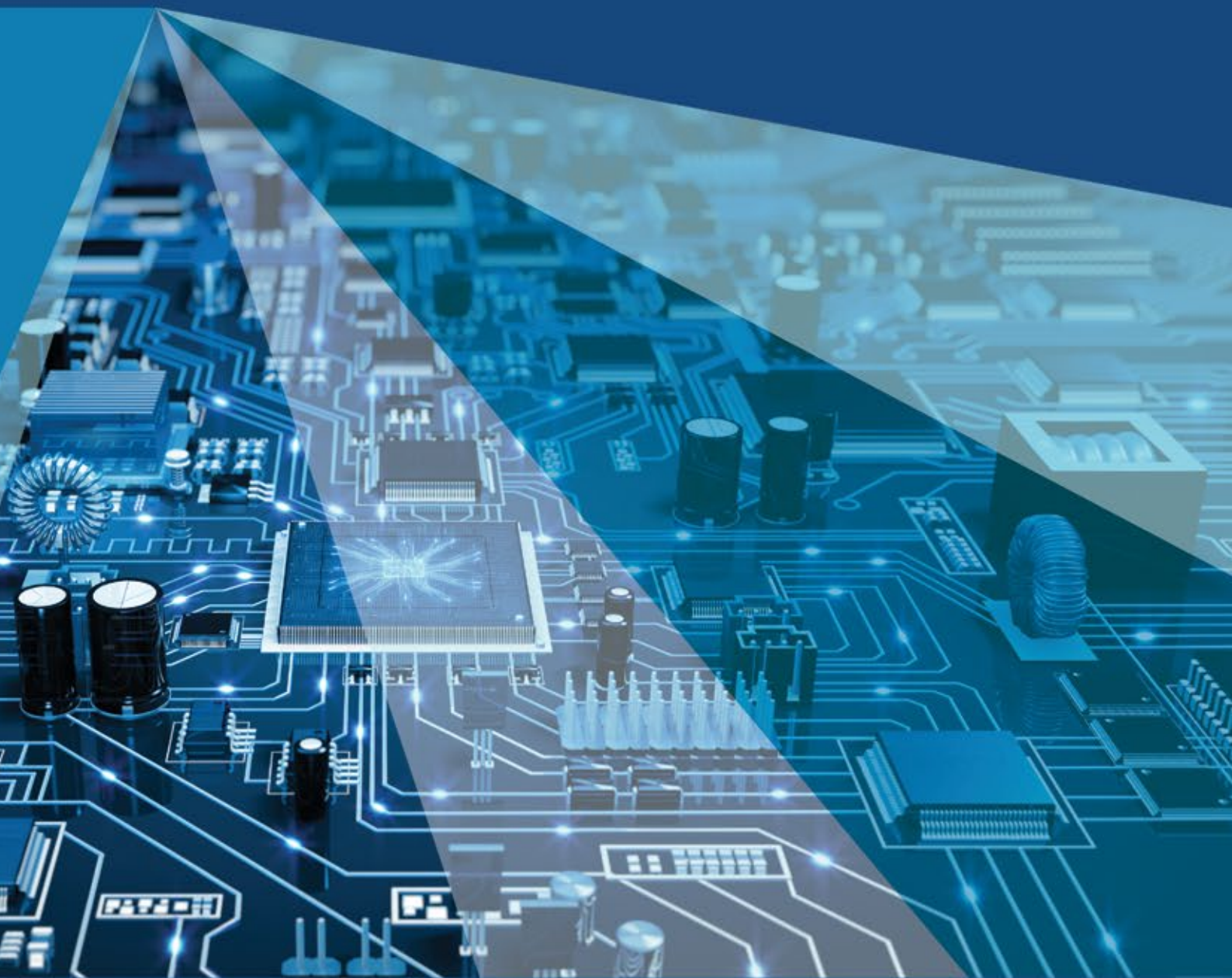


THE CAPITAL MARKETS INDUSTRY: THE TIMES THEY ARE A-CHANGIN'



EXECUTIVE SUMMARY

The past five years have seen unprecedented change in global capital markets. Buy-side and sell-side participants, custodians, market infrastructure and financial technology providers have all had to reassess their strategies, business models and risk frameworks. Today we find ourselves at a critical juncture. A new structure for the capital markets industry is emerging, however a great deal of uncertainty remains.

Regulation continues to drive much of the change. The move towards greater transparency, less leverage and improved governance is broadly welcomed across the industry. However, while some regulations have been chewed and digested, in many places policy and regulatory requirements are still moving targets.

On top of regulation, shifting investor demands, rapid evolution in and increased dependence on technology, emergence of new risks and ever more interconnectedness are all substantially affecting the capital markets value chain.

The result is movement in revenue pools, where risk resides, and which actors are best placed to succeed.

All participants are being forced to adapt their business models as a result. Some traditional service models will be usurped by alternatives in parts of the new capital markets ecosystem. New and existing providers will compete in battlegrounds for new services such as collateral management. The economics of established businesses may change drastically in some areas of the value chain, and there will be a disproportionate impact on certain players.

The success of market participants will depend on how well they position themselves to respond to these challenges. They will need to retain the flexibility to deal with ongoing uncertainty but also identify their role in the medium-term. In this paper, we pose three questions.

Addressing these questions will be critical for all capital markets participants.

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1. Where will opportunities be created and lost?
 2. What risks are emerging?
 3. Who is positioned to meet the industry's wide-ranging needs in 2020 and beyond?
-

1. WHERE WILL OPPORTUNITIES BE CREATED AND LOST?

Market and regulatory forces are reshaping the industry. Economic pressure, constrained financial resources, greater scrutiny of conduct and conflicts, evolving client needs, and technological innovation are evident in virtually all parts of the market. While these forces are individually familiar to market participants, their confluence is leading to rapid changes in where revenue is generated across the capital markets value chain.

Changes are occurring via three mechanisms: demand for new products and services generating new revenue; shifts of existing revenue-generating activities between participants; and cost reduction efforts creating revenue for providers of insourced solutions.

These are playing out at all stages of the value chain.

The effect on execution is bifurcated between liquid and illiquid instruments. For the former, there is a heavy focus on price transparency and conduct. Scrutiny on commissions is leading to unbundling of brokerage costs from other services such as research. Additionally, concerns on conflicts in the determination of indices and price benchmarks have already resulted in sales of some of these businesses. For illiquid instruments, burdensome capital and funding requirements are the greatest challenge as returns deteriorate for both dealers and investors. This is leading to a 'futurization' through substitution into listed instruments or movement of sufficiently standardized instruments onto organized execution

venues. There is debate on the ownership and operation of such venues and their implications for reference prices. We also anticipate growth in agency models as market-makers withdraw capacity.

Centrally cleared volumes will grow significantly as a result of regulatory mandates and punitive initial margin requirements on un-cleared OTC derivatives. Clients will increasingly interact more directly with CCPs, especially where their interests are divergent with their clearing brokers' interests.

We expect initial margin requirements to have grown by >\$1TN by 2018, making collateral management increasingly important. To meet this growing demand for collateral, solutions will be required to unlock dormant eligible instruments held by institutional investors. Additionally, demand for tri-party repo will increase as withdrawal of bilateral repo capacity due to the

leverage ratio and NSFR threatens participants' ability to access cash for margin. Perhaps the greatest challenge will be ensuring operational robustness as volumes of circulating collateral increase, prompting a greater focus on standards.

Core custody and settlement services are moving ever closer to a utility model, driven by a combination of price pressure and regulatory standards. However, new revenue opportunities will emerge in the form of customized client reporting, provision of standardized back office services, asset optimization and potential in emerging markets.

Underpinning all of these trends will be wider and more sophisticated re-use of data covering both instruments and transactions. Mining of this data can increasingly be monetized through data enrichment, lead generation and optimization of other processes such as collateral management.

2. WHAT RISKS ARE EMERGING?

As the value chain and the role of market participants within it changes, so will risk levels across the capital markets ecosystem. Some financial risk will migrate from the execution layer and the sell-side to post-trade market infrastructure, particularly CCPs, global custodians and ICSDs. Across the industry, operational risk will grow as a result of increased flow and interconnectedness, with near-term peaks as participants undergo a period of operational, regulatory and technological adjustments.

On one hand, this offers the sell-side the opportunity to reduce and optimize their risk, leveraging infrastructure solutions (e.g. OTC CCPs and tri- and quad-party solutions for OTC and securities financing), mitigating in part the Basel III impact.

On the other hand, market infrastructure providers are now facing a new set of risks. Some, mainly operational, are unfamiliar and driven by interconnectedness and technological advancement. Others, typically financial, are familiar but now of previously unknown magnitude and origin (e.g. in OTC clearing and lending).

These changes should drive large investments in risk management and compliance (e.g. risk appetite statements, control frameworks, monitoring systems, lines of defense, risk culture and governance) to reflect increased breadth of focus and greater scrutiny of non-operational risks.

The concentration of risk in the industry is changing too, and arguably growing. A number of institutions are becoming systemically important as 'nodes' processing a significant proportion of flow across multiple venues, for example collateral hubs. Simultaneously, interconnectedness is increasing, for example through (planned) open access to CCPs, which has implications for the risk of contagion should one of these systemic nodes fail.

Regulatory changes are already underway to respond to these new and growing risks. Capital levels are being increased and leverage reduced, but this can never be the whole answer. No metric can fully replace sound judgment in risk management. Banks are in the midst of creating recovery & resolution planning covenants (e.g. living wills) although these are proving to be a thorny implementation issue.

Market infrastructure and custodian risk frameworks and recovery & resolution frameworks are less well developed, yet more important than ever to cementing the

new capital markets industry structure. International consistency in the treatment of these globally important institutions (lacking in many areas) will also be critical.

3. WHO IS POSITIONED TO MEET THE INDUSTRY'S WIDE-RANGING NEEDS IN 2020 AND BEYOND?

Market participants' ability to seize the emerging opportunities in the industry will vary, depending on jurisdiction and factors such as investment budget and balance sheet, perceived neutrality, and regulated status. Historically, success has been heavily driven by client network, connectivity, capital and pricing power, as evidenced by the relative size of bank and broker-dealer revenues. However, in a more transparent market, this is increasingly shifting towards cost efficiency and operational excellence, often as a result of savvy use of technology.

