Operational risk and reputation in the financial industry

Roland Gillet [a,b], Georges Hübner [c,d,e], Séverine Plunus [c,e,*]

[a] University Paris 1 Panthéon – Sorbonne, PRISM, France
[b] Free University of Brussels, SBS-EM, Belgium
[c] HEC Management School, University of Liège, Belgium
[d] Faculty of Economics and Business Administration, Maastricht University, The Netherlands
[e] Gambit Financial Solutions, Belgium

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ABSTRACT

By examining stock market reactions to the announcement of operational losses by financial companies, this paper attempts to disentangle operational losses from reputational damage. Our analysis deals with 154 events coming from the FIRST database of OpVantage. Events occurred between 1990 and 2004 in companies belonging to the financial sector and that are listed on the major European and US Stock Exchanges. Results show significant, negative abnormal returns at the announcement date of the loss, along with an increase in the volumes of trade. In cases of internal fraud, the loss in market value is greater that the operational loss amount announced, which is interpreted as a sign of reputational damage. Negative impact is proportionally greater when the loss amount represents a larger share in the company's net profit.

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1. Introduction

Major operational events have drawn a lot of attention in the press and in the academic literature: the Barings bank losing 1.4 billion USD from rogue trading in is branch in Singapore leading to the failure of the whole institution (Ross, 1997; Stonham, 1996; Sheaffer et al., 1998); Allied Irish Banks losing 750 MM USD in rogue trading (Dunne and Helliar, 2002), or Prudential Insurance incurring 2 billion USD settlement in class action lawsuit (Walker et al., 2001), to name a few. These events, as well as developments such as the growth of e-commerce or changes in banks' risks management have led regulators and the banking industry to recognize the importance of operational risk in shaping the risk profiles of financial institutions. Reflecting this recognition, the Basel Committee on Banking Supervision, in its proposal for A New Capital Accord, has incorporated into its proposed capital framework an explicit capital requirement for operational risk. Consequently, financial markets put henceforth a closer focus on this type of risk. While all these events are classified as operational, their consequences go far beyond the mere mechanical effect on the bank's P&L. They affect the reputation of the financial institu-

tion that bears them. Sometimes even the business continuity of the institution suffers more from the indirect backlash than from the direct loss.

From a strict regulatory point of view, the Basel Committee for Banking Supervision (BIS) deliberately ignores these side effects. It defines operational risk as: "The risk of losses resulting from inadequate or failed internal processes, people and systems or from external events. This definition includes legal risk, but excludes strategic risk and reputational risk" (Basel Committee on Banking Supervision, 2005, p. 140). Thus, this definition specifically dissociates operational risk from reputational risk. It follows that banks are not required to allocate regulatory capital to hedge reputational risk.

Murphy et al. (2004), specifically focusing on reputational damage, examine the market impact of allegations of firms misconduct such as anti-trust violations, bribery, copyright infringements, or accounting fraud. Their contribution builds on a previous line of results showing significant negative price impacts of firms accused of fraudulent activities (Skantz et al., 1990; Karpoff and Lott, 1993; Reichert et al., 1996). The study of Murphy et al. (2004) comprises firms of all sectors between 1982 and 1996 using the Factiva database. The authors find significant declines in reported earnings, increased stock return volatility, and declines in analyst's estimates. Larger firms experience smaller negative impacts since losses behave as fixed costs. A strong brand name mitigates the impacts and is interpreted as a protection against reputational damage.

* Corresponding author. Address: Rue Louvrex 14, B-4000 Liège, Belgium. Tel.: +32 4 232 74 28.
E-mail addresses: roland.gillet@univ-paris1.fr (R. Gillet), g.hubner@ulg.ac.be (G. Hübner), splunus@ulg.ac.be (S. Plunus).

Yet to our knowledge, only two papers examine the reputation impact on market returns of operational events affecting financial institutions. Using external public data, Cummins et al. (2006) and de Fontnouvelle and Perry (2005) analyze stock market reactions to operational loss announcements. Cummins et al. (2006) compare the price impact of operational loss announcements larger than 10 millions USD in listed US banks and insurance companies. Banks experience smaller negative impact than insurance companies. The authors interpret this result as a positive consequence of better operational risk management actions in banks following the new regulation of Basel II. Both types of companies however experience significant negative price reactions and market value drops exceeding the amount of the operational losses. The effect is larger for firms with a high Tobin's Q, suggesting that the expected cash-flows correction is larger for high growth firms. Based on an event study of operational loss announcements for 115 banks listed on developed financial markets worldwide, de Fontnouvelle and Perry (2005) find that the announcement date only has a significant, negative impact on the price. The explanatory variable is the "loss ratio", defined as the ratio between the loss amount and the market capitalization of the firm. A market value loss greater than the operational loss announced is interpreted as evidence of reputational damage. The authors show that negative price impacts are larger when the operational loss is due to internal fraud. Additionally, a loss in market value appears to be up to six times larger than the actual loss amount when the internal fraud event takes place in a country with strong shareholders rights.

Our paper follows this line of research by examining stock market reaction after the announcement of operational losses in listed financial companies. Our analysis focuses on 152 financial companies listed on major Stock Exchanges where we expect to witness a broad and reliable coverage of corporate events by analysts and financial press. We propose a refined measure of reputational risk, by accounting for the difference between the market value loss and the announced loss amount of the firm. This adjustment allows us to isolate the pure reputational effect of the operational loss event on market returns.

Departing from the extant literature, we perform in-depth investigation of the sequence of events triggering reputational effects. For a given operational loss, we define three events per firm: first press cutting, explicit recognition by the company, and settlement date. The identification of three distinct event windows for the same operational loss gives us a valuable opportunity to analyze the influence of gradual release of information on the market reaction towards the reputation of a financial institution, as also investigated in Chernobai and Yildirim (2008). This distinction between event dates also enables us to discriminate the impact, for the same kind of event (press cutting, recognition or settlement), of the various qualities of information regarding this event (from an accurate and recognized figure to complete uncertainty).

The type of operational event, its location, and the proportion of the loss in the firm's market value are also taken into account. Moreover, for each event date, we discriminate the losses on the basis of the investors' knowledge of the real loss amount, including the process of the resolution of uncertainty on the market over time. This type of disclosure is extremely valuable in the event study setup, as it integrates the level of informational efficiency on the stock market. We give a specific attention to the "Clients, Products and Business Practices" and "Internal Fraud" event types, as the first represents 72% of our sample, and the latter was given specific attention in de Fontnouvelle and Perry (2005). Furthermore, our event study includes impacts on trading volumes, and investigates on changes in market alphas and betas through a Cusum of squares test.

This paper is organized as follows: Section 2 describes the sample construction, presents descriptive statistics on that sample and explains the methodology used for our event study. Section 3 presents our results for the whole sample and the different sub-samples constructed on the basis of the knowledge of the loss amount, the event type and the relative loss size. Section 4 provides evidence from the variation of volumes and sensitivity coefficients around the event dates. Finally, we report results from the cross-section analysis of abnormal returns in Section 5.

2. Data and event study methodology

2.1. Database

The empirical analysis uses OpVantage First, a data set provided by the Fitch Group. This resource provides 8000 case studies analyzing operational risk loss events. It supplies the loss size, the name of the company and its group, the country of the company, the event type, as well as complete explanation of the loss event.

Our aim is to gather a workable sample of events affecting US and European financial institutions. In order to construct our sample, we use a first series of criteria to filter this data collection: the company group is incorporated either in United States or in Europe; the companies that suffered the loss belong to the financial industry; in a concern of sufficient impact on the firms, operational losses have to be higher than 10 millions US dollars[1]; the loss has to be settled no sooner than January 1994. From this first sample, we eliminate the losses for which the companies are not publicly listed and removed the "September 11th" events, as no market data are available for the 5 days following this event.

After removing additional firms belonging to the same group, and in order to focus on the largest effects, our final sample is composed of the 103 largest losses having occurred between April 1994 and July 2006, in 64 US companies from 44 different groups and the 49 largest losses in 47 European companies from 33 different groups.[2] Daily stock prices come from Thomson Financial DataStream. For each company we select the data from the domestic exchange. The returns for each company i at time t are continuously compounded. The market benchmarks are the S&P500 for United States and the FTSEurofirst 100 for Europe. Both series are extracted from DataStream. As the European market benchmark is expressed in Euros, an additional filter is set for the non-euro European countries for which we have not an exchange rate: Switzerland, England and Sweden before January 1999. For the risk free rate, we use the annualized 3-months LIBOR for European countries and the 3-month US T-Bill for US companies.[3] These rates are extracted from the FRED database.

