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News Dissemination and Investor Attention

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Abstract

We examine how investor attention changes when a firm adopts a modern news dissemination technology. We find that after continental European firms begin using an English-language electronic wire service to disseminate company news, they exhibit a stronger initial reaction to earnings surprises, a lower post earnings announcement stock price drift, and an increase in abnormal trading volume near earnings announcements, compared to when they disseminated their news in non-electronic format and in a continental European language. Our results hold for a sub-sample of firms for which the decision to use a wire service was likely exogenous. The effect of wire services on investor attention is due to the format of news (electronic and English-language), not to the increased speed of news transmission.

Keywords: News dissemination, Language, Media coverage, Earnings announcements

JEL Classification: D83, G12, G14

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News Dissemination and Investor Attention*

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March 9, 2016

We examine how investor attention changes when a firm adopts a modern news dissemination technology. We find that after continental European firms begin using an English-language electronic wire service to disseminate company news, they exhibit a stronger initial reaction to earnings surprises, a lower post earnings announcement stock price drift, and an increase in abnormal trading volume near earnings announcements, compared to when they disseminated their news in non-electronic format and in a continental European language. Our results hold for a sub-sample of firms for which the decision to use a wire service was likely exogenous. The effect of wire services on investor attention is due to the format of news (electronic and English-language), not to the increased speed of news transmission.

JEL classification: D83; G12; G14

Keywords : News dissemination; Language; Media coverage ; Earnings announcements ; Limited attention; High-Frequency Trading.

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A growing body of research suggests that public information does not automatically flow into stock prices. The extant evidence falls into two broad categories. The first set of studies focuses on investors – the consumers of news – and, in general, finds that when investors are less attentive, stock prices underreact to news. A second set of studies examines the role of the media – the intermediary of news. These studies generally find that when the mainstream media cover corporate news (even news that was already publicly known), stock prices are affected. Surprisingly, little work has examined how companies themselves can influence the extent to which the news they produce is reflected in their stock prices. Our study aims to fill this gap.[1]

We examine how investor attention changes when a firm adopts a modern news dissemination technology. Focusing on continental European firms, we investigate the consequences of using an English-language electronic wire service to disseminate company news, and argue that firms using such a wire service are likely to attract more attention from investors for two reasons: the use of the electronic format, and the use of English. Like previous studies (e.g. DellaVigna and Pollet 2009) we use the delayed stock price reaction to earnings, measured by the 60-day post-earnings announcement drift, as an indication of investor inattention. We find that after continental European firms start using a wire service, they exhibit a stronger initial reaction to earnings surprises, as well as a lower post earnings announcement stock price drift, compared to when they did not use a wire service to disseminate their news.

[1] For studies on investor attention to news, see Engelberg (2008); Peress (2008); Hirshleifer, Lim, and Teoh (2009); DellaVigna and Pollet (2009) in the context of earnings news; see Cohen and Frazzini (2008); Cohen and Lou (2012); Huang (2015) in other contexts. For studies on media coverage, see Huberman and Regev (2001); Tetlock (2007); Fang and Peress (2009); Engelberg and Parsons (2011); Dougal et al. (2012); Peress (2014); Hillert, Jacobs, and Müller (2014); Ahern and Sosyura (2015). For recent work on how firms actively try to shape their media coverage, see Solomon (2012) and Ahern and Sosyura (2014).

These firms also experience an increase in abnormal trading volume near earnings announcements.

A central question concerning the validity of our approach is whether the adoption of a wire service could be correlated with unobserved events at the firm level that drive both the decision to adopt the wire service and the behavior of the stock price. For example, the decision to use an English-language wire service might coincide with an international expansion of the firm, which could increase its visibility to investors. To address this concern, we exploit a European Union (EU) regulatory change that occurred during our sample period, the EU Transparency Directive, which put strong pressure on European firms to use wire services. Wire service adoption following this EU regulation is unlikely to be linked to company-level decisions to internationalize operations. When we restrict our analysis to the sample of firms that adopted a wire service following the new regulation, we observe a sharp reduction in the post earnings announcement drift after the firms started using a wire service. Overall, our findings are consistent with the idea that the use of a wire service results in a faster stock price reaction to a firm's earnings news.

We hypothesize that the effect of wire services on investor attention results from the news format (electronic and English language), which effectively converts raw company earnings news into tradeable information. We find empirical support for this interpretation.

Another possible interpretation of our results is that investors react more quickly to earnings news disseminated through wires simply because they receive it more quickly. Indeed, in a recent controversy high-frequency traders have been accused of using wire services to get

ahead of other investors.[2] While it is true that news disseminated through wires reaches investors faster, we find that this greater speed is not driving the increased investor attention we observe.

Yet another interpretation of our results is that wire services increase the awareness of firms by investors (Merton 1987). In this interpretation, companies that start disseminating news through wires receive more investor attention overall, not just to their earnings news. In this view, wire service adoption should lead to a reduction in firms' expected returns, and increase their relative exposure to global vs. stock markets. We find little empirical support for this interpretation.

1. Setting and Methodology

1.1. THE WIRE SERVICE INDUSTRY IN EUROPE

Wire services have operated in the United States as far back as the 1950s. Unlike newswires such as Dow Jones and Reuters, which select and edit company information, wire services disseminate all firm-initiated news releases. The audience for wire services is wide: It includes newswires, the business press, financial databases such as Thomson Reuters and Bloomberg, and investors directly. Today almost all U.S. publicly traded firms use a wire service. Dyck and Zingales (2003) document that "97% of firms issue a news release [... via a wire service] soon after the close of the quarter."

In contrast to the U.S., the use of wire services in Europe is relatively new and concurrent with the advent of the Internet. While in principle European firms could always hire U.S.-based wire services, until recently only large European firms with worldwide investor-relation

[2] "Speed Traders Get an Edge," Wall Street Journal 2 February 2014, Vol. 263 Issue 31, pp. C1-C2. See also "PR Newswire agrees to curb early access for high frequency traders," Reuters, 29 April 2014.

strategies did so. To disseminate news before European wire services were available, European firms could only hope for press coverage by news agencies (such as the Agence France Presse, a French government-owned agency).

As mentioned above, the use of wire services by European firms was spurred by the 2004 EU Transparency Directive. This new regulation stipulated that listed firms "ensure fast access to information on a non-discriminatory basis […] using such media as may reasonably be relied upon for the effective dissemination of information to the public." This wording echoes the Regulation FD (Fair Disclosure) adopted by the U.S. Securities and Exchange Commission (SEC) in 2000, which states that "acceptable methods of public disclosure for purposes of Regulation FD will include press releases distributed through a widely circulated news or wire service."[3] Importantly, when implementing the directive, countries either mandated the use of electronic news dissemination systems, as did Germany, or, like France, provided firms that used these systems with a safe harbor from litigation.[4]

The EU Transparency Directive also promoted the use of English for company news releases. Until then, some countries had made it legally difficult for firms to communicate in English. This politically charged reversal was worded carefully: Rather than promote the English language per se, the Transparency Directive encouraged the use of "a language that is customary in the sphere of international finance." For many continental European firms, then, adopting a wire service for news dissemination entailed two changes: the use of electronic media and the switch to English. In fact, these two changes were exactly concomitant. Before

[3] http://www.sec.gov/rules/final/33-7881.htm.
[4] See Germany's "Transparenzrichtlinie-Umsetzungsgesetz." For France, see AMF General regulation, Book II, Title II, Chapter 1, art. 221-4, &IV http://www.amf-france.org/en_US/Reglementation/Reglement-general-et-instructions/RG-mode-d-emploi.html.

the introduction of English-language wire services, there were very few local wire services disseminating press releases in the continental European languages. In effect, the EU Transparency Directive pushed the demand curve for wire services to the right by making the use of wire services almost mandatory, especially after 2007, which was the deadline for EU countries to translate the Transparency Directive into their national legislation. This point is important to our investigation, since it mitigates concerns that the adoption of a wire service might be correlated with a fundamental event at the firm level, such as the arrival of a large foreign shareholder or an M&A transaction, which would likely increase the demand for wire services. For firms located in EU countries, hiring a wire service after 2007 likely stems from the change in EU regulations. Telephone interviews we conducted with a few of our sample firms confirmed that their adoption of a wire service was entirely due to this change in the regulatory environment. For this study, then, we posit that the adoption of a wire service post-2007 is largely exogenous to unobservable firm characteristics.

1.2. HYPOTHESIS DEVELOPMENT

Europe constitutes an ideal field for investigating the consequences of news dissemination, as it provides us with a large variation in the use of wire services across firms and over time. Our discussion suggests that the use of an English-language wire service has two major consequences for company news dissemination: the electronic format and the use of English. We posit that firms that disseminate news through an English-language wire service obtain greater investor attention, compared to those that release their disclosures in non-electronic form and in a continental European language.

The literature on investor attention argues that stocks receiving more attention from investors experience a greater immediate reaction to earnings announcement and smaller post

earnings announcement drift (DellaVigna and Pollet, 2009; Hirshleifer, Lim, and Teoh, 2009) as well as a greater post earnings abnormal trading volume. Thus, if news dissemination through wire services results in higher investor attention, then the stock price reaction at announcement should be higher and the post earnings announcement drift should be lower for firms after they adopt a wire service. Moreover, the abnormal trading volume at the earnings announcement should be greater after a firm adopts a wire service.

1.3. IDENTIFICATION STRATEGY

We begin by identifying firms that communicate their news releases through wire services. We define *OnWire*, a dummy variable, as equal to one if the firm issued a positive number of news releases using a wire service during the year, and equal to zero otherwise.

The use of the annual rather than the daily volume of news releases is dictated by several considerations. First, we focus our analysis on the stock price reaction following annual earnings announcements, a more natural way to compare European firms than quarterly announcements. Second, an exploratory study leads us to believe that a firm's decision to go on-wire is made on an annual basis, with most of the first news releases issued through the wire service occurring near the annual earnings announcements. Third, the adoption of a wire service is permanent, and most of our analysis focuses on comparing the years before and after wire service adoption. Missing the exact day on which a firm starts communicating through the wire service is not likely to change our conclusions.