We expect that traditional sell-side revenues will be eroded as execution is commoditized, though this will be offset with benefits arising from greater use of market infrastructure providers. Proactive use of execution venues, CCPs, and other, e.g. non-cleared exposure and collateral management solutions will reduce risk and leverage. Focusing on smart use of 3rd party software and technology will significantly reduce costs, as will outsourcing of standardized back office functions. Overall, this should offer the sell-side the opportunity to trim operating, funding and capital costs, ultimately protecting returns.

The role of market infrastructure providers will grow throughout the value chain; those that can best serve the risk and cost mitigation needs of the industry will prevail. In the execution layer, operation of effective matching venues and building solutions for new asset classes (e.g. credit) will increasingly fall to market infrastructure providers. Exchanges will become open access networks and support execution venue selection, including taking a role in hosting of 3rd party platforms. Collateral management will be driven by a combination of CCPs and (I)CSDs, operating on a pan-regional scale, the former optimizing margin amounts and supporting bilaterally margined trades, while the latter focusing on efficient identification and allocation of collateral.

This will be driven by a collective push for open access to CCPs and improved collateral standards, with success of individual (I)CSDs contingent on intermediating a critical mass of client flow.

Leading custodians will take an ever more global role, acting as gateways for transactions and collateral, leveraging improved data and reporting capabilities. They will also play an essential role as tri-party agents facilitating funding and collateral transformation. Custodians' success will rest on their ability to deliver a wide spectrum of client services, combining post-trade capabilities with core custody, though this will also bring them into intense competition with (I)CSDs, as already seen.

The agility and expertise of specialist technology providers will make them essential given the residual uncertainty in the market and scarcity of investment budgets. Their role will be threefold: supporting outsourcing push for back office functions, helping mine and process under-utilized data, and development of software.

Adaptation of existing business models and collaboration with other market participants will be required. The diversity of requirements needed in the new capital markets ecosystem, the size of investments required and the inherent uncertainty of outcomes in the medium to long-term raise the value of collaboration. For example, banks have historically developed swathes of software in house, much of it replicated and often not providing competitive differentiation. Success in the new paradigm is likely to focus on greater use of 3rd party developers to avoid unnecessary duplication and focusing internal resources in those areas that can deliver differentiated results. Collaboration can take multiple forms, whether joint-venture, partnership, white-labelling, client-vendor relationships, or even acquisition.

Overall, the role of market infrastructure providers, custodians and technology providers will grow significantly, playing an increasingly vital role in the effective

operation of capital markets. However, the sell-side will also benefit, optimizing their business around financial resources and sustaining returns at lower risk.

CONCLUSIONS

Capital markets business models are changing substantially. New opportunities are being created for a broad range of actors spanning the sell-side, the buy-side and market infrastructure providers. Some of these opportunities are already advanced whereas others are less clear and only just emerging. In a few areas, the industry will consolidate and leave service delivery and risk management to a few experts, but in most areas, we expect industry fragmentation will persist, though with a markedly new profile.

In light of the change of the past five years and the additional shifts expected over the next five years, medium-term planning and strategy are becoming ever more important. All players across the sell-side, buy-side and market infrastructure providers need to identify the best opportunities, and then decide which role to take in the 2020 capital markets and how to adapt to succeed.

We expect that regulators will intervene with proposed solutions in those areas where risk is shifting significantly, with a view of driving mechanisms to stabilize the market. In those areas where capabilities are scarce or investment requirements are unachievable, collaborative models should be explored.

Firms will need to align their planning cycles and approaches to the inherent uncertainty in the market in terms of regulation, competitor action and macro environment/volatility. Flexible management of innovation and advanced risk management practices will be essential to succeed.

1. WHERE WILL OPPORTUNITIES BE CREATED AND LOST?

Over the past 5 years, capital markets have undergone a period of unprecedented change. The primary drivers have been the wide-ranging post-crisis regulatory regime and a challenging macro-economic environment. However, the confluence of these factors, plus additional market forces such as conduct scrutiny, evolving end-client demand, and technological progress, mean yet more significant change is still to come. Both the way in which users interact with capital markets and how providers enable access to them will be affected, ultimately causing changes in the way value is generated. These changes in value will take one of three forms:

- New sources of revenues emerging as users' needs change and regulations mandate new activities
- Shifts of revenue from one provider type to another, at a high-level between buy-side, sell-side and market infrastructure providers, but also between e.g. (I)CSDs and custodians
- Outsourcing of cost from one provider type creating revenue opportunities for others.

This section examines these changes in detail, starting with an overview of the current capital markets ecosystem.

CURRENT STATE OF THE CAPITAL MARKETS ECOSYSTEM

The capital markets value chain follows the lifecycle of a trade, from the inception of a trading idea, to execution, to post-trade securities services.

Enabling a trade to take place requires a series of supporting activities carried out by a multitude of different market participants, together forming the capital markets 'ecosystem'.

EXHIBIT 1: Overview of capital markets value chain

VALUE CHAIN	DESCRIPTION	PRIMARY ACTORS	EXAMPLE FIRMS
Primary	Issuance of securities, debt and equity, e.g. IPO		<ul style="list-style-type: none"> • Goldman Sachs
Client Coverage	Client relationship management and trade generation, e.g. research	Sell-side	<ul style="list-style-type: none"> • Citi • JP Morgan • UBS
	<i>Commissions</i>	IDBs	<ul style="list-style-type: none"> • Tullett Prebon
Execution	<i>Risk premiums</i>	Exchanges	<ul style="list-style-type: none"> • ICE • Deutsche Börse • CME • BATS Chi-X
	<i>Financing</i>		
Clearing	Reconciliation of orders, reporting and central margining	CCPs	<ul style="list-style-type: none"> • Eurex Clearing • LCH.Clearnet
	<i>Settlement</i>		
Securities services	<i>Custody</i>	(I)CSDs	<ul style="list-style-type: none"> • DTCC • Euroclear • Clearstream • State Street • BNY Mellon
	<i>Collateral management</i>	Custodians	
Post trade data and analytics	Data access & analytics, software and platform support for post-trade	Data & technology & other 3 rd parties	<ul style="list-style-type: none"> • Thompson Reuters • Sungard

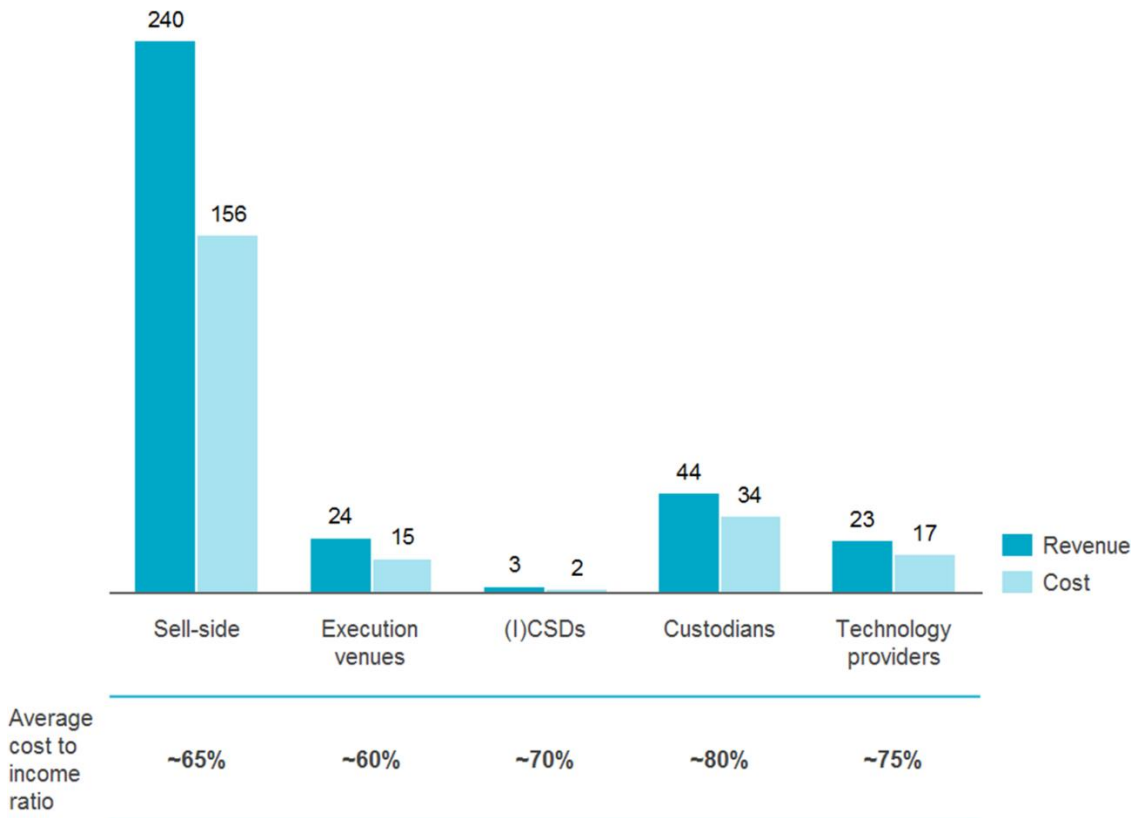
Source: Oliver Wyman analysis

Buy-side investors, who generate their own revenue through investment, also provide the wider revenue that sustains the capital markets ecosystem. As buy-side investors trade, they generate revenue, either as fees paid or spreads captured, for providers offering access to capital markets and associated services. The sell-side is the primary and most immediate beneficiary due to its client-centric role. They also make money from the issuance of securities, i.e. primary trading, which includes equity/debt capital markets and mergers & acquisitions which together generate an estimated \$57BN. However, the largest tranche of revenue for the sell-side comes from secondary trading which contributes ~\$180BN in revenue and within that execution in particular.

