed. First, firm division consumes resources in negotiating the sharing of the firm's assets, bonding these agreements, and monitoring their fulfillment. Second, establishing and liquidating legal entities incurs administrative

costs that could be avoided. Third, there is some inefficient risk allocation when risk is held by contracting parties who can, in principle, be considered relatively risk averse because they are self-employed individuals or closed corporations. All these costs are mostly private in character. Therefore, parties have the right incentives to achieve an efficient trade-off. This is not the case of the purely social costs. To the extent that fragmentation avoids socially efficient rules and taxes, it is bound to cause substantial social costs. Among them, and apart from an excessive allocation of resources to lowly taxed and lightly regulated activities, it probably originates negative external effects in the form of legal inequality and disrespect for the law.

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