

Financial institutions, information, & investing-at-a-distance.

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Abstract. Seminal papers on the size of the firm emphasise the benefits of in-sourcing over outsourcing services from the market. This provides a rationale for the development of large firms, especially in circumstances of market risk and uncertainty as to the price and quantity of available services. This model is less successful when considering the scope of the firm – what firms do and where they do it, given their assets and the complementarities between related activities. In this paper, we develop a model of the firm that is sensitive to the production and consumption of information (internal and external to the firm). Links are made between what the firm does and where it does it in relation to the information systems that enable firms to reach beyond what they are able to achieve within their own organisations. This model is particularly relevant to financial institutions, many of which face hard-to-realise expectations as to their investment performance. Making good on these expectations depends on the degree to which financial institutions can effectively mobilise information at the margin of markets. In the penultimate section of the paper, we consider the virtues or otherwise of three particular models of investing-at-a-distance. In conclusion, lessons are drawn for the theory and practice of financial intermediation in the context of increasingly distant investment opportunities.

Keywords. Buzz, financial institutions, governance, information, networks, pipelines

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Introduction

Western institutional investors dominate global financial markets (Morrison and Wilhelm 2007). The maps of financial assets typically accompanying yearly reports on the volume of financial assets by institution type (e.g. insurance companies, mutual funds, pension funds, sovereign wealth funds and endowments) emphasise the importance of developed economies, especially the UK, North America, and Australasia. (See, for example, Pensions and Investments January 13th, 2012.) Reflecting the heritage pension fund capitalism (Clark 2000), these countries and regions have been joined by others from resource-rich developing economies (Middle East) as well as from the East (China) and the South (Brazil) (Clark et al. 2013). However, for much of the 20th century western institutions dominated the structure and performance of financial markets, imposing a high degree of centrality on the global financial system (Wójcik 2011).

This map of finance was underwritten by the principles of neoclassical finance (Merton and Bodie 2005): in particular, the efficient market hypothesis (Wójcik et al. 2013). At base, this doctrine is framed by three assumptions or propositions (Litterman et al. 2004). First, the efficiency of financial markets depends upon the volume and integrity of relevant information. Second, market prices fully-reflect the available information, thereby promoting the efficient allocation of resources between competing ends. Third, to the extent there exist information asymmetries, the search for market advantage will, inevitably, price those corners of the market leaving little opportunity for abnormal returns. Even so, it has been long recognised that all market agents do not have the same capacity to process information or, for that matter, make sense of information in a timely manner. The very idea of informationally-efficient markets has also been subject to trenchant criticism (Grossman and Stiglitz 1980).

We show in Clark and Monk (2013) that the scope of financial institutions depends upon the processing of information internal to institutions, and between institutions and their market providers.¹ There our concern was about the governance of financial institutions, paying particular attention to the relationships between senior managers and portfolio managers in the context of strategic choices about in-sourcing, outsourcing, and off-shoring. It was noted that these types of organisations have three kinds of intangible assets: human capital, institution-specific decision-making procedures, and the infrastructure for processing information. In this particular paper, we focus upon the design and management of financial institutions' information systems. We focus on the interface between geographically dispersed financial institutions, centralised financial markets, and return-seeking investment strategies at the margins of markets.

The next section of the paper provides a brief account of the growth of the global finance industry, emphasising its autonomy from industrial capitalism. We argue that the premium on local knowledge was systematically discounted over the second half of the 20th century by the intellectual apparatus accompanying portfolio management. This is followed by a discussion of the theory of the firm, and our own assessment of the applicability of this logic to financial institutions and to economic geography more generally (compare Dicken 2000; Taylor and Asheim 2001). Throughout, we emphasise the importance of information in the finance industry: the dependence of the industry upon the valuation and deployment of information within and without financial institutions through return-seeking investment strategies. It is also argued that these institutions

¹/. Throughout, we refer to financial institutions rather than firms or organisations. In part, this is because the organisations we have in mind (i.e. pension funds and sovereign wealth funds) are normally not firms or corporations but have a legal status more important than the term 'organisation' would imply. This may cause some confusion if our use of the term 'institution' is conflated with the theory of institutions, which is to be found in economics and political science.

face an increasingly hostile environment, which has prompted investment in systems of information processing aimed at exploiting opportunities at the margins of global financial markets.

Inspired by Storper and Venables (2004) and the distinction made by Bathelt and Glückler (2011) to the effect that information flows occur through either 'pipelines' or 'buzz', the penultimate section focuses on the information-processing attributes of investment strategies aimed at realising superior rates of return at the margins of markets. In conclusion, we consider the implications of our analysis of the imperatives driving the 'representative' investment institution and how this type of entity might deal with the emerging realities of 21st-century global financial markets. In large part, this paper is theoretical, focused upon principles and practices rather than case studies of particular institutions in their home jurisdictions. It is arguable that financial institutions share with many more conventional types of firms the same market imperatives including the costs and benefits of insourcing as opposed to outsourcing and off-shoring. However, financial institutions operate in quite distinctive environments with particular factors driving behaviour. Articulating these imperatives is the goal of the paper.

