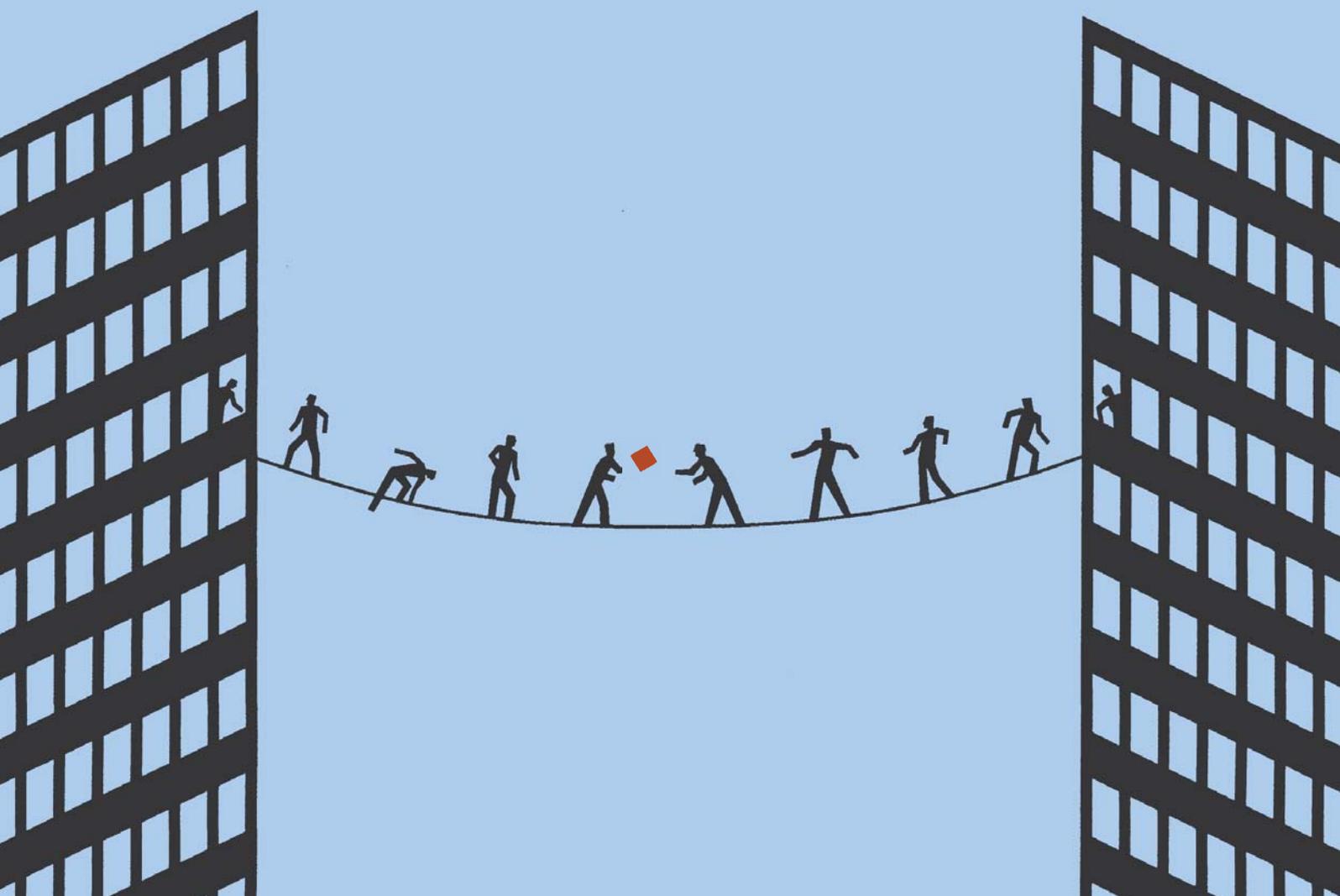


Corporate action processing: what are the risks?

Sponsored by:
The Depository Trust & Clearing Corporation

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Why corporate actions are important to the securities industry

Corporate action events are an integral feature of today's capital markets. They take place whenever changes are made to the capital structure or financial position of an issuer of a security that affect any of the securities it has issued. Rights issues, tender offers, conversions, takeovers, mergers, early redemptions and dividend payments are just a few examples.

Close to 1m corporate actions take place every year worldwide.¹ A single event may involve hundreds of different market participants (including custodians, fund managers, broker/dealers and depositories), ultimately cascading down to thousands of investors. Each of these participants faces high risk because corporate action processing is complicated, deadline-driven, not standardised, and to a large extent still manual.

In the past few years, concerns about corporate actions have been raised by, among others, the Group of Thirty, the Giovannini Group, the Committee for European Securities Regulators and the European Central Bank. These organisations have advocated bringing greater efficiency and standardisation to corporate action processes, and some industry initiatives have been launched to work towards these aims. This reflects an increasing awareness in the securities industry that corporate action processing involves significant risks, and that corporate actions are not just a 'back-office' issue but also have an impact on trading strategies in the front office, and the efficiency of capital markets more broadly.

To date, however, there has never been a systematic and quantitative analysis of the risks related to corporate action processing in the global securities marketplace. This Oxera study is a first step towards such an analysis.

What the Oxera study aims to contribute

The study, which seeks to inform the current debate on corporate actions, has been sponsored by The Depository Trust & Clearing Corporation (DTCC) to help measure the magnitude of risk to the industry as a whole. Oxera has undertaken this study independently, from a 'public-interest' perspective, and is responsible for the analysis presented. In the research process, Oxera consulted a range of data sources, referred to regulatory reports and recommendations, and conducted interviews with various brokerage, fund management and custodian firms, and other market participants.²

Part of the study—in particular, some of the risk estimates—focuses on European markets, for practical reasons. However, the participants interviewed noted that the issues surrounding corporate action risks are similar in any market, including the Americas and markets in the Asia-Pacific region, such as Japan, Hong Kong, Korea and Australia.

¹ This does not include the 3m plus scheduled fixed-rate interest payments and scheduled maturities that occur every year.

² These firms remain anonymous.

Summary of main findings: risk estimates

The study systematically reviews the risks involved in corporate action processing and derives some crude estimates of their impact on the various market participants.³

- The direct risks to any individual firm involved in the corporate action processing chain can be very significant. Failure in handling a single, complex corporate action has the potential to result in a loss running into tens of millions of euros. The risk is highest for individual custodian firms because they safeguard large amounts of assets on behalf of many different investors, but fund management firms also face risks.
- Corporate action risks are not limited to the back office. Because the dissemination of corporate action information is complicated, temporary arbitrage opportunities (and risks) arise in trading. Failure to interpret corporate action information correctly may lead to sub-optimal trading decisions by brokerage and fund management firms for clients or for proprietary positions. **The risk to firms' front offices from sub-optimal trading decisions is estimated to be in the region of €1.6 billion–€8 billion per year globally.**
- The *actual* losses due to processing failures are somewhat lower, because firms in the industry spend very large sums on failure prevention. **Available data on the European fund management industry indicates that firms in Europe incur total actual costs in the region of €65m–€140m per year. This would imply an annual cost of €300m–€700m to the fund management industry worldwide.**⁴
- **Processing failures can arise anywhere in the corporate action chain, and all market participants run the risk of failures**, due to two factors:
 - *errors in the downstream flow of information*—there is no standard way in which events are announced by issuers; there is no single securities identification system that is universally accepted; different information sources are often inconsistent; and processing details and terminology are often specific to a particular market or financial instrument. The result is that accurate information on corporate actions is difficult to obtain. Moreover, since each party in the chain is responsible for getting the information right, considerable resources are spent on various, often duplicative, external data sources and internal data 'scrubbing' efforts;
 - *errors in the upstream flow of instructions*—the sheer number of different financial intermediaries (custodians, fund managers, broker/dealers, and depositories) involved in any one event requires that many instructions be delivered for each corporate action. This complex chain of communications (with most instructions delivered via phone, fax, telex or unformatted email, and processed manually) can cause a domino effect of potential error and loss if information is misinterpreted or mishandled. The more intermediaries in the chain, the tighter the deadline for the ultimate decision-maker, since each intermediary sets its own deadline to allow sufficient time to handle the instruction—this, too, increases the scope for failure.

³ These estimates should be interpreted with care, as they are based on many extrapolations that can only be verified by additional research. Historical data on the costs of corporate action failures incurred by firms is not readily available in the public domain. On the contrary, firms involved in corporate actions usually treat this kind of information as extremely sensitive. This inevitably limits the extent to which this study, and indeed any other study, can accurately quantify the costs of corporate actions.

⁴ Any extrapolation of the European data to the global market is necessarily imprecise.

- Compared with the above risks, the other types of cost discussed in the study—the **direct costs of late payment** of mandatory corporate actions, and the **costs of failure to exercise shareholder rights**—are smaller. These costs **cannot be ignored**, however, because they have the potential to have a significant impact on individual investors and firms, and to affect the efficiency of capital markets overall.

Conclusion and next steps

Oxera greatly appreciates the cooperation of the firms that agreed to be interviewed for this study, and acknowledges DTCC for its sponsorship. We welcome any views and comments on the issues raised in this study.⁵

Based on the study's findings, and given the increased focus on operational risk management in the industry worldwide, it is important to raise awareness in the securities industry that corporate actions do involve significant potential risks and costs, affecting the front office as well as the back office.

Because of limited data availability, our estimations of the orders of magnitude of risk involved are only indicative. A further in-depth research effort, with the cooperation and participation of a greater number of market participants across a more geographically diverse area, might determine with even greater clarity the level of risks and costs related to corporate actions globally. Indeed, during our interviews, several firms expressed interest in such a comprehensive study.

⁵ Please contact the Oxera team at financial_services@oxera.co.uk.

Oxera

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1.0 Introduction: objectives of the research

Corporate action events are an integral feature of today's capital markets. They take place whenever changes are made to the capital structure or financial position of an issuer of a security that affect any of the securities it has issued. The processing of corporate actions involves a range of market participants—from the issuer, to intermediaries, such as custodians, fund managers and brokers, and to the final investor who is the beneficiary of the security in question. Each of these participants risks being affected by failures in corporate action processing. The fact that the process is complicated, to a large extent still manual, and involves a chain of intermediaries, means that the risk of such failures is high.

Corporate actions fall into the category of activities often referred to as 'post-trade processing' or 'asset servicing', together with the clearing and settlement of securities trades. The risks and inefficiencies involved in clearing and settlement have received much attention in recent years from various industry groups and government institutions. This has generated various studies with policy recommendations, such as the Group of Thirty (G30) report (January 2003);⁶ the second Giovannini report (April 2003);⁷ and the consultation paper issued jointly by the Committee for European Securities Regulators (CESR) and the European Central Bank (ECB), in July 2003.⁸

While these reports focus primarily on clearing and settlement, they are also of direct relevance to corporate action processing, since both activities largely use the same communications and back-office infrastructure. Indeed:

- one of the recommendations in the G30 report was to automate and standardise asset-servicing processes, including corporate actions. The report acknowledges the importance of the availability of accurate and timely information for market participants, and emphasises the role of a fully automated communication flow through the value chain in achieving this end;
- likewise, the Giovannini report stated that there are significant national differences in the rules and practices governing corporate actions within the EU. These differences may act as a barrier to efficient cross-border securities transactions. Efforts to improve consistency in the national rules governing corporate actions are therefore essential if the integration of EU equity markets is to proceed.

At present, various industry initiatives have been set in motion to achieve greater harmonisation and standardisation of corporate action processes. One example is the dedicated working group set up by the European Central Securities Depositories Association (ECSDA).⁹ On the other side of the Atlantic, similar efforts have been launched by both US and Canadian market bodies. The US Securities Industry Association (SIA) and the Canadian Capital Market Association (CCMA) have formed working groups to investigate the obstacles for increased automation, and the possibility of moving into t+1 corporate action processing.¹⁰ Several market participants have been developing business solutions to improve corporate action processing (focusing on automation and efficient information processing). In the UK, a recent report by Paul Myners contained in-depth analysis and

⁶ G30 (2003), 'Global Clearing and Settlement: A Plan of Action', January.

