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Risk, Data, and the Barcodes
of Finance

Allan D. Grody

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Transformation

FinTech/RegTech

- 8 **Opinion: Open APIs and Open Banking: Assessing the Impact on the European Payments Industry and Seizing the Opportunities**
Thomas Egner
- 14 **Algorithmic Regulation: Automating Financial Compliance Monitoring and Regulation Using AI and Blockchain**
Philip Treleven, Bogdan Batrinca
- 22 **RegTech is the New Black – The Growth of RegTech Demand and Investment**
Kari S. Larsen, Shariq Gilani
- 30 **From “Blockchain Hype” to a Real Business Case for Financial Markets**
Massimo Morini
- 41 **Trade Finance Disrupted: A Blockchain Use Case**
André Brunner, Nourdine Abderrahmane, Arjun Muralidharan, Patrick Halfpap, Oliver Süme, Stephan Zimprich
- 49 **Towards a Standards-Based Technology Architecture for RegTech**
Tom Butler
- 60 **Machine Learning: A Revolution in Risk Management and Compliance?**
Bart van Liebergen
- 68 **Data-centered Dependencies and Opportunities for Robotics Process Automation in Banking**
Sandeep Vishnu, Vipul Agochiya, Ranjit Palkar

Investments

- 78 **John Bull Can’t Stand Two Percent: QE’s Depressing Implications for Investment**
Jason M. Thomas
- 90 **Do Credit Rating Agencies Inflate Their Ratings? A Review**
Kee-Hong Bae, Hamdi Driss, Gordon S. Roberts

- 101 **The Power of “Negative Beta”: Why Every Portfolio Should Include Private Equity**
Andrew Freeman, Iordanis Karagiannidis, D. Sykes Wilford
- 111 **Downside Risk Protection of Retirement Assets: A New Approach**
Atanu Saha, Alex Rinaudo
- 121 **The Asset Management Industry, Systemic Risk, and Macroprudential Policy**
Claude Lopez
- 129 **The Role of Asset Owners in the Market for Investment Research: Where Are the Fiduciary Capitalists?**
Alistair Haig, Neil Scarth
- 136 **Risk, Data, and the Barcodes of Finance**
Allan D. Grody

Banking

- 159 **Opinion: Risk Culture: Risk Prevention Starts With the Individual**
Ulrich Hunziker
- 164 **The Troubled Future of Global Banking**
Brad Hintz, Roy C. Smith
- 177 **Policy Response Asymmetry and the Increasing Risks From Rising Government Debt Level**
Blu Putnam, Erik Norland
- 187 **Public Disclosure and Risk-adjusted Performance at Bank Holding Companies**
Beverly Hirtle
- 207 **What do New Forms of Finance Mean for Emerging Markets?**
M. S. Mohanty

Risk, Data, and the Barcodes of Finance

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Abstract

The failure of Lehman Brothers uncovered a shocking fact that after six decades of automation there are no global standards for the identity of financial market participants nor their financial products. Bankruptcy attorneys and forensic accountants tried to understand Lehman's exposure to others and others' exposure to Lehman. There was no consistency in identifying Lehman as a counterparty; no understanding of what relationships Lehman had with others; and no mechanism to associate all of Lehman's products and businesses into a holistic view of the exposure others had to Lehman should it fail. In effect, no one, be they regulators, creditors, or counterparties, could see into Lehman's exposure to risk. This paper illuminates a fundamental component of the financial system that goes largely unrecognized as a key pillar of finance, non-standardized financial transaction data. Financial transactions lack unique, universal, and unambiguous identifying codes for the

supply chain of financial market participants and the products they manufacture, issue, own, process, and trade. Imagine if every supermarket had a different barcode for the same product on its shelves or a different code for the producer or supplier of the product. Walmart, FedEx, and Amazon could not exist. This failure has exasperated researchers, analysts, financial institutions, and regulators, who are forced to map and scrub this data before aggregating financial transactions for performance, risk, and regulatory reporting. Considerable risks, costs, and delays in receiving payment are also inherent in this reconciliation process. This paper explores the history, status, issues, work yet to be done, and recommendation by the author to create financial industry identity standards. The "barcodes of finance" will enable an automated means to aggregate risk data so that firms can reduce risk and costs, and regulators can oversee the largest systemically important global financial firms.

INTRODUCTION

There has been a long standing and unfulfilled global interest amongst members of the financial services industry to create a unique, unambiguous, and universal identification scheme for financial market participants and the instruments and contracts they manufacture, issue, trade, own, and process. While praised initially by global standards setters as a transforming pillar of financial reform, regulators who are working through the first implementations of a global financial industry identification scheme are already expressing caution. A “hurry-up to get the regulations finished” approach is dominating the regulatory agenda without considering its consequences for effective and efficient implementations and fitness for purpose.

Long overdue and now driven by the needs of financial regulators, the “barcodes of finance” (a globally unique transaction identifier – UTI, product identifier – UPI, and legal entity identifier – LEI) are expected to provide financial regulators with an automated means to observe the buildup of enterprise risk across silos of businesses within each financial institution and systemic risk across the global financial system. For industry members they are expected to allow for straight-through-processing (STP) and cost efficiencies as the barcodes of commerce had done for the commercial and retail trade supply chain.

These issues and regulators’ responses go back to the Group of Thirty’s (G30’s) study of the 1987 global market disruption, which resulted in the recognition of an interconnected global financial system. The G30 is a private think tank made up of retired central bankers and financial regulators, and chaired by Paul Volker, the retired U.S. Federal Reserve Chairman. The G30’s study offered many recommendations, amongst them a need for global standards of identification and their associated reference data.

In 2006, after twenty years of monitoring implementation, the G30 monitoring committee concluded that the industry had not solved the problem of non-standard identifiers and reference data. The financial crisis began in 2007 and reached its catalytic event in 2008 with the Lehman failure. It was at that point that regulators recognized that they could not wait for the industry to subordinate their own interests in furtherance of solving the industry’s collective action problem and fixing its own plumbing. Regulatory compulsion was applauded and an integrated identification system was requested, one which satisfied the industry’s desire for STP and the regulators’ need to observe accumulating systemic risks. Implementation in

one area, swaps transaction reporting to swaps trade repositories in the U.S. began in 2012 and in the E.U. in 2014.

Praised initially by global standards setters as a transforming and necessary pillar of financial reform, regulators are already issuing new public consultations on components of the financial barcodes and their associated reference data. These new consultations were necessitated by the recognition of the haphazard and premature implementation under prior reform regulations. Regulators and industry members who are living through the first implementations of these identification schemes are already expressing caution as documented in this paper. Others, not yet in implementation mode are moving ahead, possibly unaware of the expedient legacy solutions that are being patched into the existing infrastructure.

These Rube Goldberg or Heath Robinson implementations, incrementally complex machine constructions designed to accomplish a simple objective, are creating multiple additional layers of financial data intermediaries and identifiers that are reinforcing the high cost, high risk data mapping exercises that are duplicated across the financial supply chain. This layering-on of additional technology infrastructure is occurring as more is learned from the tens of billions of transactions containing these financial barcodes now sitting in swaps data repositories with no computerized means of accessing them or any means of aggregating them for systemic risk analysis. This later point being the first objective for their use.

A clear path toward eliminating risk and excessive costs was the promise regulators made to the industry in embarking on a new global identification scheme.

The intent of this paper is to assess the current state of implementation of the barcodes of finance and their associated reference data and to propose solutions to the known issues that have arisen. This reassessment is necessary to understand the impact of what may prove to be the early dysfunctional starting point of the journey, a U.S. regulator’s premature adaption of a LEI code while it was still under construction and which subsequently changed, and the expectations that set regulatory compulsion as a necessary enabler and global acceptance as its ultimate goal. Additionally, by examining similar programs of global identification standards successfully implemented in other industries, notably the global commercial barcodes and the domain names used in email and Web services, these known issues may be resolved and yet unknown issues prevented.

BACKGROUND

The global financial system is under pressure to adjust to a new regulatory order and to the new technologies of the digital age. The lessons of the financial crisis taught us that global financial institutions transcended sovereign boundaries of regulation. Another lesson was that the ability of regulators to observe risk building up in the financial system is critically dependent on accurate, timely, and aggregated financial transaction data. A more fundamental observation is that the discipline of risk management had for too long neglected improvements in data management.

The G20's new global standards setter, the Financial Stability Board (FSB), has been tasked with first creating data identification (ID) standards for uniquely identifying participants, products, and transactions in the financial supply chain. We refer to these ID standards as the barcodes of finance. They are then to be embedded in financial transactions and used by both regulators and industry members in automating regulatory reporting and in STP. STP has long been the unfulfilled vision of the financial services industry, described as the means to completely automate the life cycle of a financial transaction.

To accomplish STP, standard identifiers must be associated with standard reference data, the terms and conditions (or "metadata") that impart meaning to the identifiers (data elements such as dates, prices, rates, etc.). Another component, standard data "tags," are necessary to accompany the standard IDs and standard reference data to enable each ID and data element to be accessed, understood, and processed by computers.

Initially, these barcodes are to be incorporated into the reporting and recordkeeping of swaps transactions, the first globally constructed and newly regulated financial market to result from remedies from the financial crisis. In turn, global banking's risk standards setter, the Basel Committee on Banking Supervision (BCBS), has advocated their use in aggregating data for the reporting of risk. Some sovereign and regional regulators have incorporated these IDs into their own regulations. Many, however, have made them provisional, awaiting the finalization of the standards, the associated reference data, and the systems to operationalize the codes issuance and use.

The objective for the deployment of this global ID regime, as stated by regulators, is to aggregate financial transactions to observe a single firm's enterprise risk and multiple firms' systemic risk across the globe. To this end, financial transactions can be thought of as a set of computer encoded data

elements. These data elements collectively represent standard identification data: identifying the transaction uniquely (the unique transaction identifier – UTI) with a specific instrument or contract (unique product identifier – UPI) bought by a specific business entity (legal entity identifier – LEI); identifying variable transaction data, such as quantity and amount; and identifying associated referential data such as price data, credit ratings, and other types of fundamental data. Analogous to specific component items of a manufactured product, reference data also defines the products' changing specifications (periodic or event driven corporate actions such as mergers, acquisitions, and spin-offs), occasional changes to sub-components (calendar data, reset dates, credit ratings, historical prices, betas, correlations, volatilities) and seasonal incentives or promotions (dividends, capital distributions, and interest payments).

The first test of standard identifiers and reference data is in its use for data aggregation of swaps transactions reported to newly created trade repositories. This has not yet proven successful even though billions of transactions are already being reported with these codes. Recent regulatory and industry initiatives are focusing on incrementally adjusting the coding scheme and associated reference data in an attempt to correct known problems as regulators continue to attempt to rollout the ID system across the globe. The Bank of England recently reported on its attempt to use the reported data in just one market, foreign exchange derivatives, and found significant data quality issues with newly created UTIs, UPIs, and LEIs.¹

It may well be that in the haste to get the regulations passed in the newly regulated swaps markets, regulators implemented a coding scheme not fit for all its intended purposes. It is apparent from regulators' own words, as documented in this paper, that the issues already discovered in swaps data reporting needs to be fixed before their further consideration of use elsewhere.

