

# Traceability in Financial Services – A Linear Path Through The Layers



Rob Gleasure  
October 2008

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## Introduction

With the increased proliferation of computing, one consequence is that we have come to expect an abundance of available data. The systems that produce, maintain and retrieve this data have grown in competence and capacity, and as a global community we anticipate a certain level of visibility into how and where most of our physical surroundings originate. The same cannot always be said of our digital environment however. In the financial services industry in particular, much is unknown regarding matters such as the positioning of assets and risk, and the manner in which transactions and brokerage occurs.

This seems somewhat paradoxical, given the very nature of digital data hypothetically lends itself far more easily towards surveillance. Many private networks containing routers and hubs used in the Internet maintain copies of transitory emails for months, or even years, as a matter of policy such that a “paper trail” exists regarding these communications. Strange then that an industry such as financial services, not always renowned by consumers for its above-board mentality, would not possess the reassurance of such a paper trail. Technology-wise, regarding the physical world we have observed substantial breakthroughs. Tools such as RFID have enabled complex Supply Chain Management (SCM) and inventory tracking systems. Perhaps this approach could also be applied to enterprises trading in digital offerings, and in particular financial services, which can reasonably cohesively be viewed in a very similar manner to other business entities via a balance sheet [Greenbaum & Thakor, p48-49].

In this paper, an investigation will be made into the level of traceability that currently exists in financial services, if and why a need is present to increase this, and how one might go about undertaking such an increase. Needless to say, this is not a trivial task and requires considerable time and research to examine fully, but nonetheless a high level consideration follows.

## Is there a crisis in the Financial Services Industry?

As a point of inception, we might first consider why one would desire traceability in financial services. Perhaps the best means of understanding this comes from looking at recent regulatory and legislative changes surrounding the financial services industry, one such example being found in the UK. In 2000, the Financial Services Authority (FSA) introduced the *Financial Services and Markets Act 2000*, which gave them statutory powers in order to provide an objective arbitration of financial service transactions. This organization is an independent, non-governmental body financed by the financial services industry itself, its strategic aims summarized as follows:

- Promoting efficient, orderly and fair markets;
- Helping retail consumers achieve a fair deal; and
- Improving our business capability and effectiveness

[Taken from FSA website, [www.fsa.gov.uk](http://www.fsa.gov.uk)]

The FSA and these three issues are echoed somewhat by our own Financial Regulator here in The Republic of Ireland, established in 1 May 2003, and charged predominately with:

- Helping consumers to make informed decisions on their financial affairs in a safe and fair market; and
- Fostering sound, growing and solvent financial institutions which give consumers confidence that their deposits and investments are secure.

[Taken from [www.financialregulator.ie](http://www.financialregulator.ie)]

Other examples of similar supervisory bodies with similar functions emerging include the U.S. Securities and Exchange Commission (SEC), Swedish Financial Supervisory Authority (SFSA, Finansinspektionen in Swedish), the International Organization of Securities Commissions (IOSCO), the Australian Securities and Investment Commission (ASIC), to name but a few. There have also been cries amongst

individual businesses operating in and around the financial industry; Global360, Towergroup and Attunity among many others, for greater visibility into such matters as loan origination and non-routine activities.

## The nature of the problem

What is interesting among the new regulatory bodies is the recurring issues each of them recognize, namely, consumer confidence, increased visibility in the industry and efficiency in the market. The issue of consumer confidence in particular, is one of escalating importance for Financial Service Institutions (FSIs), as illustrated by the results from the most recent Financial Services Trust Index survey (see appendix 2). It reveals that 23% of British people surveyed do not trust any type of financial service provider, and among the remaining 77% loan and investment companies are trusted the least of all. This reality presents a very palpable concern for FSIs, as their success often demands they possess a healthy level of credibility among consumers. One of the five priority risks identified by the FSA's *Financial Risk Outlook (FSO) 2008* is that "*In the Market participants and consumers may lose confidence in financial institutions and in the authorities' ability to safeguard the financial system*", and that consumers may then disengage from parts of the industry.

Another risk the FSO identifies is the possibility that "*Increasing financial pressures on firms, employees and consumers could increase the motivation of some to commit financial crime, including market abuse and fraud*". The report also mentions that the uncertainty around US investment markets in 2007, accompanied by corrections in the pricing of risk across financial markets and increasing risk aversion, "*illustrated the lack of transparency in financial markets, as it became apparent that investors across several different markets were unaware of who ultimately held the subprime mortgage risk*". It also goes on to suggest this as one of the principle reasons for prolonged financial market dislocation and a lack of available funding. These were then major contributing factors in the recent credit crisis, which has seen the demise of the American

investment bank Lehman Brothers (the largest bankruptcy filing in US history), and is threatening many other financial institutions, such as Merrill Lynch in the US, and Northern Rock in the UK, who required “bail outs” by the Bank of America and Bank of England respectively, to avoid liquidity.

