Oxera

Building efficiencies in post-trade processing
The benefits of same-day affirmation

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Oxera is one of Europe's foremost independent economics consultancies. Established in 1982, we have built a reputation for providing critical economic insight to an international list of clients including governments, regulators and major companies.

Oxera prepared this report for Omgeo.

Executive summary

The efficiency of European equity trading and post-trading has been firmly on the agenda of the European Commission and national authorities for a number of years. Policy initiatives such as those targeted at the removal of the Giovannini Barriers,[1] and implementation of the Markets in Financial Instruments Directive (MiFID), are all contributing to improved efficiency and competition in the trading and post-trading sector in Europe. At the same time, advances in technology and other market-led developments are playing a similarly important role in improving the trade and post-trade environment.

One of the areas that is less well-understood and that, to date, has received less attention in the European policy debate is the potential role that an improved trade verification process between the investment manager (IM) and broker/dealer (B/D) can play in enhancing overall efficiency and reducing risks inherent in post-trading activities.[2] While many individual market participants across Europe have made significant efforts to improve the efficiency of their trade verification processes, there has been relatively little dialogue on the nature of the potential industry-wide benefits associated with these improvements.

Omgeo has therefore commissioned Oxera to conduct an independent economic analysis of the benefits associated with improvements in the trade verification process. In particular, the analysis considers the nature of the benefits associated with automating the process and establishing same-day affirmation (SDA) as best operational practice in equity markets among IMs and B/Ds in Europe.

What is trade verification?

Trade verification is carried out on the institutional side of the market between the IM and B/D, following the B/D's execution of a trade order placed by the IM. This process ensures that the parties are in agreement about the essential trade details such as security identifier, trade date, deal price, number of securities bought or sold, commissions, settlement details, and relevant account information. The four key steps in the verification process are:

– the B/D sending the notice of execution to the IM;
– the transmission of allocation details by the IM to the B/D;
– the confirmation of those details by the B/D (ie, the B/D transmits back to the IM the instructions they have received from the I/M); and
– the affirmation by the IM that the details they have received back from the B/D are correct.

Once the affirmation has been completed, the trade verification process between B/D and IM concludes, and the clearing and settlement process begins, which also involves custodians, central securities depositories (CSDs), and other participants in the post-trading value chain. SDA refers to completing the entire trade verification process on trade day (ie, on the same day that the actual trade took place), leaving more time for the clearing and settlement processes within the intended settlement period, which in most markets means on the third day after trade execution ('T+3').

[1] The Giovannini Group (2001), 'Cross-border Clearing and Settlement Arrangements in the European Union', Brussels, November; and The Giovannini Group (2003), 'Second Report on EU Clearing and Settlement Arrangements', Brussels, April.

[2] In recent years there have been a number of influential papers that describe the nature of post-trading activities. See, for example, European Commission DG Internal Market and Services (2006), 'Draft Working Document on Post-trading', May; and Chan, D., Fontan, F., Rosati, S. and Russo, D. (2007), 'The Securities Custody Industry', ECB Occasional Paper. However, to Oxera's knowledge, there has not been an in-depth analysis of the benefits associated with improved trade verification.

Automation of verification as a precondition for achieving SDA

The trade verification process between IM and B/D can be structured in a number of ways which differ in the degree of automation and sequencing of steps required. Under manual trade verification, there is no involvement of any further intermediary, and the modes of communication between B/D and IM are usually telephone, fax or email. Under automated trade verification, the process can be conducted bilaterally between B/D and IM (local matching), or through a centralised matching utility (central matching).

Automation is, in practice, a precondition for completing the trade verification process on trade day and achieving SDA. With manual processes, there can be time lags and delays, given the sequential nature of the steps in trade verification. Moreover, where the IM is not automated, there may be no affirmation at all in practice; rather, settlement instructions are sent without explicit affirmation by the IM. By contrast, with automated processes, the majority of trades (which can be around 80–90% of trades, depending on the systems used and the implementation of those systems) can be affirmed on trade date—SDA is achieved in an automated manner and without manual intervention for the bulk of trades. Manual intervention is required only for trades where details do not match between IM and B/D (ie, for exception processing).

SDA and automation—reducing risks and costs, and improving settlement performance

The analysis in this study shows that firms adopting automated processes to achieve SDA can expect reductions in the risks and costs associated with trade verification and other post-trading processes and an improved settlement performance. Further benefits in terms of risk and cost reduction may also accrue to the other parties in the post-trading value chain, and ultimately to end-investors.

The main benefits associated with automated SDA processes include the following (see Figure 1 for a summary).

- **Risk reduction and improved settlement performance**. The adoption of automated SDA processes reduces the rate at which trade fails occur and mitigates the costs associated with these fails. These costs include the various risk exposures (eg, position risk), the increased funding requirements that come with greater uncertainty in the settlement process, and claims, penalties or other direct costs associated with trades that settle either late or not at all. Automated trade verification and SDA reduce risks and improve settlement performance because of:
  - **greater accuracy in the trade verification process**—automation makes it easier for the IM or B/D to identify errors or mismatches in the trade details which, if not corrected up front, could result in the trade failing to settle on time. Automation also reduces the risk of new errors being introduced during the post-trade processes, compared with manual processing;
  - **improved process timing**—if the trade details are verified on trade day, a trade has a better chance of settling on the intended settlement day. With SDA, settlement instructions for affirmed trades can be sent to custodians or settlement agents on trade day, leaving the remaining days to finalise settlement and address any impediments that may arise further down the value chain, which would otherwise hinder timely settlement.
- **Operating cost efficiencies**. Automation allows the processing of a larger volume of trades without corresponding increases in operating costs and risk. It makes the trade verification process (and the accuracy and timeliness of that process) less sensitive to

changes in trading volumes, particularly peak volumes that would be more difficult to handle quickly and efficiently if manual processes were being used.

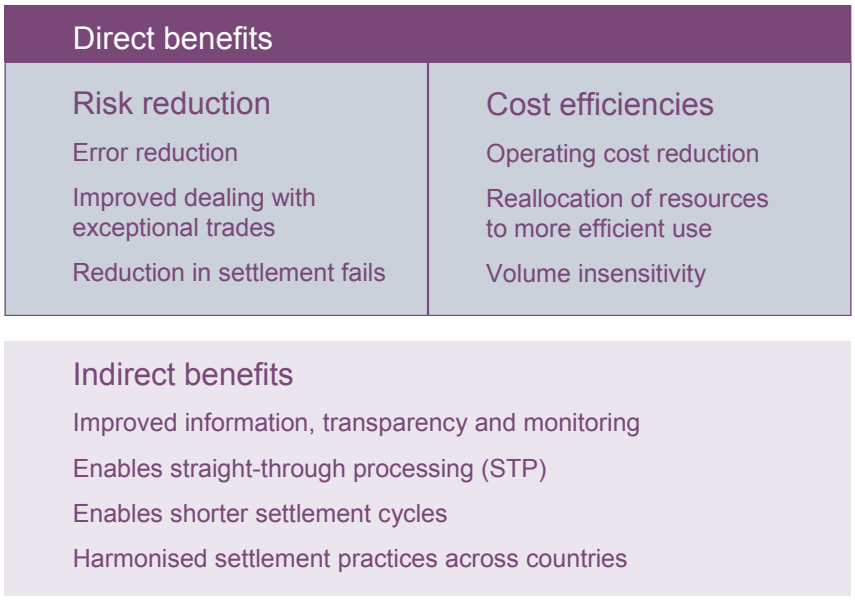
Automation allows firms to keep the number of staff working on trade verification within the middle office largely the same, despite significantly higher trade volumes, or to reallocate resources previously focused on repetitive manual tasks to more value-added activities.

Operating cost efficiencies are not restricted to the trade verification function within the middle office of the IM or B/D, but apply to other functions (and other parties) along the value chain. In particular, a reduction in the risk of trade fails implies lower costs of preventing or following up potential or actual fails.

Fewer fails mean fewer costs downstream in record-keeping, reconciliations of settlement instructions, corporate actions, claims-handling and other functions required to resolve fails. Some of the operating cost efficiencies will therefore be enjoyed by other parties along the value chain, not just the IM and B/D.

– **Indirect benefits**. In addition to the direct risk and cost reduction effects, automated SDA processes can generate benefits that are more indirect or ancillary in nature, such as improved information, greater transparency and better monitoring of the firm's own and counterparty performance.

Figure 1 Summary of benefits of automated trade verification and SDA



Source: Oxera.

The market participants interviewed for this study confirmed the empirical significance of these effects. After the transition to automation, the IMs experienced significant increases in SDA rates, improved settlement performance and notable operating cost efficiencies. Similarly, a comparison of automated and non-automated clients of B/Ds shows significant and quantifiable differences between these two groups in terms of settlement failure rates and other post-trade performance metrics—the data provided by some B/Ds suggests that, in recent months, the settlement failure rate for clients with automated trade verification processes has been as much as 50% lower than for non-automated clients.

Enhanced benefits from market-wide commitment to SDA

The risk reductions and cost efficiencies that can be realised by individual firms are likely to increase as more, and ideally all, firms in a given market adopt automated processes (that are standardised or interoperable). B/Ds, for example, need their existing (as well as potential) clients to adopt automation in order to reorganise their own activities in a way that fully captures the benefits of automation. If some clients (or potential clients) do not adopt automation, the B/D will still have to organise its operations in order to meet the requirements of its non-automated clients. At present, many IMs and B/Ds that have switched to an automated solution find it difficult to benefit from it fully due to the lack of automation of their counterparties.

Moreover, some of the benefits associated with automation and increased levels of SDA can be realised only if there is a market-wide move towards these processes (within a country or region). Initiatives such as shortening the settlement cycle and harmonisation of settlement practices across EU countries could be achieved more easily in an environment where firms have adopted more consistent and efficient trade verification processes.

Benefits for end-investors

The approach taken in this report is to consider the benefits from the perspective of individual market participants adopting automated SDA processes. However, from a wider perspective, these benefits can also be expected to translate into lower costs for end-investors—in a competitive industry, reductions in the risks and costs borne by IMs and B/Ds (or other intermediaries and infrastructure providers) would, once these benefits have been realised by a significant part of the market, be reflected in lower prices, resulting in lower transaction costs for end-investors and producing associated beneficial effects on liquidity.

Lack of automation and SDA in the current landscape

A significant and increasing proportion of market participants in Europe have already automated their trade verification processes and effectively adopted SDA as best operational practice. Nonetheless, many firms, particularly on the buy side, continue to process trades manually or in a partly automated manner, and transmit messages via fax, email or telephone—there is currently no uniform practice and often not even a specified target to complete verification and affirm trades on trade day.

If the benefits are significant, this raises the question of what prevents market participants from adopting automated processes to achieve SDA and experiencing the benefits that have already been realised by others in the market, including the firms interviewed for this study. Potential reasons for not adopting automated processes to achieve SDA include the following.

– A lack of understanding of the costs and benefits of automated SDA processes and, more generally, a lack of attention within firms to middle-office (and back-office) operations.

– A cost–benefit trade-off that may not be sufficiently attractive for individual firms given the level of implementation and ongoing costs associated with automated systems, and due to the skewed incentives of firms to undertake the investment. In particular, firms may not have the incentives to invest in automation if they currently do not bear the cost or risks associated with manual processes, but would incur the actual cost of changing the processes and investing in automated systems. Also, since the benefits depend to a large extent on the degree of automation of a firm's counterparties, the investment may not be worthwhile at current levels of automation in the market, but would become

worthwhile if automation (using standardised or interoperable systems) were introduced on a market-wide basis.

Trade verification and SDA should be part of the European policy debate

An analysis of the specific reasons for the lack of adoption of automated trade verification processes is beyond the scope of this report. However, the potential benefits on offer, combined with the possible reasons for a lack of adoption outlined above, suggest that, from a public policy perspective, there could be merits in facilitating increased adoption of automated processes and SDA as best operational practice among European IMs and B/Ds by, for example, increasing awareness and understanding, and improving the alignment of incentives within firms.

Overall, the report highlights the important role played by trade verification in the post-trading value chain, and shows how the adoption of automated processes and SDA could reduce costs and risks in post-trade processing and make the overall process more efficient. This is particularly important given the various ongoing initiatives aimed at building efficiencies in European post-trading. Trade verification, and how to improve this process (ie, towards automated SDA), should form part of the policy debate.

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1 Introduction

Oxera has been commissioned by Omgeo to carry out an independent economic analysis of the benefits associated with improvements in the trade verification process. In particular, this report considers the nature of the benefits associated with automating the process and establishing same-day affirmation (SDA) as best operational practice in equity markets among IMs and B/Ds in Europe.

Trade verification is carried out on the institutional side of the market between IM and B/D, following the B/D's execution of a trade order placed by the IM. This process ensures that the parties are in agreement about the essential trade details such as security identifier, trade date, deal price, number of securities bought or sold, commissions, settlement details, and relevant account information. The four key steps in the verification process are the notice of execution by the B/D, the transmission of allocation details by the IM, the confirmation of those details by the B/D, and the affirmation by the IM. SDA refers to completing the entire trade verification process on trade day.

A significant and increasing proportion of market participants in Europe have already automated their trade verification processes and effectively adopted SDA as best operational practice. Nonetheless, many firms, particularly on the buy side, continue to process trades manually or in a partly automated manner, and transmit the relevant messages via fax, email or telephone. There is currently no uniform practice and often not even a target to complete verification and affirm trades on trade day. The analysis presented in this report considers the benefits that firms can expect to gain from completing trade verification on trade day (ie, achieving SDA) and from adopting automated processes to deliver this. It sets out how automation of the trade verification process affects the activities of firms and reduces the operational costs and risks that arise along the post-trading value chain, ultimately lowering transaction costs to investors. The specific questions addressed are as follows.

– What is the role of trade verification between IM and B/D, and how does it relate to other activities that constitute the post-trading value chain?

– How does automation of the trade verification process improve the ability of IMs and B/Ds to achieve timely completion of the trade verification process, or why is automation a precondition for SDA?

– What is the nature of the benefits that can be expected from the adoption of automated trade verification processes, including the effects on operational costs and risks facing IMs and B/Ds?

The report examines the benefits only. The costs of implementing automated trade verification processes and any ongoing costs associated with automated systems are not directly examined; neither are the other factors that may prevent firms from adopting automated trade verification processes and achieving SDA. The focus is on equity transactions, but similar benefits can, in principle, be expected to accrue for other asset classes.

The assessment of the nature of benefits is based on a conceptual analysis of the different types of benefit that can be expected to arise at the generic level from SDA and the associated automation of the trade verification process. This analysis is supported by illustrative evidence of the extent to which benefits have accrued to individual European firms that have already automated their trade verification processes. In addition, a significant body of data on trades processed through automated systems was analysed which, given the lack of market-wide data, was mainly sourced from Omgeo. However, this analysis presents

Oxera's independent assessment and is not vendor-specific. Different automated systems are available in the market (proprietary and provided by other third-party vendors), which, in principle, could all deliver the benefits described in this report.

In addition to reviewing available information from primary and secondary sources, including the academic and professional literature, Oxera has conducted a series of in-depth interviews with IMs and B/Ds, as well as a global custodian, located in various EU Member States, including some of the largest players in their markets and at the European and global levels. These interviews informed the analysis about the importance of the trade verification process and the benefits of automation and SDA, as experienced (and in some cases quantified) by the firms themselves.

The report is structured as follows.

– Section 2 describes the structure of trading and post-trading activities typically observed in European countries, highlighting the role played by trade verification.

– Section 3 sets out the different models for trade verification and explores the relationship between automation of the process and SDA.

– Section 4 assesses the nature of benefits associated with automated trade verification and SDA.

– Section 5 provides illustrations of these benefits, drawing from the experiences of a sample of firms in Europe that were interviewed as part of the study.

– Section 6 provides a summary of findings.

2 The equity trading and post-trading value chain

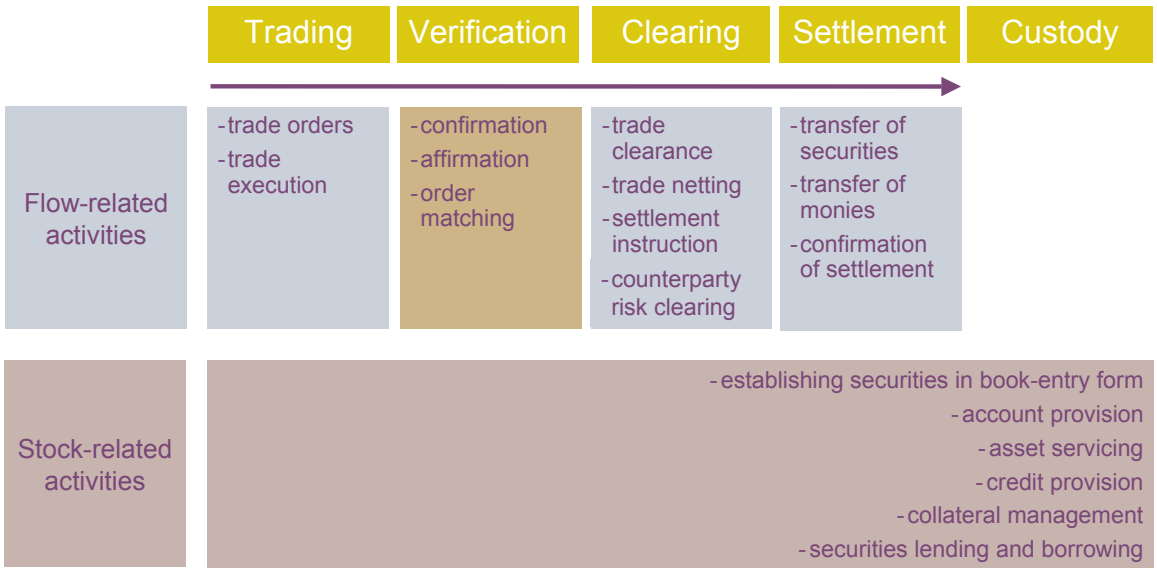
This section sets out the activities and roles of the participants in the equity trading and post-trading value chain. It specifically considers how the trade verification process is typically structured, and how it interacts with other activities in the value chain. This analysis therefore provides a basis for the assessment of the effects that improvements in the trade verification process can have on the costs and risks in the entire equity post-trading value chain.

2.1 Overview of trading and post-trading activities

Activities in the equity trading and post-trading value chain are complex, and involve many processes and a variety of market participants. These activities can be divided into two types: flow-related activities and stock-related activities. The former, including trading, trade verification, clearing and settlement, arise from securities transactions, while stock-related activities, such as custody and asset servicing, are related to the existence and ownership of the securities rather than the transactions involving those securities.

Figure 2.1 illustrates the generalised trading and post-trading activities, and distinguishes between services that are flow-related and those that are stock-related. The flow-related activities follow a strict sequence and, in most cases, activities at a given stage can be undertaken only when the previous stage has been successfully completed. In relation to trade verification, therefore, the way in which it is carried out will have a direct bearing on the activities in the subsequent clearing and settlement stages of the value chain. Sections 2.2 and 2.3 describe verification and other activities in more detail.

Figure 2.1 Trading and post-trading activities



Notes: While the flow-related activities relate to specific stages in the trading and post-trading value chain, the stock-related activities provide the custody services and enable the provision of the flow-related activities.
Source: Oxera (2007), 'Methodology for monitoring prices, costs and volumes of trading and post-trading activities', report prepared for the European Commission, July.

2.2 Trade verification

Trade verification is the process of ensuring that the trading parties are in agreement about essential trade details such as security identifier, trade date, deal price, number of securities bought or sold, commissions, settlement details, and relevant account information. Verification occurs once the IM has sent an order, and the B/D has executed the trade as per the order. As discussed in section 4, verifying these details early in the post-trading cycle helps to ensure that the subsequent clearing and settlement process can be completed successfully.