Historically, and to this day, and as planned in the "new" identification system, an assortment of private and public data suppliers, many being for-profit data and technology vendors, stand between original sources of data generated by financial market participants (corporate issuers of securities, derivative contract creators, mortgage originators, loan and securitization dealers) and their interpretation into computer readable form. This additional layer of data intermediaries between

¹ Bank of England, 2017, "Gauging market dynamics using trade repository data: the case of the Swiss franc de-pegging," Financial Stability Paper no. 41, <http://tiny.cc/zv2kiy>

originators and ultimate consumers, while necessary in the past, with new technologies now available only serves to persist past “best practices” that have failed to attain high quality standardized data.

A new generation of digital technologies, such as reporting and product data tagging taxonomies [eXtensible business reporting language (XBRL) and financial product markup language (FpML) being working examples in finance] are already providing standardized means of identifying source data that can be directly input into financial systems. Further, the new technologies of cloud computing, distributed ledger technology (DLT) – a component of Blockchain technology – and smart contracts are ushering in an even newer digital era where collaboration, shared utilities, and a new vision for STP by eliminating data intermediaries and market utilities is being contemplated and experimented with. In this evolving technology environment, new thinking is being applied to the way in which the “new” identification system is being constructed, particularly in applying DLT concepts to the LEI.²

Notwithstanding these promising new technologies, industry infrastructure entities supported by their trade association constituents and compliant regulators are creating and interposing another set of data intermediaries and market utilities into the already complex, costly, and risk prone industry infrastructure. If this approach persists, it will perpetuate the practice of proprietary and duplicate codes and poor quality reference data arising from using secondary sources and multiple interpretations of these same sources, and from the timing differences in updating data. In the case of the LEI, it will continue the need for risk prone mapping services for parent/control/ownership hierarchies and linkages to the UPI where issuer, obligor, and guarantor relationships must be understood for analyzing risk. Rather than improve the situation it will leave the financial services industry where it has come to today, with additional processing intermediaries and unnecessary infrastructure costs for reconciling poor quality data.

How the financial system got so far before it nearly collapsed without a global set of standardized identifiers and their associated reference data for contracts, instruments, counterparties, and financial market participants is not the intent of this paper to describe. These issues and regulators’ responses go back to the Group of Thirty’s (G30’s) original study of the 1987 global market disruption. Chaired initially by then Chairman of Citibank, John Reed, the study resulted in the recognition of an interconnected global financial system and a need for adoption of uniform messaging standards and communication protocols.

In 2006, after twenty years of monitoring, the G30 study concluded that the issue had not been resolved. The G30 stated, “While all large financial intermediaries have moved to adopt common international standards, most infrastructure providers still operated proprietary standards.”³

The financial crisis began in 2007 and reached its catalytic event in 2008 with the Lehman failure. The public record and the academic literature since then describes the failure of Lehman Brothers and its revelations that drove the leaders of the G20 nations to place a global identification system on the regulatory agenda. Regulators recognized that they could not wait for the industry to fix its own plumbing, they had been given two decades to do so by the G30 and failed to make meaningful progress. Regulatory compulsion was applauded and an integrated identification system was requested, one which satisfied the industry’s desire for STP and regulators’ need to observe accumulating systemic risks.

After the financial crisis, regulators charged with implementing the barcodes of finance, after almost an additional decade of trying, summed it up succinctly: “Data standards are not an issue to set the pulse racing. In addition, the technical challenges involved in arriving at a global common financial language are nothing short of daunting. But if the financial crisis taught us anything, it is that the prize could not be larger.”⁴

Fundamentally, the barcodes of finance are tools of information and communication technology. Technology would be the enabler of these regulations. The barcodes needed to be understood through the lens of reengineering of financial institutions’ risk and technology ecosystems. It also needed to be understood in the context of the reengineering of its supply chain of financial market participants and the reconstruction of existing business processes to leverage its technical features. These have yet to be fully understood by regulators and industry members alike. This may partially account for the dysfunction observed presently with the initial rollout of the IDs.

Another complicating factor is that these IDs needed to be retrofitted onto individual firm’s legacy systems to interface

2 Wolf, S., 2016, “Identifier verification: evaluation of blockchain and alternative technologies,” Global Legal Entity Identifier Foundation (GLEIF), <http://tiny.cc/g42kiy>

3 Group of Thirty, 2006, “Global clearing and settlement, final monitoring report,” <http://tiny.cc/u62kiy>, at page ix

4 Haldane, A., A. Schubert, and R. Berner, 2015, “Knowledge needed to prevent Lehman repeat – global financial language essential to close dangerous data gaps,” Financial Times, January 14, <http://tiny.cc/382kiy>

with the global financial industry's technical ecosystem. This ecosystem evolved over nearly six decades of incremental systems development across six generations of technology innovation. It now looks more like a Rube Goldberg or a Heath Robinson contraption than anything well thought through around good systems design.

With a long history of industry failure and the current dysfunction observed with this new regulatory driven attempt at a global identification scheme, industry groups such as ISDA (International Swaps and Derivatives Association) and the Japanese Exchange Group (JPX) are calling for a deeper look into the regulatory, operational, and technical ecosystem that is to be supported by this global identification scheme. JPX has stated recently in exploring distributed ledger technology (DLT) that "We would also like to highlight that the DLT could bring innovation by reconstructing existing business processes to leverage its technological features. If existing entities knowledgeable in the business processes will lead the discussion, they need to take care not to eliminate the technical advantages by focusing too much on existing work flow."⁵ ISDA, similarly, has stated, "If DLT does take a more prominent role in the derivatives ecosystem, or in capital markets more broadly, there may be a requirement for regulators to reconsider some of their existing regulation. Therefore, collaboration between regulators and industry participants will be an important element of any deployment in this field."⁶

The barcodes of finance were expected to be transformational. Universal codes fit for all reporting purposes in all markets. Rather than disappoint politicians, who had the need to tell their constituents that all was well after the financial crisis of 2007-2008, regulators began the first use of these codes in swaps reporting with an incomplete identification scheme and incomplete, almost non-existent, reference data. They also began with an incomplete knowledge of the swaps markets, the operational components of the interconnected global capital markets, and the technical ecosystem that they operate within.

BARCODES AND SWAPS DATA REPORTING

Standardized global identifiers, to the extent they now exist, are being placed in swaps transactions at the latest point in the trade's life cycle, that being just before submitting them to newly developed trade repositories. However, what was expected but failed to materialize before their use was the vetting of the standardized definitions of the codes and their supporting reference data. Missing was standardized reporting of

data elements comprising a swap transaction and a means to aggregate the reported data in and across trade repositories. To this point, Timothy Massad, CFTC Chairman, stated in his preamble to the CFTC's consultation on standardized swaps reporting, "In our original rules, we purposely didn't prescribe exactly how each field should be reported – for two principal reasons. First, when the agency issued the reporting rules, we didn't yet have any data to inform our views. And second, we needed the industry to take coordinated steps toward standardizing its reporting. That, unfortunately, has not happened."⁷

After nearly four years of reporting swaps data in the U.S. and two and a half years in the E.U., regulators have encouraged industry members to support a myriad of new infrastructure entities: to issue new ID codes – 29 for issuing LEIs (referred to as LOUs, local operating units that act as facilities operators that organize the local LEI registries and maintain business card data on each legal entity); to maintain swaps trades in new data repositories (currently 25 new facilities); and additional regional facilities to aggregate trade repository data. In this later regard, E.U. regulators have assigned the task to the European Securities and Markets Authority (ESMA) to build the facility to aggregate data from the six trade repositories that now exist in the E.U.⁸ The U.S. has five such trade repositories and the CFTC has discussed designating the National Futures Association (NFA) as the aggregator of this data.⁹ Other sovereign jurisdictions, about ten in total at present, will have to be aggregated with the others in a still undetermined way.¹⁰ Recently, a number of trade associations in a joint statement voiced concern on the need to conform identification standards and harmonize data requirements for this all to work.¹¹ Notwithstanding this call for action going forward, there is still no understanding of what to do with the tens of billions of non-standardized transactions already in trade repositories.

5 Japan Exchange Group, 2016, "Applicability of distributed ledger technology to capital market infrastructure," <http://bit.ly/2ch11jU>

6 ISDA, 2016, "The future of derivatives processing and market infrastructure," <http://bit.ly/2jJHGua>

7 CFTC, 2015, "Request for comment, draft technical specifications for certain swap data elements," Press Release <http://bit.ly/1JpZC7G>

8 ESMA, 2015, "ESMA launches centralized data projects for MIFIR and EMIR," Press Release, April 1, <http://bit.ly/2iPJW4B>

9 NFA, 2010, "Possible role for NFA as a utility for swap transactions," <http://bit.ly/2iHRjrd>

10 Euractiv.com, 2015, "Regulators warn over-the-counter derivatives are out of control," April 14 <http://www.euractiv.com/sections/euro-finance/regulators-warn-over-counter-derivatives-are-out-control-313723>

11 Joint Association letter on global trade reporting and data harmonization, 2015, "Key principles to improve global trade reporting and data harmonization," June 11, <http://bit.ly/1fcd94Z>

It is no wonder that the premature rollout of the codes and their continually evolving features have compromised regulatory reporting. Incrementally failed implementations are forcing regulators and the industry to make costly compromises that are negating both the vision and the usefulness of a global identification system for regulators and industry participants.

It is in stark contrast that such formidable pillars of business as Wal-Mart, Federal Express, Amazon, and other participants in global commerce have a common standard for identifying their supply chain participants and the products they manufacture, transport, and sell – it is found in the ubiquitous barcode. It can be thought of as the enabler of global commerce in the digital age.

Similarly, the domain names of the internet provide unique identification across the vast interconnected set of communication networks that support unique email addresses and websites. It too can be thought of as the enabler of global commerce in the digital age.

Financial regulators have now set their own agenda for creating such digital enablers for the financial services industry, the LEI, UTI, and UPI. Regulation in the E.U. is now poised to impose these codes on all banks and other financial market participants; initially having started with reporting and recordkeeping of swaps transactions, but soon for all regulatory reporting requirements under MiFid II's (Market in Financial Instruments Directive) regulations scheduled for implementation in 2018.¹² However, with the codes already proving dysfunctional in their use in reporting swaps to swaps data repositories (SDRs), caution in extending their use should prevail.

To this end, Timothy Massad, Chairman of the CFTC, stated in his testimony before the U.S. Senate Committee on Agriculture, Nutrition & Forestry, on December 10, 2014, that "The proliferation of data repositories across various jurisdictions makes moving forward in this area more important than ever. We are leading an international harmonization effort to achieve consistent technical standards and identifiers for data in SDRs ... Standardizing the collection and analysis of swap market data requires intensely collaborative and technical work by industry and the agency's staff. We have been actively meeting with the SDRs on these issues, getting input from other industry participants and looking at areas where we may clarify our own rules ... In short, the data collection issues will take time, but we are making progress. Going forward, it must continue to be one of our chief priorities."

Most significantly, the LEI code, a key pillar of swaps data

reporting and touted as an example of industry and regulatory consensus, must still be proven to work for both aggregating data in trade repositories and within a global LEI system (GLEIS) for other market participants and in other markets. Even though 481,522 codes have already been issued, it represents only 10% of the expected total. Furthermore, 29% of the LEIs issued have not been renewed. Annual renewal of LEIs is a requirement in order to maintain a valid LEI, although no regulator has yet to mandate renewing LEIs.¹³

Most critically, the GLEIS has yet to be completed. Regulations require that each LEI be identified as to its ownership and place in the control structure of its ultimate parent. That the framework for this endeavor remains only partially defined while LEIs are being issued may prove a fatal flaw. Most importantly, the opportunity to compel both the registration of the ultimate and immediate parent of the registered counterparty (referred to collectively as relationship reference data) simultaneously at the initiation of the LEI registration process for swaps market participants has, in the cases of already issued LEIs, been lost.