Execution revenues can be separated into three main categories and associated activities for sell-side actors:

- Commissions – Execution of the trade with no associated principal risk
- Risk premiums – Fee associated with the bank undertaking risk on behalf of their clients i.e. to guarantee a given outcome for the client
- Financing revenues/Net Interest Income – Loan-based transactions that allow clients to undertake trading, such as repurchase agreements (repo) or margin financing.

EXHIBIT 2: Economic profile of market participants (\$BN, 2013)



Note: Perimeter of activities as shown in Exhibit 3
 Source: Company annual reports, Oliver Wyman analysis

As of today, the sell-side faces little competition for primary trading revenue from other providers; other providers take only 2% of total primary trade revenue. Execution venues, as well as custodians and data and technology providers do, however, compete with the sell-side for execution revenues from secondary trading. This is reflective of a broader trend that further along the value chain into execution and beyond, sell-side providers face increasing competition from alternative providers for revenue.

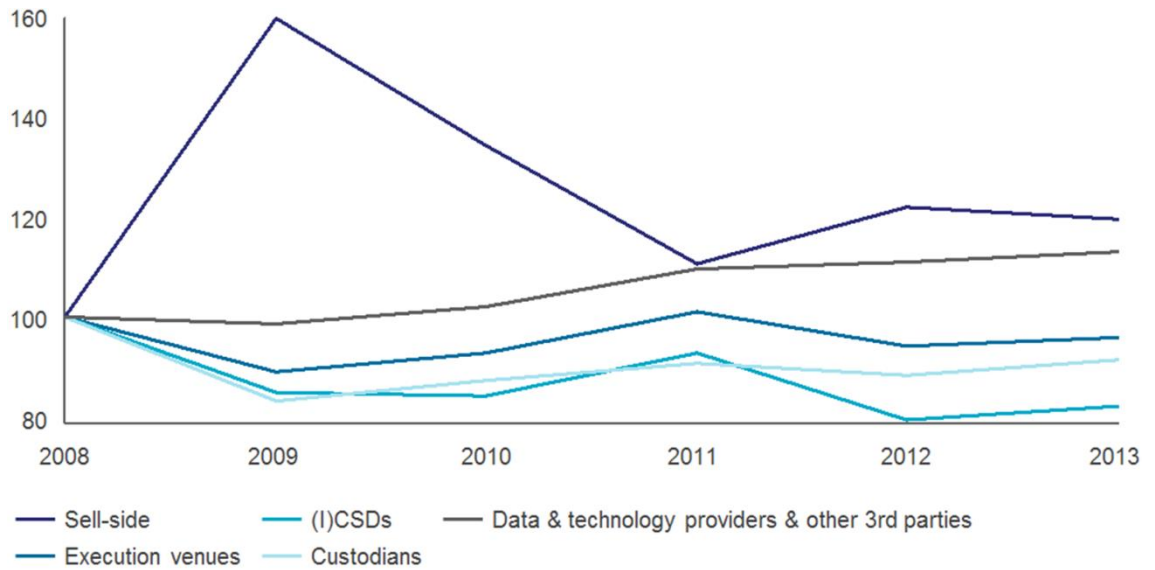
The cost and balance sheet profile of participants varies significantly. For the sell-side, balance sheet consumption and human resource costs are both high, a function of its risk-taking revenue model. In recent years both have gone through structural change as charges for financial resources have been cascaded through the business and bonuses have been reviewed. In contrast, market infrastructure providers operate with low variable costs and limited balance sheet. This model has been subject to less change over the past five years and consequently their cost/income ratios have remained relatively stable.

EXHIBIT 3: Revenue pools in capital markets ecosystem (2013)

VALUE CHAIN	ACTORS					TOTAL
	Sell-side	Execution venues (exchanges, IDBs, CCPs)	(I)CSDs	Custodians	Data & technology providers & other 3 rd parties	
Primary	\$57 BN ECM: \$20 BN DCM: \$22 BN M&A: \$15 BN	\$1 BN				\$55–\$60 BN
Client Coverage						
Execution						
<i>Commissions</i>						
<i>Risk premiums</i>		\$13 BN		\$4 BN	\$3 BN	\$190–\$210 BN
<i>Financing</i>						
Clearing	\$180 BN Cash: \$53 BN Listed: \$22 BN OTC: \$108 BN	\$4 BN		<\$1 BN		\$5–\$10 BN
Securities services						
<i>Settlement</i>						
<i>Custody</i>		\$1 BN	\$3 BN	\$39 BN		\$40–\$45 BN
<i>Collateral management</i>						
Post trade data and analytics		\$4 BN			\$20 BN	\$20–\$25 BN
Revenue	~\$240 BN	~\$24 BN	~\$3 BN	~\$44 BN	~\$23 BN	~\$330 BN

Source: Company annual reports, Oliver Wyman analysis

EXHIBIT 4: Growth in revenues by market participant (2008–2013, index 2008=100)



Source: Company annual reports, Oliver Wyman analysis

FORCES AFFECTING THE CAPITAL MARKETS ECOSYSTEM

This current state is undergoing a period of considerable change, precipitated by six key market forces. These touch all dimensions of the value chain and an array of market participants:

1. **Pressure on profitability;** while revenues across capital markets have been put under severe strain during and post-crisis, efforts to reduce the cost base have had mixed success, and we still see structural imbalance across market participants:
 - *Sell-side:* over-capacity in the sell-side combined with a structurally higher cost base (e.g. due to increased cost of compliance as well as changes in the remuneration systems towards higher fixed and lower variable components) has resulted in an imbalance between revenue and cost.
 - *Market infrastructure providers:* significant impact of regulatory implementation cost on investment cycles and business mix. As clients request new services, partially insourced, market infrastructure providers are starting to review economics and sustainability of established business models.
 - *Custodians:* scale economics only available to the largest players globally, with starkly contrasting prospects for rest of industry, e.g. in local custody. Declining margins and increasing cost base have been the main drivers, but even the largest players have experienced deteriorating cost/income ratios.
2. **Capital, balance-sheet, liquidity and collateral constraints;** regulation (Basel III, leverage ratio, liquidity rules, collateral rules) has targeted a reduction of financial leverage in the system – limiting the capacity and increasing the cost of risk taking for banks – making it more challenging to deliver above-hurdle returns. This has prompted a more rigorous approach

to where and how scarce financial resources are deployed in optimizing business mix, as well as day-to-day front-line risk taking.

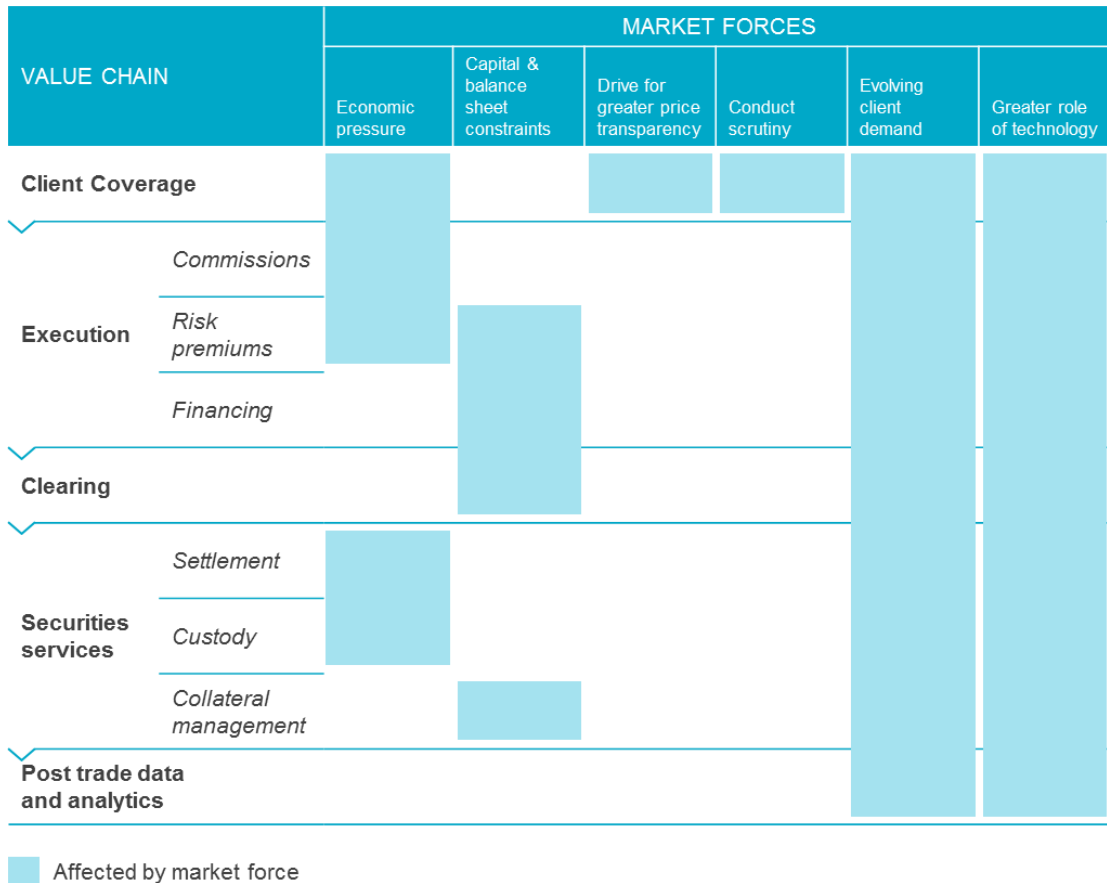
3. **Greater transparency**; regulation (MiFID II, Dodd-Frank, EMIR, AIFMD, PRIPS etc.) is enforcing minimum standards for pre- and post- trade price transparency. The price discovery and trade execution process is changing, creating opportunities for more agency-driven models in OTC derivatives and cash fixed-income products. Data availability is as a result improving both in terms of availability and quality.
4. **Conduct scrutiny**; there is heightened scrutiny around potential conflicts of interest that negatively affect end-clients/the buy-side. For example, this has resulted in a drive for separation of duties between the operation of price-dependent market functions (e.g. index calculations, LIBOR and FX fixes) and risk-taking. Moreover, there is an increased focus on operational 'hygiene', e.g. transparent process, enhanced reporting. However, this is exacerbating the economic challenge for providers due to additional cost.
5. **Evolving client demand**; clients are adapting to the changing landscape, generating demand for additional service needs, but they are also exploring opportunities to extend their own role within markets. Clients' objectives remain centered around maximizing returns whilst minimizing risk and cost, but what this means in practical terms is changing in different ways for different participants. For large institutionals, issues such as security and segregation are coming to the fore, while for hedge funds yield remains the primary concern. Corporate exemptions may dampen their urgency to adapt. The overall trend is one of investors re-evaluating how they interact with the market, both in terms of the services they use and which providers they source them from (including in-house options).
6. **Greater role of technology**; technology has and continues to drive evolution in capital markets. Rapid advances and the lower cost of technology remain a catalyst for change, especially since high-frequency trading has come under scrutiny. Potential opportunities and their impact span the post trade lifecycle; some are familiar to the market, e.g. electronification of markets and increased straight-through processing, while other emergent technologies may stimulate new waves of change, e.g. cyber currencies and cloud computing. These new uses will in part be driven by the effects of other market forces.