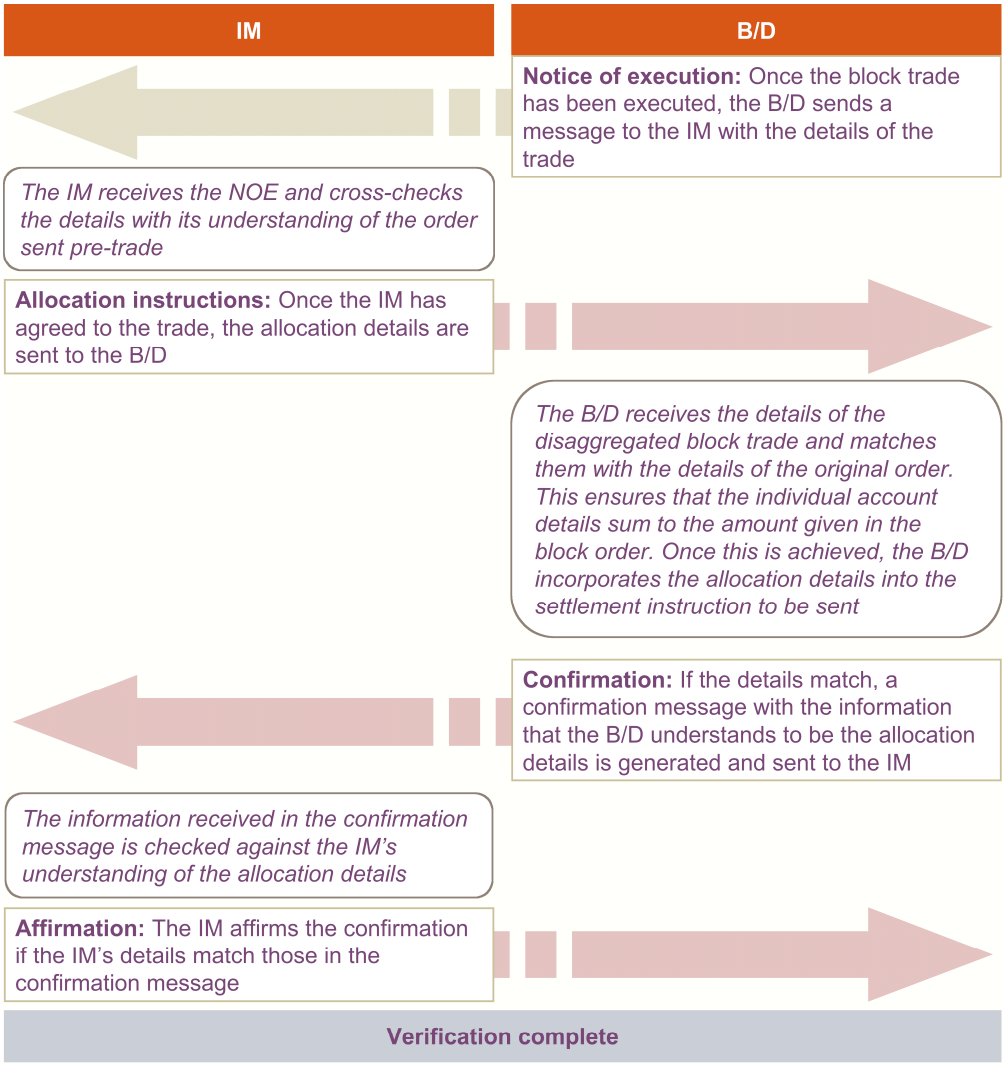
The essential focus of the trade verification process is on confirming and matching the trade details and, where required, adding further details and ensuring that the IM and B/D concur such that the trade can be cleared and settled. These functions are typically conducted from within the middle office of the firms, as opposed to the front and back offices, which are largely responsible for the trading and settlement/custodial functions, respectively.

An IM will often be entrusted to manage a number of separate accounts, or mandates, for different clients. However, it may be that the investment decisions relating to each individual mandate can be aggregated into one trade order, referred to as a 'block order'. The verification process in these circumstances starts with verifying the 'block-level' order, before verifying 'account-level' or 'allocation-level' details. The description provided in this report focuses on the verification process for block-level trades.

The process of trade verification begins once the block order has been executed by the B/D. Figure 2.2 maps out the simplified chain of activities and messages exchanged between B/D and IM in the verification process. Each message sent by the IM and B/D—ie, notice of execution (NOE), allocation details, confirmation and affirmation—contains different types of information about the trade.

The figure illustrates a trade verification process that is completed successfully. However, there are instances where some details provided by the B/D and IM do not match, and where completion of the verification process requires further intervention. This intervention—generally referred to as 'dealing with exceptions or errors'—requires the error and reasons for its occurrence to be identified, followed by corrective action to ensure that the trade details match and trade verification can be completed.

Figure 2.2 The trade verification process



Source: Oxera.

The way in which the trade verification process is carried out differs across markets and individual market participants. One key difference, and a focus of this report, relates to the extent to which the verification process is automated. At the general level, three main structural models can be distinguished.

– **Manual trade verification (local matching)**. Under manual verification, the allocation, confirmation and affirmation procedures are conducted sequentially between the B/D and IM. There is no involvement of any further intermediary, and the modes of communication between B/D and IM are usually telephone, fax or email.

– **Automated trade verification (local matching)**. The verification process can be automated in full or in part (eg, automated confirmation/affirmation, but allocation instructions are sent by fax or email). The process is conducted directly between the B/D and the IM through an electronic system (sometimes referred to as an electronic trade confirmation (ETC) system), which can be either provided by third-party vendors or developed by the parties themselves.

– **Automated trade verification with central matching**. This model is similar to the previous model in that the verification process is automated and conducted through an electronic system. However, in this case, the process is fully automated and centralised using a central matching utility, which is provided by third-party vendors. Unlike the local

matching models, where trade verification is conducted bilaterally and in a strict sequencing of steps (ie, the B/D sends notice of execution before the IM sends the allocations, and the confirmation by the B/D is followed by the IM's affirmation), central matching allows IMs and B/Ds to input the data independently and separately into the centralised matching utility, where the information is then centrally validated and matched.

Section 3 describes in detail the different types of trade verification, and provides an indication of the use of these models across European IMs and B/Ds.

2.3 Other activities

The verification of trades takes place at the start of the post-trading cycle—ie, directly after execution of the trade. Any improvements in the timing and quality of verification will affect the subsequent activities carried out not only by IMs and B/Ds but also by custodians, central securities depositories (CSDs) and other market participants. This section briefly sets out the other post-trading activities outlined in Figure 2.1 above, providing background for section 4, which considers the beneficial effects that improved trade verification can have on these activities and the completion of the settlement cycle as a whole.[3]

Flow-related activities—clearing

The two key activities involved in the clearing stage are clearing and central counterparty clearing.

– **Clearing (trade netting, trade clearance, settlement instruction)**. Clearing involves the preparation of a transaction for settlement, and comprises trade netting, trade clearance and settlement instruction. It normally follows the trading and verification stages and precedes the settlement stage. Clearing is commonly provided by CSDs.[4]

  Clearing involves three detailed processes. Trade netting is the process of bundling multiple transactions into a single settlement order. Trade clearance is the process of ensuring that the buyer has the monies available and that the seller has the securities available, based on either the gross or netted positions. The settlement instruction comprises the processing of the matched and netted trades to be sent for settlement.

  On the institutional side of the market, clearing follows completion of verification by IMs and B/Ds, and uses data that has been generated and/or checked for accuracy during the verification stage. This process takes place before the actual settlement of trades on CSDs.

– **Counterparty risk clearing**. This service is aimed at mitigating counterparty risk facing buyers and sellers of securities. In equity markets, it is usually provided by a central counterparty (CCP), and is carried out following completion of a trade on a trading platform, and before the settlement in the CSD. CCPs provide counterparty risk clearing by interposing themselves between the buyer and seller (the CCP acts as the buyer to the seller and as the seller to the buyer) in each trade in a given market segment (eg, all equity trades carried out on a given exchange).

[3] The definitions of activities set out in this section have been adopted from Oxera (2007), 'Methodology for Monitoring Prices, Costs and Volumes of Trading and Post-trading Activities', report prepared for the European Commission, July.
[4] However, in some financial centres, certain functions such as netting are provided by other market participants.

Flow-related activities—settlement

– **Transfer of securities, transfer of monies, confirmation of settlement**. Settlement is the completion of a transaction through the transfer of ownership of assets and monies, and it is the final flow-related activity in the post-trade cycle, following which the transaction is effectively complete. This is a two-stage process: the first involving the transfer of securities, and the second involving the transfer of monies. Settlement is complete only when the transfer of securities and monies is achieved, final and irrevocable.

  The settlement process uses the information generated in the trading, verification and clearing stages of the trade and post-trade cycle. With respect to verification, the accuracy and timeliness of information generated and/or checked during this stage are important determinants of whether the settlement of transactions is completed by the intended settlement day, and of the nature and costs associated with settlement activities more generally. The analysis in section 4 sets out the links between verification and settlement in more detail.

Stock-related activities

– **Establishing securities in book-entry form**. A book-entry register records all the holdings of a security in different securities accounts, and subsequently updates these accounts on the basis of settlement instructions.

– **Account provision**. The provision and maintenance of securities accounts for clients, which entails the secure holding and recording of their securities.

– **Asset servicing**. The administrative activities performed for the holders of securities, which may include the processing of corporate actions and tax reclaims and valuation of portfolios.

– **Credit provision**. The banking function within the value chain—ie, the extension of credit to ensure the clearing and settlement of transactions. As such, custody service providers and CSDs may offer credit provision as a standard arrangement to ensure that sufficient capital is available to process the transactions.

– **Collateral management**. Collateral is provided for structural purposes to ensure the efficient settlement of transactions—ie, investors and intermediaries may be required to post collateral with custody service providers and CSDs. Collateral management ensures that the best use is made of this collateral—for example, to generate inexpensive credit for the investor.

– **Securities lending and borrowing**. Services provided by custody service providers, where securities are either lent to or borrowed by other financial intermediaries. Securities lending is arranged by the custody service provider, which makes those securities available to other intermediaries (for the purposes of short-selling) and custody service providers (for the purposes of settlement).

These stock-related activities are closely linked to the verification process and other flow-related activities described above. The stock-related processes continually use information that is generated from the flow-related activities. For example, asset servicing requires information on the beneficial ownership of given securities at a given point in time. The efficient verification, clearing and settlement process is essential for ensuring timely and accurate information about beneficial ownership, which is used for asset servicing.

At the same time, stock-related activities directly facilitate completion of the flow-related activities. For example, where sufficient funds for settlement of transactions are not available, firms can use a credit provision. Similarly, in cases where required securities are not in the account, firms can borrow these securities by using a stock borrowing facility. Overall,

therefore, there is strong interaction between verification and other flow-related activities, and stock-related activities. The implications of this link are discussed in more detail in section 4.

2.4 The trading and post-trading value chain

Trading and post-trading activities are undertaken by a number of distinct intermediaries and infrastructure providers. Box 2.1 provides definitions of the main market participants.

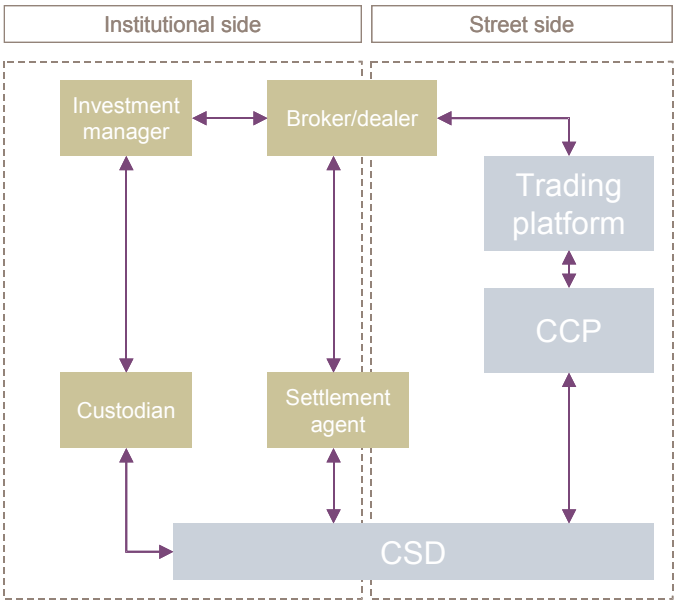
Box 2.1 Main market participants

The process of completing the trade of an equity security involves a number of market participants, which make up the security trading and post-trading value chain.

- **The investment manager (IM)**—manages the funds of other investors, making investment decisions for the funds in accordance with the agreed mandate of the fund.
- **The broker/dealer (B/D)**—an intermediary, usually, but not exclusively, an investment bank that executes trade orders on behalf of investors or IMs. An institutional brokerage firm may also execute trades on its own account.
- **Trading platform**—this may refer to an exchange, multilateral trading facility (MTF) or a crossing network. An exchange is a venue where securities are listed and trading takes place according to specified rules, providing a liquid market for trading. An MTF is a venue, other than an exchange, which provides trading in securities. A crossing network is an alternative execution network that matches execution orders outside exchanges and MTFs, using prices observed on these venues.
- **Central counterparty clearing house (CCP)**—an entity that interposes itself, directly or indirectly, between the counterparties to the trade in order to assume their rights and obligations, acting as the direct or indirect buyer to every seller, and the direct or indirect seller to every buyer.
- **Central securities depository (CSD)**—a provider of clearing, settlement and custody services. CSDs can either provide the primary book-entry register (ie, for securities issued into the CSD), or serve as a custody service provider (for securities issued into another CSD).
- **The custodian/settlement agent**—the custodian is a custody bank offering clearing, settlement, custody and safekeeping services across one or many financial centres. Settlement agents fulfil functions similar to those of custodians, and are responsible for settling the accounts of the trading parties.

The relationships between these intermediaries and infrastructures are complex and have evolved over time. To illustrate the high-level links, Figure 2.3 sets out a typical equity trading and post-trading value chain currently observed in Europe. In this case, the trade is initiated between the IM and B/D, and executed by the B/D on a trading platform. Subsequently, verification, clearing and settlement are carried out by the IM, B/D, CCP, custodian, settlement agent and CSD.

Figure 2.3 Value chain and relationships between participants



Source: Oxera.

In practice, there are often variations of the stylised value chain set out in Figure 2.3. In particular, there can be a significant degree of organisational integration between participants; transactions can sometimes involve additional firms, and do not need to involve all parties outlined in the figure. For example, one of the dominant infrastructure models used in Europe is a vertically integrated trading platform, CCP and CSD, which together form part of the same corporate entity.

As illustrated in Figure 2.3, trading and post-trading activities are typically divided into two parts—institutional side and street side. Activities on the institutional side generally relate to the trade and post-trading processes directly associated with the IM. These include trades with B/Ds, verification of trades between IM and B/D, and settlement activities related to the IM's account undertaken by custodians and CSDs. Activities on the street side generally relate to the trading and post-trading processes associated with B/D activities in the wholesale financial markets, including their dealings on the trading platforms and central counterparty clearing services provided by the CCPs.[5]

The analysis in this report focuses on the impact of changes in the trade verification process, which forms a key part of the institutional side of the trading and post-trading processes. Moreover, most of the changes on related processes are also likely to materialise on the institutional side, with somewhat weaker direct implications for activities on the street side. The analysis therefore focuses on the institutional side.

2.5 Timing of activities and SDA

The important feature of trade verification and other post-trading activities is the existence of close links between the processes involved. For example, on the institutional side, clearing and settlement of trades follows the verification stage; the verification process provides an input into the clearing and settlement processes, and various stock-related activities. Therefore, the timing (and the quality) of trade verification will affect the nature of the other

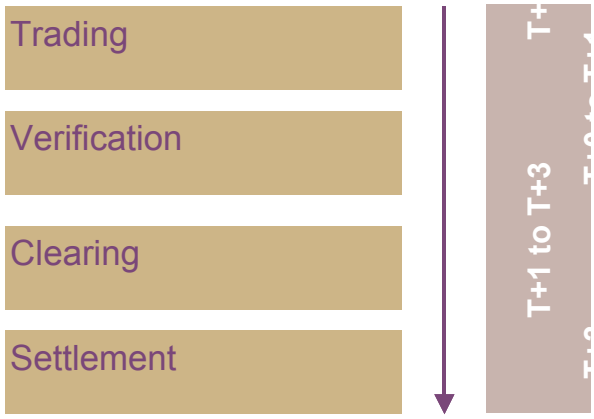
[5] Notably, the relationships between the parties and, more generally, the distinction between the street side and institutional side, are evolving over time. For example, IMs are increasingly accessing trading platforms directly using direct market access (DMA). Although this functionality is still predominantly provided by the B/Ds, this represents an increase in the direct participation of IMs on trading platforms and a shift in the role played by B/Ds.

activities that complete the settlement cycle and constitute the entire post-trading value chain.

Figure 2.4 illustrates the intended timing of the trade and post-trading activities. In most EU countries, the intended length of this settlement cycle for successfully completed equity trades is three days.[6] Trade verification is usually completed at T+0 or T+1, where T represents the date of trade. Following verification, the trade goes through clearing and settlement processes, with the full settlement achieved on T+3.

This represents the *intended* settlement cycle, which is achieved if no 'errors' or 'exceptions' are identified. In practice, a trade may be settled later than at T+3, or not at all. As discussed in section 4, some of the main benefits associated with improved verification processes relate to the ability to increase the proportion of trades that settle on the intended settlement date.

Figure 2.4 Intended timeline of trading and post-trading activities



Source: Oxera.

SDA is achieved if trade verification is completed on the trade date (T+0). Normally, firms that target SDA, and adopt automated verification processes to this effect, achieve SDA for the bulk of their transactions (see section 3), leaving the remaining days for clearing and settlement and dealing with exceptions or other impediments that may otherwise delay timely completion of the settlement cycle. Section 4 analyses the related benefits of this in more detail.

2.6 Summary

The trading and post-trading value chain in equity markets consists of a complex set of interrelated activities, and involves several types of financial intermediaries and infrastructure providers. Trade verification is one of the key post-trading activities on the institutional side of the market—it follows the B/D execution of a trade order placed by the IM, and takes place before the clearing and settlement of trades.

The process of verifying a block trade comprises four key steps: notice of execution, allocation instructions, confirmation and affirmation. It seeks to ensure that the B/D and IM are in agreement on the essential details of the trade so that the trade can be cleared and settled.

Trade verification affects the subsequent post-trading activities in the value chain down to final settlement, as well as various stock-related activities. Therefore, when considering the

[6] Some countries have adopted different settlement cycle periods; in Germany, for example, it is completed by T+2.

effects of changes in the trade verification process—ie, towards automation to complete the process on the trade day and achieve SDA—it is important to consider not only the direct changes arising at the trade verification stage, but also the wider implications for the settlement cycle as well as the post-trade activities related to the existence and ownership of the securities. Section 3 discusses the link between automating the trade verification process and achieving SDA. Section 4 describes the nature of the benefits that may be expected to arise from the move towards automated SDA processes. This conceptual analysis is supported in section 5 by illustrations of the actual benefits realised by market participants.

3 Automated trade verification and same-day affirmation

This section provides an overview of the structural models for the trade verification process, distinguishing in particular between manual verification and automation of the process, based on systems that allow either bilateral verification or central matching of the key trade details. It reviews the evidence available on the current levels of automation among B/Ds and IMs in Europe, and shows why, in practice, manual processes can delay the timely completion of trade verification, and thereby hinder SDA. This provides the basis for concluding that automated trade verification is a precondition to achieving SDA. Section 4 therefore discusses the benefits of both SDA as the outcome and automation as the process to achieve this outcome (and hence the joint benefits of automated SDA processes).

3.1 Automation of the trade verification process

As described in section 2, the verification of the trade details between IM and B/D is a key activity along the trading and post-trading value chain, taking place after the trade is executed and before it can be cleared and settled. Trade verification can be structured in a number of ways that differ in the degree of automation and the sequencing of the steps that make up the trade verification process—ranging from fully manual procedures that follow a strict sequencing of steps (ie, one party needs to complete a step before the other party can undertake the next one) to full automation, where trade details are centrally matched and validated, and the sequentiality of the processes is largely removed.

The analysis contained in this section, and in the report more generally, focuses on the generic benefits of automating the trade verification process to achieve SDA. Given the lack of market-wide data, the analysis and evidence presented draws mainly from data relating to Omgeo and the systems it offers (OASYS Global and Central Trade Manager).

3.1.1 Manual trade verification: local matching

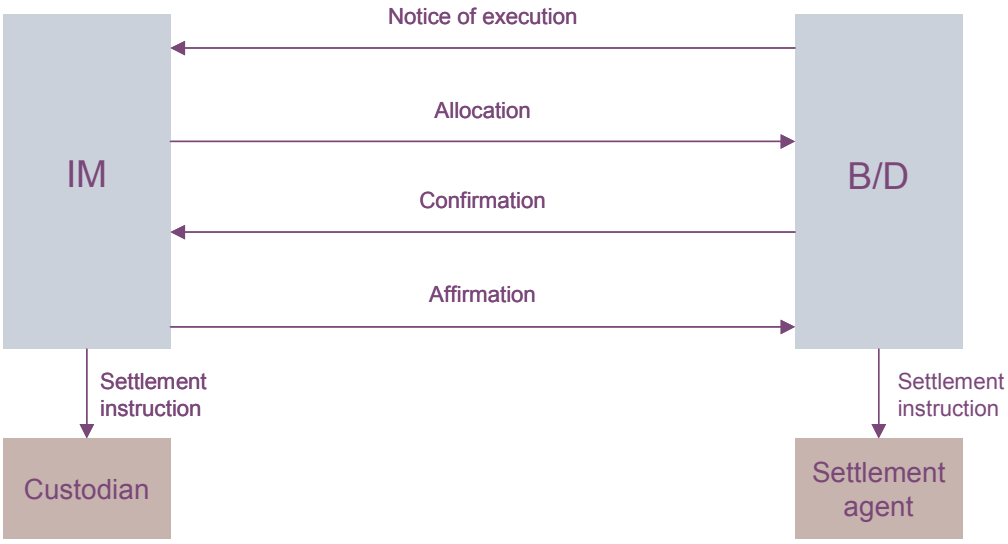
As summarised in Figure 3.1, manual trade verification involves several discrete and sequential steps that ensure that both parties agree on trade details. For block trades, these steps include the notice of execution by the B/D, the transmission of allocation details by the IM, confirmation by the B/D, and affirmation by the IM.

With manual processes, the flow of activities is sequential and the messages between B/D and IM tend to be communicated by fax, email or telephone. At each stage, the details received from the counterparties are checked manually, and there is often an element of re-keying the relevant data.

If discrepancies in trade details are identified at any time during the verification process, the parties need to take corrective action, which may involve contacting the other party or internally investigating the source of the error. Once identified, the error can be corrected, which may require adjusting the details of the trade, or initiating a new trade instruction with the correct details, after cancelling the incorrect one.