When testing the effect of wire usage on the stock price response to earnings surprises, one obvious concern is that firms communicating through wire services are likely to have

unobservable characteristics that also drive the response to earnings announcements. We address this endogeneity issue by exploiting the panel structure of our data. For each firm, we track the use of wire services from year to year, defining three groups of firms: firms that have always used wire services, firms that have never used wire services, and firms that have adopted a wire service during our sample period. The group of most interest is the last one, since it allows us to determine how the behavior of stock price changes after the adoption. Such a setting controls for time-invariant unobserved characteristics of the firms.

Another concern, as detailed above, is that wire service adoption and increased investor attention might have the same cause: for example, an expansion of a firm's international operations. To address this issue, we replicate our analysis on the firms that have adopted a wire service after their home country enacted the EU Transparency Directive. Since the adoption of wire services by firms in these countries is likely to be driven by regulation, our estimation of the effect of wire services on this sample is unlikely to be biased.

2. Data and Descriptive Statistics

2.1. WIRE SERVICE DATA

Our wire service usage data come from Factiva, which offers access to a wide range of wire services from different countries and in many languages. Factiva allows the user to narrow a search to a specific language without restraining it to a particular wire service. We use this capability to run queries on all wire services communicating news releases in English, even if these wire services are located in a non-English-speaking country.

Our initial sample comprises all firms recorded in the International Brokers' Estimate System (I/B/E/S) international database that belong to major European markets whose official

language is not English: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, and Switzerland. We require firms in our sample to be followed by at least two analysts and to have at least five years of data. Finally, we require firms to have at least one observation after 1999, to increase our likelihood of observing firms using wire services. These filters yield 2,156 firms over the 1991-2010 period.

Factiva uses a unique key to identify firms, the "Factiva Intelligent Indexing Code." We manually search this key for all firms in our initial sample based on their name in the I/B/E/S identification file. Of the 2,156 firms in the initial sample we are able to identify 1,264 firms with a valid Factiva key that unambiguously maps with the company name from I/B/E/S. To collect wire service usage data we then submit queries to Factiva, using a combination of Perl Modules (Win32::GuiTest) and text-processing techniques to collect the volume of news releases communicated through English-language wire services by each firm during the 1991-2010 period. Since Factiva occasionally assigns an incorrect Indexing Code to a company, we manually check that the output of each query actually refers to the company associated with the Indexing Code. Our final sample includes 1,222 firms from 1991-2010.

2.2. EARNINGS SURPRISES AND STOCK RETURNS

Using the I/B/E/S international database, we collect annual data on analyst forecasts and earnings announcements. Specifically, we collect one-year-ahead annual earnings-per-share forecasts for firms that have at least two analysts issuing forecasts up to six months preceding the announcement date of the actual earnings. We define an earnings surprise as the difference between the actual earnings and the median consensus forecasts, normalized by the share price five days before the announcement date of the actual earnings. To compute the consensus, we keep the most recent forecasts made by an analyst for a given fiscal period and exclude

forecasts made less than five days before the announcement date. Whenever possible we compute the consensus based on forecasts made in the last three months before the earnings announcements. Some firms in the sample have low analyst coverage; in those cases we have to compute a consensus based on forecasts made up to six months before the announcement. We use exchange rates provided by Compustat Global and exclude penny stocks (stocks worth less than five dollars per share).

We call $e_{y,i}$ the earnings per share of company i in year y and $c_{y,i}$ the corresponding consensus. $P_{y,i}$ is the price of the share five days before the announcement. The earnings surprise $s_{y,i}$ is:

$$s_{y,i} = \frac{e_{y,i} - c_{y,i}}{P_{y,i}} \qquad (1)$$

To mitigate potential errors in the reporting of actual figures, we delete observations where the earnings surprise (in absolute value) is greater than one. We match this annual earnings surprise with daily stock returns downloaded from Datastream and compute cumulative abnormal returns over various horizons. We define $R_{d,i}$ as the return on the share of company i on day d and $R_{d,m}$ as the corresponding return on the market index. We first compute $\hat{\beta}$ from the following regression:

$$R_{d,i} = c + \beta R_{d,m} \qquad (2)$$

where d is taken from 300 trading days to 46 trading days preceding the announcement date. We then define the cumulative abnormal return $CAR_{y,i}[x, X]$ as the buy-and-hold abnormal return of firm i in year y from day x to day X following the earnings announcement

and computed as $[\prod_{d=x}^{X}(1+R_{d,i})-1-\hat{\beta}[\prod_{d=x}^{X}(1+R_{d,m})]-1]$. We use the Euro Stoxx 500 as the market index and drop announcements for which we have less than 40 days of stock price data to compute $\hat{\beta}$. We define *CAR*[0,1] as the announcement return and $CAR[2,60]$ as the drift following earnings announcements.

Finally, we match stock returns with the corresponding trading volume ($V_{y,i}^{x}$) downloaded from Datastream. Similar to DellaVigna and Pollet (2009), we compute the abnormal trading volume at the announcement as:

$$AV_{y,i}[0,2]=\sum_{x=t}^{t+2}\log\left(V_{y,i}^{x}\right)/2-\sum_{x=t-20}^{t-11}\log\left(V_{y,i}^{x}\right)/10 \qquad (3)$$

where t denotes the date of the earnings announcement for firm i in year y. Thus, abnormal trading volume is the average log volume at the day of announcement and the day after, divided by the average log volume for the period -20 to -11.

2.3. OTHER DATA

To ensure that our results are not driven by mergers and acquisitions (M&A) at the firm level that push the company to use an English-language wire service, we collect data on all M&A operations on the European markets from the SDC Platinum database. To control for major corporate events that could trigger the use of a wire service, we remove from our sample firms that have a record in the SDC database in the year they adopt an English-language wire service (30 firms).

We collect data from Worldscope on market capitalization, market-to-book ratio, foreign sales, and the fraction of closely held shares. Appendix A provides a full description of these control variables.

2.4. SAMPLE AND DESCRIPTIVE STATISTICS

Our final sample comprises 1,192 firms in the 1991-2010 period, amounting to 9,629 firm-year observations. For each firm we track the use of wire services over time. We find that once a firm starts using a wire service, it then continues to do so. We are thus able to split our sample into three subsamples. The first subsample, Always-on-Wire, contains firms that use English-language wire services throughout our sample period. The second subsample, Never-on-Wire, comprises firms that never use English-language wire services in our sample period. The third subsample, Wire-Adopters, is the one of interest, since it contains firms that started using wire services during our sample period.

Finally, we consider a subset of the Wire-Adopters panel containing firms that started to use a wire service after the enactment of the EU Transparency Directive in their country. We call these firms Directive-Wire-Adopters.

[insert Table 1 here]

Table 1, Panel A describes the firms in each subsample. At one extreme are firms that have always communicated their news releases through wire services (Always-On-Wire firms): These are typically large firms, with high market-to-book and high analyst following. By contrast, firms that have never used a wire service for the dissemination of their news releases (Never-On-Wire firms) tend to be smaller and enjoy less analyst following. The characteristics of the Wire-Adopter firms are in between these two extremes: These firms tend to be slightly bigger than Never-on-Wire firms, exhibiting a larger market-to-book ratio and a greater analyst following. Firms that adopted a wire service after the change in regulation (Directive-Wire-Adopters) are much smaller and less followed by analysts. There are 9,629 earnings

announcements in the full sample, 64.7% being on-wire (Table 1, Panel B). Each year, we rank earnings surprises into five quintiles, from Q1 (the bottom surprises) to Q5 (the top surprises).

[insert Figure 1 here]

Fig. 1 shows the chronology of wire service adoption. Most of the Wire-Adopters started to use a wire service after 2000. The EU Transparency Directive coincides with a spike in wire service adoption in 2007 and 2008. In unreported statistics, we find that the proportion of firms using a wire service in our sample goes from 40% in the 1990s to 80% in 2010, suggesting a widespread use of wire services by the end of the period.

[insert Table 2 here]

Table 2 shows the geographical breakdown of wire service usage. About half of the Wire-Adopters are from France (98), Germany (88), and Switzerland (44), reflecting the weight of those countries in the sample. Table 2 suggests that the adoption of wire services is a widespread phenomenon across continental Europe.

3. Empirical Findings

Fig. 2 illustrates our central result. It shows the stock price reaction to top (Q_5) and bottom (Q_1) surprises for Wire-Adopter firms before and after they adopt a wire service. Before wire service adoption, the average top-minus-bottom initial return over a [-10;+1] window around the earnings announcement date is 3.10%. The post announcement average return is large: The cumulative return over a [+2; +60] window is 5% for top surprises and -3.6% for bottom surprises (a 8.6% top-minus-bottom average gap). Fig. 2 suggests that before wire service adoption most of the reaction to earnings announcements occured with a delay.

