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Dividends and Market Signalling: an Analysis of Corporate Insider Trading

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Abstract

This study tests the multiple-signal theory of dividends of John and Lang (1991) in the context of a European market. Our evidence shows that investors are more sensitive to insider trading signals than to signalled changes in existing dividends. In effect, the insider sales signal is universally understood as bad news. After controlling for the quality of a firm's investment opportunities, investors are found to penalise dividend outflows by mature firms that exhibit more informed insider sales activity. Finally, we offer an innovative exploration of the role of earnings announcements in market reaction to the dividend signal.

Keywords: *dividend announcements*, *insider trading*, *information-based signalling theory of dividends*, *cash flow signalling theory*, *earnings announcements*

JEL Classification: *G*14; *G*35

1. Introduction

Recent studies on the signalling theory of dividends highlight the decline in the information content of dividend announcements and, consequently, their inefficiency as market signals. Among the plausible explanations for this decline is the need to

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control for other factors, such as (i) institutional holdings (Amihud and Li, 2006), (ii) the 'catering' effect (i.e., managers pay dividends when investors place a premium on dividend paying stocks, as in Baker and Wurgler, 2004), and (iii) insider holdings (John and Lang, 1991).

With regard to insider holdings, John and Lang (1991) point out that dividends can be useful signals only when combined with other market signals, such as the level of insider trading, leading to the so-called multiple-signal cash flow signalling theory. Under the assumptions of this theory, dividend initiations do not always signal good news, since other signals may modify the information content of the dividend announcement. In fact, these authors provide evidence showing how dividend announcements come to be considered good news or bad news depending on the magnitude and sign of insider transactions.

The current paper attempts to deepen the analysis of the information effects of dividend announcements by testing the multiple-signal theory under a different framework. First, we generalise the John and Lang (1991) model to announcements of dividend increases and decreases, in addition to dividend initiations or omissions. As noted by Li and Lie (2006), corporate managers are far more likely to face decisions related to changing the level of existing dividends than decisions related to either introducing new dividends or eliminating an existing dividend.

Second, we improve on the John and Lang (1991) model by making the first attempt to isolate the dividend announcement from contemporaneous earnings announcements, since the information content of dividends may already have been conveyed by the earnings numbers.

Third, we use a more accurate proxy of insider trading based on Hillier and Marshall (2002). We distinguish between insider transactions that are *informed* and *uninformed*, that is, whether insiders are able to anticipate future market movements.

Finally, we focus on a market other than the US, thus providing the first international comparison for US results. By focusing on the Spanish market, we test the John and Lang (1991) model for the first time in a European market. Dividend signals in Spain are particularly well suited to an analysis of how complementary signals (e. g., insider holdings) may drive changes in information asymmetries. In fact, Rubio and Tapia (1996) reported no changes in information asymmetries around dividend announcements by Spanish firms from 1990 to 1994, despite a tax-system that did not penalise dividends on capital gains.

Several specific features of the Spanish market help to explain why this is so. Spain is a civil law country, in which investor protections are weaker than in the US and other European markets (La Porta *et al*., 1998, Pindado and De la Torre, 2006) and where information asymmetries are very high (Del Brio *et al*., 2002). This occurs despite the existence of comprehensive regulation on insider trading,[1] since the level of enforcement in Spain is very low. According to the Spanish National Securities Exchange Commission (CNMV), there is suspicion of market abuse in 40% of takeover announcements, but penalties were brought in only 3% of cases from 1992 to 2007. This lack of enforcement was especially noticeable during the 1992–1996 period, a time when Spain scored less than 4 out of 10 on the Transparency International Corruption

[1] In Spain, insider trading is regulated by Ley 24/1988, partially modified by the Ley 44/2002. EU Directive 2003/6/CE on market abuse and the EU Directive 2004/39/CE (MiFID) are expected to be incorporated into Spanish national regulation (Real Decreto 1333/2005 and Real Decreto 364/2007).

Perception Index. In such a market, the analysis of any signalling mechanism, understood as a way of diminishing information asymmetries, should be of greater interest.

Accordingly, we analyse the stock market's reaction to four distinct situations: increases and decreases in dividends combined with *informed* purchases and increases and decreases in dividends combined with *informed* sales. By examining the interaction of both dividends and insider trading with the quality of the firm's investment opportunities, we also identify which signal has more information content. Thus, we test which hypothesis is more appropriate for depicting the information content of dividend announcements: the cash flow signalling theory or the multiple-signal cash flow signalling theory.

Our results suggest that a joint analysis of dividends and insider trading changes the expected reaction to dividend announcements. In fact, an increase in dividend payouts represents good news only when it is preceded by *informed* net purchases. In turn, an increase in dividends represents bad news when there are *informed* net sales in the preceding months. Moreover, in some cases the insider trading signal seems to be more informative for the market than the dividend signal.

Furthermore, we conclude that investors are able to disregard dividend increase signals when they are sent by firms with non-valuable investment opportunities. The results of this study are at variance with results obtained from the US market under similar assumptions. This could be due not only to the specific features of the Spanish markets described above, but also to such differences as the depth, size, and liquidity[2] of the Spanish market compared to its US counterpart.

This paper proceeds as follows: Section 2 reviews the signalling theory of dividends and analyses the role of insider trading as a combined market signal. Section 3 describes the sample and the methodology employed. Sections 4 and 5 present the results and the main conclusions, respectively.

2. Literature Review

Traditionally, the finance literature has distinguished two major approaches to the signalling theory of dividends: (1) the cash flow signalling theory (which Kaestner and Liu (1998) also call the single-signal cash flow theory), which predicts a positive relationship between changes in dividends and stock market movements; (2) the multiple-signal cash flow, or information-based, signalling theory, which holds that multiple signalling policies may distort the interpretation of dividend announcements.

According to the cash flow signalling theory of dividends (John and Williams, 1985, Miller and Rock, 1985, Khang and King, 2003), managers have more information than outsiders; when this private information contains good news, they have incentives to signal it to investors unambiguously. Thus, for a firm having high-quality investment opportunities, managers would signal this by increasing dividend payouts and investors would react positively to such dividend increase, even though it implies raising capital. In fact, this theory predicts a similar stock price response to any management decision. The main weakness of this theory is that it is not consistent with the observed non-uniformity of stock price responses to a given dividend change (Kaestner and Liu, 1998).