There is a strict sequence of steps, and each party must wait for the other to complete its actions before proceeding. Only once all the steps in the trade verification process are completed will the settlement instructions be sent and the next stage of post-trade processing begin. In practice, where trade verification is conducted manually, the B/D may not wait for the IM's affirmation message before proceeding to notifying the settlement agent and sending settlement instructions to the market—ie, trade processing may proceed to the next stage without affirmation by the IM that the trade details are in fact correct.

Figure 3.1 Manual trade verification: local matching



Source: Oxera.

3.1.2 Automated trade verification: local matching

The steps of the manual verification process set out in Figure 3.1 can be automated. For example, if both the IM and B/D have adopted ETC systems to verify their trades, the B/D can send the confirmation messages to the IM and, if the trade details match, receive the affirmation electronically without any need for manual checking or re-keying of the information, which would be required with faxes or emails. The IM may also have adopted systems that allow electronic transmission of the allocations upon receipt of the notice of execution of the block trade by the B/D. In this case, the trade verification process is fully automated, with both block- and allocation-level details transmitted electronically between the parties. In practice, the process is only partly automated for some IMs (see section 3.2 below)—the confirm/affirm process is automated, but allocations continue to be processed manually and transmitted by email, fax or telephone.

In addition, the automated systems can be configured to ensure that the relevant static data is appended to the messages and that settlement instructions are sent out as soon as the trade details are confirmed/affirmed.

There are a number of systems, either proprietary or provided by third-party vendors, that allow electronic trade allocation and confirmation/affirmation (see section 3.2). Under the OASYS Global system, for example, the B/D sends notices of execution of block trades to its clients and receives allocations back electronically, enabling it to automatically send contract notes to the IMs for affirmation. The B/D has the option of automatically appending settlement instructions to the message (via ALERT, a database and standard for the communication of settlement instructions). Depending on the implementation and use, OASYS Global (or similar systems) may be used only in the confirm/affirm process, but the IM may continue to transmit allocations manually—ie, the systems are implemented to automate the trade verification process only in part.

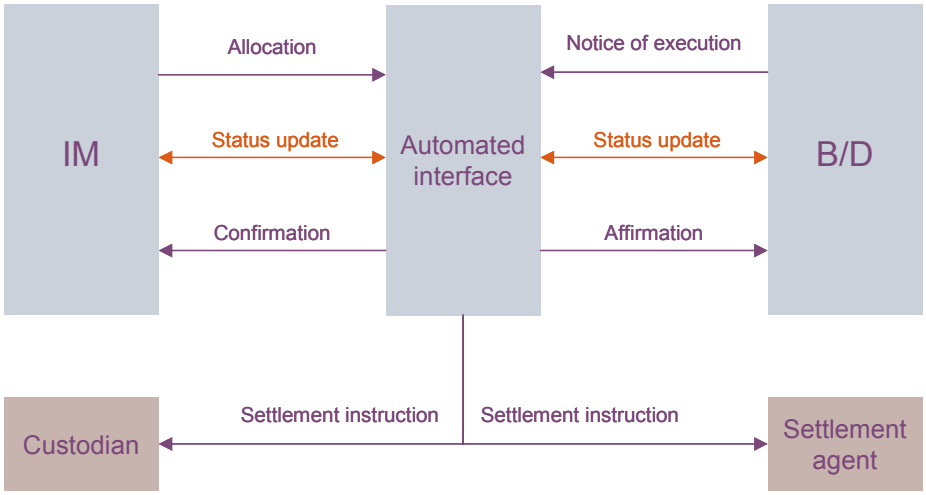
When there are discrepancies in the electronically transmitted trade details, the systems can highlight these and indicate the underlying sources of error. Manual intervention may then be required, although the software may have the functionality for such corrective action to be taken. Moreover, unlike manual verification processes, the intervention is focused on ‘problem’ trades or exceptions, rather than all trades.

3.1.3 Automated trade verification: central matching

Automation can be taken a step further by introducing an automated central interface (or matching utility) between IMs and B/Ds (see Figure 3.2). Central matching removes much of the sequentiality in the trade verification process, as the counterparties input the relevant data independently and separately. The information is then validated and matched centrally and to a large extent synchronously. When the details match, settlement instructions may be automatically sent to custodians and settlement agents. Moreover, the counterparties receive updates on the status of trades processed through the system, with errors (and the need to take corrective action) being indicated if trades do not match.

Central Trade Manager (CTM) is one solution currently available in the market to centrally match trades between counterparties (see section 3.2). In addition to matching the trade details at both block and allocation level, CTM has other functionalities, such as automated settlement notification messaging or options for exception processing.

Figure 3.2 Automated central matching



Source: Oxera.

3.2 Automated trade verification: current levels and growth rates

Comprehensive data on the trade verification process, the degree of automation and the systems adopted by B/Ds and IMs in different European markets is not currently available. The following summarises evidence based on surveys of European B/Ds and their clients, as well as data on trade flows processed through OASYS Global and CTM as two of the automated systems available for trade verification.

The analysis of the data allows two main conclusions to be drawn. First, the use of automated processes is increasing, but a significant proportion of trades continue to be processed manually using fax, email or telephone. Second, the use of automated systems differs across market participants and markets, although there is a trend towards increased automation of the trade verification process.

3.2.1 Evidence based on surveys of European firms

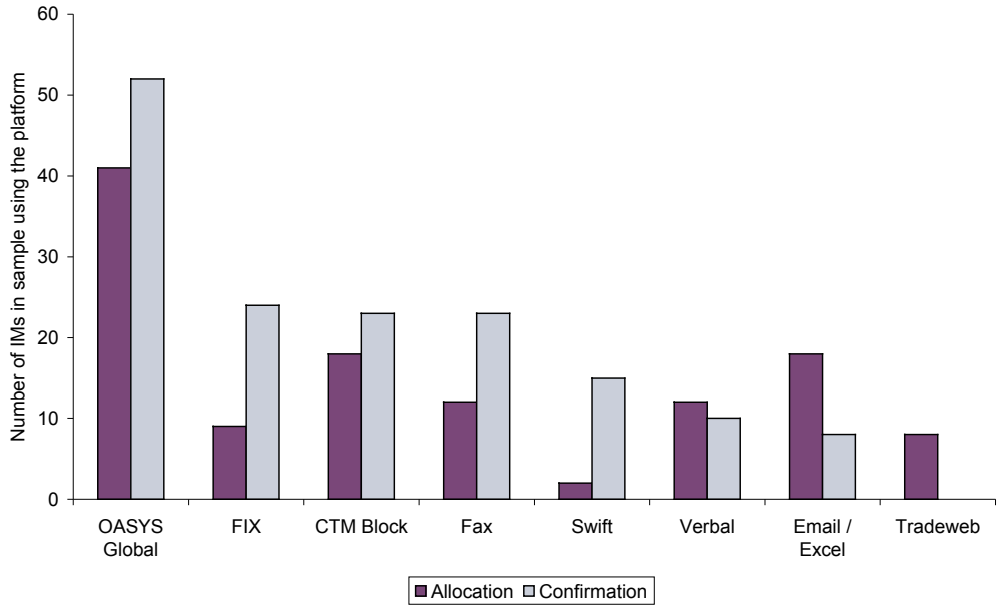
Z/Yen (2007) presents the results of a survey of 17 European B/Ds, including most of the largest firms that provide services for coverage for their clients on a global basis.[7] In addition to ranking the operational performance of a sample of 97 clients, the B/Ds were asked to

[7] Z/Yen (2007), 'Operational Performance of Client: Market Survey—2007'.

identify the platforms used by these clients for trade verification purposes, distinguishing between allocation and confirmation/affirmation.

A significant proportion of clients were reported to have implemented automated processes (see Figure 3.3). Nonetheless, emails, fax and verbal communications remain important for some of the clients reviewed by B/Ds. This applies to allocations as much as to the confirm/affirm messages, but allocation instructions in particular tend to be transmitted manually more frequently—eg, with Excel spreadsheets listing the allocations sent by email.

Figure 3.3 Platforms used by IMs for allocations and confirmation/affirmation

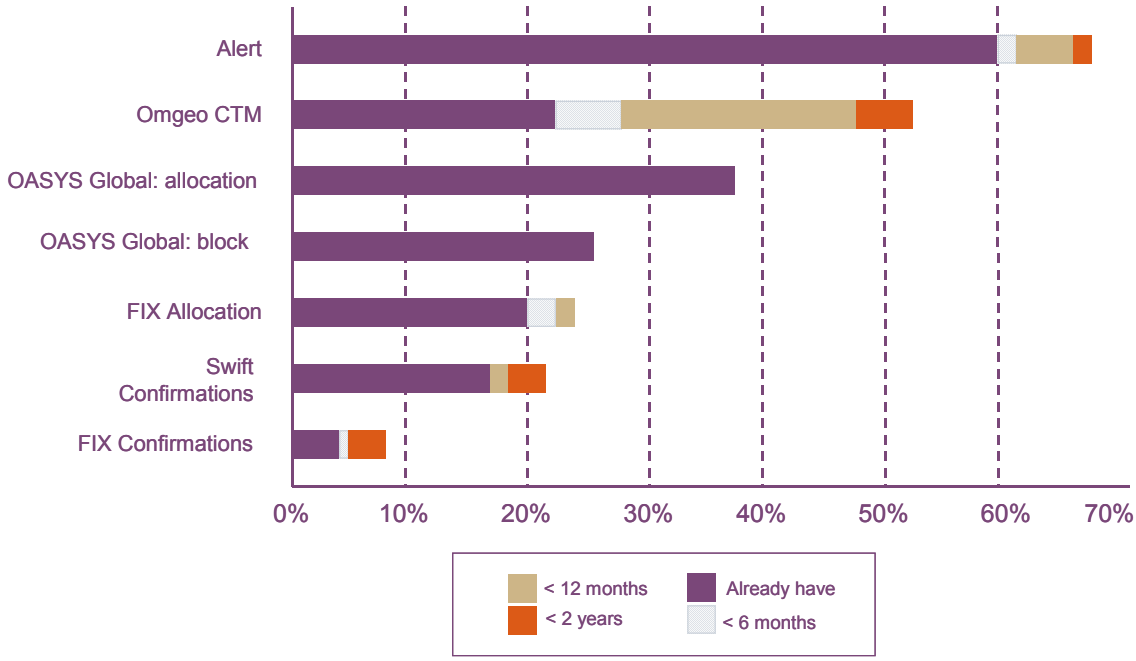


Source: Z/Yen (2007), 'Operational Performance of Clients: Market Survey—2007.'

In 2007, Z/Yen also conducted a survey of 75 clients, including leading European IMs, hedge funds and pension funds.[8] The firms were asked to describe their current use of different automated systems for trade verification, as well as their plans to introduce further automation. Figure 3.4 presents the results. The majority of firms already have ALERT, and more are expected to take it up. ALERT provides an automated tool for the maintenance and communication of settlement instructions. As regards trade verification, OASYS Global, at either the block or allocation level, is also used by many of the responding firms. Since OASYS Global will cease to be available for allocation processing, many firms stated that they will migrate to CTM, which, based on these estimates, will, within the next few years, be used by more than half of the firms responding to the survey.

[8] Z/Yen (2007), 'Operational Performance of Brokers: European Securities—2007'.

Figure 3.4 IM use of automated systems and plans for further automation (% of IMs in sample)

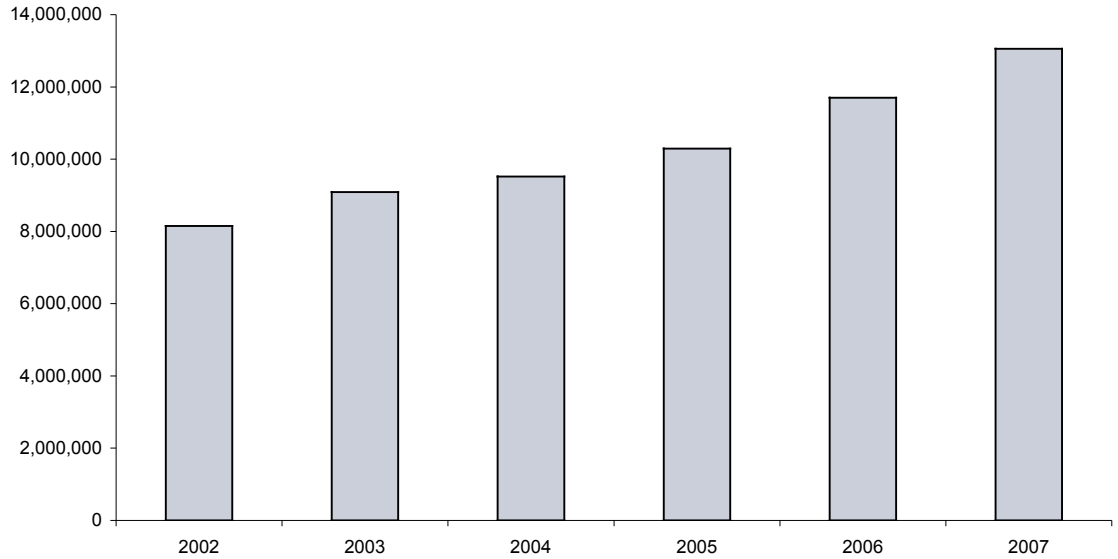


Source: Z/Yen (2007), 'Operational Performance of Brokers: European Securities—2007'.

3.2.2 Evidence based on volumes flowing through OASYS Global and CTM

Figure 3.5 shows the volume of trades of IMs in Europe that flowed through OASYS Global and CTM from 2002 to 2007. Over this period, automated trades increased by more than 60%, reaching just over 13m in 2007.

Figure 3.5 Trade volumes flowing through OASYS Global and CTM

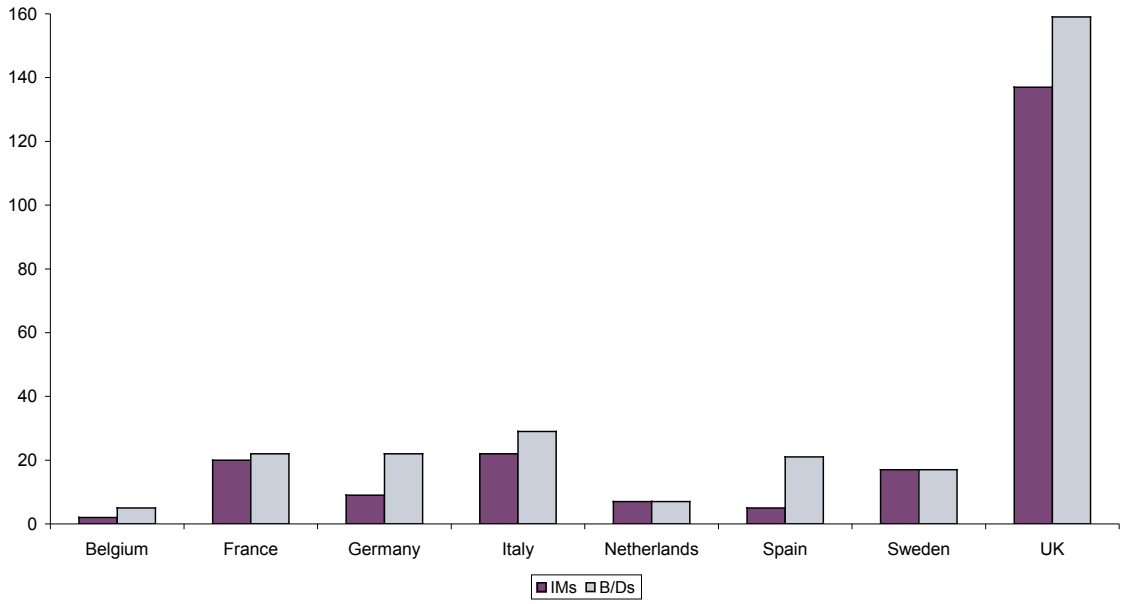


Source: Omgeo.

A significant proportion of the automated trades are for IMs based in the UK—in total, 68% of total OASYS Global and CTM trades in 2007 were for UK IMs. This is likely to reflect both the comparatively large UK market for asset management as well as the greater degree of automation of the trade verification process using the OASYS Global and CTM systems by IMs in the UK compared with other parts of Europe.

The difference in uptake across markets is also evident from the number of firms having adopted OASYS Global or CTM (Figure 3.6). Of the 219 IMs and 159 B/Ds using these systems in Europe as at December 2007, around 60% are identified as being in the UK.

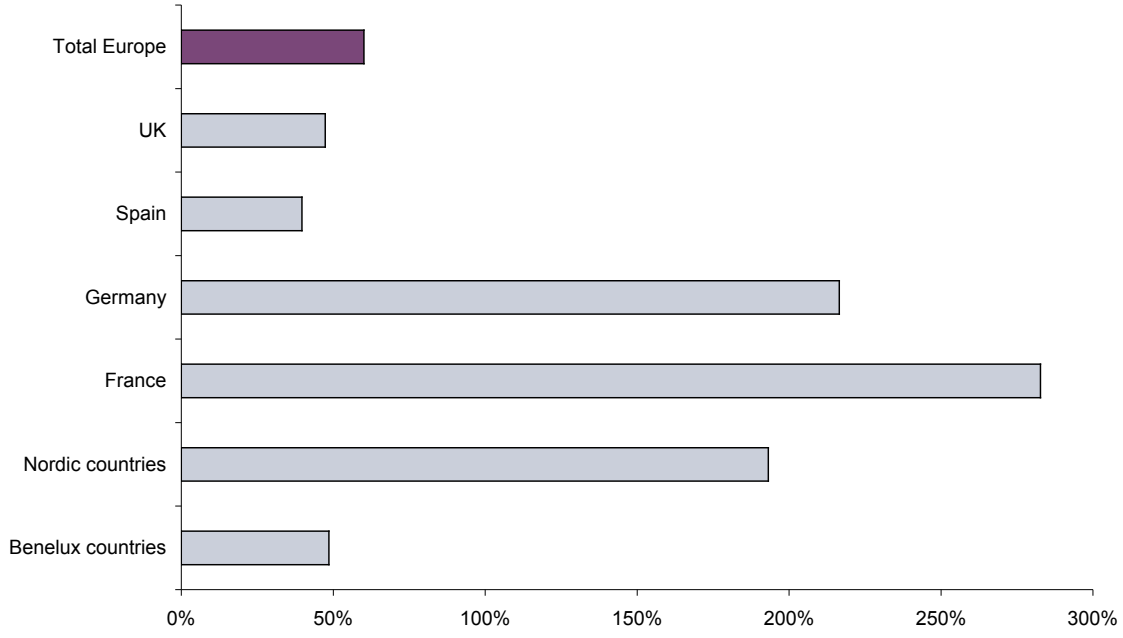
Figure 3.6 Number of market participants using OASYS Global or CTM, 2007



Source: Omgeo.

Nonetheless, the number of firms taking up automated systems, as well as the volume flowing through these systems, has been increasing across Europe, indicating a general trend towards greater automation of the trade verification process. As shown in Figure 3.7, over the six years to 2007, the number of IM trades processed through OASYS Global or CTM increased by 60% in Europe as a whole, with automated trade volumes more than tripling in some markets, albeit from low levels.

Figure 3.7 Percentage growth in trade volumes flowing through OASYS Global and CTM, 2002–07



Source: Oxera calculations based on Omgeo data.

3.3 Automation as a precondition for SDA

The trade verification process encompasses the notice of execution from B/D to IM, the allocation instructions from IM to B/D, and the confirm message from the B/D, which is then affirmed by the IM. If conducted manually, this process involves discrete and sequential steps, with the counterparties responding to each other's messages by fax, email or telephone, and the relevant data being checked and re-keyed. In practice, this means that the verification process cannot be completed on the trade day, at least for a significant number of trades, particularly given limited labour resources. Data on affirmation timing with manual processes is not systematically captured.

Moreover, with manual processes at the level of the IM, B/Ds will often not wait for the affirmation from the IM before notifying their settlement agents and submitting their settlement instructions—ie, the confirm/affirm process is one way, with the B/D sending the confirmation but without the IM returning the affirmation. In this case, settlement instructions are sent on the basis of trade details that have not been affirmed and that risk being incorrect.

SDA—or the completion of the trade verification process on trade day—is therefore difficult to achieve in practice if the process is conducted manually.

By contrast, automated trade verification processes are geared to delivering SDA, irrespective of trade volumes (including temporary peaks in those volumes). As summarised in Table 3.1, which shows affirmation timing of trades of European IMs flowing through OASYS Global and CTM, an average of 70% of trades are affirmed on trade day when the confirm/affirm process is automated, but without central matching. With central matching, the average SDA rate increases to more than 86%.