Maskell (2001) suggests that Coase (1937) provides an important analytical reference point when 'placing' firms in their geographical context. As such, the analytical logic underpinning our discussion of the structure and performance of financial institutions begins with the relevant literature from economics. But it also addresses the ways in which the geography of finance systematically frames the strategic options facing senior managers in realising target rates of return. While our discussion is about principles, it is informed by case studies and field experience with many of the world's leading financial institutions, ranging from pension funds and endowments through to sovereign wealth funds. There are close relationships between these institutions, their sponsors, and their countries of origin. Here, we hold these issues in abeyance in the hope that the analytical framework modelled on our representative institution will facilitate assessment of different circumstances (along the lines suggested by Beugelsdijk et al. 2010).

The Information–Industry Nexus

For the first 50 years of the 20th century, it was reasonable to suppose that industrial capitalism was financed by banks that, in turn, relied upon large corporations for business. From the early stages of the industrial revolution, this 'model' had a distinctive geographical footprint that persisted in many countries through to the second half of the 20th century (Martin 1999). Closely-held corporations served by local banking institutions, which together control large parts of national economies, represent the dominant model of continental European capitalism (see Dore 2000; compare Clark and Wójcik 2007). In the Anglo-American world, however, household saving was increasingly tied to workplace pension schemes, which assumed an institutional form (and function) separate from their sponsors (Clark 2000; Dixon 2012). The disconnect between bank-led industrial capitalism and third-party savings-led financial capitalism was evident in the UK and the US by the mid-1970s (witness the Wilson Report 1980).

For much of the 20th century, the asset allocation policies of pension funds, insurance companies, and related institutions were simplistic and, moreover, subject to government regulation. There were limits on equity and overseas investment and, in many jurisdictions, these institutions were required to hold a certain portion of their assets in domestic (and even local) government bonds. These restrictions were lifted by Anglo-American governments by the mid-1980s, although some US states maintained restrictions for longer and, in a number of cases, continue to do so (Mitchell et al. 2000). These restrictions were also commonplace in continental Europe until the introduction of the Euro, when most were eliminated. Through to the 'big bang' of 1986, UK financial institutions pursued rather rudimentary investment strategies hemmed-in by regulation and accepted convention. As the constraints were lifted, and market liberalisation empowered a new form of

financial capitalism, these institutions took aim at the remnants of industrial capitalism (Martin and Minns 1995).

Underwriting the deregulation of financial institutions and markets was a revolution in financial theory and practice. One thread of this revolution was the widespread adoption of modern portfolio theory (MPT) (Markowitz 1952). In conjunction with a liberal conception of fiduciary duty, MPT facilitated a switch in risk assessment from individual investments to the portfolios of institutions (Clark 2000). In a sense, the decision whether or not to invest in a particular security (company stock or government bond) was replaced with an assessment of the risk profiles of asset classes and how those 'summed-up' to the entire portfolio. A second thread in the revolution was adoption of the efficient markets hypothesis (EMH), which encouraged the belief that traded securities were properly priced and that the risk and return profiles of securities could be meaningfully projected into the future. The neoclassical theory of finance provided a recipe book for portfolio investment (see Ho and Lee 2004) and, arguably, the global financial crisis.

In effect, the premium on local knowledge was discounted. In its place, financial products were developed representing segments or slices of asset classes with distinctive industry and geographical characteristics. Instead of trading a handful of companies' securities based upon expert knowledge or some informational advantage, financial institutions were offered products that carried with them risk and return characteristics based upon historical trends. The design of these products was, and remains, dependent upon simulating their underlying properties, informed by theories of market movement and cross-correlations with other financial products.² Instead of a premium on local knowledge, the premium has been on product design and performance wherein relationships with 'insiders' have been replaced with relationships between product providers and consumers. If buzz is important, it is framed as a matter of the rate of return preferences and expectations of product purchasers.

There are two other aspects of the financial market crucial to this paper. It is self-evident that London and New York dominate their respective financial 'hinterlands'. Although both have been nationally and internationally significant for many years (centuries in the case of London), their current hegemony is owed to three intersecting forces or market dynamics. Most obviously, both markets have benefited from the public listing of corporate and government securities (including continental Europe). As the volume of financial assets grew through workplace pension saving, etc., the benefits of public listing were accompanied by discounting the power of major shareholders and the rise of 'universal owners' who were content to remain in the minority and largely silent (Hawley and Williams 2007). Moreover, with rather weak and immature financial markets dominating many developing economies, London and New York became magnets for European and international portfolio managers.

