



Financial InterGroup Holdings Ltd
169 East 69th Street – 18th floor
New York, NY 10021
<http://www.FinancialInterGroup.com>

Jan. 23, 2009

Victoria Powell, Director for
Communication and Common
Supervisory Culture
CESR
11-13 avenue de Friedland
75008 Paris, France

European Central Bank
Secretariat Division
Kaiserstrasse 29
D-60311 Frankfurt am Main, Germany

Please find attached our

Response to the CESR/ESCB CONSULTATION PAPER, recommendation 6, DRAFT RECOMMENDATIONS FOR SECURITIES SETTLEMENT SYSTEMS, recommendations 3, 11, 16, 18, 19 and DRAFT RECOMMENDATIONS FOR CENTRAL COUNTERPARTIES, recommendations 8,14, 15.

Very truly yours,

Allan D. Grody, President
212 585 0409 Mobile 917 414 3608
Email agrody@FinancialinterGroup.com

**Response to the Following
CESR/ESCB CONSULTATION PAPER
DRAFT RECOMMENDATIONS FOR SECURITIES SETTLEMENT SYSTEMS
and
DRAFT RECOMMENDATIONS FOR CENTRAL COUNTERPARTIES**

The objectives of the Recommendations

“6. The main aim of the ESCB-CESR Recommendations is to promote competitive, efficient, safe and sound pan-European post trading arrangements. This should ultimately lead to greater confidence in securities markets and better investor protection and should in turn limit systemic risk. In addition, the Recommendations seek to improve the efficiency of the market infrastructure, which should in turn promote and sustain the integration and competitiveness of the European markets. Moreover, having a single set of Recommendations should also assist public authorities in addressing the fragmented European post trading sector and should not impose undue costs on market participants.”

**CESR/ESCB
October 2008**

PART 1: DRAFT RECOMMENDATIONS FOR SECURITIES SETTLEMENT SYSTEMS	PART 2: DRAFT RECOMMENDATIONS FOR CENTRAL COUNTERPARTIES
<p>RECOMMENDATION 3: SETTLEMENT CYCLES AND OPERATING TIMES</p> <p>The recommendation</p> <p>Rolling settlement should be adopted in all securities markets. Final settlement should occur no later than T+3. The benefits and costs of EU-wide settlement cycles shorter than T+3 should be evaluated. The operating hours and days of CSDs should be open at least during the operating time of the relevant payment system (at least during TARGET2 operating times for transactions denominated in euro).</p>	

<p>RECOMMENDATION 11: OPERATIONAL RISK</p> <p>The recommendation</p> <p>Sources of operational risk arising in the clearing and settlement process should be identified, monitored and regularly assessed. This risk should be minimized through the development of appropriate systems and effective controls and procedures. Systems and related functions should (i) be reliable and secure, (ii) be based on sound technical solutions, (iii) be developed and maintained in accordance with proven procedures, (iv) have adequate, scalable capacity, (v) have appropriate business continuity and disaster recovery plans that allow for the timely recovery of operations, and (vi) be subject to frequent and independent audits.</p>	<p>RECOMMENDATION 8: OPERATIONAL RISK</p> <p>The recommendation</p> <p>A CCP should identify sources of operational risk, monitor and regularly assess them. The CCP should minimize these risks through the development of appropriate systems, and effective controls and procedures. Systems and related functions should be (i) reliable and secure, (ii) based on sound technical solutions, (iii) developed and maintained in accordance with proven procedures and (iv) have adequate, scalable capacity. The CCP should have appropriate business continuity and disaster recovery plans that allow for timely recovery of operations and fulfillment of a CCP's obligations. Systems should be subject to frequent and independent audits.</p>
<p>RECOMMENDATION 16: COMMUNICATION PROCEDURES, MESSAGING STANDARDS AND STRAIGHT-THROUGH PROCESSING (STP)</p> <p>The recommendation</p> <p>CSDs and participants in their systems, should use or accommodate the relevant international communication procedures and standards for messaging and reference data in order to facilitate efficient clearing and settlement across systems. This will promote straight-through processing (STP) across the entire securities transaction flow.</p>	<p>RECOMMENDATION 14: TRANSPARENCY</p> <p>The recommendation</p> <p>A CCP should provide market participants with sufficient information for them to identify and evaluate accurately the risks and costs associated with using its services.</p>
<p>RECOMMENDATION 18: REGULATION, SUPERVISION AND OVERSIGHT</p> <p>The recommendation</p> <p>CSDs and securities settlement systems should be subject to transparent, consistent and effective regulation, supervision and oversight. In both a national and a cross border context, central banks and securities regulators should cooperate with each other and with other relevant authorities regarding the CSD and the securities settlement systems it operates. Central banks and securities regulators should also ensure a consistent implementation of the recommendations</p>	<p>RECOMMENDATION 15: REGULATION, SUPERVISION AND OVERSIGHT</p> <p>The recommendation</p> <p>A CCP should be subject to transparent, effective and consistent regulation, supervision and oversight. In both a national and a cross borders context, central banks and securities regulators should cooperate with each other and with other relevant authorities regarding the CCP. Such cooperation should also ensure a consistent implementation of the recommendations.</p>

<p>RECOMMENDATION 19: RISKS IN CROSS-SYSTEM LINKS OR INTEROPERABLE SYSTEMS</p> <p>The recommendation</p> <p>CSDs that establish links to settle cross-system trades should design and operate such links so that they effectively reduce the risks associated with cross-system settlements. They should evaluate and mitigate the potential sources of risks that can arise from the linked CSDs and from the link itself.</p>	
---	--

INTRODUCTION

One of the most intractable and long-standing impediments to global straight-through-processing initiatives, systemic risk mitigation, and operational efficiencies in the global clearance and settlement system has been the proprietary and non-standard nature of referential data. Referential data is a broad term understood by operating management, information technology professionals, and risk managers alike. Unfortunately each group understands it differently. To the information professional reference data is “*any kind of data used solely to categorize other data found in a data base or solely for relating data in a data base to information beyond the boundaries of an enterprise*”¹. To the risk manager it is “*...internal and external (third party) data that is used to establish the underlying criteria from which credit risk analysis is performed and credit risk exposure is modeled.*”² To operating management referential data is information that enables financial transactions to be identified and processed and financial information to be internally and externally reported. It is no wonder that risk management, operating management and information technology professionals are not focused on observing, let alone resolving, one of the most significant operational risks, that of faulty referential data.

