Spillover effect upon a labor event: an empirical analysis for the Spanish continuous market *

Efecto spillover *ante un evento laboral, un análisis empírico para el mercado continuo español*

Ana María Sabater Marcos **. Universidad Miguel Hernández
Joaquina Laffarga Briones. Universidad de Sevilla

RESUMEN El objetivo de este trabajo es analizar el efecto desbordamiento o *spillover* del Mercado Continuo Español ante la firma de un convenio colectivo a nivel empresa. Empíricamente, para el mercado español, se ha demostrado que un convenio de empresa incorpora información negativa para los inversores por el hecho de que este tipo de convenios sesga al alza los salarios respecto a los del sector, lo que conlleva la venta de los títulos afectados y una caída en su precio. Este trabajo analiza si este evento laboral tiene también contenido informativo para los inversores de las empresas competidoras, es decir, si existe efecto *spillover*. La llegada de la nueva información que contiene la firma del convenio podría afectar a las empresas competidoras de distinta forma dependiendo del sector. Los resultados generales de este trabajo confirman esta hipótesis, si bien se observan reacciones distintas dependiendo del sector al cual pertenezca la empresa y del nivel de concentración de la oferta productiva que posean.

PALABRAS CLAVE Efecto Industria; Negociación Colectiva; Rentabilidades Anormales; Competencia.

ABSTRACT The aim of this paper is to analyse the reaction of the stock prices of competing companies to the signature of a firm-level collective agreement. Considering that this type of agreement slants to the rise the wages of these firms with respect to those of the sector, we have found empirical evidence that, for the Spanish Market, a firm-level agreement incorporates information that could be negatively considered by the investors of the companies which sign own agreement. This would entail a sale of the affected titles whose price would then fall. This paper analyses whether this event affects the stock price of competing companies, that is, whether a *spillover effect* exist. The arrival of the new information inherent in the signature of the agreement could have a different effect on competing companies based on the type of competition in their industry. The general results of this paper confirm the *spillover effect*, although different reactions are observed depending on the industry to which the company belongs and their level of concentration.

KEY WORDS *Spillover Effect;* Collective Bargaining; Abnormal Returns; Competition.

1. INTRODUCTION

Business profitability has been a constant concern in economic research, which has basically examined parameters and factors involved in profitability, concentrating on the

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** Author contact: Ana María Sabater Marcos, Tfno: 96665 8884. E-mail: asabater@umh.es.

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characteristics of the company or on the structure of the market. Nevertheless, collective bargaining has seldom been considered as decisive in terms of profitability (1).

Many labor market analysts agree on the impact that the structure of collective bargaining may have in fixing wages and in productivity. These aspects can have significant the evolution of company earnings. However, it is not generally easy to explain variations in profitability through variations in wages or productivity. This influence is better analyzed measuring the impact that negotiation of a labor agreement has on company value.

Collective bargaining in Spain is characterized by a widely used system based on a two-level negotiation: bargaining at firm level and at industry level. Sector-level collective bargaining establishes the lower limits applicable to every worker within a specific sector in terms of labor and economic conditions. The company may, on its turn, voluntarily improve the conditions set up for the sector agreement and, thus, supersede them (2). Bronars and Deere (1994) for the American market, and Inurrieta (1977b), Sabater and Laffarga (2006) for Spain, have shown that the signature of a firm level collective agreement brings about a fall in stock prices and minor volatility the days around the event. This reaction is justified because the wage increase derived from this type of agreements increases staff expenses as well. This fact can reduce the value of future cash flow, with a subsequent loss of wealth for the investor. If this situation takes place, it means that investors consider labor relations within the company with particular emphasis on the collective negotiation.

Bentolila *et al.* (1996) indicated that the effects of collective bargaining in some companies are projected outside the firm itself and have strategic effects on the market for goods as well as in the fixing of wages within the sector. These strategic effects depend, in essence, on the different asymmetries between companies and should be reflected in the relative value of the company.

This study aims at analyzing whether the signature of a firm level collective agreement also provides information for the investors of the competing companies; that is, if there is a *spillover effect*. The specific goal is to show whether a company signing its own agreement induces changes in stock prices of competing companies. *Spillover effect* on the Spanish Stock Market are analyzed with respect to this type of labor events.

The main contribution of this study is to be found in the analysis of the direct impact that union negotiation power may exert, upon the signature of a company agreement, on the stock price of the competing companies. Moreover, the analysis is also linked to the degree of concentration in the production supply of each sector. By doing so, we avoid the need to model production functions which, in their dynamic version, reflect adjustment costs of the different productive factors.

Our results provide evidence on the existence of abnormal returns of different nature and magnitude depending on the sector analyzed: everything depends on the specific charac-

(1) Lindenberg and Ross (1981), Hirschey (1985).
(2) Jimeno and Rodríguez (1996) found out that companies with their own bargaining agreement paid a 5% premium while other firms regulated only by the sector agreement did not.

teristics of the sector as well as on the level or degree of concentration of its productive supply.

The remainder of the paper is organised as follows: The second section of the study presents the empirical evidence and the development of the hypotheses. In the third section, data collection is presented by means of a descriptive analysis of accounting and financial variables from companies with signed agreement and their competitors. The degree of concentration of the sectors to which the companies of the sample belong to is also calculated in this section. The fourth section reflects on the methodology and the different results obtained in value variation of companies with agreement and their competitors; after establishing the existence of different reactions in returns, the fifth section studies whether the change in expectations for investors is influenced by company factors, that is size, annual earnings and industry effect; finally, section six presents the conclusions.

2. EMPIRICAL EVIDENCE AND DEVELOPMENT OF THE HYPOTHESIS

Although there is ample bibliography on *spillover effect*, it has mainly been concerned with the overflow effect produced by research and development as shown by Bernstein and Nadiri (1988), Griliches (1992), Mamuneas (1999), Park (1995) or Crespo *et al.* (2004), among others.

There has been little empirical evidence used to analyze *spillover effect* in a context of collective bargaining. There are two types of studies: those which analyze the direct influence on the wages of competing companies; and a second group focusing on the price variations of competing companies around the date of publication of the announcement. With a focus on the American Market, Freeman and Medoff (1981) and Pencavel (1991) analyze what happens to wages of competing companies when one of them implements an increase. Freeman and Medoff (1981) calculate *spillover effect* on wages in the manufacturing industry, from 1973 to 1975, by measuring the existing correlation between wages of companies with union presence and those without. No significant repercussion is found. However, Pencavel (1991) does show existence of certain *spillover effect* in the negotiation power of a company over the wages of the competition.

The measurement of *spillover effect* over stock price has been studied by Bronars and Deere (1994). From results obtained by Ruback and Zimmerman (1984), Bronars and Deere estimate the impact that requests made by union representatives to the National Labor Relations Board has on competing companies quoted on NYSE. The results show a negative 0,72% *spillover effect*. The authors conclude that greater union power in a company with less market value is compatible and it does not purport an increase in labor costs for the competition. The explanation lies in the possibility of implementing anti-union strategies on the part of the employers in order to compensate for the foreseeable wage increases. This possibility in the Spanish case is not institutionally viable.

Jimeno and Rodríguez (1996) argue that there are sectors more prone to sign company agreements. This may either be because of union tradition or because of greater sector concentration, which favors a greater possibility to obtain profit through the negotiation. Salinger (1984) and Inurrieta (1997a) point that such sectors are most penalized by the

market, since collective negotiation at company level has a major (negative) effect in those sectors where a greater volume of profit can be obtained. With the use of the CAPM model and providing annual data, Inurrieta (1997a) indicates that, in the Spanish case, collective negotiation in a company reduces returns of competing companies within more concentrated sector in a 0.2 percent. According to the author, a possible explanation for this figures is that when a company signs its own agreement in a highly concentrated sector, optimal balance for the rest of the employees of the rest of companies can only be achieved by also signing company agreements; profit of these companies subsequently falls. Another possible explanation for this, always according to Inurrieta (1997a), could be found in the show effect, especially in highly-concentrated sectors, in which the leading company has its own company agreement and the other companies reproduce such a situation.

As a point of departure, then, if we consider that when a company signs a collective agreement brings about an effect that reaches out to the other companies in the sector, it is possible to wonder if all sectors would react similarly. Since a company agreement modifies wages and work conditions with an upward tendency, we could expect a possible correlation (sign beforehand ambiguous) between the structure of the negotiation of any company and the profit of competing companies. Bronars and Deere (1994) indicate that sign and magnitude of the *spillover effect* will a priori depend on the degree of concentration within the sector.

In this sense, it would be reasonable to expect a negative *spillover effect* when the signature of a company agreement provokes a revision of wages also in competitors. This situation occurs in highly-concentrated sectors in which the company signing its own agreement is the sector leader, or behaves as it were. Subsequently investors of competitors are concerned their employees would consider the situation of the leading company a justification to demand better wages or even to propose the signature of a company agreement. Hence our first hypothesis:

H_1: The sectors with greater concentration level of the productive supply experience a negative *spillover effect*.

Moreover, if we suppose benefits of companies represent a decreasing function of the product level of their competitors, as Inurrieta (1997a) argues: any variable modifying the production level of company *i* (and wages can modify it) must have an impact on the benefits (and therefore on the stock returns) of companies within the same sector. A positive *spillover effect* could be expected in sectors with a market proportionally distributed among companies. In these sectors, labor costs increase as a consequence of the agreement causes an increase of production costs, which implies a loss of market quota. Competing companies benefit from this loss. Thus, the reaction expected in investors of competing companies should be positive. Then, our second hypothesis:

H_2: Sectors with smaller level of concentration of the productive supply experience a positive *spillover effect*.

Previous empirical studies, Inurrieta (1997b) or Sabater and Laffarga (2006) have demonstrated that the signature of this type of agreement has a significant and negative impact on

the market. It has also been shown that, up to now, reaction of the rival company is always inferior to the one of the signatory company. We, therefore, raised our last hypothesis:

H_3: The average return of a portfolio comprising by shares of competing companies is higher than the returns of a portfolio comprising shares of a company which has signed an agreement.

3. RESEARCH DESIGN

3.1. SAMPLES

In order to carry out the analysis of *spillover effect* we need to obtain two samples, composed by companies with their own agreements and another comprising their competitors.

Our main sample covers companies quoted on the Spanish Continuous Market that signed a firm-level collective agreement between 1995 and 2002. First, we obtained the 230 firm-level collective agreements signed in companies quoted on Spanish Continuous Market from the Collective Agreement Register. As time 0, or zero moment, *i.e.:* the date on which the signature is known to the market, we chose the date on which the firm-level agreement was signed. In order to verify whether the date selected as zero moment was correct, we conducted a data search for when the events were published in the economic press. The search was conducted in the Baratz database of economic press and in the website of the National Stock Market Commission (CNMV) [(3)]. We found that the announcement of the agreement is published on the very day the agreement is signed, which confirms the validity of the date selected.

In order to test for abnormal behaviour in the returns of the companies, we then selected the length of the event window. We considered the five days before and after the zero moment due to the fact that, although most information on collective agreements is usually quickly incorporated into stock prices, information may sometimes leak out before formal publication, or publication may be delayed.

