Mitigating Operational Risk and Increasing Settlement Efficiency through Same Day Affirmation (SDA)

Industry Discussion Paper

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About the Authors

This industry discussion paper was authored by Lisa Ortner-Ghouze, Executive Director of Marketing at Omgeo. The section on the correlation between SDA and settlement performance was written by Dominic Hobson, editor in chief of *Global Custodian.*

To learn more about the methodology and approach to this paper, please review the Appendix.

Executive Summary

The financial crisis has clearly shown that risk management – the way we knew it – didn't adequately manage risk. The turmoil in the financial markets has been the catalyst for firms worldwide to look more closely at their risk management methodology while thinking about risk more holistically, including gaining a better perspective of their operational risk. At the same time, regulators on both sides of the Atlantic are focusing on overhauling post-trade infrastructures. Regulatory action has often, if not always, been an effective driver of change. But proactive firms don't always rely on regulatory drivers and, instead, consistently review their internal operations for continued opportunities to mitigate risk.

In the area of operational risk, there is one industry best-practice that firms should pay particular attention to: Same Day Affirmation (SDA). We define SDA as "the agreement of all trade details on trade date (T+0) between a broker/dealer and an investment manager (or their agent)". The case for SDA is based on the simple premise that by agreeing on the details of a trade more quickly, operational risk, costs and inefficiencies are significantly reduced. If you can lock-in trade details sooner and affirm on trade date, you will have that much more time to identify and resolve any potential errors, and so the chances of a trade failure are reduced.

SDA is a vital prerequisite for mitigating operational risk and increasing settlement efficiency. It is also an important prerequisite for achieving shorter settlement cycles, a topic heavily debated in preparation for TARGET2-Securities (T2S) in Europe. In 2008, Oxera, an independent research firm, conducted an analysis on the benefits of SDA. One of the key findings was that firms adopting automated processes to achieve SDA can expect reductions in the risk and costs associated with trade verification and other post-trade processes, including reduced trade failure rates.

We have now taken SDA analysis one step further by closely comparing Omgeo service performance data with *Global Custodian* settlement efficiency intelligence. The key findings of the paper include:

- The analysis confirms that securities trades affirmed on the same day have a much higher chance of settling on time and are less likely to fail. Quantifying settlement performance improvements across multiple markets can be challenging given the range of factors that affect the ability of counterparties to settle trades successfully. However, we found evidence from *Global Custodian* survey intelligence that operations managers at major global custodian and investment banks have noticed improved settlement performance in markets where levels of SDA are high.

- The combination of Omgeo data on SDA rates and *Global Custodian* settlement efficiency data suggests that there is a direct correlation between high SDA rates and high settlement rates. Settlement efficiency in countries with SDA rates of over 90 percent – India, Taiwan, Hong Kong, Japan, Singapore and Korea – is 26% higher than in countries with SDA rates of less than 70 percent – Brazil, Italy, South Africa and the United States.

- As Europe debates shortening settlement cycles, the analysis showed that there are benefits of a regulatory and industry push to shorten the settlement cycle. Four of the five countries which display the highest SDA rates and highest settlement efficiency scores require T+2 settlement for most securities, including India, Taiwan, Hong Kong and Korea. Similarly, South Africa, which has one of the lowest SDA rates and settlement efficiency scores, operates on a T+5 cycle. These data points suggest that countries that have imposed shortened settlement cycles are achieving higher efficiency and lower operational risk than other countries with more relaxed standards.

- Our analysis shows that approximately $4.1 Trillion DTCC eligible trades are at risk on an annual basis because of poor market practice that allows trades to settle even if they have not been affirmed or matched.

- Generally speaking, regulatory, cultural and regional workflow practices are the main determinants of SDA rates, with regional regulation being the most important driver. Unless firms are under strict obligations to comply with specific market rules and regulations, it's often very difficult to change and improve historical processing behaviours.

- From a regional perspective, Asia displayed the highest SDA rates and the Americas the lowest, making Asia the region with the lowest operational risk. Asian rates are a reflection of regulatory and cultural practices. A number of regulations are in place in different markets that require, for example, prompt trade matching or affirmation on T+0. In addition, a regional culture of efficiency which has shaped day-to-day life as well as financial processes is an important contributor to high SDA rates. The same cannot always be said for the Americas (with the exception of Canada), where the U.S. most negatively impacts the regional average.

- SDA rates across Europe are consistently in the mid 80% range, with Switzerland leading the region and Italy at the bottom of the SDA curve. Again, differences in rates can be attributed to local regulation, cultural and market practices. Switzerland has the highest SDA rate in the region (87.6%), where a Code of Conduct requires trades to be confirmed on the day of execution (T+0) and where there is also a regional culture of efficiency that has shaped day-to-day life as well as financial processes.

- Centrally matched trades are much more likely to be affirmed on the day the trade was executed. On average, centrally matched trades achieve an average SDA rate of 86.5% whereas locally matched trades obtain 66.6%.

- There are significant differences in SDA rates between equity and fixed income trades, with fixed income rates being considerably lower. This gap is primarily due to the relatively recent fixed income automation effort (as compared to equities), the over-the-counter nature of fixed income, the sheer number of fixed income products, and workflow practices within the fixed income market.

As global economies slowly emerge from the financial crisis, few would doubt that the lessons learned in risk management have become embedded in the DNA of our industry. It's clear that firms who've taken a serious and holistic consideration of risk across their organization are the ones best prepared to navigate the industry. In many cases, being able to prove risk management policies and procedures to clients and prospects, even regulators, has become a necessary part of doing business.

It's clear from the findings of this analysis that SDA correlates highly with settlement efficiency and that institutions in countries which have pushed forward automation, either through industry best-practice or regulation, are achieving a higher degree of efficiency and reducing risk and cost for their firms and their clients.

A closer look at Operational Risk

One thing that the financial crisis has shown very clearly is that, amongst many contributing factors, risk management – the way we knew it – didn't adequately manage risk. Did risk managers not understand the warnings, or were risk managers not able to answer the basic questions of their trade? Since the financial meltdown, culminating with Lehman's collapse in September 2008, much has been written about risk mitigation and what the industry and policy makers should do to get everything right again. Rightly so, the turmoil in the financial markets has been the catalyst for many firms to look more closely at the methodology of risk management and at risk more holistically, including operational risk. There are many types of risk that firms are grappling with. Within this industry discussion paper, our focus will be on Operational Risk[1].

Current Risk Management Priorities[2]

- Systemic risk
- Counterparty risk
- Credit risk
- Liquidity risk
- Market risk
- Operational risk
- Portfolio risk
- Regulatory risk
- Settlement risk
- Reputational risk
- Sovereign risk

Source: TowerGroup

If the financial crisis has taught investors one important lesson, it is that you might have the greatest trading strategy, but if the "life blood" of your company – your operations – cannot execute on that strategy, you are in trouble. Back in 2003, about 70% of banks considered operational risk to be as important as market or credit risks. Nearly a quarter of the same banks admitted to operations-related losses of more than \$1.6 billion[3]. One can only imagine what this statistic would look like today, post financial crisis! In October of 2009, Omgeo surveyed its global Advisory Board[4] and found that 88% of the board's members had taken steps to improve communications between their front, middle and back office operations in an effort to reduce risk. However, while most respondents felt their firms were already being proactive, many said that the industry as a whole did not possess the same level of readiness. Operational risk has emerged with renewed vigor and gained an important prominence in the minds of financial professionals.

1 Operational Risk is the risk of loss resulting from inadequate or failed internal processes, people and systems, or from external events.

2 "Understanding Securities Industry Risk by Using the TowerGroup Risk Management Matrix", Stephen Bruel, Tower Group, March 2009.

3 Operational Risk: Regulation, Analysis and Management, by Carol Alexander, March 2003.

4 Omgeo operates a global advisory board program that engages 100 firms globally, including a balance of large and small investment mangers, hedge funds, broker/dealers, outsourcers and custodian banks, all actively using Omgeo services. The Board provides guidance on strategic priorities, a forum to discuss industry issues and trends, and ensures that Omgeo services continue to meet market needs.

That's why regulators on both sides of the Atlantic are focusing on overhauling post-trade infrastructures. The recently passed Dodd-Frank Bill in the U.S., for example, increases the oversight and reporting requirements for all large firms as well as hedge funds. It also seeks to reduce the complexity and opacity in the market by forcing many over-the-counter ("OTC") derivatives trades onto exchanges. It also supports the notion of a robust collateral management and reconciliation regime to reduce counterparty risk. Similar themes have emerged from regulators in Europe. The European Commission published a draft law in September 2010 (called Regulation on OTC derivatives, central counterparties and trade repositories) which will ensure that a significant portion of the global $615 trillion over-the-counter derivatives market is centrally cleared. In addition, European Union officials and law makers have agreed to the establishment of a new European Systemic Risk Board, hosted by the European Central Bank, to warn about broader risks and asset bubbles as well as to create three new pan-European supervisory authorities for markets, banks and insurers, which will be in place on January 1, 2011.