Recently the FSB's Regulatory Oversight Committee (ROC), the overseer of the LEI initiative, published a public consultation on relationship data in which it stated, "Each potential parent entity, in conjunction with the work of its external auditors, determines whether it controls another entity and should consolidate it under applicable accounting standards."¹⁴ Matthew Reed, Chairman of the ROC, in an interview, in anticipating the public consultation, commented, "We expect that we will view the LEI file as complete only when certain corporate information is revealed with respect to hierarchy information."¹⁵

In March 2016, the ROC published its response to the comments received in its public consultation on relationship data.¹⁶ Its overreaching recommendation requires entities that either possess or acquire an LEI to report their "ultimate accounting consolidating parent," defined as the highest level legal entity

12 ESMA, 2016, "Technical standards under Directive 2004/39/EC (MiFID I), Directive 2014/65/EU (MiFID II) and Regulation (EU) No 600/2014 (MiFIR)," <http://bit.ly/2iPMJjUQ>

13 Financial InterGroup, 2017, "The global LEI initiative – a 2016 year-end review of progress and issues," Research Note, <http://bit.ly/2iAtQgy>

14 LEI ROC, 2015, "Consultation document on collecting data on direct and ultimate parents of legal entities in the global LEI system," September 7, <http://bit.ly/1KIDMg5>

15 Roland, N., 2015, "LEIs seen as key to understanding firms' overall risk exposure," FIA SmartBrief, <http://bit.ly/2jMZ4Op>

16 LEI ROC, 2016, "Collecting data on direct and ultimate parents of legal entities in the global LEI system – phase 1," March 10, <http://bit.ly/2iBgCAn>

preparing consolidated financial statements, as well as their “direct accounting consolidating parent” to the LOU maintaining their LEI. In both cases, the identification of the parent is to be based on the accounting definition of consolidation.

The ROC is referring to the next steps process as a six-month pilot, after which they will evaluate outcomes. This process of soliciting ultimate and direct parents will begin in 2017. The ROC has recognized that this falls short of complete hierarchies as requested by the FSB, which they expect to be addressed in further consultations. To this end, the FSB in their 2016 annual report addressed the need to expand the LEI by stating that “This unique identifier is used in two-thirds of FSB jurisdictions to support regulatory activities, for instance in connection with financial reporting. Additional uses are contemplated, such as in the area of correspondent banking. Further adoption of the LEI by legal entities worldwide and its use by authorities for a wider range of regulatory purposes is essential to fully reap its collective benefits.”¹⁷

The UTI, already in use but without consistent definition, is also contained in the same tens of billions of transactions reported to swaps trade repositories as is the LEI. It too is in need of a global standard before it can be used to match buys and sells or pays and collects of the same swaps transaction. Already underway is a public consultation sponsored by IOSCO and the Committee on Payments and Market Infrastructure’s (CPMI’s) Board of IOSCO that is attempting to do just that, referring to existing dysfunctional UTIs as “legacy UTIs.”¹⁸

Recommended in the IOSCO/CPMI proposal is the use of the LEI as a construction element (a prefix) for the UTI. Industry commentators, however, have noted issues with such use, such as the length of the LEI code, which is too long to fit into data fields of legacy systems and the timeliness of acquiring a LEI.

The UPI, like the LEI and UTI, is also incomplete and being reported without consistent ways of constructing it. It too needs to adhere to a global standard in order for it to be fit for all its intended uses. In its UPI consultation paper, IOSCO/CPMI proposes standard UPI reference data elements.¹⁹ The UPI code construction itself is to be the subject of further IOSCO/CPMI consultations in 2017.

To this end, ANNA (Association of National Numbering Agencies) in consultation with ISDA have advanced the idea of a UPI based on the use of ANNA’s ISIN (International Securities Identification Number) infrastructure, generating UPI codes for each contract from templates submitted by requestors. The

code will have twelve alphanumeric characters, like existing ISINs, but, unlike them, will be generated in near real-time. ANNA will establish the ANNA Derivatives Service Bureau, proposed as a centralized facility to generate ISIN’s for derivatives contracts. The requestor would be validated, presumably by inputting a valid LEI, but further input data elements would not be validated.²⁰

The FSB in referring to their expectations for the global ID system of the LEI stated that “Such a system would provide a valuable ‘building block’ to contribute to and facilitate many financial stability objectives, including: improved risk management in firms; better assessment of micro and macro prudential risks; facilitation of orderly resolution; containing market abuse and curbing financial fraud; and enabling higher quality and accuracy of financial data overall. It would reduce operational risks within firms by mitigating the need for tailored systems to reconcile the identification of entities and to support aggregation of risk positions and financial data, which impose substantial deadweight costs across the economy. It would also facilitate straight through processing (STP).”²¹

With regard to the ultimate use of these identifiers in data aggregation of financial transactions and in STP, the BCBS states, “Many banks lacked the ability to aggregate risk exposures and identify concentrations quickly and accurately at the bank group level, across business lines and between legal entities. Some banks were unable to manage their risks properly because of weak risk data aggregation capabilities and risk reporting practices. This had severe consequences to the banks themselves and to the stability of the financial system as a whole.”²²

The necessary next steps to complete the barcodes of finance may be to take a step back and start with a global committee looking at the entire range of needs, not just by mixed

17 Financial Stability Board, 2016, “Implementation and effects of the G20 Financial Regulatory Reforms 2nd Annual Report,” August 31, <http://bit.ly/2cgh6aM>, at page 16

18 Committee on Payments and Market Infrastructures Board of the International Organization of Securities Commissions, 2015, “Harmonization of the unique transaction identifier,” consultative report, <http://bit.ly/2jZPV11>

19 BIS, 2015, “Harmonization of the unique product identifier,” Bank for International Settlements, December, <http://bit.ly/2iJ535b>

20 FinOps, 2016, “OTC derivatives players: the ISIN engine emerges,” <http://bit.ly/2chWjVB>

21 Financial Stability Board, 2012, “A global legal entity identifier for financial markets,” June 8, <http://bit.ly/1ESyEkC>, at page 1

22 BCBS, 2013 “Principles for effective risk data aggregation and risk reporting – final document,” Basel Committee on Banking Supervision, January 9, <http://bit.ly/2iQQkJO>

committees formed in multiple silos of sovereign regulation, markets, or businesses, as is the situation at present with the singular focus being on the swaps markets. An example is ISDA recently calling for expanding the LEI, UPI, and UTI and creating a central data dictionary of terminology and reference data, but just for derivatives trades.²³

The G30 study, concluded in 2006 and referred to earlier, had recognized that “implementing reference data standards is a complex and long-term project. There is no dispute that the diversity of coding systems and the difficulty of translating between them is a core reason for the currently high processing costs of global investment. More significant effort is needed to develop global standards in this area. There is not yet a clear global owner of reference data and there is friction between the needs of the domestic and cross-border market user. Senior level support for standardization will be vital.”²⁴

Perhaps it is time for the G30, a neutral private, nonprofit, international body composed of very senior representatives of the private and public sectors and academia to reassert itself into fixing the infrastructure of the global financial system at this vital juncture by examining the choices available to market practitioners and policymakers.²⁵

CURRENT STATE OF THE LEGAL ENTITY (LEI) IDENTIFICATION STANDARD

The method of universally identifying financial supply chain participants, after earlier industry attempts going back over two decades, remained unresolved when the financial crisis erupted in 2007-2008. This failure left data vendors and financial market utilities in charge of supplying their own proprietary and quite different codes and reference data for the same legal entity or product. Financial institutions, too, created their own codes and tried to cleanse multiple versions of reference data supplied from data vendors. The bridge between the external and internal codes was left to computer driven tables used to map each of the many codes representing the same company or product. These mapping tables are populated by comparing the alphabetic names associated with each proprietary code to determine a match, not a very exact science considering different spellings appear frequently for what is the same product or entity requiring manual intervention and research.

These mapping tables have to be continually maintained as companies and products are ever changing. Some vendors and financial market utilities do not change their information

in the same timeframes as others; some miss these changes altogether and some interpret the changes incorrectly. Each financial institution similarly makes its own determination as to changes to be made and their timing. The result has been an error prone and costly process to establish which part of each company is each financial institution’s counterparty and the product or contract being traded. This point was made in a recent Dun & Bradstreet report quoting a senior data manager at a Tier-1 global bank: “At the moment, the LEI is a mapping exercise. Only a limited number of LEIs have been issued and my database holds over one million identifiers. The LEI can provide value in niche corporate markets, but for us it is a big mapping exercise and getting bigger.”²⁶

In the aftermath of the financial crisis, regulators proposed solutions and sought consensus from the industry, focusing initially on legal entity identification. Two different approaches emerged to register codes and their legal entity data, either by intermediaries or via companies registering their own data directly. Self-registration was approved by the FSB to register a unique code accompanied initially by business card data (principally name and address data). Later more significant data, such as relationship information amongst legal entities and other operational reference data would be registered.

Assignment of preliminary codes (LEIs) through “self-registration” would later be modified to allow them to be assigned by data intermediaries (LOUs) as “third-party registrants.” This third-party registration has become the de-facto method of registering information in the interim global LEI system. This approach was condoned so that regulators could accommodate the early issuance of codes by the CFTC under the CFTC’s own mandates, using both its own proprietary legacy codes and LEI issued codes (the CICI – CFTC Interim Counterparty Identifier) of its first designated LOU, the Global Market Entity Identifier (GMEI) utility organized by DTCC and SWIFT. These CICI codes were issued before the FSB was tasked with the global LEI implementation. This early mover approach was cautioned against in the earlier G30 study, which stated, “First mover implementation of global standards should not be mistaken for the first mover setting the standard.”²⁷ Subsequently,

23 ISDA, 2015, “Improving regulatory transparency of global derivatives markets: key principles,” International Swaps and Derivatives Association, February, <http://bit.ly/2k4e3Hs>

24 See footnote 3

25 Group of Thirty, <http://group30.org/members>

26 Dun & Bradstreet, 2016, “Deriving true business value from the global LEI,” October, <http://bit.ly/2jrkwZL>

27 See footnote 3

the standard had to be reset by the FSB, the consequences of which resulted in thousands of codes being rescinded by the CFTC; different formatted codes populating multiple LOUs' LEI registries; and high lapse rates for annual code renewals, currently 29% of total issued LEIs, with the GMEI accounting for 37% of all lapsed LEIs.²⁸

At this time, the LEIs being assigned in the interim GLEIS (global legal entity identifier system) have no association with their registering parents. Rather, they are associated with a prefix embedded at the front of the code that recognizes the intermediary facility operators (pre-local operating units or "pre-LOUs") that initially assigned the codes. The FSB, and subsequently the ROC, formed of regulatory authority representatives to oversee the implementation of the GLEIS, assigned these unique prefixes to each pre-LOU as the first four digits of the LEI codes. This was done so that each pre-LOU could then assign codes to each legal entity at their choosing in order to make all the codes globally unique. In contrast, the GS1 system, the commercial barcode assignment system, assigns a globally unique company prefix to each company to create global uniqueness. The company itself then uses this prefix to self-register separate codes for locations (branches), legal entities,²⁹ and products by affixing a suffix (at the companies' choosing) to the company prefix. For smaller entities, GS1 assigns both the company prefix and the suffix.