We excluded from the sample announcements in whose event window announcements were made on other relevant events for the company, such as mergers, splits, equity issues or dividend announcements, among others. This allowed us to measure only the effect of the new agreement; excluding, also, any potential confusing effects.

The sample remaining after these exclusions consisted of 84 firm-level collective agreements related to 40 companies over a period of 8 years, 1995-2002 [(4)]. The companies were classified by sector according to the National Classification of Economic Activities (CNAE-93). There was a two-digit breakdown level. The industries are $S1$ = Food and beverage; $S2$ = Paper products; $S3$ = Petroleum, refined petroleum products and processing of radioactive materials; $S4$ = Chemical products; $S5$ = Non-metallic mineral products;

(3) The Spanish SEC.
(4) Agreements may be signed every two or three years, that is why a company can sign more than one agreements for the period under study.

*S*6 = Basic Metal; *S*7 = Industrial machinery; *S*8 = Electronic material; *S*9 = Electric Power; *S*10 = Trade and other services; *S*11 = Transport and communication; *S*12 = Financial.

The next step in the analysis of the *spillover effect* requires a sample composed of competing firms, i.e.: for each date and company signing a firm-level collective agreement, we obtain competing companies in the same industry, they had a two-digit CNAE breakdown level, and quoted on Spanish Continuous Market, but not experiencing the event, i.e.: not having signed a firm-level collective agreement. For greater robustness in the results, we consider as competing firms companies not signing a firm-level collective agreement and not undergoing conversions, equity issues, mergers, splits or others events, as these could contaminate results. Total is 447 elements distributed among the different sectors of study, and corresponding to 97 competing companies [(5)].

The first panel in Table 1 indicates the distribution per year and sector of the companies with agreement, and the second panel displays the distribution of the sample of competing companies.

TABLE 1

SAMPLE DISTRIBUTION AMONG YEARS AND SECTORS

Distribution of firm-level collective agreements or events per year and industry and competing sample per year and industry. The industries are *S*1 = Food and beverage; *S*2 = Paper products; *S*3 = Petroleum, Refined petroleum products and processing of radioactive materials; *S*4 = Chemical products; *S*5 = Non-metallic mineral products ; *S*6 = Basic Metal; *S*7 = Industrial machinery; *S*8 = Electronic material; *S*9 = Electric Power; *S*10 = Trade and other services; *S*11 = Transport and communication; *S*12 = Financial.

PANEL A. EVENT SAMPLE									
Industry/Year	1995	1996	1997	1998	1999	2000	2001	2002	*Total*
*S*1	1	1	1	0	0	1	1	1	6
*S*2	1	0	0	0	1	0	2	0	4
*S*3	2	2	1	1	0	1	0	0	7
*S*4	3	1	1	0	1	0	0	0	6
*S*5	4	1	0	0	0	0	0	0	5
*S*6	0	0	0	0	0	2	0	0	2
*S*7	1	0	2	1	1	1	1	0	7
*S*8	1	2	1	2	1	0	2	0	9
*S*9	1	4	3	2	2	0	2	2	16
*S*10	1	1	0	1	0	1	1	0	5
*S*11	0	0	2	3	2	2	1	2	12
*S*12	1	1	1	0	1	1	0	0	5
TOTAL	16	13	12	10	9	9	10	5	84

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(5) A company may be the competitor of several other companies in the sector.

TABLE 1 (cont.)

SAMPLE DISTRIBUTION AMONG YEARS AND SECTORS

Distribution of firm-level collective agreements or events per year and industry and competing sample per year and industry. The industries are *S*1 = Food and beverage; *S*2 = Paper products; *S*3 = Petroleum, Refined petroleum products and processing of radioactive materials; *S*4 = Chemical products; *S*5 = Non-metallic mineral products ; *S*6 = Basic Metal; *S*7 = Industrial machinery; *S*8 = Electronic material; *S*9 = Electric Power; *S*10 = Trade and other services; *S*11 = Transport and communication; *S*12 = Financial.

PANEL B. COMPETING SAMPLE									
Industry/Year	1995	1996	1997	1998	1999	2000	2001	2002	*Total*
*S*1	3	7	6	0	0	7	7	5	35
*S*2	4	0	0	0	4	0	8	0	16
*S*3	3	4	2	3	0	1	0	0	13
*S*4	7	5	4	0	6	0	0	0	22
*S*5	9	10	0	0	0	0	0	0	19
*S*6	0	0	0	0	0	7	0	0	7
S7	7	0	10	6	5	9	8	0	45
S8	9	10	11	9	6	0	9	0	54
S9	5	24	14	11	7	0	10	13	84
S10	6	7	0	7	0	6	5	0	31
S11	0	0	12	11	10	8	6	8	55
S12	17	14	13	0	11	11	0	0	66
TOTAL	70	81	72	47	49	49	53	26	447

The first panel in Table 1 corresponds to the group of companies with company agreement. It is worth mentioning that, for the period under study, a 20% of the total agreements signed took place in 95, whereas only a 5% appears for 2002 (6). The rest of the period displays an average of 10 company agreements per year. If we pay attention to sector distribution, we can find that Electric power and Trade and Electronic material show the highest number of agreements.

With regard to the sample of competing companies, there more instances documented for the analysis of the *spillover effect* in the sectors of Industrial machinery, Electronic material, Electric power, Transport and communication and financial. In the rest of sectors, the sample ranges between 15 and 30 instances by sector. Because of this, as will be shown, the non-parametric technique *bootstrap* has been used in order to solve the statistical problem of a reduced number of instances.

3.2. DATA, VARIABLES AND DESCRIPTIVE ANALYSIS

In order to analyze the impact of the event on returns, daily returns data of companies from both samples was collected for the period 1-2-1995 to 12-31-2002. IBEX-35 is used as a proxy for the market portfolio. The data was obtained from the SIBE database.

In order to assess whether there is a consistent relationship between abnormal returns of competing companies and their company characteristics we used industry specific, dummy

(6) The difference in number of agreements signed for every year may be no mean that there were less of them, the number may be the result of the filter used for the sample.

variables. Other variables are also used like company size, measured as market capitalization and obtained from *Compustat*. Other variables and data collected come from annual audit reports: number of employees, labor cost by employee and results for the year.

If we are to expect that the sign of *spillover effect* varies according to the degree of concentration of the sector, some premises apply: that the leading company is the largest company, the one with a greater quota of participation on the rest, the one with greater operational income, the one with more prestige. For this reason it seems interesting to examine the most significant differences in some variables, as documented in companies with agreement and competing companies. In order to do, the following variables were selected: size, number of employees, labor cost by employee and annual earnings. All of these variables are from the year the company agreement was signed. Means analysis is carried out and significance for the *t* statistical is provided.

If compared to competing companies, the magnitude and significance of the variable size shows that, in terms of market capitalization, greater companies with company agreement belong to the following sectors: Paper industry, Chemical Industry, Basic Metal, Transport and communication and Financial. Conversely, in Trade and other services, greater companies belong to the group of rival companies.

If we consider the variable *number of employees*, results are similar to those referring to size. In fact, number of employees is a variable which previous research has used as proxy for company size.

TABLE 2

DESCRIPTIVE ANALYSIS OF FINANCIAL AND ACCOUNTING, VARIABLES FOR COMPANIES WITH FIRM-LEVEL AND COMPETING SAMPLE

Averages of certain financial and accounting variables in event sample (*M*1) and competing sample (*M*2).

INDUSTRY	*Simple*	*Size*	*Employment*	*LC/employ*	*Annual earnings*
*S*1. Food and beverage	*M*1	189.64	2258.20	45.80*	24019.25
	*M*2	288.72	3398.22	36.83	25161.44
*S*2. Paper products	*M*1	901.39**	1591.75	45.00***	51875.57***
	*M*2	106.38	2748.60	29.30	-4150.74
*S*3. Petroleum. refined petroleum and radioactive.	*M*1	6287.12	14996.43	40.71	593065.78
	*M*2	6561.24	13580.50	40.38	433411.44
*S*4. Chemical products	*M*1	12173.52***	1175.50	45.00	44570.71***
	*M*2	102.48	984.75	39.50	8572.19
*S*5. Non-metalic- mineral products	*M*1	542.68*	2710.40	70.80**	54983.40***
	*M*2	132.29	535.33	30.00	13788.57
*S*6. Basic metal	*M*1	1126.25**	16073.00**	38.00	375360.00***
	*M*2	386.54	1575.67	33.50	56188.96

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TABLE 2 (cont.)

DESCRIPTIVE ANALYSIS OF FINANCIAL AND ACCOUNTING, VARIABLES FOR COMPANIES WITH FIRM-LEVEL AND COMPETING SAMPLE

Averages of certain financial and accounting variables in event sample (*M*1) and competing sample (*M*2).

*S*7. Industrial machinery	*M*1	2174.98**	2150.86	45.17*	44849.14*
	*M*2	136.78	2492.67	31.00	12431.92
*S*8. Electronic material	*M*1	307.47	1970.75*	31.38	6416.89**
	*M*2	520.47	3443.43	33.29	19611.22
*S*9. Electric power	*M*1	5436.64	5651.00	49.50	291958.79
	*M*2	6091.16	8534.62	45.23	330380.69
*S*10. Trade and other services	*M*1	339.74***	2060.20**	24.20*	22629.89*
	*M*2	1119.02	10103.14	17.00	64677.89
*S*11. Transport and communications	*M*1	29388.29***	60417.25**	38.75	987748.10***
	*M*2	3990.32	3113.80	39.30	-60972.10
*S*12. Financial	*M*1	15993.92**	32668.4***	67.67**	968871.08***
	*M*2	1994.71	3024.76	39.53	82729.62

Size: Market capitalization Million €; Employment: Number of employees the year of the agreement; Labour costs/number of employees in thousand €; Earnings: annual earnings in million €.; The industries are *S*1 = Food and beverage; *S*2 = Paper products; *S*3 = Petroleum, Refined petroleum products and processing of radioactive materials; *S*4 = Chemical products; *S*5 = Non-metallic mineral products; *S*6 = Basic metal; *S*7 = Industrial machinery; *S*8 = Electronic material; *S*9 = Electric power; *S*10 = Trade and other services; *S*11 = Transport and communication; *S*12 = Financial.

* Significantly different at 10%; ** Significantly different at 5%; *** Significantly different at 1%.

As advanced in the introduction, collective bargaining in Spain is characterized by a widely used two-level negotiation, sector and company level. Firstly, sector agreement is negotiated. The company may voluntarily on its turn dissociate itself from the agreement and sign its own labor and economic conditions in a company agreement. Besides improving economic conditions, a company negotiation essentially provides exclusive conditions for its workers. This is particularly the case in sectors in which very different companies (in terms of size, for example) coexist, and the sector agreement is not always suitable for all of them. Those companies without a company agreement are regulated by the sector agreement by default. It is worth emphasizing that sectors like Food and beverage, Petroleum, refined petroleum products and processing of radioactive materials do not have sector agreement; all companies have their own agreement. As can be seen in Table 2, values of these sectors, in which all companies have their own agreement, indicate that no significant differences between both groups of companies exist. The competing companies group is composed by those which, in spite of having their own agreement, have not signed any that year.

