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Cross-border information transfers: evidence from profit warnings issued by European firms

Paulo Alves, Peter F. Pope and Steven Young*

Abstract — This paper reports evidence on cross-border accounting information transfers associated with profit warning announcements. Using a sample of firms from 29 European countries, we find that negative earnings surprises disclosed by firms in one country affect investors' perceptions of comparable non-announcing firms in other countries. The form and magnitude of cross-border effects is consistent with domestic transfers. Tests explaining variation in cross-border information transfers provide some (albeit rather limited) evidence that effects vary according to a range of firm-, industry- and country-level characteristics.

Keywords: information transfers; profit warnings; stock market reaction; cross-border effects

1. Introduction

Prior research provides evidence of within-country information transfers in response to earnings-related news (Firth, 1976; Foster, 1981; Clinch and Sinclair, 1987; Han and Wild, 1990; Freeman and Tse, 1992; Baginski, 1987; Han et al., 1989; Pyo and Lustgarten, 1990; Tse and Tucker, 2006). In contrast, the extent to which investors and analysts extrapolate earnings information across national boundaries has been largely overlooked in the literature despite the relentless globalisation of capital and product markets. This paper reports evidence on the incidence and magnitude of cross-border accounting information transfers within Europe.

The essence of our study is perhaps best illustrated by the following example. On 23 June 2003 Dutch brewing giant Heineken announced that half-yearly earnings growth would remain flat. Not only did the news prompt a 12% drop in Heineken's share price; it also caused shares in Interbrew (Belgium) and Carlsberg (Denmark) to fall by 4% and 5%, respectively (*Financial Times*, 24 June 2003). Clearly, investors and analysts considered news of Heineken's performance useful in updating expectations about other firms in the European brewing sector. With more firms transacting a larger fraction of their business across national boundaries, the relevance of financial results released by firms in one country for their foreign peers is likely to be on the rise.

We test for evidence of cross-border information transfers using profit warnings (i.e. voluntary trading updates that signal a material deterioration in profitability and earnings relative to market expectations). Our analysis utilises 4,283 firms from 29 European countries over the period January 1997 through December 2007. Restricting the analysis to European-listed firms represents a compromise between scope and feasibility. It also yields a sufficiently broad cross-section of economic, political and regulatory environments to facilitate a rich analysis of cross-border effects, while simultaneously ensuring that earnings information remains relevant for non-announcing firms (by confining the analysis to a single economic zone).

Tests provide evidence that negative earnings surprises affect investors' perceptions of comparable foreign non-announcing firms. The average market-adjusted price reaction for foreign non-announcers is statistically negative, suggesting that

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contagion effects dominate in the cross-section. Non-announcing firms are also associated with abnormally high trading volume and downward revision in analysts' earnings forecasts during the announcement window. Comparing the magnitudes of within- and cross-country transfers reveals that the average market reaction for foreign non-announcers is statistically similar to that experienced by domestic non-announcers. Cross-sectional tests provide evidence that cross-border transfers vary according to firm-, industry- and country-level characteristics. However, results are far from clear-cut: findings vary across alternative market response metrics; associations are not symmetric with respect to contagion and competitive effects; and the explanatory power of the models is typically low.

Evidence concerning cross-border information transfers contributes to prior research in several ways. First, Firth (1996a) is the only published study to our knowledge that directly tests whether investors and analysts extrapolate earnings information across national boundaries from announcing to non-announcing firms. While Firth's (1996a) results provide evidence consistent with cross-border information transfers associated with corporate earnings announcements, his analysis is restricted to two countries with strong economic and institutional links (the US and UK). Despite these commonalities, however, Firth (1996a) documents asymmetry in the strength of cross-border transfers, with larger effects observed for US announcers. Our analysis extends Firth (1996a) by documenting the presence of earnings-related information transfers in a more extensive set of countries characterised by a broader range of political, legal, and financial reporting arrangements. Second, evidence on cross-border earnings information transfers speaks to the ongoing debate surrounding the impact of international accounting diversity on the usefulness of financial statement data. The demand for improved harmonisation of international financial reporting practices to facilitate better comparative analysis is one of the main driving forces behind the adoption of International Financial Reporting Standards (IFRS). To the extent that our sample period is characterised by considerable cross-country accounting diversity, evidence of cross-border transfers similar in form and magnitude to those observed between firms within a country suggests that GAAP differences do not necessarily prevent investors from conducting international comparative analyses. Third, profit warnings may be viewed as a special category of management forecasts. Although the literature on management forecasts is extensive (see Hirst et al., 2008), few papers have examined management forecasts in an international context.[1] Our paper contributes to this line of research by providing evidence on the incidence and informativeness of profit warnings in a broad set of European countries.

The remainder of the paper is organised as follows. Section 2 locates our analysis within the extant literature. Section 3 describes the research design and introduces the sample and data used to test for evidence of cross-border earnings-related information transfers. Section 4 presents univariate evidence regarding the incidence and magnitude of cross-border transfers. Section 5 investigates cross-sectional variation in the magnitude of cross-border information transfers. Section 6 summarises a series of sensitivity tests designed to assess the robustness of our results. Section 7 concludes.

2. Background, motivation and research question

Information transfers occur when an announcement made by one firm contemporaneously provides information about the performance and value of one or more non-announcing firms (Schipper, 1990: 97). In the accounting literature, the majority of information transfer research has focused on earnings-related announcements and events.[2] Using a small sample of UK firms, Firth (1976) tested whether earnings announcements impact stock prices of reporting firms' non-announcing industry peers. Firth's (1976) results support the view that announcing firms' earnings contain information relevant for valuing non-announcing firms. Subsequent research by Foster (1981), Clinch and Sinclair (1987), Han and Wild (1990), Freeman and Tse (1992), and Joh and Lee (1992) explored intra-industry information transfers in relation to US firms' earnings announcements, while other studies have examined information transfers associated with management earnings forecasts (Baginski, 1987; Han et al., 1989; Pyo and Lustgarten, 1990), profit warnings (Tse and Tucker, 2006),

[1] Notable exceptions include Baginski et al. (2002) who compare disclosure of management earnings forecasts in US and Canadian markets, and Frost (2000) who provides comparative descriptive evidence on disclosures of forward-looking information in the US and several European countries for firms in the manufacturing sector.

[2] Finance researchers have examined the information transfer phenomenon in a variety of corporate contexts including bankruptcy filings (Lang and Stulz, 1992), bank failures (Aharony and Swary, 1983), merger proposals (Eckbo, 1983), dividend initiations (Firth, 1996b), stock repurchases (Hertzel, 1991), management buyouts (Slovin et al., 1991), corporate accidents (Bowen et al., 1983), and public securities offerings (Szewczyck, 1992).

and earnings restatements (Xu et al., 2006; Gleason et al., 2008). The conclusion emerging from this body of work is that earnings-related news events are associated with statistically significant transfers of information from announcing to non-announcing firms, although the magnitude of the market reaction for non-announcers tends to be considerably smaller than that observed for announcers.

Earnings surprises containing state-of-the-sector information may impact announcing firms' peers in one of two ways. Surprises that signal changes in the size of the overall sector pie are expected to affect announcing and non-announcing firms similarly, with favourable (unfavourable) news leading to positive (negative) shocks for both groups. These same-sign information transfers are often labelled contagion effects. Conversely, holding demand within a sector constant, an earnings innovation reported by one firm may signal a shift in its competitive position with respect to other firms in the same sector, with a negative (positive) surprise implying good (bad) news for its non-announcing peers. Opposite-sign information transfers that reflect a redistribution of a constant industry pie are often labelled competitive effects. Although examples of both types of transfer have been documented in the literature (Lang and Stulz, 1992; Firth, 1996a), evidence for earnings-related information transfers suggests that contagion effects dominate in the cross-section (Firth, 1976; Foster, 1981; Clinch and Sinclair, 1987; Han and Wild, 1990; Tse and Tucker, 2006).

While prior research reveals interdependencies among firms' share prices based on key accounting disclosures and major corporate events, results are almost exclusively confined to within-country effects. Notable exceptions include studies examining the Latin American debt crisis (Madura et al., 1991; Diaz and McLeay, 1996) and the effects of the Enron scandal (Cahan et al., 2005). To the best of our knowledge, Firth (1996a) is the only published study that tests for evidence of cross-border information transfers in the context of earnings disclosures. Firth (1996a) investigates information transfers between US and UK firms associated with corporate earnings announcements. Findings reveal evidence of statistically significant earnings information transfers, although the cross-border effects are reliably smaller than corresponding within-country transfers. US announcers are associated with larger cross-border transfers than UK announcers, reflecting the international importance of the US corporate sector coupled with earlier reporting by US firms relative to their UK counterparts with comparable fiscal year-ends.

Evidence presented by Firth (1996a) reveals that institutional, regulatory, and financial reporting differences between the US and UK are not sufficient to impede cross-border extrapolation of corporate earnings surprises. As Firth (1996a) acknowledges, however, cross-border earnings information transfers are more likely to exist between this pair of countries than many other groups of nations because of the strong linkages between US and UK financial markets and corporate activities. An unresolved question is whether analysts and investors extrapolate earnings information across national boundaries in the face of substantial institutional, legal, political, cultural and financial reporting differences.

Building on Firth (1996a), we employ a large sample of firms from a broad set of European countries to test whether firm-specific earnings-related news disclosures convey information to stock market investors about the performance and value of comparable foreign firms. While the existence of cross-border earnings-related information transfers is intuitively appealing, several factors militate against observing such effects in practice. First, such effects rely on the assumption that firm-specific accounting releases contain common information useful in updating expectations about non-announcing firms. Whereas this assumption may be axiomatic at the country level for well-developed financial reporting systems such as the US or UK (Schipper, 1990), it is less obviously so in a cross-country setting where the quality of financial reporting varies and where some accounting systems are designed for purposes other than reflecting underlying economic reality (e.g. tax-based systems). Second, Ball (2006) conjectures that despite extensive international integration of capital and product markets, most economic and political activity remains intranational. To the extent that firms' activities are shaped largely by domestic considerations rather than global factors, the scope for cross-border information transfers for the average firm may be limited. Third, even when earnings-related information transfers do occur, the empirical challenge of detecting such activity is far from straightforward (Schipper, 1990). The problem of low power is likely to be especially acute in a cross-country setting given heterogeneity in economic, political, cultural and regulatory factors (Firth, 1996a).