> **"Because of the financial crisis, operational risk has emerged with renewed vigor in the minds of financial professionals."**

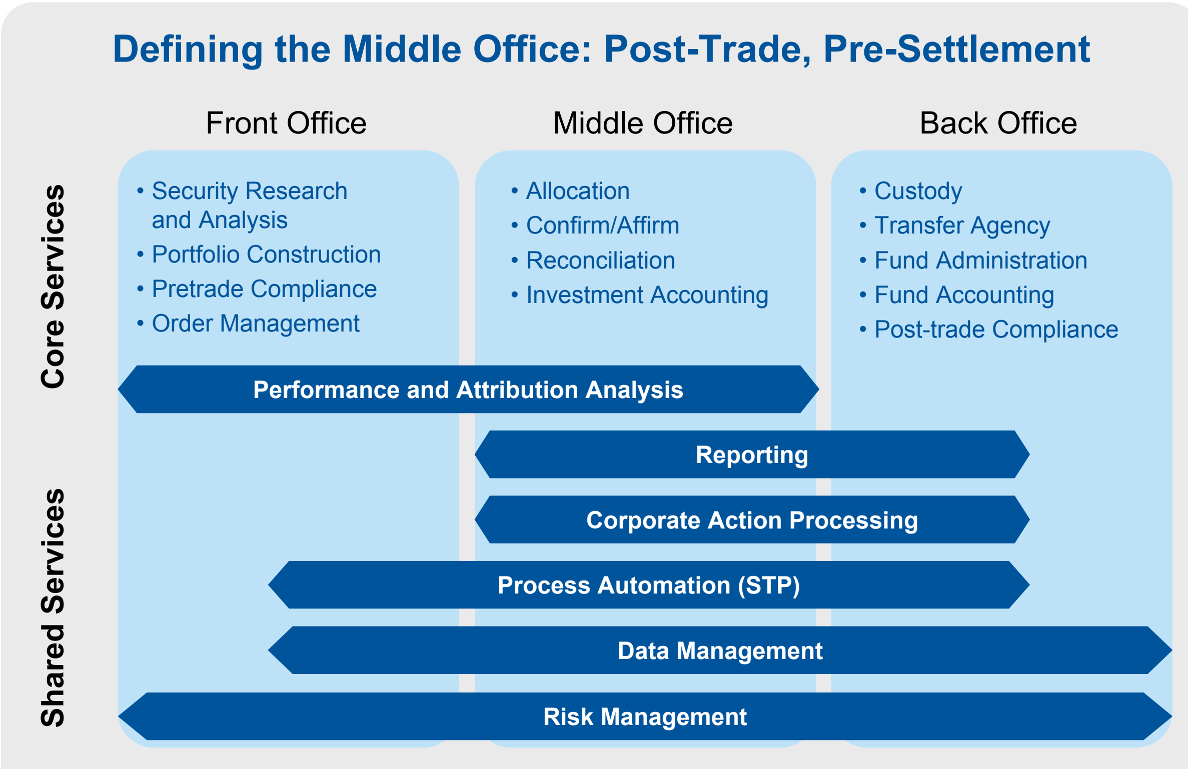
Regulatory action has often, if not always, been an effective driver of change, no question. But proactive firms are not waiting on regulation and are already looking at their internal operations for other opportunities to mitigate risk, such as addressing outdated risk models or systems, poor valuation techniques or manual post-trade processes. There is one industry best-practice that firms should pay particular attention to in order to mitigate operational risk, and that is called Same Day Affirmation (SDA). As you read this paper, you'll see that SDA is a vital prerequisite for mitigating operational risk and increasing settlement efficiency. It is also an important prerequisite for achieving shorter settlement cycles, a topic heavily debated in preparation for TARGET2-Securities (T2S) in Europe. But before we dive right into Same Day Affirmation, it seems necessary to spend a few moments shedding some light on the role that the middle office plays in the life cycle of a trade.

The importance of the Middle Office

Because of the financial crisis, the often overlooked middle office function has increased in importance. We mentioned earlier that almost 90% of our Advisory Board members have taken steps to improve communications between their front, middle and back offices in efforts to reduce operational risk. That's not a coincidence. An increasing number of risk professionals are now viewing the middle office as an essential step in the life cycle of a trade as it prepares for efficient clearing and settlement, which in turn plays an important role in reducing operational risk.

> **"Increased requirements for risk mitigation and transparency are putting the middle office in the limelight."**

The role of the middle office is to control and process those transactions which have been executed by traders and portfolio managers in the front office so that they can be cleared and settled. Here, important trade details such as the security type, buy or sell, date, deal price and the number of securities bought or sold are verified, omnibus trades are broken down and allocated to different funds, and trades are confirmed and affirmed between trade counterparties. This process of trade confirmation (sometimes also referred to as "matching" or "verification") should, optimally, occur as soon as possible after the trade execution. An old saying states that "nothing good ever happens between execution and settlement". The truth is that there is a reduced chance of trade failure if you lock-in your trade with your counterparty as quickly as possible. Without an efficient middle office, there would be a lack of clarity on which securities have been bought or sold, in what quantity and by whom. This transparency is essential to effectively manage operational risk.



Source: TowerGroup

On the buy side, the ability to view current and estimated future risk exposure is more important than ever, given that fund managers have expanded their investment strategies beyond traditional equity and fixed income instruments. In addition, both institutional fund managers and hedge fund managers are facing pressure from their investors to provide more transparency into their operations, so that they can better understand the balance between risk and return. On the sell side, broker/dealers want to better understand the relative profitability of their clients to them. Middle office transparency provides data that they can use to identify which clients are profitable, and which are not. It is because of these increased requirements for risk mitigation and transparency that the middle office is finally getting some limelight.

Defining Same Day Affirmation (SDA)

Now, let's turn our attention to exploring the concept of Same Day Affirmation (SDA)[5]. The case for SDA is based on the simple premise that by agreeing on the details of a trade more quickly, operational risk, costs and inefficiencies are significantly reduced. If you can lock-in trade details sooner and affirm on trade date, you will have that much more time to identify and resolve any potential errors, and so the chances of a trade failure are reduced.

What is SDA?
We define it as "the agreement of all trade details on trade date (T+0) between a broker/dealer and an investment manager (or their agent)".

There is a direct correlation between high SDA rates and high settlement rates, thus trade failure rates are reduced if trades are affirmed sooner in the process. (The next section of this paper will expand on this very point.) Unfortunately, it is very difficult, if not impossible, to quantify the exact cost of a failed trade. There are many variables that need to be considered such as the number of resources a firm employs, how many portfolios are involved, which systems store the trade data and specific costs associated with the trade itself (e.g. fixed income trades are typically higher value than equity trades). Very few firms track all these variables in one place, so calculating exact numbers is incredibly challenging.

> **"There is a direct correlation between high SDA and high settlement rates, thus trade failures are reduced if trades are affirmed sooner in the process."**

We feel that identifying a figure that demonstrates the importance of SDA is a bit like asking your dentist to quantify – in precise monetary terms – how much you will save on dental care if you brush your teeth after every meal. Common sense tells you that it is a good idea, even if exact cost savings on dental care are very difficult to quantify. Similarly, it is very difficult to quantify how much expense you might incur if "something bad" happened because you did not affirm your trades the day they were executed. Common sense tells us that confirming a trade as quickly as possible, ideally on trade date, is a smart thing to do. It's hard to argue against SDA as an industry best-practice. This brings us back to our earlier point: proactive firms embrace all opportunities to mitigate risk, including SDA.

Mitigating operational risk through Same Day Affirmation (SDA)

Now we would like to focus on the important role SDA plays in mitigating operational risk. In 2008, Oxera, an independent research firm, conducted an analysis on the benefits of SDA. One of the key findings was that firms adopting automated processes to achieve SDA can expect reductions in the risk and costs associated with trade verification and other post-trade processes, including reduced trade failure rates[6]. We have now taken this analysis one step further. In this paper, we identify that:

- SDA is a prerequisite of shorter settlement cycles, meaning that a move to T+2 or T+1 is only achievable if your trades are affirmed on the day they are executed. If SDA is not in place, your trade failure rates and operational risk could increase exponentially.

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5 It is important to note that Same Day Affirmation (SDA) is a generic concept and not a recommendation of a specific workflow.

6 "Building efficiencies in post-trade processing: The benefits of same day affirmation", Oxera Consulting Ltd., June 2008.

- When trades are affirmed or matched the day a trade is executed, the principal amount of securities at risk each year is significantly reduced.
- This is the first data analysis to confirm that securities trades affirmed on the same day have a much higher chance of settling on time and are less likely to fail.

The Benefits of Same Day Affirmation

Direct Benefits

Risk reduction
- Error reduction
- Improved dealing with exceptional trades
- Reduction in settlement fails

Cost efficiencies
- Operating cost reduction
- Reallocation of resources to more efficient use
- Volume insensitivity

Indirect Benefits
- Improves information, transparency and monitoring
- Enables straight-through processing (STP)
- Enables shorter settlement cycles
- Harmonizes settlement practices across countries

Source: Oxera, "Building Efficiencies in post-trade processing – the benefits of same day affirmation," June 2008

SDA as a prerequisite of shorter settlement cycles

The current European debate around shortening of settlement cycles is a heated one, and this paper would be incomplete without it. There are a number of reasons why Europe is at the forefront of this discussion at this point in time.

Because of the Lehman bankruptcy and the fact that many firms lost a lot of money, people acknowledged that three days is actually a very long time between trading and settlement – especially when you consider the speed at which trading occurs. Regulators felt that if you reduced the amount of time between trade execution and settlement, it would also reduce the amount of counterparty risk exposure in that market.

In addition, the implementation of a uniform, pan-European settlement system called TARGET2-Securities (T2S) planned for 2014 and led by the European Central Bank (ECB), has forced the debate over harmonization of settlement cycles across Europe. Germany currently settles on T+2 whereas the rest of Europe is on a T+3 cycle. To live up to its mandate, T2S is aiming for *one harmonized* settlement cycle across Europe and the majority thinking is that that should be T+2. Lastly, at time of writing this paper, the French government is legislating for a move to T+2 sometime in 2012 to restrict short selling, although the implementing measures and actual date are currently unclear.