This response tackles this issue with suggestions for a permanent solution to the proprietary and non-standard nature of financial industry referential data using concepts embodied in this CESR/ESCB Draft Recommendations Consultation Paper that traditionally have been applied to Settlement Systems and Central Counterparties and that we believe should first be applied to the matching, clearing and settlement of referential data. To date mutualized risk sharing within clearance and settlement systems have only been applied to the value portion of transactions (principally quantities, transaction prices and currency values). These same techniques, however, can be applied to the matching and settling of the referential data components of these transactions.

Referential data is at the heart of the globally intertwined clearance and settlement system. While reference data is not value-bearing, computer matching algorithms do not differentiate reference data from other data and mismatches and failed transactions occur regardless of the data elements’ business intent. Acquiring, maintaining and managing such data is costly, estimated now at \$1bn+ annually for each of the largest financial enterprises, with faulty data being at the core of significant components of operational losses.³

We are suggesting that a new facility, the Central Counterparty for Data Management (CCDM), be established to match multiple incoming sources of referential data, clear this data through best-of-breed computer analysis and settle (distribute) industry accepted, CCDM assured data sets to participants and, in turn, to their downstream correspondents. The CCDM would be established initially by a handful of industry infrastructure entities and multi-national financial firms as first described by the Group of Thirty⁴ (below), chartered as an exempt clearing corporation with ownership eventually passed to the industry and overseen by regulators.

“The implementation of reference data standards has proven difficult. With no global owner of reference data and friction between the needs of the domestic and cross-border market users, progress has been slow. Future progress will require greater efforts by market infrastructure operators and international institutions with global reach.”

**Group of Thirty
Final Monitoring Report
Global Clearing & Settlement Committee
May 22, 2006**

While the CESR/ESCB Draft Recommendations are intended to “promote competitive, efficient, safe and sound pan-European **post** trading arrangements” our recommendations are intended to establish the matching, clearing and settlement of reference data, valuation prices and corporate event data at the **pre-trade** financial transaction assembly point. By doing so at the immediate front-end of a financial transaction’s life cycle the authors believe the post trade environment can be improved significantly. This should become apparent as the reader progresses through the following discussion and specific recommendations. We begin our discussion by suggesting that the reader anticipate the solutions we are proposing by first reading the following quotes:

“Our current regulatory regime is almost solely focused above ground, at the tree level. The real threat to market stability is below ground, at the root level, where the health of financial firms is intertwined.”

**U.S. Treasury Secretary Henry M. Paulson Jr.
March, 2008**

“Systems underpinning global financial markets are becoming more interconnected in increasingly complex ways.”

**US Treasury Secretary Elect Timothy Geithner
June, 2008**

“In addition, direct relationships among systems may facilitate a reduction in specific sources of operational risk by favoring the standardization, automation and integration of different payment and settlement processes. Such developments in the functioning of payment and settlement processes can reduce the complexity of payment and settlement operations and minimize the potential for human error. As a result, key sources of operational risk can be eliminated.”

**Bank for International Settlements
Committee on Payment and Settlement Systems
“The interdependencies of payment and settlement systems”
June 2008**

“Defy collaboration limits—Collaborate on a massive, geography-defying scale to open a world of possibilities”.

**IBM Global Business Services
Expanding the Innovation Horizon
The Global CEO Study, 2006**

*“Regardless of who manages the initiative(s), TowerGroup agrees that now is the time to begin a serious dialogue on **a collaborative solution to the securities industry's reference data problem**.The cost to move forward will be significant, but with the securities business growing ever more complex, the cost of inactivity would be far greater.”*

**TowerGroup
Dec, 2007**

“The Governing Council of the European Central Bank (ECB) is today issuing a proposal to all European central securities depositories (CSDs) to join the TARGET2-Securities (T2S) initiative. T2S is a major step forward in delivering a single integrated securities market for financial servicesT2S will deliver a single borderless pool of Europe-wide securities, and a core, neutral, state-of-the-art settlement process...T2S offers a single securities accounts reference data model for all connected CSDs.”

**European Central Bank
“CSDs invited to join the TARGET2-Securities initiative”
Press Release
May 23, 2008**

The essential argument we are putting forth is that of the benefit of the evolution toward a global “central” counterparty (i.e. one “golden copy”) for the industry, vs. multiple golden copies, one each for each firm (the Enterprise Data Management or EDM model), or multiple ones shared by multiple firms/facilities in multiple outsourced facilities. The industry is already embarked on rationalizing content standards such as instrument codes and business entity identifiers and implementing EDM and outsourcing models and will thus make it much easier to evolve to the final phase, that of applying the central counterparty concept to data management globally. Here, the focus is both on cost efficiencies and risk mitigation, as well as the recognition that the financial industry has become global, transcending sovereign state regulations and, even, regional regulatory compacts.

Much activity is present in the referential standards setting space. Organizations such as the International Standards Organization (ISO), the Markets in Financial Instruments Directive (MiFid) Joint Working Group, the SWIFT organization, The Group of Thirty, the ANNA Service Bureau, the International Securities Association for Institutional Trade Communication (ISITC), the Reference Data User Group (RDUG) and its successor organization ISITC-Europe, The Enterprise Data Management Council, the Financial Information Services Division of the Software and Information Industry Assoc. (SIIA), the Asset Backed Securitization Forum, The UK’s Pension Regulator, the International Society of Securities Administrators (ISSA) and many more ad-hoc working groups, industry task forces, industry trade associations and industry regulators provide forums where asset managers, banks, broker/dealers, hedge funds, global custodians and other financial enterprises and financial institutions discuss issues pertinent to straight-through processing (STP)⁵ and work towards improving their understanding of solutions which could improve performance for their own firms, as well as devising common solutions to shared problems in the standards and market practices space.

Adding to this complexity is the multiple development activities and varied implementations of securities messaging standards such as Fix Protocol Ltd’s Financial Information Exchange (FIX) and FIXML messaging protocols to standardize formats for communication of pre-trade and trade information, principally equities and fixed income securities and their content between broker/dealers and investment managers; the ISITC schemas for messages between investment managers, broker/dealers and custodians; the FpML schema for derivatives; and the 15022 and 20022 schemas from SWIFT. SWIFT, in conjunction with the ISO’s Working Group 11, is redefining the 15022 standard to incorporate the existing FIX Protocol, the FISD’s MDDL (Market Data Delivery Language) schema (and its recent work incorporating corporate action data into the MDDL schema), into an all encompassing XML (Extensible Markup Language) schema. This standard is known as the 20022 message standard.

