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An empirical analysis of labor agreements on Spanish Stock Market

Abstract

The objective of this paper is to consider the reaction of the Spanish Stock Market when a collective agreement at firm level is announced and signed, by measuring abnormal returns and abnormal volume on the day the information reaches the market. Bearing in mind that this type of agreement tends to increase salaries with respect to those in the rest of the sector, the initial hypothesis is that a company agreement incorporates negative information leading to expectations of abnormal negative returns and positive volume on the event day. This paper analyzes 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. The general results of this paper confirm the spillover effect, although different reactions are observed depending on the industry to which the company belongs.

Keywords: abnormal returns, abnormal volume, spillover effect, collective bargaining.
JEL Classification: G14, J30, J51.

Introduction

The daily stock prices of companies quoted on the stock market are conditioned by a series of key dates and events, such as announcements of dividends, equity issues, mergers and earnings. Markets and investors internalize the information to avoid potential negative effects on stock prices. Since collective bargaining has been considered decisive in terms of profitability only in a few occasions, this paper evaluates whether investors also take into account other events, such as industrial relations between employers and trade unions. Collective bargaining may have a variety of effects on the performance of firms. Several of these effects, such as raising wages, suggest that labor agreements raise labor costs and thereby reduce profits[1].

In the Spanish labor market, collective bargaining may produce agreements at industry or at company level, and the results of collective bargaining are applied to all workers, regardless of their union membership. When an industry-level agreement is signed, individual companies may decide whether to implement it as it is, or to improve the labor and economic conditions in a firm level collective agreement.

Jimeno and Rodriguez (1996) and Barcena and Inurrieta (1997) find that, in Spain, wages paid by companies with firm-level collective agreements are around 5% higher than those paid in companies with industry-level collective agreements. The wage drift resulting from firm-level collective agreements means increased labor costs, which may reduce future cash-flows, and end up in the subsequent reduction of wealth for investors. If this is the case, investors may consider the signing of a firm-level collective agreement as bad news, resulting in lower stock prices and greater sale pressure on the stocks affected by the announcement.

Spain is a good example of an environment where the hypothesis of the depressing effect of collective bargaining on stock prices can be verified. Public information about labor agreements available in Spain makes the market especially appropriate for the analysis. Therefore, our study is based on a sample of Spanish companies.

We analyze, like first hypothesis, if the event has negative information content for investors, so this paper directly analyses whether the signing of a firm-level collective agreement causes changes in stock prices and trading volumes among companies the days around the announcement of the agreement.

Our approach has several advantages. First, there is ample evidence that an unbiased assessment of the effects of public information releases about firm profitability is quickly incorporated into stock prices[2]. Higher wages, not compensated by increases in productivity, reduce the present value of profits and the equity value of the firms falls. If the firm-level agreement increases productivity to offset higher wages, profits increase and equity value rise. So, the impact of collective agreement can be measured without specifying production functions or the length of time required to adjust factor inputs. Second, since profits include the effects of both higher wages and higher product prices, the net effect of the labor agreement can be measured without ambiguity. If unions succeed in signing a firm level

[1] A collective agreement can be defined as a written agreement freely negotiated by unions and employers to regulate working conditions and rules. Collective agreements regulate economic, labor, union and support issues, and in general, all issues that may affect employment conditions and the relationships between workers and employers. Agreements are binding for both parties and agreed conditions may not be modified unless they are would improve them.

[2] Fama (1998).

agreement in several industries, this is also reflected in the revaluation of the firm's equity. The method allows aggregation across firms and industries expand, thus, the sample size and permitting non-industry specific analysis. Results show abnormal negative returns and positive volumes.

In a second stage, like second hypothesis, we analyze whether the signing of a firm-level collective agreement also has information content for investors in rival companies, that is, whether a spillover effect can be observed. Beyond the effect caused by the event on the company itself, Bentolila et al. (1996) consider that the effects of collective bargaining have also an impact on others within the same industry, and this fact should find a reflection in their relative value. Results for the sample of competing companies show industry-dependant abnormal returns of different signs and magnitudes, all of them determined by the characteristics and bargaining structure of the corresponding industry (Bronars and Deere, 1994).

The main contribution of this study lies in analyzing market reaction, using trading volumes and non-parametric tests, as a complementary measure for the changes detected in stock prices pass response to a labor-related event.

The paper is organized as follows. Section 1 shows the institutional characteristics of collective bargaining in Spain and its differences with respect to the system in the Anglo-American context. Section 2 analyzes empirical evidence. Data collection and variable definition are presented in Section 3. Section 4 contains methodology analysis and results for price and volume respectively. Section 5 analyzes the spillover effect. The last Section concludes.

1. Institutional background

Among labor market events common across Western European countries, collective bargaining is one of those with a most distinctive "European flavor". Admittedly, both the coverage rate of collective bargaining and the legal rules under which collective bargaining is conducted vary widely across countries. However, there are some key characteristics shared by the collective bargaining system of some European countries which are not observed in the US and the UK.

Collective bargaining across (Continental) Europe is mostly organized under an "open-shop" rule, so that agreements are extended to all workers within the scope of the agreement, independently of their union status. On the contrary, Anglo-Saxon countries are under the "close-shop system". That means that agreements affect only to unionized workers.