As highlighted earlier, for any market considering reduced settlement times, SDA becomes a vital prerequisite to achieving it. We are hopeful that the European industry will sharpen its focus on further enabling SDA in advance of assigning a specific settlement time across the globe. T+2 certainly is an important conversation, but we must keep in mind that while some markets appear to operate successfully in this environment, such as some markets in Asia, for others, it can be more difficult to successfully respond to a shorter settlement cycle if the proper building blocks are not already in place. One thing is clear: if Europe is successful in its move to T+2, the U.S. and other markets will not be able to ignore it since global markets are highly interconnected. Without any doubt, a European move to T+2 will have a ripple effect on markets worldwide.

"For any market considering reduced settlement cycles, SDA becomes a vital prerequisite to achieving it."

Evidence of the benefits of a regulatory and industry push to shorten the settlement cycle can be seen in the chart on page 11. Four of the five countries which display the highest SDA rates and highest settlement efficiency scores require T+2 settlement for most securities (India, Taiwan, Hong Kong and Korea). Similarly, South Africa, which has one of the lowest SDA rates and settlement efficiency scores, operates on a T+5 cycle. These data points suggest that countries which have imposed shortened settlement cycles, while embracing SDA as an industry best-practice, are achieving higher efficiency and lower operational risk than other countries with more relaxed standards. It's likely that this is being achieved through a heightened focus on automation, which in turn leads to the ability to confirm and finalize trades as quickly as possible after execution.

SDA and $4.1 Trillion DTCC eligible trades at risk per year

Now that you have heard about how Europe is trying to reduce risk and accelerate the trade life cycle, it seems time to tell you more about one of the U.S. trade processing anomalies: the U.S. is one of the rare markets where trades can settle even if a trade has not been affirmed or matched between a broker/dealer and an investment manager. The main reason for this anomaly appears to be historical: U.S. utilities have simply never felt the need to mandate affirmation or matching as a prerequisite of settlement. Not only does this unnecessarily increase operational risk in the U.S., but it also negatively impacts SDA rates.

Omgeo TradeSuite Quality Control reports[7] show that approximately 10% of all DTCC-eligible trades[8] are never affirmed or matched. According to DTCC, approximately 3.5% - 5.0% of all trades that are not affirmed are "reclaimed". This means that when a broker attempts to deliver a security to a custodian, the custodian does not accept the delivery. Why? Because the custodian has not received proper instructions from the institution to accept this delivery. The broker then has to "reclaim" the transaction and finance it until it is delivered and accepted. Many factors contribute to the high number of unaffirmed or unmatched trades in the U.S., including insufficient exception management processes, lack of adequate systems and resources to conduct a proper affirmation process, and lack of automation. The main reason for reclaims appears to be the lack of affirmation or matching prior to settlement.

[7] Omgeo TradeSuite provides connectivity from execution to settlement on domestic and cross-border fixed income and equity trades of U.S. securities. TradeSuite Quality Control (QC) reports measure the timeliness and accuracy of confirmations and affirmations for institutions, agents and broker/dealers.

[8] In the United States, equities, corporate bonds and municipal bond trades are eligible to settle at the Depositary Trust and Clearing Corporation (DTCC). Other types of securities settle elsewhere, like treasuries and government bonds which settle at the Federal Reserve, or certain mortgages which settle at the MBSCC (Mortgage Backed Securities Clearing Corporation).

Why is this important? We calculated that the cost of reclaims to the U.S. industry ranges from $17 Million to $62 Million per year. But more importantly, the fact that trades remain unaffirmed or unmatched up until the point of settlement puts around $4.1 Trillion DTCC eligible trades at risk on an annual basis[9].

"$4.1 Trillion DTCC eligible trades are at risk on an annual basis because trades remain unaffirmed or unmatched up until the point of settlement."

The issue of settling trades without them being affirmed or matched has generated a heated debate amongst U.S. broker/dealers and investment managers, who do acknowledge SDA as an industry best-practice, but would rather see the industry focus on a mandate around matching or affirming trades prior to settlement. Insiders call this the "match to settle" discussion. It's still in its early days, and it is yet to be seen whether it will make the jump from meeting room discussion to industry mandate. We do know that the industry is engaged and is covering the necessary ground to prepare for what many consider the inevitable: shorter settlement cycles facilitated by a combination of SDA and a "match to settle" mandate.

These changes would promote reduced risk, while introducing greater levels of settlement certainty within the U.S. Market. Let's look at this more closely, with a contributed article from Dominic Hobson of *Global Custodian* magazine.

SDA and improved settlement performance

By Dominic Hobson, editor in chief of Global Custodian magazine

Quantifying improvement in settlement performance across multiple markets is challenging, given the range of factors that affect the ability of counterparties to settle trades successfully. Those factors include the quality and range of responsibilities of the local market infrastructure of clearing houses, central securities depositories and payments systems; the evolution of multi-market settlement systems, such as the ESES platform in Europe; the presence or absence of local or central trade matching systems; the length of the settlement timetable; the quality of the services supplied to global custodian and global investment banks by sub-custodian banks as their local clearing and settlement agents; the degree of complexity in settling the asset classes investors and trading houses buy and trade, and especially the persistence of any in paper form; the ability to borrow stock to cover impending trade fails; the propensity of banks to settle trades between counterparties across their own books by `internalization'; and the local combination of laws, rules and regulations governing settlement, and especially local peculiarities that make settlement more difficult, such as the notorious registration procedures in Spain.

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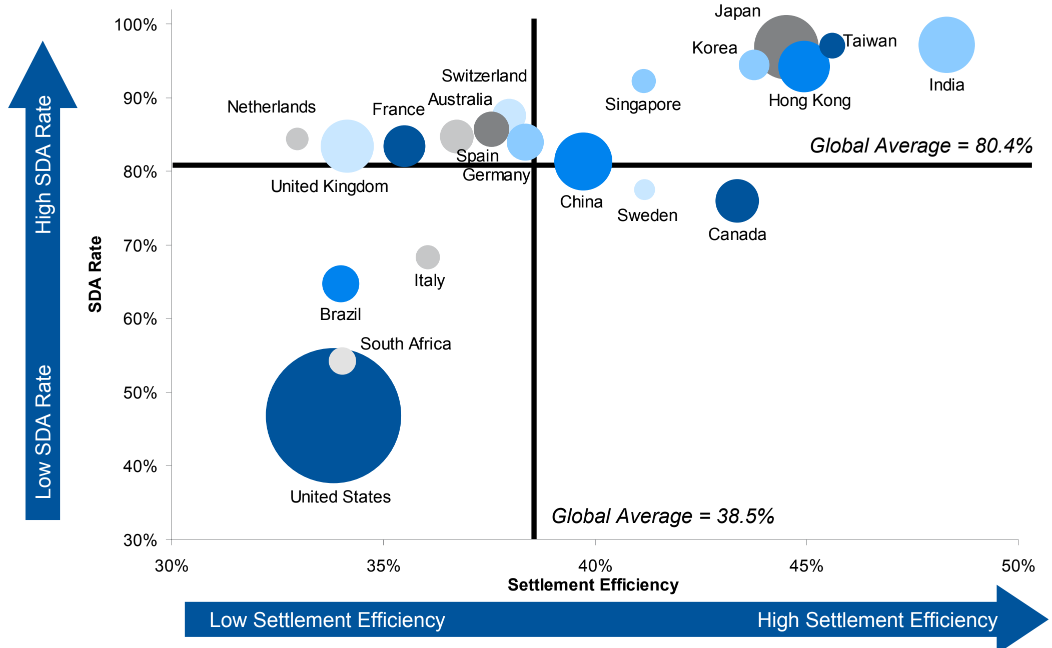
9 Based on DTCC data, between 3.5% - 5.0% of trades are reclaimed each month. Together with some of our larger broker clients, we estimated that the average cost of a reclaim ranges from $40 to $100. By looking at our clients' TradeSuite data from May 2009 to April 2010, we calculated the number of trades unaffirmed each month. We then multiplied that number by the cost of a reclaim. Since the reclaim rate (3.5% - 5.0%) and the cost of a reclaim ($40 - $100) fluctuate, reclaims cost the U.S. industry between $17 Million and $62 Million a year. We then calculated the principal amount of securities at risk and the value of these transactions. This gave us the principal amount of $4.1 Trillion DTCC eligible trades at risk each year.

All of these factors make it hard to quantify the contribution which SDA makes to higher levels of settlement efficiency. However, there is evidence from the surveys published by *Global Custodian* magazine that operations managers at the major global custodian and global investment banks have noticed improved settlement performance in markets where levels of SDA are high. In fact our analysis shows that settlement efficiency is 26% higher in countries with SDA rates over 90 percent. In other words, the combination of Omgeo data on SDA rates and *Global Custodian* settlement efficiency data suggests that there is a direct correlation between high SDA rates and high settlement rates. Higher rates of SDA are associated with greater efficiency in settlement, because high rates of SDA afford agent banks more time to manage unmatched trades, and deal with potential threats to the timely settlement of matched trades.

The Relationship Between SDA Rates and Settlement Efficiency (Top 20 Markets)



Note: Size of bubble indicates the size of the market as measured by domestic market capitalization in USD (Q2 '10)
Source: Omgeo, Global Custodian, World Federation of Exchanges

Two notable anomalies in the chart are Canada and the U.K. In Canada, the chart shows a high settlement efficiency score, but a lower-than-average SDA rate. Because of the regulatory mandate to achieve settlement on T+1 and a consequent increase in investment in automation, Canada is achieving SDA levels that are among the highest in the Americas, but still below average by comparison with other major economies. This is primarily attributable to the fact that local matching still prevails as a market practice, although central matching is increasingly being embraced by market participants. Automation levels and regulation have, however, played a key role in reducing operational risk and trade failure rates in Canada, which is evident in the high settlement efficiency rate. We anticipate that the SDA rate in Canada, as well as the settlement efficiency rate, will increase as central matching is embraced more broadly within the market.