According to Grody and Smucker (2011), "There are a few approaches to assigning a LEI. One suggested in the legislation itself and supported by industry trade associations is self-registration whereby corporations and others who participate in financial markets assign their own company identifiers under assignment rules administered by a global standards registration authority. This procedure resembles the process used in industries such as food, healthcare and consumer packaged goods, whereby manufacturers self-register their products and locations under a standard system administered by a global standards body, GS1."³⁰

Another global identification system, which is used for the Internet for email and World-Wide-Web (WWW) addresses, uses the same company-determined self-registration method as GS1 to establish unique codes (domain names), register business card data, and company email addresses.

Similar to GS1's assignment of the unique company prefix, ICANN (Internet Corporation for Assigned Names and Numbers) assigns domain names to communities of large users, such as universities and companies that, in turn register multiple users, such as their students or employees' email names

by extending the main domain name to include a unique prefix for each student or employee. Telephone companies worldwide follow similar protocols, assigning a main telephone number to a company and then allowing the company to assign extensions for each employee or department.

As stated by Haldane in his 2012 SIFMA symposium presentation on the LEI in comparing GS1 and the internet to the financial services industry "Yet despite these similarities, finance lags by a generation both products and information in the management of its network. Today's financial chains mimic product supply chains of the 1980s and the information chains of the 1990s. For global supply chains and the Internet, a common language transformed their fortunes. This enabled them to become global in scale and scope and highly adaptive to new demands and technologies. They are astonishing success stories."³¹

Noting the similarities of both GS1's and the internet's assignment protocols, both allowing for a code for each registering parent and leaving the choice of specific sub-codes to each large enterprise, the FSB, and later the ROC, chose instead to give the power of the entire code creation and assignment to intermediary facilities' operators. They, in turn, are permitted to embed their own assigned code (the LOU prefix, positions 1-4) in all the LEIs they issue. This left a large contingent of government and commercial enterprises – patent offices, depositories, business registrars, payment system operators, central bankers, custodian banks, software companies, and data vendors – to intermediate the process of code assignment and issuance as data vendors had done in the earlier era of proprietary codes. An unintended consequence was that it prevented the code from being created in real-time at the source of the entity's creation nor could it be used directly in aggregating financial transaction data. The LEI, if each registering parent entity of a financial market participant was to obtain its own prefix and embed it as part of the code, would allow for direct aggregation of financial transactions to its parent entity.

28 Financial Inter Group, 2016, "The Global LEI Initiative – moving in the right direction but still another month of lapsed LEIs exceeding new LEIs", <http://bit.ly/2kFgqgK>

29 GS1, global location number (GLN), <http://bit.ly/2IEDNKd>

30 Grody, A. D., and T. Smucker, 2011, "Legacy main street solution proposed for Wall Street," CEO Magazine, May 17, <http://bit.ly/2jOMLkP>

31 Ali, R. D., A. G. Haldane, and P. Nahai-Williamson, 2012, "Towards a common financial language," Presented at the Securities Industry and Financial Markets Association (SIFMA) "Building a global legal entity identifier framework" Symposium, New York, March 14, <http://bit.ly/2kFwwXO>

The “Report on OTC derivatives data reporting and aggregation requirements” by the Committee on Payment and Settlement Systems (CPSS) and the Technical Committee of IOSCO, supported such a prefix, stating, “The federated approach could also be extended to parent companies within a national jurisdiction. If this approach were followed, the national authority would issue a range of LEI codes to a parent company, which would in turn issue individual LEIs to legal entities within the parent company. The characters in the LEI code immediately following the first characters (the LOU prefix) that identify the national authority would identify the issuing parent company (without embedded intelligence).”³²

Parent entities self-registering each of their financial market participants is still a possibility so that the LEIs could be tied directly to the outside LEI coding scheme, thus eliminating mapping issues and allowing for internal data aggregation using their assigned codes. Parent entities of mutual fund families could self-register their individual funds under a single fund-family prefix rather than as it is done now, using a reference data element in the GLEIS, referred to as an Associated Entity, to populate the LEI of the parent entity. The ROC is planning to study the current way relationships of funds are recorded in the GLEIS.³³ The way this can be accomplished without violating the “no-intelligence in the code” construction rule is described more fully in an earlier paper by the author³⁴ and summarized later in the conclusion section of this paper.

Regulators and industry members have yet to decide on an integrated system of standards for both global identification of financial market participants and the products they trade. Connecting counterparties and their aggregated position of transactions is critical to evaluating risk. Still to be implemented just for the interim GLEIS are: the access method for more timely issuance of LEIs and more timely access of the entire database of LEIs; support of the entire hierarchies of LEIs for the parent company, many of which are now registered as LEIs in separate sovereign jurisdictions; timely updating of the information for corporate events that affect the ownership of the legal entities globally; identifying the ownership and organizational hierarchies of the legal entities; masking legal entities as required by those domiciled in privacy jurisdictions; and assuring that the code and the system are fit for all legal entity identification purposes, beyond its initial pilot test for counterparty identification for swaps data reporting.

Such broader use was intended when the FSB defined which legal entities must acquire a LEI “...the term ‘legal entity’ refers to a legal person or structure organized under the laws of any jurisdiction. Legal entities include, but are not limited to,

unique parties that are legally responsible for the performance of financial transactions or have the legal right in their jurisdiction to enter independently into legal contracts, regardless of whether they are incorporated or constituted in some other way (e.g., trust, partnership, contractual, etc.). It excludes natural persons, but includes governmental organizations; and supranationals, defined as governmental or non-governmental entities established by international law or treaty or incorporated at an international level. Examples of eligible legal entities include, without limitation: all financial intermediaries; banks and finance companies; all entities that issue equity, debt, or other securities for other capital structures; all entities listed on an exchange; all entities that trade stock or debt; investment vehicles, including mutual funds, pension funds, and alternative investment vehicles constituted as corporate entities or collective investment agreements (including umbrella funds as well as funds under an umbrella structure, hedge funds, private equities, etc.); all entities under the purview of a financial regulator and their affiliates, subsidiaries, and holding companies; and counterparties to financial transactions.”³⁵

Other remaining challenges for the LEI include using it in the development of the UTI for each financial transaction so that buyers and sellers, and payers and receivers of interest on financial products can be matched. Here the LEI, as earlier described, is being considered as a prefix for the UTI.

PROGRESSING THE BARCODES OF FINANCE (LEI, UTI, AND UPI) INITIATIVES

The first use of the financial supply chain’s new global coding schemes are being tested by swaps market participants across the globe in their new responsibility to record-keep and report swaps transactions to trade repositories. While all would agree that considerable global cooperation has been achieved and progress has been made, it is apparent that the identification codes are not yet up to industrial strength nor is their use in risk data aggregation yet functioning.

32 CPSS and IOSCO, 2012, “Report on OTC derivatives data reporting and aggregation requirements – final report, annex 3,” January, <http://bit.ly/2iMKu7Y>, at reference 111 page 65.

33 ROC, 2017, “Update on the LEI ROC activities,” January 12, <http://bit.ly/2joJLOZ>

34 Grody, A. D., P. J. Hughes, and D. Reininger, 2015, “Final report on global identification standards of counterparties and other financial market participants,” *Journal of Risk Management in Financial Institutions – Special Issue on Counterparty Risk* 5:2, March 10, 2015, <http://ssrn.com/abstract=2016874>

35 See footnote 20

David Wright, Secretary General of IOSCO, believes that “there is a general data issue...I think we don’t have a sufficient understanding of market-based financial [data].”³⁶ Recently, ESMA published updated reporting guidelines on the LEI and the UTI and on the technical standards for reporting under EMIR using the LEI and UTI.³⁷ EIOPA published reporting guidelines for the LEI.³⁸ ISDA published updated reporting guidelines for the UTI.³⁹ IOSCO/CPMI has published a recent public consultation on the UTI⁴⁰ and the UPI.⁴¹

These five recent releases are an attempt to bring clarity to the identification regime first proposed by the SEC, CFTC, and Office of Financial Research (OFR) in 2010 and subsequently transferred to the Financial Stability Board (FSB) in 2011. Since then, the FSB has organized the ROC, a group of 70 regulators from 40 countries, and the GLEIF, its board made up of 16 industry practitioners and academics to implement one part of the global identification scheme, the GLEIS. Other regulators and trade associations have opined previously on the identification regime, including the EBA,⁴² Singapore Monetary Authority,⁴³ the FSB,⁴⁴ and the CFTC.⁴⁵

ISDA’s CEO, Scott O’Malia, an earlier Commissioner of the CFTC whose remit was to oversee the U.S.’s first versions of the counterparty (LEI), transaction (UTI) and product (UPI) identifiers, commented recently on needed improvements. “Plans for a global snapshot of risks in the financial derivatives market are a ‘dream’ that must not detract regulators from tackling discrepancies in trade reporting ... Where regulators need to focus right now is working together to harmonize the convention of reporting, making sure we are doing an apples-with-apples comparison with the data”⁴⁶

The LEI is particularly important for the implementation of the global swaps risk regimes as it is intended to uniquely describe the counterparties and, potentially, reference entities in swaps transactions.

The LEI is also to be used in certain jurisdictions to construct the UTI. The IOSCO/CPMI proposal suggests it be used universally to do so. Finally, an LEI is to be assigned to identify all financial supply chain entities involved in the life cycle of swaps transactions and, eventually, in the life cycle of all financial transactions. Most importantly, the LEIs are to be chained together to aggregate data up to the controlling or parent entity and to aggregate data across multiple trade repositories. This is the first attempt to develop by regulatory fiat, albeit in cooperation with industry members, a global identification scheme and a new global market infrastructure. Timothy Massad, the Chairman of the CFTC, called it “a huge information technology challenge.”⁴⁷

The CFTC, after initiating trade reporting rules, subsequently recognized their inability to aggregate swaps data being reported to multiple trade repositories in the U.S. and requested a review of their swaps data reporting and recording keeping rules. These rules were dependent on the global identification system of the LEI, UPI, and USI (unique swaps identifier, later changed to the UTI) to provide for data aggregation. Many of the questions posed in the review were related to improvements to these identifiers as well as the data tagging language used to describe other reference and value data elements for inclusion in swaps transaction reporting.⁴⁸ The CFTC has only partially responded to the many comment letters received, responding primarily to cross border issues of reporting obligations of cleared swaps but not to the remaining issues of data standards still to be resolved.⁴⁹

The CFTC also earlier enlisted the Office of Financial Research (OFR) to assist in the data issues that had surfaced due, in part, to the early embrace of the identification schemes by the CFTC that proved to be premature as it had yet to be vetted by the FSB.