The issues dealt with in all these standards initiatives include definition of data elements; standardization and interoperability of proprietary data formats; data content, and transmission and data tagging standards. The problem is simply that no one organization has a full-time mandate and the appropriate full-time staff to make this work as a unified effort, which is

essential if the referential data that make upwards of 70% of the data components of financial transactions are to meet and match seamlessly across the global payment, settlement and clearing mechanisms, or are to be aggregated and reported on appropriately to management and boards, and to regulators.⁶

The current state of implementation of data management systems within financial enterprises and infrastructure facilities is also evolving. These systems exist both as newly implemented centralized activities supporting multiple business applications and also as separate processing components incorporated within each legacy business application. The present situation of separate business units incorporating duplicate reference data acquisition, separate data bases for storing this data, and the subsequent processing duplication across the many silos is slowly giving way to more integrated systems across the enterprise, not only for reference data but for transaction processes aligned with these business units. This is due, in part, to the continuing evolution toward all electronic order management and trade execution systems and the practice of integrated trading of products with instruments for hedging risk or conversion into other currencies. It is also due to the evolving real-time availability of locked-in quotes and last sale price information from all-electronic trading venues and the integration of executed trades within firm-wide financial, risk management and P&L reporting systems.

While the initial industry's focus on data content standards is essential, and a lot more needs to be done, what the industry is now tackling as an intermediate step is a standard taxonomy for tagging of data. The aim is to provide unambiguous nomenclature with precise definitions in the context of real business requirements from which all data sources can be tagged in a standard way for computer based searching, access and comparison. The precise identification of data elements used by financial institutions should be the foundation of effective data management. Here, such "tagging" of data is at the baseline of many industries. The internet requires it for precise searching. Manufacturers use it for supply chain management. And retailers use it for more efficient inventory control. But while other industries have made progress, the financial industry still grapples with the problem of terms that have different meanings in different segments of the business, common meanings that use different terminology, and vague definitions that don't capture critical nuances.

This seems incongruous for an industry that operates real-time trading systems around the clock and around the world, processing nearly 1/2 million transactions per second in the US equities markets alone, for a whole range of complex tradable capital and contract market instruments, and with an increasing mandate of highly automated straight-through processing.⁷ This straight-through processing environment is still a distant vision, even though the financial industry has just the information flow to consider. While some progress has been made, financial enterprises are still debating the basics of reference data standards, while seeking the solution to the issue of faulty reference data, both precursors to achieving straight-through processing.

While further initiatives for EDM and outsourcing continue, these efforts will not solve the problem of excessive costs and systemic risk. This is where our recommendations are focused, basically explaining how multiply sourced, multiple copies of these golden copies cannot solve these problems permanently, even when all are using the same transmission standards, standard data tags or content standards or when everyone has one golden copy in their own firms or in each central securities depository or clearing facility, or in collective facilities that serve multiple firms. Systemic risk and excessive cost would still be built into the industry's infrastructure due to the still unmitigated risk and duplicated costs from:

- the limited availability of budgets to source data from multiple vendors;
- different vendors chosen for each firm or existing infrastructure facility thus imbedding a variance in the data sets maintained by each firm and each outsourced facility;
- each firm/facility with different rules for accepting "best-of-breed" data;
- duplicated activities and costs for each firm/facility essentially trying to do the same thing;
- regulators and firms still dealing with faulty definitions of aggregated risk for a counterparty whose hierarchies and definitions of business entities are determined separately by each firm/vendor;
- firms still only finding out data faults when they try to send a transaction through its settlement process and it fails to complete;
- the industry still lacking the ability to accommodate STP in any time frame approximating trade date settlement, let alone real-time settlement;
- regulators still rejecting electronically filed regulatory reports because they couldn't match incoming data sent electronically from firms to regulators data bases, and
- regulators' accepting electronically filed reports because they did match incoming data from firms, but the regulators data bases had different meanings (descriptions of business entities, instrument identities, data attributes, etc.) for the matched data elements.

At the regulatory level the activities of regulators throughout the world toward requiring electronic transmission of issuer financial statements, underwriter's prospectuses, and other submissions, and, along with this, the further innovation of "at source data tagging" (essentially surrounding data with computer readable tags as discussed previously), must be accommodated in any future view of settlement systems and central counterparties. Already the SEC has mandated such activities (see below) and the ECB recently proposed its own version. For, without such consideration there will be a proliferation of data tagging conventions and proprietary tags, necessitating a new set of reconciliation procedures and mapping conventions, and a new layer of costs and risk.

"The Securities and Exchange Commission voted unanimously Wednesday to propose a rule requiring companies — by as early as next year — to file financial statements in an "interactive data" format. The proposed schedule is a landmark moment for interactive data-tagging, using the system known as XBRL, for extensible business reporting language. Christopher Cox, the SEC chairman, called the development something that would "significantly transform the SEC's business model," and compared XBRL's importance to that of the first personal computers and the requirement that financial statements be published online in the Edgar database".

SEC Maps Interactive Data-filing Mandate

CFO Magazine

May 14, 2008

Over time, probably measured in a decade or two, data vendors, the CCDM and others will be accessing data directly from its originating sources in completely electronic, standard form, thus eliminating the majority of data sourcing errors the industry now deals with at considerable cost and with significant embedded systemic risk. But for this to occur intermediary steps must be taken, first communicating seamlessly across business silos within financial enterprises; then between financial businesses and regulators bilaterally; and, finally, communicating within multi-lateral payment, clearing and settlement systems seamlessly in a straight-through-processing environment, made practical by a standard set of referential data. The ultimate goal of simultaneous, near real-time trade assembly, execution and finality of payment and settlement, will thus be achievable. Along with this will come a new generation of automated business applications built within each financial firm or in each separate component of the payment, clearance, and settlement system with the potential of accessing the CCDM for all manner of standardized referential data sets.

For this to occur, regulators must organize themselves globally to oversee an already globalized financial industry, and must sit at the table with the industries' multi-national financial firms; infrastructure entities; exchanges and significant trading venues; and with data vendors to coordinate the infrastructure changes necessary for straight-through-processing. The benefit to regulators are obvious, achieving true transparency by being able to finally "see" into the standard data used by all, thus fulfilling their oversight role each are mandated by law to perform on behalf of the public.. Here, we believe the governing body for the Central Counterparty for Data Management can play a significant role in coordinating these efforts, providing for the first time, a global center for these data management initiatives.

BACKGROUND**Historical Perspective**

Financial transactions have traditionally been entered into through direct negotiation between principal parties and/or their agents. While in the pre-industrial and, later, pre-information age, these face-to-face negotiations would simultaneously result in the physical transfer of the traded goods. In later developments, the goods were transferred and paid for at a later stage beyond the agreement, wherein the principals or, more likely, their agents, would reference the original terms as recorded on paper records and assure the finality of the transaction on that basis.