⁷ Giovannini Group (2003), 'Second Report on EU Clearing and Settlement Arrangements', April.

⁸ CESR and ECB (2003), 'Standards for Securities Clearing and Settlement Systems in the European Union', consultative report, July.

⁹ ECSDA (2002), 'Report of Working Group 5 on Cross-border Corporate Action and Events Processing', November.

¹⁰ SIA t+1 Corporate Actions Subcommittee (2001), 'White Paper', August; CCMA (2002), 'Corporate Actions and Other Entitlements', White Paper, October.

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policy recommendations on one specific type of corporate action, namely shareholder voting.¹¹

All these initiatives seem to reflect an increasing awareness in the industry that corporate action processing involves significant risks, and that this is not just a 'back-office' issue but also affects trading strategies in the front office, and has an impact on the efficiency of capital markets more broadly. This coincides with the greater economic uncertainty over the past few years, which has led many firms to evaluate risks more carefully and scrutinise costs more closely.

What is still missing, however, is a systematic and quantitative analysis of the risks involved in corporate action processing for the different types of market participant involved. This Oxera study represents a first step towards such an analysis. The study is mainly concerned with processing *failures*, rather than the costs and inefficiencies of the current corporate action processes as a whole (although these are all closely related—for example, any expenditure by firms on automation of corporate action processing may also reduce the risk of corporate action failures). The aim of this study is to inform the current debate on corporate actions, and to assist in raising awareness in the industry about the magnitude of the risks involved in corporate action processing.

The study has been sponsored by The Depository Trust & Clearing Corporation (DTCC). However, it has been undertaken independently and addresses the issue of risks in corporate actions from a 'public-interest' perspective. Hence, it provides an objective assessment of the risks to the various market participants and to the financial system as a whole. In the research process, Oxera has consulted a range of data sources and has held discussions with various brokerage, fund management, custodian and other firms.¹²

Historical data on the costs incurred by firms as a result of corporate action failures is not readily available in the public domain. On the contrary, firms involved in corporate actions usually treat this kind of information as extremely sensitive. This inevitably limits the extent to which this study, and indeed any other study, can accurately quantify the costs of corporate actions. However, for this study Oxera has been able to rely on:

- a series of interviews with firms in the UK and the USA, some of which helpfully provided Oxera with some (anecdotal) data on corporate action failures;
- a previous survey undertaken by Oxera among fund managers across the EU, which provided information on the costs of corporate action failures.

While far from representative, these data sources, together with the systematic assessment of how and where corporate action failures typically arise, are sufficient to allow the calculation of some very rough orders of magnitude of the risks involved.

Part of the study—in particular, some of the estimations of the risks—focuses on European markets, for practical reasons. However, it is Oxera's understanding that the issues surrounding corporate action risks are similar in any market. In this respect, according to common industry perceptions, the corporate action situation in Europe is probably somewhat more problematic than in the USA—in part, because of the fragmented nature of European markets—but overall less problematic than in markets in the Asia-Pacific region, such as Japan, Korea, Hong Kong and Australia.

¹¹ Myners, P. (2004), 'Review of the Impediments to Voting UK Shares', report to the Shareholder Voting Work Group, January.

¹² These firms remain anonymous. Oxera greatly appreciates their cooperation.

1.0 Introduction: objectives of the research

This study is structured as follows:

- section 2 presents a generic overview of corporate actions and the types of market participant involved in the process. It also contains some data illustrating the significance of corporate actions globally;
- section 3 provides a systematic description of the types of risk and cost involved in corporate action processing;
- sections 4 to 7 present some crude estimates of the orders of magnitude of the most important types of risk—in particular:
 - the direct risk of failure in the processing of corporate actions (section 4 quantifies the risks faced by all market participants; and section 5 presents some historical data on costs incurred by fund managers in particular);
 - the direct costs of late payments (section 6); and
 - the risk of sub-optimal trading decisions arising from corporate action information failures (section 7).

2.0 Types of corporate action and market participants involved

2.1 Types of corporate action

There is a wide range of corporate actions and various ways to categorise them. One relevant classification distinguishes between:

- *compulsory (or mandatory) actions*, such as cash dividend and interest payments, where no action is required by the investor or its intermediaries;
- *compulsory actions with options*, such as scrip dividends, where the shareholders are given the option to receive dividends in the form of further units of the security rather than in cash;
- *voluntary (or optional) actions*, such as subscriptions and takeovers, where a decision is required by the investor or its agents.¹³

A full overview of all types of corporate action is beyond the scope of this study, but some of the more common events are as follows.¹⁴

- *Dividend payment*—one of the most basic passive actions is the dividend payment to equity-holders in a firm. However, even this action is not as straightforward as might be assumed, since there may be the option to reinvest dividends in shares, which requires investor approval (called ‘scrip dividends’ in Europe). If this option is passed up by default (for example, through an oversight), this may be costly—for example, if there is a substantial positive adjustment to the share price afterwards.
- *Interest payment*—an income payment for fixed-income securities analogous to dividends. Once again, this is a compulsory action, although, compared with dividend payments, the issue of reinvestment is less important.
- *Redemption*—this relates to the repayment of fixed-income securities, which is a mandatory corporate action (although optional redemptions also exist). Redemptions at maturity are repayments in full, in accordance with the terms and conditions of the issue. Partial redemptions can occur before the final maturity date, and may involve fixed or different amounts. They commonly involve a lottery in which the issuer draws a proportion of the outstanding interest-bearing securities that are to be redeemed.
- *Rights issue*—this is an optional action, to the extent that investors must choose whether to take up their rights to the new shares, usually at a discount.¹⁵ This also forms a corporate action with a deadline, and, as such, a failure with regard to rights issues could be particularly damaging.
- *Takeover*—this is clearly an optional corporate action, in that investors have to choose whether to sell their shareholding to the potential acquirer of the company. Once again, there is usually a deadline upon which the option to act expires. As such, failure to act for some reason (oversight or a processing failure) can again be costly, since it may imply forgoing opportunities for earnings enhancement. In addition, in a merger or takeover, shareholders may be offered cash or shares in the new entity; failure to

¹³ The distinction between the second and third categories may be blurred in practice. The principal characteristic of both is that some kind of decision is required from the investor.

¹⁴ For a more detailed description of the range of corporate action, see ECSDA (2002), *op. cit.*

¹⁵ In some countries, rights issues have a stronger mandatory component, in that the holders of the rights may receive a cash premium when the rights lapse, thus limiting the potential risk.

2.0 Types of corporate action and market participants involved

exercise such an option may be costly to the shareholder due to subsequent share-price movements.

Takeovers can be particularly complex events, since offers may be revised at various points in time, thereby significantly altering the event, or even creating a new event. Moreover, other bidders ('white knights') may come into play as well, creating yet another event.

- *Conversion*—convertible bonds may, on occasion, have conditions attached as to when they may be converted. The corporate event in this case would be to inform the owners of the bonds of the time window for conversion, in order to allow them to make an informed decision on whether to convert.
- *Proxy voting*—investors appoint 'proxies' and submit voting instructions (usually at the annual general meeting, but sometimes on other special occasions), thereby exercising the voting rights that accompany the shares.

2.2 Data on corporate actions worldwide

Corporate actions of some kind have an impact on virtually all securities at some point during their existence. Furthermore, the majority of these shares require custody services. Therefore, to gain a deeper understanding of the orders of magnitude involved in corporate action processing, it is informative to review briefly the scale of the global custody services and the volume of corporate actions being processed. It is also of interest to highlight the proportion of cross-border assets that custodians hold—ie, securities owned by investors located in countries other than the domicile of the issuing firm. Given the more complicated procedures involved in processing corporate actions across two or more financial and legal systems, cross-border holdings are likely to carry an additional element of risk.

In 2003, the value of the assets under custody of the 41 largest global custodians was around €46,000 billion (see Table 2.1). Market leader, State Street, provided custody services for assets valued at €7,900 billion. All ten firms held worldwide assets close to, or exceeding, €1,000 billion. This highlights the massive scale of the custodian business, and the size of funds that are affected by corporate actions.

As would be expected, for the European firms in the top ten, the proportion of assets that represents cross-border holdings tends to be higher than for the US firms (with the exception of Citibank). This indicates that the corporate action processes affecting European custodians are likely to be more complex, and therefore also have higher risks.

2.0 Types of corporate action and market participants involved

Table 2.1: Assets under custody for the ten largest global custodians, 2003

Company	Total assets under custody (€ billion)	Cross-border assets under custody (€ billion)	Cross-border assets as proportion of total (%)
State Street	7,857	2,040	26
Bank of New York	6,938	1,923	28
JP Morgan	5,933	1,867	31
Citibank N.A.	5,334	3,553	67
Mellon Group	2,926	619	21
UBS AG	1,969	n/a	n/a
Northern Trust	1,839	628	34
BNP Paribas Securities Services	1,811	1,417	78
HSBC Global Investor Services	1,096	561	51
Société Générale	996	568	57
Other	9,115	n/a	n/a
Total market (41 global custodians)	45,813	n/a	n/a

Notes: Worldwide custody assets are divided between domestic assets—those held by investors in the home country of the issuer—and cross-border, or global, assets that are held by investors in the rest of the world. The figures were reported in US dollars, and have been converted to euros using the average 2003 exchange rate (€1 = \$1.20). The exchange-rate information was taken from Thomson Datastream.

Source: www.globalcustody.net.

Tables 2.2 and 2.3 provide some insights into the number of corporate actions taking place each year across the world, with a breakdown by region and by type of corporate action. The data, provided by DTCC, covers the period from March 2003 to March 2004.

Table 2.2: Number of corporate actions taking place globally, March 2003–March 2004

	Number of corporate actions	% of global total
North America	624,700	66.8
Europe	203,600	21.8
Asia-Pacific	62,000	6.6
Other	44,900	4.8
World total	935,200	100

Note: Figures do not include the 3m plus scheduled fixed-rate interest payments and scheduled maturities that occur every year.

Source: DTCC.

Table 2.2 shows that, in this period, the total number of corporate actions taking place globally was around 935,000. North America (mainly the USA) accounts for two-thirds of all corporate actions, followed by Europe (around 22%) and the Asia-Pacific region (6–7%).¹⁶ These figures do not include the 3m plus scheduled fixed-rate interest payments and scheduled maturities that occur every year.

Table 2.3 shows the breakdown by type of corporate action. Since the terminology and definitions used to describe corporate actions often differ across countries, the figures should be interpreted with some care. Nonetheless, the table gives some idea of the orders of magnitude involved.

¹⁶ North America includes all of the Caribbean islands and Central American states, although the numbers are largely driven by the USA, and, to a lesser extent, by Canada, Bermuda and the Cayman Islands. Asia-Pacific comprises Australia, China, Hong Kong, Indonesia, Japan, South Korea, Malaysia, New Zealand, the Philippines, Singapore, Thailand and Vietnam.

2.0 Types of corporate action and market participants involved

Table 2.3: Most common types of corporate action (% of total)

Type of corporate action	Worldwide	North America	Europe	Asia-Pacific
Cash dividend	26.9	27.7	23.0	33.1
Income distribution	16.4	23.8	2.6	0.0
Partial call redemption	14.6	17.7	12.6	0.1
Full call	12.5	18.1	1.7	0.3
Meeting	7.1	0.6	18.7	18.4
Dividend omitted	2.7	0.8	3.5	18.7
Return of capital	2.0	1.6	3.7	0.5
Name change	1.8	0.8	5.2	1.3
Other	16.0	8.9	29.0	27.6
All corporate actions	100.0	100.0	100.0	100.0

Note: Figures refer to March 2003–March 2004. Definitions of corporate action types tend to differ across countries.

Source: DTCC.

It can be seen that dividend payments and income distributions are the most common types of corporate action worldwide (and in the three main financial regions, with the exception of income distribution in the Asia-Pacific region). All the other corporate actions in the top eight are of the mandatory type, which, by their nature, are relatively straightforward, as described above.

Voluntary corporate actions (or mandatory actions with options)—which are more complex and hence involve greater risk (see section 3)—represent only about 10–15% of all corporate actions taking place. Nevertheless, globally, this translates into approximately 90,000–140,000 of such complex actions each year.