Notwithstanding the reliance of financial institutions on these markets and other smaller markets, these same institutions have also sought to manage their relationships with geographically dispersed clients. Whether by inertia or the continuing significance of client–financial institution relationships financial markets have acted as giant vacuum engines, using pipelines to collect assets from dispersed sources and channel them to centralised switch-points in the global economy. This has been made possible by the development of market intermediaries such as custodian banks, broker–asset managers, and third-party brokers that locate close to financial markets so as to manage the

²/. The finance industry relies upon analytical frames of reference for organising market information. Whether imposed by theoretical principles, accepted models of measuring and pricing risk, or by evident patterns in the pricing of traded securities, the formal representation of market information is believed to guard against impulsive market behaviour, including herding, opportunism, and being caught up in speculative bubbles. Compare Ho and Lee (2004) with Hilton (2003).

placement, switching, and distribution process. These pipelines have been so successful, in fact, that financial institutions have largely given-up their own systems in favour of market intermediaries. This has allowed sponsors to remain 'remotely located' relative to global and national financial markets.

Institutional Size and Scope

Much of the literature on the size and scope of the modern firm begins with Coase's (1937) seminal paper. Coase sought to explain how and why firms internalise tasks and functions relative to the market for services. Utilising standard microeconomic tools (average and marginal costs, for example), he was able to show that firms grow in size to the extent that the costs associated with increasing size (including complexity) are more than offset by the benefits (including flexibility) that accrue to entrepreneur-coordinators when they hold tasks and functions internal to the firm. His argument was based upon a rather inchoate theory of the employment contract (compare Hart and Moore 1999). In effect, he distinguished between what modern theorists of the firm term as (internal) relational or incomplete contracts and (external) discrete or complete contracts (Macneil 1980; see also Baker et al. 2002).³

When augmented by reference to the separation of owners and managers, which is characteristic of modern firms (Easterbrook and Fischel 1991), transaction costs (Williamson 1975), and sunk costs (Clark and Wrigley 1997), Coase provides an analytical rationale for the size and scope of industrial enterprises. Nonetheless, his conception of the firm is rather idealised given the coexistence of different types of employees subject to different incentive systems inside and outside the somewhat arbitrary boundaries of modern firms (Clark and Monk 2013). The limits of this particular perspective are obvious. For example, the claimed distinction between relational and discrete contracts seems to favour a (large) firm-centred arrangement of production and supply where, in fact, other arrangements could be just as desirable. Jensen (1993) contends that relational contracts are often self-defeating because they reinforce the inertia of entrenched managers against the ever-changing circumstances of competitive markets.

By contrast, it is arguable that the Internet, through inexpensive and virtually instantaneous electronic communication networks like Twitter and Facebook, have profoundly altered the 'terms of trade' such that comparative advantage is now to be found in the highly decentralised networks of suppliers and producers that drive-down the costs of production and promote innovation (Benkler 2006, p.55). Whereas Coase identified the costs of finding relevant market information on potential suppliers, as well as potential market opportunities, as the crucial impediments to outsourcing tasks and functions, this type of information is increasingly available at a 'click'. The retention of production at a centralised location should thus be less important than hitherto assumed. See, for instance, Grossman and Rossi-Hansberg (2008, p.1978), who suggest "revolutionary advances in transportation and communications technology have weakened the link between labour specialisation and geographic concentration, making it increasingly viable to separate tasks in time and space."

³/ Baker et al. (2001, p.212) define relational contracts as "self-enforcing agreements in repeated games". They also suggest that relational contracts are "informal agreements and unwritten codes of conduct that powerfully affect the behaviours of individuals within firms. There are often informal quid pro quos between co-workers, as well as unwritten understandings between bosses and subordinates about task assignment, promotion, and termination decisions." (Baker et al. 2002, p.39). This approach resonates with Bathelt and Glückler's (2011, pp.6-7) relational economic geography, even if their approach is more programmatic and methodological than it is specific to a particular type of institution.

Gene Grossman and his colleagues acknowledge that search costs are important, reflecting the analytical logic of Coase (1937) if not his assessment of what is possible in space and time. Grossman and Helpman (2005, p.136) suggest that outsourcing requires firms to find suitable partners with "expertise" consistent with their requirements, convince them to "customise" their production systems so as to be consistent with the systems of the 'home' company, and be responsive both to the terms and conditions of agreed contracts and to changes in those contracts in response to markets. By their account, firms seek distant partners that are simultaneously committed to the firm *and* are flexible with respect to unanticipated changes in the terms of agreed relationships. They suggest that finding these types of partners may be difficult—large and deep markets (cities) are deemed preferable to small and thin markets.