For each loss, three event dates are identified:

– The first press cutting date, available through the source of OpVantage First. We double-check this date manually through the Nexis Lexus database and correct it if necessary. For each case study, we select the date of the first press cutting mentioning the operational loss event. We further call it "Press date".
– The recognition by the company date, corresponding to an announcement of the loss (the event or the amount) by the company itself. We find this date (when available) in the complete description and history of the loss event, provided by OpVantage. We refer to it as "Recognition date".
– The settlement date, directly given by OpVantage.

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[1] Smaller losses were first considered in the sample but were removed as we were confronted to a loss of explanatory power. The same threshold as ours was also used by Cummins et al. (2006).

[2] Descriptive statistics on loss sizes are given further in Tables 2 and 3.

[3] The use of the 10-year T-Bond did not significantly change our results.

If these dates are the same for a given loss, we only keep the loss data in the first event group. For instance, if a company announces a loss through the media, and this is the first appearance in the press, we keep the press date and retain no date for recognition.

In addition to the global sample, we create several sub-samples in order to study more precisely these events. For the two first event dates, we assign a dummy variable that partitions the losses between *known* and *unknown* losses. Indeed, some press cuttings mention a "big event loss" but give no information on the loss size or a company might confirm a loss but give no info on the size of the loss. The settlement event does not distinguish the losses on the basis of the knowledge of the market, as all loss amounts are known at the settlement. Finally, we split the data in two sub-samples of equal size on the basis of relative loss size, i.e. the loss amount divided by the market value of the company.

2.2. Descriptive statistics

Table 1 presents the characteristics of the sample. Column 3 gives the average market value of these companies on the December 31st preceding the loss event, which is significantly higher than for the sector of bank and insurance (column 4). Columns 5 and 6 display significantly (at 1%) different price-to-book value ratios for the sample and the sector.

We compute the returns and beta on a 250 trading days' window, preceding of 40 trading days the press date of the loss events.

Data reported in Table 1 show that both groups of companies present slightly positive average returns and exhibit relatively aggressive betas, especially for USA, although European returns seems a bit more volatile.

Tables 2–4 present descriptive statistics around the three events dates corresponding to, respectively, the press date, the recognition date and the settlement date.

Due to the limited size of some sub-samples, we restrict the interpretation of the data to those samples displaying at least 10 observations.

Table 2, Panel A, shows that the average returns are negative for USA and positive for Europe after the press date. We compute these data on the period $t = 0$–10. The average loss suffered by the European companies is higher than the one suffered by US companies,

Table 1
Descriptive statistics of the companies before the loss events.

	No. of obs.	Market value (in Mio $)[a]		Price-to-book value		Returns ($t = -289$ to -40 days)				Beta
		Sample	Sector	Sample	Sector	Mean (%)	Min (%)	Max (%)	SD (%)	
Europe	49	47,184	9273	1.81	1.62	0.02	−0.46	0.54	2.14	1.09
USA	103	59,264	18,012	2.55	2.11	0.05	−0.19	0.37	2.03	1.20
Total	152	55,370	15,236	2.3	1.94	0.04	−0.46	0.54	2.07	1.17

[a] Average market value of the firms on the December 31st preceding the first press cutting date mentioning the loss event.

Table 2
Descriptive statistics for the firms on the first press cutting date.

	No. of obs.	Market value (in Mio $)	Loss size (in Mio $)			Returns ($t = 0$ to +10 days)			
			Mean	Min	Max	Mean	Min (%)	Max (%)	SD (%)
Panel A – Full sample									
Europe	49	38,138	277	11	3000	0.04	−1.83	2.79	1.82
USA	103	60,462	196	10	2650	−0.13	−4.47	1.44	1.96
Total	152	53,053	222	10	3000	−0.07	−4.47	2.79	1.91
Panel B – Known losses									
Europe	28	45,447	239	11	2923	−0.04	−1.83	2.79	1.90
USA	62	60,873	165	10	2650	−0.01	−1.42	1.44	1.75
Total	90	55,847	188	10	2923	−0.02	−1.83	2.79	1.80
Panel C – Unknown losses(1)									
Europe	21	27,539	309	11	3000	0.13	−1.21	1.12	1.71
USA	41	62,558	222	10	2160	−0.30	−4.47	0.81	2.27
Total	62	46,646	254	10	3000	−0.14	−4.47	1.12	2.07

Table 3
Descriptive statistics around the event date of the recognition by the company.

	No. of obs.	Market value (in Mio $)	Loss size (in Mio $)			Returns			
			Mean	Min	Max	Mean	Min (%)	Max (%)	SD (%)
Panel A – Full sample									
Europe	17	24,601	596	35	3000	−0.49	−2.87	0.44	2.63
USA	28	61,591	517	8	4371	−0.04	−3.27	1.96	2.24
Total	45	47,299	368	8	4371	−0.21	−3.27	1.96	2.39
Panel B – Known losses									
Europe	12	29,493	694	25	3000	−0.35	−2.54	0.44	2.12
USA	22	63,230	574	8	4371	−0.01	−3.27	1.96	2.28
Total	34	51,269	526	8	4371	−0.21	−3.27	1.96	2.22
Panel C – Unknown losses									
Europe	*5*	*12,863*	*252*	*100*	*452*	*−0.84*	*−2.87*	*0.35*	*3.84*
USA	*6*	*49,919*	*215*	*90*	*455*	*−0.16*	*−2.54*	*1.12*	*2.09*
Total	*11*	*33,075*	*232*	*90*	*455*	*−0.47*	*−2.87*	*1.12*	*2.89*

Table 4
Descriptive statistics for the full sample around the settlement date.

	No.	Market value (in Mio)	Loss size (in Mio)			Returns			
			Mean	Min	Max	Mean (%)	Min (%)	Max (%)	SD (%)
Europe	22	27415	346	11	2923	−0.07	−0.73	0.78	1.33
USA	47	65114	322	10	2650	−0.05	−0.98	0.85	1.59
Total	69	54064	330	10	2923	−0.06	−0.98	0.85	1.50
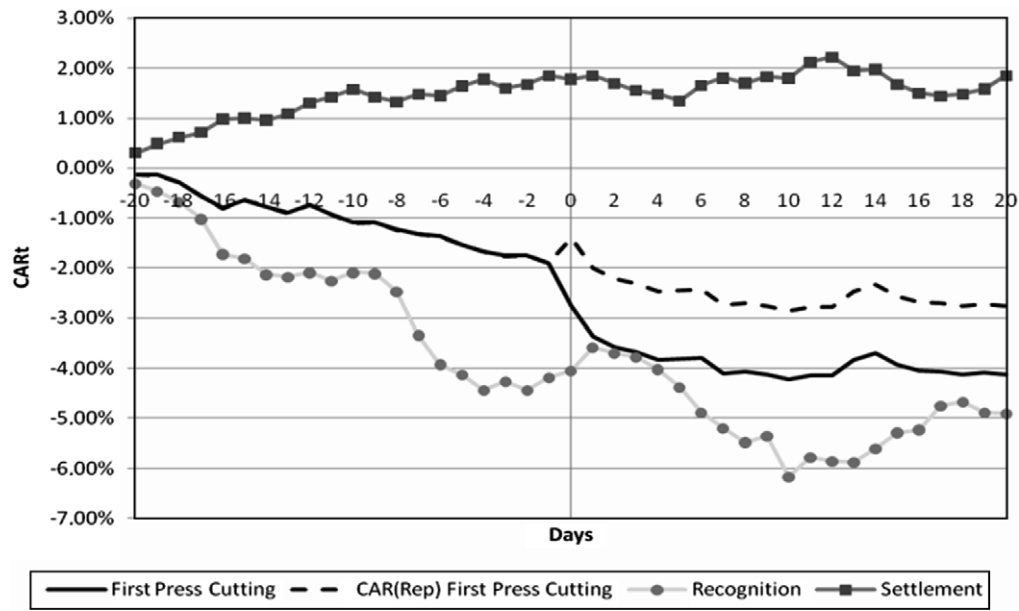
Fig. 1. Average cumulative abnormal returns around the three event dates from day $t = -20$ to day $t = 20$ for the full sample. The dashed line illustrates the reputation effect, as the values of the losses divided by the market value of the firms are added at date 0. The sample reduces to 45 loss events when the recognition by the company is concerned and to 69 when the settlement date differs from the two preceding date.

but globally, extreme events are of the same order of magnitude. Panel B and C distinguish the events when the amount of the loss is announced or not. In the known loss category, the statistics concerning European and US companies are similar. Yet, for the unknown loss amounts, European companies record positive average return, whereas US companies display negative return.