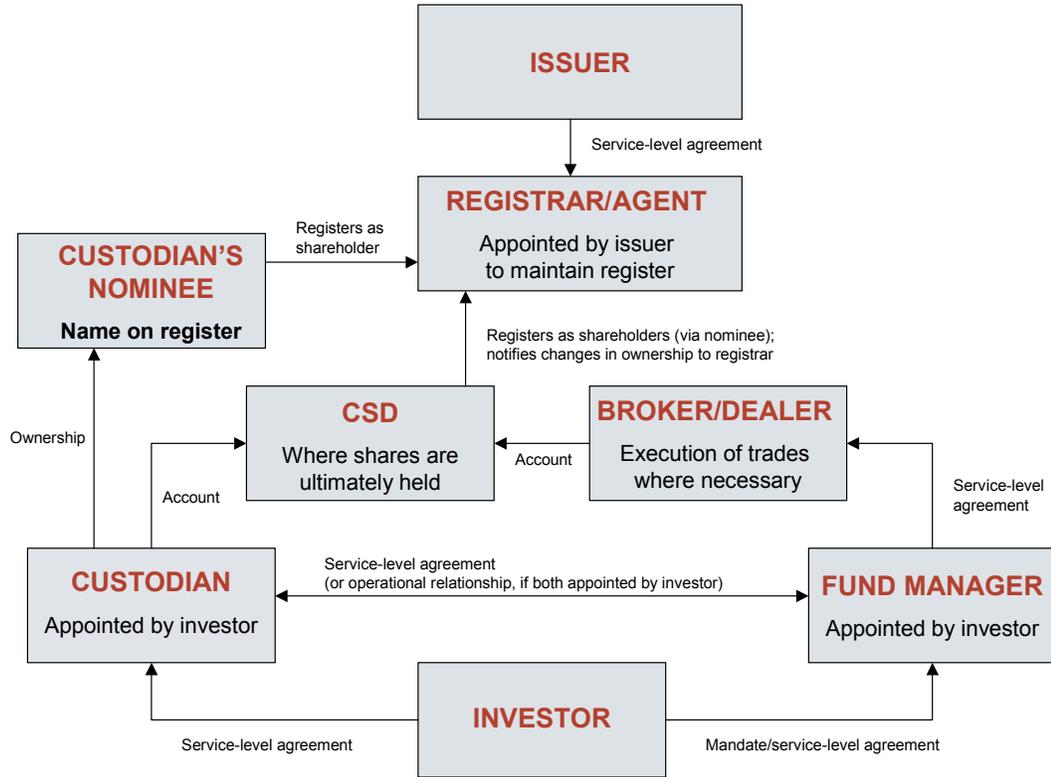
2.3 Market participants involved in the corporate action chain

Any corporate action involves a range of intermediaries that operate between the issuer and the final investor. The corporate action chain is highly complex, probably because of the way in which it has been formed over time in response to market and institutional challenges.

Figure 2.1 presents a highly stylised illustration of the various *participants* in the corporate action chain. Figure 2.2 shows the typical corporate action *information and instruction flows* between these participants. These illustrations are largely based on the UK model, although the structure in other markets is not dissimilar in terms of the level of complexity and types of intermediary involved. Furthermore, the illustrations represent a ‘domestic’ corporate action chain. If the corporate action involves cross-border security holdings, the number of intermediaries, and hence level of complexity, is even greater. In particular, cross-border holdings may involve a larger number of custodians (or ‘sub-custodians’) in the chain.

2.0 Types of corporate action and market participants involved

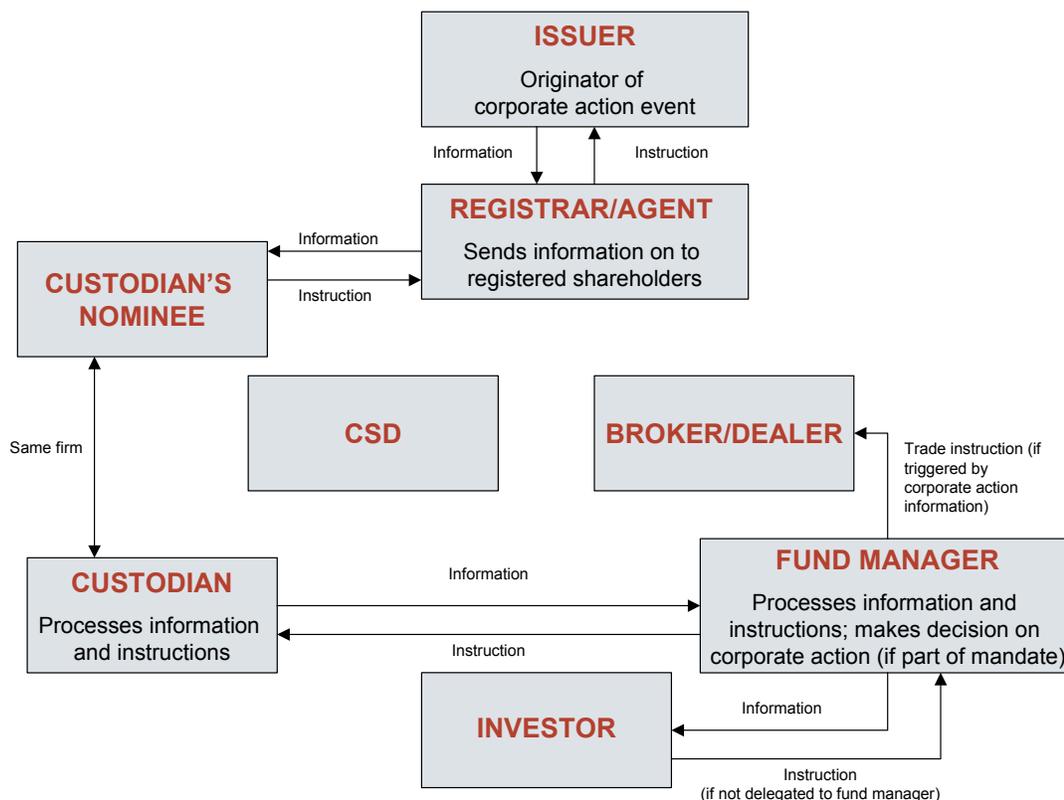
Figure 2.1: Stylised illustration of the participants in the corporate action chain (based on the UK model)



Note: Arrows in figure show the contractual/business relationships between the participants. The corporate action information and instruction flows between the participants are shown in Figure 2.2.

2.0 Types of corporate action and market participants involved

Figure 2.2: Stylised illustration of the main information and instruction flows between participants in the corporate action chain



The following market participants are usually involved in the corporate action chain.

- *Issuer*—by definition, the issuer is where the corporate action originates.¹⁷ Company law usually requires the issuer to announce the corporate action publicly. In practice, this information dissemination normally involves two channels:
 - contacting the registered shareholders directly—the issuer knows who these registered shareholders are through the appointed registrar/agent or the central securities depository (CSD), depending on the country concerned (see below);¹⁸
 - by making a public statement, either through a press release, or, as is usual for UK-listed shares, in the form of a Stock Situation Notice (a service offered by the London Stock Exchange). This information is then typically dispersed to interested parties through data vendors and other media.
- *Registrar/agent/CSD*—in the UK, issuers generally appoint a registrar to maintain the register of shareholders. Changes in ownership are notified to the registrar by the CSD (CREST in the UK) after settlement. In the USA, registrars are referred to as ‘agents’,

¹⁷ Takeover events are an exception to this rule, since they are originated by the potential acquirer.

¹⁸ One exception is bearer bonds, for which the holders are not registered.

2.0 Types of corporate action and market participants involved

and the DTC (the CSD part of DTCC) is registered as one of the shareholders with the agent (and for some debt securities, as the only shareholder), and thus forms an important link in the chain from issuers to investors. In other jurisdictions, the structure is similar.

- *Custodian*—institutional investors usually appoint a custodian bank to safeguard their securities holdings. The service-level agreement between investors and custodians typically covers administrative tasks such as settlement of trades and processing of corporate actions.¹⁹ Custodians, in turn, have an account at the CSD, where securities are ultimately held. For cross-border securities holdings, the chain may involve multiple custodians—in many non-domestic markets, custodians engage local ‘sub-custodians’, who, in turn, have an account in the domestic CSD.

Custodians are registered at the registrar/agent or CSD as the owner of the security on behalf of investors. In compliance with asset segregation rules, this is usually done through nominee companies owned by the custodian. These can be either client-specific nominee names or, more commonly, ‘omnibus’ nominee names that pool together the holdings of multiple investors under one registered name. Consequently, most issuers will only have information on the custodian nominees who are registered as their shareholders; they cannot observe directly through the registrar/agent who the ultimate beneficiary investor is.

Corporate action notices from the issuer are passed on by custodians to the next intermediary in the chain, either the next custodian or the fund manager (see below). For voluntary corporate actions and mandatory actions with options, the custodian who is registered as shareholder is responsible for responding to the corporate action in accordance with the instructions received from the previous custodian or fund manager in the chain.

- *Fund manager*—fund managers are appointed by the investor to manage the investment portfolio. Through its mandate, the manager is given discretion to take investment and trading decisions.²⁰ This often covers income collection and decisions in relation to corporate actions. Thus, decisions relating to scrip dividends, rights issues and proxy voting are often taken by the fund manager on behalf of the investor, rather than by the investors themselves.

Fund managers therefore have an important operational relationship with custodians. This is not always in the form of a service-level agreement, since they are often both appointed separately by the investor. From the custodian’s perspective, it is the fund manager (rather than the investors themselves) to whom they have to pass on the corporate action information, and from whom they receive instructions on how to respond.

- *Broker/dealer*—broker/dealers may form part of the corporate action chain if the action involves the buying and selling of shares. They also have to process corporate actions for their own proprietary positions (in which case their position in the chain is similar to that of an end investor).

¹⁹ Some larger institutional investors may also have accounts in CSDs directly, thus partly bypassing custodians. Hedge funds often outsource custodian services to brokerage firms (their ‘prime’ broker), rather than to custodian firms.

²⁰ The degree of discretion given to managers varies widely in practice.

2.0 Types of corporate action and market participants involved

Importantly, however, brokers may also become involved when the corporate action (or its initial announcement) triggers trading activity in the security concerned. It is common practice for fund managers and brokers themselves to make trading decisions based on the corporate action announcement, either on behalf of their clients or on a proprietary basis. Fund managers usually engage brokers to perform their trade execution needs.

- *Investor*—finally, institutional investors usually appoint both a fund manager (or various fund managers) to manage their funds and a custodian to safeguard their assets.²¹ Through the corresponding service-level agreements, investors normally delegate much of the responsibility for dealing with corporate actions to the fund managers and custodians, as explained above. The larger institutional investors may keep the decision-making responsibilities with respect to some securities to themselves (or indeed perform the fund management task in-house).

The stylised corporate action chain illustrated in Figures 2.1 and 2.2 depicts various flows of information, instructions and cash/stocks. For mandatory corporate actions, there is only a flow of information and of cash/stocks down the chain, from issuer to investor. For mandatory actions with options and for voluntary actions, there is an additional, subsequent flow of information and instructions upstream, from investor to issuer.

In addition to the complexity of the process itself, there is significant variation in the methods by which corporate action information flows along the chain. There is no current standard for corporate action communiqués—although, with the development of ISO 15022, there is the potential for more standardised forms of communication between parties. A large proportion of the current corporate action notices and instructions arrive in the form of faxes and unformatted emails, which require manual processing. The information on the corporate actions themselves usually reaches investors and their intermediaries through various channels (typically via data vendors and intermediaries immediately above them in the chain); and inconsistencies between these sources need to be cross-checked (a process known as ‘scrubbing’ of information). Many intermediary firms have large dedicated corporate action teams (sometimes with up to 20–40 staff) in charge of these manual operations.

²¹ Retail investors and smaller institutional funds will often delegate these tasks to only one intermediary (for example, a retail broker or a retail fund manager), who in turn has arrangements with custodians.