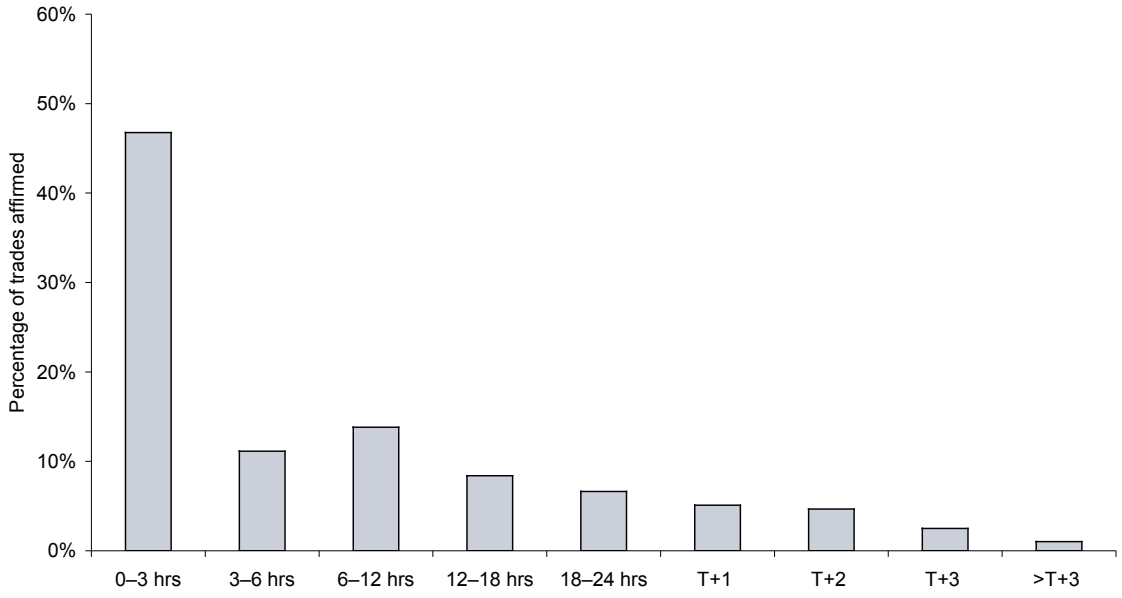
Table 3.1 Affirmation rates with automated trade verification processes

	Local matching (OASYS Global)	Central matching (CTM)
Percentage of trades affirmed on:		
T	70.26	86.72
T+1 days	85.98	91.81
T+2 days	90.97	96.48
T+3 days	97.62	98.99

Notes: Based on trades of European IMs in December 2007, including 469,093 trades processed using OASYS Global and 710,399 trades using CTM. Both equity and fixed income trades are included.
Source: Oxera calculations based on Omgeo data.

Moreover, for a significant proportion of the trades, the trade verification process can be completed within a few hours of execution. As shown in Figure 3.8, almost half of the trades of European IMs flowing through CTM are centrally matched and affirmed within three hours.

Figure 3.8 Distribution of affirmation timing with automated trade verification processes



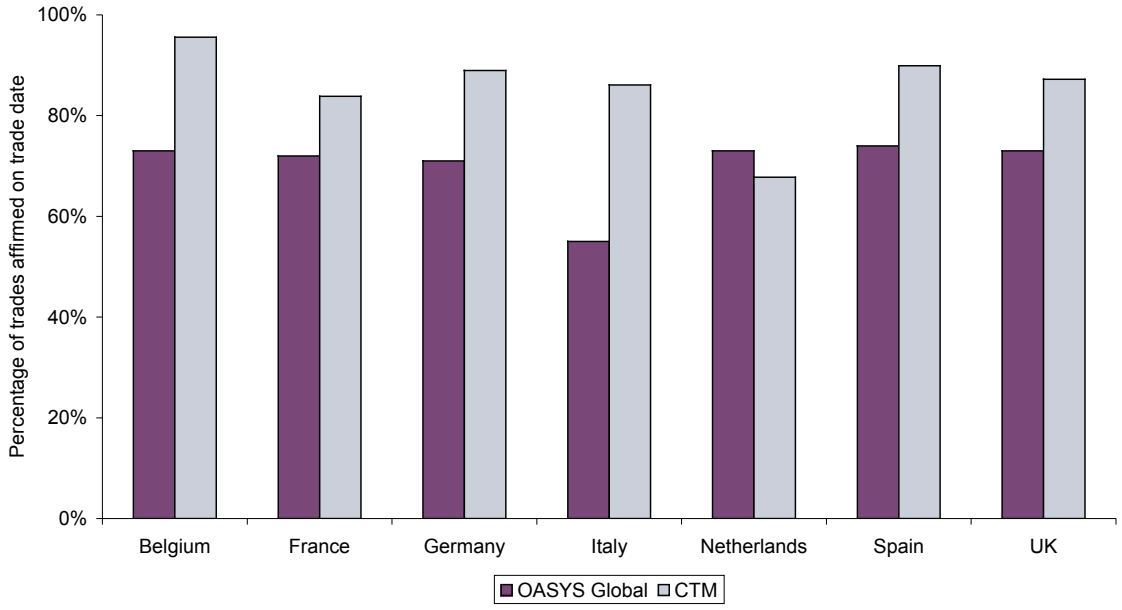
Notes: Data relates to automation via central matching (CTM) only. Equity and fixed income trades of European IMs in December 2007 are included.
Source: Oxera calculations based on Omgeo data.

The SDA rates remain below 100% even with automation. Errors and exceptions (eg, in the form of non-matching trade details) cannot be eliminated completely. Nonetheless, the data suggests that automation assists timely completion of the process for the bulk of the trades that can be sent straight through for settlement, allowing resources to be focused on those trades where manual intervention is required to rectify any errors identified.

SDA rates also depend on the way in which automated systems are implemented and operated. For example, the systems may not be effectively linked with the order management system in the front office, in which case there may be a delay following execution before the trade is communicated to the middle office for processing. Delays may also occur if automation is implemented only in part—eg, with allocations being sent manually and only the confirm/affirm process being automated. SDA rates may also differ according to the geography of a particular trade and the market participants involved. For example, given time zone differences, an IM based in Europe may more readily affirm a trade on the same day if the B/D confirms from Asia rather than the USA.

Variations in SDA rates are also evident when examining different markets (see Figure 3.9). In some markets, the average SDA rate of IMs using automated systems is more than 90%, while in others it falls short of 70% although the same system is used for trade verification. What drives these differences is unclear. In general, however, SDA rates tend to be higher if the trades are centrally matched rather than processed bilaterally at the local level.

Figure 3.9 SDA rates for IMs with automated trade verification processes, by market

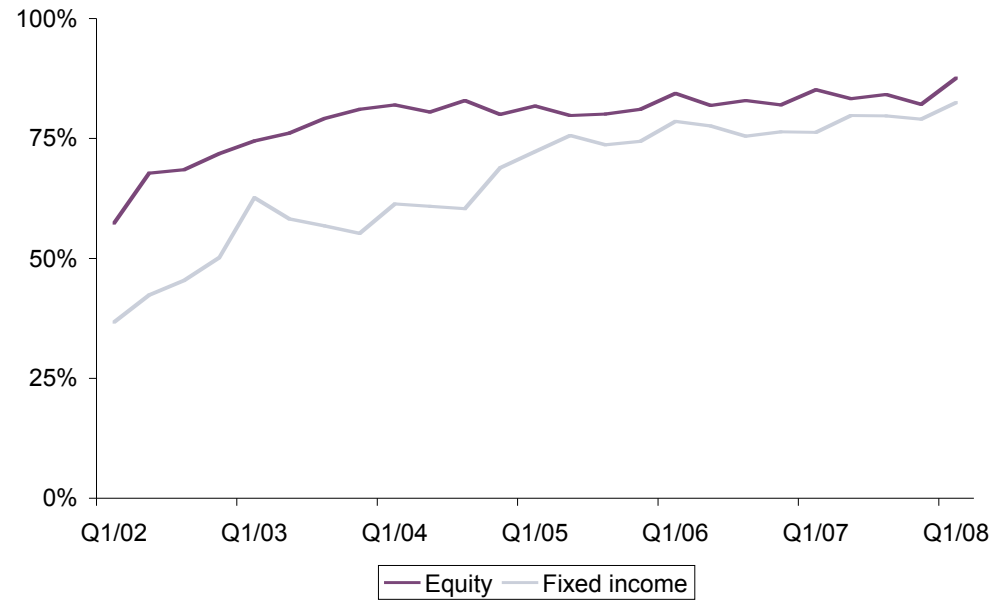


Notes: Based on trades of European IMs in December 2007. Both equity and fixed income trades are included. Countries attributed by location of IM.
Source: Oxera calculations based on Omgeo data.

Thus, automation does not lead to SDA rates of 100%, but it is arguably a precondition to achieving SDA as best operational practice for the bulk of trades. Moreover, SDA rates of trades processed through automated systems have been increasing over time (see Figure 3.10), which indicates that the systems, and their implementation and use, have been adapted over time to deliver improved SDA performance for equity trades (and also for fixed income trades).

In the analysis that follows, automation of the trade verification process (using electronic systems based on either local or central matching) is interpreted as a requirement for SDA. Although the focus of the analysis is on the benefits that can be expected to arise from SDA, in practice SDA requires automated trade verification. Some benefits of automated SDA processes can be attributed to SDA itself as the desired outcome (ie, timeliness of verification), while others are the consequence of changing the process, or means, to achieve this outcome (ie, automation of verification).

Figure 3.10 Improvement in SDA rates over time



Notes: Based on equity and fixed income trades conducted by five of the largest B/Ds based in London. SDA rates are quarterly averages of trades flowing through OASYS Global and CTM.
Source: Oxera calculations based on Omgeo data.

3.4 Summary

Automation of the trade verification process is increasing, but there are market participants in Europe, particularly IMs, which continue to verify equity trades manually or have introduced only partly automated processes. There is still some way to go before automated trade verification processes are adopted on a market-wide basis across Europe.

Manual trade verification involves discrete and sequential actions and messages between the B/D and IM concerning notice of execution, allocation instructions, confirmation and affirmation. The counterparties respond to each other's messages by fax, email or telephone, and the relevant data needs to be checked and re-keyed manually. In practice, manual processes will delay completion of trade verification beyond the trade day, at least for significant trade volumes and where there are resource constraints.

Automated trade verification (using electronic systems to match the trade details either locally or centrally) is a precondition for achieving high rates of SDA, regardless of the trading volume. While automation does not guarantee SDA for all trades, it does provide the means to achieve timely trade verification and establish SDA as best operational practice in the market. Therefore, the analysis that follows considers the benefits that can be expected from automated SDA processes—ie, benefits due to SDA as the outcome (ie, timely trade verification), and automation as the means to achieve this.

4 The benefits of automated SDA processes

The benefits of adopting automated SDA processes are set out below, together with a description of the dimensions along which the benefits can be expected to arise. Section 4.1 provides an overview of the dimensions of benefits. Sections 4.2 and 4.3 examine the direct benefits in terms of reductions in the risks inherent in the trading and post-trading process as well as operating cost efficiencies. Section 4.4 describes the more indirect benefits that may arise.

The analysis in this section is largely conceptual in nature, building on the trading and post-trading value chain described in section 2 and the link between automation and SDA in section 3. However, interviews with market participants have confirmed the empirical significance of the conceptual benefits set out in what follows; section 5 provides illustrations of the actual benefits that have been realised by the sample of European IMs and B/Ds interviewed as part of this study.

4.1 Overview of benefits

The adoption of automated SDA processes can deliver benefits along different dimensions. This section distinguishes the direct benefits accruing to market participants adopting automated processes from the more indirect benefits, which are reinforced if automated processes are adopted as best operational practice in the market as a whole.

- **Direct benefits**. Automation of the trade verification process can improve trade processing times and deliver SDA by eliminating the requirement to send information back and forth manually between B/D and IM, and by avoiding the errors inherent in manual processing. This translates into benefits in the form of:
  - a reduction in operational risk and trade failure rates for a given level of operating costs—ie, trades are more likely to settle on time, other things being equal;
  - a reduction in operating costs for a given risk and failure rate.
- **Indirect benefits**. The adoption of automated SDA processes can bring a range of benefits that are of a more ancillary or indirect nature than the risk and cost reduction effects. These relate to the following:
  - automated systems allow better (tracking of) information, enhance transparency, and facilitate monitoring of own positions and performance as well as counterparty performance;
  - automating the trade verification process is a prerequisite of straight-through processing (STP);
  - the risk reductions and cost efficiencies that can be realised by individual market participants depend on the level of automation of counterparties and the market as a whole. Market-wide adoption of automated SDA processes can deliver further benefits, such as providing a foundation for initiatives to further shorten the settlement cycle, or lowering transaction costs in the system with implications for liquidity and other aspects of market operation.

These benefits are described in more detail below.

4.2 Direct benefits: reduction in operational risks and trade failures

The aim of all participants in the post-trading cycle is to achieve settlement of the trade on the intended settlement date, which for most countries means by T+3. The sooner an error is detected, the sooner it can be corrected and the more likely it is that the trade will settle on time. The trade data therefore needs to be verified as early as possible, to establish in particular that all parties have the same data. There is reconciliation of all key data: price, buy or sell, quantity, security code, and accounting data for the counterparties; and, once the order is executed, the execution date, settlement/delivery date, stock market and local taxes, net value, allocation, commission, transaction terms, currency of execution and of settlement.

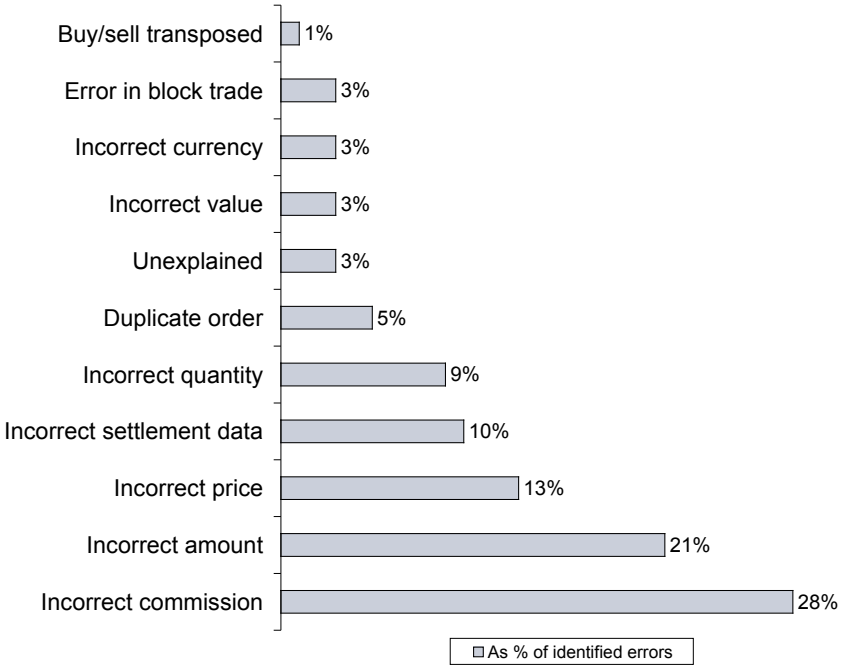
The following sets out how automated SDA processes can improve the trade verification process by reducing risks and mitigating the consequences (and frequency) of processing errors that could otherwise result in trades failing to settle.

4.2.1 Benefits from error reduction through automation of the trade verification process

Like other processes, the trading and post-trading cycle is prone to error. At the trade order and execution stage, the IM may send incorrect, incomplete or unauthorised instructions to the B/D. The B/D in turn may incorrectly interpret or execute the instructions received. Even if a trade is correctly executed, errors may arise in its processing by the middle and back offices. These relate in particular to errors in the reference data of the trade, or miscommunication of the relevant trade details. For example, the B/D may give the incorrect trade details in the notice of execution; the IM may fail to spot a mismatch between the actual trade order and what is reported; the IM may transmit the wrong allocation instructions, or the B/D may incorrectly process those allocation details; and the B/D (IM) may confirm (affirm) what are in fact incorrect trade details and, as a result, settlement instructions are sent that are based on trade details that do not match.

These errors or miscommunications can relate to all the relevant details of a trade. Figure 4.1 illustrates the main sources of transaction errors, which include incorrect trade details concerning commission charged, amount traded, price, and intended settlement date.

Figure 4.1 Main types of transaction error



Notes: The figure shows the reasons for rejection of trades flowing through Omgeo systems, as recorded in Omgeo Benchmarks (a performance benchmarking tool).
Source: Omgeo Benchmarks.

Miscommunication of the relevant reference data or other processing errors can be an important cause of trades failing, and it is the process of trade verification between IM and B/D—ie, the cross-checks and matching—that can prevent these failures from occurring.

Automation can improve the trade verification process and deliver benefits in two main ways.

– **More efficient identification of errors**. Automation makes the trade verification process more volume-insensitive, and allows a more rapid and accurate identification of any errors or mismatches in the trade details processed by the IM and B/D, including at times of peak trading volumes. The automated systems highlight those trades that do not match and that may require further information or manual intervention. For example, as illustrated in Figure 4.2, the system indicates those trades that do not match between IM or B/D and highlights the components where there is a mismatch in the details (within specified tolerance levels, where appropriate). The trades are queued in the system and indicated as 'non-matching' until the details are amended and a match occurs (or the trade is cancelled). Moreover, since the information or messages on trades arrive at one point of entry and are electronically stored, they can be more readily accessed and tracked than communications by email, fax or phone. The adoption of automated systems for trade verification may also help identify any mistakes made at the trade order and execution stage, particularly if these are integrated with the front-office systems for order management and execution.

Figure 4.2 Illustration of matching fields and electronic error identification

Required match fields	Tolerance	IM	B/D	
Quantity	Exact	200	200	
Trade date time	± 9hr	20010710114716	20010710114716	
Executing broker	Exact	ABC Ltd	ABC Ltd	
Transaction type	Exact	BUY!	SELL!	x
Instruction party	Exact	XYZ Mgt	XYZ Mgt	
Security ID	Exact	GB0007192106	GB0007192106	
Optional/variable match fields				
Price	± .25	50.00	50.05	
Commission	± 10%	40.00	42.50	
Total net amount	± 2%	10060.00	10075.00	
Settlement date	Exact	20010713	20010714	x

Source: Based on Omgeo (2004), 'Omgeo Central Trade Manager: Features Description'.

– **Less scope for new errors**. Each of the sequential stages of the manual trade verification process requires intervention to check the trade details, input instructions, etc. Data may have to be entered repeatedly, leading to duplication of effort and the risk of clerical errors being introduced in the process, especially where trade volumes to be processed are high and the manual tasks are repetitive. Where trade verification is not automated, the messages between the B/D and the IM might be transmitted by fax, which may be insecure and give rise to errors (eg, faxes can be forged, or the print quality may be unsatisfactory and lead to errors). In addition, manual intervention may not only be more prone to unintentional errors or negligence, but could also lead to manipulation of the trades processed. With automation, manual intervention is restricted to unmatched or exception trades, reducing the scope for fraud and other operational risks inherent in manual processing.

Overall, automation improves the trade verification process by eliminating the requirement to send information back and forth manually between B/D and IM and by avoiding the errors inherent in manual processing. Automation makes the process largely insensitive to trade volume and peaks in volume over time (at least up to the point where system capacity is reached) and enables a more efficient identification of errors and non-matched trades than manual cross-checking.

If automating the trade verification process ensures greater accuracy in the relevant information flows between the B/D and the IM, this is likely to imply greater accuracy in the settlement instructions that are then sent to custodians and out to the market—particularly if automation is introduced such that, for matched trades, instructions are automatically appended and sent through for settlement. As discussed below, inaccurate settlement instructions, or instructions based on trade details that do not match between the counterparties, create problems further down the value chain and increase the risk of the trade failing. In other words, a trade has a better chance of settling on time if errors in trade details are avoided in the first place, or identified at an early stage and corrected, before settlement instructions are sent to custodians and settlement agents.

4.2.2 Benefits from improvements in process timing and dealing with exception trades

In addition to greater accuracy, automation of the trade verification process gives timing advantages through achieving SDA. As set out in section 3, the adoption of automated systems means that trade verification can be completed and the bulk of trades affirmed on T+0, indeed within a few hours of the trade being executed—SDA rates with automation can exceed 80% or 90%.

If the details are verified on T+0, the trade has a good chance of settling on the intended settlement date, which in most cases means T+3. With SDA, settlement instructions for affirmed trades can be sent to custodians and out to the market on T+0, leaving three days to finalise settlement and address any impediments that may occur later in the process and potentially hinder settlement. In particular, if the trade verification process is integrated with an automated settlement notification process, for matched trades, STP can be achieved through the automatic creation and transmission of the settlement instructions—potentially all within hours of executing the trade. Similar timings would be difficult, if not impossible, with manual processes and bilateral communications via fax, email or telephone, particularly when trade volumes are significant.

By affirming the majority of trades on trade date (ie, achieving SDA for most trades), the counterparties can deal with any trade exceptions more effectively—ie, trades that fall out of the process because of problems, disputes, or incomplete or incorrect data. With automation, the bulk of trades are processed automatically without manual intervention. Further intervention by either counterparty is necessary only if the trade triggers an exception. This leaves more time and resources for B/Ds and IMs to identify any problematic trades at an early stage in the process and to focus their attention on the processing of these exceptions.

Automated trade verification systems highlight errors and unmatched trades that require intervention. This allows either counterparty to quickly determine which trade details are not ready for settlement, what further information may be required, or whether an exception must be processed. The systems automatically generate notifications of the exception for retrieval by the parties, enabling them to take appropriate action such as amending, cancelling or rejecting the trade.

Automated systems may also make the ‘repair’ of exception trades easier. Depending on the system adopted, the counterparties can view their trade status and instantly amend, cancel or reject the trade information using the system’s interface, thereby simplifying exception processing. For example, they can amend trade details as soon as they realise that trade data is incorrect or that they need to react to a rejection from their counterparty. Alternatively, either counterparty can cancel the trade at any time before the settlement instructions are

sent, or they can reject a trade where the details do not match. The reject message may provide the reason for the rejection and enable the parties to research the problem and take immediate corrective action. These actions can be automatically tracked and stored in the system, allowing the parties to research the history of a trade—following, for example, a request by the counterparty or for internal auditing purposes.