Table 3 and 4 report descriptive statistics of losses recognized by the company and of losses on the settlement date, respectively, if these dates differ from the press date. For each of these sub-samples, the average returns during the 10 days period following the event are negative.

2.3. Event study methodology

We measure the effect on corporate reputation of an operational loss announcement at up to three different dates. Regardless

Table 5
Test statistics for the three event date, for different time windows.

	First press cutting		Recognition	Settlement
	CAR	CAR(Rep)	CAR	CAR
$T = -15$ to 1	−5.42[***]	−1.96[**]	−0.64	1.71[**]
$T = -10$ to 5	−6.09[***]	−2.52[***]	−0.43	0.52
$T = -5$ to 10	−5.82[***]	−2.16[**]	−0.88	0.78
$T = 0$ to 15	−3.88[***]	−0.19	−0.80	0.53

Statistical inference is conducted through unilateral tests.
[**] Statistically significant at the 5% confidence level.
[***] Statistically significant at the 1% confidence level.

of the number of dates associated to a given loss event, the estimation period is a window of 250 trading days consisting of day −289 to −40 relative to the press date. We use a standard event study method with the single index market model.

Before computing the average abnormal return on each day t, AR_t, we adjust the return to isolate the reputational effect of the loss. The adjustment is done by adding the return due to the operational risk to the abnormal return at time 0, i.e. the operational loss divided by the market value of the company, as follows:

$$AR_{i0}(\text{Rep}) = AR_{i0} + |\text{loss}_i/\text{Market\_Cap}_i| \qquad (1)$$

where AR_{i0} is the abnormal return for firm i at time 0, loss_i is the operational loss amount suffered by firm i, Market_Cap_i is the market value of the company i at time 0.

When the loss is not known on the considered event date, we take the absolute value of the loss at the later date. We assume that the market rationally anticipates the effective loss amount. The expression for $AR_{i0}(\text{Rep})$ corrects not only for the market exposure, but also for the mechanical impact of the operational loss. Thus, it potentially captures more precisely the damage to the reputation of the firm incurred by the event. We compute all further expressions using AR_{i0} and $AR_{i0}(\text{Rep})$ alternatively.

We test the null hypothesis of no effect on the mean returns and use the Patell (1976) variance adjustment for abnormal returns.[4]

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[4] The variances of the abnormal returns for each stock are therefore multiplied by a factor Cit whose value depends on time and security (see Campbell et al., 1997 for details): $C_{it'} = 1 + 1/T + (R_{mt'} - \bar{R}_m)^2 / \sum_{k-1}^{T} (R_{mk} - \bar{R}_m)^2$ where T is the length of the estimation period.
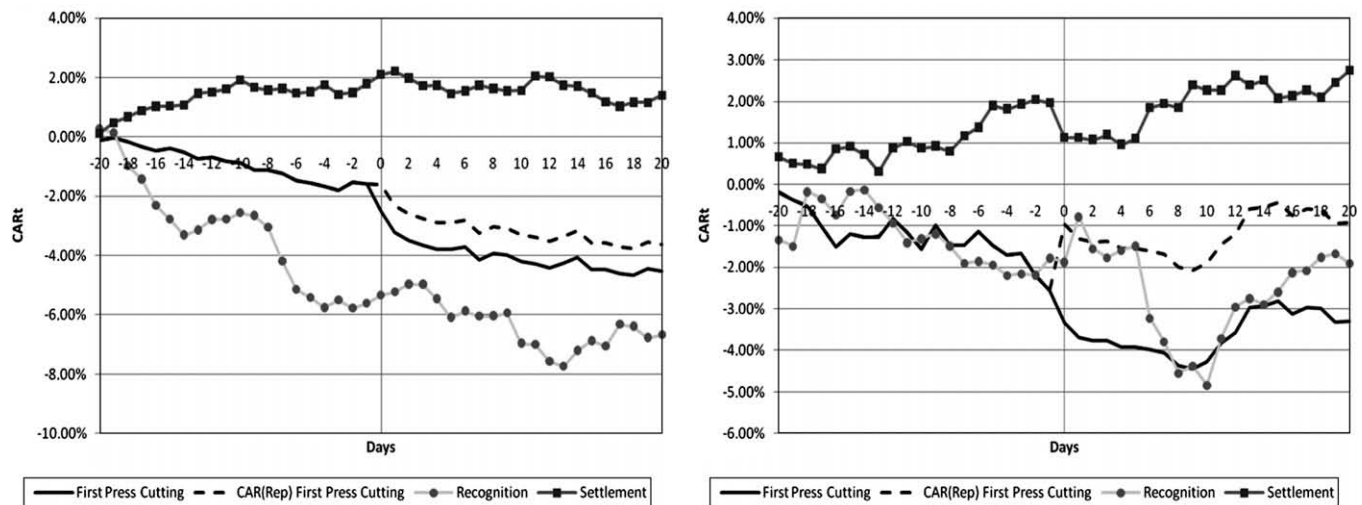
Fig. 2. Cumulated abnormal returns from day $t = -20$ to day $t = 20$ for the US (left) and the European (right) sub-samples. The dashed lines illustrate the reputation effect, as the values of the losses divided by the market value of the firms are added at date 0.

3. Empirical results on stock returns

3.1. Global sample analysis

This analysis aims at providing a general insight of the reputation effect on companies due to operational loss events. As described above, we compute cumulative abnormal returns (CAR) around the three event date linked to an operational loss, that is, the first press cutting of the event, the recognition by the company of the loss and the settlement. Fig. 1 plots the average value for the CAR from day $t = -20$ to day $t = 20$ for the full sample of 49 European companies and 103 US companies[5]. The dashed line illustrates the reputation effect, as the values of the losses divided by the market value of the firms are added at date 0. The sample reduces to 45 loss events when the recognition by the company is concerned and to 69 when the settlement date differs from the two preceding date. The lines that reflect the behavior of the samples around the recognition and settlement dates should be viewed as indicators of the differential effect of these two events over the press date.

For this and all subsequent figures, the dashed lines represent the sample path of CAR where AR_{i0} has been replaced by $AR_{i0}(\text{Rep})$.

As illustrated in Fig. 1, the comparison between the three straight lines clearly differentiates the settlement date from the two first event dates. Indeed, the latter events show CAR at date 0 around −4%, whereas this value is clearly positive (2%) for the settlement date. However, we can observe that the CAR seems to stabilize for the press event, whereas it continues to decrease during 10 days after the recognition date.

In order to test the statistical significance of these values, we use the significance test of Patell (1976). The results are reported in Table 5.

The test statistics show that the CARs are significantly negative for the press event, and particularly before date 0. For the other events, they are not significant, except for the 2 weeks preceding the settlement date (significantly positive). Regarding reputational risk, the CAR is also significantly negative before the press date. At this stage, we can either attribute this behavior to market overreaction (semi-strong informational inefficiency) or to some insider trading (strong form inefficiency).

3.2. Sub-samples Europe/USA

Fig. 2 displays the three curves of the CAR corresponding to the three event date. We present them separately for the EU and US sub-samples.

For the US sample, we get the same behavior as for the whole sample, i.e. negative CAR for the two first events (press and recognition), and positive CAR around the settlement date. In this sub-sample, however, the CAR around zero is twice lower for the recognition date than for the press date, while they were much closer for the full sample, indicating that the loss recognition is generally perceived as bad news by US investors. We investigate this issue further in the next sub-section through the analysis of the level of knowledge of the loss.

For the EU sub-sample, the purely mechanical operational loss returns recorded at time zero are much larger. Indeed, losses are, on average, about the same size as in the US, but the European firms usually display lower market value, leading the mechanical impact of the loss to be stronger. The return adjustment brings the CAR to levels similar as for the US sample (−2%) after the press date. The main difference lies in the evolution of returns around the recognition date, whose CAR remains closer to zero before the event. Table 6 reports the differences between the US and EU samples.

Table 6
Test statistics for US and European loss events.