Conversely, we found all financial organizations regulated by the sector agreement in the financial sector. Those companies which dissociate themselves from the sector agreement and pact their own conditions are bigger companies, with a greater number of employees and a better financial position than their competitors.

Among the labor and economic conditions negotiated in agreements, wage increase is most important. In order to check that the increase in labor costs in companies signing this type of agreements is not simply due to an increase in the number of employees, the variable labor cost by employee is analyzed. If Table 2 is considered for the majority of sectors,

labor cost by employee is greater in companies with firm-level agreement. In particular, it is significantly greater for companies in the sectors of paper, non-metallic mineral products, trade and financial.

If we pay attention to earnings, the positive difference in favor of the companies with firm-level agreement indicates that they have better results, in spite of the labor cost increase by employee. If compared to competitors, companies with a firm-level agreement, in particular, paper, chemicals, other non-metal products, basic metal, transport and finance companies display greater accounting returns. It should be emphasized that the biggest companies with higher earnings are, for unions, the target to get profit from in internal negotiations (also in Jimeno and Rodriguez, 1996).

3.3. Concentration indices

In this paper, the concentration level of the productive supply is going to be calculated for the different sectors represented in the companies sampled for 1995-2002.

The degree of concentration of the market supply in the different economic sectors provides valuable information to determine the degree of competition in the sector.

By measuring the concentration level, we try to ascertain to what extent the activity in a sector is controlled by just a few companies. The degree of concentration of a sector depends on two variables: total number of companies in the sector and difference in size, as defined by number of employees and production. Thus, the more concentrated an activity is the fewer the companies in the sector or the more difference in size there is among them.

In order to measure concentration a great number of indices, usually refer to as like concentration indices, have been developed. Among the best known indices, we may for example refer to: Entropy Index, Exponential, Herfindahl, Standard Herfindahl, Gini and Lorenz's Curve Index. These indices of concentration display different factors; this is the reason why the use of one of them depends on the event under study.

Company size can be assessed in terms of production or number of employees. Different factors have been suggested: sales volume, added value, number of employees, capital and assets. According to Michelini and Pickford (1985), the use of one factor over another has an effect on the value of the measurement. It has been statistically shown by Bailey and Boyle (1971) that there is a strong correlation among the different concentration rates obtained from the different variables. Thus, choosing variable to the detriment another will add no relevant information unless the goal is to establish a comparison. In spite of this fact, the variables used the most are sales volume and employment; this is fundamentally due to the little difficulty data collection entails. For the purposes of this article, number of employees has been selected measure of the size. In addition, taking into consideration the direct relation between employment and added value, the use of employment data to calculate the concentration indices is appropriate.

Several studies analyze concentration of the industrial sectors in Spain from the Sixties with data from different sources, the use of different units of analysis, and different types of

measurements. Within this body of research, we may find García Durán (1976), Maravall (1976), Aguiló (1979), Escorsa and Herrero (1982), La Fuente y Salas (1983), Mato (1986), Segura (1989), Pablo (1995), Rodriguez Romero (1996) and Buesa and Molero (1998).

With respect to the service sector, and due to the difficulty to collect the necessary data, the only research which has measured the degree of concentration are the articles by Bajo and Salas (1998), Núñez (2000) and Núñez and Pérez (2001).

The concentration indices reflect the concentration degree in a specific sector. On the one hand, these indices take as a reference market share of in the sector defined as $S_i = \frac{\chi_i}{\sum_1^N \chi_i}$

where X_i is the added value, or employment of company *i*; and on the other hand, the concentration curve, which successively accumulates market share of all the companies ranked, in terms of size, in a decreasing order. Thus, the concentration indices depend on the two variables defining them: number of companies and the degree of inequality in size. However, these two variables are given different the weight in the different indices, so the arrangement of the sectors may vary according to the index being used.

In this paper, we have used, two ratios of concentration *CR(k)* based on the market share only in the hands of the dominant companies in the sector. They are defined as market share representing the K major companies. The companies are classified in decreasing order according to their participation in the sector. Thus, we consider $K = 5$ and $K = 10$.

$$\text{CR (k)} = \sum_{i=1}^{k} S_i^2 \tag{1}$$

On the other hand, since these ratios only consider the participation of the K major companies, Herfindahl concentration index has been used, because it takes into account participation of all the companies in the sector (N). It is defined as:

$$H = \sum_{i=1}^{N} S_i^2 \tag{2}$$

Herfindahl index takes the maximum value 1 in case of a monopolistic industry, and minimum value 1/N in the case of *N* equal companies. Market concentration and competitiveness are closely related. Since concentration is associated to monopoly power, the more concentrated a market is, the more its operation is of a monopolistic type; and the less concentrated the more competitive its operation [(7)].

For the calculation of the concentration indices for the years 1995, 1996, 1997, 1998, 1999, 2000, 2001 and 2002, we have used the company directory of the National Institute

(7) See Schmalensee (1977), Encaoua and Jacquemin (1980), Baumol *et al.* (1982), Clark andy Davies (1982), Hirschey (1985), Jaumandreu and Mato (1985), Jaumandreu (1987), Scherer and Ross (1990), Schmalensee (1992), Gandoy (1988), and Martin (1993).

for Statistics (INE). Data related to number of companies and employees for the different sectors is taken from INE, with a two-digit breakdown level from the National Classification of Economic Activities of 1993 (CNAE-93) and in twelve types:

- Companies with no employees.
- Companies between 1 and 2 employees.
- Companies between 3 and 5 employees.
- Companies between 6 and 9 employees.
- Companies between 10 and 19 employees.
- Companies between 20 and 49 employees.
- Companies between 50 and 99 employees.
- Companies between 100 and 199 employees.
- Companies between 200 and 499 employees.
- Companies between 500 and 999 employees.
- Companies between 1000 and 4999 employees.
- Companies with more than 5000 employees.

There is, therefore, available information about number of companies and employees for each size.

In order to calculate the concentration indices from this information, two assumptions have been made: first of all, companies with no employees are those of self-employed workers, so one worker is assigned for every company. Secondly, for each type of company, it has been assumed the same number of employees, which is also equal to the average number for the whole type (8). Therefore, companies of the same type and sector are of the same size: it is the result of dividing total number of employees in the type by the number of companies (9).

Three concentration indices have been calculated: CR (5), CR (10) and Herfindahl. These indices have been calculated for the different sectors represented by the sampled companies, with a two-digit breakdown level with respect to the CNAE-93. Results appear in Table 3.

The concentration indices calculated for each sector of activity represented in the companies of the sample can be checked in panel A, Table 3. If the different concentration indices are considered, CR (5) and CR (10) on the one hand and Herfindahl on the other, it follows that the arrangement of sectors based on the concentration degree is relatively independent from the index used. In order to compare the results obtained among the different sectors, the average for each of three concentration indices displaying similar results, CR (5), CR (10) and Herfindahl has been calculated. This solves the little differences resulting from the application of the different indices.

(8) See Núñez and Pérez (2001).
(9) This assumption undervalues the concentration level. However, as prior evidence shows, errors resulting from implementing this assumption after a sensitivity analysis are minor; and the relative order of sectors by concentration level is not changed much.

TABLE 3
TWO-DIGIT CONCENTRATION INDICES FOR INDUSTRIES REPRESENTED BY COMPANIES IN SAMPLE
AVERAGE FOR YEARS 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002

In the first and second column, Panel A shows the results corresponding to the degree of concentration of the productive supply of the 5 and 10 biggest companies in each sector, respectively. The third column shows Herfindahl index. Panel B classifies the sectors from lower to higher degree of concentration based on the average from the three calculated indices.

PANEL A. INDUSTRY	*CR* (5)	*CR* (10)	*Herfindahl*
*S*1. Food and beverage	0.030	0.054	0.001
*S*2. Paper products	0.160	0.332	0.667
*S*3. Petroleum. refined petroleum and radioactive	0.879	0.982	0.237
*S*4. Chemical products	0.408	0.305	0.027
*S*5. Non-metalic- mineral products	0.069	0.091	0.001
*S*6. Basic metal	0.189	0.296	0.014
*S*7. Industial machinery	0.352	0.347	0.206
*S*8. Electronic material	0.048	0.095	0.005
*S*9. Electric power	0.417	0.636	0.056
*S*10. Trade and other services	0.009	0.027	0.0002
*S*11. Transports and communications	0.868	0.941	0.629
*S*12. Financial	0.456	0.571	0.133

PANEL B. INDUSTRIES ORDERED FROM LOWER TO HIGHER DEGREE OF CONCENTRATION	*AVERAGE*
*S*10. Trade and other services	0.0120
*S*1. Food and beverage	0.0283
*S*8. Electronic material	0.0495
*S*5. Non-metalic- mineral products	0.0539
*S*6. Basic metal	0.1677
*S*4. Chemical products	0.2473
*S*7. Industial machinery	0.2986
*S*9. Electric power	0.3697
*S*2. Paper products	0.3796
*S*12. Financial	0.3845
*S*3. Petroleum. refined petroleum and radioactive.	0.6993
*S*11. Transports and communications	0.8098

Thus, Panel B of Table 3 shows activities classified according to their degree of concentration, from lower to higher degree, resulting from the calculated average. Thus, sectors displaying a lower concentration level and, therefore a more competitive market structure are Food and beverage, Trade and other services and Electronic material. Conversely, the sectors displaying a monopolistic competition are those with greater concentration indices, like for example, Transport and communication, Petroleum, Refined petroleum products and processing of radioactive materials and Financial.

4. *SPILLOVER EFFECT*

4.1. Methodology

As already mentioned in the introduction, our objective here is to verify whether collective bargaining the firm level has an impact its stock returns of event and those of competing companies. For this purpose we will use the Event Study approach (10).

Since stock prices should reflect the intrinsic value of a company and are expected to change immediately in response to any event that may potentially affect the firm's future cash-flows, we can measure the impact on corporate value of a given event by observing stock price changes over a very short time period around the date of the event. The first variable is the abnormal return observed for the firm and its competitors, around the date of the event. Based on the market model.

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \tag{3}$$

where R_{it} is the return of company i on day t; R_{mt} is the return of the market portfolio on day t; α_i is the expected return of company i, which is independent from the market; β_i is the sensitivity of the return of company i to changes in market return; and ε_{it} is a random perturbation.

This equation allows us to calculate daily abnormal returns (AR_t) for each on company:

$$AR_{it} = R_{it} - (a_i + b_i R_{mt}) \tag{4}$$

where a_i and b_i are the LS estimates obtained in regressions (3) using a period before the announcement of 145 days, an appropriate period of time for estimating the parameters according to available empirical evidence on event study (11). Parameters are estimated by LS (12).

Abnormal returns from stocks are averaged in a cross section across each day of the event window or study window, giving the average daily abnormal returns $AR_t = N^{-1} \sum_{i=1}^{N} AR_{it}$.

Considering that the market may anticipate information regarding the event or that delays may occur in its announcement, we have an event period of 11 days around the date the collective agreement is signed, from day $T_1 = -5$ to day $T_2 = +5$. For a more comprehensive analysis we calculated the cumulative abnormal returns for the period (t_1, t_2) in order to find the cumulative effect of the event.

$$CAR(t_1, t_2), = \sum_{t=t_1}^{t_2} AR_t \tag{5}$$

(10) For further information on the Event Study methodology see Ball and Brown (1968) and Fama, Fisher, Hensen and Roll (1969).