Historically, the failure to identify the details of a financial transaction in order to finalize the purchase or sale of such items as a security, physical asset or a contract was left to the visual inspection of the underlying goods or security certificates, or the reading of the details of the contract. The expectations of the purchaser and seller or, more generally, their agents as to the value, terms and conditions of the agreed transaction would be communicated to each separately by the different parties to the original negotiation. When communicated and verified by visual inspection, the transaction was finalized or settled. If the details did not agree, it would be referred to as a failed transaction (a failed, busted, or out trade, or a DK — don't know trade), and left, without payment, to be further investigated. Later, revised details would be conveyed to each party and a further attempt to settle the transaction undertaken.

Until the end of the 19th century, transactions of this nature were carried out bilaterally, that is, between two parties, first through barter transactions and then through representative collateral, such as bank notes, warehouse receipts, warrants, currencies, contracts and the like. In the USA, in the closing decade of the 19th century, the Minneapolis Grain Exchange formed the first payment and settlement 'clearing association', which permitted multi-party transactions first to be netted, then to be novated through means of a central counterparty. This payment and settlement mechanism was referred to as a 'clearing house'.⁸

Leading up to this innovation was the progress in creating transaction standards for the underlying collateral, in this case grain, such as size of contracts, grade of grain, delivery location and delivery date. Each party to a transaction would submit the details as to number of bushels, agreed price, date for delivery and with whom they transacted the agreement (the counterparty) to the clearing house. The clearing house would match the transaction to the other side, that is, the identical but mirror image of the transaction (the buyer's transaction details matched to the seller's details). When judged as matched, the clearing house would pool the transactions, netting the money owed to individual transactors and the net number of contracts each retained to fulfill, but in an obligation to the clearing house, no longer to each other. The original parties to the transaction would be separated from the fulfillment of the contract, with

the clearing house now standing in their place. Thus, mutualized risk sharing became part of the financial transaction landscape, with each member standing up to guarantee the collective interests of all members and, in turn, all of their member's clients.

The recent stress in financial markets has called into question some fundamental infrastructure components of the global payment, clearance and settlement system that are relied upon to mitigate systemic risks. Regulators across the world including the UK's FSA, the US Treasury Secretary and the US President's Working Group on Financial Markets are reviewing the regulation of payment and settlement systems with a view toward understanding why they failed to mitigate the risks of complex counterparty interactions across the global capital, contract and dealer markets.⁹ The consequence of this global review may well be a new regulatory regime and new institutions to further strengthen oversight and reduce systemic risk.

Current Operational Perspective

Of significance in all financial transactions in today's highly automated financial markets is a mandate that the data elements of a financial transaction be accurate throughout the transaction life cycle. The ability to both externally match and internally manage financial, business and risk performance data, depend on its accuracy.

Where it is to be matched externally to a counterparty it must be verified as accurate by matching both sides of a transaction to each other. When mismatches occur on any of the critical data elements, the transaction is cycled back to its originators at the most immediate previous stage for correction and re-submission. Not only does this delay the transaction, it also causes unnecessary repair work and greatly increases costs. When the transaction fails to settle it creates a loss of money to both original counterparties. The seller has paid their client for the full value of the transaction when they have not themselves received any payment, and the purchaser must borrow against the collateral and pay for, then deposit it into their client's account, having not received the collateral themselves from the seller. This undermines the trust between counterparties that drive markets.

Financial transactions can be thought of as a set of computer encoded data elements that collectively represent standard reference data, identifying the transaction as a specific product bought by a specific business entity; variable transaction data such as quantity and amount; and other associated referential information such as price data, credit ratings and other types of fundamental data. Analogous to specific component items of a manufactured product, reference data, which comprises 70% of a financial transaction, also defines the products' changing specifications (periodic or event driven corporate actions), occasional changes to sub-components (calendar data, credit rating, historical price, beta's, correlations, volatilities) and seasonal incentives or promotions (dividends, capital distributions and interest payments).

Today's process of organizing a financial transaction from order presentation to trade completion and payment is multi phased. Interactions between different automated business applications,

each defining their own unique set of reference data is common. Combined with many points of human and automated system interactions, faulty reference data requires extensive error detection and repair procedures.

Reference data should be consistent across each financial transaction's life cycle and throughout its supply chain. However, duplication of reference data is pervasive in large financial enterprises and throughout the industry, leading to significantly higher risk and operational costs. When reference data that should be identical are not, it causes miscalculated values, misidentified products, and involvement with erroneous supply chain partners (trade counterparties, custodians, paying agents, et al). These individual transaction failures cause monetary loss, higher labor costs, and the potential for both transactional and systemic failure.

The problem, simply stated is that each financial institution or supply chain participant has independently sourced, stored and applied reference data to their own copies of their multiple inventory and business entity data bases. When this reference data is applied to the variable components of a financial transaction (i.e. quantity and transaction price), and an attempt made to aggregate this information in one financial institution as for reporting purposes, or match, identically, the details sent by a counterparty or supply chain intermediary in order to accept and pay for the transaction, significant failures in matching occurs.

One component of this reference data, Business Entity Identification or BEI, has become a critical issue of late as regulators focus on new know-your-customer (KYC) rules, new Anti-Money Laundering laws, the Sarbanes-Oxley (SOX) legislation, the Markets in Financial Instruments Directive (MiFid), the Undertakings for Collective Investments in Transferable Securities (UCITS) III directive, and the Basel II Capital Accords, amongst others.

The impact in complying with these regulatory mandates is forcing an old issue of incomplete, non standard electronic representations of customers, corporations, financial intermediaries, issuers, financial products, markets, currencies and prices, to the fore-front of management priorities. Whether sourcing this information from external vendors such as S&P, D&B or Governmental registration authorities, or attempting to reconcile the data within the silos of business activity that make up financial institutions, the data is non standard and maintained in proprietary formats.

Such faulty data also has an impact on the accuracy of risk reporting processes. For example there is no global standard identity for issuers, counterparties or obligors, or any hierarchical structures to link them, thus forcing each financial institution to create their own. As examples IBM's common stock has over 25 different identifiers (i.e. CUSIP (US) 459200101, ISIN (US) 4592001014, Austria 851399, Italy 550304, Japan 584006000, Netherlands 45480, et al) used in proprietary trading systems, payment and settlement systems, and in bookkeeping systems across the globe. Berkshire Hathaway as a business entity has at least seven different identifiers in

critical information systems such as the Edgar filing system (0001067983), S&P's credit rating services (100264), and in Markit's CDS price reporting system (08CAD7).