After firms adopt a wire service the average initial stock price reaction is stronger: The top-minus-bottom initial return over a [-10;+1] window is 5.4%. The post announcement average return is lower compared to the period before the adoption: The cumulative return over a [+2; +60] window is 3.6% for top surprises and -0.5% for bottom surprises (a 4.1% top-minus-bottom average gap). Overall, Fig. 2 suggests that wire service adoption speeds up the incorporation of a firm's earnings news into its stock price.[5]

3.1. ESTIMATION

To test whether the speed of reaction of stock prices to earnings surprises increases when firms use an English-language wire service, we use an approach similar to that of DellaVigna and Pollet (2009) or Hirshleifer, Lim, and Teoh (2009). We estimate the following equation:

$$CAR_{y,i}[x,X] = \alpha_0 + \alpha_Q Q_{y,i} + \alpha_w OnWire_{y,i} + \beta^W Q_{y,i} * OnWire_{y,i} + \sum_{k=1}^{n} \gamma_k C_{y,i}^k + \sum_{k=1}^{n} \delta_{j,k} C_{y,i}^k * Q_{y,i} + \varepsilon_{y,i} \quad (4)$$

where $CAR_{y,i}[x,X]$ is the abnormal stock return of firm i in year y from day x to day X following the earnings announcement. $Q_{y,i}$ is equal to the quintile of earnings surprise for firm i in year y (1=lowest, 5=highest). $OnWire_{y,i}$ equals one if firm i communicates through a wire service in year y and zero otherwise. We allow the stock price response to depend on a set of n

[5] Fig. 2 suggests that the stock price response is stronger for positive news than to negative news. This asymmetry may result from European analysts being systematically optimistic in their forecasts and revising their forecasts too little before the earnings announcement, unlike U.S. analysts, who "walk down" their forecasts as the earnings announcement date nears (see Bolliger 2003; Richardson, Teoh, and Wysocki 2010). The true market surprise is the sum of the observed surprise (computed with the analyst forecast) and the positive analyst bias. As a result, when the observed surprise is positive, the true market surprise is larger than the observed surprise. When the observed surprise is negative, the true market surprise is smaller (in absolute value) than the observed surprise. In our sample we find that the median absolute values of the surprises are similar in the top and in the bottom quintile, suggesting that the true level of surprise is larger in the top quintile than in the bottom quintile.

control variables $C_{y,i}^{k}$. We include control for market capitalization as a proxy for size, constructed as ten deciles of the difference between the natural logarithm of market capitalization and the average of the log market capitalization of all firms in year *y* (variable *Market Cap.*). Other controls include the number of earnings forecasts issued by analysts on a firm for a given announcement (*Analyst Following*) and the market-to-book ratio (*MTB*). We interact each control variable with the quintile of earnings surprise to control for the fact that the level of earnings surprise could be correlated with characteristics of the firm. We allow the residuals to be correlated for the same firm and compute standard errors adjusting for heterogeneity and within-firm clustering (Petersen 2009).

In this panel setting, the effect of wire service adoption is driven by a change within the firm over time. Thus, the coefficient α_Q on $Q_{y,i}$ represents the incremental return between the jth and the $(j+1)^{\text{th}}$ earnings surprise quintiles before a firm adopts a wire service. Our interest is in the coefficient β^W, which represents the change in this incremental return once a firm has adopted a wire service.

We also consider a modified version of Equation (4), in which we introduce the five quintiles of surprises as dummy variables ($Q_{y,i}^{j}$ equals 1 if firm *i* is in the *j*-th quintile of earnings surprise in year *y*, and zero otherwise):

$$CAR_{y,i}[x,X] = \alpha_0 + \sum_{j=2}^{5} \alpha_j Q_{y,i}^{j} + \alpha_w OnWire_{y,i} + \sum_{j=2}^{5} \beta_j^{w} Q_{y,i}^{j} * OnWire_{y,i} + \sum_{k=1}^{n} \gamma_k C_{y,i}^{k} + \sum_{j=2}^{5} \sum_{k=1}^{n} \delta_{j,k} C_{y,i}^{k} * Q_{y,i}^{j} + \varepsilon_{y,i} \quad (5)$$

In Equation (5), the α_j coefficient on $Q_{y,i}^{j}$ can be interpreted as the incremental return between the most negative surprise (Q_1) and the jth quintile *before* the firm adopts a wire

service. For instance, α_5 is the incremental return for surprises that fall within the fifth (the highest) quintile versus the most negative surprise prior to using a wire service.[6] Similarly, the β_j^W coefficients on the interaction of each Q_i with the *OnWire* dummy represent the change in the incremental return (Q_i versus Q_1) *following* wire service adoption.

Our central hypothesis is that communicating through a wire service increases investors' attention and speeds up the incorporation of a firm's earnings news into its stock price. Thus, when the dependent variable is the stock's short term response ($CAR[0,1]$) we expect β^W in Equation (4) and the β_j^W in Equation (5) to be positive. When the dependent variable is the post-earnings announcement drift ($CAR[2,60]$)]) we expect β^W in Equation (4) and the β_j^W in Equation (5) to be negative.

3.2. THE EFFECT OF ADOPTING A WIRE

As we examine how the use of a wire service impacts the stock price reaction to earnings news, one concern is that the adoption of a wire service might result from time-invariant unobserved firm characteristics. To rule out this interpretation, we restrict the sample to firms that adopt a wire service during our sample period (423 firms). Implicitly, the control group for each period is all firms that have not yet adopted a wire service. In Table 3, columns 1-6 display the results for Equation (4), while columns 7-8 display the results for Equation (5). All the specifications in Table 3 include firm fixed effects, so that the effect of wire service adoption on stock price drift is driven by a change within the firm over time.

[6] Note that when we introduce firm fixed effects in Equation (4) or Equation (5) the coefficient on the *OnWire* dummy alone has no obvious interpretation. In Equation (5) without firm fixed effects, the sum of α_W with the constant of the model is the total return for on-wire announcements in the bottom surprises group (Q_1). With firm fixed effects, the constant of the model is replaced by a set of dummies for each firm in the panel dataset. The computation of the return for bottom surprises would involve adding each fixed effect's estimates with the *OnWire* coefficient.

[insert Table 3 here]

In the specification of Equation (4) with all controls (columns 5 and 6), before wire service adoption the incremental initial reaction to a stronger earnings surprise represents 20% of the 60-day reaction (0.452/(0.452+1.814)). After wire service adoption the incremental initial reaction to a stronger earnings surprise represents 47% of the 60-day reaction (0.452+0.397)/(0.452+0.397+1.814-0.878).

Columns 7-8 of Table 3 report the results of estimating Equation (5), which allows for non-linearity in the stock price response to earnings surprises. We focus on the comparison between the top (Q_5) minus bottom (Q_1) reaction to earnings surprises. Before wire service adoption, the top-minus-bottom initial reaction is 1.8%. After wire service adoption, it jumps to 3.8%. At the same time, the 60-day top-minus-bottom delayed reaction falls from 8.4% to 4.2% following wire service adoption. These numbers are similar to those reported in columns 5 and 6.[7]

Finally, we conduct an analysis of the abnormal trading volume in this panel setting by estimating the following regression:

$$VOL_{y,i}[0,2] = a_0 + \sum_{j=2}^{5} b_j Q_{y,i}^{j} + b_w OnWire_{y,i} + \sum_{k=1}^{n} c_k C_{y,i}^{k} + \varepsilon_{y,i} \qquad (6)$$

where $VOL_{y,i}[0,2]$ denotes the abnormal trading volume at announcement for firm i in year y. The coefficient of interest is b_w, which measures the average effect of communicating through a wire service, conditional on earnings surprises and a set of control variables.

[insert Table 4 here]

[7] These numbers imply that the price reaction over the [0,60] interval decreases after wire service adoption: however, this decrease is smaller once we take into account the increased run-up post-wire adoption (see Fig. 2).

Table 4 displays the results. All specifications include firm fixed effects. Adopting a wire service is associated with a statistically and economically significant increase in the abnormal trading volume following earnings announcement. In the specification with all controls, the coefficient on *OnWire* is positive and statistically significant at the 1% level. Compared to their offwire announcements, firms that adopt a wire exhibit a 8.6% higher abnormal trading volume. Since low trading volume has been associated with investors inattention (Gervais, Kaniel, and Mingelgrin 2001; Barber and Odean 2008), this pattern is consistent with the idea that failing to communicate earnings announcements through a wire service causes investors to be less reactive in the short run.

All in all, the evidence on stock price reaction and trading volume supports our hypothesis that the dissemination of news through wire services increases investors' attention to earnings announcements.

3.3. DOES WIRE SERVICE ADOPTION COINCIDE WITH AN EXPANSION OF THE FIRM'S INTERNATIONAL PRESENCE?

A potential concern is that the adoption of a wire service could be correlated with other events at the corporate level that also affect the stock price behavior. In part, this concern is mitigated by the fact that once firms start using a wire service, they continue to use it. Nevertheless, the decision to use a wire service might coincide with other corporate decisions that bring the firm more visibility and more investor attention, such as, for instance, an expansion of international operations.

In each of the three years before and after wire service adoption, we estimate the following equation:

$$CAR_{y,i}[x,X] = \alpha_0 + \alpha_Q Q_{y,i} + \sum_{k=1}^{n} \gamma_k C_{y,i}^k + \varepsilon_{y,i} \quad (7)$$

where α_0 includes a set of country and industry fixed effects. The specification is similar to Equation (4). We estimate this equation using two different $[x, X]$ windows for the dependent variable: [0,1] and [2,60]. Denoting by $\alpha_Q^{[0,1]}$ (resp. $\alpha_Q^{[2,60]}$) the average short-term (resp. long-term) return to earnings surprise, we compute the share of the immediate reaction in the total 60-day stock return as $\alpha_Q^{[0,1]}/(\alpha_Q^{[0,1]} + \alpha_Q^{[2,60]})$.

[insert Figure 3 here]

Fig. 3 illustrates how the share of immediate stock price reaction evolves around the wire service adoption year. In the three years preceding wire service adoption, the average share of immediate reaction is below 17%, while it increases to more than 36% in the three years following adoption. Interestingly, wire service adoption does not appear to coincide with firms' decisions to expand their international operations, as shown by the average evolution of foreign sales over the period.

3.4. EXOGENOUS ADOPTION OF A WIRE SERVICE IN RESPONSE TO THE TRANSPARENCY DIRECTIVE

Fig. 3 is reassuring as it suggests that wire service adoption does not coincide with a firm's international expansion. Nevertheless, it is still possible that other corporate events drive both the adoption of a wire service and the stock price reaction to news.