In the U.K., the chart shows above average SDA rates, but a low settlement efficiency score. The reason behind this anomaly seems to be that the U.K. hosts some of the largest and most liquid securities markets in the world, with a much broader range of issuers and investors. While daily settlement success rates of 95-99 percent are achieved in the most liquid and least complex U.K. equities, gilts and money market instruments, efficiency is relatively low in other securities, where the degree of manual intervention remains high. There is also a preference for self-clearing among the major global investment banks, which are elsewhere in the world a major driver of high levels of efficiency among third party providers. This means many of the broker/dealers which respond to the survey are using relatively inefficient systems, and their local providers tend to operate off aging platforms.

This is the first data analysis to confirm that securities trades affirmed the same day have a much higher chance of settling on time and are less likely to fail. With SDA, settlement instructions for affirmed trades can be sent to agent banks on trade date (T+0), leaving the remaining days before cash is exchanged for securities (typically T+3) to identify and address any errors and mismatches before they put final settlement at risk. Where errors are not addressed early in the process, trades tend not to settle on time or at all. The head of operations at a European custodian bank-cum-fund administrator claimed recently that matching trades on trade date has caused his failed trade rate to drop to below 0.5%. There is certainly evidence in the *Global Custodian* surveys that high rates of efficiency in trade matching are highly prized by network managers, and that they have noticed it liberates resources which enable local clearing agents to deliver a higher quality of service. In each of the last three years, the effectiveness of an agent bank in resolving unmatched trades has consistently ranked among the top five issues – out of around 70 possibilities – for clients trading securities actively in the major markets of the world.

Numerous verbatim comments in the 2010 edition of the survey confirm that operations managers highly value timeliness in affirmation and matching of trades[10] and in fact list them as one of the most important qualities in a trade counterparty. To quote a few: “timely notification of fails and unmatched trades to ensure settlement by market cutoff is the most important quality I seek in an agent bank”; “unmatched report details and accuracy need to be improved”; “matched/unmatched information from local agents via global custodian can sometimes be slow and needs to be improved”; “lack of automation led to errors as a direct result of manual pre-matching of off-market transactions”. The highest praise one operations manager had to offer was the fact that “we have never had an unmatched trade”.

Though a high level of automation is a prerequisite of a high level of trade matching – “Telephone matching is not fluent,” as a respondent to the 2010 survey put it – operations managers recognize that automation improves service levels too, as agent banks have more time to deal with exceptional threats to timely settlement and trades whose details have failed to match. Respondents to the 2010 survey praised banks for providing them with consistent updates on unmatched trades and flexibility in settling trades and for providing unmatched/failed reports to them promptly. Similarly, operations managers noticed when service levels fell below this level of pro-activity, and were dissatisfied when account managers were very difficult to get hold of when there was a lag in information about a mismatch, or a lack in pro-activity when it came to issue resolution, especially unmatched trades.

[10] To avoid confusion: the terms “matched trades” and “affirmed trades” are synonymous.

Why does this matter so much to operations managers? Chiefly because they no longer have to charge clients for costs associated with failed trades. This ultimately improves investment performance for end-investors, by reducing the erosion of alpha by unnecessary operational costs. A more efficient settlement process also means that operations managers can offer a more attractive service to broker/dealer clients, because they can trade closer to the cut-off time for settlement in the various markets where they are active. Of course, SDA is not the only reason why trades settle on time and fail less often. Indeed, there is a group of markets with high rates of SDA that do not perform well in terms of the various measures of settlement efficiency in the *Global Custodian* surveys , but each of those markets suffers from specific inhibitions to settlement efficiency.[11] In other words, the gains from SDA can be offset by other factors. The United States does not fall into this category, because the data finds both the rates of SDA and the rates of settlement efficiency are low, but the findings nevertheless illustrate the cost imposed on a market where a trade can settle without being matched: a drastically lower rate of SDA. A higher rate of SDA would afford American banks the time to perform the tasks identified by *Global Custodian* as essential to a high rate of settlement efficiency: resolving unmatched trades pro-actively, including covering impending failed trades by securities borrowing, as close as possible to the market settlement deadlines.

[11] France, the Netherlands and Portugal are Euronext markets, which encourage network managers to assess settlement across multiple markets in an undifferentiated way. Much of the liquidity in Portugal has now migrated offshore, making it less attractive for agent banks to invest. Trades in both France and the Netherlands are also settled on a single Euroclear-managed ESES platform. In Spain, registration procedures have made efficient settlement notoriously difficult to achieve. In Austria, many trades are settled remotely, and a high proportion of clients use Vienna as a hub in the markets of central and eastern Europe, strongly influencing their assessment of Austrian agent banks. Denmark is outside the euro, and affected by infrastructural developments at the trading and clearing as well as settlement level that affect all of the Nordic markets. In all of these markets there are agent banks that under-perform conspicuously against the *Global Custodian* survey benchmarks, with predictably depressive effects on scoring, irrespective of actual settlement performance.

Key findings from the Same Day Affirmation (SDA) analysis

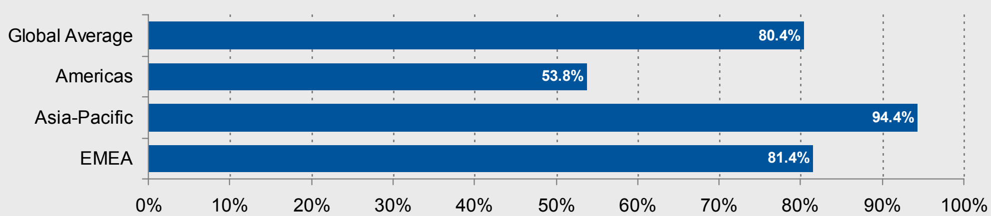
Now that we have elaborated on the critical role SDA plays in mitigating operational risk and increasing settlement rates, we wanted to share which regions and countries are leading the pack and who is falling behind. Generally speaking, regulatory, cultural and regional workflow practices are the main drivers of the SDA rates shared on the following pages. You will see that regional regulation, however, is the most important driver. This does not come as a complete surprise. Unless firms are under strict obligation to comply with specific market rules and regulations, it's often very difficult to change and improve historical processing behaviours. It's human nature[12].

Asia leads the way in the global SDA rate comparison

> **"Asia's high SDA rates are a reflection of regulatory and cultural practices. Operational risk exposure is highest in the United States."**

Our analysis shows that Asia has the highest SDA rates and the Americas the lowest, making Asia the region with the lowest operational risk. Asia's rates are a reflection of regulatory and cultural practices. A number of regulations are in place in different markets that require, for example, prompt trade matching or affirmation on T+0. In addition, a regional culture of efficiency which has shaped day-to-day life as well as financial processes is another important contributor to high SDA rates in Asia. The same cannot always be said for the Americas, with the exception of Canada. With the Americas, it's actually the United States that is most negatively impacting the regional average. We have mentioned earlier that the U.S. allows trades to settle even if they have not been matched or affirmed, resulting in high reclaim rates. This inefficient market practice, together with a number of other factors which will be outlined in detail later, are at the core of these low SDA levels.

SDA Rates by Region



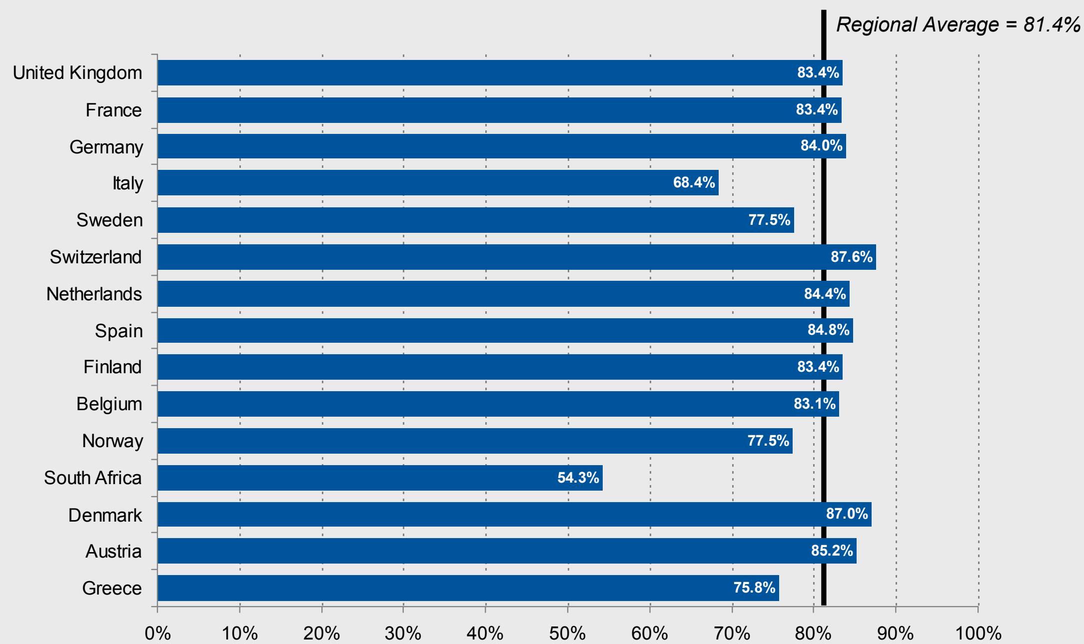
Source: Omgeo, data as of Q2 2010

[12] Disclaimer: The SDA rate calculations are based on transactions processed through Omgeo services, but do not include transactions processed manually or through any proprietary systems.