	First press cutting		Recognition	Settlement
	CAR	CAR(Rep)	CAR	CAR
USA				
$T = -15$ to 1	−5.96***	−4.41***	−0.53	1.87**
$T = -10$ to 5	−6.52***	−4.89***	−0.68	0.49
$T = -5$ to 10	−5.70***	−3.49***	−0.80	0.08
$T = 0$ to 15	−5.12***	−4.41***	−1.17	−0.53
Europe				
$T = -15$ to 1	−0.95	2.89***	−0.36	0.34
$T = -10$ to 5	−1.33*	2.56***	0.17	0.21
$T = -5$ to 10	−2.02**	2.04**	−0.41	1.23
$T = 0$ to 15	0.52	4.61***	0.21	1.65**

Statistical inference is conducted through unilateral tests.
  * Statistically significant at the 10% confidence level.
 ** Statistically significant at the 5% confidence level.
*** Statistically significant at the 1% confidence level.

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[5] All samples and sub-samples of events have been checked for contamination effects of other information released in the test window.
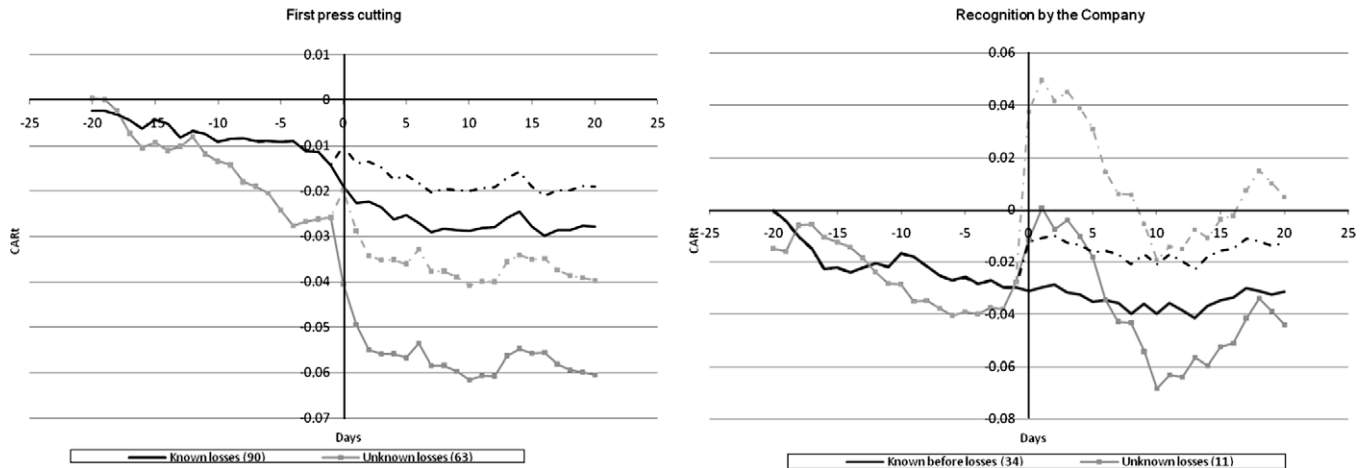
Fig. 3. Cumulated abnormal return around the press date (left graph) and around the recognition date (right) for sub-samples based on the knowledge of the loss amount. The dashed lines illustrate the reputation effect, as the values of the losses divided by the market value of the firms are added at date 0. For the unknown sub-samples, the value of the loss is its expected value proxied by it value on the settlement date.

For all windows around the press date, the CAR for US loss events is significantly less than zero at a 99% degree of confidence. For Europe, CARs are significantly negative at 90% for the second window and at 95% for the third one. On the opposite, CAR(Rep)s are significantly positive for all windows. For the recognition date, none of the statistics allows us to reject the hypotheses that the CAR is equal to zero. For the settlement date, however, the CAR is significantly positive at a 95% level of confidence for the first window in USA and for the last window in Europe. This significantly positive effect may be explained by tax considerations. Considering the possibility that firms have provisioned an excess operational loss prior to settlement, the actual knowledge of the real loss amount could allow them to announce good news to the market.

3.3. Sub-sample analysis according to the knowledge of the losses

Fig. 3 displays the CARs around the three different event dates, and distinguishes the cases when a loss amount is known or still unknown. The total loss due to operational risk appears to be much higher when the loss is not known yet, especially around date zero where the average CAR doubles from −3% at date −2 to −6% at date +2. But once we concentrate on the reputational effect, the higher

mean loss from the second category brings both curves a bit closer to each other, yet still at a level lower than zero. There remains no significant difference between the reputational damages for both types of events when the mechanical effect of operational losses is properly accounted for. For the recognition event, the unknown losses present a sharp negative trend until day 10, followed by a partial recovery. For the reputational effect, the curve crosses above zero on the horizontal axis. For the known losses, the curve is almost flat and slightly negative.

Table 7 presents the test statistics for the CAR series.[6] Unsurprisingly, the first press cutting disclosing an operational loss event triggers a significantly negative price reaction. However, when the market knows the extent of the loss by that moment, most of the drop is attributable to this loss. The market even "overcorrects" for this effect in the post-event window ($t = 0$ to +15). However, loss events with an unknown magnitude result in a negative return that significantly exceeds the actual (yet to be released later) extent of the loss. But beyond this expected result, Table 7 reveals that, provided that its loss was not known beforehand, the financial institution suffers from a further price decline at the time of its own recognition. The market seems to sanction the "deafening silence" of those firms that let the press investigate and disclose an event whose magnitude is hidden to investors. This is largely consistent with Hirschey et al. (2005), who relate the magnitude of the negative impact to the market reaction associated to window dressing by those firms that attempt to hide or minimize the extent of operational losses.

3.4. Sub-samples according to the event type

Figs. 4 and 5 present the CAR for two event types: the internal fraud events and the "Clients Products and Business Practices"[7] (CPBP).

Around the press date, we can clearly see the negative effect of the operational loss on the performance of the companies, particularly for the fraud, which lowest CAR is −7% compare to the lowest CAR of −4% for the CPBP. As far as reputational effect is taken into account, it still appears to be important for the fraud event, but less significant for the other group.

Table 7
Test statistics on the CAR(Rep) for the sub-samples on the basis of the loss amount knowledge.

	Known		Unknown	
	CAR	CAR(Rep)	CAR	CAR(Rep)
First press cutting				
$t = -15$ to +1	−2.47***	−0.28	−5.08***	−2.76***
$t = -10$ to +5	−2.39***	0.00	−6.23***	−4.02***
$t = -5$ to +10	−1.92**	0.63	−6.64***	−4.36***
$t = 0$ to +15	−0.60	1.90**	−5.17***	−2.84***
# Obs.	90		62	
Recognition				
$t = -15$ to +1	−1.2	2.37***	*0.44*	*2.09**￼*
$t = -10$ to +5	−1.13	2.50***	*0.61*	*2.32***￼*
$t = -5$ to +10	−1.19	2.39***	*−0.37*	*1.33**￼*
$t = 0$ to +15	−0.59	3.42***	*−0.54*	*1.16*
# Obs.	34		*11*	

Statistical inference is conducted through unilateral tests.
  * Statistically significant at the 10% confidence level.
 ** Statistically significant at the 5% confidence level.
*** Statistically significant at the 1% confidence level.

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[6] We report results for the sub-sample unknown losses/recognition by the company but the low amount of observations precludes any meaningful statistical inference.