3.0 Types of risk in corporate action processing

The processes of dealing with corporate actions give rise to operational risks which, if something does go wrong, may lead to various types of cost, affecting different market participants. Below, a broad distinction is drawn between four types of risk/cost. Some of these costs are not necessarily linked directly to corporate action failures as such, but follow more generally from the inefficiencies in the corporate action chain, as described in section 2:

- direct risk of failure in the processing of a voluntary corporate action (or mandatory corporate action with options);
- direct costs of late payment of mandatory corporate actions;
- risk of sub-optimal trading decisions by the front office, arising from corporate action information failures; and
- indirect costs of failure to exercise shareholder rights, which may have an impact on the effectiveness of corporate governance.

Each of these is discussed below.

3.1 Direct risk of processing failures

This is the most common type of risk involved in corporate action processing. It is of relevance to voluntary corporate actions and mandatory actions with options. Processing failures can, in principle, arise anywhere in the chain illustrated in Figures 2.1 and 2.2, and this risk therefore affects all market participants involved in the chain. Failures can be due to either:

- an error in the flow of information downstream (from issuer to investor); or
- an error in the return flow of instructions upstream (from investor to issuer).

Both raise separate issues, as examined below.

3.1.1 Failures in the information flow down the chain

Custodians will receive the information on the corporate action from the CSD or registrar if they are registered as the (nominee) owner of the security, or from a sub-custodian if they are not directly registered as owner. Fund managers typically receive the information both from data vendors and from the custodians who safeguard the securities in question. For any single security, a fund manager may receive notices from several different custodian firms if that same security happens to be managed on behalf of different clients who each have appointed different custodians for the safekeeping function.

Obtaining accurate information on corporate actions is difficult for various reasons²²—there is no standard way in which the events are announced by issuers; there is no single securities identification system that is universally accepted; and the processing details and terminology are often highly specific to the particular market or financial instrument.²³ The precise details of an event may be altered at some stage in the process (eg, if a takeover bid is modified, as mentioned in section 2). In addition, corporate actions are themselves multi-dimensional, so the total number of possible corporate actions is very high. This makes standardisation to enable automatic information processing fundamentally complex and difficult. It is therefore not surprising that the different information sources used by firms in the chain may be inconsistent and not standardised.

²² See, also, DTCC (2003), 'Transforming Corporate Action Processing', White Paper, June, available at www.dtcc.com.

²³ For example, what is described in the UK as a one-for-one share distribution, whereby holders of a security receive one new share for each share held, is known as a 'two-for-one' stock distribution in the USA.

3.0 Types of risk in corporate action processing

In addition to the information on the corporate action itself, there can be inaccuracies in the information that custodians send to the next participant in the chain (whether another custodian or a fund manager)—ie, information on the implication of the corporate action for the stock position of that next participant. This is because the custodian may not always have fully up-to-date information on the exact stock position of that next participant because, for example:

- the next participant has just engaged in trading or stock-lending activity that has not been fully settled or notified to the custodian (in which case, the custodian is not responsible; the delay in settlement is simply an inefficiency in the system); or
- the custodian has not fully updated the positions of the different clients in its omnibus accounts for the particular security (which may reflect some inefficiency on the part of the custodian).

Current custom and practice mean that responsibility for failures in the information flow usually cannot be passed on to the direct source of the information. Typically, the contractual relationships between links in the chain require the party providing the information to make best efforts, but the accuracy of the information passed on is not guaranteed. Third-party data vendors are normally exempt from liability for providing inaccurate information. Registrars/agents, CSDs and custodians also do not normally accept liability for inaccuracies because they simply pass on the information as they receive it.²⁴

Thus, ultimately, each party in the chain is responsible for getting the information right. This is why the industry spends considerable resources on various, often duplicative, external data sources and on internal data ‘scrubbing’ efforts. These resources represent an inefficiency in the system. For the purpose of this study, they are not considered as costs of corporate action risks as such, even though they may be substantial.

In addition, the need to interpret, and act upon, corporate action information may lead to *reputational* risks to intermediaries. Firms that set themselves up as being fully informed run a strong reputational risk if they get it wrong and subsequently have to compensate their clients. The costs attached to this risk are difficult to quantify, but, because of the potentially high visibility of errors, the reputational risk may well be greater than the economic importance of the specific corporate action where the mistake was made.

3.1.3 Failures in the instruction flow up the chain

Failures can also arise in the instruction flow back up the chain, either between parties at different layers of the chain, or within a firm in the chain. For example, a certain instruction from a fund manager to a custodian may not be processed accurately, or may reach the custodian after the set deadline. Likewise, the portfolio manager within the fund management firm may not notify its decision to the corporate action team in its own back office in time.

There is ample scope for such failures to arise somewhere in the chain at some point in time, for various reasons:

- the sheer number of different custodians, fund managers and investors involved in any corporate action means that there is necessarily a large number of instructions for each action;

²⁴ There may be exceptions where local sub-custodians in some countries do accept some liability for passing on inaccurate information on corporate actions to the global custodians.

3.0 Types of risk in corporate action processing

- the fact that most instructions are sent via fax, telex or unformatted email, and processed manually, means that any of these instructions has some potential for misinterpretation or mishandling;
- the more intermediaries in the chain, the tighter the deadline for the ultimate decision-maker, since each intermediary will set its own deadline to allow sufficient time to handle processing and communicate the instruction;
- fund manager decisions are sometimes changed before the deadline, and the custodian will receive a second instruction in relation to the same client, which further complicates the process. Fund manager decisions may also be left until very close to the deadline because some trading activity is undertaken in response to the announcement;
- the method by which a specific corporate action is finally acted on is not itself standardised (at least not in an electronic form). This reflects the diversity of possible actions involved and the existing restrictions applied to issuers/registrars in what constitutes a decision on which they have to act. Often, a physical paper form supplied by the registrar must be returned correctly completed and officially stamped.

In practice, the liability (and hence costs) for these processing failures is usually borne by the market participants where the failure arises. This participant will usually have to incur the cost of compensating the client for the losses incurred, or the cost of re-establishing the position in which the client would have been, had the instruction been processed correctly. For example, if, for a scrip dividend, the investor (or its portfolio manager) opts for cash, but due to an error by the fund manager or the custodian, the investor ends up with the extra shares, the cost by the party responsible for the error would basically be the loss incurred when selling the stock for cash after the event, potentially at a lower price.²⁵

In some cases, the liability or responsibility for the mistake may be less clear-cut—for example, where the fund manager altered its original instruction to the custodian just before the deadline. In most cases, some form of settlement is reached between the parties involved. To Oxera's knowledge, legal disputes in this field are not very common.

The above-described direct risks of failure are to some extent 'zero-sum'—ie, the loss to one investor (or intermediary) of being in the wrong position (eg, receiving shares instead of cash for a scrip dividend) may be a gain for another investor or intermediary. However, the upside will have often been spread across a large number of market participants which each made a very small (and possibly unobservable) gain, while the downside falls upon one or a few participants and is therefore much more visible. In addition, there is a net cost to the financial system as a whole; namely, the additional transaction costs incurred in correcting the failure, which, from an economics perspective, is an inefficiently incurred cost. In other words, corporate action failures make the overall financial system less efficient.

Estimates of the direct risk of processing failures are provided in section 4. Data on the historical costs of failures incurred by European fund management firms is presented in section 5.

²⁵ In this example, there is only a cost to the investor if the share price is actually *lower* after the event. If the share price turns out to be higher, the client is better off because of the mistake, and no compensating action may need to be taken.

3.0 Types of risk in corporate action processing

3.2 Direct cost of late payments

Mandatory corporate actions without options, such as dividend and interest payments, are straightforward, in that they only require a transfer of money from the bank account of the issuer to the bank account of the investor who is the ultimate beneficiary. In many domestic systems, such payments are normally made on the due (pay) date without much delay. For example, in the UK and the USA, CREST and DTC credit the accounts of the registered holders of the security in question on the due (payable) date. Most custodians who are registered as holders also tend to credit their clients' (or their clients' fund managers') accounts immediately.

For income from cross-border security holdings, however, the process may operate less smoothly, and a (potentially very long) delay may occur between the due date and the time at which the cash reaches the beneficiary's account. While the entitlement to a dividend payment does not disappear, the delay causes costs of interest forgone (there may also be currency costs). This is usually a zero-sum loss, since the interest forgone by one party will be gained by another party somewhere further up in the chain.

In addition to interest costs, such delays might also cause cash-flow problems for smaller investors. Intermediaries tend not to be affected by late payments, since they usually do not pay their clients until they receive the money. However, intermediaries may also face cash-flow problems if the delays in payment are not anticipated (eg, a security that always pays income within a certain timeframe is unexpectedly delayed), and if, in the meantime, they have taken a certain short-term cash position (eg, in a stock-borrowing operation).

It is Oxera's understanding that, where the amount of interest forgone is reasonably high (above, for example, €1,000), fund managers would often seek to claim compensation for the delay from the custodian (who might do the same from the local custodian in the country in question). However, for smaller amounts this tends not to happen because of the relatively high administrative costs of a compensation claim.

Some estimates of the direct costs of late payments are given in section 6.

3.3 Risk of sub-optimal trading decisions by the front office

The information content of a corporate action announcement often represents new information about a specific company, and therefore its market value. The assimilation of this information by investors (or their agents) and other market intermediaries may lead to a change in the valuation of the company or the current share price (or bond price), or both. In addition, the corporate action itself may set up a future date at which the price of the shares (or bonds) will change in a predictable way (for example, when a share goes ex-dividend), or in a less predictable way (eg, a close vote on a takeover).

Thus, corporate actions create (temporary) arbitrage opportunities for both brokerage and fund management firms trading either on behalf of their investors or on their own (proprietary) account. In this respect, trading desks within brokerage and fund management firms treat corporate action information as any other information of relevance to trading decisions.

In practice, trading desks tend not to rely on the corporate action information chain, as depicted in Figures 2.1 and 2.2. This chain is simply too slow in many cases. Rather, information on corporate actions first tends to come through the initial notice of the corporate

3.0 Types of risk in corporate action processing

action in question, possibly in the form of 'rumours', which does not yet contain the precise details on the action. This is the information acted upon by the trading desk in the first instance. Only at a later stage (often a few days later) does the more formal and detailed notice of the action come through, which is relied on by the back office to process the action.

It follows that a failure to understand correctly the corporate action can result in a misvaluation of the security by an investor or an intermediary trading on its own account. As a result, the investor may make trading decisions based on misinformation. Two types of risk are likely to flow from this type of trading: transaction cost risk and market movement risk.

Estimates of these risks are presented in section 7.

3.4 Indirect cost of ineffective corporate governance

Shareholder proxy voting is another example of a corporate action process, albeit slightly different in nature from the more traditional corporate actions. Although the process does not have an explicit financial element, the actual procedure for collecting the votes from the investors is parallel to that used for other corporate actions. In other words, although the nature of the action is different, the processing chain is very similar.

The UK shareholder voting processes have recently been reviewed by the Shareholder Voting Working Group.²⁶ The conclusion arising from the report confirmed anecdotal evidence, that the voting process seems to fail with reasonable regularity. This is an interesting observation given the evidence that traditional corporate actions using very similar processes tend to fail far less often. In other words, the corporate action chain seems to be far better at processing corporate actions that have a distinct monetary value, and therefore liability, attached to them.

Efficient voting procedures are valuable to companies, although the nature of the activity makes it very difficult to quantify the costs from lost votes. As a general rule, voting can be assumed to improve corporate governance—ineffective shareholder voting may enable managers to reap private benefits from the company, resulting in a loss to the shareholders. Therefore, to the extent that good corporate governance has a beneficial impact on the company, improved voting procedures will benefit the shareholders. Substantial literature exists on the benefits of good corporate governance; for example, in a recent study, Gompers et al. (2003) document that between 1991 and 1999 the shares of those companies with the highest corporate governance standards produced on average 8.5% higher returns per annum on a risk-adjusted basis, compared with companies with the lowest governance standards.²⁷

While voting procedures represented only a very small fraction of the total corporate governance index used in the analysis, the result nevertheless highlights that voting might have an important impact on a company's long-run performance, by inducing improved corporate governance.