CHANGING OPPORTUNITIES IN CAPITAL MARKETS ECOSYSTEM

These market forces are not new to the industry, but in combination they are now resulting in major structural changes. Execution is becoming commoditized, leading to a shift in services across

providers. Core settlement and custody are moving closer to a utility model, while in parallel value-added post-trade and adjacent services are growing, for example collateral management.

EXHIBIT 5: Impact of market forces on capital markets value chain



Source: Oliver Wyman analysis

EXECUTION

Across the value chain, execution is the largest pool of revenue in the capital markets ecosystem at \$200BN, of which the sell-side takes the greatest portion. However, this has been declining post crisis driven by a combination of regulation and a challenging macro-economic environment. The former has led to withdrawals in capacity due to scarcity of requisite financial resources and reduced risk appetite, while the latter has dampened end-client demand.

We anticipate further significant change as other forces come into effect, for example leverage ratio rules.

On the supply side, market-makers are re-pricing to reflect a structurally higher cost base or withdrawing/scaling back, which will continue to occur as, for example, gross balance sheet and availability of collateral become constraints. On the demand side, clients are assessing whether to accept these higher costs or find cheaper alternatives (e.g. standardized listed

derivatives instead of OTC). The trend towards passive investment strategies will also reduce executed volumes, as will any potential clampdowns on high-frequency trading.

Commissions are under scrutiny by both clients and regulators, with pressure to unbundle pricing, prompting re-evaluation of rolled-up services, e.g. research.

CLEARING

Capital constraints are resulting in a widespread push for clearing, including more contracts within established securities, plus currently non-cleared OTC derivatives, and repo/securities lending. This trend is being further accelerated in anticipation of collateral requirements rising due to introduction of initial amounts on

In a similar vein, the location of pricing calculations (e.g. indices, fixes) is being challenged from the perspective of potential conflicts of interest. Finally, greater focus on fairness of execution in terms of access and benign liquidity (i.e. observable and tradable) is leading to re-evaluation of dark pools and internalization engines and the respective role of brokers and exchanges.

un-cleared derivatives. The established interaction of CCPs to clearing broker to end-client is also changing driven by new segregation models and the economic impact of regulation. This is being captured in pricing as for example, clearing brokers inflate the cost of full segregation accounts for clients.

SECURITIES SERVICES

Securities services make up the second largest share of revenues in the capital markets ecosystem, which has been growing moderately but steadily.

This growth is despite significant commoditization in custody and settlement due to price pressure at buy side clients (who predominantly utilize these services from custodians) and the standardizing influence of regulation. Within Europe, TARGET2-Securities (T2S) is introducing a cross-border settlement platform that links custodians and (I)CSDs. Custodians will seek to utilize this platform either directly or indirectly, significantly further commoditizing settlement across Europe. Furthermore T2S will lead to new competitive structures, particularly in cross-border markets, and hence lead to further margin pressure on the supply side. As a result, 10–15% reductions in revenue are to be expected for some players.

In the longer-term, technological capabilities and client demand may lead to growing pressure to reduce settlement times, moving closer to T+1/0 from T+2 (previously T+3). Enablers could include cyber currencies, overcoming the historical constraints around FX mismatch

In the course of further commoditization of vanilla settlement and custody and increasing regulatory requirements, buy and sell side institutions will seek to

centralize and outsource back office functions due to cost and regulatory pressures. This will create opportunities for securities services providers. Furthermore, clients will also require enhanced reporting capabilities such as bespoke reporting services or online access capabilities. The development of such reporting tools and new services, increased regulatory requirements and upgrades to infrastructure to address inefficiency issues, are all exerting significant cost pressure on custodians.

Collateral requirements are expected to increase by >\$1TN of initial margin by 2018 due to clearing obligations and introduction of initial amounts for un-cleared OTC – collateral management in turn will become increasingly important to users. Capital and balance sheet constraints are pushing minimizing margin requirements and optimizing collateral allocation to the top of the agenda for both end-clients and clearing brokers. In turn asset owners are looking towards custodians for support in optimizing use of their assets not only for investment purposes but also collateral management.

Clients are also looking for better solutions to ensure safe-keeping of assets (both in terms of transparency and bankruptcy remoteness) and to reduce the operational

cost of collateral (e.g. better returns on collateral holdings, reduced costs for moving collateral between obligations).

DATA & ANALYTICS

Technological progress is extending the scope for data and analytics across various activities, for example custody plus asset servicing, risk positions and collateral location & optimization. This is also enabling providers to meet users' increasing demands for 'big data' and sophisticated ways to analyze it. Neutrality

is becoming a point of concern with respect to data, as end-clients rationalize who sees their flow, how this information is processed and how they might be advantaged by it. Beyond this, we expect certain data layers to be offered for free in the near term, causing value and business model shifts.

ASSET CLASS PERSPECTIVES

In addition to the broad trends we observe (commoditization of execution, utility-like structures for standard settlement/custody, growth in enhanced post-trade and adjacent services) there are more specific trends within each asset class. How these trends are playing out varies significantly depending on:

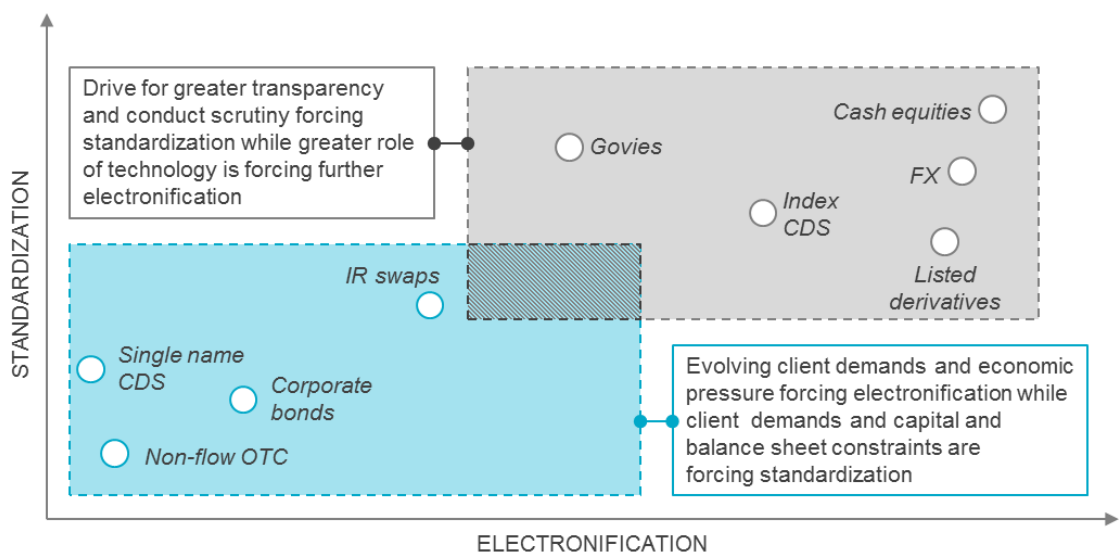
- Contract type – e.g. OTC contracts are subject to significant new collateral requirements that may push revenue to some degree towards standardized, listed contracts
- Principal vs. agency driven – as capital and balance sheet constraints tighten,

value in those asset classes that require principal risk e.g. repo, may shift to new agency models e.g. tri-party

- Severity of regulatory impact and conduct scrutiny – FX trading is under significant conduct scrutiny, especially focusing on FX fixes, which may result in value shifts to alternative providers.

Broadly, those assets which are most liquid, such as cash equities, FX and bonds will be subject to considerable client pressure to standardize and develop transparency, while illiquid assets will continue to be most affected by funding constraints and regulatory pressure.

EXHIBIT 6: Illustrative impact of market forces on asset



Source: Oliver Wyman analysis

CASH EQUITIES

For cash equities large parts of the value chain from execution to post-trade are already heavily commoditized. Value creation in the execution layer has recently centered on sell-side internalization and the operation of dealer-owned dark pools and helping clients navigate fragmented liquidity. Conduct scrutiny and a

renewed focus on best-execution will drive volumes and value back to third party regulated markets. While interoperability and margin compression have quasi-eliminated cash equities clearing revenues, in Europe, TARGET2-Securities will lead to a shift in value from settlement to custody and asset servicing.

FX

As with cash equities, value creation in FX trading has been driven by the internalization of flows captured through proprietary single dealer platforms. Recent regulatory and conduct scrutiny around reference prices and broader questions raised on the overall integrity of the market structure will shift favor back to more

transparent, 3rd party markets. Pressure on sell-side models (high fixed cost-base, overlapping infrastructure, deteriorating margins) is limiting the number of dealer platforms that can succeed. We expect greater co-operation and co-mingling of liquidity with 3rd party infrastructure will occur more and more going forward.