Besides, collective bargaining across (Continental) Europe is often structured around multiple levels of negotiation (national, industry, firm, etc.), while in other countries as in the US only a single level of bargaining (firm-level bargaining) is operative. In fact, in those countries individual negotiation of salaries with the workers is quite common.

According to most experts and union officials, firm-level bargaining is to happen mostly in large firms which, supposedly, have the income and capacity to pay higher wages. In general terms, the Spanish system of collective bargaining concurs with the sketch of the European model of collective bargaining mentioned above. Spanish collective bargaining is a worker's right, in effect since 1980, recognized by Constitutional Law and the Workers' Charter. This right is exercised by free election of representatives by all workers in the company, whether they belong to a union or not. Workers' representatives constitute work councils which are entitled to bargain wages and employment conditions at firm level. Work councils may call for strikes in support of their demands.

One of the main differences between the "open-shop system" and the "close-shop system" is that under the "close-shop system" there are just firm level agreements negotiated by the unions. As consequence, the results of the agreements are only applicable to unionized workers. Therefore, it could be argued that the effect of the salary increases on the firm earnings after a collective agreement could be lower than in an "open shop system". This fact could be essential if one is to understand differences between the US or the UK and Continental countries showed in the previous evidence. Besides, under "close-shop system" it is possible to bargain lower wages in the same firm. For example, Thomas and Kleiner (1992) find that two-tier wage agreement (a concession made by union and employees) resulted in small but significant increases in shareholders wealth because for these workers the wages became lower. In Spain, this is impossible because an important feature in firm-level agreements is that they cannot contradict the terms of industry agreements. Thus, *de facto*, industry agreements establish a second layer of minimum wages (above the national statutory minimum) which can only be revised upwards by firm-level agreements. So, the salary increment agreed by both parts will be always higher that the one agreed in the industry agreement.

The fact that Spanish work councils can produce a wage drift relative to industry agreements, and that they are able to call strikes are, as Mora and Sabater (2008) argue, distinctive features of the Spanish collective bargaining system. In addition, collective

agreements are legally enforceable and apply to all workers, regardless of their union status. Therefore, it could be argued that, after a collective agreement, the effect salary increase has on firm's earnings could be significant and could be reflected on the stock prices of the company.

2. Empirical evidence

Most researches focus on the Anglo-American context: for example, Ruback and Zimmerman (1984), and Bronars and Deere (1994) for the USA, find a reduction of stock values in the presence of unionization in a company. Abowd (1989) observes that shocks in labor costs cause a proportional decrease in stock prices.

Other papers that also address the relationship between collective bargaining and corporate performance in the Anglo-American context have been written by Salinger (1984), who measures performance by using Tobin's Q and finds a negative correlation between union presence and performance. Also Connolly, Hirsch and Hirschey (1986), who find that companies with high union power have reduced market value and R&D investments.

By means of a lineal regression between different measures of stock performance and collective bargaining, Clark (1984) finds that collective bargaining affects distribution, but it does not have an impact on neither production nor the use of productive factors.

On the other hand, evidence of the effect of labor unions contracts in Europe is practically nonexistent. The most recent paper to study the relationship between stock performance and collective bargaining is by Inurrieta (1997b), Sabater and Laffarga (2006, 2008) who focus on the Spanish context. Like previous papers, it shows that the relationship between collective bargaining in the company and stock performance is negative around the date of the event.

The information content of many events is measured not only by analyzing changes in stock prices, but also in terms of trading volumes. Both stock prices and trading volumes reflect the information content of a given event, although each magnitude captures different features of investor reaction. Changes in trading volumes take into account different investors' interpretations of the information disclosed by the announcement, and they reflect the sum of the differences of investor reactions; however changes in stock prices reflect average market reaction, as this reaction is analyzed as a whole, without taking the heterogeneous character of investors' expectations into account (Kim and Verrecchia, 1991a).

Bamber and Cheon (1995) indicate that changes in trading volumes do not necessarily go hand-in-hand with changes in stock prices and vice versa. If consensus among investors is reached in the first transaction, there would be changes in stock prices but not in trading volumes, assuming always that risk preferences among investors are homogeneous. However, if some heterogeneity exists, we should be able to observe changes in trading volumes even after having reached the equilibrium price. Karpoff (1986) suggested an explanation that justify why informative events affect trading volumes. For Karpoff, the lack of consensus with regard to the interpretation of the disclosed information leads to higher trading volumes. Thus, even if an agreement is signed, trading volumes will remain high as long as investor expectations differ prior to the event.

Empirical evidence on the spillover effect in a collective bargaining context is very scarce. Some studies have detected that the variations in stock prices of competing companies are negative around the date of the announcement; these results have been considered a clear hint of the informative content of the event. A first approach to this type of analysis is the work of Freeman and Medoff (1981) about the American stock market. They estimate spillover effect on wages by measuring the correlation between wages in unionized and non-unionized companies in the manufacturing industry between 1973 and 1976. No significant relationship was found. However, other studies find a spillover effect on wages. For instance, Pencavel (1991) shows presence of a certain spillover effect of a given company's bargaining power on the wages of its competitors.