[7] The other types of event are not represented as the samples were not sufficiently large.
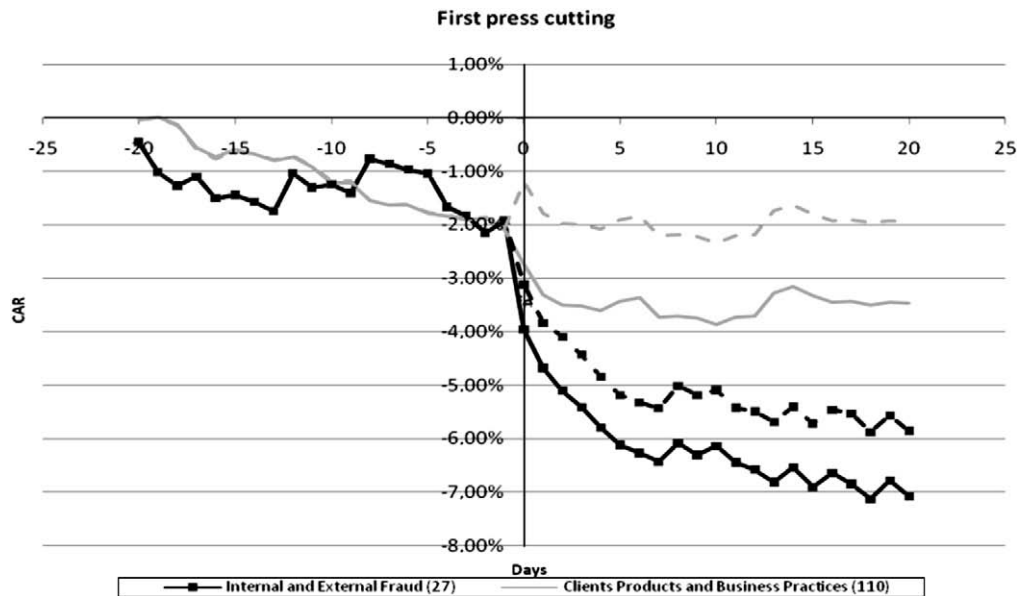
First press cutting

Fig. 4. Cumulated abnormal return around the press date for sub-samples based on the type of the loss event. The dashed lines illustrate the reputation effect, as the values of the losses divided by the market value of the firms are added at date 0.

Fig. 5's left graph displays these results for the recognition event. The effect of operational loss on the global performance, or the reputational risk taken alone, is close to nil for the CPBP event type. On the other hand, fraud seems to be an event type having a strong negative effect on the performance of the company, as well as on the reputation. Finally, the settlement date shows positive effect for all events, with a stronger effect for the fraud event type, indicating an upward correction from the market.

Table 8 presents the test statistics for these sub-samples. The strong visual impression from the inspection of the graphs is confirmed by high significance levels. The first line displays larger swings for the fraud event types, which result from a voluntary breach of the firm's procedures, than when the cause of operational losses is more accidental. This evidence is in line with other research dealing with the reputational effect of frauds. The larger impact of fraud events can be explained by reduction in market demand (Karpoff and Lott, 1993), by suspicion on management competence and integrity (Palmrose et al., 2004), or by fundamental internal control problems (de Fontnouvelle and Perry 2005).

Table 8
Tests statistics for event types sub-samples.

	First press cutting		Recognition		Settlement	
	Frauds	Clients	Frauds	Clients	Frauds	Clients
$T = -10 + 5$	−1.84**	−1.75**	−3.37***	2.17***	2.39***	1.14
$T = -5 + 10$	−2.02**	−1.20	−3.10***	0.08	1.39*	2.11**
$T = 0 + 15$	−1.36*	0.61	0.49	−0.48	−1.11	1.82**

Statistical inference is conducted through unilateral tests.
* Statistically significant at the 10% confidence level.
** Statistically significant at the 5% confidence level.
*** Statistically significant at the 1% confidence level.

3.5. Sub-sample analysis according to the relative size of the losses

Fig. 6 presents the CAR around the press date for two relative sizes of loss groups: the 50% bigger relative losses (higher than the median level of 0.29% of market value) and the 50% lower rel-
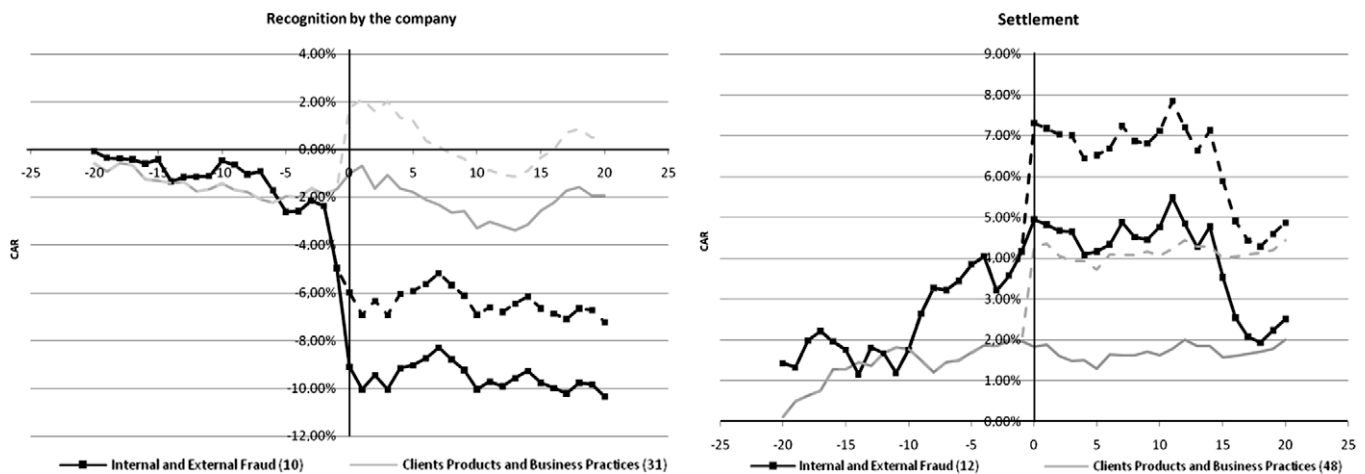

Fig. 5. Cumulated abnormal return around the recognition date (left graph) and around the settlement date (right graph) for different types of events. The dashed lines illustrate the reputation effect, as the values of the losses divided by the market value of the firms are added at date 0. For the unknown sub-samples, the value of the loss is its expected value proxied by it value on the settlement date.
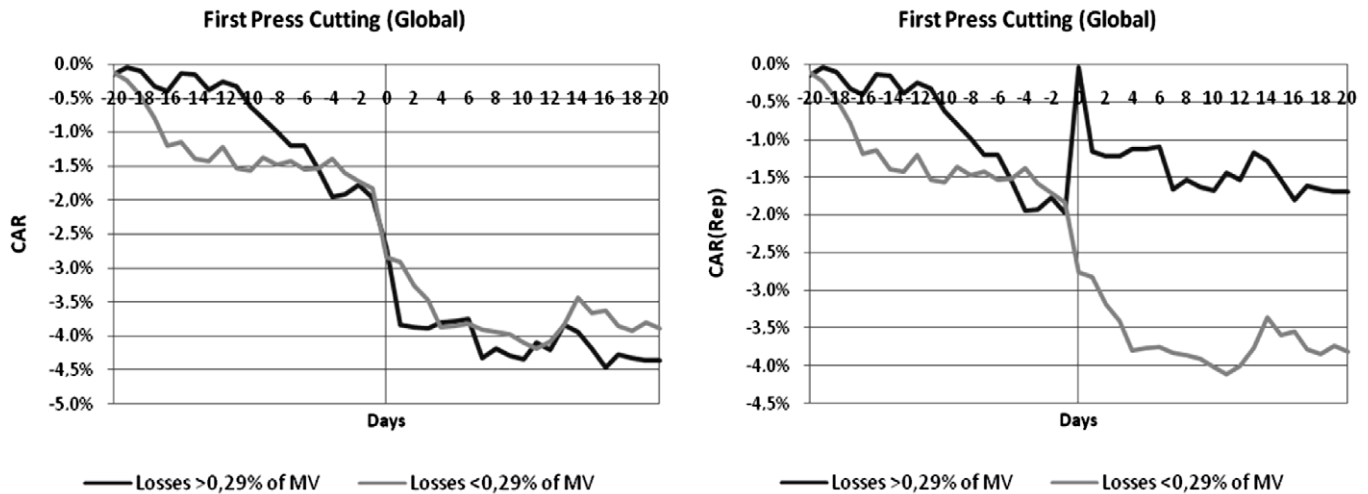
Fig. 6. Cumulated abnormal return (left) and cumulated abnormal return adjusted for reputation (right) around the first press cutting date for different relative sizes of loss.

ative losses.[8] The market seems to overreact to the announcement of a relatively small loss as both uncorrected CAR curves evolve quite similarly, whereas the reputation-corrected CAR(Rep), adjusted for relative size of loss, clearly exhibits an exaggeration of the consequence of a small loss while the impact of large losses are underestimated.

As a first explanation, the market seems to assign very similar penalties to operational loss events irrespective of their relative size because the uncertainty about the magnitude of the loss is still very high. To investigate further this hypothesis, we report in Fig. 7 the CAR(Rep) sample paths for the sample split according to relative loss size and to whether the loss amount is already known or not at the time of the event (four time series).