In contrast, the multiple-signal cash flow theory of dividends focuses on how managers use market signals to bring stock prices back in line with a firm's intrinsic value when

[2] The total market capitalisation on the Spanish stock exchanges was equivalent to the 5.5% of the total on the NYSE (Abad and Robles, 2006).

their private information indicates that a firm's stock price is undervalued. This theory states that, in such a case, a single signal may not be sufficient for managers to align stock prices with their intrinsic values. Thus, in addition to dividends, managers should simultaneously use alternative signals to convey their private information to the market. Among alternative potential signals, the literature has focused on investment (John and Mishra, 1990), share repurchases (Chhachhi and Davidson, 1997, Grullon and Michaely, 2002), and insider holdings (John and Mishra, 1990, John and Lang, 1991).

John and Lang (1991) provide the basis for a new approach to the signalling theory of dividends by examining how the information content of dividends may be nuanced by insider trading prior to the dividend announcement. Moreover, when taking into consideration a firm's level of technology (as measured by Tobin's q), they conclude that for mature firms, dividend initiations are positive signals only when they are preceded by insider purchases. However, for firms with good growth expectations, the market reacts positively to dividend initiations even when insiders are net sellers.

More recently, Kaestner and Liu (1998) and Khang and King (2003) have obtained results opposite to those of John and Lang (1991). Kaestner and Liu (1998) analyse the use of multiple signals, but conclude that dividends function as the most efficient signal by which managers convey information on a firm's future growth. Khang and King (2003) support the cash flow signalling theory of dividends, concluding that the higher a firm's dividend, the lower its insider trading gains.

By revisiting the relationship between insider holdings and dividend changes, we touch upon a related line of research that has already provided outstanding results: the study of insider trading around different types of corporate announcements. Because managers know, *a priori*, the date on which their corporate announcements are to be released, they have the capability to time open-market transactions in their firm's securities. The insider trading literature has traditionally focused on the trading patterns and motivations behind these transactions.

Timing by managers is a phenomenon generally observed around significant corporate events. A significant increase in net insider trading has been identified around the announcements of several types of corporate financial decisions. Gombola *et al*. (1999) find significant net insider selling prior to an SEO announcement, while Clarke *et al*. (2001) analyse the long-run performance and insider trading around SEOs. Similarly, Eyssell and Arshadi (1991) conclude that top managers increase their net purchases prior to takeover and merger announcements. Hillier and Marshall (2002) detect abnormal trading around earnings announcements. They find that insiders are able to time their trades even in markets where insider trading is banned during prohibited or close periods (Hillier and Marshall, 1998, 2002).

Insider trading around other relevant corporate announcements has been examined for corporate sell-offs, stock repurchases, earnings forecasts, exchange listing and delisting, private renegotiation, and financing issues, among others; in most cases, evidence on the timing capability of insiders has been generated. Regarding dividend announcements, insider trading has been analysed only around specially designated dividends and dividend initiations (John and Lang, 1991, Kaestner and Liu, 1998).

3. Sample and Methodology

Our sample is composed of announcements of dividend changes made by non-financial Spanish firms quoted on the Spanish Continuous Market (SIBE) for the period

1992–1996. Overall, we record 624 dividend payments announced by 88 firms, of which 319 represent increases and 219 decreases. For the remaining 86 cases, the dividend remained unchanged.

The dividend announcements used in this study are taken from a database containing historical records of dividend payments by firms quoted on the Spanish market, published in the Daily Bulletin of the Madrid Stock Exchange. From this source we also obtain the records of daily stock prices for the SIBE and the dates and magnitude of earnings announcements. Interim Financial Reports are obtained from the CNMV, as well as the Insider Dealings Records used to measure insider trading.

Like the SEC in the US, the CNMV requires officers, directors, and large shareholders of all publicly held firms to report all their trading in their firms' stocks. Spanish insiders are required to report their trading within 15 days following the trade. The daily records of these insider transactions are used to construct a proxy of information asymmetry. The realisation of a single insider transaction does not necessarily represent a meaningful signal to the market. Thus, some sort of aggregation mechanism is needed. For this purpose, we follow Hillier and Marshall (2002) and focus on *informed* versus *uninformed* transactions.

We define an *informed* trade as that insider transaction which anticipates the information contained in the dividend announcement as follows: (i) any insider purchase which anticipates a significant increase in dividends in the following three months (and the subsequent increase in stock prices); and (ii) any insider sale which anticipates a significant decrease in dividends (and the subsequent decrease in stock prices). By contrast, an *uninformed* trade is any insider transaction that is not able to anticipate any significant increase or decrease in dividends. Since *uninformed* trades might not be motivated by the possession of private information, only *informed* trades are considered in our study.

Once each insider transaction is assigned to a category, we construct two ratios: a ratio of net *informed* sales and a ratio of net *informed* purchases. These ratios are regarded as sensitive to insider information because previous evidence suggests that registered insiders tend to be net sellers over any given period. In fact, such ratios are already employed in the insider trading literature by Eyssell and Arshadi (1991) and Ke *et al*. (2003), among others. Next, we construct a dummy variable that takes the value of 1 when the ratio of net *informed* sales takes positive values during the period $(-60, -15)$,[3] and that takes the value of 0 when the ratio of net *informed* purchases is positive in the same period. For any ratio taking the value of 0, the dividend announcement is excluded from the analysis.

This paper, then, analyses the combined effect of dividend announcements and insider holdings, starting from the premise that *informed* insider purchases signal management forecasts of good future earnings and firm growth. Conversely, *informed* insider sales signal management's lack of confidence in the future prospects of the firm. We gauge the combined effect of these two signals when they reach the market contemporaneously.