We test for evidence of cross-border earnings-related information transfers in Europe using a sample of profit warning announcements. Profit warnings offer several research design advantages with respect to our analysis. First, since earnings

information transfers are likely to be small and difficult to detect (Schipper, 1990; Firth, 1996a), high power tests are required to reject the null hypothesis of no information spillover. Prior research indicates that the scope for earnings transfers is increasing in the magnitude of the earnings surprise (e.g. Firth, 1996a). Profit warnings, which are associated with dramatic valuation effects for announcing firms (Kasznik and Lev, 1995; and Clarke, 2001; Helbok and Walker, 2003; Collett, 2004), therefore provide a potentially powerful context in which to test for cross-border transfer effects. Second, whereas periodic earnings announcements require estimation of the surprise component, profit warnings represent earnings surprises by construction. Consequently, our tests are not constrained by the availability of analyst forecast data, which can be patchy in some European countries. Third, because profit warnings do not follow a systematic disclosure pattern during the fiscal year, they help overcome the problem of cross-event contamination common to other accounting disclosures such as annual or interim earnings announcements that cluster in calendar time.

3. Sample, data and methods

3.1. Sample selection

Our analysis examines whether profit warnings issued by firms resident in one country convey information to stock market investors about the performance and value of similar non-announcing firms in other countries. For each profit warning announcement in country *k* we identify all comparable foreign non-announcing firms at the event date (including firms that warned at other times during the sample period). Warnings announced between January 1997 and December 2007 by European publicly traded firms form the basis of our tests.[3] Profit warning data are obtained from JCF Quant/Factset (now ExtelConnect). The sample period begins in 1997 because coverage of profit warning announcements on JCF is limited prior to this date.

The sample selection procedure involves first identifying all European-listed firms included in the JCF proprietary international industry portfolios with market capitalisation data for at least one fiscal year-end during the sample period.[4] The resulting sample comprises 11,835 firms from 30 countries. The total number of profit warnings available on JCF for these firms during the sample window is 3,635.[5] Financial statement and market data required for our tests are drawn from Datastream. While only 6,135 firms (52%) from the initial JCF sample are located on Datastream, the corresponding reduction in the profit warning sample to 2,482 observations is less than 32%. This is consistent with our matching procedure excluding a disproportionately high number of small firms that are less likely to warn. This preliminary sample is then refined as follows. First, observations with missing announcement-period price data required for our market reaction tests are excluded. Second, profit warnings for which a comparable foreign non-announcer cannot be identified at the event date are excluded because our tests require at least one foreign non-announcing peer firm. Third, profit warnings released within four days of a warning issued by another firm in the same sector are excluded to avoid possible contamination caused by overlapping event windows. Fourth, warnings with non-negative announcement-period abnormal returns for the issuing firm are removed because such observations further complicate our analysis.[6] Fifth, firms classified by JCF as investment trusts are excluded due to the unique nature of their regulatory and financial reporting environment. We also drop firms that JCF does not allocate to a specific industry sector. Finally, countries and industry-year combinations with fewer than three firms are excluded because it is hard to draw meaningful conclusions about cross-border information transfers from such sparse data. The final sample consists of 4,283 firms drawn from 29 countries, and 1,357 profit warnings issued by firms from 20 countries. Most firms (3,479) did not warn during our sample period. Of the 804 announcing firms, 497 (62%) issued a single warning, 165 firms

[3] Rules governing when and how European firms issue warnings vary across countries. For example, Berglund and Westerholm (2007) note that Finnish Supervisory Authority rules require firms to warn when performance or financial position is worse or better than expected. Similar rules exist in the UK (e.g. PSI Rule 1 and Rule 2). In contrast, firms in some countries never issue warnings, suggesting the absence of any regulatory requirement for firms to update investors in situations where expectations and actual performance are materially misaligned.

[4] Firms are considered European-listed when their JCF primary stock listing code refers to a recognised European exchange.

[5] An earlier version of the paper focused on the last warning issued by a firm in a given fiscal year because JCF only retained the final announcement for firms issuing multiple warnings during a fiscal year. Following a database upgrade in late 2007 JCF now reports all profit warning announcements. We therefore recollected our sample of warnings to avoid potential sampling biases.

[6] Non-negative price responses for the 365 announcements in our initial sample are most likely caused by 'positive' warnings (see footnote 3 for evidence that regulations in some European countries require firms to warn when actual performance exceeds expectations). Sensitivity tests reveal that including these cases does not impact materially on our findings and conclusions.

Table 1
Sample selection and composition
Panel A: Sample selection process

	Firms	*Profit warnings*
JCF Factset European population with market capitalisation between 1997 and 2007	11,835	3,635
Datastream European population with market capitalization between 1997 and 2007	11,352	N/A
Intersection of Datastream and JCF Factset samples	6,135	2,482
Less:		
Firms with missing price data at announcement date	(659)	(253)
Investment trusts and unclassified firms	(795)	(64)
No comparable foreign non-announcers at announcement date	(179)	(230)
Multiple profit warnings within 4-day window	(27)	(203)
Profit warnings with non-negative announcement returns	(182)	(365)
Countries and industry-year combinations with < 3 firms	(10)	(10)
Final sample	4,283	1,357
Frequency of profit warnings:		
No profit warning	3,479	0
One profit warning	497	497
Two profit warnings	165	330
Three or more profit warnings	142	530
Total	**4,283**	**1,357**

Panel B: Final sample by country

Country	*Firms*	*Profit warnings*
Austria	91	15
Belgium	133	39
Croatia	17	0
Cyprus	8	0
Czech Republic	38	0
Denmark	113	16
Estonia	13	0
Finland	89	46
France	509	181
Germany	380	86
Greece	123	1
Hungary	3	0
Iceland	20	1
Ireland	69	25
Italy	223	6
Latvia	14	0
Luxembourg	25	5
Netherlands	180	81
Norway	131	25
Poland	71	4
Portugal	68	1
Russia	143	3
Slovakia	4	0
Slovenia	24	0
Spain	132	4
Sweden	172	15
Switzerland	190	47
Turkey	72	0
United Kingdom	1,228	756
Total	**4,283**	**1,357**

Table 1
Sample selection and composition (*continued*)
Panel C: Final sample of profit warnings by calendar year

Calendar year	*Profit warnings*
1997	30
1998	45
1999	18
2000	33
2001	249
2002	202
2003	164
2004	109
2005	156
2006	172
2007	179
Total	**1,357**

Note: The sample is based on all announcements classified as profit warnings by JCF Quant/Factset. Firms are considered European-listed when their JCF primary stock listing code refers to a recognised European exchange. JCF and Datastream data are matched using various combinations of the following company-specific identifiers: firm name and parts thereof, SEDOL, ISIN and CUSIP. Comparable foreign non-announcers are defined as firms in the same JCF international industry portfolio as the announcer with a different primary stock listing code.

(20%) warned twice, and 142 firms (18%) issued three or more warnings. Sample firms are drawn from 112 out of 130 JFC international industry portfolios. Information technology services account for the largest fraction of warnings (firms) in the final sample at 4% (3%). Panel A of Table 1 summarises the sample selection process.

Panel B of Table 1 reports the frequency of firms and warnings by country. The sample is dominated by firms from the major European exchanges, with 29% of firms (1,228) listed in the UK, 12% (509) listed in France, and 9% (380) listed in Germany. A similar pattern is evident for profit warnings. Untabulated statistics indicate that the proportion of sample firms issuing at least one warning is highest for the UK (62%), Finland (52%) and the Netherlands (45%). Conversely, sample firms in Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Slovakia, Slovenia, and Turkey do not issue warnings. Panel C of Table 1 reports the distribution of profit warnings by calendar year. The pattern of warnings tracks the business cycle (Clarke, 2001): the peak in warnings coincides with the stock market slow-down in 2001 and 2002, whereas periods of strong economic growth such as 1997–2000 and 2004–2006 are characterised by fewer warnings.

3.2. Measuring information transfers

Prior research uses a variety of metrics to measure accounting-related information transfers including announcement-period abnormal stock returns (Han and Wild, 1990; Firth, 1996a; Thomas and Zhang, 2006), announcement-period abnormal trading volume (Weigand, 1996), and analysts' earnings forecast revisions (Pownall and Waymire, 1989; Firth, 1996a; Ramnath, 2002). In the absence of compelling theoretical reasons for favouring one particular approach over another and because each metric is expected to measure transfer effects with error, we report results for all three constructs.

We use market-adjusted returns to measure abnormal stock price movements around the announcement of a profit warning. Daily abnormal returns (AR) for firm i from country k on day t are computed as:

$$AR_{ikt} = R_{ikt} - RM_{kt}, \tag{1}$$

where R is the Datastream return for firm i on day t and RM is the corresponding value-weighted market return in country k as given by:

$$RM_{jt} = \sum_{j=1}^{J} \left(R_{jt} \times \frac{MV_{jt}}{\sum_{j=1}^{J} MV_{jt}} \right), \tag{2}$$

where MV is the market value of firm j on day t and J is the population of stock exchange-listed firms (including firm i) in country k with returns available from Datastream on day t. Since profit warnings may lead to the transfer of negative or positive news to non-announcing firms conditional on the competitive nature of the sector (Schipper, 1990), tests

are conducted using both signed and absolute abnormal return measures.

Our second information transfer measure is abnormal trading volume (*AV*) during the period surrounding the profit warning announcement. If profit warnings contain information relevant for valuing announcing firms' peers then we should observe abnormally high levels of trading activity for non-announcers when a warning is issued. Following Bailey et al. (2003, 2006), announcement-period abnormal trading volume is computed as:

$$AV_{it} = \frac{VOL_{it}}{\sum_{s=t-150}^{t-25} VOL_{is} \Big/ N}, \quad (3)$$

where *VOL* is the trading volume for firm *i* on day *t* and *N* is the number of trading days from $t-150$ to $t-25$. Unlike directional market-based measures such as price, trading volume provides an absolute measure of the market response to an announcement and as such is capable of capturing both positive and negative information transfers.