Largely ignored in their analysis are issues related to the governance of the home firm and how that intersects with the governance of networks of decentralised suppliers. At one level, they suggest that the home firm's preference for flexible external networks means that the relationship between the firm and its extended networks may be best conceptualised in terms of incomplete contracts. Suppliers are functionally part of the firm and should be treated as such, even if they are located outside its formal boundaries and outside the borders of the home firm's jurisdiction. Even so, if suppliers are located in large urban markets, the home firm may be tempted to control these suppliers via discrete and complete contracts rather than relational and incomplete contracts. The search costs involved in switching suppliers may be low, given existing knowledge of other suppliers gleaned through initial searches for current partners. In a similar manner, suppliers may well resist customising their production systems, given the possibilities of switching to other firms that offer more advantageous conditions.⁴

Control of suppliers or partners is a significant issue and has two dimensions. In Clark and Monk (2013b), we distinguish between the authority of senior managers and the mechanisms whereby the firm and its production systems (internal, external, and offshore) are coordinated. Much of the literature on the digital economy assumes relationships between firms, between partners, and between suppliers are bilateral (pareto optimal) albeit often short in duration. By contrast, much of the literature on the modern firm assumes that authority is crucial for setting goals and objectives, just as the efficient management of the component parts that make-up the production and sale of the final product is crucial in realising those objectives. By this logic, authority is a necessary condition for effective coordination. Nonetheless, in the absence of an active owner, authority may be highly contested within and without the firm. The allocation of 'decision rights' and how they are exercised is vital for understanding the functional performance of firms.

Recognising the governance costs associated with dispersed networks of suppliers, Grossman and Helpman (2005) locate authority with the home firm. They suppose that suppliers operating at a distance are controlled by complete contracts as to the nature and performance of their production. Grossman and Rossi-Hansberg (2008) distinguish between suppliers according to their specific tasks and functions, believing that detailed rulebooks or sets of instructions can govern suppliers and the configuration of production. By this assessment, it is efficient to offshore tasks and functions when the home institution sustains the simplicity of tasks and functions, there is an ease of substitution

⁴/ It is widely assumed that complete contracts are framed according to legal norms. By comparison, relational contracts are assumed framed against social norms and conventions including reciprocity, cooperation, and trust (Bowles 2004, pp. 264-5). Whether either of these types of agreements comes to court is hardly ever considered. Notice, London provides third-party arbitration mechanisms for the resolution of disagreements over discrete contracts. Financial services and legal services are complementary industries (see Beaverstock et al. 1999).

between suppliers, and there are complementarities between suppliers and the home production systems.

Governance of Financial Institutions

Theories of the modern firm are, more often than not, based upon entities that make and sell commodities. The analytical logic thus relies upon tangible or physical assets. The coordination of labour and capital is a crucial task of senior managers, recognising that production itself can take place at home or offshore from the firm's notional headquarters. Notwithstanding absent or silent owners, authority (decision rights) over the coordination of the firm is located with senior managers and is distributed down through the firm by virtue of an established hierarchy of roles and responsibilities. If markets are an alternative to hierarchies (Williamson 1975), the choice of markets over in-sourcing is presumably exercised by senior managers on behalf of their owners.

By contrast, financial institutions do not make and sell commodities. They produce a rate of return via strategic decisions made about the appropriate mix of asset classes and the implementation and execution of investment strategies through portfolio managers (Campbell and Viceira 2002). Financial institutions rely upon three intangible assets: human capital; the process of decision-making; and the data and information infrastructure and architecture. As is the case in other types of firms, owners are either absent or silent. This could be thought to provide senior managers a great deal of authority over the production process. However, because of the premium on human capital, the exercise of authority is mediated by the need to sustain cooperation between senior managers and portfolio managers. As Rajan and Zingales (2001) note, flat hierarchies are characteristic of human capital intensive industries (see also Teece 2000).

In Clark and Monk (2013), we showed that the governance 'problem' of large financial institutions is framed by reference to authority and coordination (the powers and responsibilities of senior managers) and the skills and talents (human capital) of portfolio managers. Skills are distinguished from talent in the sense that the former are owed to formal training and education relevant to responsibilities, while the latter reflects domain-specific expertise. As such, the tasks and functions of portfolio managers are highly specialised and distinguishable, for example, by asset class, style of investment, and industry and geographical association. Furthermore, portfolio managers run teams of similarly specialised individuals, binding team members together by reference to common performance objectives, incentive programmes, and prospective opportunities (within and without the institution). There is a market for talented portfolio managers and their teams; see Che and Woo (2001) on the logic of team-based systems of production and Rosen (1981) on the market for 'super' talent.

As noted above, the product produced by financial institutions can be conceptualised as the planned rate of return on assets under management (AuM). This rate of return target can be seen as representative of the goals and objectives of the entire institution, or it can be distinguished or differentiated by reference to the goals and objectives of the institution's clients. Some institutions, like pension funds, have a single target rate of return. Other types of financial institutions bring together a myriad of clients each with their own target rates of return. Even so, there are significant incentives for clients and producers to pool the available AuM so as to reap economies of scale in the management process, the governance and oversight of investment, and in the nature and volume of transactions in financial markets. For argument's sake, we assume that our representative institution has a single rate of return target.