BONDS

Many initiatives have recently attempted to shift corporate bond execution to a platform structure but have failed to gain traction in the market. There are a number of structural factors that make such a shift challenging; the lack of issuance standardization, large number of instruments, low trading velocity and volatile liquidity. Regulation and technology should drive innovative solutions to overcome these challenges. Data-driven solutions on inventory and quote tracking,

proxy matching and liquidity aggregation initiatives will help reduce the dependency on principal risk-taking.

The structural challenges for government bonds are less steep (e.g. fewer sovereigns than corporates); as a result electronic trading has begun to take hold – particularly for small ticket sizes. We expect further commoditization of the execution layer, particularly if central-limit-order book platforms gain a critical mass of liquidity.

LISTED DERIVATIVES

The increase in funding and capital cost of OTC derivatives (for both cleared and non-cleared contracts) is driving 'futurization'; the migration of OTC volumes to listed derivatives. The scale of migration will be determined by investors' willingness to accept basis risk in favor of lower direct transaction costs. However, as with cash equities, margin pressure will commoditize execution where possible, even more than has been the case in listed derivatives in the past. It will become harder for the sell-

side to make money as clearing fees will move to CCPs and margin becomes segregated due to EMIR requirements. Some market infrastructure providers will attempt to win through listed derivatives by launching OTC-like products with listed derivatives benefits, e.g. lower margining requirements, but there is some uncertainty on the willingness of market participants to embrace such new products and provide liquidity.

FLOW OTC (SWAPS, CDS)

The flow OTC execution layer will become commoditized through price transparency and also become more dependent on exposure and collateral management (margining). As standardization of flow OTC continues, a template for the overall direction of travel exists in listed futures and options. Swap execution venues (SEFs) and organized trading facilities (OTFs) will move closer to listed venues, with tighter pricing and a higher degree of

electronification. The scale of this shift will be determined by the resulting platform structure; incremental change if the current request-for-quote (RFQ) model is preserved but in an electronic format (e-RFQ) or more radical shifts if a central-limit-order-book (CLOB) is supported. In recent years, index-CDS has experienced such a transformation (electronic share of trade volume 75%+, margins <0.5bps).

NON-FLOW OTC (STRUCTURED RATES, CREDIT, EQUITY SWAPS)

Increased collateral requirements associated with bi-lateral margining will require a fundamental re-pricing of non-flow OTC to cover capital and liquidity costs. Despite this, dealers will likely remain

central to non-flow OTC and shift towards providing adjacent services to improve efficiencies, such as margin calculation and mark-to-market.

REPO & SECURITIZED LENDING

Leverage constraints will likely make securitized financing value-destroying for the sell-side under the current model, therefore prompting re-pricing, withdrawal of dealer capacity and/or increased use of CCPs for clearing repo and securities lending.

Access to repo and securities lending markets remains crucial to enabling the efficient sourcing and transformation of collateral, as well as broader funding purposes for broker-dealers and end-clients. We expect value to shift to a tri-party and cleared repo/securities lending model, where custodians, (I)CSDs and CCPs drive an infrastructure-led solution to source and connect buy-side liquidity.

2. WHAT RISKS ARE EMERGING?

The changes we anticipate in the capital markets ecosystem will also affect the quantum and preponderance of risk across the value chain and market participants. The main mechanisms will be actors entering new parts of the value chain, greater volumes and/or complexity, and concentration of risk among a smaller set of institutions.

Where such changes occur, actors will be exposed to an unfamiliar scale and profile of risk, and consequently the development of appropriate processes to mitigate and control these new risks will become critical. As a result increased scrutiny will be placed on some actors' risk management frameworks as well as recovery & resolution plans.

EXHIBIT 7: Overview of risk types and drivers

	SOURCE	EXAMPLE CAUSES	EMERGING COMPLEXITY DRIVERS
Operational risk	Failure of internal processes, people and systems	<ul style="list-style-type: none"> • Process failures • Systems failures/IT risk • Damage to physical assets • Compliance/legal risk 	<ul style="list-style-type: none"> • System outages • Interconnectedness • New technologies • High frequency trading
Credit risk	Default by borrower, leading to loss of principal and/or interest	<ul style="list-style-type: none"> • Credit default risk • Country risk 	<ul style="list-style-type: none"> • Agency models • Bilateral margining • Shift to central clearing
Market risk	Adverse change in market prices	<ul style="list-style-type: none"> • Equity risk • Currency risk • Interest rate risk • Commodity risk 	<ul style="list-style-type: none"> • Buy-side market-making • Internalization
Liquidity risk	Lack of funds to support operations or inability to exit market position	<ul style="list-style-type: none"> • Funding liquidity risk • Market liquidity risk 	<ul style="list-style-type: none"> • Withdrawal of repo capacity • Execution venues for new asset classes

Source: Oliver Wyman analysis

We anticipate three main trends in risk profile as a result of the changes in the capital markets ecosystem:

1. De-risking from the sell side in response to regulation

The sell-side will have an opportunity to de-risk, reaching far beyond the reduction

of prop activities which has already occurred. Primarily this will occur by reducing the volume of risk they are exposed to through central clearing, collateral management, increasing use of agency models, disposal of business lines and outsourcing. Further reductions from in-house risk management optimization will be comparatively small given the already intense focus in this area in recent years.

2. System wide increase in operational risk due to increasing flow, use of technology, interdependency and complexity

Operational risk is likely to increase across the market, both due to higher volumes and new complexities. Flow is expected to increase in existing post-trade operations as a result of the shift to listed instruments and the introduction of new products.

New risks will arise from increasing interconnectedness resulting from commoditization of services and outsourcing of operations from the sell-side. This will likely be exacerbated due to increased velocity of flow e.g. electronification and high-frequency trading.

Additionally, operational complexity is increasing due to number of stakeholders involved and players entering new areas of the value chain which are still in flux.

Finally, new risks are emerging from increasing legal and regulatory requirements as result of greater scrutiny

of faults, e.g. sanctions and conflicts of law, and increased implications for failure, e.g. substantial fines.

These new operational risks come in two forms; transitional and inherent. As a result of new entrants into areas of the value chain and increased customization of products short term transitional risk will be high, whereas inherent risk will increase system wide and then stay at the same level. This combination creates a short term spike in operational risk.

3. Increased liquidity and credit risk residing within CCPs and (I)CSDS as a result of growing volumes and services

CCPs and (I)CSDs are expanding into new parts of the value chain causing their liquidity and credit risk to increase. In addition, CCPs are taking on increasing levels of risk – counterparty credit risks (primarily gap risks due to collateralization), liquidity risks around collateral and operational risks as a result of sell-side and buy-side efforts to de-risk.

EXHIBIT 8: Evolving profile of risk for market participants

	OPERATIONAL RISK	CREDIT RISK	LIQUIDITY RISK	MARKET RISK
Buy side		Buy-side changing the composition of credit and liquidity risk while increasing market risk		
Sell side	Sell side de-risking across all risk types			
Exchanges & IDBs	Increasing operational risk at market infrastructures			
CCPs		Growth in liquidity and credit risk at CCPs, (I)CSDs and Custodians		
(I)CSDs				
Custodians				
Data & technology providers & 3 rd parties				
Market-wide (aggregate impact)	Operational risk increasing	Shifting credit and liquidity risk		

Source: Oliver Wyman analysis

As the roles of market participants change, it is important they evaluate the implications on their risk profile and make active judgments about the resiliency of their risk management frameworks and processes.

Through this assessment, participants can carry out optimization of their risk profile and ensure correct resources are in place to mitigate and control the new risks they face.

SELL-SIDE

The overall trend for the sell-side is one of de-risking: actively e.g. via clearing; and passively, as certain activities move to alternate providers.

The introduction of central clearing and margin requirements for bilateral OTC derivatives will result in a decrease of both credit and liquidity risk. The sell-side can further reduce risk profiles as well as associated capital and funding costs, through clearing and margining of products beyond requirements (e.g. securities lending and repo, derivative exposures with

exempt counterparties) and optimizing netting across counterparties and venues.

Additionally, outsourcing of standard back office functions will help reduce operational risk for the sell-side, though potential expansion into new areas of the value chain may also create new operational risks. Vendor relationships, including outsourcing, will become a more important dimension of risk management for the sell-side, as integral services move out of their direct control. Appropriate risk assessments of vendors and resolution protocols to mitigate e.g. reverse migration risk will be essential.

MARKET INFRASTRUCTURE PROVIDERS

Market infrastructure providers will take on more risk, and in turn come under increased scrutiny from regulators around the globe. The expansion of individual actors' business activities is adding more complexity as they combine several business lines "under one roof", some with bank-type footprint, other focused around processing.

Exchanges will experience increased flow, and therefore increased risk, due to a move to standard execution and introduction of initial margin for un-cleared OTC derivatives. Additionally as they expand their business, e.g. exchanges purchase of index companies and dark pools relocation to neutral venues, they will experience new operational risks. Spikes in outages will remain the largest operational risk while the effects of these outages will rise with greater interconnectivity.

CCPs will experience increased volumes as demand for cleared products increases, which will in turn increase the quantum of risk residing in the CCPs (though margin held and own resources committed should increase in proportion). Additionally, as new contracts are offered for clearing and phased into use, risk will increase though with some mitigation through netting benefits. Expansion of services into OTC and bilateral margining will also introduce new forms of risk, although this is likely to be operational rather than financial unless regulators accept multi-lateral netting solutions for bilaterally margined trades. Further expansion into collateral management more broadly, e.g. data & analysis and safe keeping, will add new operational risk.

One concern for CCP risk relates to a potential 'collateral crunch'. This could lead to pressure on CCPs to widen collateral eligibility, in turn increasing risk if newly accepted instruments have a higher margin period of risk or greater likelihood of default. Another outcome of such a 'collateral crunch' could be greater homogeneity of collateral eligibility and haircuts to allow easier movement of collateral between CCPs, which would lead to increased market and liquidity risk as well as increased risk of systemic failure.