To investigate this issue further and obtain reliable estimates of the effect of wire services on investor attention, we exploit the regulatory changes caused by the EU Transparency

Directive. The Transparency Directive came into force in all European countries from 2007 onwards (the precise enactment date varies slightly across countries). Wire adoption around the enactment date is likely to be driven by the regulatory environment and thus largely exogenous. We choose 2007 as the starting date for considering wire adoption to be caused by the new regulation, since 2007 was the deadline for EU countries to translate the Transparency Directive into national legislation. All countries in the sample except Norway abide by the Transparency Directive. Switzerland is not normally concerned with EU Directives, but it simultaneously implemented a law that is similar in content to the Transparency Directive.[8]

To capture the effect of adopting a wire service, we use a difference-in-differences approach. We compare the stock price behavior of firms that adopt a wire in response to the Transparency Directive (the treatment group) with that of firms that have always been on-wire (Always-on-Wire firms, the control group). To do so, we estimate Equation (4) on a sample that includes the treatment group and the control group. We interpret the coefficient of interest (β^W) as the mean difference in the top-minus-bottom drift between Wire-Adopters and Always-on-Wire firms in the post-Directive period, as compared to the pre-Directive period.

A potential concern is that Wire-Adopters and Always-on-Wire firms might be different along dimensions correlated with investor attention. Table 5, Panel A (columns 1 and 2) suggests that this concern is warranted. On average, Always-on-Wire firms are larger, have higher market-to-book ratios, and enjoy greater analyst following. Comparing these two subgroups is thus unlikely to provide a reliable estimate of the effect of wire service adoption.

[insert Table 5 here]

[8] Stock Exchange Ordinance-FINMA, SESTO-FINMA of October 25, 2008

To overcome this problem, we create a matched sample of Always-on-Wire firms that are similar to Wire-Adopters with respect to size, market-to-book ratio, and analyst following. Specifically, we run a probit regression in which the dependent variable is a dummy variable equal to one if a firm adopts a wire service in response to the Transparency Directive and zero otherwise. We include the means (computed over the pre-enactment period 1991-2007) of variables likely to affect the probability of adopting a wire service in response to the Transparency Directive. Table 5, Panel B (first column) presents estimates of the probit regression on a cross-section of 149 Directive-Wire-Adopters and 443 Always-on-Wire firms. We then use these estimates to generate a propensity score, a prediction of the firm's probability of being a Directive-Wire-Adopter. We use this propensity score to match each treated firm with its four nearest neighbors, using a nearest neighbor match with replacement technique similar to that of Lemmon and Roberts (2010). This matching procedure results in the pairing of 142 treated firms with 205 always-on-wire firms. We check the significance of coefficient estimates in the probit regression once the matching has been performed. In Table 5, the last column of panel B shows that only the market capitalization remains significant, although the magnitude of the coefficient has decreased, suggesting that the post-match samples are more comparable than the pre-match samples. Table 5, Panel A (columns 3 and 4) confirms that the post-match samples are more similar along the three dimensions of market capitalization, market-to-book ratio, and analyst following.

A crucial assumption for the difference-in-differences estimator to be valid is that the treatment and control groups show similar trends prior to the change (the "parallel trend assumption"). To verify this assumption, we fit the model on observations prior to the enactment of the Transparency Directive, and check that the difference-in-differences estimator

is not statistically significant. Specifically, we estimate Equation (4) by replacing the variable *OnWire* with the variable *Treatment*, which indicates whether or not a firm belongs to the treatment group (firms adopting a wire service after the enactment of the EU Transparency Directive). We estimate this equation using firm fixed effects, so that coefficient estimates are driven by a change within the firm over time. If the post earnings announcement drift in the treatment and control groups have similar evolution prior to the enactment of the Transparency Directive, then the coefficient of interaction between *Treatment* and Q should be not be statistically different from zero on the sample of announcements prior to the enactment of the EU Transparency Directive. Table 6 reports coefficient estimates for several specifications. In none of them is the coefficient of interaction between *Treatment* and Q significantly different from zero at the 5% level, suggesting that the two groups indeed experienced the same evolution prior to enactment of the Transparency Directive.

[insert Table 6 here]

We now turn to our key question: Did the adoption of a wire service after the Transparency Directive was enacted result in greater investor attention? We estimate Equation (4) again, replacing the variable *OnWire* with the variable *Directive*, which is equal to one if a firm adopts a wire service after 2007 and is incorporated in a country affected by the Transparency Directive, and zero otherwise.

[insert Table 7 here]

Our results, presented in Table 7, confirm that the adoption of a wire service leads to a sharp drop in post earnings announcement drift. Before wire service adoption, the top-minus-bottom initial reaction is 1.8% (column 7). After wire service adoption, it jumps to 4.1% (a

slightly bigger jump than in Table 3). At the same time (column 8), the 60-day top-minus-bottom reaction falls from 7.2% to 2.3% following wire service adoption (a larger fall than in Table 3).

To further check the robustness of this result we use a placebo test: We pretend that firms adopted a wire service two years before they actually did and we remove the last two years of observations in the sample period. We report this estimation in Table 7, Panel B. In all specifications, the coefficient of interaction between *Q* and *Directive* is indistinguishable from zero. Table 7 suggests that wire service adoption in response to the Transparency Directive is indeed the main trigger of the change in the post earnings announcement drift.

Wire service adoption in response to the new European regulation is unlikely to be associated with any change in corporate policies, and yet it has a marked impact on the delayed response of stocks to earnings surprises. For these firms, improved news dissemination through the use of English-language wire services appears to increase investor attention.

4. Attention to Earnings News or Awareness of the Firm?

This result, that firms' earnings announcements receive more attention from investors after the firms start using a wire service, can be interpreted in two ways: First, as wire services deliver information in a more intelligible and accessible way, perhaps investors are better able to process earnings information. Or, alternatively, do more investors become aware of the firm and follow its announcements as a result of the adoption of a wire service?[9]

[9] We thank an anonymous referee for prodding us to distinguish between these two interpretations.

That investor attention could increase for the firm overall as a result of wire service adoption follows from Merton's (1987) investor recognition hypothesis. In this view, before wire adoption not all investors were aware of the existence of the firm. Obstacles to investor awareness include language (if the firm disseminates its news in a language other than English) and technology (if the firm does not disseminate its news electronically). Wire service adoption removes these obstacles, resulting in an expansion of the firm's shareholder base. Following Merton (1987) risk then becomes more widely shared among shareholders. The expected return falls as the premium for insufficient diversification (the "shadow cost of incomplete information" in Merton's (1987) terminology) vanishes.

A number of empirical studies have examined the predictions of the Merton (1987) model in situations likely to involve increased awareness of a firm by investors.[10] We build on this literature to examine the implications of increased investor awareness in the context of wire adoption. If the adoption of a wire service results in increased investor awareness for the firm overall (not just during the earnings announcement season), after wire service adoption one would expect a fall in the future returns of the firm, as well as in the shadow cost of information. Moreover, one would expect wire service adoption to result in an increase in the firm's exposure to global markets, and a reduction in their exposure to local markets. We now turn to examining these predictions empirically.

The first column in Table 8, Panel A, compares daily returns before and after wire adoption. We regress daily market-adjusted returns on firm fixed effects and on an *OnWire*

[10] Listings on the New York Stock Exchange (Kadlec and McConnell 1994); cross-listing on the U.S. market (Foerster and Karolyi 1999); decrease in the minimum trade size (Amihud, Mendelson and Uno 1999); inclusion in the S&P 500 index (Chen, Noronha and Singal 2004); media coverage (Fang and Peress 2009); advertising expense (Chemmanur and Yan 2009).

dummy variable equal to one in or after the wire service adoption year, and equal to zero otherwise. The coefficient on *OnWire* captures any change in expected returns after wire service adoption. We report results both outside earnings announcement periods and throughout the year. We find no discernible drop in returns post-wire adoption.

[insert Table 8]

A potential concern with the results shown in the first column of Table 8, Panel A is that the realized returns might be biased upward because of the announcement effect of wire service adoption. To alleviate this concern, in column 2 we rerun the regression excluding the year in which the wire service was adopted. The results are qualitatively unchanged: Wire service adoption does not appear to result in significantly lower expected returns.

Table 8, Panel B examines whether wire service adoption affects three measures of firm visibility: the shadow cost of incomplete information (Merton 1987), the number of shareholders, and analyst following. We use Kadlec and McConnell's (1994) measure of the shadow cost, $\frac{\sigma.MV}{number\ of\ shareholders}$, where σ is the idiosyncratic volatility computed as the standard deviation of the residuals of a market model (Ang et al. 2006) and *MV* is the firm size scaled by the value of the index in the year of the wire service adoption. We collect shareholder information from Thomson Ownership, which gathers information on major blockholders for European firms. We collect this information from Thomson Ownership on the sample of Directive Wire-Adopters only. Table 8, Panel B shows no statistically discernible change in the shadow cost of incomplete information or in the number of shareholders following wire

adoption. It shows a small increase in the number of analysts following the firm following wire adoption (a 12.6% increase).[11]

If companies adopting wire dissemination become followed by more international investors, one would expect an increase in the exposure of their stocks to global markets and a decrease in their exposure to local markets. Similar to Foerster and Karolyi (1999), we estimate a market model that accounts for both local and global market risks. We compute local market risk relative to each country's market index (see Appendix B for the list of local market indices) and global market risk relative to a global European index (the Euro Stoxx50). We estimate the model on the sample of Directive Wire-Adopters and we restrict the sample to a three-year window surrounding wire adoption by each firm. We pool firms' excess returns and estimate the following market model:

$$R_{it} = \alpha_{PRE} + \beta^{L}_{PRE} R^{L}_{mt} + \beta^{G}_{PRE} R^{G}_{mt} + \alpha_{POST} D_{i,POST} + \beta^{L}_{POST} R^{L}_{mt} D_{i,POST} + \beta^{G}_{POST} R^{G}_{mt} D_{i,POST} + \varepsilon_{i,t} \quad (8)$$

where R_{it} is firm i's return in excess of a three-month government bond yield[12], α_{PRE} is a constant, R^{L}_{mt} and R^{G}_{mt} are respectively the local and global market excess return, and $D_{i,POST}$ is a dummy variable that takes on a value of one the year firm *i* adopts a wire service and in the year immediately after. We estimate the model using OLS, and compute robust standard errors

[11] In unreported analyses, we find that firms that are already on-wire do not experience a decrease in analyst following when another firm starts using a wire service.