Mistakes in the trade verification process may result in settlement instructions being sent that are based on incorrect or non-matching trade details. Where the trade details do not match, the trade cannot settle in the market. If the process is carried through to T+1 or T+2, rather than completed on the trade date, there may be insufficient time to repair exception trades and take corrective action. The result may be the trade failing to settle on the intended settlement date.

Failure to affirm and match trades in a timely manner is of course not the only reason why trades fail to settle, and adopting automated SDA processes will not eliminate trade fails completely. Trades may also fail for the following reasons.

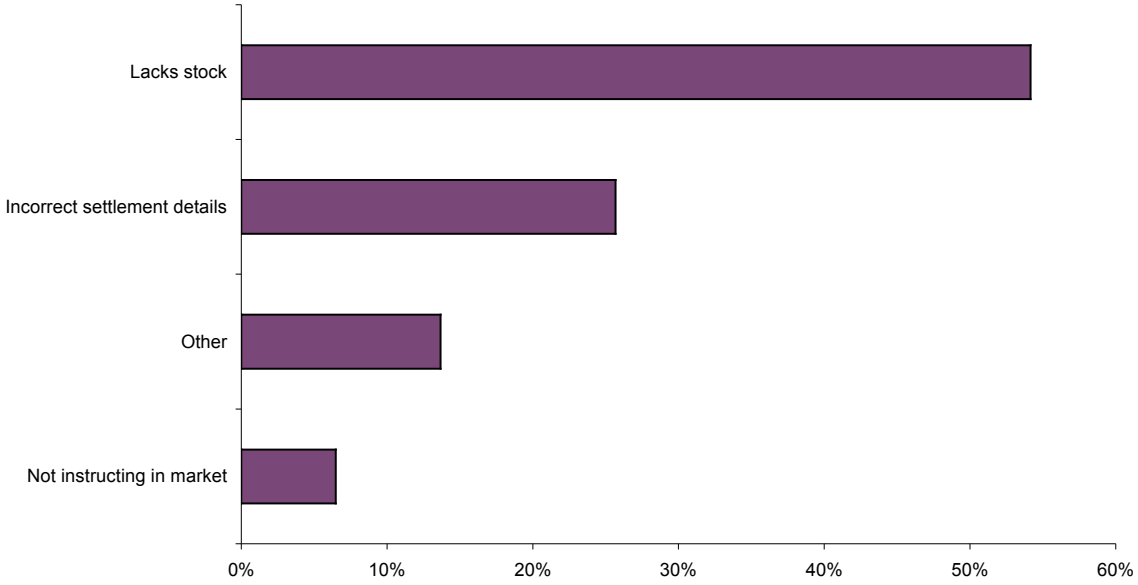
– **Delayed or incorrect settlement instructions**. Even if the trade is affirmed by the IM on T+0, problems may arise if there are inefficiencies at the settlement notification stage—for example, due to communication problems with, or lack of automation of, the relevant back-office functions of the IM. Incorrect or late instructions may also be sent into the market by the B/D or custodian for reasons that are not directly related to the efficiency of the trade verification process between IM and B/D.

– **B/D short of stock**. Settlement may fail to occur because the B/D may be short of the relevant securities. For example, it may be unable to deliver the securities because of a failure to receive those securities via the settlement of an unrelated purchase. The fail may be averted by borrowing the securities from a third party. Borrowing securities may also prevent fails where the B/D sells securities it does not own (ie, it sells the securities 'short'). Despite the option to borrow, the trade may fail to settle if borrowing is delayed or if there are insufficient incentives to borrow the securities to make the delivery.

– **Custodian short of stock**. Where the IM instructs selling securities, settlement may be delayed if the relevant securities are not in the custody account because they have been lent to another party. Again, return of the lent stock or borrowing of the relevant securities may take time, and settlement could be delayed during this period.

Figure 4.3 provides an illustration of the frequency of different sources for trade fails, using the data provided by a European asset management firm and outsourcer. It shows the most frequent sources of failures for a sample of more than 2,000 trade fails from 2005 to 2007. The data comprises the combined failures at B/D and custodian level. For this particular firm, which has used automated processes internally for a significant period of time, the majority of trade fails were explained by the B/D (and in some cases the custodian) lacking the relevant stock. Mistakes relating to settlement details or failures to send settlement instructions to the market also occurred relatively frequently.

Figure 4.3 Frequency of sources underlying trade fails, 2005–07 (% of total fails recorded)



Source: Based on a breakdown of more than 2,000 data points on trade fails (attributable to B/D and custodian failures), as provided by a (fully automated) European asset management firm and outsourcer.

While the adoption of automated SDA processes cannot directly avert trade fails that result for these or other reasons, it nonetheless has positive effects further down the value chain in reducing the incidence of trade fails and associated costs. The downstream benefits arise from accuracy and timing.

– **Accuracy**. Automation allows better identification of errors and easier repair of exception trades, reducing the risk that incorrect information and the wrong trades flow through to settlement and are then rejected because trade details do not match. The resources that would be required to address these problems later in the process can instead be used to address other settlement impediments.

– **Timing**. The time saved by affirming trades on T+0 can be used to address other impediments so as to ensure that trades can be settled on the intended settlement date. The sooner the trades are affirmed, the sooner the instructions can be sent to custodians and into the market, and the more time there is to match trades in the market or to take the action required to prevent settlement fails.

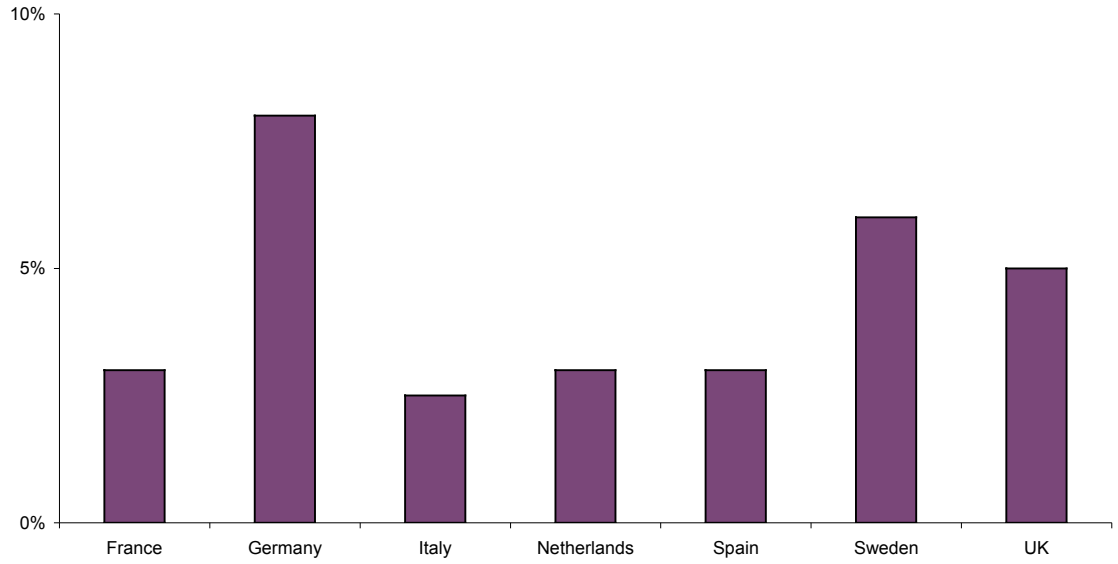
4.2.3 The costs of trade failures and the corresponding benefits of automated SDA

By introducing greater accuracy into the process and improving timing, the adoption of automated SDA processes can reduce the risk of trade fails (defined here as failures of a trade to settle on the intended settlement date) and thereby improve overall settlement performance. Hence, the benefits take the form of a reduction in the frequency of trade failures occurring and an avoidance of the costs if those failures had occurred.

Scope for reducing trade failures

Detailed data on the frequency of settlement failures in different markets is not widely available. Data that is available, however, suggests failure rates of between 3% and 8%, with significant differences between European markets (see Figure 4.4).

Figure 4.4 Estimates of trade failure rates in different markets



Source: Data provided by Omgeo, drawing from Z/Yen research.

This range of failure rates reflects estimates reported in Euroclear (2006).[9] As summarised in Table 4.1, the rate at which trades fail to settle on the intended settlement date is reported to be between 1% and 9%, depending on the market. The differences in failure rates between markets may be explained by many factors (eg, length of settlement cycle, volume and complexity of transactions, penalties for late settlement, etc). Irrespective of these differences, the evidence shows that settlement fails do occur, which correspondingly indicates that there is scope for reducing this risk.

Table 4.1 Transactions not settling on intended settlement date

	% of transactions by volume
Euroclear Netherlands	3% (stock exchange and over-the-counter activity)
Euroclear Belgium	9% (all activity)
CREST	8% (for standard delivery transactions, 2% by value)
Euroclear France	2% (for Relit+ revocable settlement channel; 0.2% on irrevocable RGV channel)

Source: Euroclear (2006), 'A Market Discipline Regime on the Single Platform: Consultation Paper', May.

Different costs of trade failures

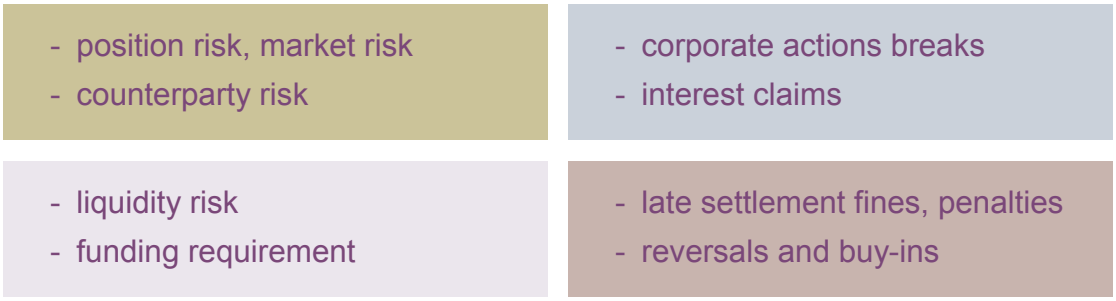
Delayed settlement is not in general viewed as an event of contractual default. Rather, a failing seller can generally make delivery the next business day at the same invoice price, and a failing trade often (but not always) continues to be rescheduled until it finally settles. Because the buyer does not pay the seller until the seller delivers the securities, the seller loses (and the buyer gains) the time value of the transaction proceeds over the fail interval. Thus, the most immediate cost to a seller of a trade fail is the interest that could have been earned on the trade proceeds (although a firm can lend the securities it has and replenish them in normal market circumstances). Moreover, both the seller and the buyer have portfolios that are not necessarily what they expected.

[9] Euroclear (2006), 'A Market Discipline Regime on the Single Platform: Consultation Paper', May.

There are different dimensions to the costs of trade fails—including both direct financial costs and the indirect costs associated with increased risks—and these costs can become significant if fails persist.

In addition to the resources spent on trade failure resolution (discussed in section 4.3), the main dimensions relate to the following.

Figure 4.5 Dimensions of costs associated with failed trades



Source: Oxera.

– **Market risk, position risk**. Market risk arises from fluctuations (volatility) in the market prices of securities from the time of trade execution to eventual settlement. Where the trade is in a foreign currency, the risk may be exacerbated by exchange rate fluctuations. Market risk corresponds to position risk to the extent that it relates to uncertainties in the long or short position in the securities that constitute the trade, which remain until the trade is settled and the securities delivered. For example, a seller may incur a loss if the price of the security has fallen and the seller has to find a replacement buyer at a lower price. Conversely, a buyer may incur a loss if the price of the security has risen and the buyer has to find a replacement seller at a higher price.

– **Counterparty risk**. At the most general level, any delays in settlement expose a trading party to the risk of non-fulfilment of the trade contract by the counterparty. The risk takes the form of market or position risk as well as liquidity risk (see below), which in turn could contribute to credit risk in the event of insolvency of the counterparty.

– **Liquidity risk**. Delayed settlement creates liquidity risk. For example, if the seller of a security does not receive payment when it is due, the seller may have to borrow or liquidate assets to complete other payments. There may also be a risk that the buyer does not receive delivery when it is due and may have to borrow the security in order to complete its own delivery obligation.

– **Funding requirement**. Delays in settlement have funding implications, and any uncertainty in the ultimate delivery of, and payment for, securities may increase the overall funding requirement for a given volume of trades. For example, the more cash or collateral B/Ds may need to hold with the CSD, the more uncertain and unpredictable the settlement timing of the trades executed. Similarly, for the IM, the cash requirement in the custodian account may be higher, or there may be greater need for overdraft facilities. The additional funding requirement presents an opportunity cost relative to the firms' cost of capital.

– **Corporate action breaks**. A trade that fails to settle for a number of days implies wrong positions and inaccurate records, which can have significant implications for asset servicing. If a corporate action (eg, dividend payment, rights issue, or stock split) occurs in the period of delayed settlement, the exposure and risk of losses can be significant if based on the wrong positions. There may be an impact on the rights that the buyer receives as part of the rights issue, which, when trades settle late, may also be delayed or indeed lost, depending on the circumstances.

– **Claims**. Delays in settlement and subsequent financial losses incurred by one of the trading parties may trigger claims for damages. For example, where the buyer has caused the failure of settlement, the seller may claim from the buyer the loss of interest on the net amount of the transaction from the date of presentation of the securities until the date that settlement takes place. The fines for late settlement imposed by CSDs (see below) can give rise to claims against the B/D, the IM (or its client), the custodian or, more generally, the party responsible for the delay. Whether claims will be made, and by whom, will largely depend on the nature and source of the problem, the allocation of risks and responsibilities between the relevant parties, and the actual losses incurred.

– **Settlement fines, penalties**. A direct financial cost may be incurred by the trading parties as a result of fines imposed by CSDs if settlement is extended beyond the intended settlement date. Settlement fines may be imposed on the seller for failure to deliver the securities, and there may also be an interest fine imposed on the buyer for failed bought transactions. The calculation of the fines differs between CSDs in Europe, and the structure of fines can be complex. The threat of fines provides an incentive for greater compliance with settlement standards, and although the fines tend to be small on a per-unit basis, the total can be significant for large trades that fail to settle over a longer time period. In addition to late settlement fines, the CSD may impose trade reversals and buy-ins, with associated penalties. Box 4.1 provides an illustration of the settlement fines imposed.

– **Reversals and buy-ins**. A trade may ultimately not settle at all, but may need to be reversed because there is no prospect of settling it (or no desire among the trading parties to settle), even after an extended settlement period. Although practices differ across EU markets, CSD rules may specify the number of days from the intended settlement date after which the trade will not be recycled further but needs to be cancelled or reversed. The CSD may also specify buy-in procedures after a certain date following the intended settlement date (or indeed by close of that day), whereby the securities will be automatically bought in the market and delivered to the buying counterparty, with the price charged to the party that failed to deliver, along with an additional penalty. An illustrative overview is provided in Table 4.2.

Box 4.1 Illustration of settlement fines

CSDs can impose settlement fines on trade participants whose failure to fulfil their contractual obligations results in the trade failing to settle on the intended settlement date. Settlement fines, when aggregated across the total number of 'excess' days, can involve complex calculations, which vary across CSDs. The following provides an illustration based on Euroclear (2007), 'A Market Discipline Regime on the Single Platform: Consultation Paper—Version 2', December.

CREST settlement discipline rules

Under CREST settlement rules, trading parties can be subject to settlement discipline fines or interest rate fines, depending on whether the trade failure was caused by a failed sold transaction or a failed bought transaction, respectively.

– **Settlement fines**. Fails attributable to the seller incur penalties payable to CRESTCo. Penalties are incurred from the intended settlement date (ISD) if a firm's performance does not achieve the target rate of 85% settling on the ISD by volume. The target rate increases progressively thereafter (90% on ISD+1; 95% on ISD+2, etc). Penalties are levied on an *ad valorem* basis—ie, as a percentage (0.05%) of the value of the failed transactions, subject to a minimum fine (£5 per transaction).
– **Interest rate fines**. Fails attributable to the buyer incur a penalty in the form of an interest payment payable to the seller to compensate for the lost time value of money. The fine is calculated as the multiple of the cash to be transferred and the LIBOR rate for the relevant currency taken at 11:00 the previous day and applied for the relevant number of calendar days since the ISD.

In addition, the matching rules require 98% of transactions to be matched on T+1 and 100% on T+2 (for market firms); penalties are levied at a flat rate for each transaction that does not meet the targets.

Euroclear France penalty regime
Like the CREST settlement discipline rules, the Euroclear France penalty regime attempts to dissuade market players from abusing market flexibility by imposing financial penalties. Examples of such penalties include the levying of additional fees for those that match on ISD–1 or ISD, and penalty charges against the first defaulting party in a chain of transactions.

Table 4.2 Days to trade cancellation and buy-in procedures

CSD	Number of days after ISD that a matched domestic transaction is recycled	Comment on buy-in procedures in market
Clearstream Banking Frankfurt	40 business days	Buy-ins can be effected
CREST	No fixed number of days (indefinitely)	Buy-ins are rare
Euroclear France	Between 0 and 30 business days depending on the transaction type	Buy-ins are rarely enforced; buyers' discretion
IBER (Spain)	For equities, buy-in procedures and collateral processes ensure that settlement always occurs	Enforcement of buy-ins if fail to settle. Bought in on T+4
VPC (Sweden)	0 business days in settlement system and 20 business days for instruction entered into the pre-match system	Buy-ins are rare

Notes: This table is not comprehensive and is for illustrative purposes only. Comments on buy-ins are based on information provided by IMs consulted as part of this study.
Source: Information on the number of days that a matched trade is recycled is based on ECSDA (2006), 'The European Central Securities Depositories Association's Second Annual Status Report Relating to its Standards for the Removal of Giovannini Barriers 4 and 7', July.

Overall, although a range of factors is important for efficient settlement, the adoption of automated SDA processes can contribute to reducing the rate at which trade fails occur, and to mitigating their impact when they do occur. In particular, the early verification of trade details reduces counterparty risk exposure and the associated liquidity risks, uncertainties concerning positions, and implied funding requirements. Furthermore, error reduction and early detection of any remaining errors on trade date rather than later in the cycle enables more time to be spent on correcting other impediments to settlement, thereby reducing claims, fines and other direct costs associated with trades that settle late or never.

4.3 Direct benefits: operating cost efficiencies

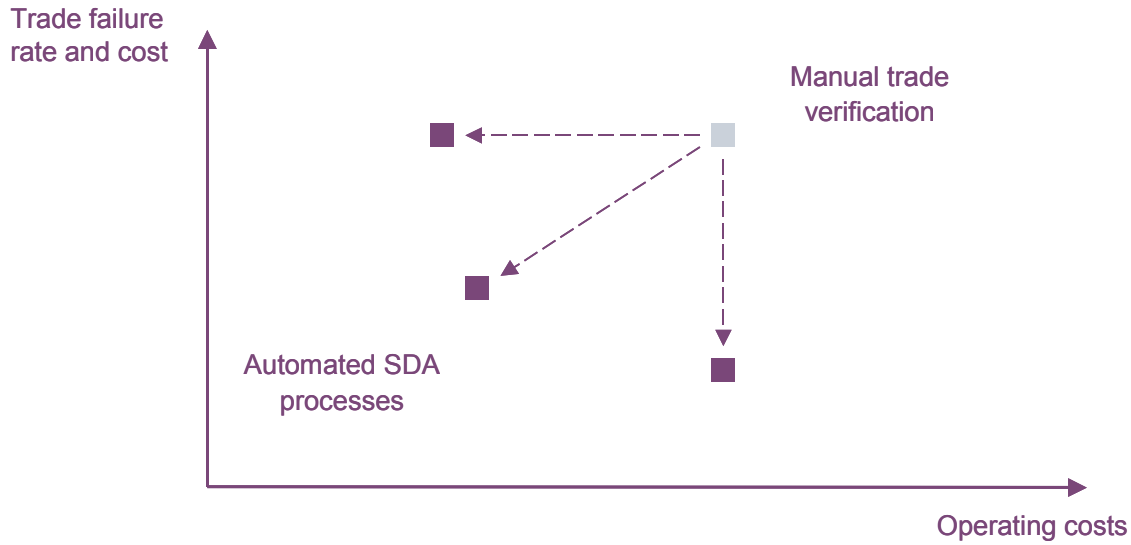
The risk reduction effect is directly linked with the second main dimension of direct benefit that can be expected to arise from the adoption of automated SDA processes—namely, the realisation of operating cost efficiencies.

As illustrated in Figure 4.6, the move towards automation and SDA can be seen as leading to a reduction in trade failures for a given level of operating costs, or conversely, a reduction in operating costs for a given level of trade failures. In practice, the two types of effect are related, and a firm adopting automated SDA processes may be able to realise efficiencies along both dimensions.

Moreover, automation allows a larger volume of trades to be processed without corresponding increases in operating costs or risk. It makes trade verification less sensitive

to changes in trade volumes, particularly peak volumes which would be more difficult to deal with, or adjust to, if manual processes were in place.

Figure 4.6 Two dimensions of direct benefits of automated SDA processes



Source: Oxera.

The costs associated with manual processes include in the first instance the middle-office staff required to transmit the confirm/affirm messages via fax, email or telephone, check the accuracy of the trade details transmitted, and identify matching and non-matching trades. They also include the costs incurred in filing and archiving the relevant information and other related costs (eg, office space).

Automated trade verification systems eliminate much of the standard and repetitive manual tasks for the bulk of the trades that can be confirmed, affirmed and matched in an automated manner. With automated systems, manual intervention is, in principle, required only for exception trades, thereby reducing labour input compared with the level that would be required if each trade had to be processed and verified manually.