EMEA SDA rates consistently in the mid 80s

SDA rates across Europe, the Middle East and Africa (EMEA) are consistently in the mid 80% range, with Switzerland leading the region and Italy at the bottom of the SDA curve. Again, differences in rates can be attributed to local regulation, cultural and market practices.

Regional SDA Rates: Europe, Middle East & Africa



Notes: Sorted by trade activity in descending order
Source: Omgeo, data as of Q2 2010

- **Culture and workflows – Switzerland**

  Switzerland has the highest rate of Same Day Affirmation in Europe (87.6%). There are several factors at play here. Not only is there a Code of Conduct which requires trades to be confirmed on the day of execution (T+0), but there is also a regional culture of efficiency that has shaped day-to-day life as well as financial processes. For example, the former stock exchange trading floors in Zurich, Geneva and Basel are all linked, via the Electronic Bourse Switzerland ("EBS"), so that trades can be carried out among traders on all three of the trading floors, electronically.

Added to these cultural drivers are the high rates of central matching amongst industry participants[13] in Switzerland. Centrally matched trades are much more likely to be affirmed on the day the trade was executed (see section on Italy and local matching for more). All these factors contribute to the high rates of SDA in Switzerland.

- **Regulation – U.K.**

  The U.K. is a good example of where market practice and regulation have positively impacted SDA rates. Under FSA rules, each order must be placed knowing which clients will be allocated the trade, and in what proportions. Theoretically, trades could be pre-allocated where the client would specify allocations at the time the order is placed. In reality, this does not happen because orders are typically separated in multiple executions at different prices, and frequently orders are not wholly filled which results in the requirement of an average pricing exercise before the allocations are fully defined.

  In addition, investment managers regulated by the FSA perform the trade allocation process at regular intra-day intervals. This is because they interpret the FSA Code of Conduct Business Rule to mean that the allocation process must be performed very shortly after the market order has been completed. The rule around fast allocation may explain the high SDA rates in the U.K.

- **Regulation and market practices – Spain**

  Spain has one of the highest rates of SDA in Europe at 84.8%, but further analysis reveals a market with a very small number of highly efficient operators and a larger group of much smaller firms. The big global firms consistently have SDA rates above 95% whilst the smaller domestically focused firms may be 20 percentage points lower. The market is also highly impacted by the unique registration process which Spain adopts called Referencias de Registro (“RR”). This is a process whereby each Spanish security is given a unique identifier code which is re-issued any time a transaction takes place. Registration can only occur after a trade has been confirmed. The re-registration process is unpopular because of its workload implications but it does help to generate high SDA rates.

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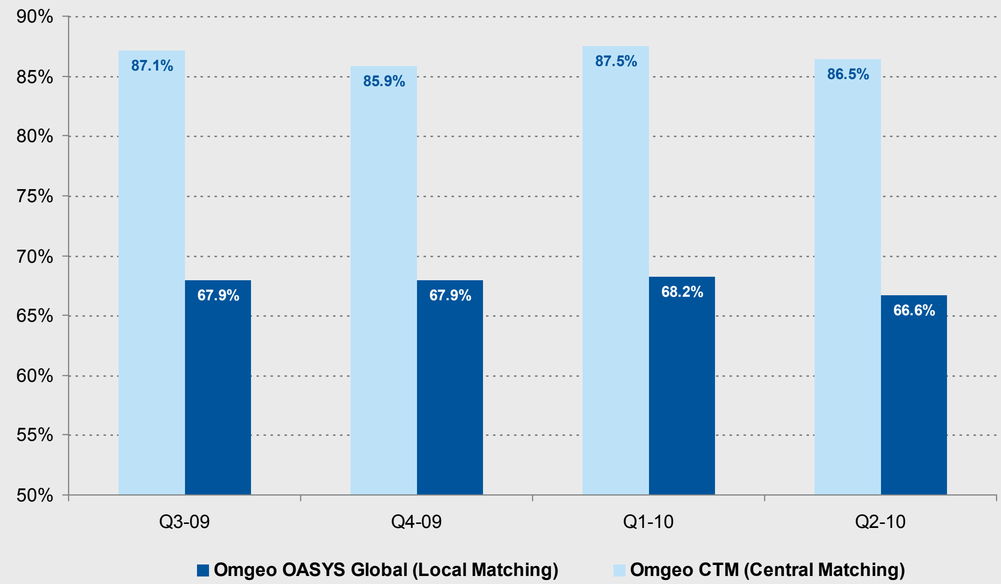
[13] **Local versus Central Matching**
Local matching refers to a process where buy and sell side counterparties agree to trade details in a sequential manner; insiders refer to it as the “windshield wiper” effect because of the back and forth nature of the exchange of information. The process starts when an investment manager sends an order to the broker, who sends a notice-of-execution (NOE) back, which the investment manager matches with the order submitted. The manager then creates and submits trade allocation details to the broker, who adds in commission and fee information and sends back trade confirmations. The investment manager then locally matches the confirmations against allocation details, and if everything matches, trades are affirmed and the process is complete.
Central matching describes a process that is non-sequential, typically using a centralized matching system. Either party can submit their trade details at any time, and in any order, into the system which automatically matches the trades based on specific criteria and tolerances set up by the investment manager. Eliminating the local matching sequential steps saves time and mitigates risk as trades are locked in soon after execution, resulting in higher SDA rates.

- **Local matching practices – Italy**

Italy's relatively low SDA rates can be attributed to the fact that the majority of firms are still using local matching systems to process their trades. Centrally matching trades is far more efficient than local matching. It offers speedier trade confirmations, reduced errors, lower levels of risk and cost, as well as the ability to monitor trade flow. For workflow diagrams detailing local versus central matching, please see the Appendix.

Central Matching Produces Far Superior Operational Efficiency

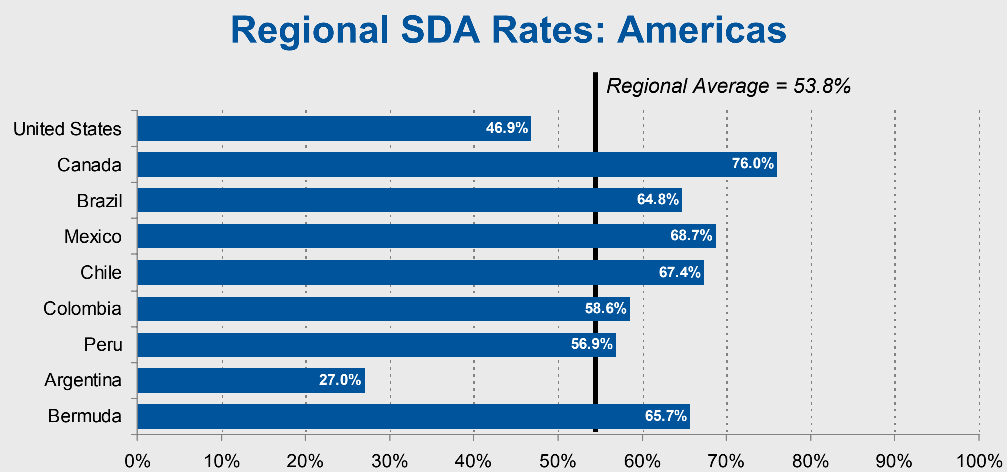
Same Day Affirmation Rates: Central Versus Local Matching



Source: Omgeo, data as of Q2 2010

SDA rates in the Americas are relatively poor

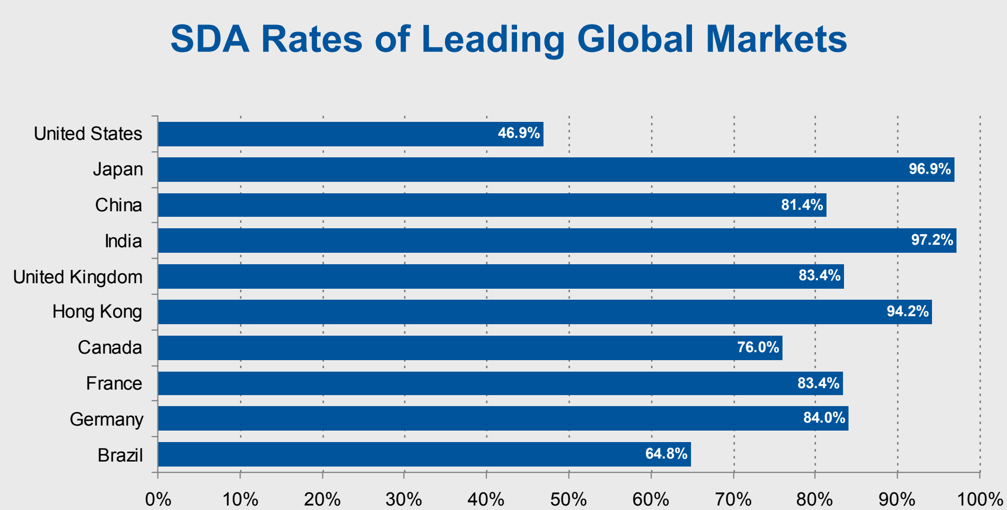
Relative to other parts of the world, the Americas exhibit poor SDA rates, with some exceptions. Most notable among these is Canada. First, let's start with the U.S.