Another approach taken in the academic literature is to estimate directly the value of a corporate vote for an investor. This approach has used share-price information from dual-

²⁶ Myners, P. (2003), 'Review of the Impediments to Voting UK Shares', report by Paul Myners to the Shareholder Voting Working Group.

²⁷ Gompers, P., Ishii, J. and Metrick, A. (2003), 'Corporate Governance and Equity Prices', *Quarterly Journal of Economics*, **118**, 107–55. The calculation was based on a zero-investment strategy buying a portfolio of shares with the highest governance index, and short-selling a portfolio of shares with the lowest governance index.

3.0 Types of risk in corporate action processing

class companies (ie, companies with two classes of share that carry different voting rights). Zingales (1995) estimated an average price for a US corporate vote of 12.5% of the price of the share with the voting right.²⁸ Megginson (1990) considered UK shares, and arrived at an average vote value of 10.6% of the share price.²⁹ A slightly different approach was taken by Nenova (2003),³⁰ who estimated the value of the block of votes providing the owner with full control over the company. The paper reports large cross-country differences, but highlights that, in most countries, the value of corporate votes appears significant: the highest estimated average value of the control-block votes was 48% of the firm value, in South Korea.³¹ The corresponding values reported for the UK and the USA were 10% and 2% respectively.

The above evidence suggests that corporate votes are valuable to investors. In practice, failures in voting procedures may often have only a very limited and indirect effect on companies' long-run prospects. Nonetheless, occasions can be highlighted where failed voting could have had a clear impact; for example, the GlaxoSmithKline vote in May 2003, concerning the directors' remuneration package, was rejected by a very slim majority of 50.72% to 49.28%.³² In such cases, any lost votes could prove decisive.

3.5 Overview of types of risk and costs

Table 3.1 gives a brief summary of the types of risk and costs of corporate action failures identified in this section. It highlights the types of corporate actions that may give rise to these risks and costs, which market participant bears them, and whether they are zero-sum or a net cost to the financial system as a whole. The table also indicates the sections of this study in which the order of magnitude of each type of risk is estimated.

²⁸ Zingales, L. (1995), 'What Determines the Value of Corporate Votes', *Quarterly Journal of Economics*, **110**, 1047–73.

²⁹ Megginson, W. (1990), 'Restricted Voting Stock, Acquisition Premiums, and the Market Value of Corporate Control', *The Financial Review*, **25**, 175–98.

³⁰ Nenova, T. (2003), 'The Value of Corporate Voting Rights and Control: A Cross-country Analysis', *Journal of Financial Economics*, **68**, 325–51.

³¹ The corollary of this result is that, on average, the controlling shareholders in South Korean companies are able to appropriate 48% of the value of the firm.

³² See 'Glaxo Defeated by Shareholders', *BBC News*, May 19th 2003.

3.0 Types of risk in corporate action processing

Table 3.1: Overview of the types of risk and costs of corporate action processing

Type of cost	Type of corporate action involved	Who bears the cost?	Zero-sum or net cost to the financial system?	Where quantified in the study?
Direct risk of processing failures	Mandatory with options; voluntary	Can be anybody in the corporate action chain (eg, custodian, fund manager, or broker) Liability depends on which market participant causes the failure	In part zero-sum (offsetting trading positions), but gains and losses are unevenly distributed; and extra transaction costs to unwind failures represent a cost to the system	Section 4 (potential risk to all participants in the chain) Section 5 (historical costs to fund managers)
Direct cost of late payments	Mainly mandatory (mostly dividend and interest payments)	Investors (interest forgone)	Mostly zero-sum (interest forgone is gained by others)	Section 6
Risk of sub-optimal trading decisions	All	Brokers or fund managers involved in trade (if proprietary) or investors (if cost passed on)	Mostly zero-sum (offsetting trading positions), but gains and losses unevenly distributed, and 'deadweight' loss to investors	Section 7
Indirect cost of ineffective corporate governance	Voluntary (mainly proxy voting)	Issuers (in the long run), investors, the system at large	Net cost to the system	Not further quantified

4.0 Potential processing failure risk to all intermediaries in the chain

As described in section 3, and given the large number of complex corporate actions that take place globally each year, the potential risks involved in corporate action processing can be very significant. These risks are borne by all intermediaries in the chain—custodians, fund managers and brokers—and are proportionate to the number and value of the assets they are looking after. Thus, the corporate action risk is probably largest for global custodians who safeguard the assets of a very large number of fund managers and institutional investors (see Table 2.1).

Estimating the total value of the direct risks of processing failures is virtually impossible. However, a useful way to illustrate the orders of magnitude of such risks is to look at specific past corporate actions that were very complicated and involved relatively large investment positions. It is Oxera's understanding that this is how some firms in the industry also assess their own potential risks. Two recent corporate events—a rights issue and a takeover—are considered below, together with an estimate of the sums potentially at risk for any of the intermediaries involved in the corporate action chain. Section 5 presents some data (for fund managers only) on costs that are incurred due to these types of failure.

4.1 Example 1: France Telecom rights issue (March/April 2003)

4.1.1 'Risks to intermediaries in rights issues generally

A rights issue has the typical characteristics of a voluntary corporate action event. This includes information outflow following the announcement, decisions made by the owners of the share, the instruction flow through the intermediaries following the decision, and the price impact that induces potential trading opportunities. Analysing this process illuminates many of the problems involved in all voluntary corporate actions. In 2003, around 450–500 rights issues took place in the USA and Europe combined.³³ Given the large number of intermediaries and investors involved in each of these, the risk that something might go wrong somewhere in the chain is not theoretical.

In a rights issue, the issuing company gives current shareholders an opportunity to buy new shares in the company proportionate to their current ownership. The holders of the shares are given a period of time to decide whether to buy the offered shares, to sell the rights in the market, or simply let their rights lapse by taking no action. If shareholders do not subscribe to the new shares, their ownership in the company will be diluted.

Upon announcement of the rights issue, information on the terms of the offer is passed from the issuer to the owner through the chain of intermediaries described in Figures 2.1 and 2.2. However, as the rights issue is likely to affect the company's share price, it may also present (temporary) trading opportunities to brokers' and fund managers' trading desks (see also section 7). Therefore, the information concerning the announcement spreads quickly through the 'unofficial' information channels, including commercial data vendors.

Typically, the new shares have to be offered at a discount to the current share price, in order to induce the shareholders to increase their holdings.³⁴ The required discount is determined by the way shares are offered—whether or not the offer is underwritten—and the current perception of the company's prospects. A non-underwritten issue is likely to require a higher discount on to ensure that the offer price remains above the market price of the share.

³³ Source: DTCC.

³⁴ It is common practice to express the discount as a percentage on the pre-offer price of the share. This is somewhat misleading, however, as the discount relevant to the shareholder decision is to the share price after the issue, the ex-rights price, which will normally be lower.

4.0 Potential processing failure risk to all intermediaries in the chain

According to the evidence presented by Armitage (2000), the average discount to the market price in UK rights issues during 1987–96 was 21%.³⁵ In essence, a rights issue therefore provides the current shareholders with an opportunity to buy the issuing company's shares below the market price.

If a fund manager or a custodian firm fails to process a client's instruction to participate in a rights issue, it normally needs to re-establish the position the client would have been in, had the failure not occurred—ie, it needs to acquire (or sell) the appropriate number of shares from the market at the prevailing market price.³⁶ The size of the exposure arising from such failure is dependent on the exact terms of the rights issue.

A particularly important factor from the intermediaries' perspective is the procedure for dealing with the rights that have either not been taken up or have not been sold. The common practice, at least in Europe, tends to be for the issuer or the underwriter to tender separately any lapsed rights, and credit the proceeds to the initial holder of the right. In other words, the right-holder receives the market price for that right, regardless of whether any action is taken. However, in some cases no such auction procedure for the lapsed rights exists. If the investors fail to take action prior to the closing date of the offer, the rights lapse and the entitlement is lost.

In the absence of a separate auction process for lapsed rights, the corporate action intermediaries are also exposed to higher risks. If they fail to execute investors' buy instructions and have to purchase the shares from the market, the intermediary will normally lose the value of the discount on the issued shares; the shares may have to be purchased for the client at the market price, but only the offer price is received from the investor. If, however, the investors receive the market price of the rights in any case, the intermediaries' potential liability is limited to the share-price movements between the failure and the corrective action. Although the majority of the failures are identified reasonably quickly, in some cases this time lag could be up to two or three weeks.

Given the potentially large discounts involved, the rights themselves are valuable. It is common for fund management and brokerage firms to trade with the 'nil paid rights' attached to their shareholdings prior to the actual issue date. Some of the fund management firms Oxera spoke to highlighted this trading activity as one factor increasing the risk of failure in processing the corporate action. Traders wish to trade right up to, and sometimes beyond, the custodian deadline, which puts pressure on the corporate action team to process the instruction correctly.

4.1.2 Potential risks in the France Telecom rights issue

To gain a better feel of the *potential* risks, a hypothetical example is considered here, based on a real event. On March 24th 2003, France Telecom announced a 19-for-20 rights issue with an offer price of €14.50 per share, with April 4th as the latest date for acceptance. At the time of the announcement, France Telecom shares were trading at €17.30. The issue was fully subscribed and raised a total of €15,039m. On April 5th the France Telecom shares

³⁵ Armitage, S. (2000), 'Placed Shares: The Role of the Discount in UK Rights Issues and Open Offers', University of Edinburgh Working Paper, March.

³⁶ In some cases, investors may simply be compensated in monetary terms.

4.0

Potential processing failure risk to all intermediaries in the chain

were trading at an ex-rights price of €20.60,³⁷ so the new shares were effectively offered at a 29.4% discount on the ex-rights price, or €6.10 per share.

Table 4.1 gives a breakdown of France Telecom's share ownership. In March 2003, 35.4% of the 1.2 billion France telecom shares outstanding were held either by France Telecom employees or the general public. The market value of the privately held shares was therefore around €8.1 billion at the time of the rights issue, giving an indication of the funds at stake and the transaction volume arising from the issue. Although the shareholding information presented in the table does not contain any detail about the size of individual holdings, information from other sources indicates that various institutional investors had positions in France Telecom shares valued at several million euros.

Table 4.1: France Telecom shareholdings at March 31st 2003

Owner	Number of shares held	Percentage of outstanding shares
French state	671,786,275	56.59
Public	383,179,333	32.28
Employees	36,829,897	3.10
France Telecom (treasury stock)	95,363,219	8.03
Total	1,187,158,724	100.00

Source: France Telecom.

Table 4.2 describes in more detail the exposure for intermediaries processing the instructions for large positions of France Telecom shares. The table reports the cost that intermediaries holding large share positions would have had to incur, had they failed to carry out instructions by their clients to participate in the issue. The risks of monetary loss arise here from the share-price movements between the ex-rights date (t) and the date when the failure is corrected ($t + x$).³⁸ For example, if a fund manager had to go to the market one day after the offer day, to purchase shares for a client who originally held 500,000 France Telecom shares, this would have been at a loss of €574,750. Had the failure not been identified until 12 trading days later, the correcting transaction would then have been at a loss of over €1m.³⁹

Risks related to any particular client can therefore be quite significant, and are much greater when a processing failure affects the accounts of multiple clients (or other intermediaries in the chain). Such risks are particularly high for custodian firms, as noted earlier. For example, in the above illustration, the largest private France Telecom shareholders are likely to have acquired custody services from one of the 20–30 largest global custodians. Therefore, these custodians' positions in France Telecom could have extended to tens, if not hundreds, of millions of shares. As shown in Table 4.2, having to re-establish a position of, say, 50m shares on day $t + 12$ would have carried a cost in excess of €100m. This does not yet take

³⁷ For details of the issue, see France Telecom (2003), '20-F Report', March 31st. The share-price information was taken from Thomson Datastream.

³⁸ This is assuming that France Telecom auctioned the lapsed rights, and that the original holders of the rights received the difference between the offer price and the auction price, adjusted for the fact that the 19 new shares were offered for every 20 existing shares. In other words, no losses arose through this price differential, only through the subsequent share-price movement. For simplicity, the auction price is assumed to be equal to the closing price of the France Telecom share, on the final day of the offer (€19.34). Therefore, the loss to the intermediary will be equal to the difference between the closing price at t , and the market price of the share on a subsequent trading day.