Even retrieving a simple description for a security in order to access the proper internal code, such as is the case with General Electric, can produce errors due to variations of descriptions such as Cap, Cap Corp, Capital Cor, Captl Corp, and Co, each with a different symbol and each with its own separate internal code for completing transactions or measuring risk.

Finally, even retrieving the exact same symbol has different meanings as for example the symbol NQL which, on the Toronto Stock Exchange, is the symbol for NQL Energy Services Inc. Class A and on the American Stock Exchange is the symbol for TIERS Principal-Protected Trust Certificates, Series NASDAQ 2002-6. PAC is the ticker symbol at the New York Stock Exchange for Grupo Aeroportuario del Pacifico, S.A.B. and at the Chicago Mercantile Exchange (Comex division) for Palladium futures contracts.

The industry is not without its leaders in standards setting. The Association of 60+ National Numbering Agencies ("ANNA") in 2002 authorized Standard & Poor's and Telekurs to develop and manage the "ANNA Service Bureau." The Service Bureau is tasked with improving all aspects of the timely, accurate and standardized identification of financial instruments and operates as a central hub to receive and consolidate International Securities Identification Numbers (ISIN's) from ANNA members and partners. ISIN securities identifiers combine a country code with the local national security identifiers (in the US, it is combined with the CUSIP number) for engaging in cross-border transactions. And the industry is not without its controversies. The European Commission (EC) has opened formal proceedings against Standard & Poor's (S&P) to look into whether it abused its dominant market position by forcing financial firms to pay for the use of US securities numbering codes when accessing data from third party vendors. The Commission believes S&P might have broken rules by forcing banks and investment funds to pay licensing fees for the use of US ISIN codes in their own databases.¹⁰

The Deutsche Borse's Avox subsidiary is supporting a collaboration of 25+ financial institutions that share their independently sourced business entity data for assuring their accuracy and compatibility. Avox validates, corrects, enriches and maintains business entity reference data. This includes data such as corporate hierarchies, registered address information, industry sector codes and company identifiers. Financial institutions collectively addresses poor client, issuer and counterparty data quality. The participants, which include some of the largest banks and asset managers in the world, both contribute and subscribe to a shared pool of data

Collectively, these and all the other varied and disparate standards initiatives have the goal of rationalizing the multiple security numbering systems (Symbols, CUSIP, Sedol, ISIN, et al) through the establishment of the Unique Instrument Identifier (UII)¹¹; establishing uniform counterparty and supply chain identifiers, known as the International Business Entity Identifiers (for all businesses that are either regulated or on which due diligence is necessary)¹²; to establish

standards for settlement instructions, known as the Standard Settlement Instruction (SSI)¹³; to confirm a broadened, internationally compatible list of CFI (Classification of Financial Instruments) codes for instrument types, foreign currencies, etc.¹⁴; and to rationalize corporate event announcements¹⁵.

In a recent EDM Council/IBM data quality study high levels of inconsistencies for a number of critical fields just in the product/instrument data base was revealed. The study focused on 42 data attributes needed for trade confirmation for 51 new and secondary market fixed income instruments across a dozen financial institutions. The normalized results confirmed a significant level of inconsistencies (varying as much as 30%) on a number of critical data attributes. For example, there were 20 instances of coupon differences, 81 mismatches for Issue Date, plus many other elements where the discrepancy rate was expected to be much lower.¹⁶

Compounding the problem further is the introduction of a whole new set of proprietary data tags that will be used by document preparers and transaction originators for identifying elemental data to be selected from a message or a document or used as a self describing content format for financial transactions. Here regulators across the world, including the SEC, the EC and the Federal Reserve have XML (eXtensible Mark-up Language) tagging initiatives underway to code prospectuses, corporate filings, and mutual fund filings with specific tags.

XML is a way of representing data so that its content is discernable within the message or transport layer. Unlike earlier standards that primarily transported data, this standard imbeds the data's intent, or content, and structure into the message through the use of tags. The reference data requirements for equities and fixed income securities and other instruments, such as derivatives, futures, commodities, and options, are also being addressed through incorporation into existing standards and through the establishment of standards within the XML protocol.

The US's SEC Edgar data base, a repository of corporate financial information, has mandated electronic filing of these reports in XBRL format, a variant of XML. The DTCC has initiated its New Issue Information Data Service (NIIDS) requiring XML tagging. Content standards will ultimately be required as, for example, security or business entity codes will be rejected if they do not match up to the reporting venues (the SEC's or DTCC's) master data files.

Already such organizations as the FISD and the EDM Council have initiated projects to standardize a set of business terms for all the data components required for a market placed financial transaction throughout its life cycle, with the intent to transform these into a set of XML data tags. However, these and all the other XML initiatives, if left to their own stand-alone implementations will be introducing a whole new generation of proprietary reference data, thus adding to the problem we already have of multiple and proprietary product and business entity identification codes and other data attributes.

The embrace of XML by so many trade associations, industry working groups, major financial institutions and global standards organizations suggest that a critical mass can be built, and that

both its rate of adoption and its use can be accelerated if a globally centralized body, such as the proposed Central Counterparty for Data Management made up of a group of the world's leading financial enterprises and their financial infrastructure institutions, focuses its attention here at this critical time.

Are the industry leaders up to the task? Only a handful of largest financial enterprises interact with the vast majority of smaller securities firms, banks, insurance companies, investment managers and hedge funds in the capital, contract and investment markets. These smaller firms, in turn, use these larger firms' services as traders, investment managers, prime brokers, paying agents, servicing agents, trustees, fiduciaries, escrow agents, clearing agents and custodians. The largest of firms are also the key members of the financial infrastructure entities that constitute the global payment, clearance and settlement system. Participants in these organizations must allocate capital to support the guarantees and risk management practices of these industry-wide risk mitigating entities. For example DTCC and its clearing and settlement subsidiaries, NSCC, FICC and GSCC collectively held \$10.6 billion of such participants' funds at year end 2004.¹⁷

Operational Risk Perspective

2008 marked the beginning of the phase-in globally of the Bank for International Settlements (BIS's) new regulatory regime (known as Basel II). Basel II is a global standard that will require additional capital to be reserved for unexpected operational losses based upon historical operational loss experiences and key risk indicators of operational effectiveness.¹⁸

Many of the tools required for operational risk capital calculations are still not in place even though many operational risks are at the root causes of the financial crisis. Here, such information as a client's total holdings, credit profile and credit limits for both risk calculations and regulatory reporting require not only precise BEI's but precise linkage to other BEI's in the overall entities' ownership structure and hierarchical relationships. Many of these problems map back to the lack of data standards and subsequent data quality issues.¹⁹

External examination is now focusing on the dominance of the financial firms' siloed business models which, in turn, have created siloed implementations of referential data bases. These multiple data bases have necessitated reconciliations of data across an enterprise to report a single view to regulators at best, and more realistically has caused the reporting of multiple views of the same data from the different business silos and certainly from the many firms that are supposedly reporting on the same set of products or business entities.