Notes: Sorted by trade activity in descending order
Source: Omgeo, data as of Q2 2010

- **Greater exposure to operational risk than other global economies – United States**

  The first thing that jumps out when looking at the Americas' SDA rates is how low the U.S. rates are. If SDA rates are one way of measuring operational risk exposure, then the United States is much more exposed to risk than other global economies.



Notes: Sorted by domestic market capitalization (US$) in descending order
Source: World Federation of Exchanges, Omgeo, data as of Q2 2010

- **Inefficient workflows and limited regulation – United States**

  We have uncovered four primary reasons that negatively impact risk exposure in the U.S.:

  a. **No match to settle requirement**: We already talked about the fact that, in the U.S., an investment manager is not required to affirm a trade with their broker/dealer in order for it to settle. This not only impacts SDA rates, but more importantly, puts around $4.1 Trillion DTCC eligible trades at risk on an annual basis.

  b. **End of day processing:** In the U.S., approximately 65% of allocations are delivered from buy side firms to their counterparties after the 4:00 p.m. ET market close. This is also called "batch processing". Clients trade throughout the day, but largely process their allocations in a single batch. In the U.K., where investment managers have interpreted the FSA Conduct of Business Rules to mean that the allocation process must be performed very shortly after the market order is completed, trade allocations are done at regular intra-day intervals, making SDA more possible. (In contrast to FSA rules, SEC regulations do not refer to this issue, so the U.S. market has largely adopted end-of-day batch processing, making SDA harder to achieve.)

  c. **Unnecessary additional steps and local matching:** When looking at the U.S. domestic market, the majority of institutions prefer to have their custodian bank send trade affirmations to their broker/dealers. This can result in an extra day for the institution to advise their custodian that they want them to perform the affirmation process. This added step can delay affirmations and is technically not required. But more importantly, in the U.S., local matching still prevails as market practice. Other leading economies have embraced central matching as a means to process their trades more efficiently and centrally matched trades are much more likely to be affirmed on the day the trade was executed.

  d. **Inefficient cross-border affirmation process:** The exchange of cross-border trade information between an investment manager and a broker/dealer is not as efficient as it could be. There are a number of steps that need to take place for a cross-border trade to be affirmed by an investment manager. After a trade is executed:
     i. The broker needs to send the trade to the investment manager.
     ii. Once the investment manager accepts the trade, they need to send the trade allocations across the different funds back to the broker.
     iii. The broker then confirms the trade so the investment manager can affirm.

     Ideally, this process happens on the same day as the trade. However, if any of these steps are delayed – for example, if the broker sends the trade late in the day, or if the investment manager does not send allocations back until late in the day, or if the investment manager does not agree on the trade confirmation it receives from the broker/dealer (which happens relatively often!) and the broker/dealer needs to submit a new trade, SDA can become very difficult to achieve. It becomes especially challenging if the investment manager and broker/dealer are in different time zones.

- **Regulation and automation – Canada**

Although below average when compared to other major markets including Japan, Korea and Hong Kong, Canada leads the Americas region in SDA efficiency. Not surprising! In April 2007, Canada set aggressive targets to increase its competitiveness and market efficiency with the National Instrument 24-101 rule. Essentially, the mandate required participants to implement procedures to accelerate their trade process, enabling parties to meet "trade date match" requirements (essentially the same thing as SDA) within specific timelines. Data published by the Canadian Depository for Securities (CDS) shows that settlement failure rates declined from a 3% national average before implementation of NI 24-101 to 1.5% in September, 2009[14]. That's an impressive reduction. And it's proof that improved levels of automation and SDA lead to reduced operational risk and improved settlement efficiency. We estimate that, based on the reduction in fails achieved to date, NI 24-101 has contributed to a savings of more than CA$170 million in the Canadian market.[15]

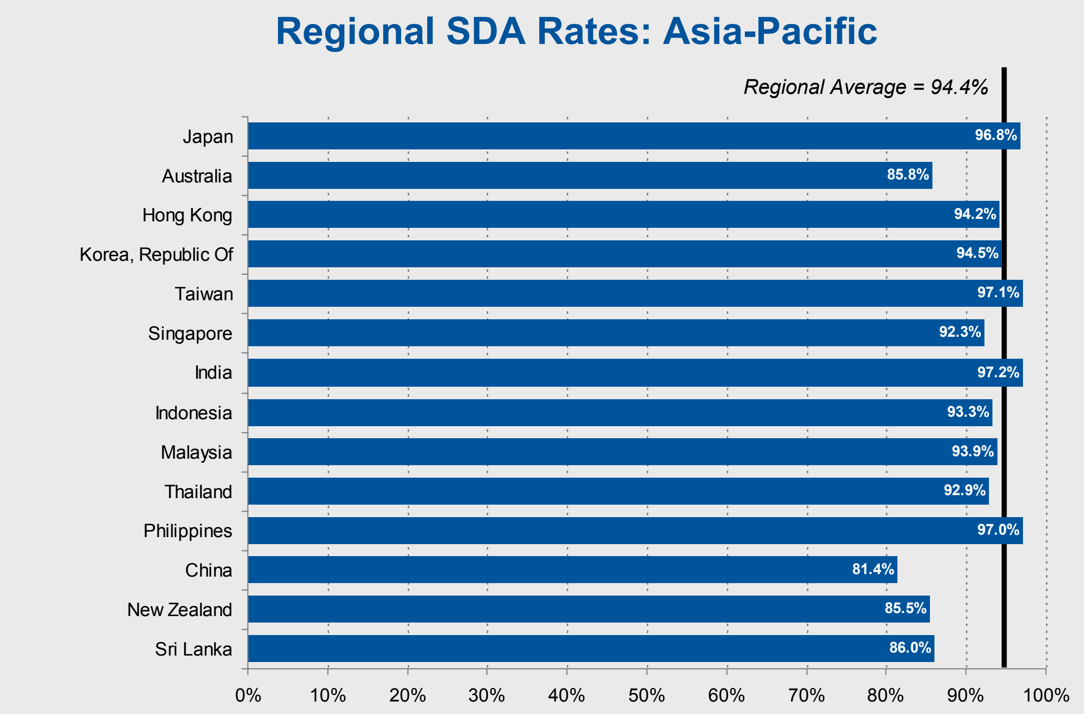
As a result of the regulatory mandate and increased investments in automation, including central matching, Canada has achieved SDA levels that are among the highest in the Americas. While the regulation has been put on hold, currently with the goal of achieving 90% of trades achieving SDA on T+1 at 12:00 noon (and to be revisited pending accelerated settlement cycles in other markets), there is little doubt that automation levels and regulation have played a key role in reducing operational risk and trade failure rates in that market.

[14] The Canadian Securities Administrators Request for Comments regarding proposed amendments to National Instrument 24-101, October 30, 2009.

[15] We assumed the average number of trades per year = approx 77 million (as reported by CDS). We also assumed an average failure rate of 3% (as reported by CDS) and a conservative average cost of CA$150 per domestic failed trade (based on 2002 Fulcrum Research study estimate, discounted to reconcile with above noted European findings). We conservatively estimated the resultant annual gross cost of failed trades at CA$346 million. Next, we assumed that if SDA contributed to a reduction in failed trades by 50% (as reported in the CSA Request for Comment), SDA would contribute to a minimum industry savings of CA$173.25 million per year.

Asia's regional SDA average is almost twice as high as U.S. rates

You already know that Asia has the highest SDA rates globally. To be precise, the average Asian SDA rate is almost double the U.S. rate. As mentioned before, SDA can be attributed to local cultural and regulatory practices in each of the individual markets. Let's take a closer look at a few of them.



Notes: Sorted by trade activity in descending order
Source: Omgeo, data as of Q2 2010

- **T+2 settlement cycles & regulation – India, Hong Kong and Taiwan**

  In India, the T+2 settlement cycle along with the requirement for most mutual funds to calculate and publish NAVs (Net Asset Values) by the end of the trading day have contributed to making India's SDA rates the highest ones in the region (97.2%). Back in 2003, the Indian regulator (SEBI) set up and mandated the use of an STP system for all institutional equity trades to ensure a smooth transition to a T+2 settlement cycle. To create interoperability among the different 'approved STP providers', an STP Central Hub initiative was implemented. The T+2 regulation, coupled with the implementation of a local STP framework, has played an important role in driving India's high SDA rates. As domestic volumes increase and additional asset classes are mandated under STP, it remains to be seen if the high SDA rate is sustainable within the current Indian infrastructure.

Hong Kong, where SDA rates are 94.2%, is another highly efficient market where local regulation has positively impacted affirmation rates. Here, due to the market operating on a T+2 settlement cycle, all final clearing statements must be transmitted for confirmation and reconciliation purposes just after 2:00 p.m. on T+1. A prerequisite for this activity is that trades must be affirmed on trade date (T+0). Here, the 97.1% SDA rate of Taiwan, one of the highest rates globally, can be attributed to the T+2 settlement cycle and the need for timely confirmation and reconciliation on T+1. This is evidence that T+2 and T+1 settlement cycles spur high SDA rates, reducing operational risk as a result.

- **Regulation and culture – Japan**

  In Japan, regulatory rules require market participants to verify their trades and to publish the Net Asset Value (NAV) for most domestic funds by 6:30 p.m. on the day the trades are executed (T+0). In addition, Japan's culture of efficiency – or *Kaizen*, meaning "continuous improvement" – translates in practical terms into a philosophy of setting and continually improving standards, resulting in their reputation for quality. The result? A very beneficial effect on trade processing practices. No one goes home until the work is done and it's done well. This cultural best-practice is also a contributing factor to the high performance of companies across various sectors, such as Honda in the car manufacturing industry and Canon in the imaging production industry.