We assume that the target rate of return is provided to senior managers by the client. This may be an explicit mandate or it may be inferred by senior managers given the long-term commitments of the client. Senior managers then frame the institution's investment strategy, focusing upon the

optimal mix of asset classes that should achieve the target rate of return over some preferred time horizon. Given the volume of AuM, tranches of assets are allocated to the various asset classes that make-up the optimal investment portfolio. For example, assuming AuM of £100, £50 might be allocated to domestic equities, £30 to government bonds, £15 to tangible assets, and £5 held as cash. Assuming the institution has the relevant portfolio managers, this allocation provides the assets that investment teams within the institution manage on behalf of the ultimate clients or sponsors. Senior managers view their investment teams as complimentary tasks and functions. However, portfolio managers typically view one another as rivals for the allocation of investment funds. Reputation is based, in part, on the volume of AuM.

We also assume that senior managers either allocate funds to third-party (external) provided asset-specific investment products (e.g. active domestic equity or passive domestic equity) or they allocate funds to their own portfolio managers to 'make' products (returns) that mimic or are superior to the available products in the market. If they outsource, the institution's managers are: engaged in the search for external providers; focused on relative performance of managers; and required to monitor the performance of selected providers. If they 'make' their own products (in-source), their performance (in terms of costs and rate of return) is, inevitably, judged against that which is available in the market. A successful outsourcing institution has managers with skills, experience, and judgement at least equal to those that they hire. Likewise, successful in-sourcing institutions have internal portfolio managers with the talent and skills at least equal to those that might be hired in the external market.⁵

Whether it makes or buys financial products, our representative institution relies upon financial markets for realising the target rate of return. It holds directly or indirectly the traded securities of companies, governments, other investment houses, and related synthetic products. Either way, its investment performance depends upon the flow of market information. Senior managers setting the strategic asset allocation of the institution rely upon data representing the long-term performance of asset classes (separately and together); senior managers seeking to determine whether to make or buy portfolio investment products rely upon data representing the costs and market performance of competing options; managers seeking to hire external providers rely upon data representing the market performance of third-party providers; and portfolio managers seeking to realise asset-specific rate of return targets rely upon data representing market opportunities over the short-, medium-, and long-term.

The quality and quantity of information are thus important factors in the effective governance of these institutions. Senior managers seeking to realise the institution's rate of return objectives through its strategic plan and the coordination of portfolio managers' investments have enormous interest in monitoring portfolio managers' actions. In part, oversight reinforces *a priori* agreements about the nature and scope of investment policies, the risks associated with those policies, and the ways in which the policies of separate investment teams cohere and complement one another (Clark 2002). This may involve, for example, the daily transmission of information to senior managers on the flow of transactions, current positions against benchmarks, risk profiles, and the nature and status of outstanding positions (bets on market momentum).

By this logic, senior managers rely upon information to impose their authority on investment teams and ensure that coordination is both effective and consistent over time. Failure of oversight and the

⁵/ This discussion is, as indicated above, centred upon the representative institution. We should note, however, that these organising principles are widely associated with short-termism and relatively high costs of (internal and external) management. Indeed, some of the more innovative institutions have sought to overturn these principles in favour of direct investment bypassing intermediaries through the development of internal skills and expertise not reliant upon intermediaries.

subversion of information and monitoring systems can result in bankruptcy: the so-called 'rogue trader' phenomenon. If this type of failure flows-on to other institutions, counterparties, and market-makers, it can result in systemic market failure. As a consequence, there is a premium on the timely flow and veracity of information internal to the institution just as there is a premium on access to information on financial markets themselves.

Architecture of Financial Information

On the supply side of the equation, the financial services industry is concentrated in global, national and, to a limited extent, regional nodes. Tokyo, London, and New York are the primary international financial nodes, overshadowing national financial centres such as Sydney, Singapore, Frankfurt, etc., which, in turn, cast large shadows over their respective regional centres such as Melbourne, Manchester, and Munich (Porteous 1999). By contrast, institutional consumers of financial services tend to locate within, or adjacent to, national and regional population centres, matching the locations of their primary sponsors. Whereas the US financial services industry is dominated by New York, with significant offshoots in Chicago and Los Angeles, public sector pension funds are to be found in every state and in many municipalities.