The event study methodology that we employ requires that we isolate dividend announcements and insider transactions from other confounding events. For that reason, we drop from the sample all announcements that were concurrent with a relevant firm-related event, such as a merger, takeover, outstanding investment, divestment

[3] Prior evidence suggests that insiders time their transactions around the two months prior to the announcement (the CNMV allows 15 days to report insider trading).

announcement, exclusion from negotiation, equity issues, bankruptcy, or firm dissolution. In contrast, earnings announcements are an important confounding event from which dividend announcements are difficult to isolate. In Spain, as in many other countries, dividend announcements are usually reported quite close in time to the announcement of either interim or annual earnings. Since both dividend and earnings announcements contain price-sensitive information and are competing signals concerning future earnings, some effort should be made to disentangle the impacts of both announcements.

However, Aharony and Swary (1980), Bajaj (1999), and Conroy *et al*. (2000) consider that, when the Miller and Rock (1985) model applies, the pricing effects of announcements vary depending on whether the announcements are reported simultaneously or contemporaneously (i.e., conveyed to the public on different dates). In an attempt to isolate the possible effects of earnings announcements from those of dividends, Aharony and Swary (1980) suggested dropping from the sample any dividend announcement that is released at the same time as an earnings announcement. They further calculate abnormal returns associated with dividend announcements, distinguishing whether earnings announcements precede or follow dividend announcements. They find no significant difference in market reaction with regard to the timing of the earnings announcement.

Similarly, Bajaj (1999) calculates excess returns for two samples of dividend omissions: one composed of all announcements and a second composed of dividend announcements that are preceded by earnings announcements. The comparison of excess returns for both samples indicates that the information in the dividend announcement could be partially anticipated as a result of the preceding earnings announcement.

Therefore, to properly control for earnings announcements, we follow Aharony and Swary (1980) and first eliminate all dividend announcements released simultaneously with earnings announcements. As a result of these sample filters, the final sample is composed of 500 announcements, of which 293 are announcements of dividend increases and 207 are decreases.

Further, to control for the effect of contemporaneous earnings announcements, we construct the variable *UNEXEAR*, or unexpected earnings, which is measured by subtracting from the announced earnings the last available interim earnings figure. This variable is then included in the return-generating model used in the event study described below.

To measure abnormal returns around the dividend announcement, we apply the methodology of event studies, considering the day of the dividend announcement (day 0) as the event date. We estimate the market model adjusted to heteroscedasticity by a GARCH model (hereafter, Model 1), as shown in equations 1 and 2, for the 80 days prior to day -10, i.e., the estimation period is $(-90, -11)$ while the event period is $(-10, +10)$.

$$R_{it} = \alpha_i + \beta_i R_{mt} + u_{it}, \tag{1}$$

where α_i and β_i are the parameters of the model; R_{it} and R_{mt} are asset and market return, respectively; and u_{it} represents a random variable distributed as independent $N(0,\sigma_i^2)$, where σ_{it}^2 follows a GARCH process, as stated in equation 2

$$\sigma_{it}^2 = \alpha_{0i} + \alpha_{1i}\sigma_{t-1}^2 + \alpha_{2i}u_{it-1}^2; \;\; \alpha_{ji} \geq 0, \forall j = 0, 1, 2 \quad \text{and} \quad \alpha_{1i} + \alpha_{2i} < 1. \tag{2}$$

We also estimate Model 2, in which we have incorporated the variable *UNEXEAR*, so as to adjust our excess returns to any earnings announcement occurring during the

sample period:

$$R_{it} = \alpha_i + \beta_i R_{mt} + UNEXEAR_{it} + u_{it}. \quad (3)$$

For testing purposes, we use a modified version of the portfolio test to account for this GARCH structure. Finally, we also produce a test of equality of the mean to determine whether results for Models 1 and 2 are significantly different from each other.

4. Empirical Results

We first test whether the return-generating model should take into account the pricing effects of any contemporaneous earnings announcements. This is done by calculating abnormal returns through Model 1 and Model 2 and comparing these results (as shown in Section 4.1). Once the return-generating model is determined, we further calculate excess returns associated with four distinct situations: increases (or decreases) in dividends combined with *informed* purchases, and increases (or decreases) in dividends combined with *informed* sales (results shown in Section 4.2).

Finally, we analyse the interaction of dividend announcements and insider holdings with the level of valuable investment opportunities within the firm. Comparison of the market reaction to both signals, and the ex post knowledge of the true investment opportunities of the firm, allows us to calibrate the quality of each signal as a transmitter of private information (results shown in Section 4.3).

4.1. *Market reaction to dividend announcements and the effects of earnings announcements*

In order to know whether the information in the dividend announcement has been partially anticipated as a result of any contemporaneous earnings announcement, we first examine whether our results were sensitive to the incorporation of the variable *UNEXEAR* into the market model. For this purpose, we calculate the abnormal returns associated with the announcement of either dividend increases or dividend decreases by estimating Model 1 and Model 2, as described in Section 3. We then employ a test of equality of the mean to detect any significant difference between the results drawn by the models.

The average returns and t-statistics associated with the announcements of dividend increases and dividend decreases are shown in Tables 1 and 2, respectively. Panel A of each table shows the results for the estimation of Model 1 and Panel B shows the results for the estimation of Model 2. The values for the test of equality of the mean, as shown in Panel C, indicate that our results are sensitive to the return-generating model employed for both the dividend increase and the dividend decrease samples, but only on day 0. For any other day in the event period, results are largely identical. Actually, on day 0, the abnormal returns drawn by Model 2 are higher, indicating that the earnings surprise is not fully impounded in prices when the dividend signal is released. Therefore, the effects of both signals are accumulated on day 0.

The information content of the dividend announcement adjusted to the earnings figures is somewhat larger than expected. This can be explained only by a stock market that is reacting very slowly to the earnings information, rather than impounding the information instantaneously. If this is so, this finding provides evidence against the semi-strong market efficiency hypothesis.

Table 1

Market reaction to increases in dividend payouts – adjustment to earnings announcements.