This figure shows that the strong negative CAR(Rep) is mainly due to still unknown losses of a small relative size. Thus, the market either seems to get a much better anticipation of large but unknown losses, for which there is hardly any penalty – which would be consistent with semi-strong efficient market hypothesis only applying to large losses – or the market is systematically pessimistic about the magnitude of the loss and sanctions all firms without distinction. This second interpretation appears more plausible because the market consistently overreacts to smaller unknown losses (t-stat = -5.43). As market participants cannot discriminate between the sizes of the losses, they appear not to account for their severity when translating their level into a stock price reaction.

Fig. 8 reports CARs around the recognition and settlement dates for the two size-related sub-samples. The results confirm our interpretations of Fig. 7. The penalty remains closer to zero around the recognition date (in Fig. 8's left graph) and even becomes positive (t-stat: 1.50) around the settlement date, even without correcting the CAR series for the magnitude of the loss. This evidences that the market rightfully assesses the consequences of the event for those institutions experiencing larger losses. On the other hand, there still seems to remain a serious doubt concerning companies that only acknowledge a smaller loss. Combined with the results of Fig. 6, there appears to be a double penalty associated with operational losses smaller than the median. The more favorable market reaction to larger losses is naturally reinforced after accounting for
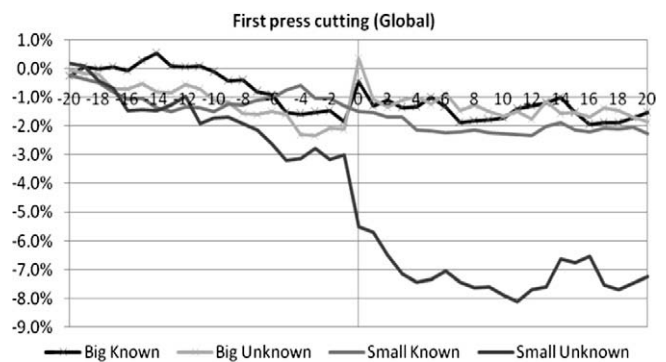

Fig. 7. Cumulated abnormal return adjusted for reputation around the first press cutting date for small and unknown losses versus other losses.

the correction in the CAR(Rep) process.[9] The dichotomy between the two sub-samples fades away when the settlement date is considered (Fig. 8's right graph). Consistent with our adverse selection interpretation, the settlement date corresponds to the unambiguous resolution of uncertainty. Therefore, one should not expect any significant difference in abnormal returns, which is essentially what we find.

4. Evidence from other data

The analysis of volumes and sensitivity coefficients around the three event dates not only permits to refine our previous analysis of returns, but it also allows us to check with independent data the precision of our assessment of the exact triggering events.

4.1. Volumes

In order to study the effect of operational losses announcements on the volumes of trade, we calculate an average volume for each companies on a 250 days basis, from $t = -289$ to $t = -40$. We then compute the daily variation of the volume on the basis of this average, for the windows $-20 + 20$ days around the three announcement dates. Fig. 9 plots these variations for the whole sample. It reveals that the volume variations are positive for the three dates.

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[8] The further split of the sample on the basis of the US/Europe distinction leaves very similar results.

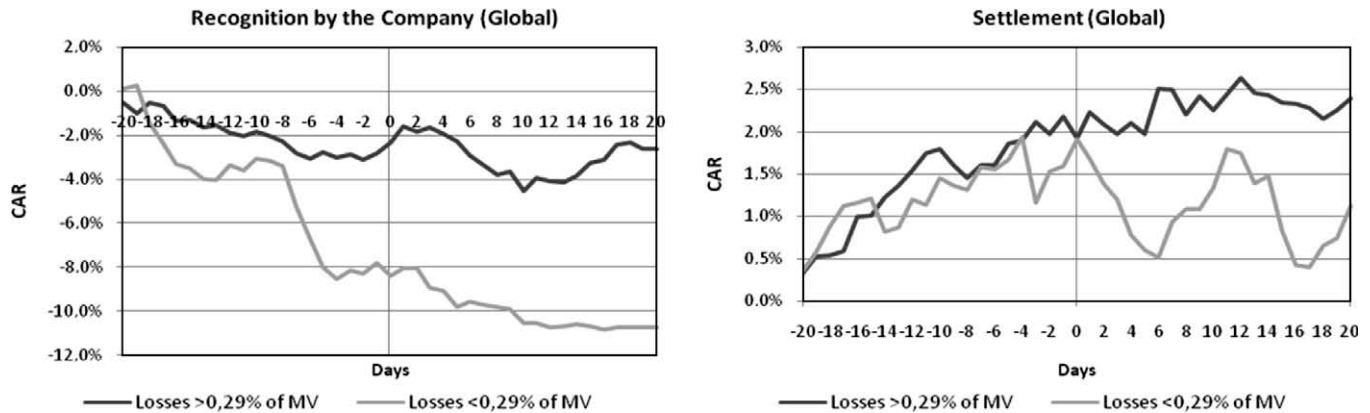[9] Detailed results are available upon request.

Fig. 8. Cumulated abnormal return around the recognition date (left graph) and the settlement date (right graph) for different relative sizes of loss.
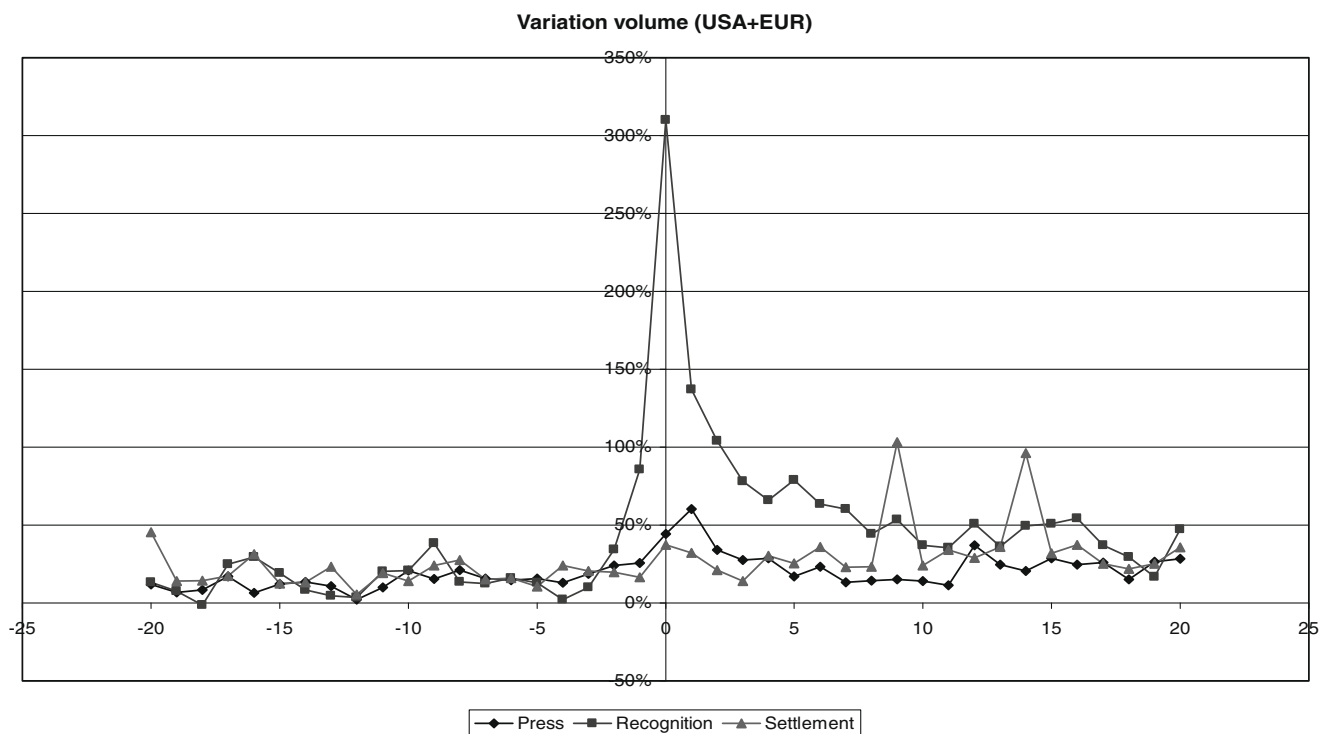

Fig. 9. Volume variation of the stocks exchanged on the markets of the companies having suffered an operational loss.