If profit warnings contain new insights concerning the expected performance of non-announcing firms then one might expect peer firms' analysts to respond by updating their earnings forecasts to reflect such changes. Accordingly, our third measure of information transfers focuses on revisions in analysts' earnings forecasts. Analysts' forecast revisions (*FR*) in response to profit warning *p* announced on day *t* are computed as the change in the IBES mean consensus annual one-period-ahead earnings per share (EPS) forecast:

$$FR_{ip} = \frac{EPS_{it+n} - EPS_{it-k}}{P_{im-1}}, \quad (4)$$

where *EPS* is the IBES mean consensus annual one-period-ahead EPS forecast for firm *i*, EPS_{t-k} is the last consensus EPS forecast available prior to profit warning announcement date *t* (*k* = days −180 to −2), EPS_{t+n} is the first consensus EPS forecast available after the profit warning announcement (*n* = days −1 to 10), and P_{m-1} is the last available IBES stock price for the month preceding announcement date *t*. Where no consensus forecast is recorded on IBES between days −2 and −180, the value of *FR* is set to missing to reduce the impact of stale forecasts. We constrain *n* at 10 days to limit the opportunity for subsequent events (in particular additional warnings) to contaminate the forecast revision metric. Using a short revision window yields a relatively conservative forecast update metric. *FR* is set equal to zero when no new IBES consensus EPS value is published during days −1 to 10 to reflect the absence of a forecast revision.

3.3. Identifying comparable non-announcing firms

A key research design issue in the earnings information transfer literature is the procedure for identifying comparable non-announcing firms. Consistent with prior research on domestic information transfers (Firth, 1976; Foster, 1981; Pownall and Waymire, 1989; Han and Wild, 1990), our main tests rely on industry classification to identify peer firms. Industry groupings are defined according to the JCF sector classification. The advantages of this approach include simplicity, transparency, and minimal additional data requirements imposed on the sample. Nevertheless, the approach represents a crude and potentially noisy grouping method given the difficulty of allocating firms to industries (particularly for those operating in multiple sectors). Accordingly, the industry-based method is likely to yield relatively low power tests of the information transfer hypothesis. To address this concern, we report supplementary tests in Section 6.2 using two alternative approaches to identifying non-announcing peer firms.

4. Preliminary results

4.1. Announcer effects

Using profit warnings as the basis for exploring the cross-border information transfer phenomenon is predicated on the assumption that warnings represent significant news events for announcing firms (which in turn lead to spill-over effects for non-announcing peer firms). Prior research documenting how markets react to profit warnings is confined to the US and UK. Accordingly, Table 2 reports abnormal returns, abnormal trading volume, and analysts' earnings forecast revisions for our sample of European warnings. Since trading volume and analyst forecast data are missing for a substantial fraction of observations, sample sizes are smaller when these metrics are employed.

Pooled sample results reported in Panel A indicate a significant negative market reaction for announcing firms: the average (median) announcement-day abnormal return is −10.9% (−6.4%), while the equivalent three-day cumulative abnormal return (CAR) centred on the announcement date is −13.4% (−8.7%).[7] In addition, trading volume for the average (median) announcing firm is 7.7 (4.1) times higher than normal on the announcement day (p-value < 0.01, two-tailed test). Finally, the

[7] Similar (though slightly less pronounced) effects are evident if the 365 warnings associated with non-negative announcement-period abnormal returns are retained in the sample. For this combined sample of 1,722 warnings, the median announcement-day abnormal return is −3.9% while the median 3-day CAR is −6.4%.

Table 2
Market reaction to profit warnings for announcing firms

	Abnormal returns (%)					Abnormal trading volume					Forecast revisions (%)		
		Day 0		Days −1,+1			Day 0		Days −1,+1			Days −1,+10	
	N	Mean	Median	Mean	Median	N	Mean	Median	Mean	Median	N	Mean	Median
Panel A: Pooled sample													
	1,357	–10.89[a]	–6.39[a]	–13.36[a]	–8.73[a]	975	7.74[a]	4.13[a]	4.99[a]	3.18[a]	1,015	–0.34[a]	0.00[a]
Panel B: By country													
France	181	–6.25[a]	–3.44[a]	–8.21[a]	–6.23[a]	152	5.50[a]	3.22[a]	3.83[a]	2.69[a]	136	–0.41[a]	0.00[a]
Germany	86	–6.30[a]	–4.54[a]	–9.81[a]	–6.50[a]	72	5.99[a]	2.89[a]	4.44[a]	2.61[a]	71	–0.85[a]	0.00[a]
Italy	6	–2.06[b]	–1.59[b]	–2.23[b]	–1.43[b]	4	3.73	2.32	3.63[b]	3.72	4	–0.06	0.00
Netherlands	81	–7.17[a]	–5.57[a]	–11.55[a]	–9.77[a]	63	5.85[a]	3.22[a]	4.12[a]	2.84[a]	47	–0.08	0.00
Spain	4	–5.43	–3.51	–7.36[c]	–7.13[c]	3	11.81	3.56	5.95	1.97	2	0.00	0.00
Switzerland	47	–7.16[a]	–4.05[a]	–10.12[a]	–7.49[a]	36	6.31[a]	3.03[a]	4.12[a]	2.45[a]	32	–0.47[a]	–0.17[a]
UK	756	–14.12[a]	–10.11[a]	–16.28[a]	–11.92[a]	505	9.36[a]	5.62[a]	5.77[a]	3.83[a]	573	–0.27[a]	0.00[a]
Others	196	–7.52[a]	–4.58[a]	–10.38[a]	–6.86[a]	140	6.49[a]	4.10[a]	4.35[a]	3.03[a]	150	–0.36	0.00
p-value for difference		0.01	0.01	0.01	0.01		0.01	0.01	0.01	0.01		0.86	0.01

Note: Variable definitions are as follows: abnormal returns for firm *i* from country *k* on day *t* are equal to the daily return for firm *i* less the corresponding value-weighted market return for country *k*, multiplied by 100; abnormal trading volume for firm *i* on day *t* is equal to the daily trading volume scaled by firm *i*'s average daily trading volume over days *t* – 150 through *t* – 25; forecast revision is equal to the difference between the first IBES mean consensus annual one-period-ahead earnings per share (EPS) forecast available between days *t* – 1 through *t* + 10 and the last consensus EPS forecast recorded on IBES between days *t* – 180 through *t* – 2, scaled by the last available IBES stock price for the month preceding announcement date *t* and multiplied by 100. (Where no consensus forecast is recorded on IBES between days *t* – 2 and *t* – 180, the forecast revision value is set to missing.) Superscripts a, b and c denote statistical significance at the 0.01, 0.05 and 0.1 level, respectively, for one-sample *t*-tests (means) and Wilcoxon tests (medians). Probability values relating to means (medians) in Panel B refer to F-tests (Kruskal-Wallis tests) for differences across multiple groups.

consensus EPS forecast for the average announcing firm falls by 0.3% of price during the 12-day window ending 10 days after the profit warning announce-ment (p-value < 0.01, two-tailed test). Collectively, these results confirm that European profit warnings contain substantial information about the performance and value of announcing firms.

Panel B of Table 2 presents evidence on the market response to profit warning announcements by country. A consistent pattern of negative announcement-period abnormal returns and abnormally high trading volume is evident for announcing firms in most countries. Exceptions include Spain for announcement-day abnormal returns and abnormal trading volume, and Italy for announcement-day abnormal trading volume. However, all statistical tests and associated inferences for these two countries should be interpreted with caution due to sparse data. Abnormal stock price declines and trading activity are particularly apparent for UK announcers, where the mean announcement-day abnormal return (three-day CAR) is −14.1% (−16.3%).[8] In contrast to the price and trading volume metrics, downward forecast revisions in response to profit warning announcements are less apparent in many countries with only France, Germany, Switzerland and the UK displaying statistically negative mean (median) revisions. Comparison of mean and median values, however, reveals larger negative revisions in all countries bar Spain. Accordingly, while analysts tend not to adjust downwards their earnings forecasts for the median profit warning announcer in many countries, a small set of disproportionately negative reactions are observed in most countries examined. Finally, cross-country tests reported in the final row of Panel B reveal that announcer effects may not be equivalent across all countries in our sample, suggesting the need to control for announcing firms' country of listing when assessing the incidence and magnitude of cross-border information transfers.

4.2. Initial evidence on cross-border information transfers

Table 3 reports evidence on cross-border information transfers in response to profit warnings. Results for comparable domestic transfers (i.e. where non-announcing firm *j* is listed in the same country as announcing firm *i*) are also presented in Table 3 for comparison.[9]

Abnormal returns presented in columns 3–4 reveal statistically significant stock price reactions for comparable foreign non-announcing firms in response to profit warning announcements. The average (median) non-announcing peer firm experiences a price fall of −0.14% (−0.12%) on the day a warning is issued, and a CAR of −1.29% (−0.29%) over the three-day window centred on the announcement date. Warnings therefore appear to represent bad news for the typical non-announcing firm, consistent with the contagion effects documented by extant research (e.g. Tse and Tucker, 2006). However, the directional effect of warnings on the value of foreign non-announcing peer firms is much less uniform than for announcers: a substantial fraction of non-announcers (46%) experience non-negative announcement-day abnormal returns. Cross-border information transfers associated with profit warnings do not therefore appear limited to simple contagion effects. Instead, the impact of warnings appears to be a more complex phenomenon associated with gains for some non-announcers (e.g. through actual or expected increases in market share) and losses for others. As documented in previous studies of domestic information transfers, average spill-over pricing effects tend to be small in economic terms (despite their statistical significance). These small magnitudes, coupled with measurement error in abnormal returns, could also account for observed heterogeneity in our pricing results.

Insofar as profit warnings are associated with contagion effects for some non-announcers and competitive effects for others that are roughly symmetric in magnitude, analysis of average signed returns could mask separately non-trivial negative and positive price reactions. Accordingly, columns 6–7 in Table 3 present findings for absolute abnormal returns.[10] Results reveal relatively large

[8] Results for the UK are consistent with those documented by Clarke (2001) for the period 1994–2000 and Collett (2004) for the period 1995–2001. Announcement day returns are less negative than those reported by Helbok and Walker (2003) for the period 1992–1998.

[9] The domestic sample is smaller than the cross-border sample for two related reasons. First, there are fewer warnings with sufficient non-announcers because the domestic pool of industry peers is smaller than the international pool. Second and for similar reasons, the pool of potential non-announcers is smaller conditional on a warning being included in our final sample, resulting in fewer comparable firms for each announcement (and since a firm may be a non-announcer for more than one warning the effect is multiplicative).

[10] We explored results for foreign non-announcers conditional on whether the sign of their announcement-period abnormal returns is the same as that observed for announcers (contagion subsample) or opposite to that observed for announcers (competitive subsample). Splitting the sample on the basis of contagion versus competitive effects reveals statistically and economically significant signed abnormal returns of approximately 1% in magnitude in both samples. However, whereas announcement-period abnormal returns in the contagion subsample are negative, those in the competitive subsample are positive.