As such, operating costs (per trade) are likely to fall following automation, and as a result:

– costs incurred in trade verification may fall overall, as fewer staff (and other inputs) are required to process the same number of trades;

– costs may stay the same overall but for a larger set of trades: following automation, the same staff may be able to process a greater volume of trades, including peak volumes;

– the same staff may be redeployed to functions that are potentially more productive.

Operating cost efficiencies are not restricted to the trade verification function within the middle office of the IM or B/D; rather, cost reductions can also be expected for other functions in the value chain if trade processing becomes more efficient overall and the rate of failed trades falls. In particular, a reduction in the risk of trade fails implies lower costs of preventing or following up potential or actual fails. Fewer fails mean fewer costs downstream in record-keeping, reconciliations of settlement instructions, corporate actions, claims-handling and other back-office functions that would otherwise need to divert personnel to efforts aimed at reducing, or dealing with, the consequences of failed trades.

The knock-on effect of trade verification on other functions is not restricted to IMs and B/Ds; it can also apply to other parties in the post-trading value chain. For example, at the custodian level, if incorrect settlement instructions are transmitted by the IM and, as a result, the trade cannot settle in the market, the custodian has to revert back to the IM, which in turn

has to resend the corrected instruction, triggering additional messaging costs and resources to resolve the (potential) fail. Fail management is part of the service provided by custodians, and any reductions in the frequency of trade fails resulting from the IM's adoption of automated SDA processes can be expected to reduce the custodian's cost base associated with failure resolution and related functions. More generally, there can be efficiency implications for the system as a whole if the wider adoption of these processes translates into risk reductions and cost efficiencies overall, as is addressed briefly in section 4.4.

4.4 Indirect benefits

In addition to the benefits that can be expected to arise in terms of risk reduction and operating cost efficiencies, the adoption of automated SDA processes may lead to a range of ancillary or more indirect benefits.

4.4.1 Improved information, transparency and monitoring

Automating the message flow between IM and B/D should improve both the timing and quality of information available to the counterparties on the status of individual trades and aggregate positions. The information on trades arrives at one point of entry and is electronically stored, which means that it can be more readily accessed and tracked than communications by email, fax or telephone.

More rapid (real-time) and efficient access to information on trade status allows the parties to identify any risk exposures and manage their positions more effectively. If the relevant data is confirmed/affirmed and available on the trade date, records and accounts are more likely to be accurate, and valuations can be conducted in a more effective and timely manner.

Moreover, the electronic storage of relevant trade information, including the history of a trade (eg, any actions taken by the counterparties to rectify unmatched trades), is likely to improve transparency in the process by leaving an audit trail. It also allows individual firms to track and measure their operational performance and trade processing efficiency (eg, by measuring average response times for allocations, confirmations and affirmations).

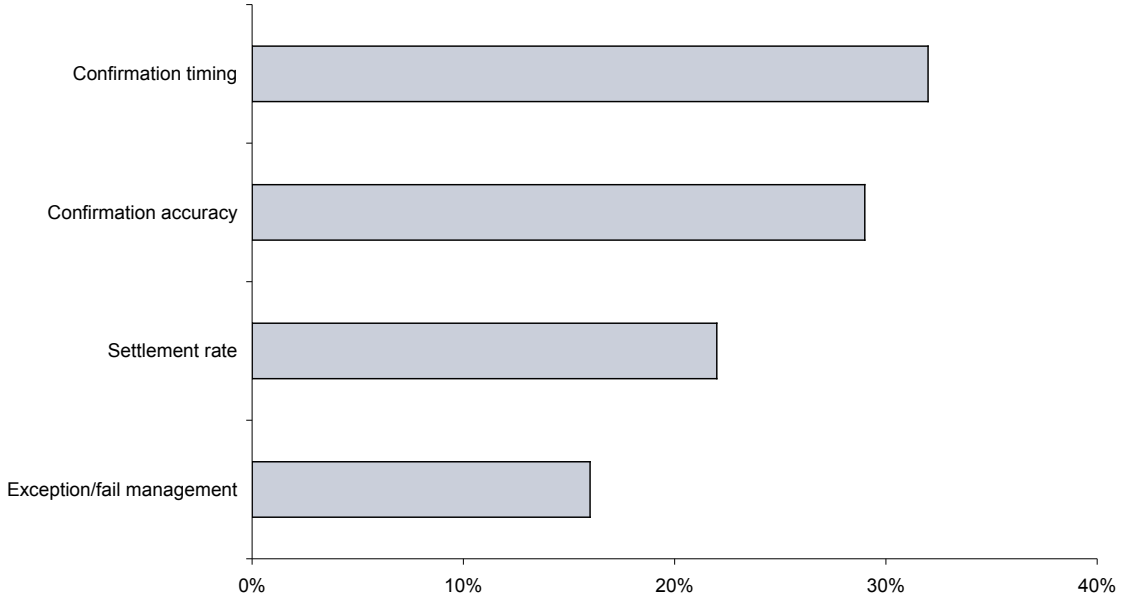
In addition to internal monitoring, automated trade processes and electronic data capture can facilitate the evaluation of counterparty performance. For example, the IM middle office can rank or benchmark B/D trade processing performance and inform the front office about short-listing and selecting the B/D through which to conduct a particular trade. In principle, the ranking can be carried out in real time (or on a daily basis) and can be based on objective, quantifiable metrics (eg, confirmation timing) using the data generated and stored in the automated system.

Based on a survey of 75 IMs (or their outsourcing agents), Z/Yen reports that 44 have a formal process for ranking B/D performance.[10] The majority that rank B/Ds do so on a monthly basis for all products, with some clients ranking and reviewing the data captured in the automated system on a daily basis.

The study also concludes that clients are increasingly well-informed about B/D performance, and that they appear to be more prepared to take the ultimate step of reducing or suspending trading with a broker on the grounds of poor operational performance—particularly with respect to equities and fixed income, the number of clients that have penalised brokers is reported to have risen significantly. Consistent with the results presented in Figure 4.7, which shows the weight attached by clients to four categories of core trade processing performance in equities, the predominant reasons for penalising brokers relate to confirmation timing and accuracy.

[10] Z/Yen (2007), 'Operational Performance of Brokers: Market Survey—European Securities 2007'.

Figure 4.7 Weight attached by IMs to dimensions of B/D operational performance



Source: Z/Yen (2007), 'Operational Performance of Brokers: Market Survey—European Securities 2007'.

The trade processing data retained in automated systems can equally be used by B/Ds to monitor the performance of their IM counterparties. As reported by Z/Yen, according to a survey of European B/Ds, most large B/Ds monitor their clients' performance with a view to improving operating efficiency, minimising operational risk and offering clients feedback on performance.[11]

Overall, automating the trade verification process facilitates data capture of trades that have passed through the system. More accurate data also contributes to the internal auditing process and can improve performance measurement. By tracking and measuring their own performance and that of their counterparties, firms can identify any weaknesses in the different parts of the process, and thereby ensure more efficient trade processing going forward.

4.4.2 Towards straight-through processing

Verification of trades is just one part in the trade processing value chain (see section 2), and automating this part of the process can be considered as one of the measures to move towards STP, with corresponding benefits.

STP refers to a solution that automates the entire processing of trades from initiation through to settlement. For example, as summarised in the Recommendations for Securities Settlement Systems of the CPSS-IOSCO Technical Committee:

> Automation allows manual intervention to be eliminated from post-trade processing through the implementation of straight through processing (STP), that is, procedures that require trade data to be entered only once and then use those same data for all post trade requirements related to settlement. Many practitioners believe that market-wide achievement of STP is essential, both for maintaining high settlement rates as volumes increase and for ensuring timely settlement of cross-border trades, particularly if reductions in settlement cycles are to be achieved. STP systems may use a common message format or use a translation facility that either converts different message formats into a common format or translates between different formats. Several initiatives

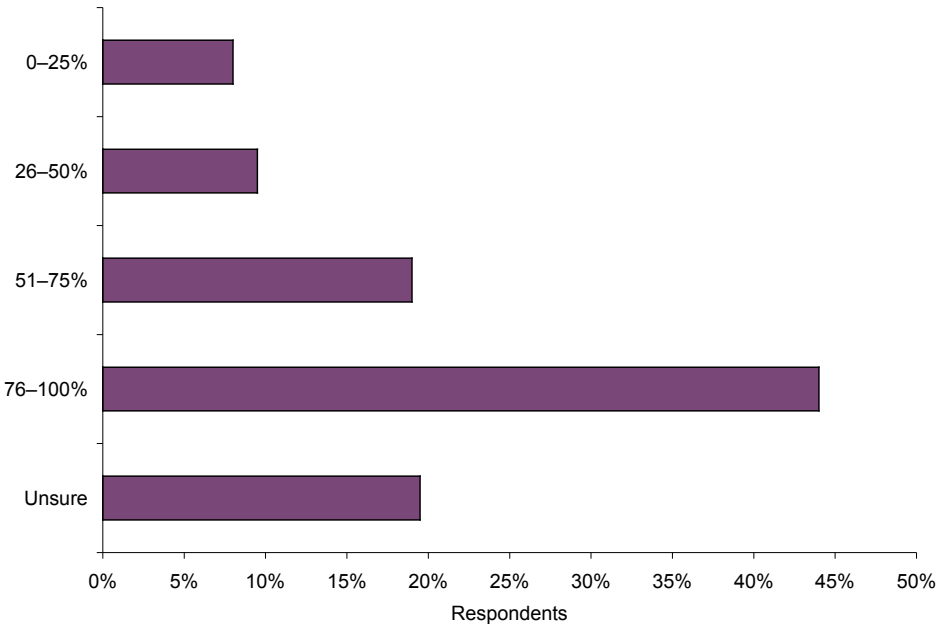
[11] Z/Yen (2007), 'Operational Performance of Clients: Market Survey—European Securities 2007'.

> aim to achieve STP. These initiatives should be encouraged, and direct and indirect market participants should achieve the degree of internal automation necessary to take full advantage of whatever solutions emerge.[12]

A recent survey by Celent of European banks and asset management firms suggests that, while STP rates have increased over time, they remain low.[13] This also applies to equity trades, although STP rates in equities are found to be higher than for other instrument types (eg, fixed income and derivatives).

As shown in Figure 4.8, around 45% of the responding firms claim to have achieved STP rates in equities of 75–100%, while some firms continue to have no or little capacity to process trades on an STP basis.

Figure 4.8 Levels of STP in equities



Source: Celent (2006), 'European Post-trade Processing: STP in the Back and Middle Office'.

The survey identifies the still relatively high levels of manual processing in the middle and back office. When asked which problems were being addressed by firms' STP projects, respondents highlighted as the most important the reduction in the use of these manual processes (see Figure 4.9).

More specifically, respondents were asked to discuss STP barriers at different stages in the trade processing value chain. Both the European banks and IMs surveyed listed trade verification, among other factors (eg, exception resolution), as a barrier to STP in equities and other instruments. Based on the survey results and interviews, Celent (2006) concludes that:

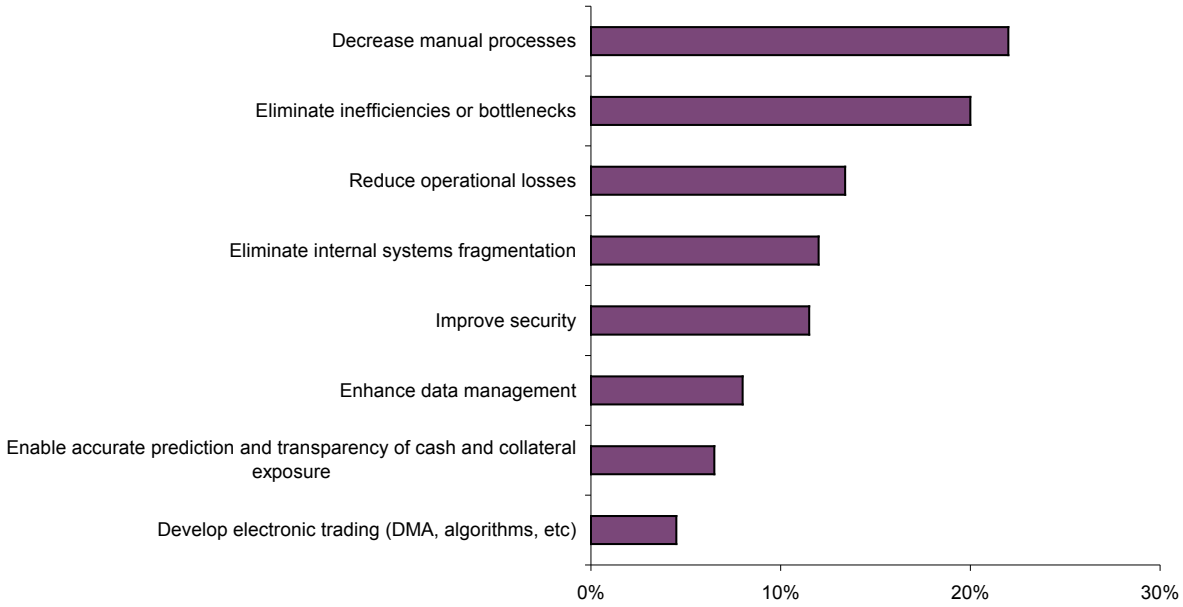
> The lack of automation of buy side firms, in terms of use of order management systems or more importantly in the area of trade allocations, is causing problems. The absence of automation of trade allocations by the buy side leads to downstream issues in post-trade processing and delays and trade failures as a result. Most tellingly, there is a low rate of same-day affirmations of trades by buy-side firms. The relatively low rate of same-day affirmations is compounded when European cross-border trades are concerned. Here, same-day affirmations are rare.

[12] CPSS-IOSCO Technical Committee (2001), 'Recommendations for Securities Settlement Systems'.

[13] Celent (2006), 'European Post-trade Processing: STP in the Back and Middle Office'.

The lack of automation is attributed to the fact that firms are not allocating sufficient time and attention to middle- and back-office STP initiatives; among the firms surveyed, only 0–25% of IT budgets are devoted to improving middle- and back-office operations, possibly suggesting a lack of commitment in this area.

Figure 4.9 Issues addressed in STP projects



Source: Celent (2006), 'European Post-trade Processing: STP in the Back and Middle Office'.

Other surveys have also identified automation of the trade verification process as a key step in achieving STP. For example, in the Z/Yen survey of European B/Ds, most firms agreed that 'moving to automated platforms for allocations and confirmations' was one of the two main ways for clients to increase STP levels (the other being the need to clean and reconcile static data).[14] Similarly, the broker survey highlighted three main areas identified by clients as particularly important to increased STP: increase the use of automated solutions for allocation and confirmation; improve updates to and maintenance of static data; and work towards standardisation in the industry.[15]

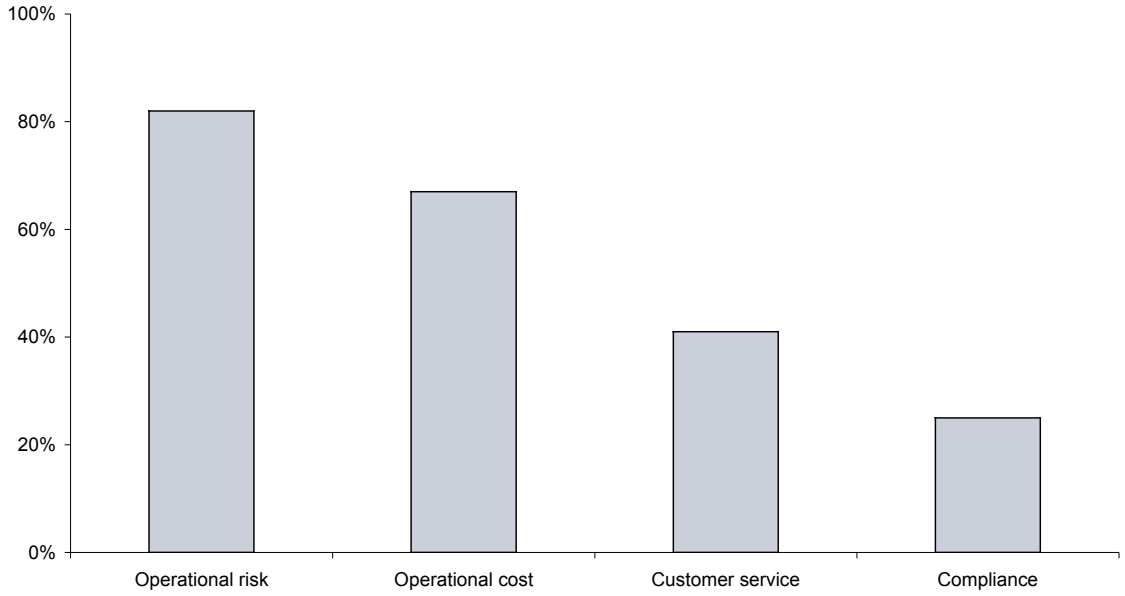
Overall, automating the trade verification process is a necessary condition for achieving STP. STP does also require automation of other parts of the value chain and direct links between different automated systems both within and between firms. For example, it requires direct real-time links with the order management system in the IM front office, where details of outstanding and executed trades are maintained, to ensure that the trader's actions are automatically fed from the front to the middle office without the need to re-key any of the information. It also requires direct links downstream, to ensure that as soon as a trade is verified and matched, it is automatically appended with the relevant static data and the instructions transmitted for settlement, again without the need for re-keying.

Therefore, automating the trade verification process provides a bridge between the front and back office, and must be implemented in order to deliver STP. The discussion of benefits in sections 4.2 and 4.3 extends to those that can be expected from STP, namely risk reduction and operational efficiencies—indeed, automating all parts of the trade processing value chain is likely to increase any benefits that accrue in terms of risk and cost reductions to a greater extent than automating only the process of allocations, confirmations and affirmations between IM and B/D.

[14] Z/Yen (2006), 'Operational Performance of Clients: Market Survey—European Securities 2007'.
[15] Z/Yen (2006), 'Operational Performance of Brokers: Market Survey—European Securities 2007'.

Operational risk and cost were also identified as the two main drivers for ongoing and future STP projects in a survey of European IMs, as shown in Figure 4.10.

Figure 4.10 Reasons for driving STP projects



Notes: Shows percentage of IMs surveyed that attached 'high importance' to the relevant reason for driving STP projects.
Source: Celent (2006), 'European Post-trade Processing: STP in the Back and Middle Office'.

4.4.3 Market-wide adoption of automated SDA processes and the wider benefits

The degree to which the benefits associated with automated trade verification can be extracted by individual market participants depends on the extent to which other firms in a given market segment have automated these processes. In particular, each firm can extract most benefits if all of its counterparties support automated trade verification using the same or interoperable systems.

Both sides (IMs and B/Ds) benefit from the adoption of automation of their counterparts. B/Ds, for example, need their existing (as well as potential) clients to adopt automation in order to reorganise their activities in such a way that fully captures the benefits of automation. If some existing (or potential) clients do not adopt automation, the brokerage firm will still have to organise its operations in order to meet the requirements of its non-automated clients. At present, many IMs and B/Ds that have switched to an automated solution find it difficult to benefit from it fully due to the lack of automation of their counterparties. The risk reductions and cost efficiencies that can be realised at individual or bilateral level would therefore be likely to deliver greater overall benefits if more, and ideally all, firms in a given market were to adopt automated processes based on standardised or interoperable systems.

The degree to which firms in a market use automated trade verification and achieve SDA has further implications in terms of the market-wide benefits that can be realised. Indeed, some potential benefits can be extracted only if there is a market-wide move towards automated SDA (at least within that market).

For example, reducing the current settlement cycle from T+3, as observed in most countries, to, for example, T+1, can at least in principle deliver risk reductions and cost efficiencies in overall post-trade processing. Although automated trade verification may not be a sufficient condition for reducing the length of the settlement cycle, the adoption of SDA as best operational practice among firms would make such a change more feasible.

In some instances, automation and the move towards SDA as best operational practice delivers most benefits if it is adopted not just by most firms within a country, but across the whole relevant economic region. For example, harmonisation of settlement practices between EU countries can arguably be achieved more easily in an environment where firms in individual countries have adopted more consistent and efficient verification processes.

4.5 Summary

The analysis set out in this section shows that the adoption of automated SDA processes delivers benefits along a number of dimensions. These benefits can be broadly classified into direct benefits, in terms of risk and cost reductions accruing to market participants adopting the processes, and more indirect benefits, which are reinforced if automated processes are adopted as best operational practice in the market as a whole.

– **Direct benefits**. Automation of the trade verification process improves trade processing times and costs, and delivers SDA by eliminating the requirement to send information back and forth manually between B/D and IM and by avoiding the errors inherent in manual processing. This translates into benefits in the form of a reduction in operational risk and trade failure rates for a given level of operating costs, and a reduction in operating costs for a given risk and failure rate. Other things being equal, automated trade verification and SDA are associated with improved settlement performance, and risk and cost reduction benefits along the post-trading value chain.

– **Indirect benefits**. There is a range of other benefits that are more ancillary or indirect in nature than the risk and cost reduction effects. These relate to better management of information, increased transparency, and improved monitoring of own positions and performance as well as counterparty performance. Automation of the trade verification process also provides a key step towards achieving full STP of trades from order to settlement, with additional risk and cost reduction implications. A market-wide move towards automation and SDA as best operational practice would make initiatives to further shorten and harmonise the settlement process more feasible. More generally, the benefits at individual, bilateral and market-wide level increase as the adoption of automated SDA processes becomes more widespread.