The plot of the recognition date is peculiar, as we can see the huge peak of ca. 300%, at date 0. This peak seems to diminish quite slowly.[10] The press date also presents a slight peak around date 1 but not as distinguishable.

The analysis of abnormal volumes provides a useful discrimination between the press date and the recognition. The visual impression arising from the analysis of AR in Fig. 1 suggests that the market reacts quite similarly to these two events, but the most significant price reaction appears to take place at the press event. The analysis of volumes strongly contradicts this impression, by showing that the press event hardly triggers any additional trades, while the recognition is perceived as a strong informational event that leads investors to revise their portfolio compositions. The

press event only triggers a noticeable volume peak for the US sub-sample (+68% in day 1), but on the recognition date, the volume increase is much larger for the EU sub-sample (+421%) than for the US (+251%). This suggests that US investors rebalance their portfolios faster at the first announcement of the loss. This evidence will be matched further with the analysis of changes in systematic risk exposures in the next section.

4.2. Cusum of squares

The Cusum of squares test (Brown et al., 1975) aims at assessing the constancy of the parameters of a model and is based on the test statistic:

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[10] Note that the two peaks at day +10 and +15 for the settlement date come from a single event.

$$S_t = \sum_{r=k+1}^{t} w_r^2 / \sum_{r=k+1}^{T} w_r^2 \qquad (2)$$
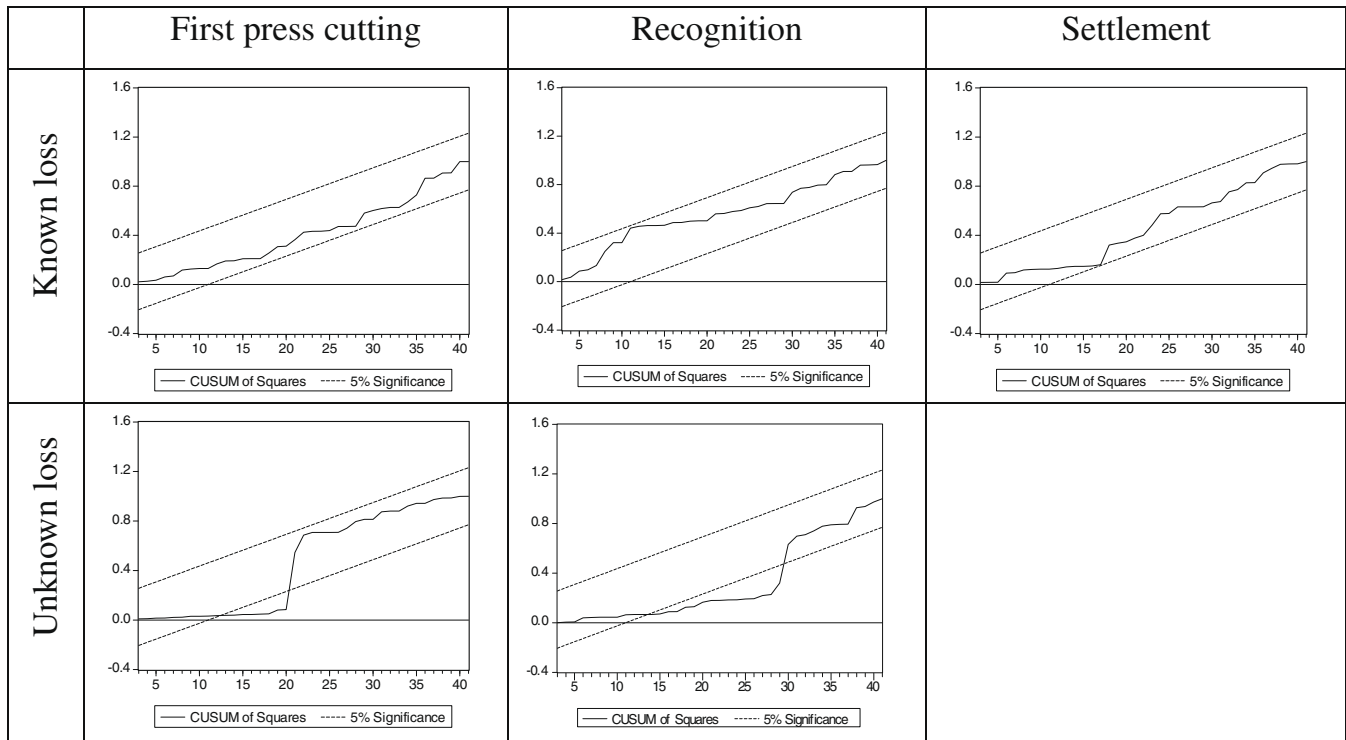
Fig. 10. Cusum of squares test for US loss events for two sub-samples based on the knowledge of the loss amount, and around the three different event date: the first press cutting date, the recognition by the company date, and the settlement date. The dotted lines represent the 5% critical lines, outside which, the plot of the statistic of the test provides evidence that the coefficients are unstable.

where w is the recursive residual defined as:

$$w_t = \frac{y_t - x_t' b_{t-1}}{[1 + x_t'(X_{t-1}'X_{t-1})^{-1}x_t]^{1/2}} \qquad (3)$$

under the hypothesis of parameter constancy, $E[S_t] = (t - k)/(T - k)$ which, by construction, goes from zero at $t = k$ to unity at $t = T$.

The significance of the departure of S from its expected value is assessed by reference to a 95% confidence interval (parallel lines).

We perform this test on equally weighted portfolios constructed from the different sub-samples. The explanatory variable is the market benchmark (S&P500 for USA, and FSE 100 for Europe) and the independent variable is the return of the portfolio. The figures plot S_t for the different announcement date against t and the pair of 5% critical lines. Any movement outside the critical lines is suggestive of parameter or variance instability. Parameters for the full sample, as well as for European companies, are stable.[11] We present therefore only the results for the US sub-samples.

Fig. 10 shows that the parameters of the market model are clearly unstable whenever the loss amount is unknown (around either the press or the recognition date). There is a structural break in the market joint assessment of company systematic risk (beta) and abnormal return (alpha) every time there is an uncertainty about the exact size of the loss. Such a finding can be analyzed together with the significant increase in conditional volatility, with the average overreaction to smaller losses, and with the sharp negative reactions to loss events reported in Fig. 2.

All these elements suggest that, particularly for US financial institutions, the penalty associated with the occurrence of an operational event whose economic impact is uncertain goes beyond the mere immediate financial penalty. The market trust towards these companies is significantly shaken, with an immediate translation

in the consensus risk estimates. This again is in line with our adverse selection interpretation of market reactions to unknown losses.

Evidence on volumes and Cusum of squares altogether suggests that market participants perceive mostly the recognition of the loss as a structural change in the firm's risk profile, generating trades and, at least for those losses that are still unknown in the US sample, a significant reassessment of the parameters of the market model.

5. Cross sectional analysis of market reactions on loss events

We study the determinants of abnormal returns through a cross-sectional regression model with several variables that are likely to influence the market reaction. The dependent variable is the abnormal return adjusted for reputation, AR(Rep) at date 0 and the different tested explanatory variables are presented below.[12]

5.1. Explanatory variables

To assess the determinants of the reputational effect of an operational loss event, we are primarily interested in firm-specific characteristics. We start with the cross-sectional analysis of firm returns proposed by Fama and French (1993). According to their analysis, firm size (proxied by the market value of the company group on the studied date, expressed in US$ billion) and its price-to-book ratio are major specific determinants of the cross-sectional variation of individual risk premia. Therefore, we can reasonably expect that the market response to a shock in the reputation of a financial firm would be related to these types of

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[11] Detailed results are available upon request.

[12] We also used the raw abnormal returns for our tests but obtained insignificant results (available upon request).

Table 9
Regressions results.