³⁹ The calculations of costs in this section ignore the additional transaction costs that have to be incurred when making an extra trade (ie, fees and market impact). These are quantified in section 7.

4.0 Potential processing failure risk to all intermediaries in the chain

into account the fact that a correcting action of this magnitude would itself probably have had a market impact (pushing the price up), thus making the cost of failure even higher.

Table 4.2: Potential risks for large France Telecom shareholdings (€)

		<i>t</i> + 1 day	<i>t</i> + 3 days	<i>t</i> + 6 days	<i>t</i> + 12 days
France Telecom share price (€)		20.55	20.7	20.54	21.45
Size of holding (no. of shares)	Value of holding at day <i>t</i> (€)	Potential risk			
100,000	1,934,000	114,950	129,200	114,000	200,450
500,000	9,670,000	574,750	646,000	570,000	1,002,250
1,000,000	19,340,000	1,149,500	1,292,000	1,140,000	2,004,500
10,000,000	193,400,000	11,495,000	12,920,000	11,400,000	20,045,000
50,000,000	967,000,000	57,475,000	64,600,000	57,000,000	100,225,000

Note: The potential loss refers to the difference between the value of a shareholding at time *t*, and the value of the same holding at some subsequent trading day after *t*. Time *t* refers to April 4th 2003, which was the last day in the offer period, and the closing share price at that day was €19.34.

Source: Thomson Datastream; Oxera calculations.

4.2 Example 2: The Vodafone/Mannesmann takeover (March 2000)

Mergers and takeovers are another class of corporate action that may present high potential risks for the parties in the corporate action value chain. The risks closely resemble those described above in the context of a rights issue; if there is a failure along the communication chain from the decision-maker to the share registry, the intermediary liable for the failure will normally have to compensate the clients for the potential loss, or re-establish the clients' positions to reflect the desired outcome.⁴⁰

In the case of a takeover, the acquiring company typically makes an offer to buy the outstanding shares of the acquired company. In return for their existing shares, the shareholders of the target company are typically offered cash, shares in the acquiring company, or a combination of the two. In essence, the shareholders will have to decide whether they want to accept the acquisition offer or sell their shares in the market.

The process failure may arise due to an intermediary not processing a client's instruction—ie, neither accepting the offer nor selling the shares, or processing a wrong instruction. The latter could involve, for example, a fund manager selling the investor's shares, when the investor wanted to receive new shares in an all-share offer. When this type of failure occurs, the fund manager normally has to buy the new shares for the client at the prevailing market price. Mergers and takeovers typically represent large corporate restructurings, so the impact on the company's share prices may be substantial. To demonstrate the risks involved, and the intermediaries' potential exposures to market movements, the Vodafone/Mannesmann hostile takeover in March 2000 is used as an example.

Vodafone launched the hostile offer on December 19th 1999, for the total value of Mannesmann's share capital. At the time of the bid, this was the largest hostile takeover in corporate history, valuing the Mannesmann share capital at €129 billion. Apart from being large, the deal was also very complex, involving several tranches of Vodafone securities.

⁴⁰ As mentioned in section 2, a takeover event may be even more complicated if the bid changes over time, or if another bidder enters the process.

4.0 Potential processing failure risk to all intermediaries in the chain

This made it a challenging and risky event to process for the corporate action intermediaries with large positions in Mannesmann shares. A further complicating factor was that Vodafone changed its bid during the intense negotiation process.

This was an all-share offer, which, in its final form, offered Mannesmann shareholders 58.96 new Vodafone shares for each Mannesmann share they were holding. At the time of the bid, Mannesmann had approximately 503m shares in issue. On February 17th 2000, the last date of acceptance for the first tranche of new Vodafone shares, the Vodafone shares traded at €5.25; however, on March 6th, two weeks after the offer, the share price had increased by 24.3%, to €6.53.⁴¹

To estimate the potential monetary exposures involved, Table 4.3 considers a hypothetical example of a corporate action failure related to the transaction. The table reports the total losses for an intermediary that sold a client's Mannesmann shares for cash on February 17th, when the investor in fact wanted to accept the offer and receive the new Vodafone shares. Therefore, the required Vodafone shares had to be purchased at the prevailing market price, some time after that date.

As in the France Telecom rights issue example, the loss in this case arises from the difference in value of the Mannesmann shareholding at the time of the sale and the corresponding Vodafone shareholding when the mistake is identified. The table reports this value differential for various periods, and for various sizes of holdings affected by the error. The calculation ignores the effect that any purchase would have on the share price, which would further exacerbate the loss.

As is clear from Table 4.3, the potential risks for fund managers—and, in particular, custodians processing large numbers of Mannesmann shares—were substantial, in some cases up to several hundred million euros. Several investment funds had holdings of up to 100,000 Mannesmann shares at the time of the takeover bid. The holdings of the large global custodians could therefore have been in the order of millions of Mannesmann shares.

Table 4.3: Potential risks for large Mannesmann shareholdings (€)

		<i>t</i> + 1	<i>t</i> + 3	<i>t</i> + 6	<i>t</i> + 12
Vodafone share price (€)		5.13	5.52	5.89	6.53
Size of Mannesmann holding (no. of shares)	Value of holding at <i>t</i> (€)	Potential risk			
50,000	15,300,000	-170,477	964,583	2,074,713	3,952,042
100,000	30,600,000	-340,953	1,929,166	4,149,426	7,904,084
500,000	153,000,000	-1,704,767	9,645,830	20,747,132	39,520,421
1,000,000	306,000,000	-3,409,534	19,291,660	41,494,264	79,040,843
5,000,000	1,530,000,000	-17,047,671	96,458,299	207,471,320	395,204,214

Note: The potential loss represents the difference between the value of a Mannesmann shareholding at time *t*, and that of the corresponding number of Vodafone shares at a subsequent trading day after *t*. Time *t* refers to February 17th 2000, and on that date Mannesmann shares traded at €306.

Source: Datastream; Oxera calculations.

⁴¹ All conversions in this case study from UK sterling to euros have been calculated using the exchange rate on the given date. The exchange rates and share-price data are taken from Datastream.

4.0 Potential processing failure risk to all intermediaries in the chain

4.3 Conclusion

These hypothetical examples highlight the potential liability for the intermediaries in the corporate action chain. It can be seen that the potential losses to fund managers and, in particular, custodians, can be enormous: in some cases up to tens of millions of euros. It is Oxera's understanding that these orders of magnitude are not dissimilar to the calculations that some firms have done for themselves.

Bearing in mind these numbers, it is easy to understand the amount of resources that companies commit to ensure that information on corporate actions is received and interpreted correctly, and that the instructions are dealt with in an accurate and timely manner.

In the above examples, the potential loss arises because of the share-price movement after the date on which the relevant corporate action took effect. Such exposure to share-price movement arises with any buy or sell instructions from a fund manager to a broker. However, for these types of transaction, the processes are highly automated so that risks are minimised. As described above, this contrasts with instructions relating to corporate actions, which are generally not automated and where any failures may not become apparent for some time.

In addition, where the failure to do anything is not compensated—for example, where the failure to take up a discounted rights issues just results in that right expiring—there is significant potential for losses to occur, even in the absence of adverse share-price movements.

5.0 Estimate of actual costs incurred by fund managers

Some estimates of the potential risks to any of the intermediaries in the corporate action chain were presented in section 4. This section contains historical data on actual costs incurred by fund managers in Europe in relation to failures in corporate action processing.

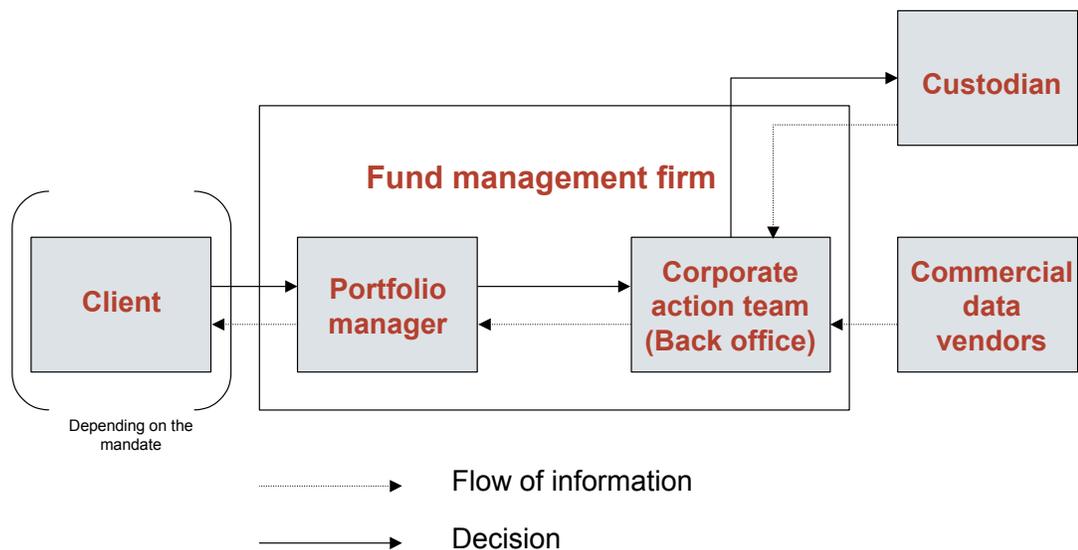
This quantification of the losses of fund management firms is based on earlier, published Oxera research on operational failures in the fund management industry.⁴² That study contains operational loss data for a sample of European fund management firms. The losses had been incurred due to a variety of operational failures, including corporate actions. For the purpose of the present study, this data was corroborated via interviews with several fund managers who were also part of the original survey.

5.1 The role of fund managers in the corporate action process

As discussed in section 2, fund managers play an important role in the corporate action chain, communicating with custodians and making decisions on voluntary corporate actions on behalf of their clients. The process undertaken by a fund management firm when responding to a voluntary corporate action, or a mandatory corporate action with options, is described in Figure 5.1. The process chain contains two crucial stages:

- upon announcement of a corporate action affecting a firm's holdings, the corporate action team has to verify that the information on the terms of the corporate action has been correctly received, and has to pass the information on to the fund manager. This involves consulting multiple data sources, including the custodian bank as well as commercial data vendors;
- the event date, whereupon the fund manager has to instruct the custodian of the required action on all holdings by the custodian deadline. If this process fails—ie, the custodian deadline is not met, or the instruction is incomplete—the fund management firm remains liable for the resulting loss.

Figure 5.1: Corporate action process for a fund management firm



⁴² Franks, J., Mayer, C. and Oxera (2001), 'Risks and Regulation in European Asset Management: Is There a Role for Capital Requirements?', European Asset Management Association.

5.0 Estimate of actual costs incurred by fund managers

Fund management firms also engage in trading activities triggered by corporate action information. Therefore, in addition to the failures affecting the communication process within the main corporate value chain, the fund managers' trading desks could be affected by inaccuracies in information concerning corporate actions. Such trading effects are further discussed in section 7.

5.2 Estimate of the costs to fund managers

5.2.1 Description of the corporate action failure data

The earlier Oxera research analysing operational failures in the European fund management industry collected information concerning fund managers' losses in the financial year 1999 due to a variety of operational failures, including corporate actions, as well as their perceptions concerning the relative importance of different types of failure. With regard to the latter point, the fund management firms in the survey ranked corporate action failures in third place among all the types of operational risk, in terms of potential financial impact.⁴³

The data was collected via questionnaires from 39 European fund managers operating in the UK, France, Germany, Italy, Ireland and the Netherlands. Of these 39 responses, 15 reported a figure for losses due to corporate action failures: six of these 15 entries reported actual losses, and nine reported a zero loss in the period. The other 24 responses did not answer this question. As it is not clear whether this was because there were no losses or because the firm was not willing to disclose any details, these observations have to be excluded from the analysis presented here.