A good reference in the measuring of spillover effect on stock prices is Bronars and Deere's (1994). They took the work of Ruback and Zimmerman (1984) for companies trading on the NYSE as point of departure and estimated the impact on the prices of stocks of companies in the same sector when demands were made by union representatives in the company and presented to the National Labor Relations Board in the United States. The results show a negative spillover effect accounting for 0.72 %. In regard to Spain, Inurrieta (1997a) applies the capital asset pricing model (CAPM) to annual data and finds that in certain industries firm-level collective bargaining can reduce competitors' stock prices by 0.2%. Also, Sabater and Laffarga (2008) find spillover effect although different reactions are observed depending on the industry to which the company belongs and their level of concentration.

3. Sample and variable definition

Our main sample covers companies quoted on the Madrid Stock Market that signed a firm-level collective agreement between 1995 and 2006.

First, we obtained the 384 firm-level collective agreements signed in companies quoted on the Madrid Stock Market from the Collective Agreement Register. As time 0, or zero moment, i.e., the date on which the signing 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 and verified 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)[1]. 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 behavior in the magnitudes of the sample companies, we then selected the length of the event window. We considered the five days before and after the zero moment. The reason for this is because, 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 companies which happen to have more than one relevant announcement within the event window (apart from the bargaining agreement, 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.

In the case of Spain, a firm-level agreement is mandatory enforced. Indeed, the firm is required to publish the text of the agreement and the date of the signing in the BOE (Spanish Official State Gazette). Once the text as drafted by unions and firm is signed (zero moment), it is filed with the Public Registry for Agreements at the Department of Employment. The average time between signing the agreement and registration is five days. We assume that the latest time that the information is made public is when it is filed with the registry. The market may often know about the agreement days before it is signed. This is the case when there is a pre-agreement which usually gets media coverage. However, before any type of agreement is reached, both parties (the firm and unions) do not leak information to the press in order not to endanger the final agreement. Therefore, we consider the event analyzed as non-anticipated.

The sample remaining after these exclusions consisted of 138 firm-level collective agreements over a period of 12 years, 1995-2006, corresponding to 11 sectors according to the CNMV two-digit sector classification. The industries are: new technologies; trade and other services; metal manufacturing; other manufacturing industries; cement, glass and construction materials; real estate; chemicals; finance; utilities, transport and communications, and basic metal industries.

The distribution of the sample among sectors and years is illustrated in Table 1. Two of the sample years (1995, 1996) are more active and account for over 10% of the sample, while 1995 carries over 14% of collective agreements. In relation to the distribution among sectors, over 50% of signings of firm-level collective agreements correspond to three sectors: utilities (41), transport and communications (26), and metal manufacture (14)[2].

The next step in the analysis of the spillover effect requires a sample composed of "non-event firms": for each date and company signing a firm-level collective agreement, we obtained competing companies, within the same industry, and quoted on the Madrid Stock Market, but not experiencing the event. These companies are regulated by the industry-level collective agreement because they have not signed a firm-level collective agreement. For greater robustness in the results, we consider as "non-event 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. The competing samples are illustrated in panel B of Table 1 for the 11 sectors and 12 years considered in this study.

Table 1. Sample distribution among years and sectors

Panel A. Event sample													
Industry/year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	TOTAL
MI	2	2	2	0	1	1	2	1	0	0	0	0	11
MM	2	1	3	2	1	1	1	0	0	1	1	1	14

[1] The Spanish SEC.
[2] This difference through the years is due mainly to the exclusions of observations when, apart from having a firm level agreement, they have other events that could influence on stock market.

Table 1 (cont.). Sample distribution among years and sectors

Panel A (cont.). Event sample													
Industry/year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	TOTAL
CI	3	1	1	0	1	0	0	0	0	0	0	0	6
UT	4	7	5	3	2	1	2	1	5	1	4	6	41
TC	0	0	2	3	3	2	3	2	4	5	0	2	26
BM	0	0	0	0	0	2	0	0	1	0	0	0	3
NT	1	2	1	2	1	0	2	0	1	1	1	1	13
CGC	3	1	0	0	0	0	0	0	0	0	0	0	4
TOS	2	2	1	2	0	1	2	1	1	0	0	1	13
RE	2	0	0	0	0	0	0	0	0	0	0	0	2
FINAN	1	1	1	0	1	1	0	0	0	0	0	0	5
TOTAL	20	17	15	12	10	9	11	5	12	8	6	11	138
Panel B. Competing non-event sample													
Industry/year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	TOTAL
OMI	17	14	12	0	11	8	5	6	5	4	0	5	87
MM	6	7	7	7	5	3	3	0	4	3	4	3	52
CI	5	3	2	0	2	0	0	0	1	3	1	0	17
UT	0	0	0	0	0	0	0	0	0	0	0	0	0
TC	0	0	5	4	0	1	1	1	0	0	3	0	15
BM	0	0	0	0	0	7	0	3	0	0	0	1	11
NT	5	6	7	5	2	0	2	0	5	0	2	0	34
CGC	3	2	0	0	0	0	0	0	0	0	0	0	5
TOS	6	5	3	5	0	6	2	0	0	2	1	0	30
RE	15	0	0	0	0	0	0	2	0	1	0	0	18
FINAN	15	12	11	0	9	9	0	0	0	8	0	0	64
TOTAL	72	49	47	21	29	34	13	12	15	21	11	9	333

Notes: Panel A presents distribution of firm-level collective agreements or events per year and industry. Panel B presents competing non-event sample per year and industry; OMI – other manufacturing industries, MM – metal manufacture, CI – chemistry industry, UT – utilities, TC – transport and communication, BM – basic metal, NT – new technologies, CGC – cement, glass and construction materials, TOS – trade and other services, RE – real estate and FINAN – finance.