Escalating uncertainty surrounding the financial services and banking industry is compounded, as analysts and regulators continue to struggle to decipher complex and overlapping matrices of intermediaries, hedge funds, derivatives, fee structures and short selling. There are numerous claims that hedge funds in particular, appear to have been abused in many instances as a means of avoiding regulation. Recent studies have suggested that the voluntary contracts to which these hedge funds adhere, and to which there are frequently no penalty for underperformance, are largely open to “gaming” by managers with little or no investment skill (Foster and Young, 2007/2008). Consumer fears concerning hedge-funds, fuelled by a plethora of speculation over their robustness in the current economic climate, have seen many fund-managers forced to “lock-up” finances to avoid massive amounts of withdrawals. Constructs such as hedge-funds, of such regulatory impenetrability, arguably present the single greatest obstacle to transparency and accountability in the financial industry.

## **The need for traceability**

Based on these reports, it seems fair to suggest that establishing a superior level of transparency in financial markets is a matter of necessity. In the case of the US market, if it could have been determined where the subprime mortgage risk lay, it may have prevented the sense of panic that seems to have fostered so much turmoil in the sector. With this in place, a much better understanding amongst lenders could be nurtured and a much greater degree of stability in the financial industry cultivated. There would of course, also be the added benefit of deterring entities from engaging in opportunistic financial crime.

All of this is not intended to suggest that there is currently no visibility whatsoever. Public limited companies in particular, with whom brokers and other financial service intermediaries interact extensively, are already obliged to provide relatively comprehensive documentation, annual returns, memorandums of associations and various other articles according to the markets in which they trade. What does not exist however, is a means of tracking an investment as it travels from an ultimate lender, through any number of intermediaries, to the eventual borrower. One symptom of this is that the most common conceptualizations of the financial services industry are similar to that of appendix 1, which is to say rather concentric. While this is a perfectly logical visualization from the perspective of general human understanding, with regards transparency a more linear (i.e. trace-like) approach may be of much greater benefit. Whereas we may look at our fruit and vegetables for example, and see exactly where they were grown and packaged, etc, the origin of much investment quickly becomes impossible to trace through the complex, and often cyclical, weave of intermediaries.

## **Administration and traceability**

So if it can be concluded that a need exists for traceability, it might next be asked how we would wish this traceability to exist. One idiosyncrasy of financial services, especially where it concerns investors, that must be considered is that some confidential information is potentially a source of competitive advantage. It has been written that what binds all of these financial institutions is *the processing of risk and its subtle component, information* (Greenbaum & Thakor, p48). For this reason, complete access to the information involved in tracing transactions would very probably need to be limited to specifically created, autonomous governing/arbitrary bodies, similar to the FSA in the UK. These may then investigate explicit instances on behalf of other regulatory or taxation institutions, such as the CCCTB in the EU, without unnecessarily exposing discrete information. There is also an issue of global participation; FSIs may often operate in several different jurisdictions, as well as interacting with others all around the world. A large degree of cooperation would presumably be required among the various

economic zones if true traceability were to be obtainable.

A final characteristic we ought to consider is the range of actors in the financial services industry. One example of this, for example, is the division of financial service intermediaries into two broad groups. Brokers bring together and advise other entities acting in the financial industry, and receive a fee for doing so, while Qualitative Asset Transformers (QATs), such as banks, venture capital and monitor the recipients. In addition to these, we will also have original lenders depositing the capital, and original borrowers utilizing it outside of the financial services industry. Each of these, as well as other more subtle variants, may require a different perspective in order to properly envision our desired portrayal of the financial service industry.

## **Implementing traceability in the financial services industry**

Having taken stock of the aforementioned factors, we might try and discern how we could actually go about, from a logical and technical point of view, actually implementing such traceability. Firstly, it becomes quickly apparent that the amount of data generated will be immense, so only relevant data need be stored and maintained. In addition to keeping the solution relatively straight-forward, keeping data to a minimum avoids excessive reporting, as well as minimizing the need for auditing by governing bodies. We may then examine the potential solution in terms of how we will construct our traceability, there being two distinct elementary approaches

1. Construct a complete portrayal, continuously updating and revising it as time passes.
2. Maintain and update the data continuously but only construct a vestige upon initiating an individual trace.