(11) For the collective agreements signed in the first months of 1995, we have used the daily performance of 1994 to complete the estimation period of 145 days prior to the event window.

(12) Parameters α and β have also been estimated with Theil's non-parametric technique and the same results were obtained.

If the signature of a firm-level collective agreement conveys new information to investors, the expected value of abnormal returns must be significantly different from zero. In order to test this hypothesis we use Corrado's test (1989) and the *bootstrap* technique. An analysis of the behaviour of abnormal returns in the study window indicates that some of the distributions are slightly biased and show leptokurtosis. Indeed, Jarque-Bera's test does not validate the normal distribution of the sample; and therefore, the proposed hypothesis must be tested using a non-parametric test consistent with absence of a normal distribution, such as the Corrado test (1989). As opposed to parametric tests, the Corrado test makes no pre-assumption regarding the distribution of returns, and is adapted to correct for infrequent trading (Corrado and Zivney, 1992). The expression of the statistic is as follows:

$$\frac{\frac{1}{N}\sum_{i=1}\left[k_{it}-\frac{1}{2}(\tau+1)\right]}{S(K)}=\frac{\frac{1}{N}\sum_{i+1}^{N}\left[k_{it}-\frac{1}{2}(\tau+1)\right]}{\sqrt{\frac{1}{\tau}\sum_{t=1}^{\tau}\left[\frac{1}{N}\sum_{i=1}^{N}\left[K_{it}-\frac{1}{2}(\tau+1)\right]\right]^2}} \qquad (6)$$

where k_{it} is the rank allocated to the abnormal returns for stock i on day τ, τ is the number of days in the estimation and event period and N is the total number of cases.

Additionally, this study incorporates a further non-parametric test based on the *bootstrap* methodology, and consisting of obtaining the empirical distribution of the target variable and testing its significance based on the simulated distribution. The distribution of the conventional t statistic is simulated in order to obtain critical values from the simulated distribution. In order to obtain the empirical distribution M = 10.000 sub-samples are subtracted with replacement of size N_i = 100% of the original sample $\{X_i: i = 1,\ldots..,N\}$:

$$\{X_{b,i}: i = 1,\ldots,N_b\} \text{ for } b = 1,\ldots,M$$

The following statistic is calculated for each sub-sample:

$$t_b = \frac{\overline{X_b} - \overline{X}}{\hat{\sigma}(Xb,i)\sqrt{N_b}} \qquad \text{for } b = 1,\ldots,M \qquad (7)$$

where $\overline{X_b}$ and $\hat{\sigma}(X_{b,i})$ are the mean average and standard deviation of sub-sample b.

Following this process, if the number of extracted sub-samples M is high, we obtain a sample of *bootstrap* statistics $\{t_b: b = 1,\ldots,M\}$ large enough to obtain the empirical distribution of the conventional t statistic. Using the percentiles of this distribution we can establish the acceptation and rejection regions. Thus, the critical values X_L and X_u for an α significance level (bilateral contrast) will be those for which:

$$Pr(t_b \le X_L) = \Pr(t_b \ge X_u) = \frac{\alpha}{2} \qquad (8)$$

the null hypothesis will be rejected if $t \le X_L$ or $t \ge X_u$.

In order to analyse the robustness of the results obtained in the event study, we have added to the traditional methodology an alternative filter for the identification of economically significant abnormal returns (13). We consider as atypical performance those abnormal returns that fall out of the internal range, comprising two standard deviation, above and below the abnormal returns calculated over the 145-day period prior to the event. Normal returns are computed based on the market model for the calculation of abnormal returns. We consider those that fall out of the range to be significant and test the significance of the selected abnormal returns using Corrado's non-parametric test. The results are the same as in the traditional methodology (14).

4.2. EFFECT ON THE COMPANIES WITH FIRM LEVEL AGREEMENT OR EVENT SAMPLE

The evidence found through the analysis of changes in stock prices of companies signing a firm-level agreement is that announcing the signature of this type of agreement has a negative and significant impact on stock prices. The results of the significance test of the abnormal returns for the companies that have signed a firm-level agreement appear in Table 4.

TABLA 4
ABNORMAL RETURNS EVENT SAMPLE CORRADO'S TEST (1989)
TECHNIQUE. *N* = 84

DAY	*AR*	*BOOTSTRAP*	CORRADO
-5	-0.0029	-1.308	-1.031
-4	0.0003	0.272	-0.713
-3	0.0005	0.228	-0.120
-2	0.0019	1.096	-0.653
-1	-0.0020	-1.009	-1.809*
0	-0.0028	-2.035**	-1.971**
1	-0.0017	-1.083	-1.375
2	-0.0031	-2.153**	-1.532
3	-0.0001	-0.091	-1.366
4	-0.0030	-1.672*	-1.035
5	-0.0006	-0.285	-0.985

WINDOW	*CAR*	*BOOTSTRAP*	*CORRADO*
(-5,+5)	-0.0135	-2.305***	-2.235**
(-1,+1)	-0.0063	-2.578***	-2.373***

(Continúa pág. sig.)

(13) For this purpose we followed the methodology applied by Ryan and Taffler (2004).
(14) The market model prediction relies on the historical relationship between a firm and the stock market. If news of a collective agreement is leaked to investors during the model estimation period, however, that news will bias the firm's model parameters and, in turn, result in the CARs in response to the announcement being incorrect. Using market-adjusted returns enables the researcher to avoid estimating market model parameters that may be biased by the anticipation or ex-post effect of the labour agreement. Therefore, market adjusted returns were used as well. We obtain the same results as in market model prediction.

TABLA 4 (cont.)
ABNORMAL RETURNS EVENT SAMPLE CORRADO'S TEST (1989)
TECHNIQUE. *N* = 84

WINDOW	*CAR*	*BOOTSTRAP*	*CORRADO*
(-2,+2)	-0.0076	-2.327***	-2.366**
(-5,-1)	-0.0022	-0.325	-1.682*
(+1,+5)	-0.0085	-2.387***	-2.127**

* Significantly different at 10%.
** Significantly different at 5%.
*** Significantly different at 1%.

The first panel shows the abnormal returns for each day in the event window (-5,+5); the third and fourth columns show the results of Corrado's (1989) test and the non-parametric *bootstrap* technique.

The most significant changes in returns take place on the day of the agreement and the previous day. The average abnormal returns on the day of the event is -0.28%, and Corrado's test and the *bootstrap* test both give significant values of -1.97 and -2.03 respectively. Average abnormal returns on the day before the announcement are of -0.20%; this figure is also negative and significant only for Corrado's test. The sharpest reduction in stock prices takes place on day +2 reaching a value of -0.31%, significant for the *bootstrap* test.

The presence of negative abnormal returns on the day before the event seems to indicate information leaks from alternative sources (i.e.: online information), allowing investors to anticipate the information content of labour-related event.

Panel 2 Table 3 summarises the cumulative abnormal returns by means of different windows around the event.

Cumulative average abnormal returns in event window (-5,+5) are -1.35%, highly significant for all the tests used. The same result is observed for windows (-2,+2) and (-1,+1). We also observe significant negative abnormal returns in pre-event windows, such as (-5,-1) with a *p-value* of -1.68, significant for Corrado's non-parametric test, or post-event windows such as (+1,+5), significant for both tests. If we consider the value of cumulative average abnormal returns, we see that the lowest value, i.e.: the period in which stock prices suffer the sharpest falls, is the period between day -1 and day +1. Cumulative average abnormal returns for window (-5,-1) are -0.22%; -0.65% for (-1,+1) and the strongest decrease is for window (+1,+5), accounting for -0.98%, all significant for the *bootstrap* test. If we add more days to the windows, we see that stock prices fall further in post window events, for example (+1,+5), than in window (-5,-1).

The leaking of information before zero moment, as evidenced by pre-event abnormal returns, window (-5,-1) for example, may be due to the fact that in certain bargaining processes, a pre-agreement is reached between trade unions and management some days before signature of the collective agreement and until the final text is drafted, and this may be reported by the media. This would explain market reaction before the event date.

Our findings are consistent with previous research (Ruback and Zimmerman, 1984, for US market; Inurrieta, 1997a, Sabater y Laffarga, 2006 for Madrid Stock Market).

The study was extended to a wider event window —(-30,+30) days— although no significant changes were detected in the margin for window (-5,+5). Therefore, in the days following to the signing, gradually the market incorporates this information into the stock prices. The definition of the window chosen is of the major importance, given that the majority of abnormal negative returns are significantly different from zero in this window. This result supports of semi-strong efficiency in Spanish Stock Market

The results obtained for abnormal returns suggest that investors agree to interpret the information content of the event as bad news and incorporate this information in their decision making process in the days following the signature of a firm-level collective agreement.

4.3. *Spillover effect*. Result by industry

Once the negative reaction of investors of companies with a firm level agreement has been verified, it is possible to consider if this event has also information value for investors of competing companies. In order to do so, we analyze and cumulative abnormal returns of competing companies by sector, for the twelve days in the event window.

Previous work on *spillover effect* shows that the publication of the signature of a company agreement has information value for investors of competing companies. Table 5 shows the results of the significance test of daily abnormal returns for the competing companies, by industry. *Bootstrap* technique and the non-parametric test of Corrado (1989) were used.

Applying Corrado and *bootstrap*, the average abnormal return of the day of the event or zero moment is negative and significant between 5% and 1%, for Paper products, Chemical products, Machinery construction industry, Transport and communications and Financial. For these sectors, significant negative abnormal returns appear around the zero moment, specifically, in days -1, 0 and 1, reaching to -2 and 2 in the financial sector.

Positive daily abnormal returns also appear in the around day of the event for: Food and beverages, Non-metallic mineral products, Electronic material and Trade and other services, with a significance level ranking between 10% and 5% in the tests applied.

Petroleum, Non-metal mineral products, Metal industry, and Electric power do not show statistically significant abnormal returns. This could indicate a specific reaction in these sectors.

Daily analysis of the average abnormal returns shows a priori statistically significant results. Sign and magnitude may vary depending on the sector under study. Hence, and by using the accumulated abnormal magnitudes, we can determine the accumulated effect of the event [15].

(15) With the hope to make data reading easier, Table 6 displays the results of both tests only for the most representative windows of the event period.