Table 3
Market reaction to profit warnings for non-announcing firms

	Abnormal returns (%)			Absolute abnormal returns (%)			Abnormal trading volume			Forecast revision (%)	
	N	*Day 0*	*Days −1,+1*	*N*	*Day 0*	*Days −1,+1*	*N*	*Day 0*	*Days −1,+1*	*N*	*Days −1,+10*
Cross-border transfers	34,592	–0.14[a]	–1.29[a]	34,592	1.84[a]	4.41[a]	13,680	1.94[a]	2.06[a]	18,834	–0.16[c]
		(–0.12[a])	(–0.29[a])		(0.99[a])	(1.94[a])		(1.03[a])	(1.18[a])		(0.00[a])
Domestic transfers	10,869	–0.27[a]	–0.30[a]	10,869	1.76[a]	3.31[a]	4,435	2.17[a]	1.92[a]	6,567	–0.09[b]
		(–0.18[a])	(–0.34[a])		(0.99[a])	(1.88[a])		(1.05[a])	(1.26[a])		(0.00[a])
p-value for difference in means		0.16	0.09		0.38	0.06		0.01	0.01		0.60
p-value for difference in medians		0.01	0.21		0.01	0.23		0.89	0.01		0.49

Note: Variable definitions are as follows: abnormal returns for firm *i* from country *k* on day *t* are equal to the daily return for firm *i* less the corresponding value-weighted market return for country *k*, multiplied by 100; absolute abnormal returns are equal to the modulus of the market-adjusted abnormal return; abnormal trading volume for firm *i* on day *t* is equal to the daily trading volume scaled by firm *i*'s average daily trading volume over days *t* – 150 through *t* – 25; forecast revision is equal to the difference between the first IBES mean consensus annual one-period-ahead earnings per share (EPS) forecast available between days *t* – 1 through *t* + 10 and the last consensus EPS forecast recorded on IBES between days *t* – 180 through *t* – 2 prior to the profit warning announcement, scaled by the last available IBES stock price for the month preceding announcement date *t* and multiplied by 100. (Where no consensus forecast is recorded on IBES between days *t* – 2 and *t* – 180, the forecast revision value is set to missing.) Cross-border transfers refer to cases where announcing and comparable non-announcing firms are listed in different countries. Domestic transfers refer to cases where announcing and comparable non-announcing firms are from the same country. Superscripts a, b and c denote statistical significance at the 0.01, 0.05 and 0.1 level, respectively, for one-sample *t*-tests (means) and Wilcoxon tests (medians). Probability values relating to differences in means (medians) refer to two-tailed *t*-tests (Wilcoxon tests).

and statistically significant pricing effects: mean (median) absolute announcement-day returns are equal to 1.84% (0.99%), while the cumulative effect for days −1 to +1 exceeds 4.40% (1.90%). In absolute terms, therefore, cross-border transfers appear economically significant. The large magnitude of absolute abnormal returns (relative to signed returns) is further evidence that profit warnings lead to contagion and competitive effects for foreign non-announcers that net off when aggregated in a signed return metric.

Columns 9–10 and 12 in Table 3 present results for abnormal trading volume and analyst forecast revisions, respectively, in response to profit warning announcements. Mean announcement-period trading volume is approximately double the normal level for comparable foreign non-announcers (significant at the 0.01 level). The mean non-announcer also experiences a statistically significant downward revision in analysts' consensus earnings forecast during the 12-day period ending 10 days after a warning is issued. Although medians are closer to zero, non-parametric tests confirm the presence of abnormally high trading volume and downward revisions in analysts' forecast. Overall, these findings are consistent with the abnormal return results and provide further evidence that profit warnings generate cross-border information transfers that on average involve contagion effects.

Comparative results for domestic non-announcers are reported beneath the cross-border findings in Table 3. Consistent with prior research, statistically significant contagion effects for domestic same-sector non-announcing firms are evident. More relevant to our analysis, however, is the relative magnitude of domestic and cross-border results. Firth (1996a) predicts and finds that domestic information transfers for UK and US firms are larger than corresponding cross-border effects. Results reported in Table 3 for signed abnormal returns suggest a different pattern. Although domestic returns tend to be more negative than cross-border returns, differences are small and statistically insignificant in most cases. Only median announcement-day returns are significantly more negative for the domestic sample (at the 0.05 level). A similar pattern is evident for absolute abnormal returns and analyst forecast revisions: average cross-border effects are broadly comparable with domestic information transfers. While differences between domestic and cross-border effects are apparent for abnormal trading volume, conclusions are sensitive to choice of announcement window. The absence of systematic differences in the magnitudes of domestic and cross-border effects, and the extent to which this reflects increased levels of globalisation and cross-border trade, is a theme that we return to in Section 6.2.

4.3. Country-level results

Table 4 reports cross-border information transfers by country. Panel A presents evidence for foreign same-sector non-announcers conditional on the nationality of the announcing firm. (For example, where the announcing firm is French, Panel A reports the market reaction for all non-French non-announcing peer firms.) We restrict the discussion to median values because distributions for the market reaction metrics are characterised by extreme observations. Significant cross-country variation in medians is evident for all four metrics suggesting that announcer nationality may influence the informativeness of the warning for foreign non-announcers. There is some evidence that announcers from France and countries classified as 'Others' tend to produce the largest impact on comparable foreign non-announcers whereas German and UK announcers are consistently associated with statistically significant transfers that are more moderate in magnitude. However, country rankings are unstable across the different market metrics making reliable ordering impossible. Similar results are apparent in Panel B where announcement-period effects are grouped according to non-announcing firms' nationality. (For example, we pool across all French same-sector non-announcers regardless of the nationality of announcing firms.) While significant cross-country variation is again evident across all four metrics, consistent patterns are hard to detect because country rankings vary depending on the particular market reaction variable examined.

Overall, findings presented in Table 4 suggest that both announcing and non-announcing firms' nationality may influence the form and magnitude of the information transfer. However, country effects vary considerably according to the particular market reaction metric examined and no single country or group of countries is associated with consistently strong or weak effects.

5. Cross-sectional analysis

To shed further light on the properties of cross-border information transfers associated with profit warnings we augment univariate market reaction results with cross-sectional tests that relate the announcement-period market response for comparable foreign non-announcers to a series of firm-, industry- and country-level attributes. The following section develops our empirical predictions and

Table 4
Cross-border information transfers partitioned by the nationality of profit warning announcers (Panel A) and non-announcing foreign peer firms (Panel B)

	Abnormal return (%)			Absolute abnormal return (%)			Abnormal trading volume			Forecast revision (%)		
	N	*Mean*	*Median*	*N*	*Mean*	*Median*	*N*	*Mean*	*Median*	*N*	*Mean*	*Median*
Panel A: By country of announcer												
France	4,472	–0.38[a]	–0.49[a]	4,472	3.37[a]	2.07[a]	1,962	1.95[a]	1.18[a]	2,536	0.07	0.00[a]
Germany	3,046	0.01	–0.23[a]	3,046	3.11[a]	1.85[a]	1,480	1.83[a]	1.14[a]	1,731	–0.02	0.00[a]
UK	16,762	–2.33[a]	–0.25[a]	16,762	5.48[a]	1.88[a]	6,144	1.88[a]	1.18[a]	8,768	–0.15[a]	0.00[a]
Italy	196	0.30	–0.20	196	2.30	1.44	107	2.14[a]	1.19[a]	109	0.11[b]	0.00
Netherlands	2,925	–0.57	–0.07[c]	2,925	3.92	1.99[a]	1,116	2.07 [a]	1.17[a]	1,588	–0.02	0.00[b]
Spain	243	0.49	0.22	243	3.30[a]	2.27	110	1.69 [a]	1.19[a]	114	0.00	0.00
Switzerland	1,380	–0.36[b]	–0.57[a]	1,380	3.55[a]	2.26	530	1.78 [a]	1.11[a]	780	0.11	0.00[a]
Others	5,568	–0.36[a]	–0.42[a]	5,568	3.31[a]	1.92[a]	2,231	2.01[a]	1.26[a]	3,208	–0.61	0.00[a]
p-value for difference		0.22	0.01		0.17	0.01		0.15	0.01		0.42	0.03
Panel B: By country of non-announcer												
France	4,715	0.00	–0.31[a]	4,715	3.74[a]	2.13[a]	1,876	2.02[a]	1.24[a]	2,381	–0.14[a]	0.00[a]
Germany	4,046	–0.27[a]	–0.37[a]	4,046	3.61[a]	1.99[a]	1,344	1.58[b]	1.07[a]	2,061	–0.17[a]	0.00[a]
UK	5,214	–0.20[b]	–0.36[a]	5,214	3.44[a]	1.98[a]	2,284	2.20[a]	1.28[a]	3,340	0.08	0.00[a]
Italy	1,978	–0.17[b]	–0.21[a]	1,978	2.48[a]	1.69[a]	1,209	1.79[a]	1.18[a]	1,328	–0.11[a]	0.00[a]
Netherlands	2,112	–0.21	–0.17[b]	2,112	3.52[a]	2.13[a]	931	1.88[a]	1.16[a]	1,152	0.00	0.00[a]
Spain	1,521	–0.24[a]	–0.28[a]	1,521	2.26[a]	1.61[a]	815	1.68[a]	1.18[a]	1,035	–0.03[b]	0.00
Switzerland	2,017	–18.52[a]	–0.28[a]	2,017	21.28[a]	1.79[a]	866	1.98[a]	1.24[a]	1,166	–0.35[a]	0.00[a]
Others	12,989	–0.31[b]	–0.27[a]	12,989	3.36[a]	1.93[a]	4,355	1.91[a]	1.15[a]	6,371	–0.32	0.00[a]
p-value for difference		0.01	0.11		0.01	0.01		0.01	0.01		0.84	0.01

Note: Variable definitions are as follows: Abnormal return (%) is the cumulative market-adjusted abnormal return measured over days −1 to +1, multiplied by 100; Absolute abnormal return (%) is modulus of the cumulative market-adjusted abnormal return measured over days −1 to +1, multiplied by 100; Abnormal trading volume is abnormal trading volume measured over days −1 to +1; Forecast revision is the difference between the first IBES mean consensus annual one-period-ahead earnings per share (EPS) forecast available between days −1 through +10 and the last consensus EPS forecast recorded on IBES between days −180 through −2 prior to the profit warning announcement, scaled by the last available IBES stock price for the month preceding announcement day 0 and multiplied by 100. (Where no consensus forecast is recorded on IBES between days −180 and −2, the forecast revision value is set to missing.) Panel A presents evidence for foreign non-announcers conditional on the nationality of the announcing firm (e.g. where the announcing firm is French results document the market reaction for all non-French non-announcing firms from the corresponding JFC international industry portfolio). Panel B presents results for foreign non-announcers grouped according to non-announcing firms' nationality (e.g. we pool across all French same-sector non-announcers regardless of the nationality of announcing firms). Superscripts a, b and c denote statistical significance at the 0.01, 0.05 and 0.1 level, respectively, for one-sample *t*-tests (means) and Wilcoxon tests (medians). Probability values relating to means (medians) refer to F-tests (Kruskal-Wallis tests) for differences across multiple groups.

explains our modelling strategy. Results are reported in Section 5.2.