One area in which the first option may prevail is that it could much better enable a “watchdog” type system, where certain conditions would be supervised without explicitly

looking at any one particular case. Conversely, the main, and substantial, advantage the second approach offers is one of simplicity, as regards discerning what information is relevant. In all probability, the practical demands of attempting to construct and maintain a complete portrayal would make the complexity of the traceability system so cumbersome and prone to errors that it would be unfeasible. In any event, the watchdog approach is not what we necessarily require; being that many regulatory organisations already perform this function adequately through more human means. We are attempting to facilitate the traceability of specific capital to encourage accountability among financial institutions and confidence among consumers, not to automate all of the regulatory requirements.

If we assume that we would like our traceability solution to work on the basis of the second manner mentioned, that is to contain all the relevant data but only compose the trace upon request, we may next examine how this could be done. Clearly, if we wish to trace the transactions of a specific organisation, then the best place to begin is with the organisation in question. If we return to the idea mentioned earlier, that financial institutions may be viewed similarly to other organisations in terms of balance sheets and a supply chain, we may begin to resolve how our trace may be constructed. A relational network of entities, connected together by financial transactions, must be assembled in order to observe the activities of capital beyond the immediate reach of the entity under examination. In this fashion, we could build up our delineation of the movement of capital one step at a time, iteratively raising our understanding and deepening a search.

As a requisite for this technique, we would desire access to certain information regarding any entity we encounter, that being as follows

- The entity name or some form of identification mechanism.
- Balance sheets details, liquid capital and assets (to allow regulators better understand which capital is moving).
- A list of links to all external transactions involving capital transferred out.

- A list of links to all external transactions involving capital transferred in.

Ultimate users would easily be represented by not having entries for either incoming or outgoing transactions, representing capital entering or exiting the financial services industry. In addition to this list of business entities, we would then require a body of transactions where the following information could be found

- The transaction name or some form of identification mechanism.
- The transaction date.
- A link to the entity who received capital.
- A link to the entity who donated capital.
- A link to any entities involved as a broker.

With access to this information we would be able to link together entities and transactions to build a network of financial interaction, and in doing so enable the utilization of two areas in which computing is extremely proficient,

1. Relational database systems and
2. Search tree data structures.

Both of these lend themselves utterly towards the manner in which we have structured our traceability method, an actuality that presents very tangible benefits, as we may assume the advantages of using more mature technologies. To ensure our trace did not become saturated with older, less relevant components we could also choose to allow an individual trace to impose a cut-off point regarding the date of transactions. This would not involve the removal of older records, merely the option to exclude them from any given trace should they be too old to be of interest.

While it would be relatively simple to construct the system so that the user could manually navigate the database, pursuing any given path as they see fit, we may

additionally wish to design a software program to retrieve a list of financial entities and transactions, relevant to any one trace. This would make “at a glance” traceability much easier and also greatly reduce the possibility that any unusual activity could be overlooked. For the sake of completeness, and to demonstrate the lack of technical resistance to such a system, I have included an example of a simple algorithm which could form the backbone of such software, in relation to a database similar to the one we have recommended (see appendix 3).

## Conclusion

It would seem fair to conclude that enhanced traceability in the financial services industry is increasingly necessary. It would also seem that the barriers to implementation are not technological, or indeed due to resistance from any large corporate entities, but rather to do with the massive renovation it would demand of the entire industry. Hedge-funds in particular are often desirable, at least in part, for the discretion they offer consumers or intermediaries. This level of discretion however, may be developing into a liability the financial service industry can no longer afford to accommodate, at least in terms of its totality. We may assume that any adjustment to this would likely cause absolute uproar within the companies, traders, brokers and other entities that possess massive hedged investments. Part of this apprehension may result from the possibility that when true visibility occurs, they will be positioned much more perilously than before, due to circumstances over which they had little control. Some other critics of traceability, and in particular any recommendations for traceability from established FSIs, may draw some credence from the argument that “*prudential supervision acts as a 'barrier to entry', and limits the rate with which newcomers change the pattern of the financial services marketplace*” (Roger Clarke, 1997).

Even in the presence of this internal transformation, the level of inter-economic collaboration required to build a complete global portrayal of the financial industry could be insurmountable, given the more insular inclinations of many nations and economic zones. Contrary to this, the argument could be put forward that if a critical mass of participants were amalgamated into such a collaboration, others would participate purely to avoid exclusion. The most probable likelihood however, is that this would provide motivation to many economic entities “on the fence” but change little for a number of others. As an additional concern, it ought to be recognized that limited information will be available for many entities encountered in delineation, for example, sole traders and partnerships, about which there will be incomplete financial data.