TABLA 5

ABNORMAL RETURNS COMPETING SAMPLE CORRADO'S TEST (1989) AND THE *BOOTSTRAP* TECHNIQUE

The table shows daily abnormal returns AR_i in (-5,+5) per industry for competing companies, *bootstrap* statistic and Corrado (1989) statistic

INDUSTRY	*DAY*	-5	-4	-3	-2	-1	0	1	2	3	4	5
*S*1	*AR*	0.002	0.000	0.002	0.003	0.001	0.007	0.002	0.004	0.005	-0.001	0.007
	bootstrap	0.445	1.210	1.289	1.802*	1.928*	1.983**	0.370	1.047	0.883	-0.142	1.062
N = 35	*corrado*	1.209	0.284	1.113	1.789*	1.786*	1.875*	0.433	0.920	0.160	-0.203	1.316
*S*2	*AR*	-0.002	-0.008	0.005	-0.001	-0.004	-0.010	-0.004	-0.007	0.004	-0.004	-0.006
	bootstrap	-0.330	-1.395	0.573	-0.327	-1.998**	-1.967**	-1.902*	-0.866	0.537	-0.713	-0.774
N = 16	*corrado*	-0.483	-0.961	0.600	-0.093	-1.732*	-1.747*	-1.666*	-0.903	0.942	-0.844	-1.225
*S*3	*AR*	-0.002	0.006	-0.002	0.000	0.003	0.000	-0.003	0.006	-0.009	0.003	0.004
	bootstrap	-0.460	1.927*	-0.704	0.008	1.034	0.121	-0.959	1.588	-1.387	0.441	1.791*
N = 13	*corrado*	-0.350	1.518	-0.253	0.759	0.765	0.117	-0.435	1.064	-1.394	0.636	1.342
*S*4	*AR*	-0.021	-0.002	0.004	-0.002	-0.004	-0.008	-0.001	-0.002	-0.005	-0.010	0.007
	bootstrap	-1.759	-0.624	0.266	-0.452	-1.877*	-1.953*	-0.187	-0.379	-0.655	-1.876*	0.514
N = 22	*corrado*	-1.464	-0.373	0.135	-0.029	-1.732*	-1.833*	-0.390	-0.337	-0.327	-1.505	1.112
*S*5	*AR*	0.004	-0.005	-0.012	-0.002	0.008	0.012	-0.001	0.005	0.000	0.007	0.011
	bootstrap	0.505	-1.001	-1.311	-0.584	0.818	1.868*	-0.165	1.135	0.045	2.587***	1.067
N = 19	*corrado*	0.437	-0.826	-0.932	-0.502	0.389	1.960*	-0.656	1.029	0.373	1.823*	0.972
*S*6	*AR*	-0.011	0.001	-0.001	-0.012	-0.002	-0.010	-0.009	0.024	-0.011	0.013	-0.007
	bootstrap	-0.721	0.116	-0.171	-1.467	-0.306	-1.058	-0.466	2.420***	-1.226	1.848*	-0.916
N = 7	*corrado*	-0.029	0.145	-0.012	-1.096	-0.285	-1.261	-0.360	2.501***	-1.319	2.013**	-0.765
*S*7	*AR*	0.004	-0.003	-0.002	-0.006	-0.013	-0.009	-0.002	0.002	0.000	0.004	-0.003
	bootstrap	1.121	-0.515	-0.991	-1.191	-2.438***	-2.365***	-1.947*	0.416	0.080	0.642	-0.695
N = 45	*corrado*	0.636	-0.548	-0.087	-0.740	-3.189***	-2.589***	-1.799*	0.155	0.579	0.999	-1.053
*S*8	*AR*	0.006	0.006	0.017	0.002	0.003	0.005	0.010	0.009	0.002	-0.006	-0.004
	bootstrap	0.742	1.287	2.792***	0.474	0.353	1.751*	1.763*	1.887*	0.214	-1.239	-0.482
N = 54	*corrado*	1.219	1.324	2.628***	0.167	0.751	1.576*	1.675*	1.719*	0.506	-1.558	-1.049
*S*9	*AR*	0.000	0.003	0.000	0.001	-0.001	0.001	0.001	-0.001	-0.001	-0.002	-0.002
	bootstrap	0.148	1.827*	0.601	0.882	-0.216	0.377	0.271	-0.470	-1.490	-1.526	-0.973
N = 84	*corrado*	0.568	1.039	0.186	0.410	-1.036	0.614	0.168	-1.299	-1.235	-1.148	-1.057
*S*10	*AR*	-0.001	-0.005	0.009	0.012	0.013	0.009	0.003	0.002	-0.002	-0.005	0.004
	bootstrap	-0.472	-1.249	3.057***	3.029***	2.020**	1.957*	1.847*	0.517	-0.811	-1.627	0.699
N = 31	*corrado*	-0.938	-1.005	2.762***	2.539***	1.971**	1.805*	1.649*	0.183	-0.242	-1.412	0.183
*S*11	*AR*	-0.003	0.002	0.007	-0.008	-0.009	-0.005	-0.008	-0.001	-0.005	0.005	0.001
	bootstrap	-0.695	0.456	1.512	-2.118**	-3.210**	-1.657*	-1.829*	-0.294	-0.078	1.148	0.126
N = 55	*corrado*	-0.696	0.671	1.042	-1.703*	-2.512***	-1.606	-1.771*	-0.222	-0.059	0.630	0.124
*S*12	*AR*	-0.001	-0.001	-0.001	-0.002	-0.012	-0.016	-0.009	-0.006	-0.002	-0.002	-0.000
	bootstrap	-0.928	-0.963	-1.034	-1.808*	-2.283**	-2.547***	-1.988**	-1.355	-1.177	-1.132	-0.105
N = 66	*corrado*	-0.856	-0.876	-0.988	-1.634*	-2.234**	-2.323***	-1.967*	-1.233	-1.137	-0.989	-1.117

The industries are *S*1 = Food and beverage; *S*2 = Paper products; *S*3 = Petroleum, refined petroleum products and processing of radioactive materials; *S*4 = Chemical products; *S*5 = Non-metallic mineral products ; *S*6 = Basic metal; *S*7 = Industrial machinery; *S*8 = Electronic material; *S*9 = Electric power; *S*10 = Trade and other services; *S*11 = Transport and communication; S12 = Financial.

* Significantly different at 10%; ** significantly different at 5%; *** significantly different at 1%.

In Table 6, the accumulated average abnormal returns through different study windows are considered again for each sector; *bootstrap* and Corrado's non parametric test are applied.

TABLA 6

CUMULATIVE ABNORMAL RETURNS COMPETING COMPANIES. CORRADO'S AND *BOOTSTRAP* TESTS

The table shows cumulative average abnormal returns CAR per industry for competing companies. *Bootstrap* statistic and Corrado (1989) statistic.

INDUSTRY	*WINDOW*	(-5,+5)	(-1,+1)	(-2,+2)	(-5,-1)	(+1,+5)
*S*1 *N* = 35	*CAR*	0.032	0.009	0.015	0.006	0.006
	bootstrap	1.861*	2.294**	1.933*	1.846*	0.949
	corrado	1.810*	1.990*	1.871*	1.780*	0.924
*S*2 *N* = 16	*CAR*	-0.024	-0.016	-0.019	-0.009	-0.017
	bootstrap	-2.011**	16	-1.840*	-0.239	-0.714
	corrado	-1.970*	-2.699***	-1.735*	-0.181	-0.987
			-1.985**			
*S*3 *N* = 13	*CAR*	0.006	0.001	0.007	0.005	0.004
	bootstrap	0.490	0.206	1.262	0.626	0.160
	corrado	1.277	0.124	0.911	1.404	0.704
*S*4 *N* = 22	*CAR*	-0.037	-0.012	-0.017	-0.019	-0.015
	bootstrap	-1.617	-1.969**	-1.698*	-1.230	-0.452
	corrado	-0.629	-1.914*	-1.645*	-0.600	-0.157
*S*5 *N* = 19	*CAR*	0.025	0.018	0.021	-0.008	0.041
	bootstrap	0.935	0.864	1.258	-0.430	1.985**
	corrado	1.226	0.977	0.993	-0.641	2.226**
*S*6 *N* = 7	*CAR*	-0.025	-0.021	-0.009	-0.026	-0.002
	bootstrap	-0.724	-1.190	-0.436	-1.237	-0.508
	corrado	-0.123	-0.900	-0.224	-0.545	-0.198
*S*7 *N* = 45	*CAR*	-0.008	-0.024	-0.016	0.000	-0.021
	bootstrap	-1.732*	-3.586***	-1.688*	-0.921	-1.468
	corrado	-1.703*	-2.931***	-1.870*	-1.095	-1.662*
*S*8 *N* = 54	*CAR*	0.045	0.018	0.028	0.033	0.015
	bootstrap	1.985**	1.263	1.410	1.966**	0.869
	corrado	1.765*	0.808	1.246	2.051**	0.196
*S*9 *N* = 84	*CAR*	0.000	0.002	0.002	0.005	-0.005
	bootstrap	0.054	0.179	0.368	1.333	-1.818*
	corrado	0.842	0.147	0.512	0.522	-1.888*
*S*10 *N* = 31	*CAR*	0.018	0.009	0.011	0.013	0.008
	bootstrap	1.833*	2.383***	2.053**	1.896*	0.289
	corrado	1.986**	2.527***	2.050**	1.657*	0.317
*S*11 *N* = 55	*CAR*	-0.018	-0.016	-0.023	-0.011	-0.015
	bootstrap	-1.651*	-2.792***	-3.633***	-1.168	-0.934
	corrado	-0.760	-1.410	-1.984**	-0.535	-0.731
*S*12 *N* = 66	*CAR*	-0.051	-0.037	-0.045	-0.016	-0.047
	bootstrap	-2.283***	-1.962**	-1.987**	-1.256	-1.688*
	corrado	-2.464***	-2.042**	-2.182**	-1.487	-1.898*

The industries are *S*1 = Food and beverage; *S*2 = Paper products; *S*3 = Petroleum, refined petroleum products and processing of radioactive materials; *S*4 = Chemical products; *S*5 = Non-metallic mineral products; *S*6 = Basic metal; *S*7 = Industrial machinery; *S*8 = Electronic material; *S*9 = Electric power; *S*10 = Trade and other services; *S*11 = Transport and communication; *S*12 = Financial.

* Significantly different at 10%; ** Significantly different at 5%; *** Significantly different at 1%.

In window (-5, +5), accumulated abnormal returns negatives can be detected in several sectors. Paper products, machinery construction industry, transport and communications, and financial intermediation display values -2,4%, -0,8%, -1,8% and -5,1% respectively; significant for *bootstrap*. These results improve as the windows created are shorter and closer to the day of the signature of the company agreement. These sectors display, in particular, negative abnormal returns significantly different from zero in windows (-1, +1) and (2, +2) with a significance for Corrado and *bootstrap* oscillating between 5% and 1%. Moreover Chemical industry displays a -1,2% value in the window (-1, +1), significant to 5% for *bootstrap*.

Let us consider windows (-5, -1) and (+1, +5), for pre and post event reaction respectively. Financial is the only sector with significant returns in post event. The rest of the sectors do not display statistically important reactions, except during the windows next to zero moment. This result could indicate that investors of these competing companies react on the days closer to the announcement of the agreement.

As previously argued for those sectors with greater degree of concentration of the productive supply, the signature of a company agreement can entail a review of salary agreements in the rest of competing companies due to a demonstration effect. A negative *spillover effect* may be expected in these sectors. As negative and significant abnormal returns indicate, negative *spillover effect* can be particularly pointed out in Paper Industry, Machinery construction industry, Chemical products, Transport and communications and Financial. These sectors are the most concentrated (see Table 3). Therefore, investors of these sectors interpret the information value of the agreement as bad news. Thus, their stock prices are penalized on the risk of the demand for greater wages or, even, the proposal of the signature of a company agreement, mimicking therefore the behavior of the leading company of the sector one an agreement of this type has been signed. In addition, if we consider the leading company the largest firm, or the one with the greatest participation quota over the others, one can appreciate in the descriptive analysis (Table 2) that it is the largest companies the most concentrated sectors that signed company agreements. This could indicate that a leader-follower strategy is taking place justifying the negative reaction in these sectors.