(I)CSDs will expand their service offering into areas that expose them to new intraday credit and liquidity risk, in direct competition with custodians. (I)CSDs are also looking to expand across securities servicing and data & analytics which will lead to an increase in their operational risk. Furthermore, growing complexity in collateral management will also lead to new operational risk. A prime example of this is intermediating solutions for collateral allocation which are becoming more sophisticated and with wider scope in terms of participants and regional coverage.

Custodians' attempt to build clearing services will expose them to new financial risks and also require new commitments of capital against this. Additionally their expansion into collateral management and exchange venues will add new operational risk. These new opportunities will only be accessible to the largest firms who will also experience increased flow as the industry consolidates. The largest custodians are also entering the (I)CSD space in Europe, which reflects this trend of consolidation, and will also increase risk through interconnectedness.

These actors need to put the right processes in place to properly understand, mitigate and control new risks. The most sophisticated players have started upgrading their risk and compliance functions across the board:

- Defining and formalizing risk strategy and appetite linked to business strategies
- Developing more advanced frameworks to measure, monitor and track all relevant key risks
- Institutionalizing risk management processes with stress-testing and war-gaming becoming a key management tool
- Clarifying risk governance and the three lines of defense across the organization
- Upgrading and further institutionalizing risk management functions
- Launching other initiatives in areas like risk culture, reporting and infrastructure.

However, overall more work is required to ensure risk frameworks are fit for purpose in order to accept more risk. Should these improvements fail to occur, there will likely be limitations to potential growth as the sell-side and end-clients rationalize their

exposure to certain institutions; for example, diversifying relationships across multiple providers, or operating through a capitalized intermediary as with clearing brokers.

DATA AND TECHNOLOGY PROVIDERS AND OTHER THIRD PARTIES

Third party services are becoming increasingly important within the capital markets ecosystem resulting in increasing demand and risk. Third parties are looking to expand into new areas of the value chain, e.g. execution venues, which will both expose them to new operational risks and increase their systemic importance.

Third parties are currently unregulated and therefore risk management practices are typically less robust than those of regulated entities such as banks and CCPs. As their systemic importance increases, e.g. as data providers for KYC authentication and as execution venues, further scrutiny will be placed on them. Third party providers need to ensure that they and the industry have robust processes in place to prove that they are able to effectively self-regulate.

BUY-SIDE

Similar to the sell-side, the buy-side has an opportunity to mitigate risks by increasing the use of CCPs and collateral management. This will also come with some increased operational complexities and risks, for example liquidity implications in the event of CCP failure. Such issues are prompting the buy-side to explore solutions such as segregated accounts. However, a more proactive stance on understanding credit exposure to both clearing brokers and CCPs will be required, and the implications of an operational failure by one of those parties.

The buy-side is also becoming more exposed to each other as agency models take hold. For example, off-balance sheet tri-party repo makes collateral lenders and borrowers counterparties to each other rather than the agent bank, which is likely better capitalized and with more robust risk management frameworks. Securities lenders in this case will need to evaluate

their counterparty risk and mitigants such as haircut levels. Heterogeneity of risk management amongst the buy-side will also become an increasing concern as providers devolve risk to them. Risk management platforms are typically white-labelled solutions and therefore susceptible to similar risks across participants, which will need to change.

In summary, historically significant attention and resources have been deployed to manage traditional risks of the sell-side (market, credit); risk management now needs to rapidly evolve and adapt (revised controls, monitoring systems, frameworks etc.) to fit the new risk profiles across the industry. The sell-side needs to focus more on operational risk whereas part of sell-side credit and liquidity risk shifts to market infrastructure providers (CCPs, (I)CSDs) nuancing their traditional risk profile (focused around operational risk).

RECOVERY & RESOLUTION PLANNING

Global systemically important banks have been developing and submitting recovery & resolution plans to global regulators for some time now. The amount of resources being invested in these stress environment planning exercises are staggering. In spite of vast investments, banks still have more work ahead.

In contrast, market infrastructure providers, in the absence of clearly articulated regulatory guidance and deadlines in many cases, have taken a slower and more deliberate approach to recovery & resolution planning, with many large institutions still working toward their first recovery plan submission. Given the systemic importance of many market infrastructure providers, particularly when there is no direct substitute for services provided, market participants can and should expect additional regulatory scrutiny in this area over the coming years, particularly as regulators shift their attention from the banking to non-banking financial sector. While market infrastructure providers performed admirably through the recent financial crisis, high-profile events have raised public awareness around the operational risks that market infrastructure providers face both from their exposure to participants and from the complexity of their own infrastructure.

A common view held is that resolution is not a viable option for many large, systemically important market infrastructure providers. However, regulators have repeatedly stressed the fact that they will not allow “too big to fail” institutions to continue in their current form and that both bank and non-bank financial institutions will require credible plans for their recovery and, if needed, orderly wind-down, that do not contemplate extraordinary government support. Unlike their bank counterparts that must lead development of both their recovery & resolution plans, market infrastructure providers, in most cases, are expected to lead recovery planning with regulators driving resolution.

As market infrastructure providers continue to expand across the value chain (e.g. by pursuing exchange/CCP/CSD vertical integration and new businesses such as collateral management), the recovery & resolution planning process will not only become more complex, but also more important.

While final regulatory guidance and requirements will likely vary by jurisdiction, it is broadly expected that the required core elements of a market infrastructure recovery plan will follow those articulated in the CPSS-IOSCO consultative report issued in August 2013 on the Recovery of Financial Market Infrastructure.

Market infrastructure providers can learn from the experience that banks have had recently in the development of their respective recovery & resolution plans. Notably, separability and sustainability of critical operations and alignment with existing stress testing processes are likely to be flashpoints. Moreover, regulators have increasingly placed greater emphasis on quantitative support underlying bank’s plans, particularly around the quantification of the impact of stress events, recovery actions, and resolution strategies. It is reasonable to expect that these expectations will find their way to the non-bank financial sector in short order.

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RECOVERY & RESOLUTION PLANNING

A best practice recovery plan for market infrastructure providers is similar in structure to the frequently discussed recovery plans of G-SIFIs, though their contents will need to be tailored to the specific infrastructure risk profiles. Six core elements to be included in a market infrastructure provider's plan are as follows:

1. *Critical services*: Identification of services whose failure would have a material negative impact on third parties and jeopardize financial stability.
2. *Stress scenarios*: Identification of idiosyncratic and systemic stress scenarios that would prevent the infrastructure company from providing critical services. In addition to covering the company's risk profile, this should include the risk of third party failure to perform critical functions. As outlined above, the stress scenarios should be linked to the company's stress testing procedures.
3. *Triggers*: Definition of qualitative and quantitative measures and thresholds, whose breach triggers recovery. Outline of escalation process once triggers are breached and description of the governance structure for ongoing plan maintenance.
4. *Recovery tools*: Identification of appropriate recovery tools, differentiated by scenario type. Articulation of necessary steps and time needed to implement them.
5. *Tool to address structural weaknesses*: Tools to address underlying cause of stress and strategic analysis identifying structural weaknesses and determining value and marketability of businesses for disposal.
6. *Market Infrastructure links*: Identification of financial exposures between infrastructure providers to coordinate relevant aspects of recovery plans.

3. WHO IS POSITIONED TO MEET THE INDUSTRY'S WIDE-RANGING NEEDS IN 2020 AND BEYOND?

In response to the changes occurring in the value chain, providers are already exploring new opportunities and building new capabilities, products and services to

seize them. These are in varying stages of development, driven by how visible and certain the corresponding opportunities are.

EXHIBIT 9: Expansion of market participants across value chain

VALUE CHAIN	ACTORS						
	Sell-side	Exchanges & IDBs	CCPs	(I)CSDs	Custodians	Data & technology providers & other 3 rd parties	Buy-side
Client Coverage							
Execution	<i>Commissions</i>				5	8	
	<i>Risk premiums</i>						9
	<i>Financing</i>						
Clearing					6		
Securities services	<i>Settlement</i>	1					
	<i>Custody</i>						
	<i>Collateral management</i>				4	7	
Post trade data and analytics		2	3				

Core model
 Emerging model

- 1 Building out front to back capabilities in push for vertical integration
- 2 } Market infrastructure providers expanding
- 3 } into data, analytics and technology
- 4 (I)CSDs expanding into asset servicing and building out collateral management solutions

- 5 } Custodians with some electronic execution
- 6 } and clearing – looking to build out for front-to-back capability
- 7 Custodians layering collateral management over existing model, e.g. tri-party repo sourcing
- 8 Development of execution venues by data and technology providers
- 9 Buy-side taking greater role in own clearing

Source: Oliver Wyman analysis

Traditionally, each actor in the market has focused on a core business which is well suited to their characteristics. Banks, for example, have concentrated on areas where principal risk, regulatory status, and a combined client interface are most in demand. Market infrastructure providers have focused on sectors demanding bespoke market structures, operational scale and efficiency.

However, the overall trend in the industry is one of actors attempting to extend their participation in the value chain, building out from their traditional areas of focus.

(I)CSDs, for instance, are moving into asset servicing, whilst custodians encroach on the territory of the (I)CSDs and exchanges. This will result in established actors coming under pressure from new entrants. However, the competitive landscape varies greatly between different layers of the value chain, and the success of these growth initiatives will depend on whether they possess the attributes required in each layer to bring products and services to market.

The characteristics needed to successfully deliver propositions to market are changing:

- Balance-sheet, and the ability to take and manage market and credit risk is becoming critical in a narrower spectrum of areas, particularly in the OTC clearing and settlement and custody spaces
- It is becoming more important to be able to attract sufficient liquidity, and to efficiently price and match the corresponding flow
- The ability to develop innovative technology solutions (and commit resources to doing so) and the ability to effectively deploy them are becoming more important as the role of technology grows
- Demand for neutrality of providers (e.g. separation of risk-taking from market operation) is growing as scrutiny around conduct, transparency and conflicts of interest have increased
- Firms need to be agile, able to rapidly respond to changes in market structure
- There is a need to be open to new collaborations and partnership models across traditional boundaries.