This table reports abnormal returns (ARs) and t_{-GARCH} statistics sensitivity analysis for each day in the event period for the subsample of announcements of dividend increases drawn by Model 1 or GARCH_MM (Panel A), and by Model 2, where GARCH_MM is adjusted to earnings announcements (Panel B). Panel C shows values for the test of equality of the mean between the estimation of both models.

$$\text{Model 1: } R_{it} = \alpha_i + \beta_i R_{mt} + u_{it},$$

where α_i and β_i are the parameters of the model, R_{it} and R_{mt} are asset and market return, respectively, and u_{it} represents a random variable distributed as independent $N(0,\sigma_i^2)$ and σ_{it}^2 is distributed $\sigma_{it}^2 = \alpha_{0i} + \alpha_{1i}\sigma_{t-1}^2 + \alpha_{2i}u_{it-1}^2; \alpha_{ji} \geq 0, \forall j = 0,1,2$ and $\alpha_{1i} + \alpha_{2i} < 1$.

$$\text{Model 2: } R_{it} = \alpha_i + \beta_i R_{mt} + UNEXEAR_{it} + u_{it},$$

where $UNEXEAR_{it}$ represents unexpected earnings, which is measured by subtracting from the announced earnings, the last available interim earnings figure; and the rest of the variables are as shown in Model 1.

Panel A. Model 1 GARCH_MM			*Panel B Model 2 GARCH_MM and earnings*		*Panel C Mean equality test*
ARs	t_{-GARCH}	Days	ARs	t_{-GARCH}	t
1.14E-03	0.86	−10	1.24E-03	1.01	−3.26E-01
−4.13E-04	−0.09	−9	5.32E-04	0.22	6.43E-02
1.24E-03	0.19	−8	6.67E-04	0.13	−1.67E-01
1.30E-03	1.43	−7	1.36E-03	0.61	−2.73E-01
6.95E-04	1.30	−6	8.02E-04	0.28	−1.14E-01
2.49E-03	0.54	−5	1.73E-03	0.69	−3.77E-01
2.13E-04	0.45	−4	2.85E-04	0.22	−5.49E-02
9.52E-04	0.56	−3	9.29E-04	0.85	−2.85E-01
−1.69E-04	1.08	−2	−7.66E-04	−0.33	2.69E-02
1.26E-03	0.35	−1	1.13E-03	0.35	−1.82E-01
9.35E-03	1.98	0	9.14E-03	4.12	2.05E+00
−5.71E-05	0.90	1	3.88E-04	0.13	9.85E-03
−6.57E-04	0.66	2	2.28E-04	0.05	7.02E-02
−9.11E-04	0.28	3	−7.99E-04	−0.61	2.44E-01
7.04E-04	0.54	4	6.02E-04	0.53	−2.09E-01
−9.43E-04	0.52	5	−5.93E-04	−0.27	1.56E-01
−3.98E-04	−0.06	6	−3.25E-04	−0.11	5.98E-02
−7.98E-05	−0.02	7	−4.19E-04	−0.18	1.67E-02
5.72E-04	0.43	8	4.85E-04	0.42	−1.74E-01
1.03E-03	0.14	9	1.59E-03	0.45	−1.25E-01
1.14E-03	−0.20	10	−9.05E-04	−0.31	1.80E-01

4.2. *Blending the signalling effects of dividend announcements and insider trading*

Following the information-based signalling theory of dividends, we focus on the market reaction to dividend announcements when they are preceded by *informed* insider trading. By sampling for dividend announcements and *informed* transactions, we arrive

Table 2

Market reaction to decreases in dividend payouts – adjustment to earnings announcements.

This table reports abnormal returns (ARs) and t_{-GARCH} statistics for each day in the event period for the subsample of announcements of dividend decreases drawn by Model 1 or GARCH_MM (Panel A) and Model 2, where the GARCH_MM is adjusted to earnings announcements (Panel B). Panel C shows the values for the test of equality of the mean between the estimation of both models.

$$\text{Model 1: } R_{it} = \alpha_i + \beta_i R_{mt} + u_{it},$$

where α_i and β_i are the parameters of the model, R_{it} and R_{mt} are asset and market return, respectively, and u_{it} represents a random variable distributed as independent $N(0,\sigma_i^2)$ and σ_{it}^2 is distributed $\sigma_{it}^2 = \alpha_{0i} + \alpha_{1i}\sigma_{t-1}^2 + \alpha_{2i}u_{it-1}^2$; $\alpha_{ji} \geq 0, \forall j = 0, 1, 2$ and $\alpha_{1i} + \alpha_{2i} < 1$.

$$\text{Model 2: } R_{it} = \alpha_i + \beta_i R_{mt} + UNEXEAR_{it} + u_{it},$$

where $UNEXEAR_{it}$ represents unexpected earnings, which is measured by subtracting from the announced earnings, the last available interim earnings figure; and the rest of the variables are as shown in Model 1.

Panel A. Model 1 GARCH_MM			*Panel B Model 2 GARCH_MM and earnings*		*Panel C Mean equality test*
ARs	t_{-GARCH}	Days	ARs	t_{-GARCH}	t
−3.63E-04	−0.22	−10	−3.71E-04	−0.30	8.24E-02
1.27E-03	0.58	−9	1.08E-03	0.72	−1.93E-01
3.90E-04	0.11	−8	9.20E-05	0.03	−4.83E-02
2.71E-03	1.38	−7	3.36E-03	2.03	−6.43E-01
−1.34E-03	−0.62	−6	−1.53E-03	−0.83	2.82E-01
3.10E-03	1.24	−5	3.61E-03	1.68	−5.53E-01
1.18E-03	0.50	−4	9.17E-04	0.47	−2.19E-01
2.25E-03	1.38	−3	2.53E-03	2.02	−5.08E-01
−1.01E-03	−0.39	−2	−1.16E-03	−0.47	1.33E-01
1.19E-03	0.37	−1	1.39E-03	0.48	−1.58E-01
−1.14E-02	−6.13	0	−1.12E-02	−6.96	2.85E+00
−1.33E-03	−0.63	1	−5.83E-04	−0.33	2.88E-01
−1.99E-03	−0.77	2	−1.22E-03	−0.54	3.42E-01
−1.23E-03	−0.49	3	−3.72E-04	−0.18	2.14E-01
−1.32E-03	−0.82	4	−1.51E-03	−1.23	2.98E-01
−5.58E-05	−0.02	5	−2.70E-04	−0.13	7.54E-03
−3.72E-03	−1.24	6	−3.36E-03	−1.25	5.39E-01
6.86E-04	0.36	7	4.94E-04	0.29	−1.67E-01
7.68E-05	0.04	8	1.54E-05	0.01	−1.68E-02
2.94E-04	0.12	9	3.12E-04	0.15	−5.26E-02
−1.82E-03	−0.73	10	−2.12E-03	−1.05	3.20E-01