[12] We compute bond yields using the EBF-Euribor for firms incorporated in a country of the Eurozone, and national bond yield for firms incorporated in countries not part of the Eurozone (Denmark, Norway, Sweden, and Switzerland).

using Newey-West estimator, which corrects for heteroskedasticity and serial correlations of the residuals (up to 20 trading days).

[insert Table 9]

As shown in Table 9, wire service adoption results in no discernible change in a firm's relative exposures to global and local market risks: Our estimates of β^{L}_{POST} and β^{G}_{POST} are not statistically different from zero. We conclude that wire adoption does not sufficiently change the nature of the shareholder base for a firm's exposure to global and local risks to be significantly affected.

Overall, our results give little support to the view that wire service adoption results in greater investor awareness for the firm outside of earnings announcement periods.

5. Wire Services and the Conversion of Company News into Tradeable Information

Our empirical setup allows us to delve deeper into the mechanisms that foster or hinder investor attention. In William James' classical definition, "[attention] is the taking possession by the mind, in clear and vivid form, of one out of what seem several simultaneously possible objects or trains of thoughts…. It implies withdrawal from some things in order to deal effectively with others." (James (1890), cited in Goldstein (2011)). We conjecture that in today's financial markets investors give their attention exclusively to electronic English-language information, and withdraw their attention from anything else.

We argue that wire services convert raw company news into tradeable electronic English-language information. The recent controversy on high-frequency trading (HFT) provides anecdotal evidence for this conversion view of wire services. After a Wall Street Journal article

suggested that high-frequency traders sought an edge by paying for early access to earnings announcements, Berkshire Hathaway's Business Wire (one of the major wire services) stopped providing direct feeds to high-frequency traders, and PR Newswire (another major wire service) required customers that received direct feeds to certify that they would not engage in high-frequency trading based on the information.[13] This episode suggests that the newsfeeds provided by wire services to investors are a key ingredient of trading decisions and attract a lot of investor attention.

While this anecdote suggests that wire services are an important channel of information for investors even today, it also raises a concern. A company's earnings news reaches investors faster once it is disseminated through a wire service. The increase in immediate reaction and the decrease in drift that we observe after a firm adopts a wire service might then be due to a mechanical effect: before the firm adopts a wire service, perhaps some investors did not receive the earnings news in the [0,1] window that we use to measure the immediate reaction. To alleviate this concern, we replicated our analyses of section 3 using a [0,5] initial reaction window. We believe that, even when a firm did not use a wire service, it is likely that investors received its earnings news within five days of its release. Our results are qualitatively unchanged when we use the [0,5] immediate reaction window, suggesting that the effect of wire service on investor attention is not a mechanical consequence of the speed of information transmission.

We now turn to an empirical examination of the conversion view of wire services. A crucial condition for a company to be present in electronic English-language information

[13] "Speed Traders Get an Edge," Wall Street Journal 2 February 2014, Vol. 263 Issue 31, pp. C1-C2. See also "PR Newswire agrees to curb early access for high frequency traders," Reuters, 29 April 2014.

sources is to be covered by Reuters or Dow Jones. Reuters and Dow Jones journalists select and edit company news, which is then disseminated to market participants and the business press and automatically archived in financial databases. If the reason why wire service adoption affects investor attention is that it triggers the inclusion of a company's news into electronic English-language information sources, we should observe that firms adopting a wire service subsequently receive more coverage by Reuters and Dow Jones. To examine this prediction, we collect information on coverage by Reuters and Dow Jones on our sample of Directive Wire-Adopters. Almost half of the firms in this sample were not covered by those media before they start using a wire service. For those firms that were covered, the volume of articles is small (the median value is eight articles per year). We estimate a Poisson regression where the dependent variable is the volume of articles on Reuters and Dow Jones. In this Poisson specification, the number of articles for the *i*th observation λ_i is assumed to depend nonlinearly on covariates $(x_1, \dots, x_k)$: $\lambda_i = e^{\alpha+\beta_1 x_{1,i}+\cdots+\beta_k x_{k,i}}$. We include firm and year fixed effects estimated following Hausman et al. (1984).

[insert Table 10 here]

Table 10 reports our results. We find that wire adoption strongly predicts an increase in coverage by Reuters or Dow Jones. The volume of articles on Reuters or Dow Jones increases on average by 33% to 41% after wire adoption ($33\% = e^{0.29} - 1$).

To further assess the conversion view of wire services, we exploit cross-country variations in technological development. Griffin, Hirschey, and Kelly (2011) find that a country's technological development determines how efficiently it diffuses information. We conjecture that in a highly technologically developed country, by the time a company starts using a wire

service it is probably already indexed in databases. Wire service adoption is then less likely to be a firm's entry point into the world of electronic English-language information than it is for a firm in a less technologically developed country. If the effect of wire service adoption on investor attention derives from its conversion of raw company news into tradeable information, we should observe a greater effect of wire service adoption in less technologically advanced countries.

We sort continental European countries by level of technological development using the Technological Adoption index from the Global Competitiveness Report of the World Economic Forum.[14] The Technological Adoption index is constructed from a survey of executives in each country that ask their perception (on a 1 to 7 scale) about: 1) the availability of the latest technologies; 2) the level of technology adoption by firms; 3) the role of foreign direct investment in technology transfer. The index is an equally weighted average of these three values. For each country, we classify firms in the High TechAdoption (resp. Medium TechAdoption and Low TechAdoption) group if the value of the index of the home country is above (resp. equal and below) the median value of the index. We estimate Equation (4) on the sample of Wire-Adopters separately for each group and test the equality of the coefficient on $Q * OnWire$ across the High TechAdoption and Low TechAdoption groups.[15]

[insert Table 11 here]

Table 11 displays the results. For firms in the Low TechAdoption group, after wire service adoption the incremental immediate reaction to better earnings news is higher (and the post

[14] Source: http://www.weforum.org/reports/global-competitiveness-report-2014-2015.
[15] The Low TechAdoption group includes France, Italy, Spain, Austria and Greece. The Medium TechAdoption group includes Germany, the Netherlands, Finland and Denmark. The High TechAdoption group includes Sweden, Norway, Portugal, Switzerland and Belgium.

earnings announcement drift is lower) than for firms in the Medium TechAdoption and the High TechAdoption groups. The effect of wire service adoption is not significant in the High TechAdoption group. This finding indicates that the use of wire services matters most in countries with low levels of technological adoption. It supports the view that wire service adoption increases investor attention by improving the technology of news dissemination.

A natural question is whether the effect of wire services on investor attention derives from the electronic nature of wire newsfeeds, or from the use of English rather than a continental European language. One way to answer this question is to look at the UK market and study whether the introduction of wire services has comparable effects. Unfortunately, this option is not available as the use of a wire service is almost universal in the UK during our sample period. In unreported results we attempted to address the effect of language by splitting the sample between firms located in a country with a unique language (a language that is only spoken in the firm's country) vs. firms located in countries with a more universally spoken language (namely French, German, and Spanish). We do not find differences between these two groups.

Taken together, the results of this section are consistent with the view that wire services convert raw company news into electronic English-language information, which attracts investor attention. In section 4 we found that the increased investor attention following wire adoption only applied to earnings announcement periods. We speculate that the results of section 4 and section 5 are linked, and that the sporadic nature of investor attention is driven by information technology. Prior to the extensive use of electronic databases, following a company was only feasible through a continuous process of information collection. The widespread

presence of electronic information has made it possible for investors to devote attention at selected times, during the release of important company announcements.

6. Conclusion

Continental European firms that start disseminating their news through English-language wire services experience a smaller stock price drift and a larger abnormal trading volume following earnings announcements. Our results (1) are consistent with the view that wire service adoption results in increased investor attention to earnings news; (2) hold when we restrict our sample to firms that adopt a wire service because of regulatory pressures, suggesting that they are unlikely to be driven by unobserved heterogeneity; (3) are not driven by the increased speed of news transmission through wire services. We argue that wire services convert raw company earnings news into tradeable electronic information, which attracts investor attention, and we find empirical support for this view. Our findings demonstrate the importance of the format of company news for investor attention.

Appendix A. List of variables

Variable	Definition	Source
Analyst Following	Number of earnings forecasts issued by analysts on the six months preceding the annual earnings announcement.	I/B/E/S
Country	Country fixed effect.	I/B/E/S
Directive	Dummy variable that equals one if a firm adopts a wire service after 2007 and is incorporated in a country affected by the EU Transparency Directive, and zero otherwise.	Factiva
Earnings Surprise	The difference between actual earnings for the current year and the median analyst forecast up to six months before the earnings announcement, divided by the price of the share five days before the announcement date.	I/B/E/S
Foreign sales percentage	The share of sales made on foreign markets.	Worldscope
Market Cap.	Ten deciles of the difference between the natural logarithm of market capitalization and the average of the log market capitalization for all firms in the same year.	Worldscope
Market-to-Book	Market-to-book ratio	Worldscope
OnWire	Dummy variable that equals one if a firm uses a wire service during the year.	Factiva
Q1 to Q5	Five yearly quintiles of Earnings Surprise (Q5 is highest surprise, Q1 is lowest)	I/B/E/S
Sector	Sector fixed effects (six-digit SIC code).	I/B/E/S
Size	The natural logarithm of market capitalization.	Worldscope
VOL[0,2]	Abnormal trading volume: the difference between the average log number of shares traded from day 0 to day 2 following the earnings announcement and the average log number of shares traded over a ten-day period preceding the earnings announcement (days -20 to -11).	Worldscope

Appendix B. List of local market indexes

Austria	ATX - Austrian Traded Index
Belgium	BEL 20
Denmark	OMX Copenhagen
Finland	OMX Helsinki
France	CAC 40
Germany	DAX 30 Performance
Greece	ATHEX Composite
Italy	FTSE MIB Index
Netherlands	AEX Index
Norway	OSLO Exchange All Share
Portugal	Portugal PSI All-Share
Spain	IBEX 35
Sweden	OMX Stockholm
Switzerland	Swiss Market (SMI)

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Table 1

Descriptive statistics

This table displays characteristics of announcements and announcing firms during the 1991-2010 period. In Panel A, we present characteristics across firms and time for all firms in our sample (column 1), as well as characteristics for four subsamples: Always-on-Wire (column 2) are firms that have always disseminated their news releases through wire services, Never-on-Wire (column 3) are firms that have never used a wire service, Wire-Adopters (column 4) are firms that have adopted a wire service during the period, and Directive-Wire-Adopters (column 5) is the subset of firms that adopted a wire service due to the enactment of the EU Transparency Directive. In Panel B, On-Wire announcements are announcements made by firms that disseminate their news releases through a wire service in the announcement year. Q1 to Q5 denotes the five quintiles of earnings surprises.