The approach taken in this report is to consider the benefits from the perspective of individual market participants adopting automated processes and achieving SDA for the majority of trades. From a wider perspective, the benefits at the level of individual firms and the system as a whole can be expected to translate into benefits for end-investors. The analysis of these wider effects is beyond the scope of this study. However, in a reasonably competitive market, reductions in the risks and costs borne by IMs and B/Ds (or other intermediaries) would be passed through, resulting in lower transaction costs for end-investors and associated effects on the liquidity and operation of markets.

5 Illustrations of benefits based on interviews with market participants

Interviews conducted with market participants confirmed that the benefits described in section 4 are significant in practice. The interviews focused on firms which have already automated their trade verification process and which are therefore able to provide insight, based on their own experience internally and when dealing with counterparties in the market, regarding the:

– scope for reducing risks as a result of adopting automated SDA processes;
– operating cost efficiencies that can be realised following automation;
– additional risks and costs arising from counterparties that are not yet automated and, correspondingly, the wider market efficiencies that may be realised if the market were to move towards greater automation and SDA.

In total, 12 IMs and B/Ds from five EU Member States, and one global custodian, participated in the interviews. The firms in the sample included very large (and in some cases the largest) players in their national markets, operating at the European and global levels.

The interviews with IMs focused on the benefits realised as a result of adopting automated trade verification processes, with firms describing their processing before and after automation and the subsequent benefits in terms of operational risk and cost reductions. The B/Ds interviewed had been using automated processes for some time, but were dealing with a mix of automated and non-automated clients. The interviews with B/Ds (and the global custodian) therefore focused on the differences between the two types of client in terms of cost, risk and settlement performance.

This section provides a summary of the evidence obtained from the interviews with market participants. Some interviewees were able to provide quantitative evidence that illustrates the magnitude of the benefits realised in terms of improved SDA rates, lower operational costs and better settlement performance.

5.1 Illustrations based on evidence provided by IMs

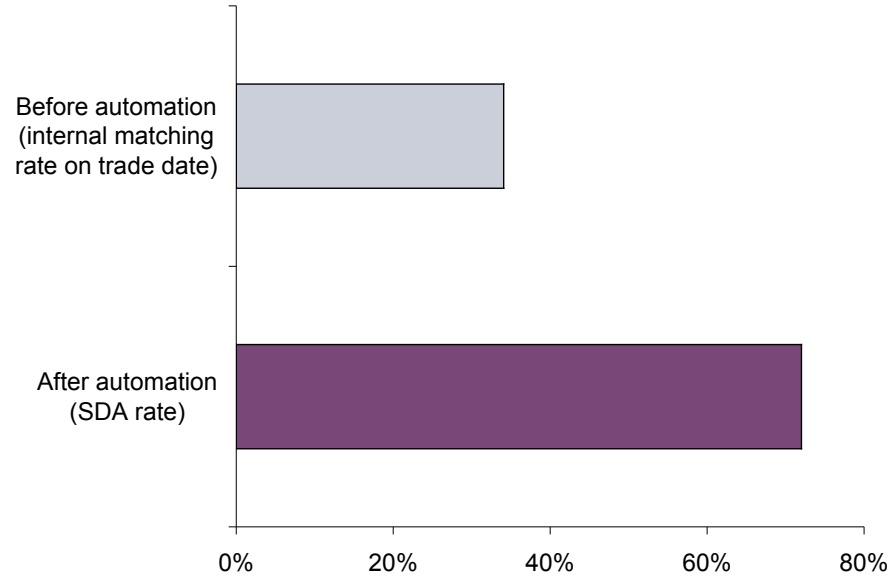
After the transition to automated trade verification, the IMs experienced significant increases in SDA rates, improved settlement performance and notable operating cost efficiencies. While some of the IMs interviewed had automated their processes by the late 1990s, others had implemented automation more recently, and these firms were able to provide data that allows a comparison of some of the relevant metrics before and after automation.

The data provided by one major European IM suggests significant improvements in the timing of the verification process following automation. In the final year of verifying trades on a fully manual basis, the IM was able to match an average of only 34% of equity transactions on trade day, and there was no target for timely affirmation of trades with the B/D. Since automation, SDA has become a key performance indicator, and the majority of equity trades are affirmed automatically on T+0. The average SDA rate for equity trades in 2007 was 72%, as illustrated in Figure 5.1.

The IM has to date only partly automated its verification process—while confirmations and affirmations of equity (and fixed income) trades flow through an ETC system, allocation instructions continue to be processed manually and communicated to the B/Ds by email or

fax. Further improvements in SDA rates are expected as the IM moves towards fully automated trade verification, including allocations.

Figure 5.1 Change in SDA rates following automation of the trade verification processes



Source: Data provided by a large European IM.

Table 5.1 provides a more detailed breakdown of matching and affirmation timing for the same IM. For example, in the final year of manually processing trades, 10% of equity trades remained unmatched even after T+1; by 2007, late affirmations had fallen to less than 4%.

Table 5.1 Affirmation timing before and after automating the trade verification process

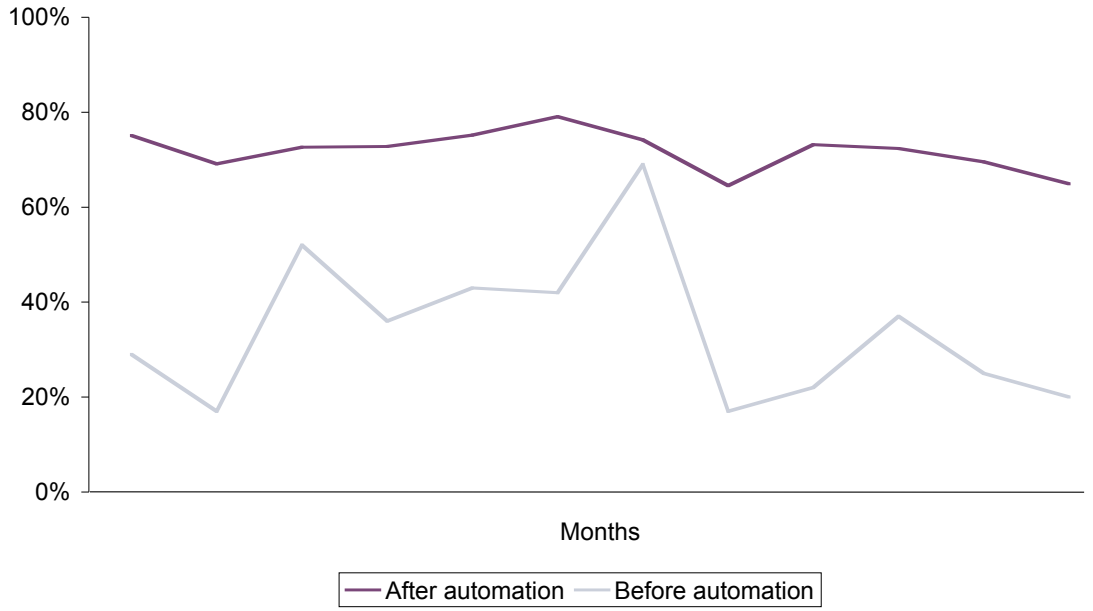
	Before automation (internal matching rate, % of trades)	After automation (affirmation rate, % of trades)
T	34	72
T+1	56	24
After T+1	10	4

Source: Data provided by a large European IM.

These improvements in process timing were achieved despite a significant growth in trade volumes. Over a five-year period, the volume of average monthly equity trades increased by more than five times for this particular IM.

Automation has therefore not only improved process timing for the IM, but has also increased its ability to deal with larger volumes. When the process was conducted manually, timely completion of verification was more difficult to obtain when volume peaked, with performance being reduced in those peak periods. Figure 5.2 shows the monthly pattern of internal matching rates on trade date in the 12 months before automation compared with the SDA rates in 2007.

Figure 5.2 Monthly SDA rates before and after automation (% of trades matched and affirmed on trade day)



Notes: The figure shows the percentage of trades matched internally on trade day in the 12 months before automation and the percentage of trades affirmed on trade day (ie, the SDA rate) for each month in 2007.
Source: Data provided by a large European IM.

In addition to the monthly SDA rates after automation being higher throughout, they display little volatility compared with the matching rates at the time when trades were still processed manually. Automation has therefore made the verification process less sensitive to trade volumes.

This increased ability to manage peaks of trade volumes with automated trade verification is not only evident in SDA rates, but also translates into a greater ability to settle trades on the intended settlement date. While the IM was not able to provide settlement performance data for before and after automating the verification process, it stated that fails have become less frequent and that there have been corresponding reductions in the frequency and total amount of claims relating to poor settlement performance (certainly when considering the significant increases in trade volumes).

Automation of the trade verification process was the first step towards further STP initiatives by the IM. While trades were processed largely manually until adopting automated verification, STP rates for equity trades now average almost 80%. However, the IM noted a significant shift in emphasis over time within the middle office and other parts of the organisation away from STP and towards SDA as a key performance indicator.

In addition to risk reduction, the IM noted significant operating cost efficiencies as a result of automation—despite increases in trade volumes (monthly trades have increased by five times since automation), the number of staff working on trade verification within the middle office has remained largely unchanged.

Other IMs interviewed confirmed these benefits. For example, one European IM with global fund management operations considered the improvement in SDA rates the single most important outcome of automating the trade verification process. Indeed, before automating the process, the IM had an internal performance target to match trades on T+1 only, meaning that virtually no trades were affirmed on trade day. With automation, the target is now SDA, and the IM now achieves SDA for 80% of its equity trades. Later affirmations generally relate to trades in certain geographic locations (eg, Latin America); trades for which automation is more complicated due to average pricing restrictions in certain markets; or trades channelled

through B/Ds that do not have ETC capacity. However, the last of these is less significant—ETC (and related confirmation performance) has become a key determinant of B/D choice by the front office.

As a result of automating the trade verification process, this IM was able to halve the size of the responsible team within the middle office, with equity trade volumes largely unchanged over the time period. The staff were redeployed to other functions. Moreover, the IM noted that cost reductions extend to other areas in the middle office as well as to the back office. No data was available to quantify these wider operating cost reductions.

In terms of improvements in settlement performance, although detailed data was not available over time, the IM indicated that the rate of trade fails in equities has approximately halved as a result of automating the trade verification process and achieving SDA for the majority of equity trades.

Further benefits of automation were also highlighted by this IM, such as the more systematic recording of key trade data; the ability to conduct net asset value calculations and update records on the trade day based on affirmed trade details; greater certainty and control; improved internal performance evaluation; and external benchmarking of brokers.

A third IM had only recently made the transition to automated trade verification. Prior to automation, the front office sent the trade details to the middle office. These details then had to be re-keyed into the system used by the middle office. At T+1, the data in the system was compared manually with the confirmation received by fax from the B/D, before being sent manually by fax to the B/D for affirmation and to the custodian, by fax again, for settlement instructions. Automation has significantly improved this process, and most trades are now fully automated from the front office down to the instructions sent to custodians.

In particular, prior to automation, the benchmark for the IM was matching and affirmation on T+1 (except for trades with Asia, for which SDA was the target given the time zone advantages), whereas the benchmark is now SDA (except for US trades where the target remains T+1, again for time zone reasons). Actual SDA rates have improved significantly, as shown in Table 5.2, which shows estimates provided by the IM. Prior to automation, only 5% of trades were affirmed on trade day, compared with 80% following automation. The IM is working to further improve affirmation timing.

Table 5.2 Time to affirmation before and after automating the trade verification process (% of trades affirmed on day)

	Before automation	After automation
T	5	80
T+1	90	18
T+2 and later	5	2

Source: Data provided by a large European IM.

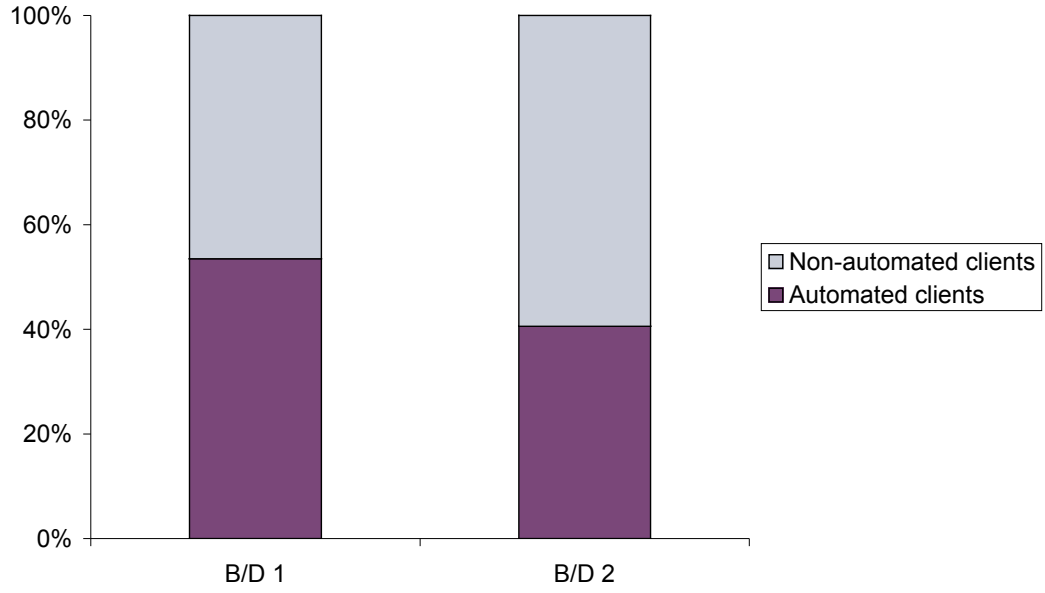
Operating cost levels for this IM have not changed to any significant degree. Fax costs are replaced by ETC costs, and the middle office continues to use the same number of staff since automation took place. However, the staff now add more value in the middle office, devoting less time to repetitive checking and data input tasks. Resources are instead reallocated to more value-added tasks such as dealing with exceptions or producing reports on confirmation and settlement performance to improve front-office decisions concerning B/D short-listing.

5.2 Illustrations based on evidence provided by B/Ds

The B/Ds interviewed as part of this study continue to deal with a significant number of clients that have not yet automated the trade verification process and that communicate information via fax, email or phone.

Two of the very large global B/Ds provided a breakdown of their client base for equity trades according to whether the clients are automated (ie, have ETC systems) or not. Focusing on equity trades, for one B/D, the total automated trade volume in EMEA (Europe, the Middle East and Africa) markets was just over 50% (February 2008). The proportion for the other BD was even lower—only 42% of equity trades for EMEA clients could be processed through ETC systems in the first quarter of 2008. Given that large clients tend to be more automated, the proportions by number of clients rather than trade volumes would be lower. Thus, due to a lack of automation of a significant part of the client base, the B/Ds need to process a large proportion of trades manually, with confirmation messages being sent (and allocations and affirmation messages received) by fax, email or telephone.

Figure 5.3 Equity trades for automated versus non-automated clients (% of total)

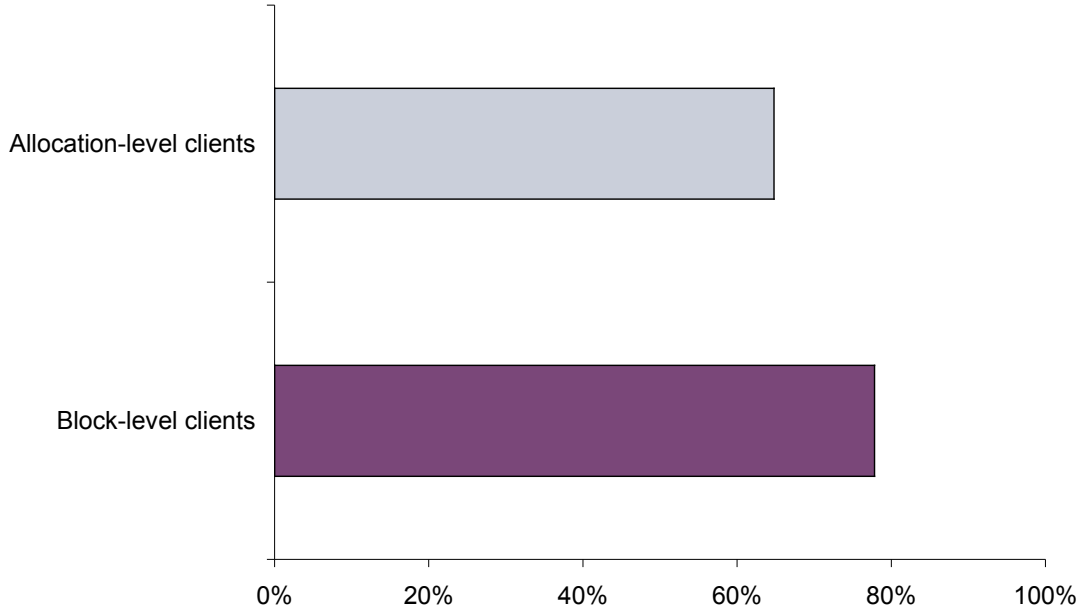


Notes: The figure shows the breakdown of equity trades between automated (ETC) and non-automated (non-ETC) clients of two B/Ds.
Source: Data provided by two large global B/Ds.

One of the B/Ds provided information on the SDA performance of different types of client. With non-automated clients, the B/D does not wait for the affirmation message from the IM before sending the settlement instructions to the market. Thus, there is effectively no affirmation of the non-automated trades—the process is one-way, with the B/Ds sending the confirmation but not waiting for the response.

For automated clients, the B/D noted the difference in SDA rates between block-level and allocation-level clients. For the former, allocations as well as affirmations are fully automated, whereas allocation-level clients send the affirmation message electronically but continue to send allocations via fax, email or telephone. As shown in Figure 5.4, block-level clients have the better SDA performance—the average SDA rate for equity trades confirmed by the B/D in February 2008 was just under 80% for block-level clients compared with 65% for allocation-level clients.

Figure 5.4 Comparison of SDA rates of allocation-level and block-level clients (% of trades affirmed on trade day)

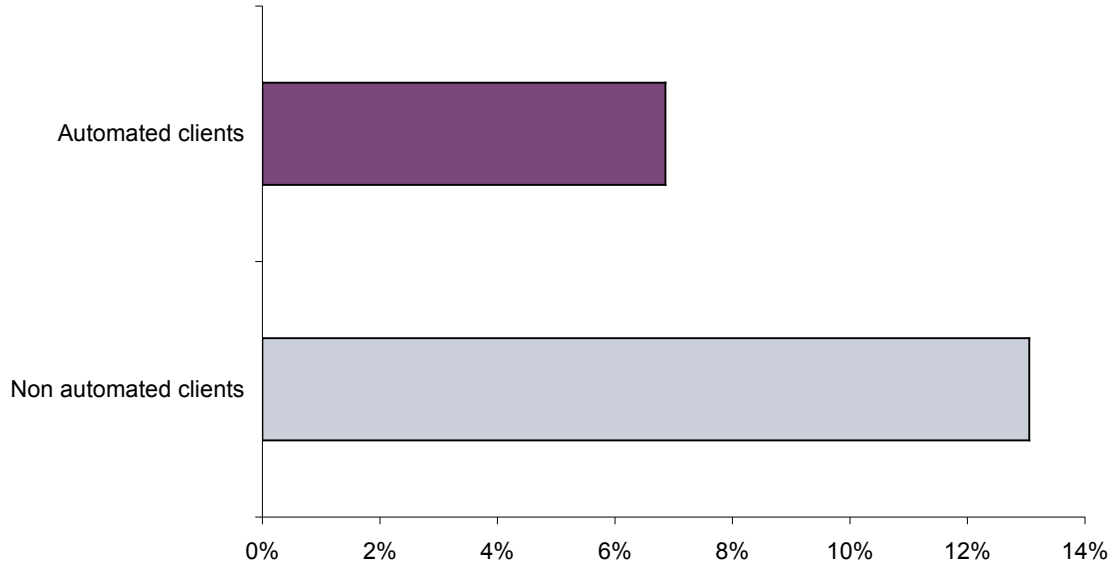


Notes: The figure shows SDA rates for equity trades in February 2008 for automated (ETC) clients, distinguishing between allocation- and block-level clients.
Source: Data provided by a large global B/D.

This evidence confirms that SDA performance is linked directly with the degree of automation of the trade verification process—automated trades achieve higher SDA rates compared with trades that are processed manually and where, in this case, trades proceed to the next stage without explicit affirmation by the IM. In addition, fully automated trades (with electronic allocations) achieve higher SDA rates than trades for clients that manually transmit allocations.

Data provided by the B/D suggests that the difference at the trade verification stage translates into differences in the performance of equity trades for non-automated and automated clients further down the post-trading value chain. For example, the actual failure rate of trades for automated clients is significantly lower. As shown in Figure 5.5, the trade fail rate for the B/D's automated clients is 7%—almost half of that for the non-automated clients (13%). This data suggests that automated clients have a better settlement performance.