The search for suppliers is a two-way process. Institutions seeking suppliers signal the market about their needs and expectations while, on the other side, potential suppliers signal institutions about their particular attributes and expertise. Conceived in these terms, markets are highly decentralised and information widely dispersed (Spence 1977). As a consequence, the search process, negotiation over contracts, and the assessment of actual and potential suppliers can be a costly affair. In the finance industry, however, potential suppliers are not dispersed over time and space but are concentrated in global and national financial centres with offshoots in major regional centres. As such, the relevant model of location and market structure is more consistent with Hotelling's (1929) conception of supplier co-location, augmented by Storper and Venables's (2004) agglomeration economies, than Coase's (inspired by von Thunen) spatial segmentation.⁶

Coase noted that intermediaries can make a difference to search costs, but the problem of time and space remains significant. In the financial services industry, the spatial concentration of potential suppliers is reinforced by co-located market intermediaries whose purpose it is to screen, sort, and recommend to financial institutions relevant suppliers. Intermediaries like Mercer and Towers Watson have become significant for collecting data on market suppliers, packaging it in parcels relevant to different types of investment services, and distributing it to institutional consumers of financial services on a timely basis. Furthermore, the largest providers of financial services seek to bypass market intermediaries by establishing relationships with the larger financial institutions, thereby absorbing the costs of market intermediation. In some smaller countries dominated by relatively few large financial institutions, intermediation has, in effect, absorbed the national market for financial services (as in Amsterdam).⁷

⁶/ Storper and Venables (2004, pp.354–55) emphasise face-to-face contact. They believe it is "essential to the transmission of complex, tacit knowledge." See also Gertler (2003). Falconbridge (2006) points out that the communication of tacit knowledge can be an organised social practice and have a spatial reach that goes far beyond the local to the global.

⁷/ Wójcik (2011, p.145) observes that proximity between traders is very important when the issue is "latency—the speed with which an order can reach the matching engine of the exchange, be executed, and the confirmation of its execution return to the computer from which it was sent". It may pay high-frequency traders and certain types of hedge funds (algorithmic traders) to locate close to one another linked by dedicated infrastructure systems. In these situations, trading at a distance through electronic pipelines may incur higher risks and a discount on returns.

There are significant economies of scale in the collection, packaging, and distribution of financial market performance data on a 24-hour/365-day basis. Companies such as Thomson Reuters and Bloomberg dominate this part of the financial services industry, with market performance data distributed to institutional consumers on a real-time basis from national and global financial centres. Furthermore, they provide data in large and small bundles with display routines, analytical tools, and routines for sifting and searching data for the most relevant indicators of performance. For financial institutions that have their own internal portfolio managers, Cerulli Associates and Reuters have obviated the need to collect and manage most market data. Indeed, the existence of these types of intermediaries has made portfolio investment-at-a-distance possible in the sense that being located on the margins of Europe relative to London does not appear to carry a price (in terms of a lower rate of return or higher volatility in returns).

Notice, however, data providers on the supply side of the market do not certify the veracity of their products. Their role is to collect, package, and distribute data rather than determine whether or not data can be trusted. In any event, in most developed economies the behaviour of agents and institutions in the financial services industry is regulated by legal principles such as fiduciary duty and/or statute-based rules and regulations regarding honesty and conflicts-of-interest. Moreover, given the costs and consequences of a failure to observe legal requirements and industry norms and conventions, many institutions in the industry have their own audit and compliance departments or, in a manner consistent with practices of intermediation in the industry, outsource this function to specialised independent service providers.

In sum, the financial services industry is awash with information. It is distributed through electronic communication networks that resemble pipelines rather than a knitted fabric of separate multi-coloured threads. In a related manner, Bathelt and Glückler (2011, p.136) refer to the ways in which information is distributed through "trans-local pipelines" with "often predefined goals planned in advance". They distinguish between the unorganised and sometimes spontaneous actions of individual agents seeking one another as part of the process of gathering information (buzz) and the deliberate use of information pipelines by institutions so as to realise their goals and objectives. In the financial services industry, pipelines of information are similar in form and function to what Casson (1997) refers to as channels of communication. Most importantly, the virtues of these pipelines of information are to be found in the 'width of the pipes' (the volume of information that can be communicated) and the 'speed of the flows' (real-time access to spatially-dispersed market information).⁸

Financial institutions typically share pipelines of information in that the distributed data is bundled and distributed by common service providers. In Figure 1, we provide a schematic representation of the information flows within and without financial institutions such as pension funds, insurance companies, and sovereign wealth funds. Unless a financial institution is extremely large, these types of entities rely upon: external pipelines of market data (bottom left-hand side); the pipelines of custodial banks and related service providers (bottom); the providers of standardised reporting systems that allow financial institutions to communicate with external managers, receive their reports, and oversee their performance (bottom right-hand side); the direct communications with brokers and online trading systems via electronic channels of communication (top right-hand side and top left-hand side); the intermediaries that specialise in risk assessment (top left); and, all the while, the data from portfolio investment providers (top right).

[Insert Figure 1 about here]

⁸/. The ways in which information is parcelled and distributed by third-party providers can frame expectations and hence market behaviour. A similar point is made by MacKenzie (2006) when discussing the significance of the Black-Scholes model of risk pricing.