5.1. Predictions and model

It is well established that investors' response to earnings-related news is positively associated with the magnitude of the earnings surprise. While the majority of prior research reports evidence for announcing firms (e.g. Foster et al., 1984), findings from the information transfer literature demonstrate that domestic information spillovers are also increasing in the size of the announcing firm's earnings surprise (Foster, 1981; Thomas and Zhang, 2006). Firth (1996a) extends the analysis to cross-border transfers between US and UK firms and finds similar evidence. Consistent with Firth (1996a), therefore, we predict that cross-border information transfers in response to profit warnings are increasing in the magnitude of the negative earnings surprise observed for the announcing firm. The announcement-period abnormal return experienced by the issuing firm represents an indirect proxy for the surprise component in a warning.[11] Accordingly, we predict that cross-border information transfers will be more (less) pronounced for profit warnings accompanied by large (small) negative abnormal returns.

Timely information transfers rely partly on the assumption that investors in non-announcing firm *j* are able to identify and process relevant information released by firm *i*. Evidence of information transfers is therefore expected to be more dramatic when the barriers to identifying and processing pertinent information are low. One factor expected to help facilitate information exchange between firms is common analyst following. Analysts specialise in processing earnings-related information and understanding its implications for announcers and their competitors. For example, analysts' reports routinely discuss and evaluate earnings-related information from the perspective of an announcer's sector in general and its peers in particular. Comparative analysis of the type performed by equity analysts is expected to facilitate information exchange between peer firms. Moreover, since analysts specialise by sector (Ramnath et al., 2008), firms with common analysts may be considered more comparable than those characterised by wholly independent analyst coverage (Ramnath, 2002). Accordingly, the absence of at least one shared analyst may proxy for firms between which earnings information transfers are unlikely to occur. Collectively, these factors suggest that the scope for information transfers between any given firm pair will be more pronounced when both are tracked by at least one common analyst.

Cross-border information transfers are also expected to be larger when announcing and comparable non-announcing firm performance is determined by a common set of factors (Firth, 1996a). A simple measure of relatedness for any given pair of firms is the degree to which their respective stock prices covary.[12] We therefore expect the magnitude of cross-border information transfers associated with profit warnings to be increasing in the degree of covariation between non-announcing firms' stock returns and those of the corresponding announcer.

The amount of common industry information contained in a profit warning is likely to vary over time with the business cycle. All else equal, warnings issued during periods of economic prosperity are more likely to reflect problems specific to an announcer rather than generic sector-wide trends. Conversely, warnings issued during periods of economic slowdown are more likely to capture systemic performance problems within a sector. As a result, the magnitude of cross-border information transfers is expected to be larger for profit warnings issued during periods of economic contraction.

Intra-industry cross-border information transfers are also expected to be contingent on the prevailing competitive structure within a sector. For example, earnings surprises are expected to provide particularly useful information for assessing the performance and value of announcers' peers in industries where firms follow similar strategies and face exposure to comparable market pressures. In contrast, earnings surprises are likely to be less informative about non-announcing firm performance and value in sectors characterised by greater product market segmentation and strategic differentiation. The level of strategic differentiation (direct competition) is expected to be decreasing (increasing) in the degree of industry concentration.

[11] As Firth (1996a: 314) discusses, a problem with this approach is that the association between stock returns of announcing and non-announcing firms may be due to misspecification of the expected return model (e.g. market-adjusted returns fail to control for industry-related factors). The alternative approach is to use to a direct measure of earnings surprise. Unfortunately, ExtelConnect does not provide information on the magnitude of the earnings surprise associated with a profit warning. Our inability to control for the magnitude of the warning represents an important limitation of our analysis.

[12] Firth (1996a) focuses on the extent to which non-announcers' earnings covary with those of the announcing firm, based on 10 years of quarterly earnings changes. The absence of quarterly data in Europe and an insufficient time-series of annual observations for most firms prevent us from adopting a similar approach.

We therefore expect cross-border information transfers in response to profit warnings to be more pronounced in concentrated industries.

Stronger cultural and economic links are predicted to reduce barriers to cross-border information flows by increasing investors' ability to obtain and interpret firm-specific information (Bell et al., 2006: 15). To the extent that social and fiscal differences inhibit the flow of information between firms in different countries, cross-border information transfers are expected to be more pronounced between firms from countries with shared economic and cultural traditions (Firth, 1996a). Our proxy for the strength of cultural and economic integration is geographic proximity: all else equal, neighbouring countries are expected to be culturally and economically more similar than geographically remote countries. We therefore predict that the magnitude of cross-border information transfers will be greater for firms from neighbouring countries relative to firms that are geographically remote.

The above predictions are tested using the following OLS regression model:

$$MR^{m}_{jpt} = \gamma_0 + \gamma_1 AR_{ip} + \gamma_2 COMANAL_{jt} + \gamma_3 CORR_{jt} + \gamma_4 CLIMATE_t + \gamma_5 HERF_{jt} + \gamma_6 NEIGHBOUR_j + \sum_{n=1}^{N} \lambda_n Controls_{jn} + \varepsilon_{jpt} \quad (5)$$

Variable definitions for Equation (5) are as follows: MR^m is the m^{th} market reaction metric for comparable foreign non-announcer j in response to profit warning p released by firm i at time t (m equals three-day cumulative abnormal returns, absolute three-day cumulative abnormal returns, abnormal trading volume, or analysts' forecast revisions); *AR* is the announcement-day abnormal return for announcement firm i issuing profit warning p; *COMANAL* is an indicator variable that takes the value of one if non-announcing firm j has at least one analyst in common with announcing firm i, and zero otherwise; *CORR* is the Pearson correlation coefficient between stock returns for announcing firm i and non-announcing firm j (computed using daily returns over days t–250 to t–10); *CLIMATE* is an indicator variable taking the value of one if profit warning p was announced during a period of economic contraction (calendar years 2000 through 2003) and zero otherwise; *HERF* is the Herfindahl index of global industry concentration (computed using revenues for all firms in the corresponding JCF international industry portfolio); *NEIGHBOUR* is an indicator variable that takes the value of one where firms i and j are listed in countries that share a national border and zero otherwise; *Controls* is a vector of N additional factors that may also influence the magnitude of the information transfer; and ε is the regression residual. Separate versions of Equation (5) are estimated for the m dependent variables.

With little theory to guide the selection of appropriate control variables, our final choice is unavoidably arbitrary. We include firm size (natural logarithm of market capitalisation) because larger, higher profile firms may be associated with more pronounced information transfer effects. We also control for firms' global status (measured by inclusion in the Morgan Stanley MSCI global stock index) on the basis that cross-border information transfers may be larger for firms with greater international exposure. Analyst following is included to control for differences in firms' general information environment. We also control for GAAP regime (IFRS, US GAAP and UK GAAP versus the remainder) because cross-border information transfers could be influenced by financial reporting quality. Measures of all control variables are constructed separately for announcing and non-announcing firms. Finally, in view of significant cross-country variation in the market reaction to profit warnings for announcers (Table 2) and non-announcers (Table 4), we include two vectors of country indicator variables to capture unmodelled country-level effects for announcers and non-announcers, respectively.[13]

As Firth (1996a: 318) discusses, coefficient predictions in regressions using signed market reaction metrics (i.e. cumulative abnormal returns and analysts' forecast errors) will differ according to whether a transfer leads to contagion or competitive effects. For example, where warnings lead to contagion, more (less) pronounced transfers should yield more (less) *negative* realisations of the dependent variable. In contrast, where warnings are associated with competitive effects, more (less) pronounced transfers should yield more (less) *positive* realisations of the dependent variable. To avoid these opposing effects netting out in the cross-section, empirical tests should allow for coefficient sign switches. We permit coefficient signs to vary according to the type of information transfer by estimating separate versions of Equation (5) conditional on contagion and competitive effects. Absent any reliable ex ante means of distinguishing between contagion and competitive transfers, we follow Firth (1996a) and use non-announcing firms'

[13] Sensitivity tests exploring the impact of alternative variable definitions and model specifications yield results that are similar to those reported in Table 5. Further details of these tests are presented in Section 6.2.

announcement-day abnormal return realisations to partition observations. Since profit warnings represent negative earnings surprises, we interpret instances where non-announcers experience negative (positive) announcement-day abnormal returns as cases of contagion (competitive effects). Conversely, where the dependent variable in Regression (5) is an unsigned measure of market reaction (i.e. absolute abnormal returns and trading volume), coefficient signs for our test variables will remain constant irrespective of whether information transfers reflect contagion or competitive effects. Nevertheless, we follow the approach adopted for signed market response metrics and present separate results partitioned on the sign of non-announcers' returns to allow for variation in the magnitude of predicted associations between contagion and competitive effect cases.

5.2. Results

Table 5 reports coefficient estimates and model summary statistics for Regression (5). (Coefficient estimates are multiplied by 10^2 to assist tabulation.) Panel A (B, C, and D) presents results for three-day CARs (three-day absolute CARs, three-day abnormal trading volume, and forecast revisions) partitioned according to the sign of non-announcing firms' announcement-period abnormal return. Results including and excluding control variables are reported in each case. To reduce the impact of extreme observations the 1st and 99th percentiles of the following variables are removed prior to estimation: three-day CARs, three-day abnormal trading volume, forecast revisions by model, and market value for non-announcing and announcing firms for all models.[14] Since our sample contains multiple non-announcers for a single profit warning, regression residuals are likely to be correlated across firms. Further, since some firms issue multiple warnings during the sample period (see Table 1), regression residuals may also be correlated across time. Table 5 therefore reports probability values based on clustered standard errors (Petersen, 2009), with clustering performed by profit warning announcement and calendar year.