The sample is reasonably representative of the European asset management industry. The total value of the sample firms' assets under management (AUM) amounted to €644 billion in 1999. This compares with the total AUM of €7,678 billion in five of the larger European countries, and the AUM of the global asset management industry of €37,620 billion in 2001.⁴⁴

The sample firms are examined in more detail in Table 5.1. The table highlights the significant differences in the scale of operations of the firms providing asset management services. While the smallest firm had AUM valued at only a few million euros, the largest firm managed a portfolio valued at more than a quarter of a billion euros. An interesting observation from the table is that there appears to be little correlation between the size of a firm in terms of the AUM and losses incurred due to corporate action failures. It appears that a smaller firm could be just as likely to experience a loss event as a larger one.

Table 5.1: General statistics of the firms included in the sample

AUM (€m)	No. of firms	Mean AUM (€m)	Median AUM (€m)	Average loss due to corporate action failure (€m)
< 1,000	7	147.1	98.0	0.54
1,000 to 100,000	6	43,283.7	52,526.0	0.26
> 100,000	2	191,412.1	191,412.1	0.00069
All	15	42,903.7	6,598.9	0.36

Source: Franks et al. (2001).

⁴³ See Franks et al. (2001), op. cit., Figure 7.11. The top two operational risks were stock-lending failures and financial insolvency.

⁴⁴ IFSL (2003), 'Fund Management', The City Business Series. The five countries are the UK, France, Germany, the Netherlands and Italy.

5.0 Estimate of actual costs incurred by fund managers

Table 5.2 presents figures of the losses incurred by the sample firms due to corporate action failures in 1999. The total losses of the 15 sample firms amounted to €5.37m. This translates into an average of €360,000 per firm (or a loss per firm of €9,000 if weighted by the firms' AUM). For the firm in the sample with the largest single loss (€2.6m), this loss represented 0.16% of its total capital.⁴⁵

Table 5.2: Corporate action losses incurred by firms in the sample (€m)

Total sample loss	Unweighted average loss per firm	Average loss per firm weighted by AUM	Average loss per firm weighted by transaction value	Largest reported loss event
5.37	0.36	0.009	0.015	2.6

Source: Franks et al. (2001).

Given the sample ratios presented above, it is of interest to consider the implications of the results when extrapolated to the European fund management industry as a whole. In order to draw inferences about the potential market-wide losses based on a sample, a detailed dataset would ideally be needed of all firms in the market and their characteristics, such as size, number of corporate actions processed, and transaction value. This would allow sophisticated modelling of the occurrence of loss events in firms with different characteristics.

The two scaling factors for which some data is available are the number of European asset management firms and the total value of the AUM in Europe. Assuming that the sample averages are reflective of the actual population values, it is possible to extrapolate the sample results to industry and national levels. Essentially, the sample loss statistics can be scaled up to reflect the industry size using the observed average loss per company and the ratio of losses to AUM, in order to obtain estimates of the potential industry-wide losses.

Tables 5.3 and 5.4 report the results of this exercise. As mentioned above, in 2001 the AUM managed by fund managers in five of the largest European countries amounted to €7,678 billion. This information is presented in Table 5.3, which also reports the estimated market-wide losses based on the sample average ratio of loss to AUM of 0.00084%. The results suggest that fund management firms operating in these countries could incur aggregate losses of around €65m per year.

Table 5.3: Scaling losses by AUM for fund managers in five European countries

	Total AUM (€ billion)	Potential aggregate loss due to corporate action failures (€m)
UK	3,241	27.1
France	1,683	14.1
Germany	1,272	10.6
Netherlands	756	6.3
Italy	725	6.1
Total	7,678	64.5

Source: IFSL (2003); Oxera calculations.

⁴⁵ Franks et al. (2001), op. cit., Table 7.13.

5.0 Estimate of actual costs incurred by fund managers

No accurate figures for the number of fund management firms operating in these countries were available, apart from the UK. The picture is further complicated because large European firms tend to operate in several countries; therefore, including all registered firms in all countries would be likely to result in double-counting. Table 5.4 below reports results based on assumptions of the numbers of firms operating in the market.

The number of large UK fund managers was approximately 160 in 2001.⁴⁶ Based on this information and the size of the AUM in the relevant markets, the number of firms is estimated to be between 250 and 400. Given these assumptions and the average loss per firm of €360,000, the results suggest that failures in processing corporate actions could cost the European asset management industry between €90m and €143m per year.

Table 5.4: Scaling losses by the number of fund managers in five European countries

Total number of fund management firms	Potential aggregate loss per year due to corporate action failures (€m)
250	89.5
300	107.4
400	143.3

In order to undertake a ‘sense check’ on the above results, Oxera interviewed a number of European fund management firms for this study. They were asked to describe the size and frequency of the monetary losses they had incurred due to corporate action failures over recent years, and to explain the processes leading to the failures. To gain a better understanding of the risks involved, ‘near-miss’ situations were also discussed. The anecdotal evidence obtained from the interviews suggests that corporate action failures causing losses to fund managers do not arise very often, and therefore the average loss in a given year is not likely to be very large.

For fund managers, the corporate action failures are best described as ‘tail events’—ie, events with a low probability of occurring but a high potential impact. The evidence from the interviews suggests that larger fund management firms seem to experience significant corporate action failures only occasionally. The monetary impact of such failures tends to be in the range of €150,000–€1.5m (but with some outliers both above and below this range). Some fund managers highlighted that there might also be cases where failure has occurred with some ambiguity concerning liability, and where negotiation with the custodian is required.

Although, in practice, the losses seem relatively low, the interviewed firms acknowledged the potential for a very large loss arising from a corporate action failure. One large fund management firm had identified in its contingency plans a theoretical possibility of losses rising to several tens of millions of euros, a number obtained along the same lines as the analysis presented in section 4 of this study.

Taken together, the above analysis suggests that the fund management firms operating in the five European countries may be incurring losses due to corporate action processing failures of between €65m and €140m per year.

⁴⁶ Data taken from the UK Financial Services Authority (FSA). ‘Large’ is defined as a fund manager with AUM exceeding £1 billion.

5.0 Estimate of actual costs incurred by fund managers

Funds under management in these markets represent roughly 20% of all funds globally.⁴⁷ Abstracting from the fact that, as mentioned in section 1, the situation in Europe is difficult to compare with that in the USA or other markets, this might indicate that the total losses to the fund management industry worldwide are in the region of €300m–€700m per year.

However, the above figures are only crude approximations. Similar to the other operational loss events within the financial services industry, the size and frequency of corporate action losses are, by their very nature, unpredictable. As the failures are characterised by a low probability of occurring but high potential impact, using only the mean values estimated over a relatively short period of time may result in a large margin of error. Nevertheless, the figures seem to be roughly consistent with the anecdotal evidence obtained from the discussions with fund managers.

As mentioned previously, the total cost to individual custodian firms is likely to be a multiple of the costs to individual fund management firms, if only because of the larger volumes and values of securities looked after by the former. Again, anecdotal evidence from interviews with various types of market participant seems to confirm this. However, more detailed research, with the participation of many custodian firms, would be necessary to obtain further insight into the costs in this part of the industry.

⁴⁷ IFSL (2003), op. cit.

6.0 Potential direct costs to investors resulting from late payments

As explained in section 3.2, costly process failures can occur even for mandatory corporate actions, even though the majority of such actions have been fully automated. Cross-border dividend or interest payments provide examples of such events. If the interest or dividend payments on securities are delayed, the beneficiaries could suffer losses due to forgone interest income that could have been earned on the funds.

For cross-border payments within Europe, or from North America, such delays are rare; where they do occur, they will be measured in days rather than weeks. However, for dividend payments from some emerging markets, delays of up to 2–3 months are common. As discussed above, the fund managers may claim back the lost interest from the custodian (who in turn might do the same from the local custodian or agent in the country concerned). However, in practice, claims are made only when the losses are more substantial.

According to the IMF Coordinated Portfolio Investment Survey, the value of the foreign equity portfolio investment in emerging markets amounted to approximately €150 billion, as at December 2001.⁴⁸ Assuming an average dividend yield of 3%,⁴⁹ and that approximately half of the dividend payments from emerging markets are delayed, the amount of potential funds at risk can be approximated. Using the above assumptions, roughly €6 billion of investors' dividend income worldwide could be affected by delays. Furthermore, assuming an average delay of 30 days, and that investors could have earned an average of 5% interest income on the delayed funds, the potential losses could amount to around €9.3m worldwide.

Table 6.1 looks in more detail at the cross-border equity investments of European institutional investors. At the end of December 2001, the level of European equity investments in North American and emerging countries' stock markets amounted to approximately €630 billion: €578 billion in US and Canadian markets, and €56 billion in various emerging markets.

Table 6.1: Estimating the impact of late dividend payments for cross-border equity investments of European institutional investors

Country of origin	Foreign equity investments (€m)	Average dividend yield (%)	Assumed proportion of dividend payments delayed (%)	Assumed length of an average delay (no. of days)	Funds at risk, per annum (€)
Emerging markets	56,000	3.0	50	30	3,390,000
North America	578,000	3.0	2	5	238,000

Note: The volume of foreign equity investments as at December 2001.

Source: IMF (2002), 'Co-ordinated Portfolio Investment Survey'; Oxera interviews.

The final column of Table 6.1 estimates the potential foregone interest income, assuming that the forgone interest payments would be earned at LIBOR.⁵⁰ Based on these assumptions, delayed dividend payments from emerging stock markets could be costing approximately €3.4m per year to European institutional investors. As expected, the

⁴⁸ IMF (2002), 'Co-ordinated Portfolio Investment Survey'; Oxera calculations.

⁴⁹ Based on current observed average dividend yields.

⁵⁰ The average 12-month GBP LIBOR in 2001 was 4.99%.

6.0 Potential direct costs to investors resulting from late payments

potential losses from delays on cross-border dividends from the more developed financial systems seem negligible.

Overall, it appears that the losses to investors due to inefficiencies in the dividend payment channels are not as significant as the other risks in corporate action processing analysed in this study.

7.0 Potential risks of sub-optimal trading decisions by front offices

7.1 Trading decisions based on corporate action information

As described in section 3, the front offices of fund management and brokerage firms often make trading decisions based on corporate action information—either on behalf of their clients or on a proprietary basis. This information will reach them in the early stages through specialist channels (eg, a stock exchange’s system for distributing price-sensitive information) and media (eg, data vendors, newswires and newspapers). This means that those making trading decisions will tend to gain information ahead of the more formal—and normally more accurate—corporate action information flow which is used by the back office, as outlined in section 2.

Notwithstanding that the formal information flows may eventually ensure that the correct (well-scrubbed) information is in the market, the quicker, but ‘dirtier’, information flows may create an opportunity for information on corporate actions to be based on rumours and on incompletely described actions by the issuer. This occurs in particular where the corporate action is complex, or where it is only contemplated rather than actual (eg, a rumour that a firm ‘might mount a takeover bid’).

This creates a market where failure to take account of the information regarding corporate actions (both the formal and less formal information) can lead to fund managers and brokers making a decision to trade which they would not have made had they had been fully and correctly informed. Two types of cost are likely to flow from this type of trading:

- transaction costs; and
- risk of market movement.

These are further discussed below.

7.2 Transaction costs and risk of market movement

The first type of cost occurs where the misinformation or misunderstanding results in a trade that would not otherwise take place. This arises from the transaction costs incurred in making the trade, which is essentially the spread, plus the costs of any intermediaries used in the transaction. Furthermore, if, after receiving the correct information, the trader needs to reverse the trade to re-establish the previous position, the transaction costs need to be incurred for the full ‘round trip’.

Trading costs can be significant. According to data by Elkins and McSherry, average transaction costs in the major stock markets currently range from around 20 basis points in Japan and Switzerland to 60 basis points in Taiwan, South Korea and Malaysia.⁵¹ This includes trading fees, brokerage commissions and market impact costs. For ‘round-trip’ trades, this cost is incurred twice.

In addition to the direct transaction costs, there is the risk of adverse market movements. If an unnecessary (mistaken) transaction occurs, it can often be unwound by a reverse transaction. If it is assumed that all the information contained in a corporate action announcement is immediately reflected in the market price, the unnecessary transaction and its reversal will take place at the ‘correct’ prices. Although there may be differences in the price of the security between the first and second transaction, on average these will be

⁵¹ These figures are from the latest Elkins/McSherry Global Universe Ranking (Q4 2003).