at a sample of 303 dividend announcements. In 58% of the 293 dividend increase announcements, *informed* transactions by insiders took place. This represents 167 cases, versus 132 announcements not preceded by *informed* insider transactions. Out of 207 dividend decrease announcements, *informed* insider transactions in the selected surrounding period took place in 65% of the cases (136, versus 71 announcements

Table 3

T-statistic for dividend increases preceded by either *informed* sales or purchases

This table reports abnormal returns (ARs) and t_GARCH statistics for each day in the event period (−10, +10) for two subsamples: dividend increases and *informed* purchases (Panel A), and dividend increases and *informed* sales (Panel B). Abnormal returns are drawn by Model 1.

$$\text{Model 1: } R_{it} = \alpha_i + \beta_i R_{mt} + u_{it},$$

where α_i and β_i are the parameters of the model, R_{it} and R_{mt} are asset and market return, respectively, and u_{it} represents a random variable distributed as independent N(0,σ_i^2), and σ_{it}^2 is distributed $\sigma_{it}^2 = \alpha_{0i} + \alpha_{1i}\sigma_{t-1}^2 + \alpha_{2i}u_{it-1}^2$; $\alpha_{ji} \geq 0, \forall j = 0, 1, 2$ and $\alpha_{1i} + \alpha_{2i} < 1$.

Panel A Dividend increases and informed purchases			*Panel B Dividend increases and informed sales*	
ARs	t_GARCH	Days	ARs	t_GARCH
3.59E-03	1.06	−10	4.32E-03	0.90
−1.77E-03	−0.09	−9	1.15E-03	0.41
−1.07E-03	−0.08	−8	1.89E-04	0.06
3.99E-04	0.06	−7	−8.19E-04	−0.25
−2.31E-03	−0.26	−6	−1.56E-03	−0.44
−2.75E-03	−0.26	−5	−9.23E-04	−0.23
2.24E-03	1.19	−4	3.42E-04	0.11
2.90E-03	1.05	−3	−2.97E-04	−0.11
−8.01E-04	−0.05	−2	−2.79E-04	−0.10
1.31E-03	0.10	−1	−4.65E-04	−0.16
8.99E-03	1.31	0	−4.27E-03	−1.29
−2.33E-03	−0.28	1	−7.59E-03	−2.15
−2.94E-03	−0.25	2	3.70E-03	0.87
5.64E-03	1.88	3	−1.88E-04	−0.04
−3.01E-03	−1.36	4	−2.81E-03	−1.06
1.59E-03	0.10	5	−7.44E-05	−0.03
−2.22E-03	−0.20	6	−3.86E-03	−1.22
1.23E-03	0.18	7	−2.76E-03	−0.75
4.28E-03	2.16	8	−3.03E-03	−0.96
2.43E-03	1.45	9	3.58E-03	1.58
−4.09E-04	−0.19	10	1.87E-03	0.51

without *informed* transactions). In view of these results, *informed* insider trading seems to be a quite common event in Spanish firms.

Regarding the distribution between sales and purchases by insiders, the number of purchases is greater than the number of sales. This is correlated with both the bonanza years of the Spanish market and the higher number of dividend increase announcements during the period under analysis. This may also indicate that dividend announcements provide an exploitable trading opportunity based mainly on insiders' information advantage over outsiders (Hillier and Marshall, 2002).

Results for market reaction to the blended signal drawn by Model 2 (i.e., returns adjusted to the earnings announcement) are shown in Table 3 and Table 4. Table 3

Table 4

T-statistic for dividend decreases preceded by either *informed* sales or purchases

This table reports abnormal returns (ARs) and t_{-GARCH} statistics for each day in the event period (−10, +10) for two subsamples: dividend decreases and *informed* sales (Panel A) and dividend decreases and *informed* purchases (Panel B). Abnormal returns are drawn by Model 1.

$$\text{Model 1: } R_{it} = \alpha_i + \beta_i R_{mt} + u_{it},$$

where α_i and β_i are the parameters of the model, R_{it} and R_{mt} are asset and market return, respectively, and u_{it} represents a random variable distributed as independent N(0,σ_i^2), and σ_{it}^2 is distributed $\sigma_{it}^2 = \alpha_{0i} + \alpha_{1i}\,\sigma_{t-1}^2 + \alpha_{2i} u_{it-1}^2$; $\alpha_{ji} \geq 0, \forall j = 0, 1, 2$ and $\alpha_{1i} + \alpha_{2i} < 1$.

Panel A Dividend increases and informed purchases			*Panel B Dividend increases and informed sales*	
ARs	t_{-GARCH}	Days	ARs	t_{-GARCH}
1.20E-03	0.56	−10	1.02E-05	0.01
3.07E-03	1.02	−9	1.78E-03	0.35
−2.81E-03	−0.21	−8	6.82E-03	0.79
9.92E-03	1.18	−7	4.10E-03	0.86
−1.87E-03	−0.17	−6	2.09E-03	0.46
8.69E-03	0.83	−5	−5.89E-04	−0.13
−3.47E-03	−0.32	−4	−1.41E-03	−0.33
5.30E-03	2.65	−3	5.63E-03	1.88
−2.44E-03	−0.86	−2	−2.47E-03	−0.48
−2.67E-03	−0.19	−1	−2.26E-03	−0.37
−1.14E-02	−1.36	0	−1.90E-02	−5.13
2.65E-03	0.25	1	−1.04E-02	−2.69
7.58E-03	0.50	2	−4.01E-03	−0.91
9.57E-03	0.71	3	−1.87E-03	−0.38
−2.78E-03	−1.16	4	−2.83E-03	−0.85
1.44E-03	0.45	5	4.04E-03	0.79
7.59E-03	0.46	6	1.17E-03	0.20
9.96E-04	0.10	7	1.44E-03	0.41
4.70E-04	0.04	8	−1.25E-04	−0.03
4.22E-03	0.32	9	−2.34E-03	−0.51
−4.04E-03	−0.41	10	−2.51E-03	−0.62