Results provide mixed evidence with respect to the predicted determinants of cross-border transfers. On the one hand, the majority of test variables display some evidence consistent with their predicted impact on cross-border information transfers. On the other hand, insofar as no variable is consistently significant with the predicted sign across all four market response metrics for both the contagion and competitive effect partitions, findings reported in Table 5 provide only partial support for the predictions developed in Section 5.1. Further, the poor explanatory power of all models presented in Table 5 suggests that the primary determinants of cross-border information transfers remain elusive.

Findings for individual test variables are as follows. Evidence supporting the prediction that cross-border transfers are increasing in the size of the earnings surprise (proxied by *AR*) is evident in Panels A (CARs) and B (absolute CARs) for both contagion and competitive effect samples. In contrast, estimated coefficients on *AR* in Panel D (forecast revisions) are insignificant, although coefficient signs are as predicted, while coefficient signs in Panel C (abnormal trading volume) are contrary to predictions. Results provide no support for the prediction that cross-border information transfers are more pronounced when announcers and non-announcers share at least one common analyst. Indeed, coefficient estimates on *COMANAL* are significant and in the opposite direction to our predictions in Panels A and B for Model 1, although these inconsistent findings are not apparent in Model 2 where control variables are included.

The degree of covariance between non-announcing firms' stock returns and those of the corresponding announcer is associated with cross-border transfers as predicted in Panels A (CARs) and B (absolute CARs) for models where control variables are included. Conversely, coefficient estimates on *CORR* in Panels C and D are statistically indistinguishable from zero at conventional significance levels. Evidence consistent with more pronounced cross-border transfer effects for profit warnings issued during periods of economic contraction is apparent in Panels A (CARs) and B (absolute CARs) for both contagion and competitive groups, and in Panel D (forecast revisions) for contagion cases only. Contrary to predictions, however, *DECLINE* is positively associated with abnormal trading volume (Panel C) and forecast revisions (Panel D) for the competitive transfer partition. Support for the predicted link between cross-border information transfers and industry concentration is also evident in Panels A and B for both contagion and competitive groups, and Panel D for the contagion group. Finally, although the magnitude of cross-border transfers varies with the strength of countries' cultural and economic links in the

[14] Results are not sensitive to alternative trimming procedures. Estimating Equation (5) prior to trimming yields broadly similar conclusions for *AR*, *COMANAL*, *CORR* and *DECLINE*. However, coefficient estimates on *HERF* are generally insignificant using untrimmed data. The explanatory power of all models is systematically lower pre-trimming.

Table 5
OLS regression coefficient estimates and summary statistics for models explaining the market reaction for comparable foreign non-announcers (probability values in parentheses)

	Contagion ($AR_j < 0$)				Competitive effect ($AR_j \geq 0$)			
	Sign	*Model 1*		*Model 2*		*Sign*	*Model 1*		*Model 2*	
Panel A: 3-day CARs										
Intercept	?	–2.76	(0.01)	–3.29	(0.01)	?	2.89	(0.01)	3.34	(0.01)
AR	+	2.13	(0.01)	1.93	(0.01)	–	–1.38	(0.01)	–1.20	(0.01)
COMANAL	–	0.22	(0.01)	0.04	(0.70)	+	–0.33	(0.01)	–0.04	(0.57)
CORR	–	–0.60	(0.13)	–1.15	(0.01)	+	–0.07	(0.88)	0.54	(0.06)
DECLINE	–	–0.92	(0.01)	–0.86	(0.01)	+	0.56	(0.01)	0.53	(0.01)
HERF	–	–0.48	(0.06)	–0.49	(0.02)	+	0.39	(0.10)	0.31	(0.12)
NEIGHBOUR	–	–0.02	(0.43)	0.02	(0.44)	+	–0.05	(0.39)	–0.04	(0.55)
MV^A	?			–0.02	(0.54)	?			0.04	(0.05)
MV^{NA}	?			0.09	(0.02)	?			–0.15	(0.01)
$MSCI^A$	?			0.08	(0.42)	?			–0.22	(0.04)
$MSCI^{NA}$	?			0.12	(0.27)	?			–0.03	(0.81)
$ANAL^A$	?			–0.00	(0.67)	?			–0.00	(0.16)
$ANAL^{NA}$	?			0.00	(0.85)	?			0.01	(0.07)
$GAAP^A$	?			0.17	(0.25)	?			0.26	(0.15)
$GAAP^{NA}$	?			0.12	(0.16)	?			–0.14	(0.12)
Country dummies^A		No		Yes			No		Yes	
Country dummies^{NA}		No		Yes			No		Yes	
Adj-R^2		0.061		0.066			0.028		0.037	
N		16,833		15,940			14,052		13,399	
Panel B: 3-day ACARs										
Intercept	?	–390.03	(0.01)	–369.31	(0.01)	?	–402.52	(0.01)	–392.93	(0.01)
AR	–	–80.64	(0.01)	–73.04	(0.01)	–	–48.30	(0.01)	–38.90	(0.01)
COMANAL	+	–7.45	(0.01)	0.85	(0.40)	+	–8.94	(0.02)	0.02	(0.50)
CORR	+	24.90	(0.12)	47.57	(0.01)	+	8.24	(0.29)	24.94	(0.02)
DECLINE	+	35.68	(0.01)	33.92	(0.01)	+	23.64	(0.01)	25.18	(0.01)
HERF	+	26.36	(0.01)	26.12	(0.01)	+	10.15	(0.14)	7.42	(0.20)
NEIGHBOUR	+	3.71	(0.11)	2.72	(0.22)	+	0.79	(0.40)	1.09	(0.36)
MV^A	?			0.01	(0.99)	?			0.92	(0.36)
MV^{NA}	?			–2.74	(0.03)	?			–4.17	(0.02)
$MSCI^A$	?			–4.03	(0.33)	?			–8.70	(0.02)
$MSCI^{NA}$	?			–4.69	(0.14)	?			2.20	(0.58)
$ANAL^A$	?			–0.06	(0.71)	?			–0.19	(0.17)
$ANAL^{NA}$	?			0.02	(0.67)	?			0.24	(0.00)
$GAAP^A$	?			–4.99	(0.45)	?			13.83	(0.02)
$GAAP^{NA}$	?			–2.67	(0.53)	?			–1.36	(0.71)
Country dummies^A		No		Yes			No		Yes	
Country dummies^{NA}		No		Yes			No		Yes	
Adj-R^2		0.055		0.058			0.025		0.031	
N		16,999		16,103			13,887		13,243	

Table 5
OLS regression coefficient estimates and summary statistics for models explaining the market reaction for comparable foreign non-announcers (probability values in parentheses) (*continued*)

	Contagion ($AR_j < 0$)				Competitive effect ($AR_j \geq 0$)			
	Sign	*Model 1*		*Model 2*	*Sign*	*Model 1*		*Model 2*	
Panel C: 3-day AVOL									
Intercept	?	–22.82	(0.04)	–21.72	(0.27)	?	12.48	(0.07)	36.44	(0.00)
AR	–	17.77	(0.43)	14.07	(0.51)	–	24.63	(0.04)	29.69	(0.02)
COMANAL	+	–2.48	(0.20)	0.11	(0.48)	+	–8.21	(0.00)	–5.88	(0.00)
CORR	+	1.36	(0.87)	–1.92	(0.81)	+	–25.47	(0.00)	–14.04	(0.03)
DECLINE	+	1.78	(0.33)	–0.66	(0.90)	+	–5.54	(0.06)	–7.74	(0.07)
HERF	+	4.27	(0.36)	6.20	(0.31)	+	11.12	(0.09)	7.67	(0.18)
NEIGHBOUR	+	0.05	(0.50)	–1.11	(0.70)	+	0.51	(0.42)	0.56	(0.42)
MV^A	?			0.30	(0.79)	?			–1.23	(0.40)
MV^{NA}	?			–0.59	(0.57)	?			–2.51	(0.01)
$MSCI^A$	?			3.03	(0.38)	?			4.51	(0.30)
$MSCI^{NA}$	?			0.64	(0.84)	?			–5.93	(0.07)
$ANAL^A$	?			–0.21	(0.28)	?			–0.02	(0.86)
$ANAL^{NA}$	?			–0.23	(0.01)	?			0.12	(0.12)
$GAAP^A$	?			–5.39	(0.19)	?			1.13	(0.81)
$GAAP^{NA}$	?			–0.12	(0.98)	?			–4.61	(0.18)
Country dummies^A		No		Yes			No		Yes	
Country dummies^{NA}		No		Yes			No		Yes	
Adj-R^2		0.021		0.026			0.024		0.030	
N		6,639		6,286			5,590		5,346	
Panel D: FR									
Intercept	?	–0.03	(0.59)	–0.07	(0.43)	?	–0.05	(0.26)	–0.13	(0.01)
AR	+	0.03	(0.12)	0.02	(0.24)	–	–0.01	(0.80)	–0.04	(0.42)
CONANAL	–	–0.01	(0.39)	–0.01	(0.34)	+	0.01	(0.43)	0.00	(0.50)
CORR	–	–0.01	(0.40)	–0.01	(0.33)	+	–0.01	(0.59)	–0.03	(0.37)
DECLINE	–	–0.06	(0.01)	–0.06	(0.01)	+	–0.05	(0.01)	–0.06	(0.01)
HERF	–	–0.07	(0.07)	–0.09	(0.03)	+	–0.04	(0.48)	–0.05	(0.49)
NEIGHBOUR	–	0.02	(0.05)	0.02	(0.60)	+	0.01	(0.25)	0.02	(0.20)
MV^A	?			–0.00	(0.50)	?			0.01	(0.20)
MV^{NA}	?			0.01	(0.31)	?			0.01	(0.36)
$MSCI^A$	?			0.02	(0.06)	?			–0.00	(0.71)
$MSCI^{NA}$	?			0.01	(0.77)	?			–0.00	(0.94)
$ANAL^A$	?			0.00	(0.14)	?			0.00	(0.30)
$ANAL^{NA}$	?			–0.00	(0.01)	?			–0.01	(0.01)
$GAAP^A$	?			0.01	(0.19)	?			0.02	(0.51)
$GAAP^{NA}$	?			0.01	(0.41)	?			–0.01	(0.73)
Country dummies^A		No		Yes			No		Yes	
Country dummies^{NA}		No		Yes			No		Yes	
Adj-R^2		0.014		0.016			0.010		0.014	
N		9,377		8,842			7,641		7,268	