These results are along the lines of Bronars and Deere (1994) for the American market; for the Spanish market, Inurrieta (1997a) also finds negative *spillover effect* sign before an increase of the union power in sectors with a greater level of concentration in the productive supply.

Therefore, and according to the results obtained, negative *spillover effect* exists in those sectors with greater level of concentration.

On a different line, as shown in Table 6, Food and beverage, Electronic material and Trade display accumulated abnormal returns significantly different from zero at 5% for *bootstrap*, but with a positive sign. Values for these sectors vary between +3% and +8% in windows (-5, +5), (-2, +2), (-1, +1) and (-5, -1). Unlike the results presented in the previous paragraphs, investors in these sectors start reacting days before the signature of the agreement, as indicated by the presence of significant abnormal returns at 10% in window

(-5, -1) with a +0.006 value for Food industry, +0.013 for Trade and a +0.033 value for electronic material significant at 5% for both tests.

This result indicates investors of the Food and beverage, Electronic material and Trade interpret positively the company agreement and their stock prices get the bonus of a positive return excess with respect to what was to be expected for that date. A possible explanation for this situation could again be derived in the degree of concentration.

If we consider Table 3, we can see that these sectors display a lower level of concentration of their productive supply, that is to say, they are sectors in which the companies share the market in the same proportion. Along these lines, as Bárcena and Inurrieta argue (1997), if a company of this type of sector decides to renegotiate the wages framework, the increase in labor and production costs induce an important loss market share which benefits the competing company in two ways: the workers, with wage increases and, the shareholders, with greater returns due to the greater market share.

Therefore, positive *spillover effect* exists in sectors with lower level of concentration of the productive supply.

With respect to Petroleum, Non-metallic mineral products, Basic metal and Electrical power, the results indicate that, for these sectors, *spillover effect* does not occur when significant abnormal returns are absent. The exception to be noted is the post event window (+1, +5) with significant negative for electric power and positive abnormal returns for manufacture of other mineral non-metal products. As Bronars and Deere argue (1994), this result can be due to heterogeneity among the competing companies in the industry. Companies in these industries could also carry out different activities which can not always be classified within one industry. This fact may create distortion in the results.

Results for Petroleum, refined petroleum products and processing of radioactive materials should be specifically emphasized. As indicated by their high degree of concentration and as defined in the hypotheses, a negative *spillover effect* was to be expected. A possible explanation for this result can be found in the specific characteristics of the sector: all the companies in the sector have a firm level agreement. When a company of this sector signs a firm-level agreement, the reaction expected from the competition is, a priori, is positive. As Bárcena and Inurrieta (1997) argue, this is due to the fact that the possible competitive advantage the signatory company could get via operational costs disappears when a new collective agreement is signed, thus making all companies in the sector compete on a equal basis. Hence the negative effect expected due to the concentration level is compensated by the positive effect mentioned in our argument. This is the reason for the absence of statistically significant abnormal returns.

According to the results obtained, we can conclude that there is *spillover effect* in some sectors of the Spanish economy upon the signature of a firm level collective agreement. However the sign of this effect depends on the specific characteristics of the sector, particularly, on the level of concentration of the productive supply. Therefore, the two first hypotheses presented study can be confirmed.

4.4. Alternative Analysis. Methodology

The purpose of this second analysis is to try assess the existence of a consistent relationship a between companies with their own agreement and competing companies. Once demonstrated that the signature of this type of agreements has a negative and significant impact on the market (see Table 4), we verified whether the average return for a portfolio composed by shares of competing companies differs from the return of a portfolio composed by shares of the companies with a firm level agreement.

Once again more, and as done before, we have analyzed *spillover effect* for each of the sectors represented by the companies in the sample, but with the particular aim to establish a relation between the competing company and the company signing its own agreement. Thus:

$$R_{it} = \alpha_i + \beta_i R_{EVENTSAMPLEt} + \varepsilon_{it} \quad (9)$$

where R_{it} is the return of competing company i on day t; $R_{EVENTSAMPLEt}$ is the return of the company with firm level agreement on day t; α_i is the expected return of company i, which is independent from the return of the company with agreement; β_i is the sensitivity of the return of competing company i to changes in returns of the company signing the collective agreement; and ε_{it} is a random error term.

This equation allows us to calculate abnormal daily returns (AR_i) for information on competing company i:

$$AR_{it} = R_{it} - (a_i + b_i R_{EVENTSAMPLEt}) \quad (10)$$

where a_i and b_i are the LS estimates obtained in the regressions (9) using a period before the announcement of 145 days.

Abnormal returns are averaged in a cross section across each day of the event window $AR_t = N^{-1} \sum_{it}^{N} AR_{it}$.

We use again an 11 day period for the event and the date of the signature of the company agreement is zero moment, from day $T_1 = -5$ to day $T_2 = +5$. In order to offer a more complete analysis, we calculated the accumulated abnormal returns CAA_t in a period ($t1$, $t2$) as defined in Equation 5.

Once again, we tested the significance of the average abnormal returns through non-parametric test of Corrado (1989) and the nonparametric technique *bootstrap* (16). We tried to verify with this analysis whether the link between the competing company and the signing company has varied in the study window during the event window.

4.5. Results alternative analysis

Daily abnormal returns of competing companies by sector are shown in Table 7. They are calculated based on the returns of the company with an agreement. Although this sign and

(16) Just as it happened in the previous case, we have not used abnormal returns out of the range chosen, as done by Ryan and Taffler (2004). We have reached the same results got with the classic method.

TABLA 7

DAILY ABNORMAL RETURNS COMPETING FIRMS REGARDING EVENT FIRMS. CORRADO'S AND *BOOTSTRAP* TESTS

$$R_{it} = \alpha_i + \beta_i R_{EVENTSAMPLE} + \varepsilon_{it}$$

$$AR_{it} = R_{it} - (a_i + b_i R_{EVENTSAMPLE})$$

INDUSTRY	Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
	AR	-0.003	-0.004	0.005	0.004	0.007	0.006	0.005	0.001	0.002	0.003	0.002
S1	*bootstrap*	-0.789	-0.253	1.780*	1.502	0.975	2.136**	0.210	1.030	0.240	0.676	0.655
N = 35	*corrado*	-0.645	-0.324	1.565	1.564	1.020	1.986**	0.197	0.987	0.134	0.457	0.342
	AR	-0.003	-0.001	-0.001	0.001	0.002	0.003	0.002	0.002	-0.005	-0.005	-0.001
S2	*bootstrap*	-1.345	-0.391	-0.337	0.088	2.104**	1.722*	1.342	0.031	-2.076**	-0.716	-0.079
N = 16	*corrado*	-1.576	-0.397	-0.256	0.107	2.118**	1.677*	1.435	0.021	-1.945*	-0.685	-0.087
	AR	0.003	0.001	0.001	-0.002	-0.001	0.003	0.006	0.005	-0.004	-0.006	0.001
S3	*bootstrap*	0.859	0.376	1.736*	-1.157	-0.394	0.976	1.998**	1.434	-0.147	-1.300	1.113
N = 13	*corrado*	0.787	0.259	1.632	-1.025	-0.478	0.986	1.675*	1.357	-0.125	-1.457	1.102
	AR	-0.001	-0.002	-0.003	0.002	0.001	0.003	-0.002	-0.003	-0.004	-0.003	-0.004
S4	*bootstrap*	-1.480	-0.826	-0.690	0.660	1.001	1.123	-0.354	-1.303	-1.917*	-0.424	-1.720*
N = 22	*corrado*	-1.607	-0.785	-0.579	0.487	1.079	1.076	-0.986	-1.065	-1.851*	-0.327	-1.645*
	AR	0.001	0.003	-0.001	-0.003	0.004	0.006	-0.004	-0.002	-0.001	-0.003	0.004
S5	*bootstrap*	1.447	0.567	-0.184	-1.349	0.804	1.753*	-0.201	-0.068	-0.264	-1.458	0.277
N = 19	*corrado*	1.647*	0.553	-0.356	-1.252	0.756	1.976**	-0.346	-0.025	-0.347	-1.575	0.357
	AR	-0.001	0.002	-0.002	-0.002	-0.004	-0.002	0.003	0.007	0.003	-0.003	-0.004
S6	*bootstrap*	-0.415	0.356	-0.376	-1.127	-0.869	-0.245	0.305	2.278**	1.485	-1.506	-1.234
N = 7	*corrado*	-0.475	0.237	-0.458	-1.104	-0.758	-0.326	0.257	1.976**	1.575	-1.645*	-1.057
	AR	-0.001	-0.004	-0.001	0.001	0.004	0.005	0.004	0.003	-0.004	-0.005	-0.001
S7	*bootstrap*	-0.171	-0.455	-1.421	1.216	0.577	0.034	1.645*	1.955*	-0.672	-0.045	-0.265
N = 45	*corrado*	-0.356	-0.257	-1.432	1.013	0.257	0.231	1.967**	1.989**	-0.357	-0.023	-0.125
	AR	0.005	0.001	0.003	0.001	0.007	0.005	0.003	0.001	0.002	0.005	0.003
S8	*bootstrap*	0.676	0.526	1.640*	1.134	2.332***	1.762*	0.878	0.045	0.197	0.360	0.647
N = 54	*corrado*	0.576	0.348	1.624	1.098	2.025**	1.647*	0.785	0.023	0.098	0.257	0.346
	AR	-0.003	-0.002	-0.000	0.003	0.002	0.003	0.002	0.000	0.001	-0.003	-0.001
S9	*bootstrap*	-1.294	-1.230	-0.102	-1.565	2.451***	2.357***	1.761*	0.186	0.398	-0.750	-0.572
N = 84	*corrado*	-1.257	-1.098	-0.097	-1.404	1.978**	2.012**	1.709*	0.098	0.354	-0.708	-0.556
	AR	0.002	0.004	0.009	0.003	0.007	0.009	0.003	0.001	0.003	0.001	0.001
S10	*bootstrap*	1.121	1.969**	2.323***	1.175	2.322***	2.321***	2.240**	1.143	1.634	0.346	0.762
N = 31	*corrado*	1.098	1.967**	2.035**	1.098	2.235**	2.098**	2.128**	1.965	1.674*	0.557	0.786
	AR	-0.002	-0.003	-0.001	0.004	0.003	0.001	0.002	-0.002	-0.003	-0.002	-0.001
S11	*bootstrap*	-0.732	-0.962	-1.211	1.967**	2.179**	2.576***	1.884*	-0.387	-0.914	-0.344	-1.412
N = 55	*corrado*	-0.354	-0.897	-1.018	1.675*	2.032**	2.341***	1.645*	-0.257	-0.819	-0.246	-1.256
	AR	-0.003	-0.002	-0.003	-0.004	0.001	0.008	0.003	-0.003	-0.002	-0.003	0.001
S12	*bootstrap*	-1.718*	-0.711	-0.605	-1.132	1.069	1.088	1.966**	-0.161	-0.070	-1.390	0.487
N = 66	*corrado*	-1.546	-0.546	-0.987	-1.097	1.057	1.045	1.768*	-0.098	-0.324	-1.098	0.327

The industries are *S1* = Food and beverage; *S2* = Paper products; *S3* = Petroleum, refined petroleum products and processing of radioactive materials; *S4* = Chemical products; *S5* = Non-metallic mineral products; *S6* = Basic metal; *S7* = Industrial machinery; *S8* = Electronic material; *S9* = Electric power; *S10* = Trade and other services; *S11* = Transport and communication; *S12* = Financial.
* Significantly different at 10%; ** Significantly different at 5%; *** Significantly different at 1%.

magnitude of the effect vary depending on the sector under study, there are significant Positive abnormal daily returns for the majority of sectors.