shows abnormal returns, as well as values from the portfolio test for the case where announcements of dividend increases were preceded by either *informed* purchases or sales. As can be seen in Panel A of Table 3, when announcements of dividend increases are preceded by *informed* purchases, the market interprets such announcements as good news, since positive abnormal returns are detected from day 0 onwards at the 1% and 5% significance levels. It is worth noting the large realised return on day 8 (t = 2.16), which may represent the upward market reaction of outsiders to the double signal.

On the other hand, when dividend increases are preceded by *informed* sales, the reduction in insider holdings receives a negative market reaction. As shown in Panel B of Table 3, the market's negative reaction on day 1 is significant at the 1% level

($t = -2.15$). Abnormal returns thus differ from those obtained for the subsamples of dividend increase and dividend decrease announcements when we do not control for insider dealings, as shown in Panel A of Table 1 and Panel A of Table 2. For the sample of dividend decrease announcements (Table 2), there was a significant downward market reaction on day 0 ($t = -6.13$) and an upward market reaction to dividend increase announcements (Table 1) on the same day ($t = 1.98$). Thus, our results corroborate the view that the change in the interpretation of the signal is conditional on the direction of the insider transaction. This finding is in line with the results of John and Lang (1991) for the US market.

We replicate this analysis for the sample of dividend decreases. Results are shown in Table 4, which shows average returns and t-statistics for dividend decrease announcements, preceded by *informed* purchases and sales. When dividend decrease announcements are preceded by *informed* purchases, the insider signal is taken as positive by the market, which reacts upwards on day -3 at the 1% level. However, no significant reaction is detected on day 0, when the dividend decrease is announced (the t-statistic still takes negative, non-significant values). For insider sales, we detect a clear downward reaction on days 0 and $+1$. The accumulation of both signals on day 0 gives us a t-statistic of -5.13. However, on day -3 a significant positive return is detected in the market (but only at the 10% level), which may imply that some insiders are taking their profits several days prior to the dividend announcement.

Unlike Ambarish, John, and Williams (1987), we observe that the effects of alternative signals do alter the impact of dividend announcements. Furthermore, if we take into account that insiders usually time their sales (purchases) prior to bad (good) news announcements, we may conclude that their best returns are obtained when they time their transactions around firm payouts.

4.3. *Market signals and the level of valuable investment opportunities within the firm*

As discussed earlier, signalling theories of dividends test whether dividends are efficient signals of a firm's prospects, where a firm's prospects are represented by future earnings, but also by the quality of its investment opportunities (Miller and Rock, 1985). Broadly speaking, the cash flow dividend signalling theory predicts that any dividend increase announced by a firm having high-quality investment opportunities will be taken as good news by the market. However, in the context of the information-based signalling theory of dividends, dividend increases announced by firms having good prospects do not always convey good news. Indeed, investors may prefer that firms preserve their future growth by avoiding current payouts.

In an attempt to determine which theory is more appropriate for explaining signalling mechanisms, we proceed to jointly analyse the signalling effects of both dividends and insider trading in conjunction with the firm's investment opportunities. For this purpose, two models are tested. Model 3 attempts to determine whether the dividend signal allows the market to accurately distinguish the level of investment opportunities of the firm. Model 4 analyses the interaction of dividend announcements with the level of investment opportunities and insider trading. The analysis of the interaction of insider trading, dividends announcements, and the Tobin's q allows us to check which signal (insider trading or dividend announcements) has more information content.

The quality of a firm's investment opportunities are proxied by Tobin's q. For values of Tobin's q greater than or equal to 1, a firm's investment opportunity set is classified

Table 5

Interaction between dividend announcements and Tobin's q

This table reports coefficients, t-statistics, and Wald tests for the four subsamples depicted in Model 3. This model regresses cumulative abnormal returns obtained by firm *i* on days (0, 10) on two binary variables which represent dividend announcements and investment opportunities:

$$\text{Model 3: } AR_i = \beta_1 + \beta_2 D_{1i} + \beta_3 Q_{1i} + \beta_4 D_{1i} Q_{1i} + u_i,$$

where D_{1i} is a binary variable constructed to measure the sign of the change in the dividend payout announced by firm *i*, taking the value of 1 for a dividend increase and 0 for a dividend decrease; $Q_{1i}$is a firm's investment opportunity set. A firm is classified as high quality for Tobin's q $\geq$1 and low-quality firm for Tobin's q<1. Finally, u_i is the error term. (Coefficients for the whole sample are not reported).

	Coefficient	t-Statistic	Wald Test (*p*-value)
Dividend increase for high-quality firms	0.013	8.58	73.69(.000)
Dividend increase for low-quality firms	−0.014	−3.61	13.02(.000)
Dividend decrease for high-quality firms	0.012	6.48	42.00(.000)
Dividend decrease for low-quality firms	−0.015	−2.49	84.24(.202)
Number of observations: 303			

as high quality. For Tobin's q values less than 1, a firm's investment opportunity set is classified as low quality. Among the various metrics used in the literature to measure Tobin's q, we select the one employed by Miguel and Pindado (2001), which combines the quality of the investment opportunities and the firm's capacity for self-financing over raising new capital.