Panel A: Characteristics of firms by news dissemination policy

	All Firms	Always -on-Wire	Never -on-Wire	Wire-Adopters	Directive-Wire-Adopters (subset of Wire-Adopters)
Median Market Capitalization ($M)	0.89	2.54	0.48	0.69	0.38
Mean Market-to-Book	2.92	3.11	2.75	2.87	2.72
Mean Analyst Following	11.43	15.44	8.39	10.01	6.45
Number of Firms	1,192	443	326	423	149

Panel B: Distribution of announcements by type of announcement

	All	On-Wire	Off-Wire
Number	9,629	6,228	3,401
Fraction	100%	64.7%	35.3%

Table 2

Summary statistics by country

This table presents the total number of announcing firms by country over the 1991-2010 period for all firms in our sample (column 1) and for four subsamples: Always-on-Wire (column 2) are firms that have always disseminated their news releases through wire services, Never-on-Wire (column 3) are firms that have never used a wire service, Wire-Adopters (column 4) are firms that adopted a wire service during the period, and Directive-Wire-Adopters (column 5) are firms that adopted a wire service after the enactment of the EU Transparency Directive. Statistics by country are built by aggregating all firm-year observations for each country. The last row is the total number of distinct firms across all years.

	All firms	Always-on-Wire	Never-on-Wire	Wire-Adopters	Directive-Wire-Adopters
Austria	31	11	9	11	3
Belgium	55	17	20	18	7
Denmark	46	14	17	15	5
Finland	60	27	13	20	9
France	219	72	49	98	40
Germany	219	82	49	88	32
Greece	48	18	24	6	1
Italy	86	27	34	25	8
Netherlands	73	17	30	26	9
Norway	80	51	13	16	0
Portugal	13	6	1	6	4
Spain	67	19	29	19	5
Sweden	102	60	11	31	5
Switzerland	93	22	27	44	21
Total	1,192	443	326	423	149

Table 3

Stock price response to earnings news for Wire-Adopters

The sample includes all the firms that adopted a wire service at some point between 1991 and 2010. All specifications include firm fixed effects. For each firm, we identify the year in which it started to use a wire service (the wire adoption year). *OnWire* is a dummy variable equal to one if the earnings announcement was made in or after the wire adoption year, and equal to zero otherwise. In specifications (1) to (6), *Q* is the earnings surprise quintile (*Q*=1 for the lowest quintile, *Q*=5 for the highest quintile). Specifications (7) and (8) introduce the Q_i as dummy variables (one dummy variable for each quintile, *Q1* omitted) and report parameter estimate on the highest quintile. Standard controls include market capitalization, market-to-book ratio, and analyst following. Whenever a control is included, it is also interacted with all quintiles of earnings surprises. We report coefficient estimates expressed in percentage. Standard errors adjusted for heteroskedasticity and clustered by firms are in parentheses below the coefficient estimates.*, **,*** indicate significance at the 10%, 5%, and 1% level, respectively.

	Dependent Variable: Market Reaction to Earnings News							
	(1) CAR[0,1]	(2) CAR[2,60]	(3) CAR[0,1]	(4) CAR[2,60]	(5) CAR[0,1]	(6) CAR[2,60]	(7) CAR[0,1]	(8) CAR[2,60]
Q	0.289***	2.590***	0.300***	2.367***	0.452***	1.814***		
	(0.094)	(0.336)	(0.094)	(0.332)	(0.123)	(0.442)		
Q x *OnWire*	0.340**	-1.106***	0.349**	-0.890**	0.397***	-0.878**		
	(0.138)	(0.411)	(0.140)	(0.402)	(0.145)	(0.417)		
Q5							1.795***	8.365***
							(0.668)	(1.999)
Q5 x *OnWire*							1.985***	-4.089**
							(0.622)	(1.902)
Controls (interacted)					yes	yes	yes	yes
Year fixed effects			yes	yes	yes	yes	yes	yes
Firm fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Number of Observations	3,813	3,813	3,813	3,813	3,745	3,745	3,745	3,745

Table 4

Trading volume response to earnings announcements for Wire-Adopters

The sample includes all the firms that adopted a wire service at some point between 1991 and 2010. The abnormal trading volume is computed as the difference between the average log number of shares traded from day 0 to day 2 following the earnings announcement and the average log number of shares traded over a ten-day period preceding the earnings announcement (days -20 to -11). The Q_i refer to the quintiles of earnings surprise (*Q5* is the highest). All specifications include firm fixed effects. For each firm, we identify the year in which it started to use a wire service. *OnWire* is a dummy variable equal to one if the earnings announcement was made in or after the wire adoption year, and equal to zero otherwise. Standard controls include market capitalization, market-to-book ratio, and analyst following. Whenever a control is included, it is also interacted with all quintiles of earnings surprises. Standard errors adjusted for heteroskedasticity and clustered by firms are in parentheses below the coefficient estimates. *, **,*** indicate significance at the 10%, 5%, and 1% level, respectively.

	Dependent Variable: Abnormal Trading Volume			
	(1) VOL[0;2]	(2) VOL[0;2]	(3) VOL[0;2]	(4) VOL[0;2]
OnWire	0.260***	0.100**	0.212***	0.086**
	(0.038)	(0.047)	(0.043)	-0.043
Q2	-0.047	-0.061	0.021	0.026
	(0.048)	(0.049)	(0.115)	(0.115)
Q3	-0.080	-0.095*	-0.056	-0.064
	(0.050)	(0.049)	(0.121)	(0.119)
Q4	0.024	-0.001	0.057	0.084
	(0.049)	(0.048)	(0.112)	(0.111)
Q5	0.079*	0.049	0.204*	0.193*
	(0.048)	(0.049)	(0.113)	(0.111)
Controls (interacted)			yes	yes
Year fixed effects		yes		yes
Firm fixed effects	yes	yes	yes	yes
Number of observations	3,813	3,813	3,745	3,745

Table 5

Propensity score matching

The sample consists of all the firms that adopted a wire service after the implementation of the EU Transparency Directive in their home country and firms that have always used a wire service between 1991 and 2010. The treatment group consists of all the firms that adopted a wire service after the implementation of the EU Transparency Directive in their home country. The control group consists of all the firms that have always used a wire service. In Panel A, we present differences between the two subgroups on a set of variables before and after performing the matching. We present mean estimate for each variables and its associated standard error in parenthesis. In Panel B, we present coefficient estimates of the probit regression used to generate the propensity score for the control and treatment groups. The dependent variable is a dummy equal to one if a firm adopts a wire service in response to the Transparency Directive, and equal to zero otherwise. All covariates are averages over the pre-enactment period (1991-2007). The pre-match column contains parameter estimates used to estimate the propensity score matching. This score is used to match each firm in the treatment group with four firms in the control group, using a nearest-neighbor matching with replacement. The post-match column presents coefficient estimates of the probit regression on the subsample of treatment and matched-control firms. All variables are defined in the Appendix. Standard errors adjusted for heteroskedasticity and clustered by firms are in parentheses below the coefficient estimates. *, **,*** indicate significance at the 10%, 5%, and 1% level, respectively.

Panel A. Sample comparisons

	Pre-Match		Post-Match	
	Control (Always-on-Wire)	Treatment (Directive-Wire-Adopters)	Control (Always-on-Wire)	Treated (Directive-Wire-Adopters)
Market-to-Book	3.11	2.71	2.82	2.70
	(0.093)	(0.085)	(0.126)	(0.085)
Size	14.79	12.84	13.39	12.82
	(0.031)	(0.035)	(0.034)	(0.035)
Analyst following	15.45	6.44	8.50	6.37
	(0.178)	(0.142)	(0.171)	(0.143)
Number of Observations	3,268	1,059	1,233	1,037
Number of Distinct Firms	443	149	205	142

Panel B. Probit regression

	Pre-Match	Post-match
Market-to-Book	-0.035*	-0.023
	(0.021)	(0.027)
Size	-0.288***	-0.191***
	(0.065)	(0.071)
Analyst following	-0.052***	-0.015
	(0.017)	(0.020)
Number of control firms	443	205
Number of treatment firms	149	142
Pseudo-R2	0.186	0.0299

Table 6

Stock price response to earnings news for a matched sample of Directive-Wire-Adopters and Always-On-Wire firms *before* the Transparency Directive is implemented

The sample begins with all the firms that adopted a wire service after the implementation of the Transparency Directive in their home country and firms that have always used a wire service between 1991 and 2010. We match the two samples on a set of observables (size, analyst following, and market-to-book). *Treatment* is a dummy variable equal to one if a firm adopts a wire in response to the implementation of the Transparency Directive, and equal to zero otherwise. We regress abnormal return on quintiles of earnings surprises and their interaction with *Treatment* before the Transparency Directive is actually implemented. The specification is identical to the one in Table 3. All variables are defined in the Appendix. Standard errors adjusted for heteroskedasticity and clustered by firms are in parentheses below the coefficient estimates. *, **,*** indicate significance at the 10%, 5%, and 1% level, respectively.