Note: The dependent variable in panels A, B, C and D is three-day cumulative abnormal returns centred on the profit warnings announcement date (CAR), absolute three-day cumulative abnormal returns (ACAR), three-day abnormal trading volume (AVOL), and revisions in analysts' consensus EPS forecast (FR), respectively. (See Tables 2–4 for dependent variable definitions.) Variable definitions for explanatory variables are as follows: *AR* is the announcement-day market-adjusted stock return for the corresponding profit warning announcer; *COMANAL* is an indicator variable taking the value of one if the comparable foreigner non-announcer shares at least one analyst with the announcing firm and zero otherwise; *CORR* is the Pearson correlation coefficient between stock returns of the non-announcer and the corresponding announcing firm (computed using daily returns over the period $t - 250$ to $t - 10$); *DECLINE* is an indicator

Table 5
OLS regression coefficient estimates and summary statistics for models explaining the market reaction for comparable foreign non-announcers (probability values in parentheses) (*continued*)
variable taking the value of one if the profit warning was announced in calendar years 2000 through 2003 and zero otherwise; *HERF* is the Herfindahl index of global industry concentration (computed using revenues for all firms in the corresponding JCF international industry portfolio); *NEIGHBOUR* is an indicator variable taking the value of one where announcing and non-announcing firms are listed in countries that share a national border and zero otherwise; MV is the natural logarithm of market capitalisation; *MSCI* is an indicator variable taking the value of one if the firm is a member of the Morgan Stanley MSCI global stock index and zero otherwise; *ANAL* is the natural logarithm of analyst following; *GAAP* is an indicator variable taking the value of one for firms that report using International Financial Reporting Standards, US GAAP or UK GAAP, and zero otherwise; *Country dummies* is a vector of indicator variables for country of listing; and subscripts *A* and *NA* refer to announcers and non-announcers, respectively. All variables using financial statement data are measured at the fiscal year-end immediately preceding the relevant profit warning. The full sample is partitioned according to the sign of non-announcing firms' announcement day abnormal return (*AR*) and separate regressions are performed for $AR < 0$ and $AR \geq 0$. Coefficient estimates are multiplied by 10^2 to assist tabulation. Probability values are based on clustered standard errors and refer to one-tailed tests where coefficient signs are as predicted and two-tailed tests otherwise.

predicted direction in the majority of models presented in Table 5, coefficient estimates on *NEIGHBOUR* are generally insignificant.

Overall, findings for our test variables tend to be more pronounced for abnormal return metrics and weakest for abnormal trading volume. Results for several variables are not symmetric across contagion and competitive effect partitions, with stronger results typically observed for the contagion group. Comparison of Model 1 (excluding controls) and Model 2 (including controls) in each panel reveals that control variables display little incremental explanatory power beyond our main test variables. Although a number of controls display significant coefficient estimates in one or more models, consistent patterns are hard to detect. An exception is the country fixed effect vectors, the significance of which supports evidence presented in Tables 2 and 4 that cross-border information is partly contingent on country-level factors associated with both announcing and non-announcing firms, respectively.

6. Supplementary analysis

This section presents findings for a series of additional tests designed to further explore the form and magnitude of cross-border information transfers. In the following subsection we implement a more refined approach to distinguish between contagion and competitive transfers, while Section 6.2 summarises a battery of additional robustness tests designed to assess the sensitivity of our findings to alternative specifications and variable definitions.

6.1. Contagion versus competitive effects

Tests reported in the preceding section discriminate between contagion and competitive effects using the approach employed by Firth (1996a). However, partitioning solely on the basis of announcement-period abnormal returns ignores other market-response indicators; and insofar as abnormal returns are measured with error, reliance on this single metric is likely to misclassify observations. We address this problem by employing an alternative partitioning method designed to provide a more refined split between contagion and competitive effects. Specifically, we use a portfolio approach whereby observations satisfying the following three conditions were classified as contagion (competitive) transfers: negative (positive) three-day CAR; three-day abnormal trading volume greater than one; and a downward (upward) revision in analysts' consensus forecast. If Firth's unidimensional approach to distinguishing between contagion and competitive transfers leads to misclassification problems and hence lower power tests, we would expect evidence of cross-border information transfers to be more pronounced using this three-way split.

The three-way classification method yields 2,486 contagion transfers and 438 competitive transfers. All remaining observations are discarded. The low number of observations classified as competitive effects is consistent with evidence that contagion transfers dominate in the cross-section. Regression (5) is re-estimated for the two groups. Coefficient estimates for our test variables and model summary statistics are presented in Table 6.[15] (Results for control variables are not tabulated in the interests of parsimony.) Consistent with the view that a more

[15] The three-way classification is applied to the pre-trimmed sample. Variables are then trimmed separately for each regression model in Table 6 leading to minor variations in sample size across the four dependent variables.

Table 6
OLS regression coefficient estimates and summary statistics for models explaining the market reaction for comparable foreign non-announcers based on three-way conditioning for contagion and competitive effects (probability values in parentheses)

	3-day CARs				3-day ACARs				3-day AVOL				FR			
	Contagion		*Competitive*		*Contagion*		*Competitive*		*Contagion*		*Competitive*		*Contagion*		*Competitive*	
	Sign	*Coeff.*	*Sign*	*Coeff.*	*Sign*	*Coeff.*	*Sign*	*Coeff.*	*Sign*	*Coeff.*	*Sign*	*Coeff.*	*Sign*	*Coeff.*	*Sign*	*Coeff.*
Intercept	?	–2.56	?	6.15	?	–412.08	?	–269.37	?	100.71	?	193.45	?	–0.372	?	0.66
		(0.01)		(0.01)		(0.01)		(0.01)		(0.00)		(0.00)		(0.05)		(0.00)
AR	+	2.46	–	–2.07	–	–98.85	–	–82.89	–	3.64	–	–12.46	–	–0.06	–	0.13
		(0.01)		(0.05)		(0.01)		(0.11)		(0.76)		(0.28)		(0.10)		(0.32)
COMANAL	–	0.12	+	–0.02	+	6.11	+	0.53	+	–6.02	+	6.32	+	–0.03	+	0.01
		(0.57)		(0.96)		(0.18)		(0.59)		(0.01)		(0.09)		(0.19)		(0.23)
CORR	–	–1.20	+	0.96	+	36.28	+	50.47	+	–7.45	+	–4.42	+	–0.08	+	0.09
		(0.04)		(0.13)		(0.14)		(0.08)		(0.21)		(0.77)		(0.10)		(0.09)
DECLINE	–	–1.18	+	0.36	+	44.69	+	30.43	+	–0.75	+	–27.47	+	–0.07	+	0.04
		(0.01)		(0.18)		(0.01)		(0.08)		(0.74)		(0.01)		(0.01)		(0.25)
HERF	–	–2.43	+	–2.18	+	78.24	+	–70.01	+	6.25	+	–43.66	+	–0.07	+	0.18
		(0.01)		(0.10)		(0.01)		(0.38)		(0.34)		(0.04)		(0.45)		(0.20)
NEIGHBOUR	–	0.12	+	–0.03	+	–0.34	+	–0.03	+	1.73	+	–3.85	+	0.02	+	–0.04
		(0.35)		(0.95)		(0.94)		(1.00)		(0.31)		(0.67)		(0.19)		(0.10)
Control variables		Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes
Adj-R^2		0.133		0.118		0.117		0.145		0.082		0.178		0.059		0.181
N		2,213		393		2,232		396		2,215		392		2,230		371

Note: Observations are partitioned into contagion and competitive groups using the following procedure: observations with a negative announcement-period three-day cumulative abnormal return, abnormal trading volume greater than one, and a downward revision in analysts' consensus forecast are classified as contagion transfers (Contagion); observations with a positive three-day cumulative abnormal return, three-day abnormal trading volume greater than one, and an upward revision in analysts' consensus forecast are classified as competitive transfers (Competitive); all remaining observations are excluded from the analysis. The dependent variables are three-day cumulative abnormal returns centred on the profit warnings announcement date (3-day CAR), absolute three-day cumulative abnormal returns (3-day ACAR), three-day abnormal trading volume (3-day AVOL), and revisions in analysts' consensus EPS forecast (FR), respectively. (See Tables 2–4 for definitions of abnormal returns, absolute abnormal returns, abnormal trading volume, and forecast revisions.) Variable definitions for explanatory variables are as follows: *AR* is the announcement-day market-adjusted stock return for the corresponding profit warning announcer; *COMANAL* is an indicator variable taking the value of one if the comparable foreigner non-announcer shares at least one analyst with the announcing firm and zero otherwise; *CORR* is the Pearson correlation coefficient between stock returns of the non-announcer and the corresponding announcing firm (computed using daily returns over the period $t-250$ to $t-10$); *DECLINE* is an indicator variable taking the value of one if the profit warning was announced during calendar years 2000 through 2003 and zero otherwise; *HERF* is the Herfindahl index of global industry concentration (computed using revenues for all firms in the corresponding JCF international industry portfolio); *NEIGHBOUR* is an indicator variable taking the value of one where announcing and non-announcing firms are listed in countries that share a national border and zero otherwise; *Control variables* is a vector of additional variables comprising the natural logarithm of market capitalisation (*MV*); an indicator variable taking the value of one if the firm is a member of the Morgan Stanley MSCI global stock index and zero otherwise (*MSCI*); the natural logarithm of analyst following (*ANAL*); an indicator variable taking the value of one for firms that report using International Financial Reporting Standards, US GAAP or UK GAAP, and zero otherwise (*GAAP*); and a vector of indicator variables for country of listing (*Country dummies*). Separate measures of all control variables are included for announcers and non-announcers. All variables using financial statement data are measured at the fiscal year-end immediately preceding the relevant profit warning. Coefficient estimates are multiplied by 10^2 to assist tabulation. Probability values are based on clustered standard errors and refer to one-tailed tests where coefficient signs are as predicted and two-tailed tests otherwise.

refined approach to distinguishing between contagion and competitive transfers helps reduce measurement error in the market reaction metrics, the explanatory power of all models is substantially higher than the corresponding models in Table 5. Coefficient signs and significance levels, however, are broadly similar to those previously reported with the following exceptions. In the contagion regressions, *COMANAL* is significant with the wrong sign in the trading volume model, *CORR* loses its significance in the absolute return model, and *DECLINE* and *HERF* display the wrong signs in the forecast revision model. In the competitive effect regressions, incongruous findings previously documented for *AR*, *COMANAL* and *DECLINE* in the trading volume model are no longer evident, *CORR* is significant with the predicted sign in the forecast revision model, while *CORR* and *DECLINE* are insignificant in the cumulative abnormal return model. Overall, therefore, Regression (5) continues to provide only limited insights into the determinants of cross-border information transfers.[16]

6.2. Additional sensitivity tests

The first set of robustness tests discussed in this section relates to the selection of comparable non-announcing firms. Analyses reported in the preceding sections use industry membership to identify announcing and non-announcing peers. To the extent that industry portfolios are constructed using broad classifications that yield arbitrary firm groupings, our analyses are likely to generate noisy tests of the incidence and magnitude of cross-border information transfers. We therefore repeated key elements of our analysis using two alternative methods for selecting comparable non-announcers. First, in the spirit of Ramnath (2002) we group firms on the basis of shared analysts. For each profit warning we identify all foreign non-announcers that share at least n common analysts with the announcing firm. No constraints are placed on industry membership so that announcing and non-announcing firms can be drawn from different *JFC* international industry portfolios. Absent any clear guidance about the appropriate number of shared analysts to use, we experiment with a range of values for n between 5 and 15. The approach leads to a dramatic reduction in sample size and a marked bias towards larger firms.[17] Tests reveal no evidence that matching firms on the basis of shared analysts leads to more pronounced transfer effects than those reported in Tables 3 and 4. However, there is some evidence that contagion is increasing in the number of common analysts. For example, three-day CARs (absolute CARs) decline (increase) monotonically and as the number of shared analysts rises. In contrast, three-day abnormal trading volume and analyst forecast revisions are invariant to the level of common analyst coverage.