Richard Berner, Director of the OFR, stated in a speech at a CFTC Technology Advisory Committee meeting, that “We live in a world of global markets and global institutions and there’s no escaping the fact that, if we don’t standardize data and

36 Wright, D., 2014, “Iosco warns on data challenge to risk oversight,” Financial Times, October 29, <http://on.ft.com/2iEDVJn>

37 ESMA, 2014, “Review of the technical standards on reporting under Article 9 of EMIR,” consultation paper, November 10, <http://bit.ly/2kFoRZr>

38 EIOPA, 2014, “Final report on public consultation no. 14_037 on the proposal for guidelines on the use of the legal entity identifier (LEI),” September 11, <http://bit.ly/2jbl28G>

39 ISDA, Unique Trade Identifier (UTI): generation, communication and matching (updated as of 20 July, 2015), <http://bit.ly/2jbTeFQ>

40 Committee on Payments and Market Infrastructures Board of the International Organization of Securities Commissions, 2015, “Harmonization of the unique transaction identifier,” consultative report, <http://bit.ly/2jZPV11>

41 BIS, 2015, “Harmonization of the unique product identifier,” Bank for International Settlements, December, <http://bit.ly/2iJ535b>

42 EBA, 2014, “Recommendation on the use of legal entity identifier (LEI), EBA/REC/2014/01,” European Banking Authority, January 29, <http://bit.ly/2iEDRJO>

43 Singapore Monetary Authority, 2013, “Swaps regulations,” <http://bit.ly/1q3v5Pt>

44 See footnote 21

45 CFTC, 2012, “Swaps data and recordkeeping requirements, final rule,” Federal Register, Vol. 77, no. 9, January 13), <http://bit.ly/2iMBfQ>

46 O’Malia, S., 2014, “Derivatives industry calls global reporting plan a dream,” Reuters, September 23, <http://reut.rs/2jAXeDg>

47 Massad, T., 2014, “Bank scandal sparks CFTC outrage, aggression,” CNBC, November 12, <https://yhoo.it/2iVJDVU>

48 CFTC review of swap data recordkeeping and reporting requirements, March 26, 2014, <http://bit.ly/1hggugF>

49 CFTC, 2015, “Notice of proposed rulemaking on amendments to swap data recordkeeping and reporting requirements for cleared swaps,” Statement of Commissioner Christopher J Giancarlo, August 19, <http://bit.ly/2kLeAdy>

harmonize them across those borders, then we won't be able to use them ... The ability to compare and aggregate those data across the SDRs and across borders is absolutely critical to monitor those threats ... The implementation reflects the need to use standards for entity identification (LEIs) ... Obviously those are important. Equally important will be the use of instrument and product identifiers ... and the use of hierarchies to organize those data in a coherent framework so that we can compare and aggregate similar, but not exactly alike, either entities in a particular industry segment or instruments in a particular asset class, and both with respect to entities and instruments."⁵⁰

The FSB, in an attempt to finalize the issues still to be resolved around OTC derivatives, issued their "Recommendations on aggregation of data for OTC derivatives."⁵¹ In their recommendations, they challenge themselves and the industry to define an aggregation method for data accumulating in trade repositories; complete the global identification scheme to include ownership and control issues; come to some global consensus on UTI and UPI construction; and resolve the issues of counterparty identification in privacy jurisdictions.

In its "Feasibility study on approaches to aggregate OTC derivatives data," the FSB stated that "The report notes that, amongst these steps, it is critical for any aggregation option that the work on standardization and harmonization of important data elements be completed, including through the global introduction of the Legal Entity Identifier (LEI), and the creation of a Unique Transaction Identifier (UTI) and Unique Product Identifier (UPI). The report also indicates, in broad terms, the types of legal and regulatory changes that would be needed to allow a central mechanism to access the necessary data from trade repositories and to aggregate the data for authorities. While further work in both of these areas will be challenging, progress will be essential for a global aggregation mechanism to be effective."⁵²

The OFR in their 2014 annual report to Congress reported on the global standards initiative, the LEI in particular, and the success it had in building global consensus amongst regulators. While exemplary in its consensus building, it is suffering from the dysfunctional implementation in its first use test with swaps data reporting to SDRs.⁵³

In describing the role the OFR was playing in the U.S. with the CFTC in resolving these issues, the report describes the need to assess and improve the quality of data collected. The report stated, "Members of the CFTC Technology Advisory Committee concluded at a meeting on February 10, 2014, that

missing, incomplete, and inaccurate data made SDR data unfit to use in regulatory oversight. The committee said the CFTC's definitions for SDR reporting were not sufficiently precise and that standards must be applied when data are collected instead of trying to harmonize data later in the process. The OFR and the CFTC are collaborating to address these data quality issues with the data already collected."⁵⁴ In a subsequent 2016 report to Congress, the OFR stated, "The problem the LEI addresses – the precise identification of counterparties – remains unresolved."⁵⁵

The FSB in reporting on its overall standard's progress to its G20 members recognized the considerable effort still left in the first use test of the identification scheme in reporting swaps transactions to trade repositories. In his letter to the G20 finance ministers and central bank governors, Mark Carney, Chairman of the FSB, stated, "With the support of the G20, FSB members have made major investments to reduce the opacity of OTC derivative markets. We now need to make trade reporting truly effective. There currently are significant legal and other blockages to the reporting, sharing and aggregation of key information regarding trades and these must be removed."⁵⁶

Of significance, what remains to be accomplished at the conceptual design level are some prominent features of a global identification scheme. The first is that of the relationship of the manufacturer or issuer of a product or contract and that relationship as a counterparty, especially when the two roles are performed by the same financial market participant. Another is the collective relationship of LEIs that are under common ownership or control.

Matthew Reed, Chairman Emeritus of the ROC's Legal Entity Identifier initiative asks: "Who is who?" "Who owns whom?" "Who owns what?"⁵⁷ These two "left to last" attributes (who owns whom and who owns what) of the global identification

50 CFTC, 2013, "Technology Advisory Committee, transcript, remarks," September 12, <http://bit.ly/2jHDBcJ>

51 FSB, 2014, "Feasibility study on aggregation of OTC derivatives trade repository data," September 19, <http://bit.ly/2iJKM4t>

52 FSB, 2014, "Feasibility study on approaches to aggregate OTC derivatives data," September 19, <http://bit.ly/2j2qjGL>

53 OFR, 2014, "Annual report 2014," Office of Financial Research, November 30, <http://bit.ly/2k8qu1U>

54 See footnote 53

55 Office of Financial Research, 2016 Financial Stability Report, <http://bit.ly/2jV39jQ>

56 FSB, 2015, "Financial reforms – finishing the post-crisis agenda and moving forward," Financial Stability Board, February 4, <http://bit.ly/1Mc95xU>

57 Reed, M., 2015, "Remarks at the data transparency coalition," March 11, <http://bit.ly/1FNgWND>

scheme, along with the ability to identify and maintain changes to global identifiers, are the most critical components of the system. Solutions achieved by defining such characteristics in the code construction itself will be discussed in the Conclusion section of this paper.

To the point of the hierarchical relationships between counterparties, a recent paper by the then two leaders of the BIS secretariat supporting the FSB's LEI initiative specifically focused on such relationship data. Leonova and Jenkinson state, "In the financial context, the relationships may be determined by accounting rules set, for example, by IFRS or US GAAP, as well as regulatory requirements in areas of risk management, market integrity, know-your-client, network analysis and statistical consolidation. The financial industry and regulators have spent countless hours arguing and debating the definition of ownership. The problem lies in the question itself. We suggest that as part of any relationship data system the best approach is to put the question aside and avoid a conceptual and practical quagmire. Rather, we recommend collecting and storing less-subjective granular data on the actual legal and economic relationships between firms, which provides a flexible framework from which any user can answer the question on corporate relationships he or she determines is appropriate at a given time. Encouragingly, technological solutions are available to accommodate this multiplicity of requirements in a single solution..."⁵⁸

Unfortunately, in such a mix-and-match solution as advocated above, one which the industry has already been operating with, with all its inherent mapping issues no matter the technology deployed, there is no way to achieve a consistent view of systemic risk. A coherent, consistent view should be available to transcend each company's, or sovereign regulators', or data vendors' own organizational construction to determine the risks assumed by each parent of a legal entity and, in turn, throughout the financial system. However, given the advocacy and acceptance by the FSB that account consolidation rules should prevail in establishing a first set of standard control/ownership relationships, it follows that GAAP and IFRS consolidation rules should be adhered to, certainly for an initial common global benchmarking view of counterparty control for regulators.

The interpretation of GAAP and IFRS rules, where necessary, can be made by accountants as the accepted method of establishing the relationship standard for LEIs. Accountants and auditors are the most accepted and trusted interpreters of such issues. Their existing activities in viewing legal entity authorization documents for their "materiality attestation" role

can be extended to registering relationship information into the GLEIS under authority of a legal entity's self-registration requirement for the LEI. Materiality is determined by legal entity, requiring each legal entity to be identified in order to view the materiality of the overall parent's financial situation. Materiality, as defined by the International Accounting Standards Board (IASB), is "an entity-specific aspect of relevance based on the nature or magnitude or both of the items to which the information relates in the context of an individual entity's financial report."

According to Grody and Hughes, "The authors speculate on an expanded role for auditors to include support for functions of the FSB's newly proposed agent, the Trusted Third Party (TTP), and to validate legal identities and their ownership structures within the FSB's new global legal entity identification (LEI) system. That system requires the control and ownership structures to correspond to accounting principles and standards as applied in the preparation of consolidated financial statements."⁵⁹

DATA AGGREGATION – THE KEY TO RISK ANALYSIS

Aggregation of transaction data using the global coding scheme can be seen as a unique requirement for global financial industry codes and their associated reference data. For example, cash flow and position data, such as total notional value of swaps or holdings of a particular security, are accumulated from multiple transactions in each product in the hierarchical chain of control of each counterparty. These positions are summed together and the aggregate value used to describe the risk to the controlling parent entity that may potentially be putting the entire financial system at risk. This can be the result of a single firm accumulating exposures beyond its limits of capital, risk concentration, or liquidity that goes undetected by regulators. To this later point, no single regulator or financial institution at this time has the capability to see such systemic risk building up across multiple disbursed components of a counterparty's legal entities nor the myriad of financial products these entities own that create exposure to such risk. This capability was desired by regulators and was the impetus for mandating the creation of the barcodes of finance.

58 Leonova, I. S., and N. Jenkinson, 2014, "Relationship data: the missing link of the current financial infrastructure," October, <http://bit.ly/2k8JbBz>

59 Grody, A. D., and P. J. Hughes, 2015, "The global risk regime – new roles for auditors," December 21, <http://bit.ly/2jHCR7t>

To this end, the identification scheme ideally will provide the means to look through a single financial transaction to its ultimate owner or beneficiary. In the case of the UPI, its controlling party is the contract or instrument's issuer, obligor, or guarantor. In the case of the LEI, it is the entity owning or controlling the counterparty based upon accounting control standards. Eventually, LEIs will be assigned to identify all issuers, obligors, guarantors, counterparties, and beneficial owners. Finally, the UTI will allow for an audit trail throughout a transaction's life cycle. It will also allow for the component parts of a two-sided (buy-sell, pay-collect) transaction to be identified so that the same counterparty transacting in the same product can be separately identified. Examples include swaps reporting to trade repositories and trades reported to clearing entities.

If the codes themselves do not lead directly to such beneficial interest, ancillary databases will have to be accessed whereby some will be unavailable as they reside in privacy jurisdictions and others will have to wait until batch processes are run for next day availability, perhaps longer. Surely, global mapping issues will delay the aggregation of multi-market contracts and instruments, and multi-counterparties belonging to the same business entity. Real-time data aggregation, or even real-time risk exposure flagging, important in a real-time financial transaction system, may never be possible.

The BCBS, recognizing the data aggregation issue, has published a risk data aggregation and risk reporting paper, known as BCBS239, and mandated its implementation beginning January 2016.⁶⁰ A number of objectives are anticipated, including a comprehensive assessment of risk exposures at the global consolidated level. To this point, BCBS anticipates merging, in the case of the largest financial institutions, the risk exposures of hundreds, even thousands of legal entities that comprise a consolidated financial entity.