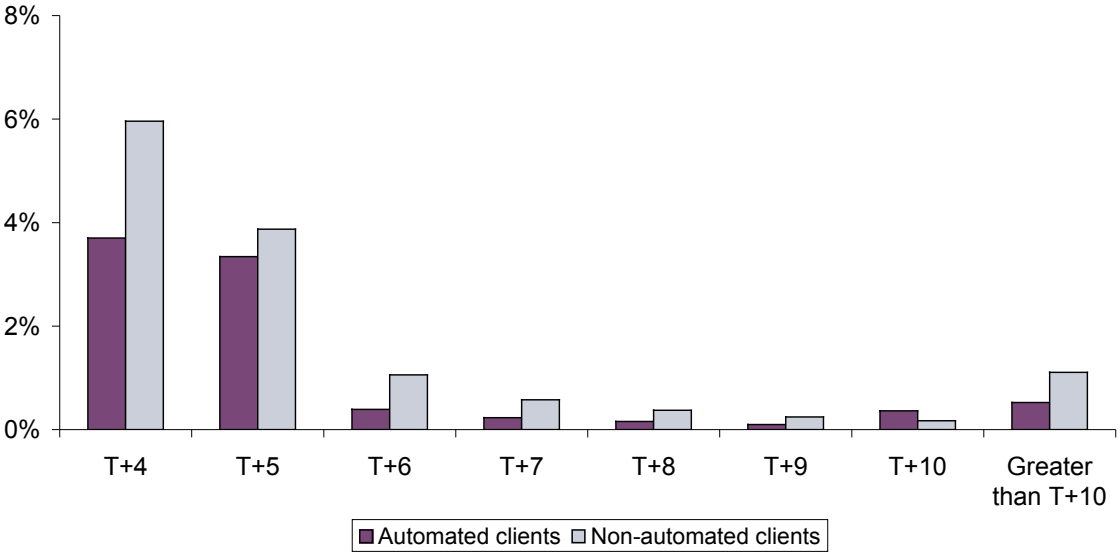
Figure 5.5 Comparison of settlement failure rates for automated and non-automated clients (% of total equity trades)



Notes: The figure shows the percentage of equity trades in EMEA markets in February 2008 that were not settled on intended settlement date for automated (ETC) clients and non-automated (non-ETC) clients.
Source: Data provided by a large global B/D.

Figure 5.6 shows the distribution of late settlements (ie, settlement on T+4 or later) of equity trades for automated and non-automated clients of the B/D. This distribution confirms that settlement delays are more frequent among the B/D's equity trades for non-automated clients. For example, the proportion of trades not settled by T+10 remains 1.1% for non-automated clients, compared with only 0.5% for automated clients.

Figure 5.6 Comparison of settlement timing of trades for automated and non-automated clients (% of equity trades settling on T+4 or later)



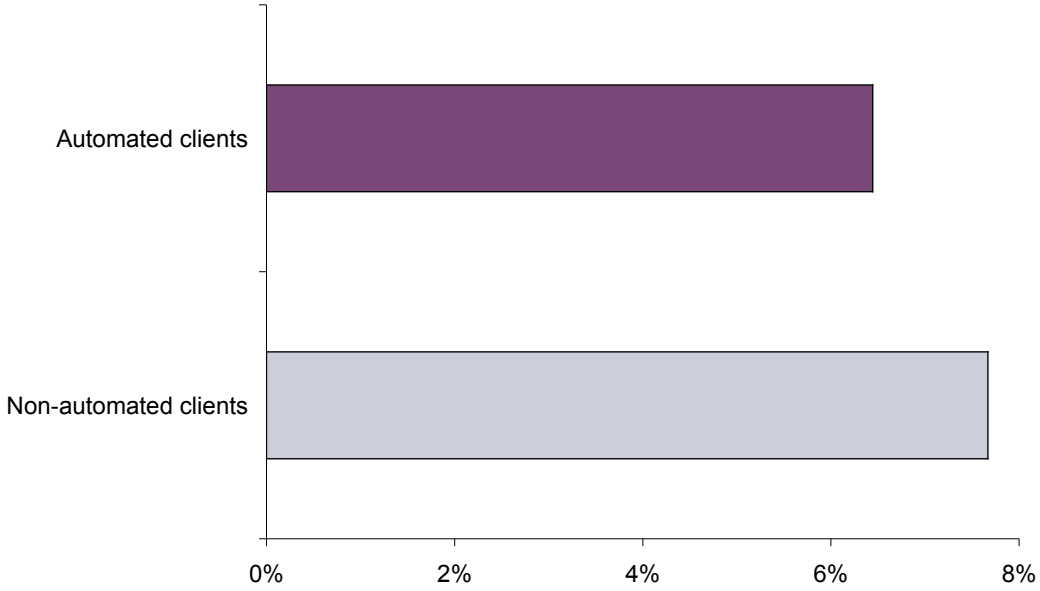
Notes: The figure shows the percentage of equity trades in EMEA markets for automated (ETC) and non-automated (non-ETC) clients in February 2008 that settle late.
Source: Data provided by a large global B/D.

Although there may be other differences between the two groups of client that may not be accounted for in the comparison, this evidence nonetheless indicates that the trade

verification process has direct implications for settlement performance, and that automation and early affirmation help to reduce the number of trade fails.

Another B/D (B/D 2 in Figure 5.3) also provided data on the rate of settlement fails for its ETC and non-ETC clients based in the EMEA region, using trades conducted for these clients between January and April 2008. According to this data, trades for automated clients also have a better settlement performance, although the difference compared with non-automated clients is less pronounced than for the first B/D—as shown in Figure 5.7, the average fail rate of trades for automated clients was 6.4% compared with 7.7% for non-automated clients.

Figure 5.7 Comparison of settlement failure rates for automated and non-automated clients (% of total equity trades)



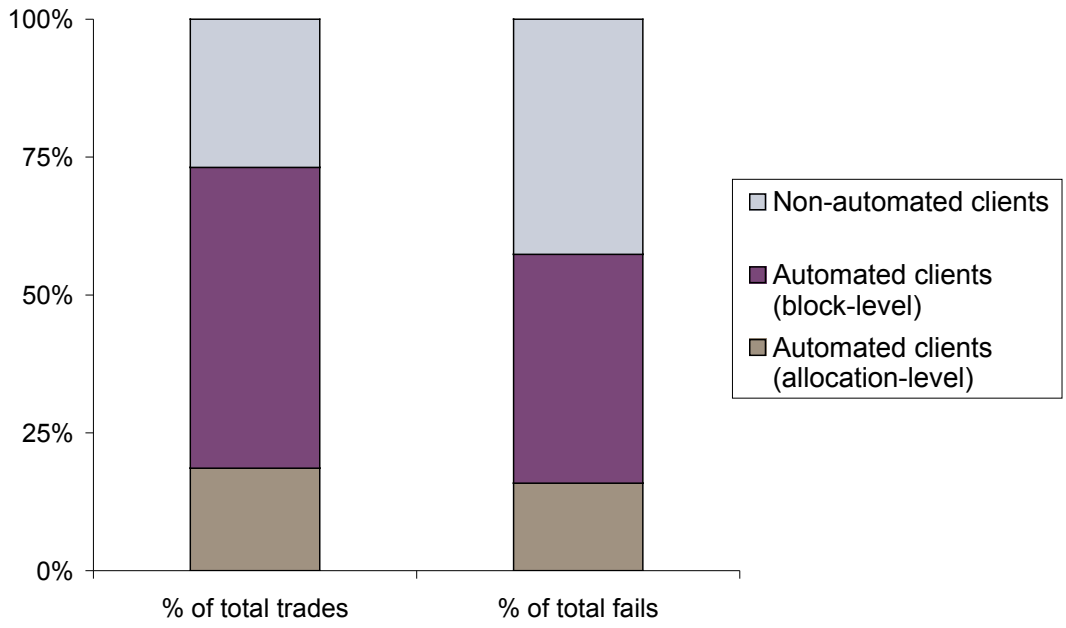
Notes: The figure shows the percentage of equity trades that fail to settle on the intended settlement date for automated (ETC) and non-automated (non-ETC) clients. Based on total equity trades for clients in EMEA region during January to April 2008.
Source: Data provided by a large global B/D.

A third firm, another very large B/D with European and global operations, was not able to provide data on the actual rate of settlement fails for different types of client. However, the firm provided a breakdown of total trade volume and fails for three types of client: block-level clients which send electronic allocations of block trades as well as electronic affirmations; allocation-level clients for which only the confirm/affirm process is automated; and non-automated clients without ETC capacity.

The data covers equity trades for European clients during March and April 2008. As summarised in Figure 5.8, 73% of total equity trades were for (partly or fully) automated clients and 27% for non-automated clients—ie, client automation levels were somewhat higher than those reported by the two B/Ds in Figure 5.3, at least when measured by trade volume. Importantly, the trades for non-automated clients failed proportionately more often—while only 27% of trades were for non-automated clients, 43% of total fails were attributable to those clients.

Correspondingly, trades for automated clients failed less frequently. In particular, the proportionate reduction in the number of fails compared with the number of trades is most apparent for block-level clients—these clients made up 55% of total equity trades during the two-month period but only 41% of fails.

Figure 5.8 Equity trades and fails for automated versus non-automated clients



Notes: The figure shows the percentage breakdown of both the total equity trades and the total fails of those trades for automated (ETC) and non-automated (non-ETC) clients, based on equity trades for mainly UK and Continental European clients during March and April 2008. ETC clients are broken down further into clients with automated verification at block level and at allocation level.
Source: Data provided by a large global B/D.

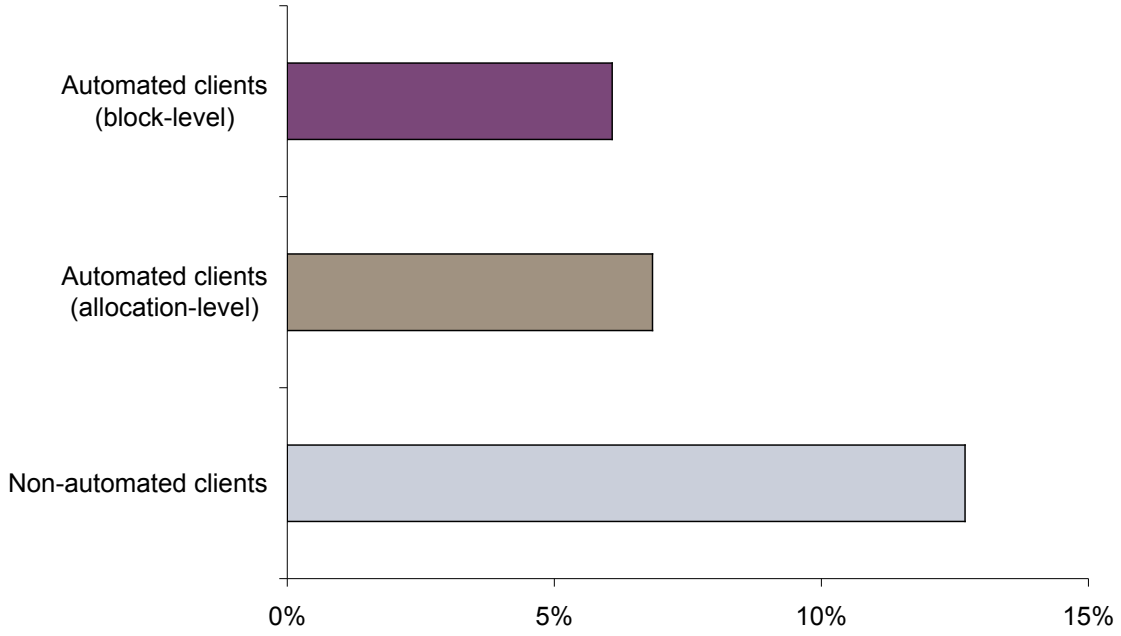
Although data on the actual fail rate was not available, the data on the trade and fail proportions can be used to infer illustrative fail rates that allow a comparison between the two groups in terms of settlement performance. For example, based on the assumption that the overall fail rate of equity trades is about 8% across the three client types, Figure 5.9 presents the inferred settlement failure rate for automated and non-automated clients. The inferred fail rate for non-automated clients is 12.7% compared with 6.8% or 6.1% for automated clients, depending on whether they are allocation- or block-level clients.

A lower and higher assumed overall fail rate would change the fail rates for the different client groups, but in the same proportions—eg, based on the data provided by the B/D, a lower overall fail rate of 6% would imply that trades for non-automated clients failed at a rate of 9.5% compared with 5.1% and 4.6% for automated clients at allocation and block level, respectively.

Thus, the data provided by this B/D suggests differences in settlement performance between automated and non-automated clients of a magnitude similar to those for the first B/D (Figure 5.5)—ie, the trade fail rate for automated clients has been almost half of that for non-automated clients over the same time period.

The data provided by the third B/D indicates additional improvements in settlement performance for block-level clients that use electronic systems for allocations compared with those that have the capacity for electronic confirmations and affirmations only.

Figure 5.9 Comparison of inferred settlement failure rates of automated and non-automated clients (% of equity trades)



Notes: The figure shows the inferred percentage of settlement fails for different types of client, using the data on the breakdown of total trades and fails reported in Figure 5.8, as well as an assumed overall settlement fail rate of 8%. A lower and higher assumed overall fail rate would change the fail rates for the different types of client, but would do so proportionately—ie, the difference between automated and non-automated clients would apply but the rates would all be lower or higher. No data on the actual overall fail rate was available.
Source: Oxera calculations based on data provided by a large global B/D.

Overall, all B/Ds, including those not able to provide data, confirmed that automation of the trade verification process has significant downstream implications and improves the post-trading and settlement performance overall. Importantly, verifying the trade details electronically and early (on trade date to achieve SDA) can reduce costs significantly—it avoids manual input at the verification stage and reduces resources required at later stages to correct non-matching trade details that would otherwise hinder timely settlement. No data was available to assess the extent of these cost efficiencies or to quantify the costs associated with trades that fail to settle because of errors or delays in trade verification and other settlement impediments.

5.3 Summary

The market participants interviewed as part of this study confirmed that the benefits of adopting automated trade verification processes and achieving SDA are significant. In particular, after having made the transition to automation, the IMs experienced significant increases in SDA rates, improved settlement performance and notable cost efficiencies. Similarly, although having been automated themselves for some time, the B/Ds continue to deal with a mix of non-automated and automated clients, and observe a significant and quantifiable difference between the two groups of client in terms of settlement rates and other post-trade performance metrics. These illustrations indicate the empirical significance of the conceptual benefits described in section 4.

6 Summary of findings

Building efficiencies in European equity trading and post-trading has been at the centre of the policy debate in Europe for a number of years. However, less attention has been paid to the important role of the trade verification process between IM and B/D in reducing risks and costs in post-trade processing and laying the foundation for effective and timely settlement of trades. This report describes the trade verification process and examines benefits that can be expected, for individual firms and the industry as a whole, from moving towards SDA as best operational practice and adopting automated trade verification processes to achieve this.

Based on conceptual analysis, data from primary and secondary sources, and in-depth interviews with 12 IMs and B/Ds, as well as a global custodian, the following emerge as the main findings of the study.

1) Automation of the trade verification process is a precondition for SDA

Automation is a precondition for completing the trade verification process on trade day and achieving SDA. With manual processes, there can be time lags and delays, given the sequential nature of the steps in trade verification. Moreover, where the IM is not automated, there may be no affirmation at all in practice; rather, settlement instructions are sent without explicit affirmation by the IM. By contrast, with automated processes, the majority of trades (which can be around 80–90% of trades, depending on the systems used and the implementation of those systems) can be affirmed on trade date—SDA is achieved in an automated manner and without manual intervention for the bulk of trades. Manual intervention is required only for trades where details do not match between IM and B/D (ie, for exception processing).

2) Automated trade verification and SDA reduce risks and improve settlement performance

The adoption of automated SDA processes reduces the rate at which trade fails occur and mitigates the costs associated with these fails. These costs include the various risk exposures (eg, position risk), increased funding requirements resulting from greater uncertainty in the settlement process, and claims, penalties or other direct costs associated with trades that settle either late or not at all. Automated trade verification and SDA reduces risks and improve settlement performance due to:

– **greater accuracy in the trade verification process**—automation makes it easier for the IM or B/D to identify errors or mismatches in the trade details which, if not corrected up front, could result in the trade failing to settle on time. Automation also reduces the risk of new errors being introduced during the post-trade processes, compared with manual processing;

– **improved process timing**—if the trade details are verified on trade day, a trade has a better chance of settling on the intended settlement day. With SDA, settlement instructions for affirmed trades can be sent to custodians or settlement agents on trade day, leaving the remaining days to finalise settlement and address any impediments to timely settlement that may arise further down the value chain.

The market participants interviewed for this study confirmed the empirical significance of these effects. After the transition to automation, the IMs experienced significant increases in SDA rates and resulting improved settlement performance. Similarly, a comparison of automated and non-automated clients of B/Ds shows significant and quantifiable differences

between these two groups in terms of settlement failure rates and other post-trade performance metrics—the data provided by some B/Ds suggests that, in recent months, the settlement failure rate for clients with automated trade verification processes has been as much as 50% lower than for non-automated clients.

3) Automated trade verification and SDA generate operating cost efficiencies

Automation allows the processing of a larger volume of trades without corresponding increases in operating costs and risk. It makes the trade verification process (and the accuracy and timeliness of that process) less sensitive to changes in volumes, particularly peak volumes that would be more difficult to handle quickly and efficiently if manual processes were being used.

As confirmed by interviews with IMs that have recently adopted automated processes, automation has allowed the firms to keep the number of staff working on trade verification within the middle office largely the same, despite significantly higher trade volumes, or to reallocate resources previously focused on repetitive manual tasks to more value-added activities, such as exception processing, reporting on internal performance or monitoring counterparty performance.

Operating cost efficiencies are not restricted to the trade verification function within the middle office of the IM or B/D, but apply to other functions (and other parties) along the value chain. In particular, a reduction in the risk of trade fails implies lower costs of preventing or following up potential or actual fails.

Fewer fails mean fewer costs downstream in record-keeping, reconciliations of settlement instructions, corporate actions, claims-handling and other functions required to resolve fails. Some of the operating cost efficiencies will therefore be enjoyed by other parties along the value chain, not just the IM and B/D.

4) Market-wide adoption of automation and SDA enhance the benefits realised

The risk reductions and cost efficiencies that can be realised by individual firms increase as more, and ideally all, firms in a given market adopt automated processes (that are standardised or interoperable). B/Ds, for example, need their existing (as well as potential) clients to adopt automation in order to reorganise their own activities in such a way that fully captures the benefits of automation. If some clients (or potential clients) do not adopt automation, the B/D will still have to organise its operations in order to meet the requirements of its non-automated clients. Many IMs and B/Ds that have switched to an automated solution currently find it difficult to benefit from it fully due to a lack of automation of their counterparties.

Moreover, some of the benefits associated with automation and increased levels of SDA can be realised only if there is a market-wide move towards these processes (within a country or region). Initiatives such as shortening the settlement cycle and harmonisation of settlement practices across EU countries could be achieved more easily in an environment where firms have adopted more consistent and efficient trade verification processes.

4) Risk and cost reductions translate into benefits for end-investors

The approach taken in this study is to consider the benefits from the perspective of individual market participants adopting automated SDA processes. However, from a wider perspective, these benefits can also be expected to translate into lower costs for end-investors. In a competitive industry, reductions in the risks and costs borne by IMs and B/Ds (or other intermediaries and infrastructure providers) would, once these benefits have been realised by a significant part of the market, be passed through and reflected in lower prices, resulting in lower transaction costs for end-investors, and associated effects on liquidity.

4) There is a current lack of automation and commitment to SDA

A significant and increasing proportion of market participants in Europe have already automated their trade verification process and effectively adopted SDA as best operational practice. The way in which automation is implemented varies across firms and markets. In principle, there is no need for a single, all-encompassing IT solution for trade verification. Several vendors may compete and succeed, as long as they have the scale and scope to deliver the services in the market. What matters is interoperability.

Despite the growth in automated trade verification, many firms, particularly IMs, continue to process trades manually or in a partly automated manner, and transmit messages via fax, email or telephone—there is currently no uniform practice and often not even a specified target to complete verification and affirm trades on trade day.

The question that arises, therefore, is what prevents market participants from adopting automated processes to achieve SDA and experiencing the benefits that have already been realised by others in the market, including the firms interviewed for this study. Potential reasons for not adopting automated processes to achieve SDA include the following.

- A lack of understanding of the costs and benefits of automated SDA processes and, more generally, a lack of attention within firms to middle-office (and back-office) operations.
- A cost–benefit trade-off that may not be sufficiently attractive for individual firms, given the level of implementation and ongoing costs associated with automated systems, and the skewed incentives of firms to undertake the investment. In particular:
  - firms may not have the incentives to invest in automation if they currently do not bear the cost or risks associated with manual processes, but would incur the actual cost of changing the processes and investing in automated systems;
  - since the benefits depend to a large extent on the degree of automation of a firm's counterparties, the investment may not be worthwhile at current levels of automation in the market, but would become worthwhile were automation (using standardised or interoperable systems) introduced on a market-wide basis. Thus, even if the individual benefits are transparent and well understood, automation may not take place, notwithstanding the fact that if there were a coordinated response the benefits could be realised.

5) Trade verification and SDA should be part of the policy debate in Europe

An analysis of the specific reasons for the lack of adoption of automated trade verification processes is beyond the scope of this report. However, the potential benefits on offer, combined with the possible reasons outlined above for not adopting these processes, suggest that, from a public policy perspective, there could be merits in facilitating increased automation and SDA as best operational practice among European IMs and B/Ds by, for example, increasing awareness and understanding, and improving the alignment of incentives within firms.

Overall, this report highlights the role played by trade verification in the post-trading value chain, and shows how the adoption of automated processes and SDA can reduce costs and risks in post-trading and make the overall process more efficient. This is particularly important given various ongoing initiatives aimed at building efficiencies in European post-trading. Trade verification, and how to improve this process (towards automated SDA), should form part of the policy debate.

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