	Dependent Variable: Market Reaction to Earnings News							
	(1) CAR[0,1]	(2) CAR[0,1]	(3) CAR[0,1]	(4) CAR[2,60]	(5) CAR[2,60]	(6) CAR[2,60]	(7) CAR[0,1]	(8) CAR[2,60]
Q	0.060	0.070	0.200	1.367**	1.305***	1.570		
	(0.201)	(0.208)	(0.391)	(0.530)	(0.499)	(1.322)		
Q x *Treatment*	0.344	0.299	0.200	1.383*	0.927	0.339		
	(0.259)	(0.263)	0.200	(0.780)	(0.726)	(0.871)		
Q5							0.281	7.767
							(1.716)	(6.103)
Q5 x *Treatment*							0.418	2.891
							(1.244)	(3.828)
Controls (interacted)			yes			yes	yes	yes
Year fixed effects		yes	yes		yes	yes	yes	yes
Firms fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Number of Observations	1,257	1,257	1,240	1,257	1,257	1,240	1,240	1,240

Table 7

Stock price response to earnings news for a matched sample of Directive-Wire-Adopters and Always-On-Wire firms

The sample begins with all the firms that adopted a wire service after the implementation of the EU Transparency Directive in their home country and firms that have always used a wire service between 1991 and 2010. We match the two samples on a set of observables (size, analyst following, and market-to-book). In Panel A, *Directive* is a dummy variable that equals one if the earnings announcement was made in or after the wire adoption year. In panel B, we pretend firms adopt a wire service two years before they actually did; we set the *Directive* variable to zero before the (fake) wire adoption and to one afterwards. In specifications (1) to (6), *Q* is the earnings surprise quintile (*Q*=1 for the lowest quintile, *Q*=5 for the highest quintile). Specifications (7) and (8) introduce the Q_i as dummy variables (one dummy variable for each quintile, *Q1* omitted) and report parameter estimate on the highest quintile. All specifications include firms' fixed effects. Standard controls include market capitalization, market-to-book ratio, and analyst following. Whenever a control is included, it is also interacted with all quintiles of earnings surprises. We report coefficient estimates expressed in percentage. Standard errors adjusted for heteroskedasticity and clustered by firms are in parentheses below the coefficient estimates. *, **,*** indicate significance at the 10%, 5%, and 1% level, respectively.

Panel A: Stock price response to earnings news

	Dependent Variable: Market Reaction to Earnings News							
	(1) CAR[0,1]	(2) CAR[2,60]	(3) CAR[0,1]	(4) CAR[2,60]	(5) CAR[0,1]	(6) CAR[2,60]	(7) CAR[0,1]	(8) CAR[2,60]
Q	0.433***	1.858***	0.433***	1.616***	0.547***	1.729***		
	(0.109)	(0.305)	(0.112)	(0.293)	(0.209)	(0.626)		
Q x *Directive*	0.466**	-1.592**	0.475**	-1.116*	0.459**	-1.185*		
	(0.220)	(0.621)	(0.221)	(0.599)	(0.227)	(0.609)		
Q5							1.839**	7.173***
							(0.906)	(0.906)
Q5 x *Directive*							2.254**	-5.451**
							(1.046)	(1.046)
Controls (interacted)					yes	yes	yes	yes
Year fixed effects			yes	yes	yes	yes	yes	yes
Firm fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Number of Observations	2,270	2,270	2,270	2,270	2,250	2,250	2,250	2,250

Table 7 (continued)

Panel B. Placebo test pretending firms adopt a wire service two years before they actually did

	(1) CAR[0,1]	(2) CAR[2,60]	(3) CAR[0,1]	(4) CAR[2,60]	(5) CAR[0,1]	(6) CAR[2,60]	(7) CAR[0,1]	(8) CAR[2,60]
Q	0.411***	1.591***	0.412***	1.780**	0.386*	1.434**		
	(0.111)	(0.273)	(0.113)	(0.720)	(0.218)	(0.705)		
Q x *Directive*	0.089	0.034	0.052	0.159	0.048	0.268		
	(0.240)	(0.676)	(0.244)	(0.653)	(0.243)	(1.132)		
Q5							1.511***	6.571**
							(0.433)	(2.900)
Q5 x *Directive*							-0.616	1.335
							(1.208)	(2.957)
Controls (interacted)					yes	yes	yes	yes
Year fixed effects			yes	yes	yes	yes	yes	yes
Firms fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Number of Observations	1,880	1,880	1,880	1,880	1,861	1,861	1,861	1,861

Table 8

Firm visibility and stock returns

The sample consists of all the firms that adopted a wire service after the implementation of the EU Transparency Directive in their home country. In Panel A, daily adjusted returns (raw returns minus the index return) are regressed on individual firm fixed effects and *OnWire*, a dummy variable equal to one in or after the wire adoption year, and equal to zero otherwise. We report the point estimate and the standard error of the coefficient on *OnWire* for two different return periods: (1) all periods except earnings announcement periods, and (2) the entire sample period. Earnings announcement periods are defined as the month in which earnings announcements occur. In Panel B, Merton's "shadow cost of incomplete information" is computed following Kadlec and McConnel (1994), the number of shareholders is extracted from Thomson Ownership, and the number of analysts is extracted from I/B/E/S. We restrict the sample to the year immediately preceding the wire adoption and the year of adoption. Each of these three measures of visibility is regressed on the *OnWire* dummy and year fixed effects. We report the point estimate and the standard error of the coefficient on *OnWire*. For readability, the shadow cost is multiplied by 10^6.

Panel A. Difference in daily average adjusted return after wire adoption, controlling for firm fixed effects

	(1) *Including adoption year*	(2) *Excluding adoption year*
(1) Outside announcing periods	0.015	0.022
Standard Error	(0.012)	(0.016)
Number of observations	238,165	206,462
(2) All periods	0.010	0.016
Standard Error	(0.012)	(0.015)
Number of observations	259,883	225,315

Panel B. Change in firm visibility

	Post vs. *Pre wire* adoption	t-stat
Shadow cost of incomplete information	0.336	0.59
Number of Shareholders (in log)	0.064	0.68
Number of Analysts (in log)	0.126	1.98

Table 9

Market model regression for Wire-Adopters around the wire adoption year

The sample includes all the firms that adopted a wire service after the implementation of the EU Transparency Directive in their home country. We restrict the sample to a three-year window surrounding wire adoption by each firm. We estimate the following market model, using daily returns:

$$R_{it} = \alpha_{PRE} + \beta^{L}_{PRE} R^{L}_{mt} + \beta^{G}_{PRE} R^{G}_{mt} + \alpha_{POST} D_{i,POST} + \beta^{L}_{POST} R^{L}_{mt} D_{i,POST} + \beta^{G}_{POST} R^{G}_{mt} D_{i,POST} + \varepsilon_{i,t} \quad (8)$$

where R_{it} is firm *i*'s return in excess of a three-month government bond yield, α_{PRE} is a constant, R^{L}_{mt} and R^{G}_{mt} are respectively the local and global market excess return, and $D_{i,POST}$ is a dummy variable equal to one in the year firm *i* adopts a wire service and in the year immediately after. We estimate the model using OLS, and compute robust standard errors using Newey-West estimator that corrects for heteroskedasticity and serial correlations of the residuals (up to 20 trading days). Pre- and post-adoption abnormal returns are expressed in percentage. *,**,*** denotes statistical significance at the 10%, 5%, and 1% respectively.

The dependent variable is firm excess return (in excess of the three-month government bond yield)	
Pre-adoption return (in %) (α_{PRE})	0.03**
	(0.014)
Local beta pre-adoption (β^{L}_{PRE})	0.176***
	(0.044)
Global beta pre-adoption (β^{G}_{PRE})	0.747***
	(0.047)
Change in return post-adoption (in %) (α_{POST})	-0.013
	(0.01)
Change in local beta (β^{L}_{POST})	0.078
	(0.11)
Change in global beta (β^{G}_{POST})	-0.09
	(0.11)
Nobs	67,796
R2	15.6%

Table 10

Coverage on Reuters and Dow Jones before and after the adoption of a wire service

The sample includes all the firms that adopted a wire service after the implementation of the Transparency Directive in their home country between 1991 and 2010. Coverage is defined as the count of articles that Reuters and Dow Jones published on a firm. We use a Poisson regression with firm and year fixed effects. For each firm, we identify the year in which it started to use a wire service. *Directive* is a dummy variable equal to one if the earnings announcement was made in or after the wire adoption year, and equal to zero otherwise. Standard errors adjusted for heteroskedasticity and clustered by firms are in parentheses below the coefficient estimates.

Dependent variable: coverage on Reuters and Dow Jones		
	(1)	(2)
Directive	0.345***	0.290***
	(0.041)	(0.042)
Market Cap.		0.452***
		(0.032)
Analyst Following		0.001
		(0.004)
Market to Book		-0.007
		(0.006)
Firm fixed effects	yes	yes
Year fixed effects	yes	yes

Table 11

Stock price response to earnings news for Wire-Adopters: cross-country analysis according to the *Technological Adoption* index

The sample includes all the firms that adopted a wire service at some point between 1991 and 2010. All specifications include firms' fixed effects. For each firm, we identify the year in which it started to use a wire service (the wire adoption year). *OnWire* is a dummy variable equal to one if the earnings announcement was made in or after the wire adoption year, and equal to zero otherwise. *Q* is the earnings surprise quintile (*Q*=1 for the lowest quintile, *Q*=5 for the highest quintile). We classify firms according to the value of the Technological Adoption index in their home country (source: Global Competitiveness Report). We classify firms in the High (resp. Medium and Low) group if the value of the index of the home country is above (resp. equal and below) the median value of the index. We estimate Equation (4) separately for each group and test the equality of the coefficient on *Q*OnWire* across the High and Low groups. We report p-value of the test. Standard errors are in parenthesis below the coefficient estimates.***, **, and * indicate statistical significance at the 1%, 5%, and 10% respectively.