To accomplish this, BCBS is requiring controls surrounding risk data to be as robust as those applicable to accounting data (a risk control equivalent to the U.S.'s Sarbanes Oxley's financial control and auditing requirement). Further, that risk data be reconcilable to accounting data to ensure risk data accuracy, and that a financial institution should strive towards a single authoritative source for risk data.

To assist in this data aggregation effort, the U.S. and other sovereign regulators are assuming that global data standards will find their way into risk systems across the business silos of individual financial institutions. In turn, these data and identification standards will be carried through to aggregate

risk data across multiple financial institutions to allow the FSB and other regulators to observe the contagion of systemic risk. Regulators initiated reviewing the way financial institutions are implementing BCBS239 beginning in January 2016 after initiating surveys of preparedness, which showed little progress.⁶¹

Toward this goal, the very first initiative announced by the FSB and referenced in BCBS239 was the creation of the standardized global identification system for legal entities, the LEI initiative. The FSB suggests, "The financial crisis has provided a renewed spur to the development of a global LEI system. International regulators have recognized the importance of the LEI as a key component of necessary improvements in financial data systems. To provide additional impetus, the FSB was given a mandate by the G-20 to lead the co-ordination of international regulatory work and to deliver concrete recommendations on the LEI system ..."⁶²

The LEI was to be a unique, unambiguous, and universal standard identifying every financial market participant throughout the global financial supply chain. It was intended to enable regulators to aggregate and analyze risk data across an enterprise and to facilitate observing emerging systemic risks across the financial system.

In Europe, the LEI has been provisionally mandated for supervisory reporting purposes for every credit and financial institution in the E.U. The intent is to have unique, unambiguous, and universal codes embedded in all reports to regulators and in all financial transactions. While adhering to a "no LEI no trade" rule, the rule does not require the validation of the LEI at each use "... there is no requirement to ensure that an LEI for a client or a counterparty has been renewed."⁶³ With 29% of the issued LEIs not renewed, this may be considered a showstopper until some remedy is found.

To emphasize this point Rodrigo Buenaventura, Head of the Markets Division of European Securities and Markets Authority (ESMA), stated earlier that "... generating common identifiers is not only a legal obligation, it's also essential for the quality of the data. No matter what method counterparties choose, they

60 See footnote 22

61 Grody, A. D., and P. J. Hughes, 2016, GARP – BCBS 239: Heightened standards and operational risk, <http://bit.ly/2jHDgXx>

62 See Footnote 21

63 ESMA, 2015, Consultation on transaction reporting, reference data, recordkeeping and clock synchronization under MIFIR, December 23, <http://bit.ly/1sOnkDo>, at page 20

need to agree on a single identifier that is common for that transaction ... That is the main challenge, the main element that we are now working on. We are conducting a number of initiatives.”⁶⁴

A recent joint consultative paper on the reporting of risk in intergroup transactions of financial conglomerates was proposed by ESMA, EIOPA (European Insurance and Occupational Pension Authority), and the EBA (collectively, the joint committee of the European Supervisory Authorities). It requires breakdowns of risk by counterparties and groups of interconnected counterparties using the LEI.⁶⁵ The objective for the deployment of this global ID regime by regulators is to exercise their obligations to the public to provide assurances that aggregate risk data observed in a single firm’s enterprise risk management system and in calculating multiple firms’ systemic risk exposures are accurate and reliable. For banks and other financial intermediaries, it is also about cost reduction, operational risk mitigation, and the long sought efficiency of STP.

FIT FOR PURPOSE?

Regulators are noticeably confused about what exactly has been accomplished and whether the coding scheme rushed into use initially by a single agency, the CFTC, will be fit for all its intended purposes. Today, what is operational is only the local issuance and maintenance of standardized LEI codes by 29 LOUs. Another three LOUs are still in the formation stage. In fact, the CFTC has been tentative in supporting its own designated LOU, the GMEI (Global Markets Entity Identifier) facility, first providing a two-year mandate and then only extending its mandate year-by-year until the LEI system becomes “fully operational.”⁶⁶ What fully operational means, remains to be determined. Certainly, it would seem to mean using the LEI to aggregate financial transaction data from all its consolidated entities up to its ultimate parent, a far off but primary objective.

EIOPA’s final report on its public consultation proposal for guidelines on the use of the LEI states, “The Global LEI System (GLEIS) is not yet fully operational but a number of entities, sponsored by national authorities, have already started to issue LEI-like identifiers (LEIs) in order to satisfy local reporting requirements.”⁶⁷

The FSB’s report on correspondent banking, specifically its section on the use of the LEI in payment messaging, does not support any thought as to the replacement of the BIC (Banking

Identification Code) with the LEI, rather it supports a BIC-LEI mapping convention. This assumes, falsely, that there is a one-to-one correspondence between BIC and LEI codes (right now BIC codes identify financial institutions and their branches involved in the payment system, LEIs identify counterparties in swaps transactions). It also assumes that mapping is a desirable feature of any identification solution. However, as has been discussed in this paper, it is fraught with risk as no two identifiers are updated simultaneously owing to different change notifications methods and timing updates. The report further suggests that by adding the LEI to the payment message it would achieve some benefit “... adding the LEI may reduce the number of requests for additional information by correspondent to their respondents.”⁶⁸ This benefit is hardly the transformational benefit of a universal identification scheme intended by regulators.

The Board of Governors of the Federal Reserve System, a very early supporter of the LEI, moved cautiously in recommending its reporting entities to register for LEIs, stating “... The Federal Reserve is only proposing requiring the reporting of an LEI if one has already been issued for the reportable entity at the time of collection. At this time, the Federal Reserve is not requiring an LEI to be obtained for the sole purpose of reporting the LEI on the FR Y-6, FR Y-7, and FR Y-10.”⁶⁹

The Investment Company Institute (ICI) also moved cautiously in endorsing the LEI, stating “The use of LEIs is evolving, and as such, until companies adopt it, and there are service providers that can report LEIs along with their securities identifiers, as well as systems built to support fund reporting of LEIs, funds face significant challenges in obtaining and correctly identifying LEIs.”⁷⁰

64 Bloomberg Brief, 2014, “EMIR special report,” August, <http://bit.ly/2kiNk9C>

65 Joint Consultative Paper, 2014, “Draft regulatory technical standards on risk concentration and intra-group transactions under Article 21a (1a) of the Financial Conglomerates Directive,” July 24, <http://bit.ly/2jGY6pq>

66 CFTC, 2016, “CFTC extends designation of DTCC-SWIFT as LEI provider,” July 18, <http://bit.ly/2jHa16P>

67 See footnote 38

68 FSB, 2016, “Progress report to G20 on the FSB action plan to assess and address the decline in correspondent banking,” August 25, <http://bit.ly/2bMysuC>

69 Federal Reserve, 2015, “Federal Reserve Board announces proposal requiring banking organizations to include existing Legal Entity Identifiers on certain regulatory reporting forms,” Press release, March 16, <http://bit.ly/2jJRYMH>

70 Investment Company Institute, 2015 response to the proposed Investment Company Reporting Modernization and Amendments to Form ADV and Investment Adviser Act Rules, August 11, <http://bit.ly/2jx9XEG>

It was a further disappointment that the Securities Industry & Financial Markets Association (SIFMA), one of the very first trade association supporters of the LEI, declined to endorse the LEI for its non-swaps reporting members. When asked recently by the Securities & Exchange Commission (SEC) whether its broker-dealer members should be compelled to obtain an LEI for use in uniquely identifying themselves in the newly planned Consolidated Audit Trail System (CATS) it declined to do so.⁷¹ In a final action, the SEC declined to make the LEI mandatory.⁷² In similar manner, the U.S. Treasury declined to make the LEI mandatory for much of its Qualified Financial Contract Recordkeeping requirements.⁷³

Continuing the theme of caution, such a cautious approach was recently and explicitly requested by ISDA and GFMA (the Global Financial Markets Association).⁷⁴ In a joint letter to the ROC and GLEIF, they asked to modify the finalized international/foreign branch policy document on LEI issuance, stating, “If the framework is drafted in a hurry, we risk ending up with a system that is not practical and useable.”⁷⁵

A presentation by the OFR’s Chief Data Officer, Cornelius Crowley (the OFR having been the early lead regulator on the LEI), stated, “The OFR has also seen that even though industry participants praise standards, without regulatory mandates, they may not adopt them. An incentives mismatch remains. Firms have demonstrated that they will not spend money on data-related issues to keep their own houses in order without significant public-sector involvement, as the LEI and SDR (Swaps Data Repository) experiences show. Neither group can solve this mismatch separately, presenting a challenge that must be addressed if the industry and public sector are to use the same underlying microdata to improve risk management and reporting.”

Crowley further stated that “Resolving that challenge requires that regulators continue outreach to the industry as well as participation in multinational standards-setting initiatives. It also requires that industry participants collaborate in joint standards development efforts, then adopt and use those standards. Development and adoption of standards obviously is neither fast nor easy. The result, though, should be improved data quality and lower cost for both regulators and industry, with reduced reporting burden for the industry.”⁷⁶

This lack of follow through, both by industry trade groups and regulators in the U.S., prompted the U.S. Congress to author a bill that would hold the OFR responsible for the progress of the LEI initiative. It would require that the OFR report on regulations mandating the use of the LEI to ensure the adoption

of the LEI by primary financial regulators.⁷⁷ It should be noted that even though the LEI was first championed by the OFR, and that it did work on its deployment initially as a U.S. undertaking, it did so without any reference to the LEI in the Dodd-Frank legislation. This amendment in some respects creates the justification for the OFR’s pursuit of the LEI. Right now, the OFR is pursuing the LEI under Dodd-Frank authority to pursue “other necessary data,” after direct reference to establishing an LEI was removed from early drafts of Dodd-Frank.

REFERENCE DATA UTILITY

Identifiers and reference data about a counterparty or product should be consistent across each financial transaction’s life cycle and throughout the financial supply chain. Maintenance data about changes to either should similarly be consistent across the financial supply chain. However, poor quality and duplication of this data is pervasive in large financial enterprises, in data vendors that supply proprietary codes and associated data, amongst financial market utilities, and throughout the industry, leading to significantly higher risk and operational costs. When identification codes and reference data that should be identical are not, it causes miscalculated values, misidentified products and counterparties, and involvement of multiple supply chain partners (trade repositories, custodians, paying agents, etc.) to resolve the problem. Inappropriate transactions and individual transaction failures cause monetary loss, higher labor costs, fines, and the potential for systemic failure.

Shared utilities have become a model for collaboration, including shared reference data utilities (RDUs). However, there is a fundamental misunderstanding of both the past and current attempts at establishing an RDU. Multiple sourced, multiple

71 SIFMA, 2016, “Comments to SEC on File No. 4-698: Joint industry plan; notice of filing of the National Market System plan governing the consolidated audit trail,” July 18, <http://bit.ly/2a7xk1D>

72 SEC, 2016, “Statement on the joint industry plan on the Consolidated Audit Trail (“CAT”), Commissioner Kara M. Stein, November 15, <http://bit.ly/2jV2mzd>

73 U.S. Treasury, 2016, “Qualified financial contracts recordkeeping related to orderly liquidation authority, final rule,” Federal Register, vol. 81, no. 210, Rules and Regulations, October 31, <http://bit.ly/2k8Rld7>

74 International Swaps and Derivatives Association, 2016, “Joint letter to the LEI ROC policy document regarding international branch LEIs,” Global Financial Markets Association, August 30, <http://bit.ly/2jxbHxD>

75 LEI ROC, 2016, “Including data on international/foreign branches in the Global LEI System, July 11, <http://bit.ly/2jlxwBR>

76 OFR, Cornelius Crowley, 2016, “Setting standards for microdata,” July, <http://bit.ly/2j2vPsX>

77 Bill H. R. 3340, In the Senate of the United States, 2016, “Financial Stability Oversight Council Reform Act,” SEC. 5 (V), April 18, <http://bit.ly/2jHGw53>

copies of what is intended as golden copies of the same data cannot solve the STP issue, even when all are using the same transmission standards, standard data tags, standard IDs or standard reference data, or when everyone has one of their own golden copies in their own firms or in each central securities depository or clearing facility, or in collective facilities that serve multiple firms.