The first part of the study focuses on the signing of 138 firm-level collective agreements. In order to analyze the spillover effect, we used 333 elements corresponding to competing companies without firm-level agreements, consisting of data on daily stock prices and daily stock trading volumes. The historic data sample selected covers the period between January 2, 1995 and December 31, 2006. The market portfolio is represented by the IBEX 35 index. The information was drawn from the SIBE database.

By means of an analysis of equality of mean per industry, we study the most significant differences in size, number of employees, labor costs per employee, earnings, productivity and coverage ratio between firms under their own collective agreement and those applying the industry level agreement. Data is for the year the collective agreement is signed.

Table 2. Descriptive analysis. Event sample and competing sample for industry

Industry	Sample	Size	Employment	Lc/empl	Productivity	Earnings	Coverage ratio
OMI	M1	1135.47***	6589**	65.20***	1.76	75.44***	17.18***
	M2	225.47	3157	31.5	1.94	14.24	82.81
MM	M1	1465.93	4528.45***	35.37*	3.42***	35.45***	18.72**
	M2	164	2358.47	25.14	1.78	11.6	81.28
CI	M1	14145.38*	1287	48.50	2.45***	47.6***	6.37***
	M2	148.68	1145	42.50	1.37	11.4	93.63
UT	M1	5589.14	9358*	47.60	3.57	414.6	100***
	M2	5489.65	13115	41.75	3.67	350.4	0
TC	M1	24255.64***	45899**	40.35	3.72***	835.3***	40.95
	M2	456533	3415	38.55	0.8	-68.3	59.05
BM	M1	1278.47	17185***	45.60**	1.54	387.3	34.23
	M2	536.41	2535	37	2.25	73.24	65.77

Table 2 (cont.). Descriptive analysis. Event sample and competing sample for industry

Industry	Sample	Size	Employment	Lc/empl	Productivity	Earnings	Coverage ratio
NT	M1	312.78	2052	32.58	1.38***	6.7	88.80**
	M2	535.75	3589	34.78	1.75	18.4	11.20
CGC	M1	635.7***	3125**	72.50*	2.15	57.32***	89.33**
	M2	134.42	834	45	2.55	14.97	10.66
TOS	M1	385.78	13687	27.85	1.75	27.5	5.64***
	M2	765.25	6525	20.32	1.97	45.6	94.35
RE	M1	97.34	1315***	56.65**	3.70	1.25	62.12
	M2	58.4	118	31.50	-2.30*	0.587	37.87
FINAN	M1	21317.85***	36558***	83.76***	3.32	1224.6***	5.76**
	M2	2115.85	2897	45.84	2.45	86.7	94.24

Notes: Mean of financial and accounting variables in event sample (M1) and competing sample (M2). The industries are OMI – other manufacturing industries, MM – metal manufacture, CI – chemistry industry, UT – utilities, TC – transport and communication, BM – basic metal, NT – new technologies, CGC – cement, glass and construction materials, TOS – trade and other services, RE – real estate and FINAN – finance. Size: Market capitalisation in thousand €; Employment: Number of employees the year the agreement is signed; Labor costs/number of employees in thousand €; Productivity: (Operating income – procurement cost – other operating cost)/ Labor cost in thousand €; Earnings: Annual earnings in million €. Coverage ratio: or percentage of workers with firm-level collective agreements or industry-level collective agreements. Significantly different at 10%; ** significantly different at 5%; *** significantly different at 1%.

If we consider the variable size, the largest firms signing firm-level collective agreements are in chemical industry, other manufacturing industries, transport and communications, and financial. An analysis of the utilities and financial industries shows different results for the different variables. Utilities is the only sector that does not have an industry-level collective agreement, so we consider as "non-event firms" for utilities those companies that do not negotiate a labor agreement the same year that event firms. Utilities' ratios indicate that there are no significant differences between the two groups of companies, as might be expected, since all companies have the same type of collective agreement. The opposite holds in the financial sector. Almost all financial entities apply the industry-level agreement, with the only exception being large firms with a high number of employees and a better financial position than their competitors. There are no significant differences in trade and other services sector. Table 2 also shows that productivity bonuses, which are among the conditions sometimes established in collective agreements, depend on the industry under study. Productivity varies across industries either in size or in magnitude, due to different features such as market structure and technology intensity (Clark, 1980).

The variable labor costs per employee are high in firms under a firm-level collective agreement. They are significantly high in cement, glass and construction materials, metal manufacturing, other manufacturing industries, and finance. If we focus on annual earnings, they perform better despite the high labor costs per employee, except in the case of new technologies. It should be borne in mind that large firms with better performance are targeted by trade unions to draw more income in collective bargaining (Jimeno and Rodriguez, 1996).