Recently the Basel Committee was particularly vocal in their "condemnation" of the siloed approach which has historically characterized financial services business and organizational models.²⁰ Citing from the report:

“...it is clear that risk concentrations may arise from (interrelated) exposures across the risk categories, rendering a silo-based approach insufficient as potential concentrations across categories may not be captured” and “...firms reported significant differences across entire risk systems (e.g. risk typology, risk metrics, mathematical and statistical risk measures, historical IT systems etc) as important impediments to the integration process.”

**Basel Committee
Banking Supervision’s Joint Forum
“Cross-sectoral review of group-wide identification and management of risk concentrations”
April 2008**

The failure to take a broader view in analyzing reference data has led to negative consequences for both market and credit risk capital calculations. For example, historically most organizations have failed to identify a comprehensive well defined separate “operational risk bucket” to place operational losses in. Many operational losses were most likely identified as either a credit risk (e.g. a counterparty misidentification, an improper delivery vs. payment address, an improper account allocation, etc.) or a market risk (e.g. wrong product identification, missed stock-split date, improper conversion rate, etc.). Now, within the new mandate of Basel II, faulty reference data should find its way into the right operational risk bucket. The key is to implement an appropriate operational risk management framework which contains causal relationships that drive these operational loss events.²¹

THE KEY ISSUES

The Devils in the Data

The importance of reference data can be understood by recognizing that all financial transactions are represented as data in information systems. If the data are wrong, the transaction does not settle. The retail and manufacturing industries understood this issue a long time ago and standardized around universal barcode identifiers for products and electronic data interchange standards for communicating across suppliers, distributors and retailers. The financial industries’ clearing and settlement infrastructure similarly has such identifiers for financial products; supply chain participants (counterparties, financial intermediaries, corporations, issuers, etc); financial markets and currency designations; valuation and market prices; and other referential information such as credit ratings and economic data used in valuation models.

However, financial industry reference data that should be standardized and identical across each organization are not. These data are sourced independently, with each financial institution or infrastructure facility performing duplicative functions in an attempt to represent each unique product, business entity and valuation price identically, but failing to do so. The consequence is that proprietary and conflicting identification codes exist across the entire range of referential data, including such fundamental identifiers as symbols for corporate issuers, symbols used in

contract markets, numbering conventions for securities, supply chain business entity identifiers, and counterparty identifiers.

To compound the problem, clearing and settlement systems operators and even regulators maintain proprietary codes and duplicate sourcing and maintenance functions. Even dates and rates for corporate events and valuation prices for all manner of traded financial instruments are obtained and organized in this manner. Such reference data are represented as 70 per cent of the data content of financial transactions.¹⁶ Thus, the effect on operating costs and operational risk in faulty data entering clearing and settlement systems is significant. In fact, those infrastructure institutions that operate clearing and settlement systems have capital structures that are primarily supporting the risk of mismatched transactions caused by faulty data.

All central counterparty markets, Central Securities Depositories (CSD's), payment networks, and novational clearing systems (collectively the global Clearing, Payment & Settlement System) have priced into them the transaction costs supporting such processing activities as matching of counterparties and the details of the transaction, the reconciliation and work flow processes when transactions do not match, and additional capital for protecting against losses incurred from failures in transactions to be reconciled in a timely fashion. In addition members assure each other through capital contributions to the entity to prevent against default risk. In fact the existence of these facilities are, in the main, simply to assure participants that what was agreed to earlier in the first instance of executing the capital, contract or currency transaction gets paid for (settled). The bilateral counterparty dealer markets are not centralized and do not fit within the global clearing and settlement system, but they are now being induced to do so by regulatory fiat.

In the OTC derivatives markets, a mutualized risk mitigating facility as proposed by the US Presidents Working Group²² and supported under US Secretary Treasury Paulson's blueprint for payment and settlement systems²³ would be a welcome addition to reducing the risk at the root of intertwined financial institutions. Acting as the central counterparty for an integrated operational infrastructure, it is intended to support the seamless payment and settlement of OTC derivatives contracts through promoting the standardization of data and the interoperability of infrastructure components.²⁴ Another central counterparty facility, this for Securities Lending and sponsored by the Options Clearing Corporation is also underway, intending to mitigate counterparty risk in this segment of the industry. All such central counterparty activities would enhance participants' ability to manage counterparty risk through accepted netting, collateral and novation techniques, promote the near real-time reconciliation of portfolios and collateral, and accurately value trades.

Operational Losses

The majority of operational losses are due to transaction processing errors²⁵ — the failure of people, systems and the data they act upon to operate seamlessly, from origination of the transaction through to payment and settlement, referred to as straight-through-processing.²⁶

These losses result from human error, from failure to follow existing procedures, or from inadequacies within the procedure when first established, such as wrong codes or identifiers. These losses are normally considered unintentional and correctable with proper business planning and controls.

Surveys have found that in 30% - 45% of the cases of failed transactions the problem lies with faulty reference data.²⁷²⁸²⁹³⁰ The value of these mismatched transactions can be estimated against the nearly \$7.5 trillion in daily settlement value at risk in the U.S. in 2007 at DTCC alone. Globally, SWIFT estimated in 2002 that the work effort involved in repairing these mismatched transactions cost the industry \$12 billion annually.³¹

Similarly, product inventory adjustments within these systems (due to corporate actions such as mergers or tenders) and additional cash flows from dividends and interest payments on this inventory, which DTCC reported processing nearly \$3.5 trillion of corporate action value in 2007³², are increasingly being automated. Complicating these announced events is the voluntary nature of some of them, necessitating interactive communication with the beneficial inventory holder, before action can be affected. Owing to the fact that these corporate directives are usually unstructured text published as a press release or regulatory filing, and then interpreted through independently sourced reference data intermediaries, financial enterprises occasionally receive erroneous adjustment information or payments that they then apply to their product inventory. In some instances such events are completely missed or go unreported.