In some institutions, external pipelines go through the institution to the relevant function or office. In other institutions, the flow of information is enveloped in an enterprise-wide information system. Given the premium on imposing authority and ensuring coordination between functions (Clark and Monk 2013), this may result in bespoke or tailor-made networks of communication that are based on industry standards, but modified for the specific circumstances of the institution. At this level, standardised pipelines of information give way to the heterogeneity of financial institutions in terms of their histories and geographies (for example, their relationships with sponsors, regulators, and beneficiaries) (see generally Von Hippel 2005). At another level, whether an institution or a sponsor can afford its own information systems typically depends on AuM. Smaller institutions have little option other than piggybacking on external pipelines, while relying upon their administrative hierarchies as the frame of reference for electronic reporting. As such, in small funds, “buzz” may have to compensate for rudimentary channels of electronic communication.

Investment at the Margin

Over the past 15–20 years, many institutions have failed to meet their rate of return targets. Discount rates have declined over the past 20 years, systematically reducing the benefits of a balanced portfolio of equities and bonds while, in the case of defined benefit pension schemes, adding significantly to prospective liabilities. Figure 2 displays the monthly discount rates on 30 year UK government bonds (gilts) since the late 1990s. The precipitous decline in discount rates from the mid-1990s onwards in many developed economies has been argued, by some, to reflect the benefits of globalisation as well as the easing of commodity prices. Just as importantly, the US Fed has used ‘easy money policies’ to stabilise the US economy in the face of repeated financial crises. The effects of this policy have flowed onto other countries, notably the UK. One result has been the discounting of returns on savings, and the concomitant search for higher returns in traded and non-traded securities.

[Insert Figure 2 about here]

Anglo-American equity markets have failed to produce, over much the same period of time, a rate of return much above 3 per cent (real) per year. The equity-risk premium, so important for investment strategy over the past 50 years (Dimson et al. 2002), has withered. Figure 3 displays the gap between assumed yearly rates of return reported for US state pension fund systems and actual returns on a balanced portfolio of US equities and bonds.⁹ Many US state government pension institutions assume rates of return in the order of 6 to 8 per cent per year. When looked over the past 10 years or so, realised US portfolio returns have done quite poorly, rarely retaining the real value of the average investment portfolio. Equally, there is widespread recognition that the risks associated with a balanced portfolio are much larger than often appreciated. Shortfalls in target rates of return and growing liabilities threaten the viability of many different types of Anglo-American financial institutions (public and private). Not surprisingly, institutions have looked for alternatives to make up the difference (see Jones 2012).

⁹/. The data for this chart were compiled on January 10th, 2012 using Datastream. The expected returns line was calculated using the 126 funds in the Public Fund Survey and averaging their reported 'expected returns'. This came to roughly 7.9 per cent, which was then applied to the \$100 and compounded over time. The realised line was generated by applying the realised returns from equity markets (the average of S&P 500; FTSE 100; DAX; NYA; and W5000) and fixed income markets (the average of US Bank Prime Loan - Middle Rate; US Corp Bonds; Moody's Seasoned AAA; BOFA ML US DOM MSTR - TOT RETURN IND; LIBOR; US Treasury Const Mat 1 Year - Middle Rate; US CORP BONDS MOODYS SEASONED BAA (W) - MIDDLE RATE; and UBS AU COMPOSITE BOND 1+YEARS - TOT RETURN IND) and then applying those returns to the \$100 portfolio, with a 60-40 breakdown, and compounding over time.

[Insert Figure 3 about here]

Financial institutions have sought to realise their rate of return targets by shifting asset allocations towards asset classes quite different from conventional traded equities and debt. One approach has been to invest at the margin, seeking to take advantage of the growth prospects and momentum associated with emerging markets. Below, we refer to three types of strategies that funds are today gravitating around for meeting their return objectives. First, funds have sought **pipeline extensions** using established communication channels and pipelines of information to access geographies previously not included in their investment portfolios. A related strategy involves **pipelines and buzz** where institutions compensate for imperfect information systems by investing in a market presence that compliments existing pipelines. Finally, we note that some institutions have discounted pipelines in favour of **buzz**, pursuing relationship-intensive investment strategies that are not amenable to management through conventional channels of communication.¹⁰

Pipeline Extensions: The logic behind investing in emerging markets via pipeline extensions is entirely conventional. Working from senior managers' strategic asset allocations, financial institutions reallocate a portion of their existing AuM to portfolio managers who specialise in emerging markets either internal or external to the organisation. If institutions in-source, this strategy depends upon the relevant information pipelines available, the degree to which these new responsibilities can be overseen by senior managers, and the level of complexity that such strategies add to the institution. Outsourcing is often an easier option, piggybacking on existing network relationships with external portfolio managers. As such, the shift towards emerging markets via pipeline extensions tends not to disrupt internal commitments, while external providers rely upon their spatially-extensive information channels without having to establish new pipelines from scratch. In these circumstances, senior managers can govern external providers using complete contracts rather than negotiating with their own portfolio managers who are often entrenched in their own disciplines.