With buy-side investors driving flow and therefore revenues, success is dependent on who best delivers the markets to these users. However, we see several changes of emphasis on which characteristics are most important to achieve this, with alternate factors becoming the fundamental differentiators between winners and losers.

Historically, success has been delivered by client network, pricing power, connectivity and specialization, as evidenced by the relative size of the sell-side compared to market infrastructure providers. However, success under the new paradigm will require a different set of capabilities, including cost efficiency, use of technology, consolidation of flow, and ecosystem relationships.

The over-riding theme for these capabilities is operational excellence. A winning model will operate from a low variable cost base, likely driven by a strong technological toolkit, and connect seamlessly into the market across regions and participants. In a number of areas, the ability of providers to offer users a consolidated view across otherwise fragmented markets and business lines will be invaluable. For example, agency matching becomes more efficient as the share of market increases; collateral optimization improves as diversification benefits increase and collateral can move more easily.

While technology has long been considered a driver of success, the way in which it is developed and deployed is shifting. In the case of software, the banks' arms race has been duplicative and costly. In the future, success will likely be driven by banks operating as excellent users of 3rd party software. This raises a broader success factor of managing vendor relationships, ensuring appropriate performance management and quality control, as well as mitigating risk (e.g. migration/reverse migration).

The areas into which providers are building their businesses are not consistently aligned with the areas in which they are most advantaged. In some cases, providers will need to adapt in order to succeed. Moreover, they will find themselves in competition with other providers who are better suited to successfully delivering solutions in that space.

EXHIBIT 10: Assessment of current suitability of providers

VALUE CHAIN	ACTORS						
	Sell-side	Market infrastructure			Custodians	Data & technology providers & other 3 rd parties	Buy-side
		Exchanges & IDBs	CCPs	(I)CSDs			
Client Coverage	Core model	Major adjustments to business needed to enter	Major adjustments to business needed to enter	Major adjustments to business needed to enter	Major adjustments to business needed to enter	Major adjustments to business needed to enter	Major adjustments to business needed to enter
Execution	<i>Commissions</i>	Core model	Major adjustments to business needed to enter	Major adjustments to business needed to enter	Adjustments to business needed to enter	Able to enter with minimal adjustments to business	Major adjustments to business needed to enter
	<i>Risk premiums</i>	Core model	Major adjustments to business needed to enter	Major adjustments to business needed to enter	Major adjustments to business needed to enter	Major adjustments to business needed to enter	Able to enter with minimal adjustments to business
	<i>Financing</i>	Core model	Major adjustments to business needed to enter	Major adjustments to business needed to enter	Major adjustments to business needed to enter	Major adjustments to business needed to enter	Able to enter with minimal adjustments to business
Clearing	Emerging model	Major adjustments to business needed to enter	Able to enter with minimal adjustments to business	Major adjustments to business needed to enter	Adjustments to business needed to enter	Major adjustments to business needed to enter	Major adjustments to business needed to enter
Securities services	<i>Settlement</i>	Adjustments to business needed to enter	Able to enter with minimal adjustments to business	Able to enter with minimal adjustments to business	Able to enter with minimal adjustments to business	Able to enter with minimal adjustments to business	Major adjustments to business needed to enter
	<i>Custody</i>	Adjustments to business needed to enter	Major adjustments to business needed to enter	Able to enter with minimal adjustments to business	Able to enter with minimal adjustments to business	Major adjustments to business needed to enter	Major adjustments to business needed to enter
	<i>Collateral management</i>	Adjustments to business needed to enter	Major adjustments to business needed to enter	Able to enter with minimal adjustments to business	Able to enter with minimal adjustments to business	Major adjustments to business needed to enter	Major adjustments to business needed to enter
Data/analytics/technology	Adjustments to business needed to enter	Adjustments to business needed to enter	Adjustments to business needed to enter	Able to enter with minimal adjustments to business	Able to enter with minimal adjustments to business	Able to enter with minimal adjustments to business	Adjustments to business needed to enter

<input type="checkbox"/> Core model	<input checked="" type="checkbox"/> Able to enter with minimal adjustments to business
<input checked="" type="checkbox"/> Emerging model	<input checked="" type="checkbox"/> Adjustments to business needed to enter
	<input checked="" type="checkbox"/> Major adjustments to business needed to enter

Source: Oliver Wyman analysis

Of the sectors which are open and accessible to new entrants, some stand out as offering advantages over incumbent providers:

- Areas where market infrastructure providers will be able to act more efficiently and independently of other business interests in the medium-term
- Areas where buy-in from regulators is likely due to systemic risk and/or importance and neutrality considerations
- Areas where market infrastructure providers and their clients can easily form new ventures without near term conflicts of interests

- Areas where infrastructures and third parties can offer enhanced transparency and so negate information advantage.

Traditional players will come under pressure from new entrants moving across the value chain. ICSDs, and some large CSDs for instance, are expanding into asset servicing, altering their relationships with CCPs and custodians. However, whilst (I)CSDs are well equipped for this move, investment banks would require adjustments in order to move into collateral management services. Across the system the opportunities for repositioning are determined by the characteristics of each actor:

SELL-SIDE

Two key characteristics make the sell-side secure in their core markets. The first and foremost is their role as principal risk takers, whether market-based or credit-based. This is inherent in roles such as market-maker, lender or clearing broker. The second key strength is their centrality to clients' interaction with capital markets, whether from the perspective of idea generation, accessing markets, or providing financing. When clients have complex needs, they will often turn to the sell-side in the first instance due to their ability to offer bespoke solutions based around risk-taking and/or financing. The advantage of being the incumbent relationship should not be under-estimated.

On the other hand, the sell-side is constrained in other parts of the value chain. While users' demands for data & analytics are growing, banks' traditional role as providers of this information is diminishing due to their partial view of the market. This is exacerbated by the reluctance of more sophisticated clients to offer full visibility of their positions and activity to a potentially conflicted party.

Consequently, we expect banks will focus on de-risking and preserving client relationships, and therefore protecting returns. For example, we see banks withdrawing significant financial resource capacity (RWAs, balance sheet) from fixed income, and exploring business models that can increase the velocity and productivity of their balance sheet (e.g. agency models, automated trading) while maintaining the capabilities required to continue to serve

their clients. Principal risk will continue to migrate out of the sell side, due to the punitive costs, creating the potential for equipped buy side groups to fill the void.

The sell-side's approach to technology will change significantly in the coming years. Instead of developing increasingly complex systems themselves, banks will outsource development and focus on successful implementation of systems. This presents a host of new challenges, including how to control and integrate these systems, as well as how to assess their performance. Beyond technology, the sell-side will outsource a range of middle and back-office functions that provide little differentiation; KYC for example.

With proposals to unbundle research from commissions pricing, research groups will increasingly have to justify their own value proposition. We therefore see the potential for consolidation in equity research as boutique dealers lack the resources to support top research groups.

For data & analytics, the sell-side will continue to play a fundamental role, but with a focus on individual, sophisticated insights for clients rather than market data. This will likely center on their execution expertise, e.g. pricing, forecasts, and risk assessment. As execution becomes transparent and commoditized, dealers will have to become more innovative and leverage data assets to create a competitive edge in pricing. We also expect retardation in some of the instances of 'reintegration', e.g. closer ties or acquisition of post-trade entities.

EXCHANGES

Exchanges have a key role providing high quality reference prices for 'lit' (as opposed to "dark") markets in a neutral setting. Many exchanges have the ability to gather and monetize data, though this is dependent on the degree to which liquidity for their target instruments is fragmented. Attracting a large share of flow is vital for obtaining a full view of the target market. Whilst many exchanges deliver data sets to exchange members, exploitation of this data more widely is limited currently. We expect new solutions to emerge in this space in the medium-term, with the virtual consolidation of data across exchanges.

Whilst exchanges will continue to play a key role providing reference prices, they may also further diversify to own dark pools within the boundaries of regulatory guidance. They will be at the forefront of launching new listing and execution venues cross segments leveraging close connections with the surrounding ecosystem. They will also form partnerships with their clients and potentially third party data providers to create new execution optimization services cross venue. They will be increasingly able to extract value from the large quantities of data gathered from trades and transactions on their platforms. Some exchanges will use their technology capabilities to create cross-exchange data repositories, potentially leveraging cloud solutions.

CCPS

CCPs are the beneficiaries of regulatory mandates for central clearing. However, their ability to succeed can still be constrained by geographical location, especially given regulatory balkanization following EMIR, as well as client demand for 'over-the-top' products/services they provide with clearing, e.g. segregated accounts, collateral eligibility, margin optimization. The quality of risk-management practices also drives flow, as clients seek out robust, well-financed CCPs to reduce exposure to a potential default. Furthermore, there likely exists a natural limit to the flow any one CCP can attract, due to fears of possible concentration risk. In this context, we see a clear trade-off between standardization and customization. Following implementation of OTC reform, the industry and particularly regulators will need to review the balance that has been struck and whether this is consistent with the objectives and spirit of the regulation.

CCPs also benefit from extensive, live position data. The value of this again depends on the fragmentation of the market, but limited monetization of this data occurs today. CCPs as owners of margin calculations and haircut levels could potentially play a vital role in the delivery of collateral management solutions which are dependent on these inputs. We already see CCPs start to prepare accordingly by refining haircut methodologies in a first instance.

Whilst we do not see the core business of CCPs changing, the drive to clear a wider range of products will make their role even more important. As such, they will require far more robust risk-management systems, including recovery & resolution planning to cover either their own default or that of a member firm.

CCPs will also have a key role to play in setting the risk management standards for bilateral margin derivatives and for the use of collateral across the industry. Banks will require their assistance to set up bilateral margining infrastructure.

CSDs AND ICSDs

(I)CSDs benefit from a perceived independence and their ability to form strong networks. In certain areas this independence gives them an advantage over global custodians – for example where national regulators mandate local custody and collateral management. EU regulation also ensures that their core (domestic) settlement business is not under threat.