	CAR[0,1]			CAR[2,60]		
	(1)	(2)	(3)	(4)	(5)	(6)
	Low TechAdoption	Medium TechAdoption	High TechAdoption	Low TechAdoption	Medium TechAdoption	High TechAdoption
Q	0.316**	0.551**	0.228	3.152***	2.723***	1.565***
	(0.157)	(0.223)	(0.211)	(0.450)	(0.616)	(0.575)
Q x Onwire	0.518**	0.201**	0.189	-1.734***	-1.295*	0.041
	(0.203)	(0.101)	(0.112)	(0.580)	(0.750)	(0.715)
Number of Observations	1,514	1,266	1,033	1,514	1,266	1,033
Low vs. *High*		0.329			-1.775	
p-value		0.08			0.03	

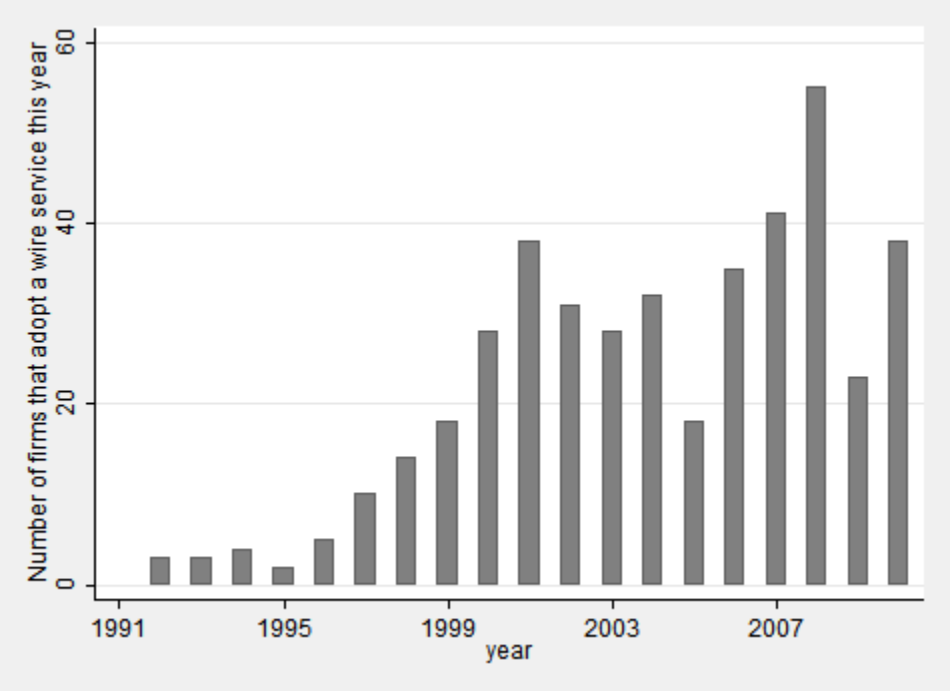

Figure 1. Evolution of news release wire service usage. This figure reports the number of firms that start to use a wire service each year over the 1991-2010 period.

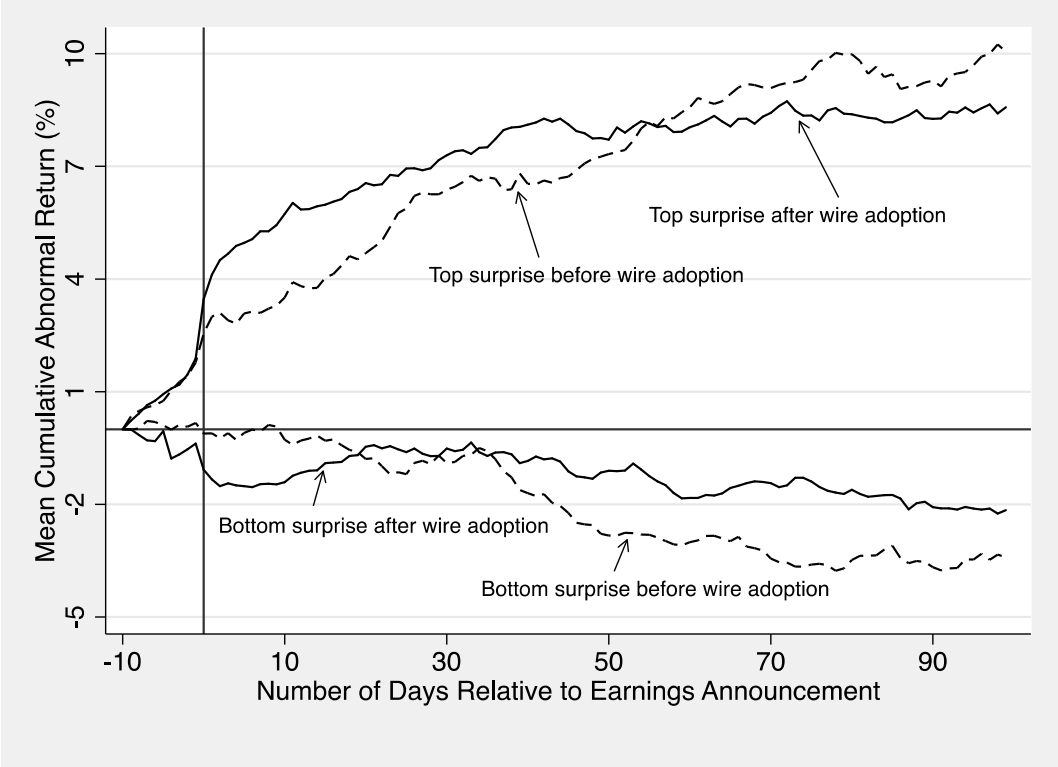

Figure 2. Mean cumulative abnormal return for top and bottom surprises before and after wire service adoption. The cumulative abnormal return for each stock is computed as the difference between the cumulative return of the stock and the cumulative expected return estimated from the market model. Announcements are pooled together, and five quintiles are formed on the basis of earnings surprise. For each firm, we identify the year in which it started to use a wire service and compute the cumulative abnormal return for the top and bottom surprises from -10 to +100 days around earnings announcements. We present the average across firms of cumulative abnormal return before and after the switch to a wire. The sample period is 1991-2010.

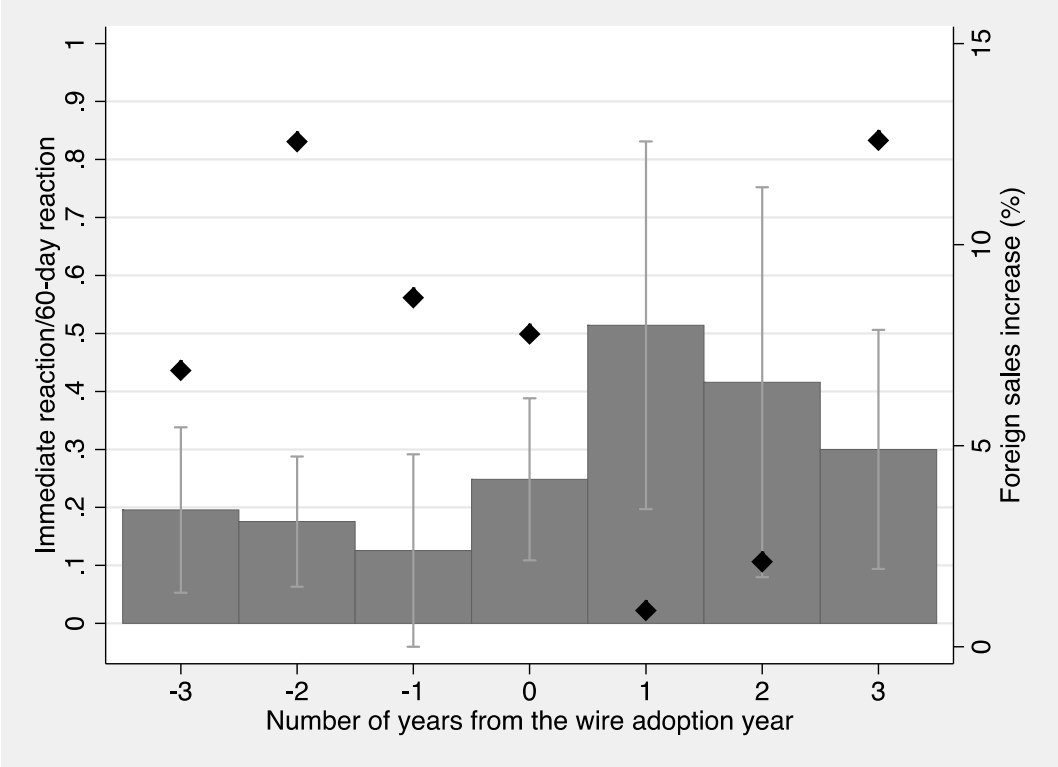

Figure 3. The share of the immediate reaction in the total stock return before and after wire service adoption. This figure reports the value of the share of the immediate reaction in the total stock return in each of the three years surrounding wire service adoption. We estimate the following equation separately for each year using two different *[x,X]* windows as dependent variables, [0,1] and [2,60]:

$$CAR_{y,i}[x,X] = \alpha_0 + \alpha_Q Q^j_{y,i} + \sum_{k=1}^{n} \gamma_k C^k_{y,i} + \varepsilon_{y,i}$$

where α_0 is a set of country and industry fixed effects. The $Q^j_{y,i}$ are quintiles of earnings surprises. Control variables $C^k_{y,i}$ include size, analyst following and market-to-book. Standard errors are adjusted for heteroskedasticity and clustered by firms. Denoting $\alpha_Q{}^{[0,1]}$ (resp. $\alpha_Q{}^{[2,60]}$) the average short-term (resp. long-term) return to earnings surprise, we compute the share of the immediate reaction in the total 60-day stock return as $\alpha_Q{}^{[0,1]}/(\alpha_Q{}^{[0,1]} + \alpha_Q{}^{[2,60]})$. We report the value of the ratio for each distance together with its 95% confidence interval. The sample period is 1991-2010. The black diamonds represent the average increase of foreign sales as a proxy for firms' internationalization over the period.

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