Our second method of grouping firms uses pairwise correlations in stock returns to identify common firms. For each announcing firm we compute the pairwise return correlation with every foreign non-announcer and then define comparable foreign non-announcers as those with a correlation coefficient greater than ρ.[18] Correlations are computed using daily returns for days -150 to -25 relative to the profit warning announcement. Results using values of ρ between 0.3 and 0.7 yield average cross-border transfers that are either similar to or smaller than those obtained using the industry matching method. Collectively, therefore, our common analyst and correlation tests provide no evidence that measurement error in the industry-based method used to select comparable firms understates the magnitude of cross-border transfers.

Analyses presented in Sections 4 and 5 are inclusive insofar as they incorporate announcing and non-announcing firms regardless of their size or global economic significance. A weakness of this approach is that it retains small firms with less exposure to cross-border effects due to the parochial nature of their business and market. Including such firms is likely to increase noise in our tests. We therefore performed two tests where sample firms were restricted to those likely to have a more global presence. In the first set of tests, we constrained the sample to include the largest 10 firms (ranked by market capitalisation) in each country. In the second set of tests, we restricted our focus to European-listed constituents of Morgan Stanley's MSCI global stock index. Cross-border information transfers associated with these two alternative sampling approaches are similar in magnitude to those reported in Tables 3 and 4, and as such provide no

[16] To limit the impact of measurement error when partitioning observations solely on the basis of abnormal return, we also repeated tests after excluding cases with abnormal return estimates close to zero. Specially, we defined contagion (competitive) transfers as cases where abnormal returns $\leq -0.5\%$ ($\geq 0.5\%$); all remaining observations where $-0.5\% <$ abnormal return were excluded. Untabulated results are similar to those presented in Table 5 using the full sample.

[17] For example, restricting comparable foreign non-announcers to those that share at least five (10 or 15) analysts with the announcing firm yields a final sample of 9,338 (1,910 or 569) observations.

[18] The approach is extremely computer intensive. Applying this method to our sample involved computing over six million pairwise correlations.

suggestion that our main findings understate the size and importance of the phenomenon.

Sample characteristics reported in Table 1 reveal that UK firms are responsible for a disproportionately large fraction (56%) of the warnings issued during our sample period, raising the possibility that our findings may be unduly influenced by a single country. We therefore repeated our main analyses after omitting UK profit warnings. While some minor differences in results are apparent, the overall tenor of the conclusions is not affected. As an extension of this analysis, we also examined cross-border effects for a restricted set of major European economies (France, Germany, Netherlands, Spain, Italy and the UK). No material difference in results is evident using firms from these countries.

A series of supplementary tests were conducted to assess the sensitivity of results reported in Tables 4–6 to alternative event study specifications including: (i) using raw stock returns and abnormal returns estimated using the market model in place of market-adjusted returns; (ii) removing zero return observations from all test and estimation periods; and (iii) using a range of alternative announcement windows including days (–1, 0) and (0, +1), as well as day 0. Results display slight variation across alternative specifications, most noticeably for the regression results reported in Table 5 where some coefficient estimates change sign depending on the particular specification employed. In almost all cases, however, these sign changes are associated with insignificant coefficient estimates. Overall, the tenor of our findings and conclusions is robust to changes in key event study parameters.

Although disparities may exist between the incidence and magnitude of domestic versus cross-border information transfers, the presence of widespread inconsistencies could cast doubt on the validity of cross-border results. To the extent that evidence of material domestic information transfers provides an indication that a profit warning contains relevant information for foreign peers, we would expect the magnitude of cross-border transfers to be larger (smaller) in the presence (absence) of a material domestic transfer effect. We test this conjecture by classifying profit warnings into two samples according to whether or not the corresponding average domestic transfer (based on three-day CARs) is statistically different from zero. We then compare the average (median) cross-border market response across the two profit warning subsamples. Results for the abnormal returns metrics are consistent with our conjecture: both contagion and competitive cross-border effects are more pronounced for the subset of warnings associated with significant domestic transfers relative to those for which no significant domestic transfers exist. In contrast, no difference in the magnitude of cross-border effects conditional on the significance of domestic transfers is evident using the abnormal trading volume and forecast revision metrics.

Results presented in Table 3 reveal similarities between cross-border and domestic effects with respect to the average sign and magnitude of information transfers. In supplementary tests we examined the degree to which these average results mask changes over time in the average level of cross-border transfers relative to domestic effects. In particular, we investigated whether the relative magnitude of cross-border information transfers increased during our sample period in line with advancing globalisation. Annual comparisons of median cross-border transfers against domestic transfers reveal no evidence of a time-series shift in relative magnitudes: the average market response for comparable foreign non-announcers is similar to that observed for domestic non-announcers throughout our sample period. Accordingly, we find no evidence that cross-border effects have increased (relative to domestic transfers) in recent years despite the growth in cross-border trade and steps to harmonise international financial reporting practices.

We assessed the robustness of results reported in Table 5 to alternative definitions for a number of our test and control variables. For example, we experimented with a regional approach to measuring geographic and cultural proximity that involved allocating countries to one of five regions. A *REGIONAL* indicator variable was then constructed taking the value of one where announcer and non-announcer come from countries in the same region and zero otherwise. Results provided no new insights beyond those obtained with *NEIGHBOUR*. We used a continuous measure of common analyst following in place of the *COMANAL* indicator variable. Findings based on the continuous variable were generally less pronounced than those reported for *COMANAL*. In other tests Spearman correlations were used in place of Pearson correlations to construct *CORR* and we defined *DECLINE* to include only warnings issued in calendar years 2000 through 2002. In neither case did these changes yield results that differed materially from those reported in Table 5. We replaced *MSCI* with a more sophisticated measure of international exposure derived from firm-specific geographical segment data. The approach led to a considerable reduction in sample size due to

missing geographical segments. Nevertheless, conclusions were identical to those reported in Table 5. Finally, we expanded Equation (5) to include controls for legal origin and IFRS adoption. Coefficient estimates for these variables were not significant at conventional levels and results for all other variables were unchanged.

7. Summary and conclusions

This paper reports evidence on the existence and magnitude of cross-border accounting information transfers associated with profit warning announcements. While prior research indicates interdependencies among firms' share prices based on key accounting disclosures and major corporate events, results are almost exclusively confined to within-country effects. Firth (1996a) is the only study to our knowledge that examines cross-border information transfers associated with earnings disclosures. However, Firth's study is restricted to analysing transfers between firms from countries that share similar economic, institutional and financial reporting arrangements. An unresolved question is the extent to which analysts and investors extrapolate earnings information across national boundaries in the face of substantial legal, political, cultural and financial reporting differences.

We examine cross-border information transfers between European-listed firms in response to profit warnings issued between 1997 and 2007. Empirical tests are based on samples of 4,283 firms drawn from 29 European countries and 1,357 profit warnings issued by firms from 20 countries. Tests provide some evidence that negative earnings surprises affect investors' perceptions of comparable foreign non-announcing firms. However, results are far from clear-cut. Our main findings can be summarised as follows. First, there is evidence of abnormal market activity for foreign same-sector non-announcers surrounding the release of a profit warning, consistent with the existence of cross-border information transfers among European-listed firms. Second, warnings are interpreted as bad news for the average comparable foreign non-announcer, suggesting that contagion effects dominate in the cross-section. Nevertheless, markets respond positively for a surprisingly large fraction of non-announcers, reflecting either a perceived reallocation of market share within the sector or measurement error in our market reaction metrics. Third, average cross-border information transfers are similar in character to domestic transfers. To the extent that domestic accounting-related information transfers are well established in the literature, these similarities provide some comfort regarding the reliability of our cross-border evidence. Fourth, cross-sectional tests reveal that cross-border transfers vary according to firm-, industry- and country-level characteristics. However, findings vary across alternative market response metrics; associations are not symmetric with respect to contagion and competitive effects; and the explanatory power of the models is typically low.

Our analysis provides a modest step towards developing a better understanding of how investors extrapolate earnings information across national boundaries. Accordingly, many potentially interesting avenues for further research remain unexplored. First, it seems likely that our large sample analysis pools together a small number of material transfer cases with a large number of negligible responses, resulting in relatively low power tests. Further research aimed at identifying the factors that distinguish material cross-border earnings transfers from immaterial cases is likely to yield interesting insights. Second, cross-border information transfers provide a potentially interesting framework in which to explore the consequences of international accounting diversity. While investors are compelled to think globally, global investment decisions are complicated by internationally diverse accounting practices. Investors reading foreign financial statements are frequently confronted with unfamiliar reporting rules and country-specific nuances. Additionally, many countries' financial reporting rules are not necessarily designed to reflect underlying economic performance (Revsine et al., 2002; Ball et al., 2003). Our preliminary findings suggest that GAAP diversity may not represent the barrier to international information flows that some commentators and practitioners suggest. Further work exploring financial reporting comparability from an international perspective, with particular emphasis on benefits of IFRS for cross-border financial statement analysis, is likely to be of interest to academics and policymakers alike. Third, our analysis reveals considerable cross-country variation in the propensity to issue a profit warning. Research aimed at understanding how institutional factors and firm-level incentives influence the decision to warn (and to issue a management forecast more generally) is likely to prove informative, particularly to policymakers concerned with the regulation of capital markets.

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