7.0 Potential risks of sub-optimal trading decisions by front offices

neutral. Hence, the average costs of reversing the mistaken trade are limited to the transaction costs, as set out above.

If, however, the price reaction to the information contained in a corporate action announcement is *not* instantaneous, the failure by individual fund managers or brokers to understand correctly the corporate action places them at a systematic informational disadvantage to the rest of the market. This disadvantage means that, if they trade unnecessarily because of the price change induced by the corporate action, the price will have systematically moved against them when they attempt to unwind their trade. Thus, in addition to the transaction costs, the trader will suffer a systematic loss as the market moves adversely, owing to that trader's informational disadvantage.

To incur a loss of this sort, the following conditions would need to be met:

- the corporate action must lead to a change in the price of the security, either at the time of the announcement or when the action has taken effect; and
- in the case of an immediate price change, there must be a period of adjustment (even if very short) during which the security is mis-priced and temporary trading/arbitrage opportunities arise.

It is likely that these conditions will frequently be met in relation to many corporate actions—for example:

- the announcement of a dividend payment of a specific amount payable to shareholders holding securities on a specific date may move the current share price (eg, if the amount differs from market expectations). The dividend payment itself will also cause the share price to fall as it goes ex-dividend. Assuming an average annual dividend yield of 3%, shares can be expected to fall on average by 3% upon going ex-dividend;
- announcements of proposed mergers and takeovers can sometimes shift the share price by more than 10%;⁵²
- a discounted rights issue is likely to move both the existing share price and, if the discount is significant, change the share price once the additional shares have been issued (see the discussion in section 4).

Other types of corporate action are also likely to move the share price and to set up dates when a specific share-price movement can be expected, since the economic value of the action transfers from the share to the entity that owned the share on that specific date.

All these events create a trading risk where the uninformed (or less well-informed) are likely to lose systematically to a better-informed counterparty.

The market itself may reduce the probability of losses, even for the uninformed. Standardised future contracts often automatically take account of the predictable share-price changes arising from certain common corporate actions (eg, dividend payments and discounted rights issues). In addition, where the price impact is significant, that impact itself may raise the attention of the uninformed traders, possibly inducing them to double-

⁵² For example, the share price of Walt Disney Co. jumped 14.6% on February 11th 2004 following a takeover bid by Comcast.

7.0 Potential risks of sub-optimal trading decisions by front offices

check their own interpretation of the corporate action in question. This may mitigate the probability of large trading mistakes.

There is no consensus on how quickly markets usually react to new information and, therefore, how 'at risk' the uninformed traders are at any point in time. For example, a considerable body of academic literature has documented a delay in firms' stock-price responses to earnings announcements.⁵³ Given the nature of corporate action information at the early (unscrubbed) stages, it is not unreasonable to assume that there will be some delay between the time of announcement and the time when all the relevant information has been correctly incorporated in the new price.

The actual frequency of mis-trading as a result of incorrect or incomplete corporate action information is extremely difficult to ascertain. In part, this is because corporate actions are only one among many types of information that can move share prices, or prompt investors to re-evaluate the value of securities.

In addition, the trading losses that arise in these situations are most likely to manifest themselves in poorer fund performance (if the fund manager mis-trades), or lower profits for an intermediary (if, for example, a broker mis-trades on a proprietary account). Those losses will therefore not be commonly identified as costs of corporate action failure as such.

Nevertheless, the potential for trading loss (and gain) arising from corporate action information is evident. This is illustrated by the fact that some trading desks in brokerage and fund management firms have specialised traders attempting to gain from arbitrage opportunities arising from the fact that they are better informed about corporate actions than others in the market.

7.3 Estimate of the potential risk of sub-optimal trading

This sub-section presents a very crude estimate of the orders of magnitude of the risks of sub-optimal trading, in particular the transaction costs and market movement risk discussed above. This estimate necessarily relies on a number of assumptions that cannot be readily verified, and is thus presented for illustrative purposes only.

As a starting point, it is noted that, according to DTCC data (which are also discussed in section 2.2), approximately 90,000–140,000 complex (voluntary) corporate actions took place globally between March 2003 and March 2004. Of these, around 23,000 could, roughly, be classified as high-impact events. This includes events such as bonus rights issues, mergers, redemptions of rights, voluntary reorganisations, rights distributions, rights subscriptions, spin-offs, subscription offers and tender offers. Some of these events will have moved share prices by more than 10% (as discussed in section 7.2), while others may have had only a minor impact. For the purpose of this calculation, it assumed that these types of event have the *potential* to move the share price by 5% on average.

⁵³ This literature includes Ball, R. and Brown P. (1968), 'An Empirical Evaluation of Accounting Income Numbers', *Journal of Accounting Research*, Autumn, 1–25; Bernard, V. and Thomas, J. (1989), 'Post-Earnings-Announcement Drift: Delayed Price Response or Risk Premium', *Journal of Accounting Research*, Supplement, 1–36; and Calegari, M. and Fargher, N. (1997), 'Evidence that Prices do not Fully Reflect the Implications of Current Earnings for Future Earnings: An Experimental Markets Approach', *Contemporary Accounting Research*, Fall, 397–433.

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The impact of these corporate actions in 25 of the largest stock markets by market capitalisation (listed in Table 7.1) is considered here.⁵⁴ Together, they represent roughly 95% of global market capitalisation. In these 25 markets the total number of corporate actions in the categories specified above was around 18,000. Since there are approximately 25,500 companies listed on these 25 exchanges,⁵⁵ on average, roughly three out of four companies every year appear to undertake corporate actions that have the potential to move the share prices significantly.

The frequency of mis-trading depends on the proportion of shareholders/traders who are uninformed (or misinformed), and on how much trading activity they undertake. Here, two relatively conservative scenarios are examined: one in which the proportion of traders who are uninformed is 1%, and one where it is 5%. These proportions are low, but it should be borne in mind that mis-trading is a result of the *relatively* uninformed nature of the trader. Therefore, such mis-trading cannot arise across the market as a whole.

In both scenarios it is assumed that these participants trade around 5% of their total holdings in response to the corporate action information (in line with the assumed average share-price effect of 5%). Once they realise their mistake, these traders can either unwind the transaction and seek to recover some of the losses (in which case they incur the 'round-trip' transaction costs), or they can 'stay put' (in which case they incur no further trading costs other than the costs of the original mistaken trade). It is assumed here that the likelihood of these two options is 50:50.

Table 7.1 shows the potential transaction costs incurred due to misinformed trading, using the Elkins/McSherry trading cost data referred to above. For the 25 major markets, the total cost can be somewhere between €50m and €270m. These costs are essentially a 'dead-weight' loss to the financial system as a whole; they are transaction costs incurred inefficiently. Because these costs are in fact incurred by only a small number of firms, for any of these firms individually the costs can be very significant.

Table 7.1 also shows the estimate of the potential market movement risk that misinformed traders incur in addition to the transaction costs. It is assumed that, on average, 80% of a share-price reaction is immediate and the remaining 20% occurs by the end of 24 hours. This is probably not uncommon where trading takes place on corporate action information, which, as discussed in this study, is often imprecise when first announced.

In this case, mis-trades that take place within that trading period will, on average, have a systematic error of 20% of the share-price change. This share-price change is assumed to be 5% on average for the types of corporate action included in this analysis. Hence, each mis-trade will cost an additional 100 basis points to unwind (20% of 5%). Again, this is a significant cost penalty to fund managers or brokers who trade incorrectly as a result of failing to understand the corporate action.

Table 7.1 shows that across the 25 major markets this additional risk of market movement can be range between €1,5 billion and €8 billion. These estimates provide only very rough orders of magnitude of the potential trading risks caused by corporate actions, and are

⁵⁴ The risk calculations below therefore only focus on equity. Corporate action information may also have an impact on trading in bonds and derivatives. China and India were excluded from the sample due to all required data not being available.

⁵⁵ Source: World Federation of Stock Exchanges. Figures refer to end of December 2002.

7.0 Potential risks of sub-optimal trading decisions by front offices

based on a series of assumptions that are difficult to verify. However, what is clear is that the potential trading risk to any individual firm is large.

As discussed in section 7.2, these risks are unlikely to be identified as such by most firms. Trading losses due to corporate action information failure will instead be reflected in lower returns to fund managers or reduced net trading income to brokers. Although this means that the direct costs of failure in the dissemination of corporate action information may not be directly observable, as far as the organisations subject to the failure are concerned, these are real costs to their business—profitability, in the case of brokers; and success in the market place, in the case of fund managers.

7.0 Potential risks of sub-optimal trading decisions by front offices

Table 7.1: Estimated risk arising from sub-optimal trading

Market	Total market cap (€m) ¹	No. of listed firms ¹	No. of share-price moving events ²	Average trading costs (bp of trade value) ³	Transaction costs (€m)		Market movement risk (€m)	
					1% scenario	5% scenario	1% scenario	5% scenario
USA	9,241,357	6,590	6,655	31 ⁴	21.8	109.2	933.3	4,666.3
Japan	1,729,727	2,153	416	19	0.5	2.4	33.4	167.1
UK	1,505,170	2,272	1,999	52 ⁵	5.1	25.7	132.4	662.2
Euronext	1,286,161	1,114	1,013	28	2.5	12.4	117.0	584.8
Germany	573,439	934	871	33	1.3	6.6	53.5	267.4
Canada	476,650	1,287	881	30	0.7	3.7	32.6	163.1
Switzerland	457,254	398	270	23	0.5	2.6	31.0	155.1
Italy	398,787	295	549	32	1.8	8.9	74.2	371.1
Hong Kong	387,068	978	126	45	0.2	0.8	5.0	24.9
Spain	385,818	3,015	222	32	0.1	0.3	2.8	14.2
Australia	317,715	1,421	1,427	32	0.8	3.8	31.9	159.5
Taiwan	218,430	641	240	60	0.4	1.8	8.2	40.9
South Korea	180,272	679	357	61	0.4	2.2	9.5	47.4
Sweden	149,724	297	508	29	0.6	2.8	25.6	128.0
Finland	116,050	149	53	39	0.1	0.6	4.1	20.6
Brazil	105,960	412	781	46	0.7	3.5	20.1	100.4
Malaysia	102,726	861	584	58	0.3	1.5	7.0	34.8
South Africa	97,419	451	216	51	0.2	0.9	4.7	23.3
Mexico	86,884	169	378	37	0.5	2.7	19.4	97.2
Singapore	84,889	501	139	38	0.1	0.3	2.4	11.8
Denmark	64,155	201	97	34	0.1	0.4	3.1	15.5
Norway	56,927	203	200	32	0.1	0.7	5.6	28.0
Greece	55,203	314	223	61	0.2	0.9	3.9	19.6
Ireland	50,102	76	108	84 ⁵	0.9	4.5	7.1	35.6
Chile	41,651	246	167	82	0.2	0.9	2.8	14.1
Total	18,169,539	25,657	18,480	-	40	200	1,571	7,853

Notes: ¹ Total market capitalisation refers to market capitalisation of domestic listed companies at end-December 2002. Data converted using the average 2003 exchange rate, €1 = \$1.20, downloaded from Thomson Datastream. Listed firms are domestic listed firms only (ie, excluding secondary listings). ² The share-price moving events are assumed to move share prices by 5% on average, and include bonus rights issues, mergers, redemptions of rights, voluntary reorganisations, rights distributions, rights subscriptions, spin-offs, subscription offers and tender offers. ³ The Elkins/McSherry data includes commission charges, trading fees and market impact costs in the stock exchanges as per Q4 2003. ⁴ US transaction cost is the market-value-weighted average across NYSE and NASDAQ. ⁵ For UK and Ireland the cost of buy and sell transactions differs; the figure presented in the table is the average of the two. The UK transaction cost is inclusive of stamp duty.

Sources: World Federation of Stock Exchanges; DTCC; Elkins/McSherry Global Universe Ranking Q4 2003; Oxera calculations.

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