Finally coverage ratio in the industries in which the industry-level agreement is predominant are identified by the fact that the number of workers regulated by the collective agreement is much higher than the number of workers under firm-level agreements. In these industries unions have greater bargaining power than the companies and the industry reference wage is high. Accordingly, it is not attractive to negotiate a firm-level agreement. Table 2 shows that industries such as trade and other services, the chemical industry and finance have the highest number of workers subject to industry-level agreements. In turn, in sectors with a higher presence of firm-level agreements, the wages obtained in industry-level agreements are lower because of the weaker bargaining power of the trade unions. Unions renegotiate firm-level collective agreements, and the number of workers subject to this type of agreement is higher. This is the case in cement, glass and construction materials, new technologies and utilities.

4. Effect on market variables

As already mentioned in the introduction, our objective here is to verify whether collective bargaining at firm level has an impact on stock returns and trading volume. To this purpose we will use the event study technique[1].

4.1. Effect on stock price. Since stock prices reflect the true value of a company and change immediately in response to any event that may potentially affect the company's future cash-flows, we can measure the impact on the corporate value of a given event by observing stock price changes over a very short time period around the date of the event.

[1] For further information on the event study methodology see Campbell et al. (1997) and Khotari and Warner (2007).

The first variable is the occurrence of abnormal returns in companies signing a collective agreement, around the date of the event. In order to calculate this, we will use as normal the return given by the market model:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}, \quad (1)$$

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 abnormal daily returns (AR_i) for information on company i:

$$AR_{it} = R_{it} - (a_i + b_i R_{mt}), \quad (2)$$

where a_i and b_i are the OLS estimates obtained in the regressions (1) by using a period of 145 days before the announcement. That is an appropriate period of time for estimating the parameters according to available empirical evidence on event study. Parameters are estimated by OLS[1].

Abnormal returns from stocks are averaged in a cross section throughout each day of the event window or study window, producing 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:

$$CAR(t_1, t_2), = \sum_{t=t_1}^{t_2} AR_t. \quad (3)$$

If the signing of a firm-level collective agreement conveys new information to investors, the expected value of the 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 evolution of abnormal returns in the study window indicates that some of the distributions are slightly biased and present leptokurtosis. 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. Such a test has to account for the presence of non-normal distribution, as Corrado's test (1989) does.

As opposed to parametric tests, the Corrado test makes no pre-assumptions regarding the distribution of returns; the test is adapted to correct for infrequent trading (Corrado and Zivney, 1992). The expression of the statistic is as follows:

$$\frac{\frac{1}{N}\sum_{i=1}^{N}\left[K_{it} - \frac{1}{2}(\tau+1)\right]}{S(K)} = \frac{\frac{1}{N}\sum_{i=1}^{N}\left[K_{it} - \frac{1}{2}(\tau+1)\right]}{\sqrt{\frac{1}{\tau}\sum_{t=1}^{\tau}\left[\frac{1}{N}\sum_{i=1}^{N}\left[K_{it} - \frac{1}{2}(\tau+1)\right]\right]^2}}, \quad (4)$$

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[1].

Additionally, this study incorporates a further non-parametric test based on the bootstrap methodology. The test aims at 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 $\{X_i: I = = 1,\ldots, N\}$:

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

The following statistic is calculated for each sub-sample:

$$t_b = \frac{\overline{X_b} - \overline{X}}{\hat{\sigma}(X_{b,i}) \Big/ \sqrt{N_b}} \text{ for } b = 1, \ldots, M, \quad (5)$$

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

This process continues if the number of extracted sub-samples M is high. Then, we obtain a sample of bootstrap statistics $\{t_b: b = 1,\ldots.., M\}$ large enough to figure 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:

[1] Parameters α and β have also been estimated with Theil's non-parametric technique and the same results were obtained.

$$Pr(t_b \le X_L) = Pr(t_b \ge X_u) = \frac{\alpha}{2}, \quad (6)$$

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

In order to analyze the robustness of the results obtained in the event study, we have added an alternative filter for the identification of economically significant abnormal returns to the traditional methodology[1]. We consider as atypical performance of those abnormal returns that fall out of the established range. Such a range comprises twice the standard deviation above and below the abnormal returns calculated over the 145-day period prior to the event. As normal returns, we have used the market model for the calculation of abnormal returns. Once obtained, we consider those that fall out of the range to be significant and we test the significance of the selected abnormal returns using Corrado's non-parametric test. The results are the same as in traditional methodology[2].

4.2. Effect on trading volumes. This section analyzes the effect of these labor-related events on daily stock trading volumes. The literature uses several models to estimate abnormal trading volumes around an event: the market-adjusted model followed by Atiase and Bamber (1994), or the model applied by Kross et al. (1994), to measure abnormal trading volumes adjusted to the median of the volumes during the period analyzed for each company. In this section we have used the model proposed by Bailey et al. (2002) and Chae (2002), to calculate abnormal trading volumes using the average trading volumes during the estimation period for each company.

With regard to the abnormal volume observed on day t for each stock i, we compare traded capital (or observed volume for each day and company) around the time of signing the collective agreement (V_{it}), with the average capital traded in the 145-day period prior to the event window, or expected volume[3].

$$\nu_{it} = Ln(1 + V_{it}), \quad (7)$$

$$\overline{\nu}_{it} = \frac{\sum_{t=1}^{145} Ln(1 + V_{it})}{145}, \quad (8)$$

where ν_{it} is the logarithmic transformation of the observed volume, and $\overline{\nu}_{it}$ is the expected volume.