Table 8 shows the analysis of the cumulative abnormal returns for the competing companies. They are calculated based on the returns obtained by the company that has signed the agreement. Through the different windows and in each sector, the mean efficiency of a portfolio composed by shares of competing companies is always greater that the one obtained by the company which signs the agreement.

TABLA 8

CUMULATIVE ABNORMAL RETUNS FOR COMPETING COMPANIES REGARDING EVENT SAMPLE. CORRADO'S AND *BOOTSTRAP* TESTS.

$$R_{it} = \alpha_i + \beta_i R_{EVENTSAMPLE} + \varepsilon_{it}$$

$$AR_{it} = R_{it} - (a_i + b_i R_{EVENTSAMPLE})$$

INDUSTRY	WINDOW	(-5,+5)	(-1,+1)	(-2,+2)	(-5,-1)	(+1,+5)
*S*1 *N* = 35	*CAR*	0.027	0.018	0.021	0.009	0.011
	bootstrap	1.751*	1.925*	1.857*	1.644*	1.245
	corrado	1.645*	1.820*	1.772*	1.553	1.226
*S*2 *N* = 16	*CAR*	-0.005	0.008	0.009	-0.002	-0.012
	bootstrap	-1.315	1.870*	1.667*	-0.976	-0.233
	corrado	-1.268	1.744*	1.698*	-0.852	-0.135
*S*3 *N* = 13	*CAR*	0.007	0.010	0.012	0.002	0.002
	bootstrap	1.257	1.646*	1.075	0.576	0.160
	corrado	1.267	1.614	1.067	1.357	0.704
*S*4 *N* = 22	*CAR*	-0.016	0.002	0.001	-0.003	-0.016
	bootstrap	-1.467	1.957*	1.588	-0.275	-1.428
	corrado	-1.289	2.364***	1.755*	-0.600	-1.354
*S*5 *N* = 19	*CAR*	0.004	0.006	0.002	0.004	-0.004
	bootstrap	0.935	1.664*	1.258	0.430	-0.985
	corrado	1.226	1.977**	0.993	0.641	-0.226
*S*6 *N* = 7	*CAR*	-0.003	-0.003	0.002	-0.007	0.006
	bootstrap	-0.724	-0.990	1.436	-1.237	1.708*
	corrado	-0.123	-1.100	1.224	-0.545	1.998**
*S*7 *N* = 45	*CAR*	0.002	0.013	0.017	-0.001	-0.003
	bootstrap	1.432	1.786*	1.688*	-0.921	-1.468
	corrado	1.203	1.931*	1.870*	-1.095	-1.262
*S*8 *N* = 54	*CAR*	0.032	0.015	0.017	0.017	0.014
	bootstrap	1.985**	2.263**	1.910*	1.966**	0.869
	corrado	1.765*	2.808***	1.846*	2.051**	1.196
*S*9 *N* = 84	*CAR*	0.002	0.007	0.010	0.001	-0.001
	bootstrap	1.654*	2.579***	1.968**	1.333	-0.818
	corrado	1.542	2.147**	1.951*	0.522	-0.897
*S*10 *N* = 31	*CAR*	0.039	0.019	0.023	0.024	0.009
	bootstrap	2.333***	2.383***	1.953*	1.896*	1.989**
	corrado	2.077**	2.227**	1.950*	1.657*	1.717*
*S*11 *N* = 55	*CAR*	-0.004	0.006	0.008	0.001	-0.006
	bootstrap	-0.651	2.792***	2.633***	1.168	-0.934
	corrado	-0.760	1.910*	1.984**	0.535	-1.071
*S*12 *N* = 66	*CAR*	-0.017	0.015	0.005	-0.011	0.001
	bootstrap	-1.060	1.554	0.895	-1.304	0.134
	corrado	-0.305	1.098	1.186	-1.038	0.443

The industries are *S*1 = Food and beverage; *S*2 = Paper products; *S*3 = Petroleum, refined petroleum products and processing of radioactive materials; *S*4 = Chemical products; S5 = Non-metallic mineral products; *S*6 = Basic metal; *S*7 = Industrial machinery; *S*8 = Electronic material; *S*9 = Electric power; *S*10 = Trade and other services; *S*11 = Transport and communication; *S*12 = Financial. * Significantly different at 10%; ** significantly different at 5%; *** significantly different at 1%.

On the one hand, we can derive from the results that the average return of a portfolio comprising including shares of companies from Food and beverage, Non-metallic mineral products, Industrial machinery, Electric power, Electronic material and Trade is significantly greater than the return of a portfolio comprising including shares of a company that has signed a firm-level agreement. On the other hand, the return obtained by a portfolio of shares of competing companies in the Paper, Chemical, Metal Industry, or even Financial sector, for example, is not significantly different from the one obtained by a company of any of these sectors which has agreed with their employees about their own labor and economic conditions. This would indicate that both types of companies are penalized by the market in the same way the days close to the announcement of the agreement.

Liberty and Zimmerman (1986) argue that during the negotiation of a company agreement, approximately 6 months, the returns of the companies that negotiate the agreement are significantly lower than the returns of the rest of companies. This difference is even more remarkable in the days close to the announcement. Nevertheless, this difference disappears within the six months after the event. This is because during the months of negotiation of the agreement, the market reacts by penalizing shares because of the risk of a strike or a conflict inherent to all collective negotiation. Once the negotiations are concluded and upon the signature of the agreement, the information is negatively interpreted by the investor in the face of the agreed increase in labor costs and the subsequent decrease of the future cash-flow, as shown in Table 4. Hence, for the majority of sectors, the mean efficiency of a portfolio composed by shares of competing companies is superior to the efficiency of a portfolio composed by shares of companies with their own agreement. The results obtained in Tables 7 and 8 allow us to verify therefore the last hypothesis of the study.

5. *SPILLOVER EFFECT* DETERMINANTS UPON THE ANNOUNCEMENT OF THE COLLECTIVE AGREEMENT

Once the *spillover effect* in the Spanish Stock Market before the signature of a collective agreement for a company has been analyzed, it is interesting to examine the possibility of explaining these changes referring to some of the company characteristics. In order to do so, the accumulated abnormal returns in (CAA_i) for the window (-5, +5) are regressed on these variables, as indicated in Equation 11. The goal is to analyze which characteristic of the competing companies determines the abnormal returns observed in the study window. The abnormal returns observed around the date of the event are analyzed in terms of size, results of the year prior to the signature of the agreement, and the sector itself.

$$CAA_i = \sum_{k=1}^{12} \beta_i Industry_i + \sum_{k=13}^{24} \beta_i Ind_i \cdot Size + \sum_{k=25}^{36} \beta_i Ind_i \cdot Earnings_i + \mu_i \qquad (11)$$

The industries are *S*1 = Food and beverage; *S*2 = Paper products; *S*3 = Petroleum, Refined petroleum products and processing of radioactive materials; *S*4 = Chemical products; *S*5 = Non-metallic mineral products; *S*6 = Basic metal; *S*7 = Industrial machinery; *S*8 = Elec-

tronic material; *S*9 = Electric power; *S*10 = Trade and other services; *S*11 = Transport and communication; *S*12 = Financial.

It has been empirically verified that larger companies in Spain have a greater chance of undertaking internal collective bargaining (Jimeno and Rodriguez, 1996). The comparison of labour costs with other companies in the same industry is less important for these companies. The market position is not significant affected by the fact that other companies assume lower costs, since their own economic conditions allow them assume higher costs without having to transfer them to their products. On the other hand, the almost always lesser complexity of smaller companies means that labour costs and working conditions are crucial. The sample tests the effect of size on the abnormal magnitudes observed around the event date. Theoretically the sign of the correlation between size and abnormal returns is positive, as larger companies are less punished by the markets, owing, for example, to the higher quantity and quality of the information they disclose to the market (Lang and Lundholm, 1993). This same reasoning can be applied to annual results: companies with better accounts will be least penalised by investors.

The inclusion of industry dummies is especially important, as they show in which individual industries the effect of signing a firm-level collective agreement is more important in stock market terms. We have created as many dummy variables as industries. The criterion followed for the classification of companies into industries is as established by the CNAE-93 for 12 industries. Table 1 shows the distribution of the companies in the sample and their competitors into sectors.

A prior analysis of the correlation matrix of the variables shows a certain multicollinearity, the impact of which on the final results is limited by selecting non-collinear independent dimensions. Thus, the equations presented for the model are different combinations of company variables, designed in order to collectively overcome the multicollinearity problem.

We also used White's test to verify homocedasticity, allowing us to accept the null hypothesis of equality of residue variances, Jarque-Bera's test confirms normality of residues, evidencing the presence of homocedasticity. However, Durbin-Watson's test accepts the presence of residue self-correlation of order 1. Consequently, the estimate is done by LS, considering that the significance levels of the quotients have been determined from the variance-covariance matrix robust to Newey-West's general self-correlation forms [(17)] [(18)].

Table 9 summarizes the results of the cross section regressions for the abnormal returns derived from the market model.

(17) According to Karafiath (1994), the LS procedure seems to be more efficient than other more complex methods when abnormal returns are the dependent variables; this is the case even in situations with heterocedasticity residues and correlated with independent variables.

(18) Since the number of observations in analysis by size and year results may be low, regression coefficients have been estimated by means of *bootstrap* non parametric technique in order to strengthen the analysis. We obtained the same results as in the MCO calculation.