- **Cultural practices – Australia**

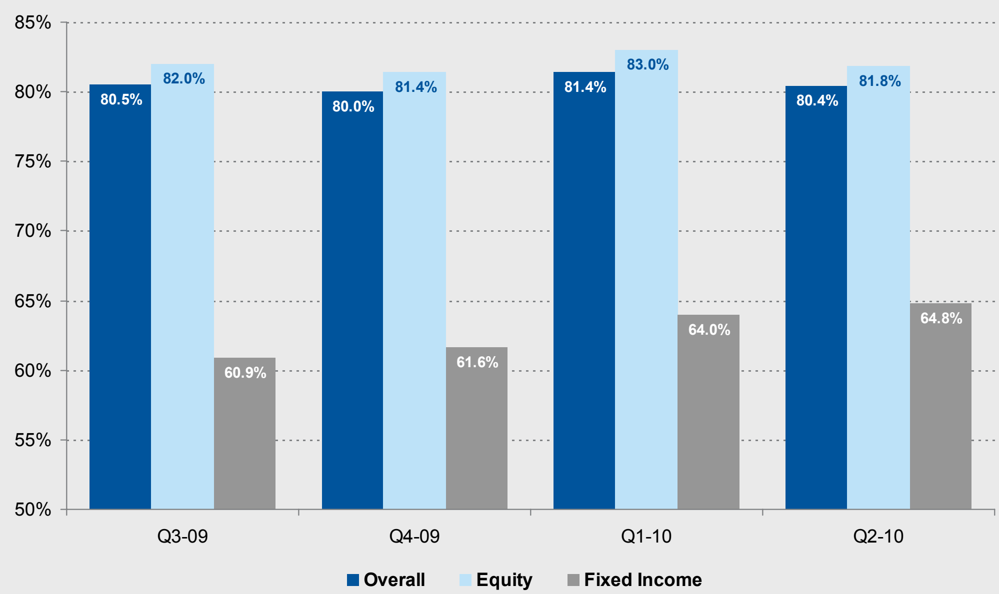
  In global terms, Australia's 85.8% SDA rates are good. However, compared to the rest of Asia, they come in a little low. There is no perceived sense of urgency in the market to move to SDA. Market participants can show that their affirmation rates at 11:00 a.m. on T+1 are close to 100%. That seems sufficient to Australian players at the moment. As cross-border traffic and trade volumes increase, things could change.

Significant gap between Equity and Fixed Income SDA rates

Our analysis also shows significant differences in SDA rates between equity and fixed income trades, with fixed income being a lot riskier. This gap is primarily due to the relatively recent fixed income automation effort (as compared to equities), the over-the-counter nature of fixed income, the sheer number of fixed income products and workflow practices within the fixed income market.

The SDA Gap Between Equity and Fixed Income is Significant

Same Day Affirmation Rates by Asset Class



Source: Omgeo, data as of Q2 2010

The equity market has had a 20 year head start in automation over the fixed income market.

Equity volumes increased as much as 30% each year from the late 1990s until trading activity peaked in September 2008. This was primarily due to regulatory and market changes such as decimalization, Reg NMS (Regulation National Market System) in the U.S and MiFID (Markets and Financial Instruments Directive) in Europe. For firms to be able to cope with significant trade volume increases, they needed to automate. In comparison, fixed income trade processing practices only began to become automated in 2002/2003. It's no wonder that fixed income still has a lot of catching up to do. Adding to that, fixed income desks, which are smaller and trade fewer quantities, have been slow to embrace change and less responsive to increased automation. Fixed income securities are far more complex than the common stock, which has made fixed income much more difficult to standardize, automate and build a community of users.

There are, however, signs that indicate that fixed income is catching up. Comparing SDA rates between equities and fixed income over the year, efficiency levels have increased for fixed income from 60.9% in Q3 2009 to 64.8% Q2 2010 (a 6% increase) compared to a decline from 82% to 81% (-1%) for equities over the same time period.

Conclusions

Same Day Affirmation (SDA) is a critical component for mitigating operational risk and increasing settlement efficiency, as well as an important prerequisite for achieving shorter settlement cycles. The direct correlation between high SDA rates and high settlement scores is particularly compelling as the data shows that trades affirmed the same day have a much higher chance of settling on time and are less likely to fail. In fact our analysis shows that settlement efficiency is 26% higher in countries with SDA rates over 90 percent. Operations managers no longer need to charge clients for costs associated with failed trades, which reduces the erosion of alpha and improves investment performance for end-investors.

SDA is an essential building block for successfully moving to shorter settlement cycles. The current European debate around moving to T+2 is an important conversation, but we should not lose sight of the fact that, for its success, the necessary building blocks need to be in place – SDA being one of them. Four of the five countries with the highest SDA rates and highest settlement efficiency scores require T+2 settlement for most securities (India, Taiwan, Hong Kong and Korea), suggesting that countries which have imposed shortened settlement cycles while embracing SDA as an industry best-practice are achieving higher settlement efficiency and lower operational risk than countries with more relaxed standards.

The United States displays one of the lowest SDA rates and settlement efficiency scores compared to other leading economies, primarily due to the poor industry practice where trades can settle even if a trade has not been affirmed or matched between a broker/dealer and an investment manager. Our calculations show that this puts around $4.1 Trillion DTCC eligible trades at risk on an annual basis and unnecessarily increases operational risk. From these findings, it is clear that the debate amongst U.S. broker/dealers and investment managers – who do acknowledge SDA as an industry best-practice, but would rather see the industry focus on a mandate around matching or affirming trades prior to settlement – should successfully continue.

A few things are for sure – how we define “risk” has changed, and the industry is engaged and is covering the necessary ground to prepare for what many consider the inevitable to further minimize operational risk: a future of shorter settlement cycles facilitated by a combination of SDA and “match to settle” mandates.

APPENDIX

a. About Omgeo

Omgeo was formed in 2001 as a wholly owned, global joint venture between the Depository Trust & Clearing Corporation (DTCC) and Thomson Reuters, formerly known as Thomson Financial. Omgeo's predecessor companies have over 30 years of experience servicing the world's capital markets; Omgeo's tenure and proven track record are key differentiators in today's volatile financial markets. Omgeo has over 6,000 clients representing over 2,400 financial institutions in 46 countries around the world. Omgeo employs over 600 staff in every major global financial center, including primary locations in Boston, New York, London and Hong Kong, with a total of 16 offices to support our business. Omgeo has also pioneered and is the global standard for electronic trade confirmations, standard settlement instructions and confirm/affirm via automation.

b. Methodology

About Omgeo SDA Data

The SDA data included in this paper was compiled exclusively from Omgeo systems. Currently, no industry-wide SDA data is available to aid clarity in this area by any other source. SDA rates cited in this report were based on January 2009 through June 2010 data. Sources used to gather the SDA data in this industry discussion paper include:

- **Omgeo Central Trade Manager℠ (Omgeo CTM):** Omgeo CTM is Omgeo's strategic platform for the central matching of cross-border and non-U.S. domestic equity and fixed income transactions.

  Community members*: 500+ investment managers, trading with 1000+ OASYS Global brokers and 10+ Omgeo CTM brokers**
  Markets*: 46 countries
  Trading*: 88% Cross-border, 12% Domestic
  Average volumes per month*: 5 million

- **Omgeo OASYS Global℠:** Omgeo OASYS Global is Omgeo's global electronic trade allocation and confirmation solution for cross-border and non-U.S. domestic equity and fixed income transactions.

  Community members*: 150+ investment managers, 1000+ brokers
  Markets*: 43 countries
  Trading*: 80% Cross-border, 20% Domestic
  Average volumes per month*: 2 million

- **Omgeo TradeSuite℠:** Omgeo TradeSuite automates messaging and settlement for equity and fixed income U.S. securities.

  Community members*: 9,600+ investment managers, 1,400+ brokers, 1,100+ custodians
  Markets*: 1 (U.S. only)
  Trading*: 98% Domestic, 2% Cross-border
  Average volumes per month*: 17 million

  * *Data as of August 2010.*

  ** *Initially an investment manager solution, Omgeo has recently started to offer Omgeo CTM to broker/dealers. A program is currently underway to migrate existing Omgeo OASYS Global broker/dealers to the central matching benefits of Omgeo CTM.*

<u>About the *Global Custodian* Surveys</u>

The *Global Custodian* surveys of agent banks in major and emerging markets provide an annual snapshot of the perceptions of network managers at the major global custodian and global investment banks of the efficiency of settlement in different markets. Both surveys include a settlement section, in which network managers are invited to rate their agent banks on a scale of 1 to 7 in eight different areas: Proportion of trades matched on time (taking account of local market practice and infrastructure); Effectiveness in resolving unmatched trades; Timeliness of settlement confirmation; Ability of agent bank to settle trades by internal book transfer ('internalization'); Ability of agent bank to settle a wide variety of securities efficiently; Pro-activity in failed trade resolution; Flexibility over trade processing deadline (i.e. closeness of agent deadlines to local market deadlines); and Efficiency of securities lending to cover trade fails. The data is not quantitative. It measures what network managers think of the settlement performance of their agent banks, not what their settlement performance actually was. The scores are based, at least in the case of the leading network managers, on actual settlement performance data.