The abnormal trading volume of asset i on day t of the event period is the excess observed over the volume, estimated according to equation (6):

$$AV_{it} = \nu_{it} - \overline{\nu}_{it}. \quad (9)$$

Abnormal trading volumes are averaged in a cross-section each day of the event window, resulting in the daily average abnormal volume,

$$AV_t = N^{-1} \sum_{i=1}^{N} AV_{it}.$$

In order to complete the analysis and to capture any potential anticipation or delay of information, we analyze the cumulative trading volume excess in the different windows around the date the agreement is signed. This is expressed as follows:

$$CAV(t_1, t_2) = \sum_{t=t_1}^{t_2} AV_t. \quad (10)$$

In order to test the presence of abnormal volumes caused by the event we apply Corrado's non-parametric test (1989) and the non-parametric bootstrap technique.

4.3. Results. An analysis of changes in stock prices shows that the disclosure of signing of a firm-level collective agreement has an informative effect on investors. Table 3 shows the results of the significance tests for abnormal returns and volume.

Table 3. Abnormal market variables (Corrado's test (1989) and the bootstrap technique, N = 138)

Panel 1. Daily abnormal market variables						
Day	AR	Corrado	Bootstrap	AV	Corrado	Bootstrap
-5	-0.0020	-0.339	-1.308	0.3759	0.978	0.306
-4	0.0009	0.566	0.272	0.5423	2.152**	2.347***
-3	0.0007	0.085	0.228	0.3921	1.835*	1.530
-2	0.0016	0.939	1.096	-0.3255	-1.235	0.102
-1	0.0001	-1.196	-1.009	0.1675	0.895	0.102
0	-0.0015	-1.651*	-2.035**	0.4457	2.433***	2.755***

[1] For this purpose, we have followed the methodology applied by Ryan and Taffler (2004).

[2] 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, then the news will bias the firm's model parameters and, in turn, result in the CARs as a response for 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 labor agreement. Therefore, market adjusted returns were used as well. We obtain the same results as in market model prediction.

[3] The transformation of variables with logarithms solves the problem of non-normality.

Table 3 (cont.). Abnormal market variables (Corrado's test (1989) and the bootstrap technique, N=138)

Panel 1 (cont.). Daily abnormal market variables						
Day	AR	Corrado	Bootstrap	AV	Corrado	Bootstrap
1	-0.0021	-1.708*	-1.684*	0.0398	0.589	1.530
2	-0.0031	-2.221**	-2.153**	-0.1686	0.245	0.918
3	0.0003	0.980	-0.091	0.1245	0.008	1.939*
4	-0.0015	-0.683	-1.672*	-0.3234	-1.125	0.918
5	-0.0000	-0.512	-0.285	-0.0685	-1.255	0.102
Panel 2. Cumulative abnormal market variables						
Interval	CAR	Corrado	Bootstrap	CAV	Corrado	Bootstrap
(-5,+5)	-0.0063	-2.225**	-2.204**	1.2426	0.978	0.714
(-2,+2)	-0.0050	-2.733***	-2.695***	0.2908	-0.825	0.714
(-1,+1)	-0.0035	-2.733***	-2.730***	0.6873	1.305	1.122
(-5,-1)	0.0014	0.501	0.363	1.2435	2.239**	2.576***
(+1,+5)	-0.0077	-2.733***	-2.658***	-0.3375	-0.361	1.349

Notes: Effect of a firm level collective agreement on the market variables. The variables are: AR – abnormal daily returns; AV – abnormal trading volume; CAR – cumulative abnormal returns; CAV – cumulative abnormal volumes; Corrado: Corrado's test; bootstrap. * significant at 10%. ** significant at 5%. *** significant at 1%.

The first panel shows the daily abnormal returns for each day during 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 the agreement is signed. Average daily abnormal returns on the day of the event are -0.15%, and Corrado's test and the bootstrap test both give significant values of -1.65 and -2.03 respectively. Average abnormal returns on the day after the announcement are of -0.21%; this figure is also negative and significant for Corrado's and bootstrap test. The sharpest reduction in stock prices takes place on day +2 reaching a value of -0.31%, significant for both tests.

Panel 1 (fifth, sixth and seventh column) gives the results of the significance tests for daily abnormal trading volumes during the event window.

The most significant changes in trading volumes are observed on days -4, 0 and 3 for bootstrap, with increases after undoing the logarithmic transformation of 71.60%, 55.27% and 12.74% respectively. According to Beaver (1968), Karpoff (1986) and Bamber and Cheon (1995), the presence of high trading volumes prior to the event indicates information asymmetry and heterogeneity in the expectations of individual investors. This heterogeneity stems from the differences in terms of preferences, and from the type of information obtained before the announcement reaches the market. This absence of homogeneity in investor expectations causes individual reactions reflected in changes in trading volumes. This would explain the change in trading volumes, but not in stock prices observed on day -4.