Financial transactions would not match more than occasionally within swaps data repositories and within the global payment, clearance, and settlement system. Further, collateral would still be valued differently at times and customers and traders would from time-to-time be improperly notified of corporate events, if notified at all, with monies received or positions adjusted incorrectly. Mappings and data transformations would still be necessary and the STP vision would remain unrealized.

Regulatory reporting would be inconsistent with different relationships of legal entities caused by different hierarchical constructions subject to financial firm and data vendor interpretations.

The mistiming of changes to product and legal entity data would result in different product or legal entity codes and differences in reference data, resulting in deterioration of data quality over time. Systemic risk and excessive cost would still be built into the industry's infrastructure due to this still unmitigated risk and duplicated costs.

To summarize, multiple versions of identification and reference datasets, whether in central data warehouses of each financial firm or available from multiple outsourced facilities will be ineffective because of:

- 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 datasets 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 could not match incoming data sent electronically from firms to regulators' databases
- Regulators accepting electronically filed reports because they did match incoming data from firms, but the regulators' databases had different meanings (descriptions of business entities, instrument identities, data attributes, etc.) for the matched data elements.

Notwithstanding this, multiple industry led initiatives are being pursued. Some are focused on the data and documentation required for legal entities under various money laundering, know your customer regulations, and new derivatives regulations; others are focused on issued securities and their price and corporate event data.⁷⁸ Trade groups (XBRL International, EDM Council, and ISDA) are focused on data tags to allow, respectively, at source reporting of corporate event and LEI data, semantic ontologies, and use of FpML for UPI taxonomies.

To further these efforts, a collaborative effort is necessary to promulgate and maintain such standards and to support any resultant common shared utility to replace proprietary and duplicative repositories within a single enterprise, amongst multiple data vendors, throughout financial market infrastructure utilities, and at multiple regulators. To this end, many attempts at such shared market utilities for common identifiers and an associated reference data utility (RDU) have been made in the last 25 years, as have many attempts at unifying standards groups for the common goal of setting universal standards. The former has still to be accomplished and progress on the latter, through the incentive of oversight by regulators, has been reported on in this paper. Similar regulatory incentives will be required for a universal RDU.

In fact, such a universal RDU can start with a shared LOU. Under current rules, each large registering parent entity could become an LOU and maintain its own LEI registries and the eventual requirement to maintain the hierarchies of ownership. This is not unlike the webmail servers that the larger companies maintain for the assignment and maintenance of the email addresses of its employees.

⁷⁸ PWC, 2016, "Market utilities in financial services: what role will you play?" March 22, <http://pwc.to/2jGWpIy>

⁷⁹ See footnote 13

A collaboratively shared LOU could be utilized starting with all the designated systemically important financial institutions (SIFIs). This approach would serve to facilitate the reconfirmation of the LEI data required each year. Nearly one-third (29%) of the 481,522 LEI codes issued as of year-end 2016 have not been reconfirmed and are now in a “lapsed” or non-validated state.⁷⁹ This is occurring even though many of these LEIs are presumed to have been used in swaps data reporting to trade repositories where they now sit, corrupting counterparty identification in active swaps transactions and potentially masking reconciliation, fraud, and default issues.

A recent research paper by a Federal Reserve analyst, a very early supporter of the LEI and a member of the LEI Regulatory Oversight Committee (ROC), addressed the lapsed issue, stating that “At least some entities that are marked as lapsed appear to be no longer in existence. Absent external motivation, LOUs appear to have little incentive to research such entities and, generally, users of LEI data should tend to have fewer interactions with data on defunct entities that might lead to a formal challenge to the data. Additional work is needed to determine the most efficient means of addressing this problem.”⁸⁰

While some of these legal entities may no longer be in existence, others may be active. Have they been assigned to entities not compelled to have an LEI, and by which LOU and for what purpose? Did nefarious actors obtain one and are hiding in plain site by not renewing given they have had a full year to renew? How many lapsed LEIs have actually been used in trade reporting and what are the implications for fulfillment of their contractual commitments? Or, is it simply, as the research notes, that some legal entities are not prioritizing renewals given there is no regulatory compulsion to do so? These and other issues need to be attended to.

In addition, a new Q&A issued by ESMA in December 2016 further clarifies the acquisition and renewal of the LEI of an issuer of a financial instrument.⁸¹ While noting a new concept created by the GLEIF, a Registration Authority as a new intermediary to assist in acquiring an LEI,⁸² it continues the theme of so many other regulatory mandates that the financial institution (in this case, the trading venue or systemic internalizer) is not responsible for assuring the renewal of the LEI, this time of the issuer. This, even though the ROC has specifically stated that “lapsed LEIs should not be used, be it in regulatory reporting or more generally by market participants: the associated reference data may not be up-to-date anymore.”⁸³

The thirty globally designated SIFIs are the most obvious to

collaborate on a shared LOU to register LEIs for their own legal entities. Their size, complexity, and their thousands of legal entities could be more easily managed and, in conjunction with their auditors, are better able to define and maintain the hierarchies of these LEIs. In fact, in an interview, the previous Chairman of the ROC reflected on these larger financial institutions’ ability to accelerate this effort. He was quoted as saying that “We’d love to see large players, particularly banks here in New York and around the world who are global, take the LEI and push it down through their family tree.”⁸⁴

In the U.S., where eight of the 30 SIFIs are domiciled, they already have to report their company’s subsidiaries in their financial reporting to the SEC. They also have to report in XBRL format, a computer readable language, although they do not report the subsidiary information in this language. The GLEIF has taken the first steps to organize a working group with XBRL International to record these LEIs in the XBRL format.⁸⁵ Tied to the audit process for financial reporting, this could be a great leap forward in direct input to the GLEIS.

Shared interest of these complex multi-LEI organizations, expressed through an advisory board to the GLEIF, could propel the adaption of the LEI much more quickly than regulators in each sovereign jurisdiction. It could also prompt the FSB to place the mandate for the UPI, and the UTI, with the GLEIF to design a common standard for the barcodes of finance and their reference data. Perhaps, SIFIs can also be given incentives for operational capital relief. While they have been identified by the global regulators as systemically important for stabilizing the global economy, they are also systemically important to fixing the plumbing of the global financial system.

80 Kennickell, A. B., 2016, “Identity, identification and identifiers: the global legal entity identifier system,” Finance and Economics Discussion Series, Divisions of Research & Statistics and Monetary Affairs, Federal Reserve Board, Washington, D.C., November 8, <http://bit.ly/2jHrvjG>

81 ESMA, 2016, “Questions and answers on MiFIR data reporting,” The European Markets and Securities Authority, December 20, <http://bit.ly/2kk7wbR>

82 GLEIF, Registration Agents, Global Legal Entity Identifier Foundation, <http://bit.ly/2eXxgVh>

83 ROC, 2017, “Update on the LEI ROC activities,” Jan. 12, <http://bit.ly/2joJLOZ>

84 Roland, N., 2015, “Banks’ adoption of LEI stalls, Treasury official says”, FIA SmartBrief, July 15, <http://bit.ly/2kiWna9>

85 GLEIF, 2016, XBRL International Forms Joint Working Group with GLEIF to Address Legal Identity in Digital Business Reporting, <http://bit.ly/2jJMMa3>

REDUCING INFRASTRUCTURE COSTS

Standardizing on a common dataset of IDs and associated reference data, on variable transaction data, and on corporate actions and defining those data elements in a common tagging language would solve some long standing problems for the financial industry. Problems such as: the systemic risk caused by mismatched counterparty transaction failures; redundant costs for sourcing, on-boarding, and maintaining the fairly static referential data that comprise 70% of a financial transaction over its trade life cycle; unnecessary costs for reconciling, mapping, transforming, and securing this data; and failures from improperly and inconsistently aggregating data for reporting of performance and risk, both internally and for regulatory purposes. In the end, it would save U.S. \$2 billion annually for each of the largest financial institutions⁸⁶ and mitigate fines that have, to date, reached as high U.S. \$9 billion for a single institution.

These issues and regulators' responses were taken up by the earlier referenced Group of Thirty (G30) study of the 1987 global market disruption, whose monitoring was ended in 2006. That study resulted in the recognition of an interconnected global financial system, the need to shorten the trade date to payment date cycle, and a need for global standards of identification and associated reference data.

In 2006, after twenty years of monitoring, the G30 study concluded that "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."⁸⁷

The benefit of a global owner of reference data – a global "data counterparty" for setting data standards, for example, for the LEI and UPI, and maintaining their associated reference data (i.e., one golden copy) – is transformational for both industry and regulators. The cost savings of a single virtual database distributed as nodes across a peer-to-peer network versus multiple golden copies is significant. Even if each firm had one centralized data warehouse (the Enterprise Data Management or EDM model), or multiple ones shared by multiple firms/facilities in multiple outsourced facilities, multiply sourced, multiple copies of these golden copies cannot solve the STP problem.

SHARED TECHNICAL MODEL

The technical model for the RDU, as is with the GLEIS, is proposed as an intelligent federated network – a secure virtual private network (VPN) overlaid on the internet, federating sovereign databases as a single virtual view, geographically distributed, organized across individual firms and regulator sponsored facilities, and regional compacts of either or both. As stated earlier, this facility could be formed initially by the largest financial institutions (the 30 SIFIs) as an industry sponsored, government regulated, and mutually shared LOU, later to be advanced as the RDU, built around DLT concepts. This collaborative industry/government mechanism has precedent as the industry's proven way of providing assurances to each participant that the use of the datasets from such a facility will be accepted as a faultless standard, both from a regulator's perspective and within the global payment, clearance, and settlement mechanism.

The private sector, initially financial institutions, will benefit through stripping its own infrastructure of the technology, people, and data costs of duplicate identifiers and reference data and multiple mappings of identifiers. Instead, financial institutions will be able to access "component parts" in the external data management layer of the shared "parts and supply chain participant catalogues" and build business applications on top of them, rather than incorporating such catalogues in each business application.

This technical model has similarities in design to the GLEIS as proposed to the FSB in its finalized form and to the most recent manifestation of technical innovation, the much touted immutable distributed database ledger technology of the blockchain and its associated "smart contracts." All commentators and collaborators, and there are many now in financial circles, are supporting experiments in blockchain technology. While a diverse set of objectives for first implementations are being considered, they all have one thing in common, a recognition of the needed prerequisite of a universal set of financial product and financial supply chain participant identification standards and associated reference data, what is being referred to as "smart contract taxonomies."