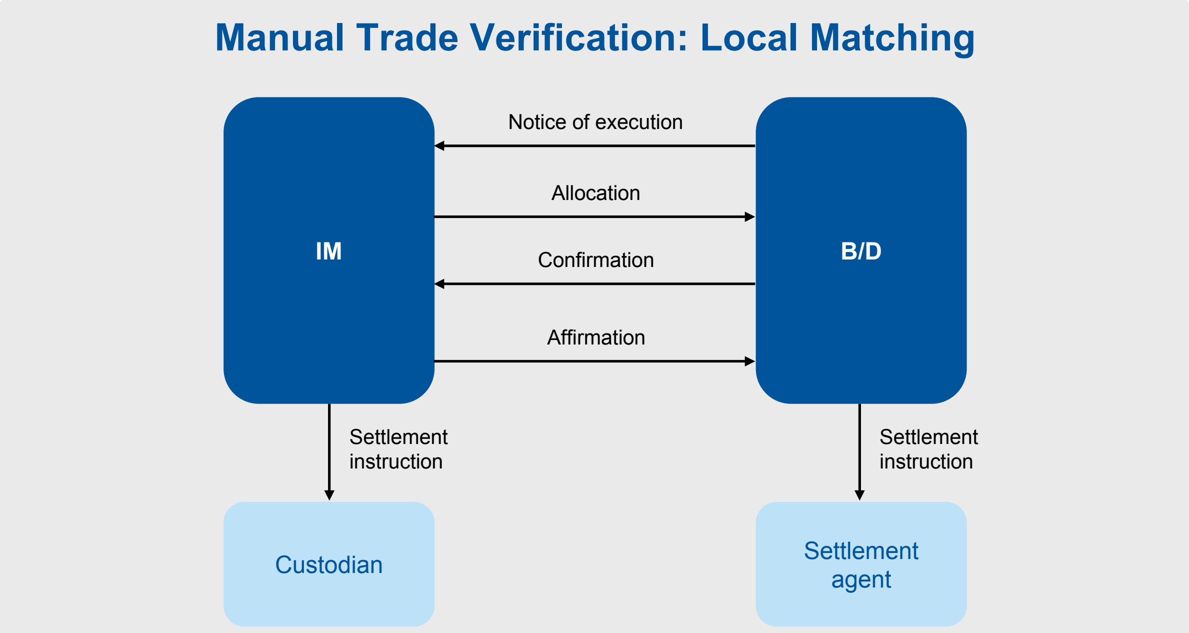
<u>Comparing Omgeo SDA Data with *Global Custodian* Surveys Data</u>

By matching flattering perceptions of settlement performance by leading network managers (drawn from the *Global Custodian* surveys) in particular markets to high rates of SDA (drawn from Omgeo SDA data) in the same markets, it is possible to search for correlations between high rates of SDA and good impressions of settlement performance. Our analysis focused on the questions directly relevant to matching and settlement efficiency: The proportion of trades matched on time (taking account of local market practice and infrastructure); The timeliness of settlement confirmation; Flexibility over trade processing deadline (i.e. closeness of agent deadlines to local market deadlines); and the overall score for the settlement service area, which provides a useful proxy for overall levels of settlement efficiency.

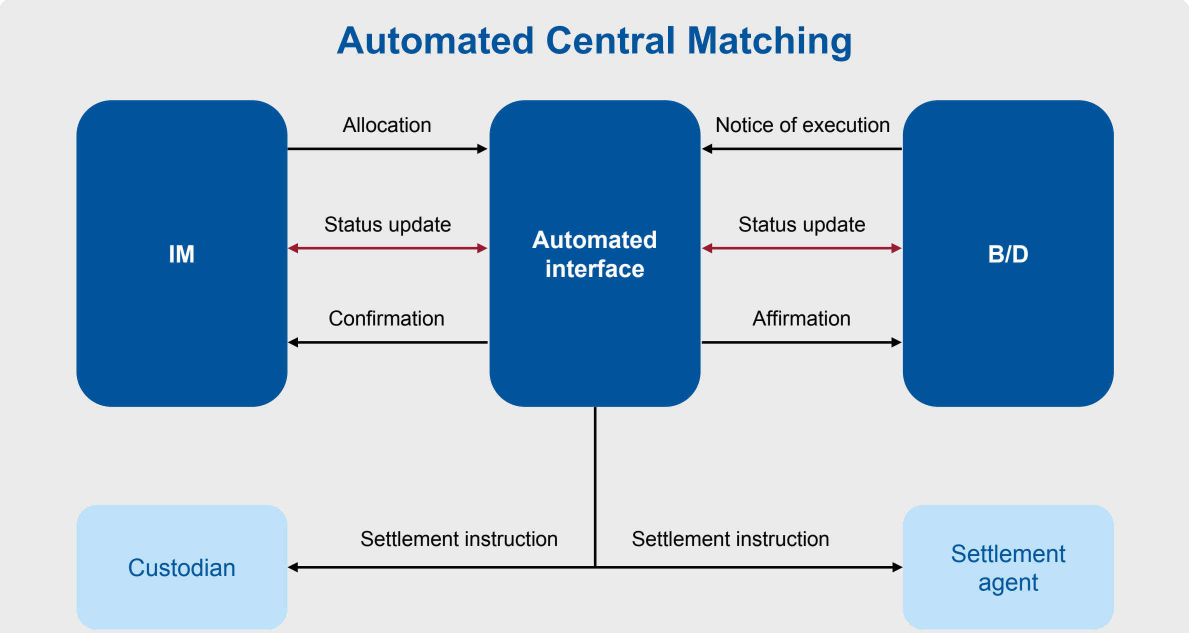
Percentile scores were taken in each of the four areas and matched against SDA rates in 29 markets where Omgeo has a sufficient volume of business to make a soundly based assessment of SDA rates. Percentile scores were calculated on a scale of 0 - 100 to further highlight the differences between scores, where a score of 7 = 100%; 6 = 48%; 5 = 24%; 4 = 12%; 3 = 6%; 2 = 3%; 1 = 0%; 0= 0%. SDA rates were plotted against the percentile scores from leading network managers in the four questions. The results are reproduced in the chart on page 11.

c. Reference Materials

Local Matching vs. Central Matching Workflow

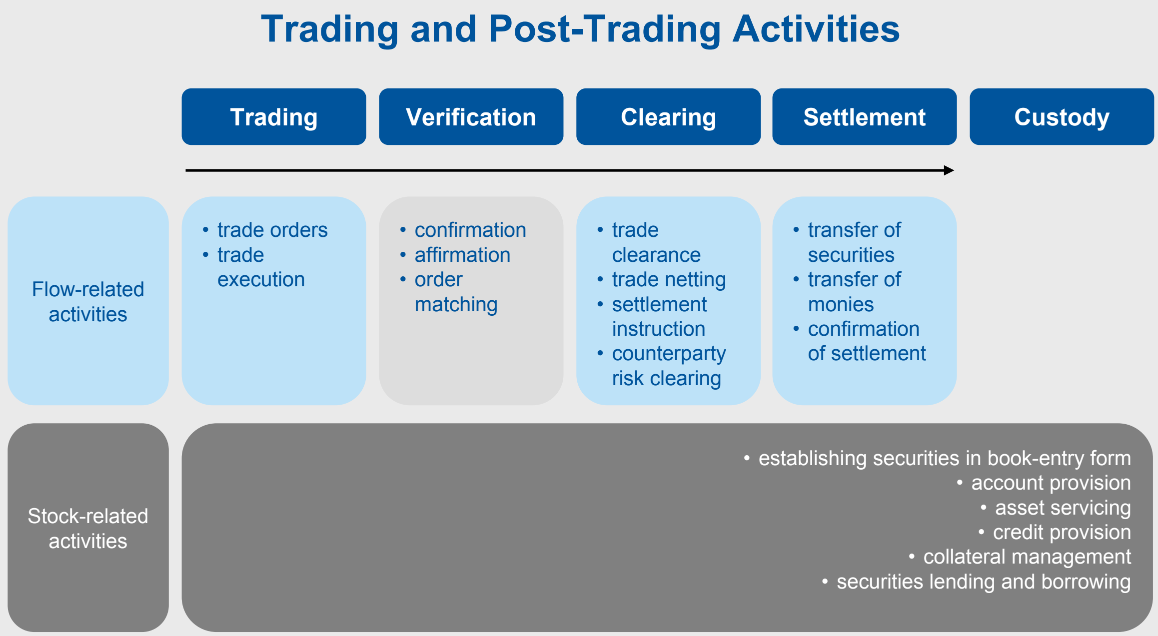


Source: Oxera, "Building Efficiencies in post-trade processing – the benefits of same day affirmation," June 2008



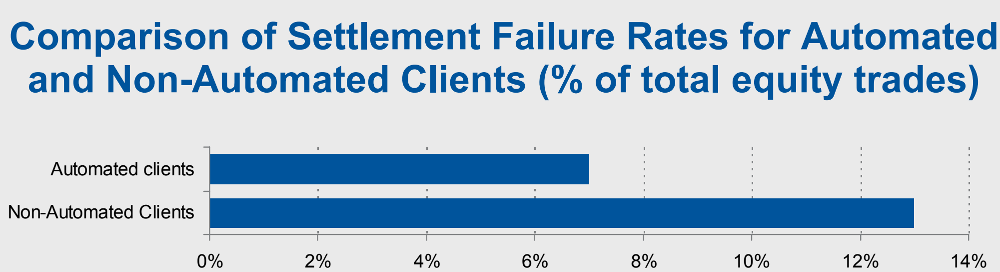
Source: Oxera, "Building Efficiencies in post-trade processing – the benefits of same day affirmation," June 2008

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

Settlement Failure Rates for Automated vs Non Automated Clients; Value of Automation



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. (Data provided by a large global broker/dealer.)
Source: Oxera, "Building Efficiencies in post-trade processing – the benefits of same day affirmation," June 2008

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