Until investors stop differing on how they interpret information, there are positive abnormal trading volumes and no abnormal returns. In our case, we have observed that consensus is reached on the day of the event: negative abnormal returns and positive abnormal trading volumes at time zero indicate that stock price reductions are caused by selling pressure on the stocks, since the event is interpreted as bad news.

With regard to the presence of positive abnormal trading volumes on day 3 of the window, Morse (1981), Karpoff (1986) and Bamber (1987), suggest that high volumes persist over the five days after the announcement of the event, even after the adjustment of stock prices. This is because information reaches some investors late, and they adjust their portfolios ignoring the fact such information is already outdated.

Panel 2 (Table 3) summarises the cumulative abnormal market variables by means of different windows around the event.

Cumulative average abnormal returns in event window (-5, +5) are -0.63%, a highly significant figure 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 post-event windows, such as (+1, +5) with a p-value of -2.73 and -2.65, 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 -2 and day +2. Cumulative average abnormal returns for window (-5, -1) are +0.14%; -0.35% for (-1, +1) and the strongest decrease is for window (+1, +5), accounting for -0.77%, all significant for the bootstrap test. Our findings are consistent with previous research (Ruback and Zimmerman (1984), for the US market; Inurrieta (1997b), Sabater and Laffarga (2006), for Madrid Stock Market).

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

The results obtained for abnormal returns suggest that investors agree to interpret the information content of the event as bad news. Investors incorporate this information into their stock dealings in the days following the signing of a firm-level collective agreement.

Measuring cumulative abnormal trading volumes shows the effect of the signing of a firm-level collective agreement in different windows. For interval (-5, -1), there are positive and significant changes in cumulative average volumes which account for 345% of all tests applied. We observe that the higher trading volumes occur before the date the agreement is signed. This may be caused by disagreement in the interpretation of the information when it is known to the market; or by the presence of investors with pre-existing heterogeneous expectations, even though the information is interpreted in a homogeneous manner. After zero moment, the post-event windows are not significant. The highest trading volumes occur up until the signing of the collective agreement. From then onwards, there is a significant reduction. There is a slow reduction of abnormal trading volumes as days pass after the agreement is signed.

Our results indicate that excess trading volumes on the days prior to signing of the collective agreement again reflect that the event has informative content for investors. However the market interprets the information differently, resulting in positive abnormal trading volumes and absence of stock price movements. Thus, from the event day, and due to the market negative interpretation, the excess in traded capital together with stock price reduction indicate a higher selling pressure on the stocks affected by the signing of the agreement.

We can accept the hypothesis that the signing of a firm-level collective agreement is taken as bad news and results in lower stock prices, and greater sales pressures on the stocks.

5. Spillover effect

Event Study technique is used again to test whether investors in rival companies take into consideration the industrial relations between trade unions and companies with firm-level collective agreements. The variable to be considered in this part of the study is the abnormal returns of the competing company around the date the firm-level collective agreement is signed. If the event conveys new information to investors in rival companies, the expected value of abnormal returns must be significantly different from zero. In order to test this hypothesis we have used Corrado's test (1989) and the bootstrap technique.

In the analysis of the spillover effect, results show that the announcement of a firm-level collective agreement has information content for investors of the competition. The cumulative abnormal returns show the effect of the announcement on competitors regulated by the industry-level agreement in different windows. As the daily analysis of abnormal returns has shown, these are significantly different to zero on different days and with a different sign even within the same industry; this provides the cumulative effect of the event.

Our results indicate the presence of a spillover effect, but its magnitude and sign depends upon the specific industry under study.

Our results indicates, that within sectors with an industry-level agreement, companies with no spillover effect belong to basic metal, glass and construction materials, real estate, transport and communications and new technologies. This result, as argued by Bronars and Deere (1994), may be due to the heterogeneous character of the companies competing in the same sector. Metal manufacturing and other manufacturing industries show a slight reaction with a single negative window significantly different from zero.

The strongest reactions with a negative sign occur in chemical industries and finance, and the weakest in metal manufacturing and other manufacturing industries. Table 4 shows that a significant market share is held by companies regulated by their own collective agreement. These companies have a higher operating income and size than their competitors implementing an industry-level agreement. In these sectors in which the leading company has its own company agreement and the other companies reproduce such a situation, the leader-follower strategy may occur: in chemical industries, finance, other manufacturing industries and metal manufacturing, investors in rival companies applying the industry-level agreement interpret the signing of a firm-level collective agreement as bad news. For those investors such an agreement may prompt employees to follow the actions of their competitors in order to achieve better economic and labor conditions. Our results agree with the work conducted for the USA market by Bronars and Deere (1994). Inurrieta (1997a) and Sabater and Laffarga (2008) also find a spillover effect of a negative sign with respect to union power in sectors with a higher industrial concentration level in the Spanish market.