Therefore, Model 3 (shown in equation 4) analyses how the market reaction to dividend announcements varies according to the firm's investment opportunities, by regressing abnormal returns on two binary variables, D_{1i} and Q_{1i}, which represent dividend announcements and investment opportunities, respectively.

$$AR_i = \beta_1 + \beta_2 D_{1i} + \beta_3 Q_{1i} + \beta_4 D_{1i} Q_{1i} + u_i, \quad (4)$$

where AR_i is the cumulative abnormal returns obtained by firm *i* on days (0, +10); D_{1i} is a binary variable constructed to measure the sign of the change in the dividend payout announced by firm *i*, taking the value of 1 for dividend increases and the value of 0 for dividend decreases; $Q_{1i}$is a binary variable that takes the value of 1 for high-quality firms (Tobin's q $\geq$ 1) and 0 for low-quality firms (Tobin's q<1); and u_i is the error term.

To adequately calibrate the market reaction to each possible combination of dividend sign and level of Tobin's q, we next examine the intercept for each subsample in Model 3. The OLS estimation provides the mean value of the abnormal returns associated with each group, as captured by their intercept. Thus, for the subsample of high-quality firms reporting dividend increases, the intercept is given by $\beta_1 + \beta_2 + \beta_3 + \beta_4$ and, analogously for the rest of the groups: low-quality firms that report dividend increases ($\beta_1 + \beta_2$); high-quality firms that report dividend decreases ($\beta_1 + \beta_3$); and finally, low-quality firms that report dividend decreases (β_1).

Results are shown in Table 5. The table also shows the corresponding value for the Wald statistic applied to test the null hypothesis that the given set of parameters is jointly zero. These results provide corroboration that the consideration of a firm's investment

Table 6

Interaction among dividend announcements, insider holdings, and Tobin's q

This table reports coefficients, t-statistics, and Wald tests for the eight subsamples depicted in Model 4.

Model 4 regresses cumulative abnormal returns obtained by firm i on days (0, 10) on three binary variables which represent dividend announcements, investment opportunities, and directors dealings:

Model 4:

$$AR_i = \beta_1 + \beta_2 D_{1i} + \beta_3 Q_{1i} + \beta_4 I_{1i} + \beta_5 D_{1i} Q_{1i} + \beta_6 D_{1i} I_{1i} + \beta_7 Q_{1i} I_{1i} + \beta_8 D_{1i} Q_{1i} I_{1i} + u_i,$$

where I_{1i} represents the sign of the informed transactions, and therefore takes the value of 1 when the ratio of net *informed* purchases for days $(-60, -15)$ is positive and 0 when the positive ratio is that of net *informed* sales. D_{1i} is a binary variable constructed to measure the sign of the change in the dividend payout announced by firm i, taking the value of 1 for a dividend increase and 0 for a dividend decrease; Q_{1i} is a firm's investment opportunity set. A firm is classified as high quality for Tobin's q ≥ 1 and low-quality firm for Tobin's q <1. Finally, u_i is the error term.

The eight subsamples and the calculation of the mean of their abnormal returns are defined as follows: Dividend increases, high-quality firms and insider purchases: $\beta_1 + \beta_2 + \beta_3 + \beta_4 + \beta_5 + \beta_6 + \beta_7 + \beta_8$. Dividend increases, high-quality firms and insider sales: $\beta_1 + \beta_2 + \beta_3 + \beta_5$. Dividend increases, low-quality firms and insider purchases: $\beta_1 + \beta_2 + \beta_4 + \beta_6$. Dividend increases, low-quality firms and insider sales: $\beta_1 + \beta_2$. Dividend decreases, high-quality firms and insider purchases: $\beta_1 + \beta_3 + \beta_4 + \beta_7$. Dividend decreases, high-quality firms and insider sales:$\beta_1 + \beta_3$. Dividend decreases, low-quality firms and insider purchases: $\beta_1 + \beta_4$. Dividend decreases, low-quality firms and insider sales: β_1. (Coefficients for the whole sample are not reported).

Subsample	Coefficient	t-Statistic	Wald Test (p-value)
Dividend increases for high-quality firms and insider purchases	0.014	6.85	46.90 (0.000)
Dividend increases for high-quality firms and insider sales	−0.023	−2.84	8.07 (0.005)
Dividend increases for low-quality firms and insider purchases	0.338	0.36	0.13 (0.072)
Dividend increases for low-quality firms and insider sales	−0.014	−2.43	13.69 (0.000)
Dividend decreases for high-quality firms and insider purchases	0.013	5.33	8.01 (0.005)
Dividend decreases for high-quality firms and insider sales	−0.021	−2.83	0.13 (0.072)
Dividend decreases for low-quality firms and insider purchases	−0.010	−3.70	13.69 (0.000)
Dividend decreases for low-quality firms and insider sales	−0.195	−3.17	0.28 (0.086)
Number of observations: 303			

opportunities modifies the market interpretation of dividend increases in such a way that not all dividend increases are interpreted as good signals by the market.

Although dividend increases by low-quality firms (t = 8.58) are considered good news by the market, they are taken negatively by the market (t = −3.61), thus penalising dividend outflows in mature firms. This contradicts the cash flow signalling theory, which supports a positive reaction to dividend increases in both cases. Thus, investors seem to fear an erosion of the firm's future value when it pays out dividends, when growth opportunities are low. Moreover, investors are able to disregard misleading dividend signals sent by low-quality firms, as shown by the fact that they do not react positively to dividend increases when a firm's prospects are unfavourable.

For the case of dividend decrease announcements, it is worth noting that the market reacts positively to them when the firm's income is devoted to financing valuable investment projects rather than being distributed (t = 6.48). As expected, the market reaction is negative for low-quality firms that also reduce dividend payouts (t = −2.49).

Model 4 tests the information-based signalling theory of dividends by incorporating the effects of insider trading into Model 3, as shown in equation 5.

$$\begin{aligned} AR_i = {} & \beta_1 + \beta_2 D_{1i} + \beta_3 Q_{1i} + \beta_4 I_{1i} + \beta_5 D_{1i} Q_{1i} + \beta_6 D_{1i} I_{1i} \\ & + \beta_7 Q_{1i} I_{1i} + \beta_8 D_{1i} Q_{1i} I_{1i} + u_i, \end{aligned} \tag{5}$$

where I_{1i} represents the sign of the informed transactions. It takes the value of 1 when the ratio of net *informed* purchases for days (−60, −15) is positive and 0 when the positive ratio is that of net *informed* sales. The remaining variables are defined as in Model 3.