However, these firms are disadvantaged by a lack of technological agility, a lack of specific new capabilities and skills and by regulation which constrains their ability to enter into partnerships. Although (I)CSDs only have a backwards view of collateral, they possess extensive data on CCPs, making them well placed for collateral management services, including optimization, re-use and transformation.

The standardization introduced under T2S may result in utilization of (I)CSDs' core custody and settlement business. However, these firms are likely to diversify to take a network aggregator and collateral coordinator role. This will bring the role of (I)CSDs into direct competition with that of global custodians.

The new post-trade landscape will allow new entrants to the European market, including the big US players. Larger firms will have an opportunity to offer a full suite of securities servicing, and data and technology products (asset servicing, for instance).

In the US, we will see further optimization of the established post trade value chain, as collateral services offer opportunities for foreign entries and recovery & resolution plans trigger a link between the 2–3 systemically relevant post trade providers.

In Asia, we expect the emergence of an ICSD-type model at least across smaller markets, with a view of bringing down the cost of operation. A similar model could be envisaged in the Middle East, where different actors are already reviewing the creation of a cross-market master CSD and/or processing platform. In some emerging markets, we will see a decoupling of the CSD from the exchange as members and regulators push to reduce systemic risk.

Both (I)CSDs and custodians may increase their role as facilitators of corporate actions, managing elections and market claims, issuing buyer protection instructions, and pre-financing payments. Which of the two actors will ultimately take this role is unclear and partnerships are likely.

CUSTODIANS

Thanks to their central position in the market, custodians benefit from a strong network and an encompassing business model. Global custodians have a proven record of operating complex cross-border, cross-service technology models: a real asset in the increasingly globalized custody system.

Like (I)CSDs, custodians utilize their independence (though sometimes hindered through nominal association with capital markets arm) and holistic view of the market, particularly for collateral management. However, they are disadvantaged by a lack of experience in the market infrastructure layer, as evidenced by their struggle to develop execution venues. Although custodians have strong connections to asset managers

in particular, they lack the individual relationships required to generate critical mass for their platforms. Those custodian banks with a capital markets arm will be advantaged in this regard.

There is also a difference between the capabilities of the global top tier custodians, and those of the smaller, lower tier, firms. In the clearing sector, for example, large global custodians can penetrate market segments that smaller players cannot. These leading firms are also able to offer a Custody+ model (i.e. custody combined with clearing and collateral management services), which increases their value-add.

This does, however, place additional demands on them: Custody+ requires significant systems investment in order to enable timely analysis of clients' asset positions and margin calls.

As the market evolves, we expect global custodians are likely to tap aggressively into post trade market infrastructure territory, competing for this space with (I)CSDs. In order to differentiate themselves, global tier 1 custodians will offer the wider range of services included in the Custody + model, and will also look to in-source asset servicing in order to reduce their dependence on the local and regional custodians. We may see some movement up the value chain, with custodians providing investment advice, market access and execution capabilities, clearing and data & analytics.

Technology-driven capabilities, for example digitalization and data analytics, have the potential to further reshape the business model but are likely to take significant time to evolve.

Domestic custodians will likely focus on developing differentiated value propositions for specific buy-side client groups (e.g. no frills proposition for local pension funds with local service model) or more closely integrate with banks and sell-side stakeholders in order to leverage client relationships and offer integrated front-to-back solutions on a local scale. In any case by 2020 we expect many domestic custodians to have reviewed their business model and focused on a model operated at sustainable economics, either stand-alone or as part of potential regional solutions.

DATA & TECHNOLOGY PROVIDERS AND OTHER 3RD PARTIES

Sell-side firms are often unable to devote sufficient resources over the long timescale that is required to develop innovative systems. Specialist technology providers, however, have the expertise and the ability to market their products to many clients, thereby achieving the scale to reduce costs.

The sell side already outsources many front-office systems to third parties; while data providers are also equipped to expand and provide products such as indices. Although the organizational efficiency of these firms would suit a post trade role, we do not see business synergies here.

We see the range of services offered by technology outsourcing firms increasing greatly by 2020. Some of this expansion will come from providing the middle and back office systems which have become commoditized and outsourced from the sell-side. However, there will also be some diversification; data & analytics firms are already moving into indices and creating trading platforms and chat based tools.

There will be a significant shift in the way products are delivered. The move to SaaS and ASP options will continue, with the technology provider hosting the service and clients accessing it on demand.

BUY-SIDE

As well as being the driver for flow throughout the system, the buy side is also a major source of dormant collateral. This can be further released using the enhanced custody model. In addition, hedge funds are able to bridge risk-intermediation and liquidity gaps, taking risk premiums from the sell-side. HFT algorithms can be rented out to help execute block trades, but this does require an API into an exchange to enable use of the system. We expect new membership models will evolve in the near term.

Demand from the buy-side will be a factor driving change across the system. However, there will also be increased

opportunity for the buy-side to provide access to its dormant collateral. Hedge-funds may also take a role as market-makers and we will see buy-side actors continue to take on more principal risk.

Due to regulatory changes and the desire of the sell-side to reduce risk, certain risk-management requirements will be foisted onto the buy-side. Although this places a new burden on these firms, it presents an opportunity for those who are best able to deal with the change. Market infrastructure providers businesses may also explore how they can assist with these demands.

With all these anticipated outcomes, there is the inherent challenge of uncertainty. This is due to future stimuli, such as changing regulation and market conditions, but also depends on how the competitive landscape pans out. A key aspect of the latter is the extent to which firms can overcome the challenges laid out above and ultimately succeed in areas where they perhaps lack all of the requisite capabilities.

To operate in new business sectors where adjustments are needed, firms can either adapt or collaborate. Examples of adaptation may include non-traditional firms securing SEC licenses in order to conduct repo clearing, and global custodians getting CSD licenses. However, there are some sectors where adaptation is not enough, and which can only be exploited through collaboration between firms.

Collaboration can take place in any number of ways, ranging from commercial relationships through to joint ventures and acquisitions. Examples of this can be found in the technology space. For instance, partnerships with technology and data analytics firms could allow the sell-side to equip itself to enter the collateral management sector.

There is also already evidence of market participants using partnerships and acquisitions to adapt. Recently we have seen collaborations between data and technology providers, supported by banks, to deliver KYC data solutions. Additionally, buy-side participants have been purchasing infrastructure solutions such as communication networks. Finally, we see exchange groups picking up the indices businesses being disposed of by banks.

By 2020 the predicted shifts in value will have taken hold, changing the market dynamics. Going forward, navigation in this space will be complex for all providers, who can adopt one of a number of medium to long term strategies:

1. **Integrated end-to-end provision:** Where providers have a full range of capabilities, services are being integrated from execution through to settlement and custody, providing a one-stop shop for buy-side clients such as investors and hedge funds. This

strategy offers potential revenue and cost synergies and could be coupled with a scaling up strategy (e.g. based on M&A or open access approach). The client appetite for this approach is, however, as of yet untested.

2. **Development of novel services and products:** Players with an appetite for innovation are developing novel services and products in response to revenue pressure. For instance, platforms are being developed that combine analytics, trading and clearing, and portfolio and data management services for asset owners and managers. However, in certain industries it may be prudent to be the fastest follower, as opposed to the first mover.
3. **Optimize the core:** Smaller players are predominantly opting for a defensive, wait and see approach, but continue to suffer from high cost/income ratios with little opportunity for attracting new revenues. Players should focus on client profitability management and core product strengthening to avoid losing market share. Cost reduction initiatives, such as outsourcing, lean and productivity management may also need to be considered.

The relative merits of these strategies will be idiosyncratic to providers. However, the industry-wide net result of following them will likely be the emergence of new industry structures, driven by large processing factories which are able to provide end-to-end solutions. The diversity of established niche providers will enrich this model, and we will see further evolution over time in service areas which are still being “tested” by the market.

While strategies will vary by provider segments, growth rates cannot be the sole factor for judging winning models. Rather, successful institutions will be those who are able to focus on client segments and products with the most attractive risk adjusted economics, while investing in systems and capabilities to achieve scale and develop competitive advantage.

PLANNING FOR CHANGE

In summary, capital markets business models are changing substantially, creating opportunities for a broad range of actors spanning the sell-side, the buy-side and market infrastructure providers. Some of these opportunities are already advanced whereas others are less clear and only just emerging. In a few areas, the industry will consolidate and leave service delivery and risk management to few experts, but in most areas, we expect industry fragmentation will persist, though with a markedly new profile.

In light of the change of the past 5 years and the additional shifts expected over the next 5 years, medium-term planning and strategy are becoming ever more important. All players across the sell-side, buy-side and market infrastructure providers need to crystallize the best opportunities, and decide which role to take in 2020 capital markets and how to adapt to succeed.

We expect that regulators will intervene with proposed solutions in those areas where risk is shifting significantly, with a view of driving mechanisms to stabilize the market. In those areas where capabilities are scarce or investment requirements are unachievable, collaborative models should be explored covering the whole spectrum of possible models.

Firms will need to align their planning cycles and approaches to the inherent uncertainty in the market in terms of regulation, competitor action and macro environment/volatility. Flexible management of innovation and advanced risk management practices will be essential to succeed.

LIST OF ABBREVIATIONS

<i>Abbreviation</i>	<i>Definition</i>
API	Application programming interface
ASP	Application service provider
CAGR	Compound annual growth rate
CCP	Central counterparty
CDS	Credit default swap
CI	Cost to income ratio
CSD	Central securities depository
EMIR	European Market Infrastructure Regulation
FI	Fixed income
FX	Foreign exchange
HFT	High-frequency trading
HNWI	High-net-worth investor
ICSD	International central securities depository
IDB	Inter-dealer broker
KYC	Know-your-customer
LIBOR	London Interbank Offered Rate
MDP	Multi-dealer platform
MI	Market infrastructure
MiFID	Markets in Financial Instruments Directive
OTC	Over-the-counter
Repo	Repurchase agreement
SaaS	Software as a service
SDP	Single-dealer platform
SEC	Securities & Exchange Commission
T+1	Transaction date plus 1 day settlement
T2S	Target 2 Securities

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