The value of losses due to faulty corporate action data is reported by US firms to be 5% - 10% of their operational costs for processing corporate actions. In a study conducted for the DTCC in 2004, industry trading losses of €1.5 - €3 billion annually was estimated due to faulty corporate action data.³³ Initiatives in the US are underway to create “at source” (directly from the reporting corporations) corporate event announcement templates and standards for this data for direct entry to the SEC’s EDGAR corporate filing system

Risk Mitigation

The Basel Committee has stated that financial institutions will be allowed to reduce their capital allocations for operational risk by as much as 20 per cent through risk mitigation. The primary risk mitigate used for operational risk is insurance. While not specifically making any reference to outsourcing, but certainly embracing it in concept, such ‘risk mitigates other than insurance’ can certainly be construed as an ‘outsourced’ or mutually owned central counterparty for data management as we are proposing. The risk mitigating and captive insurance structures of such a facility should make it available for capital relief under the Basel criteria.³⁴

One such entity, the Global Joint Venture Matching Service, now known as Omgeo, was approved by the SEC in 2001 as an exempt clearing corporation to mitigate post-trade risk in the matching and settlement of institutional securities.³⁵ A similar exempt status could be obtained for an entity formed to match and settle a set of standard reference data for universal use in the

pre-trade data assembly process, the valuation and price assembly process, and in assembling data for corporate event activities. Such an entity, organized in collaboration with large financial institutions (say, similar in governance to most other central counterparties) would be a useful vehicle to minimize operational risk for all who subscribe to its standardized data. This would include mitigating the risk of incorrect portfolio valuations, failed transactions, incorrect inventory adjustments, and erroneous dividend and interest payments.

CONCLUSION

By any standard, the costs and operational risk consequences of faulty data used in non-standardized payment, clearance and settlement systems is significant. Failed transactions and reporting processes need to be either manually reprocessed and/or reported into spreadsheets where they can be controlled, investigated, repaired and then reprocessed. Additional verifications and reconciliations are introduced to control the multiple data sources that have to be created in manual workarounds and spreadsheets outside their respective automated payment and settlement processing systems. Merging high quality and poor quality data into single sources of performance information and reference data inevitably leads to overall degradation and data redundancy, both of which are extremely costly to fix. The usual solution, cross-mapping of the disparate islands of redundant data, builds new costs into the information technology infrastructure along with new operational costs to accommodate the inevitable reconciliation process that follows from cross-mapping data failures. In this way these systems lose their capability for straight-through-processing.

While faulty data have been a persistent impediment to systemic risk mitigation across the global capital and investment markets, the consequences are not yet fully appreciated in fulfilling the new Basel II requirements for identifying causal factors in operational loss events. The industry should now be focusing on the importance of data as they ponder the underlying dynamics of operational loss events and the systemic risk exposures that exist in clearance and settlement systems.

Regulators, practitioners and other thought leaders would be well advised to focus on the last leg in Basel II's mandate, that of operational risk. Faulty data and its consequence in payment and settlement systems are but one of many areas of risk that financial institutions are exposed to from the consequences of non-standardized, faulty data. In fact, Basel II classifies operational loss events as resulting from internal fraud, external fraud, employment practices and workplace safety, clients/products/business practices, damage to physical assets, business interruption and systems failures, and execution/delivery/process management.³⁶ Here, many recent events can be attributed in part, if not in total, to data problems within these proscribed loss events. Citibank reported, for example, that its market value-at-risk number does not include CDO positions because they are hard to value in the absence of prices or model inputs³⁷; Credit Suisse took a \$2.8bn write-down for valuation-model pricing errors and use of stale prices³⁸; Société Générale reported a \$4.9bn loss from trader fraud where improper counterparty codes were used and no

systematic ability existed to look across proprietary systems position data and external exchange position data³⁹; and Bear Stearns nearly collapsed because it could not price its mortgage portfolios, among other things⁴⁰.

Finally, recognize that through collaboration, mutualized risk mitigation undertakings can benefit the entire global financial industry.⁴¹ Here, regulators hope to unleash the creative power of each financial institution, and the financial industry at large, to create a risk management culture both internally and externally. Externally, a risk management culture is necessary to safeguard these interconnected enterprises as their transactions electronically traverse a global communication grid at the core of the world's economic activity. In that grid, the goal is to complete transactions seamlessly and in real-time. This requires that each company identify its referential data identically, a lofty goal yet unaccomplished and, as we hope we have demonstrated in this response to the CESR/ESCB Consultation Paper, at the root of much operational risk throughout the global financial industry.

Dr. Michael Hammer, of *Re-engineering the Corporation* fame stated in a 2005 securities industry conference on Enterprise Data Management that “Wal-Mart has two assets, data and process, just like you”. He then chastised the securities industry for falling so far behind, not only the retail industry but the manufacturing industry, in its lack of ability to communicate across individual firm boundaries.⁴²

We, too, are fundamentally recommending the re-engineering of the financial institution to solve this longstanding industry-wide problem, and to do it at its root. Realizing the objectives of reduced systemic risk and significant operational efficiencies through a Central Counterparty for Data Management within a seamless real-time payment and settlement system would be a just reward for the financial institutions who embrace more mutualized risk mitigation solutions within the framework of Basel II.

“The difficulty lies not so much in developing new ideas as in escaping old ones.”

— John Maynard Keynes

It is this author's sole responsibility for the opinions stated herein, and any errors and omissions are solely the author's responsibility. With appreciation we acknowledge the helpful review of earlier drafts of this document by Michael Atkin, Anthony Kirby and Simon-Leighton Porter.