For Model 4, there are eight possible subsamples, depending on the value taken by each of the three dummy variables under analysis. The mean of the abnormal returns, t-statistics, as well as the corresponding Wald test for each group are shown in Table 6.

Our main findings are that the insider trading signal seems to overcome the dividend signal in many circumstances. This is especially so for the sales signal, since insider *informed* sales are systematically taken as bad news (all the related coefficients are negative and significant) regardless of the sign of the dividend change or future firm prospects. Similarly, insider *informed* purchases are most frequently taken as good news, although the market reacts negatively for the case of low-quality firms that reduce dividends (t = −3.70). Thus, the positive reaction to the insider signal is not large enough to compensate for the negative impact of dividends and the future deterioration of firm performance, as was concluded from Model 3.

We find partial evidence in favour of the multiple-signal theory of dividends, since our results support the hypothesis that dividend signals are modulated by insider trading signalling. In fact, there are two situations in which investors react negatively to dividend increase announcements: the announcement of dividend increases by high-quality firms whose directors are net sellers (t = −2.84) and the announcement of dividend increases by low-quality firms while insiders are reducing their holdings (t = −2.43). In both cases, the good news conveyed by the dividend increases is overcome by the bad news conveyed by the insider trading signal.

In this sense, one of our major results is that the market reacts negatively to the announcement of either dividend increases or dividend decreases when insiders are systematically selling firm shares before the announcement (t = −2.84 and t = −2.83, respectively). Therefore, investors focus on the fact that insiders are reducing their holdings, rather than on the magnitude and sign of the dividend change.

However, we should also emphasise the fact that investors show a genuine preference for dividends (already documented in the Spanish dividend literature). In fact, although they do not react upwards to all dividend increases, investors do react systematically downwards to dividend decreases. Stock prices move upwards after dividend decrease announcements only for one subsample, that of high-quality firms whose insiders are buying new shares ($t = 5.33$). In that case, the market reacts positively to dividend decreases because non-distributed funds are devoted to financing valuable projects, as indicated by the insider trading signal.

As regards the quality of investment opportunities, investors seem to be able to identify high-quality versus low-quality firms, as indicated by the fact that they systematically react negatively to any announcement reported by low-quality firms. This corroborates the results from Model 3, which also show that investors are able to disregard misleading dividend signals sent by low-quality firms. Only in one specific situation are investors indifferent to firms having poor investment prospects – that is, where firms with non-valuable projects pay out increasing dividends and their insiders are net buyers. In this case, the positive signal of insider purchases mitigates an otherwise negative market reaction to low-quality firms, and thus we observe a positive, but not significant, reaction ($t = 0.36$).

Our main conclusion is that the highest quality firms signal their health by increasing both dividend payouts and insider holdings. By contrast, it is difficult for mature, low-quality firms to send positive signals; although they can increase their expected dividends above their efficient level, investors perceive that the prospects of the firm are not good enough because insiders are not willing to invest (contrary to the results of John and Lang (1991) for the US market).

All in all, directors should take into account the market reaction to dividends and insider dealings when designing their signalling policy. Our results indicate that the combination of multiple signals is more relevant to corporate managers than was shown in John and Lang's (1991) model, since most of their model's conclusions can be extended to all types of dividend announcements and to multiple economic settings.

However, from our perspective, the main limitations of the multiple-signal theory of dividends are that (i) it has not yet incorporated the effects of either the magnitude or the frequency of the dividend yield, thus contradicting the 'catering' theory and the 'cash reservoir' theory of dividends, respectively; and (ii) it has not been tested using intra-day data, which may modify the magnitude of the market reaction to director signals, due to the 'magnet effect' (as suggested by Abad and Pascual, 2007).

We propose to modify John and Lang's (1991) model so as to incorporate the magnitude of the dividend payout, its frequency, and investors' desire for dividend-paying stocks (i.e., the stock price premium). Grinstein and Michaely (2005) have recently provided evidence on the combined effect of both institutional holdings and the catering theory of dividends. They conclude that institutions care about whether firms pay dividends and about the magnitude of the dividend payout. Similarly, in future research we propose to investigate whether the conclusions of the multiple-signal theory of dividends, and our own results, vary according to whether insiders cater to investor demand for dividends before sending multiple signals. Finally, our results, by highlighting the importance of dividend decisions for signalling purposes, can be considered a departure from the Miller and Modigliani (1961) dividend irrelevance theorem, a conclusion also reached by De Angelo and De Angelo (2007).

5. Conclusions

This paper provides new evidence on the multiple-signal cash flow theory of dividends by testing it in a European market. It also incorporates an analysis of decreases and increases in current dividends, rather than focusing only on dividend initiations. The results indicate that the cash flow signalling theory alone seems insufficient in explaining the information effects of dividend announcements. Quite often insiders signal a firm's future prospects by altering their ownership stakes, rather than by disclosing changes in dividend payouts. Furthermore, the dividend signal is systematically modulated by insider trading.

The highest quality firms signal their quality by increasing both dividend payouts and insider holdings. Investors are found to systematically react negatively to dividend decreases and to penalise dividend increases by mature firms when insiders reduce their holdings. Investors are also able to disregard misleading dividend signals from low-quality firms. As a secondary result, we find that earnings information is not fully impounded in prices when the dividend signal reaches the market, but our results are not especially sensitive to the incorporation of the earnings impact into the model.

Some of our results differ somewhat from those predicted by the information-based dividend theory in the US market. This can be explained by the fact that these two countries have different tax systems, their level of investor protection is extremely different, and their stock markets differ in terms of depth, size, and liquidity. However, broadly speaking, John and Lang's (1991) model can be extended to all kinds of dividend announcements and economic settings.

To diminish the limitations of the information-based theory of dividends, future research should examine the *multiple-signal catering theory of dividends*, by jointly analysing insider holdings and the catering effect; this would surely provide new insight into the dividend puzzle.

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