Variables												No. of obs.	R^2_{adj} (%)
C (%)	PTBV (%)	Size (%)	ROA (%)	Liabilit (%)	Empl. (%)	Delay (%)	Credit	Term	STInt	Div			
Panel A – USA sub-sample													
First press cutting													
2.52***	−0.92***	0.01	0.07	−1.94	0.01							99	4.0
−8.43**	−0.87***	0.01	0.14	0.51	−0.08		4.14**	0.45	1.02**	0.02**		99	10.4
Recognition													
2.99	−0.96	−0.02	0.89	−2.35	0.12	0.04						26	5.2
−5.33	−0.61	0.01	1.38	−1.86	−0.08	−0.27	3.56	−0.24	0.758	0.02		26	6.0
Settlement													
0.10	0.34	−0.01	0.84**	2.43*	−0.07	−0.77**						41	23.0
−4.01	0.59**	0.00	0.66**	3.08***	−0.13*	−0.71**	−0.63	0.26	0.47	0.02***		41	41.1
Panel B – European sub-sample													
First press cutting													
1.28	4.72***	−0.13**	−0.75	2.25	−0.48***							49	27.7
Recognition													
7.86	−2.72	0.09	−3.10**	−7.93	0.21	−3.99						17	72.3
Settlement													
0.98	3.09	−0.11	−4.14***	3.86	−0.18	−0.21						18	81.8

The model estimated is $AR(Rep)_{0,i} = C + \beta_1 PTBV_{0,i} + \beta_2 Size_{0,i} + \beta_3 ROA_{0,i} + \beta_4 Liabilit_{0,i} + \beta_5 Empl_{0,i} + \beta_6 Delay_{0,i} + \beta_7 Credit_{0,i} + \beta_8 Term_{0,i} + \beta_9 STInt_{0,i} + \beta_{10} Div_{0,i}$. C is the constant, $PTBV_{0,i}$ is the price-to-book ratio of firm i on the event date, $Size_{0,i}$ is the market value of firm i, on the event date, $ROA_{0,i}$ is the return on asset of firm i on the event date, $Liabilit_{0,i}$ is the level of liabilities (expressed in billions USD) of firm i on the event date, $Empl_{0,i}$ is the number of employees (expressed in 10 thousands) of firm i on the event date, $Delay_{0,i}$ is the amount of time (in years) elapsed since the first press cutting date of the event, $Credit_{0,i}$ is the difference between the Moody's Seasoned Baa Corporate Bond Yield and the Aaa one on the event date, $Term_{0,i}$ is the difference between the 10-Year and 3-Month Treasury Constant Maturity Rate on the event date, $STInt_{0,i}$ is the 1-Month Certificate of Deposit on the event date and $Div_{0,i}$ is the S&P500 dividend yield on the event date.
* Statistically significant at the 10% confidence level.
** Statistically significant at the 5% confidence level.
*** Statistically significant at the 1% confidence level.

characteristics. Another firm-specific variable is the level of liabilities (expressed in billions USD) proposed by Cummins et al. (2006).[13] We also test the ROA and the number of employees (in 10 thousands) as proven to significantly affect operational losses by the study of Chernobai et al. (2008).

The characteristics of the event itself could also help to explain the magnitude of the AR. Three variables are first selected to reflect the event: the trading volume on the event date, a classification dummy representing the type of loss, and the amount of time (in years) elapsed since the first press cutting. As only the latter variable, named DELAY, brings significant results, the other two are dropped in the subsequent analysis.

In order to check the robustness of firm-specific effects, we also introduce a set of macro-economic variables. These variables are meant to control the impact of the broad financial markets outlook on the bank-related activities on the investors' reaction to operational loss events. This is done by introducing variables related to the credit market, interest rate (level and slope) market, and stock market. By removing such market-wide influences that the financial firm is exposed to in its activities but cannot master, the resulting regression coefficients on firm-specific variables can better reflect their impact on the observed market reactions. The variables corresponding to the four market risks are the following.[14]

– **CREDIT:** This monthly variable is the difference between the Moody's Seasoned Baa Corporate Bond Yield and the Aaa one provided by the Board of Governors of the Federal Reserve System (FRED.[15]

– **STINT** is the short-term interest rate: the 1-Month Certificate of Deposit.
– **TERM**: This variable, provided by the FRED database, is the difference between the 10-Year and 3-Month Treasury Constant Maturity Rate.
– **DIV** is the S&P500 dividend yield for the US sub-sample and the FTSEurofirst 100 dividend yield for the European one.

5.2. Results

We test the global sample as well as the sub-samples Europe and USA. As the results on the global sample do not exhibit any noteworthy results, we present only the results for the sub-samples (Table 9).

Table 9, Panel A, indicates that the firm-specific characteristic that matters is the Value/Growth distinction. Large PTBV companies suffer more from the reputational consequences of an operational loss event. According to Beck et al. (2006) or Uhde and Heimeshoff (2009), crises are more likely in a market with lower concentration. Growth firms, which are more fragile companies, should thus experience a greater market impact from operational losses. Consistent with evidence previously reported, the AR is largely unaffected by firm characteristics on the recognition date. The variables suggested by Chernobai et al. (2008) are positively significant on the settlement date. Note also that the longer the time elapsed between the press and the settlement date, the lower the return on the settlement date.

Table 9, Panel B, reports very contrasting results. First, large Value company stocks are mostly affected by the event. The structure of the European financial sector (Goddard et al., 2007), with a higher degree of concentration than in the US leading to a greater degree of collusion (Goldberg and Rai, 1996; Beck et al., 2006), might explain this difference. The market participants may sanction more heavily the largest actors, because the anticipated externalities caused by an operational loss for a big player are greater in

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[13] The results do neither present the book value of equity per share nor the governance G-index proposed by Perry and de Fontnouvelle (2005) as they were never significant for any of our samples.
[14] Although suggested by Allen and Bali (2007), a variable for the business cycle has been tested but never appeared significant.
[15] http://www.federalreserve.gov/.

a more concentrated and cooperative banking system. Karpoff and Lott (1993) relate the extent of the reputational effect of a loss event to the market anticipation of a recurrence, which is made easier in a cartelized industry. The return on assets also affect negatively and significantly the reputational damage on the second and third event date: whereas more profitable firms seems to be less affected by an operational loss in US, there are more affected in Europe.

For the US sample, the prevailing market conditions appears to influence the amount by which the financial institution suffers from the loss event, especially at the settlement date. At that moment, the market reaction to the news conveyed by the announcement largely depends on market-related factors. This can probably be explained by the fact that the situation corresponds to a point where the firm gets definitely rid of the operational issue, restoring a business-as-usual situation, and leading market forces to become important drivers of returns. Besides, when control variables are accounted for, the pure reputational loss damage, represented by the value of the intercept, largely increases.[16]

6. Conclusions

This paper examines the reputation impact on market returns of operational events affecting US and European financial institutions. To isolate the pure reputational effect of the loss event on market returns, we propose a refined measure of reputational risk, by accounting for the difference between the market value loss and the announced loss amount.

We perform an investigation on three events per operational loss suffered by a firm: first press cutting, explicit recognition by the company, and settlement dates. We also take into account the type of operational event, and, for each event date, we discriminate the losses on the basis of the investors' knowledge of the real loss amount.

We observe negative CAR around both the press and the recognition date, which is statistically significant for the press event. When different from the press or the recognition date, the CAR proves to be significantly *positive* around the settlement date. This could be explained by tax reasons: considering the possibility that firms have provisioned an excess operational loss prior to settlement, the actual knowledge of the real loss amount could allow them to announce good news to the market.

The division of our sample between the companies for which the market knew the amount of loss from those where the amount was unknown, shows that the investors overreact when they do not know about the loss size. We interpret this phenomenon as a consequence of asymmetric information on the financial market, leading to an adverse selection type of behaviour. We also report that the market reaction to operational loss announcements is significantly worse if the loss is due to fraud and that the fraud has also a negative effect on the reputation of the company.

These results concur to a very cautious interpretation of the reputational effects of operational loss events incurred by financial institutions. Controlling for the mechanical operational loss is also very important, as the resulting pure reputational effect can be significantly altered then. Our splitting procedures also emphasize that the timing of the resolution of uncertainty also matters to a very large extent, especially when one has to assess at what moment the market perceives a shift in the risk profile of the financial institution that has suffered from a large operational loss.

As a suggestion for future research, we believe that these types of results might lead to useful applications in portfolio manage-

ment. Our finding of overreaction to loss events when the loss magnitude is unknown opens up the way for the systematic exploitation of a breach in semi-strong market efficiency. There might be significant abnormal profits to be extracted from going long those financial institutions that report losses, but cannot document their magnitude. The systematic testing of these types of hypothesis in an asset management perspective is part of our ongoing research agenda.

Acknowledgments

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[16] We did not test the control variables on the European sub-sample, as there were too many variables for the number of observations.