However, only a few of these blockchain visionaries and collaborators are placing the needed priority on globally unique

⁸⁶ See footnote 32

⁸⁷ See footnote 3

identifiers and standard reference data, the essential building blocks of smart contracts.^{88,89} Most are in denial of the existing mature technologies that can already support their vision. That vision is the displacement of financial infrastructure, such as post trade clearing, settlement, and payment mechanisms; and real-time finality of financial transactions from order placement to posting to digital ledgers.

To this end, a first industry collaboration is needed around the current efforts of the G20's Financial Stability Board to bring unique, universal, and unambiguous identification standards into existence. As discussed earlier, this effort is now bogged down in the one market it is being tested in, the global swaps market. The true test, thereafter, is the global financial industry's willingness to cooperate further around the promise of distributed database technology. This distributed capability exists and was in use, albeit not in finance, long before blockchain incorporated such techniques.

This technology, in whatever form, can be used to establish the one missing global utility to make all the blockchain global visions practicable. That utility is the universal product and participant catalogue, a facility that has been described as a reference data utility or "golden copy" of global identifiers and associated reference data. Along with standard data tags and common datasets that describe financial transactions, a distributed ledger utility can be created to underpin all subsequent legacy systems and infrastructure reengineering promised by blockchain visionaries. We refer to this facility as the "central counterparty for data management."⁹⁰ Without it, no consequential global industry transformation can take place, as is the collective vision of blockchain enthusiasts in this digital era, a vision shared by the Group of Thirty, albeit in the earlier information era.

MORE TO DO

Mark Carney, Chair of the FSB, in his 2014 Monetary Authority of Singapore Lecture stated, "From next year, the FSB will further enhance this reporting, through an annual reporting process on implementation. This will seek to highlight both shortcomings and good practice, and will seek to assess whether reform measures are having unintended effects and must therefore be adjusted ... Initiatives to collect and share data are important – whether it be the hub built at the BIS for sharing data on the balance sheets of cross-border banks, the global aggregation of trade repository data in markets such as derivatives or repos, the global legal entity identifier, or

enhanced operation of supervisory colleges and crisis management groups for systemic firms."⁹¹

The general themes common to all of the recent consultative papers and regulations related to use of global identifiers in reporting are summarized below. The key regulatory advocates of the positions are noted in parenthesis and further details on their positions described in the earlier references associated with each:

- The identification systems and coding schemes as currently implemented are not yet functioning as intended. Swaps transaction data is being sent to regulators with standards applied inconsistently, if they exist at all. Transaction data can neither be matched nor aggregated for risk assessment across trade repositories, nor up through a hierarchy of ownership to an ultimate parent (OFR).
- With some regulators, the interim LEI codes are to be used as the counterparty code until an officially approved global LEI system is operational (EIOPA). With others, the LEI code is presumed to be finalized and, therefore, should be used as the counterparty code (ESMA). And, still others have incorporated the terms "eligible to become a LEI" (EBA) and "transition to a LEI" (FSB) as suggestive of appendages and/or modifications that might be possible to the code, to the reference data, to the methodology of self-registration, etc., as more uses of the LEI are contemplated beyond swaps counterparty identification.
- With some regulators, as no LEIs were available for international branches, a BIC (SWIFT issued "banking industry code") was to be used (Singapore). With others, it is presumed that the LEI code is finalized and should be used as the branch code (ESMA) (note: there is a recent recommendation by the ROC that LEIs are to be issued for international branches).⁹²
- While there had been no provision for LEIs to be available for individuals who transact in swaps markets (or any other market), an internal customer number was allowed in some

88 Scheufen, J. H., 2016, "Legal entity global ledger – how to liberate public data (with chains)," April, 8, <http://bit.ly/2jrSgW9>

89 Sopek, M., G. Życiński, 2016, "Using blockchain for digital identifiers: improving data security and persistence for DOI (digital object identifier) and LEI (legal entity identifier)," Mako Labs, November 8, <http://bit.ly/2kFTMK7>

90 Grody, A. D., 2009, "Infrastructure issues in the financial services industry: a case for a central counterparty for data management," *Journal of Securities Operations & Custody* 2:3, 202-224

91 Carney, M., 2014, "The future of financial reform," 2014 Monetary Authority of Singapore Lecture, November 17, <http://bit.ly/1vksnL5>

92 ROC, 2015, "Consultation document on including data on branches in the Global LEI System," October 19, <http://bit.ly/2knf89f>

jurisdictions and not in others. Some regulators had been silent on what code to use for sole-proprietors that transact in swaps markets (CFTC). Recently, the ROC has allowed an LEI to be issued for those sole-proprietors that register as a business and appear in a business registry.⁹³

- Various construction “themes” of a number of regulators can be used to construct the UTI until an official “global” UTI construction method is determined. These vary from counterparties themselves agreeing on the UTI construction (ESMA) to counterparties using a portion of the LEI in its construction (ISDA). ISDA proposes a shortened (10 character) random regeneration of the 20-character LEI; the IOSCO/CPMI proposal suggests a reverse string of the entire 20 character LEI code.
- To construct a UPI for swaps data reporting, regulators either do not make any suggestion (CFTC) or had previously suggested using any available interim UPI taxonomy until a global one is determined (ESMA). ESMA has recently proposed the ISIN code be used, even though ISINs are not yet assigned to swaps.⁹⁴
- To define underliers or index products, regulators have decided to use ISIN codes. In the E.U., an ISIN repository for trade reporting is being organized for such purpose (ESMA).
- There are no provisions for identifying reference entities uniquely or consistently, whether they can be assigned an LEI or not. In the E.U., ISIN codes are to be used (ESMA). Some regulators allow for proprietary codes such as Markit’s Red code (Singapore).

For aggregating the financial data associated with these identifiers, the ROC still has to decide on the mechanism for registering and maintaining organizational hierarchies encompassing parent or controlling entities and the interrelationships of related multiple LEIs. This is no small feat, as the largest financial participants will have to register thousands of individual LEIs. Also, to be done is the mechanism to make global changes to LEIs as corporate events such as mergers, spin-offs, acquisitions, and bankruptcies occur.

To this later point, the ROC stated recently in its paper on assigning LEIs to international branches that dealing with corporate actions remains to be done, noting similar issues as with international branches when subsidiaries of legal entities and branches of legal entities are reorganized. “Independent of the implementation of this policy, the ROC intends to conduct a more comprehensive review of the effect of corporate actions on the reference data in the GLEIS, which would encompass the effects on subsidiaries and branches. Such actions could include cases when the LEI of an international branch’s head office expires (as opposed to simply lapsing), when an

international branch or a branch network is acquired by another firm (either foreign or domestic), and when an international branch becomes a separate legal entity apart from its head office.”⁹⁵

The ROC has now placed these issues as its next priority, along with other work to be done on improving the way relationships of fund families are recorded in the GLEIS and whether status as a registered entity in a financial regulator’s database should be the determinant of issuance of an LEI for a sole-proprietor or determined by presence in a business registry. The LEI ROC expects to launch a public consultation on these issues in the first half of 2017.⁹⁶

The GLEIF has still to decide on the mechanism to federate all the disparate LEI registries into a “logical” database using an internet-like federation mechanism for a single view of the entire set of LEIs. The FSB signed off on such a system,⁹⁷ although the current version of the implementation is a physically centralized database.⁹⁸ An RFP (request for proposal) had been anticipated from the GLEIF for some time aimed toward fulfilling some or all of these expectations.⁹⁹ The RFP has still to be issued.

The current approach being followed, of consolidating multiple LEI registries daily into one centralized database by downloading data to the GLEIF, might be expedient in the interim but in the longer term will leave the GLEIS vulnerable to hackers and a single point of failure. That was the reason for the internet-like federation and logical versus physical database design proposed to and accepted by the FSB – to parallel the internet’s resilience and use of its aggregation capabilities while leaving LEI registries’ data in its original physical (country or region) space.

The FSB also signed off on a plug-in network architecture (understood to be a virtual private network using internet protocol standards for interoperability) and, thus, allow virtual

93 ROC, 2015, “Statement clarifying the conditions under which individuals acting in a business capacity are eligible to obtain LEIs,” September 30, <http://bit.ly/2jTm7tB>

94 ESMA, 2015, “Final report: draft regulatory and implementing technical standards MiFID II/MiFIR,” September, <http://bit.ly/2kcoDZv>

95 LEI ROC, 2016, “Including data on international/foreign branches in the Global LEI System,” July 11, <http://bit.ly/2jlxwBR>

96 See footnote 33

97 See footnote 21, reference 3 at page 4 and page 19

98 GLEIF, “GLEIF Concatenated file specification and user manual,” GLEIF website, <http://bit.ly/2kK0cWR>

99 GLEIF, 2015, “Board meeting – meeting minutes,” June 24, <http://bit.ly/2julqC2>, at page 2

aggregation not physical centralization.¹⁰⁰ Finally, the FSB still has to decide on how to mask counterparties that transact through privacy jurisdictions while being able to aggregate their transactions for risk analysis. The CFTC, as noted earlier and other regulators require an operational LEI system before the LEI is considered final under their regulations.

Thereafter, still left to be done is standardizing on the nomenclature and data elements associated with each unique identifier (standard reference data), initially in global swaps market for swaps products (UPIs) and supply chain participants (LEIs), but eventually for all financial products in all financial markets globally.

CONCLUSION

This is not yet the success story regulators and industry members hoped for. Neither is it the nod to a unique, unambiguous, universal, and integrated set of identification codes the industry and regulators asked for. Also, the global identification scheme, the “barcodes of finance,” is not yet useable nor scalable for its intended purpose both in the immediate term (counterparty risk data aggregation within and across swaps trade repositories globally) and in the longer term (STP and risk data aggregation to support operational efficiencies and global risk analysis across all financial market participants and all the products they trade). Indeed, we are not yet there on the short term and a long way from the longer term. Most significantly, the original recommendations to the FSB on the LEI system, to operate a “virtual” database of LEI registries as an internet-like federated mechanism utilizing a plug-in architecture and network cards, has yet to be fulfilled.

To accelerate these transformational initiatives, a move to organize SIFIs, the most put upon and most significant industry participants could facilitate the establishment of a global LOU and RDU. Already they come together, albeit in varied groupings, to accomplish some of these tasks in collaborative undertakings. Organizing SIFIs for such a global market utility would permit huge infrastructure cost savings as well as individual firm’s savings approximated at U.S. \$2 billion annually. It would accommodate data aggregation without mapping to ancillary databases; ease global access to data stored in LEI and UPI registries, and in trade repositories; and permit rapid global updating of corporate events.¹⁰¹ These are all key functions yet to be implemented that are so critical to the BCBS’s risk data aggregation principles and the FSB’s mandate to observe the contagion of systemic risk building up across the

global financial system. Neither of these objectives have yet been met.

Such a collaboratively shared utility could build upon the financial industry’s excitement over DLTs and smart contracts, and reignite enthusiasm first generated by the G30 starting in the aftermath of the 1987 market crash for solving this long intractable reference data issue. And it need not wait for DLT and smart contract proofs of concept, the technology of distributed databases and placing business intelligence in computer “objects” (referred to in the context of blockchain’s “smart contracts”) have been available and in practice for some time, albeit with different names and in different industries.

It is expected that in further probing into the mechanics of implementation, where the rubber hits the technology road, the frameworks establishing the barcodes of finance and their associated reference data will meet their ultimate test.

¹⁰⁰ See Footnote 21

¹⁰¹ Grody, A. D., P. J. Hughes, D. Reininger, 2012, “Global identification of counterparties and other financial market participants,” *Journal of Risk Management in Financial Institutions* 5:2

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