Table 4. Spillover effect. Cumulative abnormal returns. Corrado's and bootstrap tests. Effect on rival companies with industry-level agreement

	CGC			TOS			FINAN			NT			OMI		
N	5			30			64			34			87		
	CAR	Corrado	Boots	CAR	Corrado	Boots	CAR	Corrado	Boots	CAR	Corrado	Boots	CAR	Corrado	Boots
(-5, -1)	-0.007	-0.587	-0.486	0.013	1.948*	2.242**	-0.005	-1.512	-1.504	0.005	0.528	0.445	-0.001	-0.587	-1.601
(-5, +5)	0.035	0.987	1.359	0.012	1.307	1.458	-0.011	-2.463***	-2.258***	-0.009	0.041	-0.458	0.001	0.212	0.085
(-2, +2)	0.003	-0.254	0.128	0.010	2.005**	2.437***	-0.006	-2.502***	-1.756*	-0.015	-1.128	-1.235	0.003	0.261	0.325
(-1, +5)	0.041	1.115	1.215	0.009	0.874	0.822	-0.005	-1.957*	-1.756*	-0.021	-0.978	-1.288	0.001	0.098	0.328
(-1, +1)	0.006	0.045	0.412	0.011	1.712*	1.642*	-0.004	-2.157**	-1.105	-0.009	-0.657	-1.415	0.000	0.248	-0.115
	RE			CI			BM			MM			TC		
N	18			17			11			52			15		
	CAR	Corrado	Boots	CAR	Corrado	Boots	CAR	Corrado	Boots	CAR	Corrado	Boots	CAR	Corrado	Boots
(-5, -1)	-0.023	-0.785	-1.482	-0.040	-1.621	-1.958*	-0.017	-0.232	-1.164	0.001	-0.718	0.025	-0.013	-0.871	-0.935
(-5, +5)	-0.002	0.452	-0.025	-0.061	-1.610	-2.823***	-0.023	-0.164	-0.848	0.004	-0.374	0.164	0.007	-0.262	0.376
(-2, +2)	0.003	0.312	0.115	-0.023	-0.855	-1.642*	0.000	0.318	-0.018	-0.005	-0.678	-0.458	0.025	1.604	1.655
(-1, +5)	0.011	0.821	1.038	-0.024	-1.818*	-2.615***	-0.005	-0.112	-0.412	-0.006	-0.911	-0.520	0.017	0.424	0.835
(-1, +1)	0.005	0.512	0.465	-0.007	-0.095	-0.354	-0.011	-0.975	-0.618	-0.015	-2.122**	-2.164**	0.011	0.835	0.997

Notes: The table shows cumulative average abnormal returns CAR_J in each sector for rival companies not having a firm-level agreement in the sampling period. CGC – cement, glass and construction material, TOS – trading and other services, FINAN – financial, NT – new technologies, OMI – other manufacturing industries, RE – real estate, CI – chemical industry, BM – basic metal industries, MM – metal manufacturing, TC – transport and communications. CAR – cumulative average abnormal returns; Corrado – Corrado's test; boots – bootstrap. N – number of events. * significant at 10%. ** significant at 5%. *** significant at 1%.

The trade and other services industry presents significant abnormal returns but with a positive sign along the study window. In this sector, investors in rival companies applying an industry-level agreement interpret firm-level agreements as positive, and their stocks benefit from excess returns with a positive sign as compared to what was expected at that time. Table 4 shows that there are no significant differences between the two groups of companies in the trade and other services sector, in which companies have similar market shares and they all have the same operating costs. Furthermore, the bargaining structure of the trade and other services sector presents trade unions with greater bargaining power than owners. As Table 4 shows, a majority of workers are regulated by an industry-level agreement, which indicates that reference wages in this industry are very high and therefore, companies have no incentive to sign their own agreements. In this context, as put forward by Barcena and Inurrieta (1997), a company in the sector deciding to renegotiate industry-wide wages would move towards an excessive increase in labor and production costs and an important loss of market share for the company. This would all translate into benefit for the employees (who obtain higher wages) and investors in rival companies (who obtain higher profits resulting from their company's higher market share).

The chemical, financial and metal manufacturing sectors have the same bargaining structure as trade and other services. However, the specific characteristics of each sector lead to different results. Table 4 shows that companies in these industries with their own collective agreements are bigger and their financial situation is much better than companies applying the industry-level agreement. In this case wage increases do not benefit rival companies. Investors penalize stocks in response to potential negotiations at company level, as reference wages for the industry are high and signing an agreement would not be viable.

The results prove the second hypothesis: the signing of a firm-level collective agreement has information content for investors in competing companies.

Conclusions

In the understanding that signing a firm-level collective agreement could affect investor appraisal of stock, this paper analyzes the consequences of such an event on two variables in companies present in the Spanish Stock Market: abnormal returns and abnormal trading volumes on the days around the date the agreement is signed.

An analysis of movements in stock prices and trading volumes around the event by means of the estimation of abnormal returns shows that the announcement of a firm-level collective agreement has some information content and is usually considered bad news by the market. On the other hand, we have found abnormally high trading volumes on the days before the announcement of the agreement. This is linked to the heterogeneous character of investor expectations, which persist to a smaller extent together with abnormally low returns closer to the date of the event. Therefore, we can conclude that investors reach a consensus when the agreement is signed.

We can see that the event has information content not only for investors in companies that sign their own collective agreement, but also for investors in the competition. The spillover effect on the Spanish Stock Market is significant in industries with a clearly defined bargaining structure.

Thus, within industries 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 imitating, thus, the behavior of the leading company in the industry. Conversely, for industries with companies of similar size and sufficiently high reference wages, firm level agreements could yield a loss of market share from which competing companies will profit. Then investors in competing companies react positively.

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