for Financial Intergroup Holdings, Ltd

Allan D. Grody, President

-
- ¹ Chisholm, M., Aug. 2000, "Managing Reference Data in Enterprise Databases: Binding Corporate Data to the Wider World", The Morgan Kaufmann Series in Data Management Systems, Page 3
- ² Federal Register/Vol. 72, No. 39/Wednesday, February 28, 2007/Notices
- ³ Grody, A. D., Harmantzis, F. and Kaple, G. J. (2007) 'Operational risk and reference data: exploring costs, capital requirements and risk mitigation', February, 2007 p. 44, working paper available at: <http://ssrn.com/abstract=849224>, accessed 2, Aug., 2008, originally presented at Financial Management Association, European Conference, Stockholm Sweden, June 9, 2006, session 47, <http://www.fma.org/Stockholm/StockholmProgram.pdf>, accessed 2 Aug., 2008
- ⁴ Group of Thirty, *Global Clearing & Settlement Committee Final Monitoring Report*, May, 2006
- ⁵ Nelson, M. 'TowerGroup: Measuring the securities industry progress on reference data, 2002–2005', TowerGroup, February, 2006
- ⁶ Ibid. see note 3
- ⁷ Financial Information Forum, Market Data Capacity Charts, March 2008 Data - Excerpt at <http://www.fif.com>.
- ⁸ Moser, J. T. (1998) 'Contracting innovations and the evolution of clearing and settlement methods at futures exchanges' FRB of Chicago, Working Paper No. 26, August, <http://ssrn.com/abstract=910505>, accessed 2 Aug., 2008
- ⁹ Bank for International Settlements, Committee on Payment and Settlement Systems (2008) 'The interdependencies of payment and settlement systems', CPSS Publications No. 84, Basel, BIS.
- ¹⁰ Kentouris, C. EC To Investigate S&P for Securities ID Fee Policies, Securities Industry News, JANUARY 12, 2009
- ¹¹ Atkin, A. Reference Data and Unique Instrument Identification, presented at the Financial Institution's Management Conference, , February 8, 2005
- ¹² ISITC-Europe IT Group / RDUG & ISITC RDUG BEI INITIATIVE REQUIREMENTS OVERVIEW Sep 05, 2005
- ¹³ SSI Fresh WHITE PAPER - Defining an industry-endorsed approach to improving SSI enrichment -November 2004
- ¹⁴ Reference Data User Group (2003) 'Industry reference data issues', 10 Feb, <http://www.fisd.net/referencedata/20030210rdugindustryissues.pdf>, accessed 2 Aug., 2008
- ¹⁵ Reference Data User Group (RDUG) & Corporate Actions Working Group (CAWG) Interim White Paper, Dec., 2004
- ¹⁶ EDM Council, Results of the Data Quality Pilot, 2007
- ¹⁷ DTCC, 2004, Annual Report
- ¹⁸ Ibid. see note 2
- ¹⁹ Grody, A. and Mark, R. (2007) 'Response to Federal Register/Vo. 72, No. 39/Wednesday, February 28, 2007 Request for Comment on Supervisory Guidance for Basel II Implementation', available at: http://www.federalreserve.gov/SECRS/2007/July/20070717/OP-1277/OP-1277_16_1.pdf, accessed 2, Aug., 2008
- ²⁰ Basel Committee, Banking Supervision's Joint Forum, Cross-sectoral review of group-wide identification and management of risk concentrations, April 2008 available at <http://www.bis.org/publ/joint19.pdf?noframes=1>
- ²¹ Grody, A., Mark, R. and Hughes P. (2008) 'Operational risk, data management and economic capital', *Journal of Financial Transformation – Cass Institute on Risk*, June, available at <http://www.capco.com/files/pdf/62/PART%202/Operational%20risk,%20data%20management,%20and%20economic%20capital.pdf>, accessed 2 Aug., 2008
- ²² President's Working Group on Financial Markets (2008) 'Policy statement on financial markets regulation', http://www.ustreas.gov/press/releases/reports/pwgpolicystatemktturmoil_03122008.pdf, accessed 2 Aug., 2008
- ²³ US Department of the Treasury (2008) 'Blueprint for a Modernized Financial Regulatory Structure', <http://www.treas.gov/press/releases/reports/Blueprint.pdf> accessed 2 Aug., 2008
- ²⁴ 'The Clearing Corporation and The Depository Trust and Clearing Corporation announce credit default swap (CDS) clearing facility linked to DTCC's trade information warehouse', press release, 29 May, 2008, <http://www.clearingcorp.com/press/pressreleases/20080528-dtcc-cds.html>, accessed 2 Aug., 2008
- ²⁵ U.S. Federal Reserve, The Quantitative Impact Study 4 (QIS4) and the Loss Event Collection Exercise, May, 2005
- ²⁶ Grody, A., Fall, 2006, "Solving the Reference Data Problem in Financial Services – Are We on the Right Path?", *Journal of Operational Risk*, Dec., 2006, Vol. 1, No. 3 , Pages 63-69
- ²⁷ Securities Industry Association, Final T+1 Report, August, 2000

-
- ²⁸ Reuters, Capco, TowerGroup , Reference Data: The Key to Quality STP and T+1, October 15, 2001
- ²⁹ Nelson, M. , The State of Reference Data Management: Results from the 2005 TowerGroup Reference Data Survey, Feb 2006
- ³⁰ Scher, D. The State of Reference Data Management: Results from the 2008 TowerGroup Reference Data Survey, Sep 2008
- ³² Depository Trust and Clearing Corporation, 'Annual report, 2007', http://www.dtcc.com/downloads/annuals/2007/2007_report.pdf, accessed 2 Aug., 2008
- ³³ Oxera/ Depository Trust and Clearing Corporation (2004) 'Corporate action processing: what are the risks?', May, 2004, <http://www.oxera.com/main.aspx?id=222>, accessed 2 Aug., 2008
- ³⁴ Grody, A.D., Payment and settlement systems: The case for mutualized risk mitigation within the Basel II framework, Journal of RISK MANAGEMENT IN FINANCIAL INSTITUTIONS, Sept. 2008 Volume 1 Number 4
- ³⁵ SEC, April 17, 2001, "Global Joint Venture Matching Services - US, LLC; Order Granting Exemption from Registration as a Clearing Agency", <http://www.sec.gov/rules/sro/34-44188.htm>
- ³⁶ Ibid. see note 19
- ³⁷ Citigroup (2008) 'Citi reports fourth quarter net loss of \$9.83bn, loss per share of \$1.99', press release, 15th January, 2008, <http://www.citi.com/citigroup/press/2008/080115a.htm>, accessed 2 Aug., 2008
- ³⁸ Borio, C. (2008) 'The financial turmoil of 2007-?: a preliminary assessment and some policy considerations', BIS Working Paper No. 251, Monetary and Economic Department, Bank For International Settlements, Basel.
- ³⁹ Société Générale (2008) 'General Inspection Department, Mission Green Summary Report', 20th May, 2008, http://www.socgen.com/sg/file/fichierig/documentIG_5197/rapportmissiongreen.pdf, accessed 2 Aug., 2008
- ⁴⁰ Wall Street Journal (2008) 'Bear's Market', Wall Street Journal, 4th April, p. A12.
- ⁴¹ Nelson, M. (2006) 'TowerGroup: Measuring the securities industry progress on reference data, 2002-2005', TowerGroup, February, 2006
- ⁴² Michael Hammer, Re-engineering the Financial Services Industry, Enterprise Data Management Council, June 16, 2005