TABLA 9

DETERMINANTS OF ABNORMAL RETURNS. WINDOW (-5,+5)

Results of the regression analysis aimed at detecting which factors can be considered to explain the changes in the abnormal return in the window (-5,+5) for competing companies using market model. The first column shows the regression of abnormal returns on industry dummies; the second column on industry dummies multiplied for size variable and the third column with earnings variable. $N = 447$.

$$CAR_i = \sum_{k=1}^{12} \beta_i Industry_i + \sum_{k=13}^{24} \beta_i Industry_i Sizei + \sum_{k=25}^{36} \beta_i Ind_i Earnings_i + \mu_i$$

INDUSTRY	ONLY INDUSTRY	SIZE INDUSTRY	EARNINGS INDUSTRY
*S*1	+0.025**	+0.009	+0.003
*S*2	-0.037**	+0.017**	+0.001*
*S*3	+0.011	+0.009	+0.001
*S*4	-0.024	+0.016*	+0.005*
*S*5	-0.012	-0.005	-0.000
*S*6			
*S*7	-0.015	-0.006	-0.000
*S*8	+0.009	-0.007	-0.000
*S*9	+0.015	+0.007	+0.005
*S*10	+0.034**	-0.016*	-0.002
*S*11	-0.013	+0.009	+0.000
*S*12	-0.036***	+0.015**	+0.003***
R^2	0.29	0.25	0.27
Pr(F)	0.00	0.00	0.00

The industries are *S*1 = Food and beverage; *S*2 = Paper products; *S*3 = Petroleum, refined petroleum products and processing of radioactive materials; *S*4 = Chemical products; *S*5 = Non-metallic mineral products; S6=Basic metal; *S*7 = Industrial machinery; *S*8 = Electronic material; *S*9 = Electric power; *S*10 = Trade and other services; *S*11 = Transport and communication; *S*12 = Financial. *SIZE* = Ln Market capitalization, *EARNINGS* = annual results/Total Assets. CAR_i = Cumulative abnormal returns using market model for the window (-5,+5).
* Significantly different at 10%; ** significantly different at 5%; *** significantly different at 1%.

As shown in the first column, when the industry specific dummies are considered included, the only sectors whose returns are affected significantly in a positive way by the signature of the agreement are: Trade, and Food and beverage, as it has also been shown in the windows with significant and positive abnormal returns for these sectors. Paper products and Financial display a significant and negative sign.

The impact of the event on returns is more noticeable when the dummies interaction with the characteristics of the company was considered in the regression. In this case, bigger companies and with better results within Paper, Financial and Chemical Industries are less penalized by the investor. However larger companies in Trade obtain minor advantages as it indicated by the negative sign in this regression.

6. CONCLUSIONS

Our results are consistent with previous empirical studies on *spillover effect*. The evidence presented here demonstrates that there is a clear relationship between firm-level collective negotiation in a company and the returns of the competing companies. Sign and magnitude of this relationship depend on the industry and the level of concentration of the productive supply there in.

Thus, within industries with monopolistic competition in which the biggest company monopolize a greater market share, the fact that one company signs its own agreement induce a negative reaction in the stock prices of competing companies. This is due to a demonstration effect in the strategy leader-follower, in the face of a possible demand for higher wages by the workers or even a proposal to negotiate a company agreement imi-

tating, thus, the behavior of the leading company in the industry. Conversely, in industries with a smaller degree of concentration industries in which companies share the market in a similar proportion, the fact that one of them signs its own agreement could derive in a loss of market share from which the competing companies will profit: Investors of these companies react positively.

LITERATURE

AGUILÓ, E. 1979. Un comportamiento teórico de los índices de concentración: un ejercicio de aplicación a la industria española, *Cuadernos de Economía,* 18.

BAILEY, D., and BOYLE, S. E. 1971. The optimal measure of concentration, *Journal of the American Statistical Association,* 66, 702-706.

BAJO, O., and SALAS, R. 1998. Índices de concentración para la economía española: análisis a partir de las fuentes tributarias, *Economía industrial,* 320.

BALL, R., and BROWN, P. 1968. An Empirical Evaluation of Accounting Income Numbers*, Journal of Accounting Research,* 6, 159-178.

BÁRCENA, J. C., and INURRIETA, A. 1997. La Negociación Colectiva en la Europa Continental: Aproximación al caso Español, *Documentos de Trabajo,* BILTOKI.

BAUMOL, W. J.; PANZAR, J. C., and WILLIG, R. D. 1982. *Contestable markets and the theory of industry structure*, New York: Harcourt Brace Jovanovich.

BENTOLILA, S.; DOLADO, J., and PADILLA J. 1996. Wage Bargaining in Industries with Market Power, *Journal of Economics and Management Strategy,* 5.

BERNSTEIN, J. I., and NADIRI, M. I. 1988. Research and Development and Intraindustry Spillovers: An Empirical Application of Dynamic Duality, *American Economic Review Proceedings,* 78, 429-439.

BRONARS, S., and DEERE, D. 1994. Unionization and Profitability: Evidence of *Spillover* Effects, *Journal of Political Economy,* 102, 1.281-1.287.

BUESA, M., and MOLERO, J. 1998. *Economía industrial de España, organización, tecnología e Internacionalización*, Madrid: Civitas.

CLARKE, R., and DAVIES, S. W. 1982. Market structure and price-cost margins, *Economica,* 49, 277-287.

CORRADO, C. 1989. A Nonparametric Test for Abnormal Security-Price Performance in Event Studies, *Journal of Financial Economics,* 23, 385-395.

CORRADO, C., and ZIVNEY, T. 1992. The Specification and Power of the Sign Test in Event Study Hypothesis Tests Using Daily Stock Returns, *Journal of Financial and Quantitative Analysis*, 27(3), 465-478.

CRESPO, J.; MARTÍN, C., and VELÁZQUEZ, F. J. 2004. International Technologic Spillovers from Trade: The Importance of the Technological Gap, *Investigaciones Económicas,* 28(3), 515-553.

ENCAOUA, D., and JACQUEMIN, A. 1980. Degree of Monopoly, Indixes of Concentration and Threat of Entry, *International Economic Review,* 21(1), 87-105.

ESCORSA, P., and HERRERO, J. 1982. *La estructura industrial española*, Economía industrial, Barcelona, Hispano Europea.

FAMA, E., FISHER, L.; JENSEN, M., and ROLL, R. 1969. The Adjustment of Stock Prices to New Information, *International Economic Review,* 10, 1-21.

FREEMAN, R., and MEDOFF, J. 1981. The Impact of the Percentage Organized on Union and non-Union Wages, *Review Economics and Statistic,* November, 561-572.

GANDOY, R. 1988. *La evolución de la productividad global de la industria. Un análisis desagregado para el periodo 1964-1981,* Madrid, Editorial de la Universidad Complutense.

GARCÍA DURÁN, J. A. 1976. Organización industrial española 1960-1970, *Cuadernos de Economía,* 4(9), 488-504.

GRILICHES, Z. 1992. The Search for R&D Spillovers, *Scandinavian Journal of Economics,* 94, 29-47.

HIRSCHEY, M. 1985. Market Structure and Market Value, *Journal of Business,* 58, 89-98.

INURRIETA, A. 1997a. Negociación Colectiva y Valor Bursátil de las Empresas, *Mimeo.*

INURRIETA, A. 1997b. Internaliza el Mercado Bursátil Español las Relaciones Laborales: Evidencia Empírica a partir de un Event-Day Study*, Mimeo.*

JAUMANDREU, J., and MATO, G. 1985. Concentración industrial en España. 1973-1981, *Documento de trabajo 8504*, Madrid: Fundación Empresa Pública.

JAUMANDREU, J. 1987. Concentración y márgenes precio-coste. Una aplicación a la industria española, 1978-82, *Tesis doctoral,* UNED, Madrid.

JIMENO, J. F., and RODRIGUEZ, D. 1996. Wage Drift in Collective Bargaining at Firm Level, *Annales D´Economie et de Statisque,* 41/42, 188-205.

KARAFIATH, I. 1994. On the Efficiency of Least Squares Regression with Security Abnormal Returns as the Dependent Variable, *Journal of Financial and Quantitative Analysis,* 29, 279-300.

LA FUENTE, A., and SALAS, V. 1983. Concentración y resultados de las empresas en la economía española*, Cuadernos Económicos de ICE,* 22-23, 7-34.

LANG, M. H., and LUNDHOLM, R. J. 1993. Cross-Sectional Determinants of Analysts Ratings of Corporate Disclosures, *Journal of Accounting Research,* Autumn, 247-271.

LIBERTY, S., and ZIMMERMAN, J. 1986. Labor Union Contract Negotiations and Accounting Choice, *Accounting Review,* 61 (4), 692-712.

LINDENBERG, E., and ROSS, S. 1981. Tobin´s Q ratio and Industrial Organizations, *Journal of Business,* 54, 1-32.

MAMUNEAS, T. 1999. Spillover from Publicly Financed R&D Capital in High-Tech Industries, *Internacional. Journal of Industrial Organization*, 17, 215-239.

MARAVALL, F. 1976. *Crecimiento, dimensión y concentración de las empresas industriales españolas, 1964-1973*, Serie E, n.º 7, Madrid: Fundación del Instituto Nacional de Industria.

MARTÍN, S. 1993. *Advanced industrial economics*, Blackwell Publishers, Cambridge.

MATO, G. 1986. *Medida y determinantes de la concentración industrial: una aplicación al caso español*, Universidad Complutense, Facultad de Ciencias Económicas y Empresariales.

MICHELINI, C., and PICKFORD, M. 1985. Estimating the Herfindahl Index From Concentration Ratio Data, *Journal of the American Statistical Association,* 80 (Jun.), 301-305

NÚÑEZ, S. 2000. La estructura por tamaño de empresas de las ramas de servicios, *Boletín Económico*, *del Banco de España,* noviembre.

NÚÑEZ, S., and PÉREZ, M. 2001. El grado de concentración en las ramas productivas de la economía española, Banco de España, *Documentos de trabajo,* n.º 0113.

PABLO, F. 1995. *La concentración industrial en la economía española: 1980-1992*, Madrid: Universidad de Alcalá.

PARK, W. G. 1995. International R&D Spillovers and OECD Economic Growth, *Economic Inquiry*, 33, 571-591.

PENCAVEL, J. 1991. Labor Markets under Trade Unionism: Employment, Wages, and Hours, *Cambridge: Blackwell*.

RODRÍGUEZ ROMERO, L. 1996. Organización de los mercados industriales (I): Concentración y resultados, en *Lecciones de economía española*, GARCÍA DELGADO, J. L. (Dir.), segunda edición, Madrid: Civitas.

RUBACK, R., and ZIMMERMAN, M. B. 1984. Unionization and Profitability: Evidence from the Capital Market, *Journal of Political Economy,* 92(6), 1134-1155.

RYAN, P., and TAFFLER, R. J. 2004. Are Economically Significant Stock Returns and Trading Volumes Driven by Firm-Specific News Releases? *Journal of Business Finance and Accounting,* 31(1), 49-82.

SABATER, A. M., and LAFFARGA, J. 2006. ¿Observa el Mercado Español las Relaciones Laborales entre Empresarios y Sindicatos?: Un Análisis Empírico para el Mercado Continuo, *Revista Española de Financiación y Contabilidad-Spanish Journal of Finance and Accounting,* 128, enero-abril, 57-86.

SALINGER, M. 1984. Tobin´s q Unionization, and the Concentration-Profits Relationship, *Journal of Economics,* 15, 159-170.

SCHERER, F. M., and ROSS, D. 1990. *Industrial market structure and economic performance*, 3.ª Edición, Houghton Mifflin, Boston.

SCHMALENSEE, R. 1977. Using de H-index of concentration with published data, *Review of economics and Statistics*.

SCHMALENSEE, R. 1992. Inter-industry studies of structure and performance en SCHMALENSEE, R., and WILIG, R. (editores): *Handbook of industrial organization*, Vol. II, North-Holland, Amsterdan.

SEGURA, J. 1989. *La industria española en la crisis 1978-1984*, Madrid: Alianza Editorial.