For all of these reasons, we may anticipate that traceability would suffer from quite limited reach, hampered both by “fuzzy” fringes as well as “black holes” into which unaccounted-for funds emerge or disappear from the radar. This is not intended to dismiss the benefits of enhanced traceability completely, even within the context of the current financial services industry. In spite of all of these limitations, there may still be plausible benefits in considerably greater delineation for any one zone or collaboration of zones, not least of all in terms of consumer reassurance. Perhaps in this manner the industry will begin to transform, increasing in traceability in much the same manner as the growth of the Internet in the last few decades; first in small pockets, later progressing into a unified whole.

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9. Examples of regulatory bodies highlighting need for traceability

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[http://www.opsi.gov.uk/ACTS/acts2000/ukpga\\_20000008\\_en\\_1](http://www.opsi.gov.uk/ACTS/acts2000/ukpga_20000008_en_1) 30/9/8

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[www.financialregulator.ie/](http://www.financialregulator.ie/) 26/9/8

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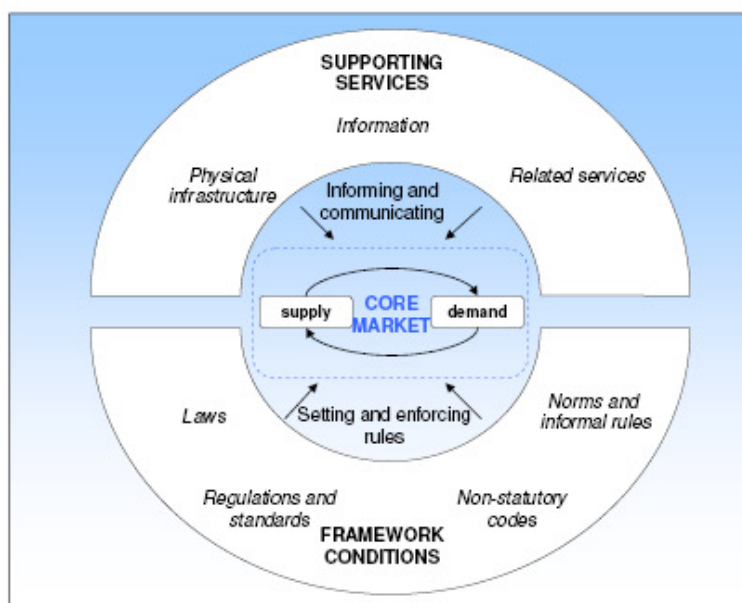
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## Appendices

### 1. How markets work



[Taken from] [http://www.lirneasia.net/wp-content/uploads/2008/03/phongsathorn\\_traceability-an-international-perspective.pdf](http://www.lirneasia.net/wp-content/uploads/2008/03/phongsathorn_traceability-an-international-perspective.pdf) ]

### 2. Results of the 2008 Financial Services Trust Index survey

**Financial Services Trust Index Results**

Position	Type of financial services business	Trust 2007
1.	Building societies	48%
2.	High street banks	46%
3.	Supermarkets	26%
4.	Direct / online banks	25%
5.	Credit card companies	22%
6.	Insurance companies	20%
7.	Investment companies	7%
8.	Loan companies	6%
	None	23%

[Taken from [http://www.teamspirit.uk.com/html/press\\_northern\\_rock.html](http://www.teamspirit.uk.com/html/press_northern_rock.html)]

## 1. Tracing algorithm

Given a financial services entity E or financial services transaction T, a Boolean value to search forwards or backwards, and a cut-off date, we construct a list of relevant financial service entities and transactions.

*List Lt* → null

*List Le* → null

*Trace-funds (Entity E, Transaction T, Boolean traceFundsBackwards, num cutOffDate)*

if *E = null* && *T = null*

break

else

if *E != null*

if *traceFundsBackwards = true*

for every transaction *t* in *E.CapitalReceivedTransactions*  
&& *t.date !> cutOffDate*

*Lt* → *Lt + t*

*Trace-Funds(null, t, traceFundsBackwards)*

else

for every transaction *t* in *E.CapitalDonatedTransactions*  
&& *t.date !> cutOffDate*

*Lt* → *Lt + t*

*Trace-Funds(null, t, traceFundsBackwards)*

if *T != null*

if *traceFundsBackwards = true*

for every entity *e* in *T.ReceivedCapitalFrom*

*Le* → *Le + e*

*Trace-Funds(e, null, traceFundsBackwards)*

else

for every entity *e* in *T.DonatedCapitalTo*

*Le* → *Le + e*

*Trace-Funds(e, null, traceFundsBackwards)*