With reference to Figure 1, the relevant pipelines connect senior managers through to external portfolio managers (and from those managers through to markets around the world). Senior managers typically utilise benchmarks and related measures of performance to govern external portfolio managers via these pipelines, which also connect them to global data providers. In these ways, pipelines of information reach beyond existing channels of communication through the core markets of the global financial system to peripheral markets. In a sense, this type of information architecture reinforces the pre-eminence of global financial markets as switch points through which information and financial assets flow in a mutually reinforcing manner. Financial institutions without experience or knowledge of emerging markets rely upon third-party channels of communication located in global financial centres.

Pipelines & Buzz: A characteristic of both emerging markets and alternative investments is the significance of information asymmetries amongst market participants and providers. As a consequence, market pricing does not always reflect underlying value and is subject to unanticipated volatility. The standard techniques used to price risk in developed markets and thereby integrate dispersed traders via pipelines of trading information are known to be ineffective. One response, especially important for emerging markets, has been to establish off-site offices and portfolio investment teams close to, or adjacent to, markets that are deemed important for realising financial institutions' rates of return targets. In this manner, financial institutions may in-source, but

¹⁰/. In effect, this characterisation matches that introduced by Clark and O'Connor (1997) where **pipeline extensions** match transparent financial products, **pipelines and buzz** match translucent products, and **buzz** matches opaque products.

offshore, the framing and implementation of asset- and market-specific investment strategies. Nonetheless, it places a premium upon control. As a consequence, offshore teams may have limited autonomy and remain closely connected to senior managers via proprietary or dedicated pipelines of information and communication that link the home institution with its offshore entities. This is a *'pipelines and buzz'* corporate strategy.

The success of this approach depends upon a number of factors. Obviously, the real-time effectiveness of the control systems and the information pipelines connecting the home entity with its offshore sites is a crucial factor. More problematic, perhaps, is the question of loyalty. That is, the degree to which off-site officers see their career prospects through the lens provided by their home institutions or in 'local' opportunities. If senior managers control their off-site managers with reporting regimes that limit autonomy, it may be difficult to recruit and retain portfolio managers in those markets. If authority is the issue, the home institution may place its own employees at off-site markets on a secondment basis. But, of course, this may mitigate against penetrating and holding the attention of local market networks so important for market intelligence (buzz). The alternative is to outsource offshore activities, using either long-term contracts to tie providers to the home institution or partial ownership of providers so as to claim a share in local pipelines of information.

Buzz: Given the risks involved with investing-at-a-distance, western financial institutions have also sought access to private equity and hedge funds because they are often located close-at-hand: in the core centres of the global financial system. These types of financial products are typically accessed on an out-sourced basis. Whereas knowledge of the suppliers of these types of products is easily obtained through existing third-party pipelines of information, knowledge of how vendors produce their rates of return is very difficult to obtain using conventional sources. Indeed, the 'promise' of private equity and hedge funds is often found in their proprietary systems of investment management and their access to information not otherwise available to financial institutions. In this respect, *buzz* has two dimensions and may not be shared with financial institutions *before* they enter into contractual relationships with desired vendors.

Such is the premium on higher rates of return, financial institutions may willingly give-up claims of authority and control characteristic of the management of their own internal portfolio managers. Also, senior managers may be forced to forego contractual terms and conditions typically applied to conventional external fund managers especially as regards the generation and distribution of information on investment strategy and related proprietary trading systems. At the same time, given that realising strategic asset allocation goals involves assembling investments that are complementary, contracts with private equity and hedge funds providers are often accompanied by 'rulebooks' that proscribe (disallow) certain types of activities including certain risks that would or could affect the overall risk profile of the institution.

Rulebooks can be extensive. For example, they can limit the use of certain kinds of credit and debt instruments (privileging listed equities), define permissible levels of leverage, and provide upper and lower bounds on assumed risks and fund volatility. As well, rulebooks can exclude certain types of stocks and securities (the object of other portfolio managers) and set limits as regards the length of time of positions taken on stock options. In a similar manner, they can exclude certain industries and geographies while allocating to the portfolio manager any risks associated with currency exposures. In terms of the authority of the home institution, rulebooks can set the terms as regards the desired liquidity of investments, reporting on risk exposure and the performance of risk control systems, the mechanisms whereby breaches of rulebooks are reported to the home institution and the penalties that may be invoked in relation to such reported breaches. In some cases, rulebooks can be varied at a moment's notice by the home institution, being less a matter of contract and more a matter of operational management.

In these ways, the rulebooks accompanying contracts with vendors of alternative investments are quite different than those used in commodity supply-chain management. Grossman and Helpman (2005) suggest that the rulebooks accompanying off-shoring contracts set the ways in which vendors produce the products desired by the home institution. By contrast, in the financial services industry vendors have significant autonomy over how they produce desired rates of return; the limits imposed by financial institutions seek to protect the authority and the risks borne by clients.

Conclusions

Pipelines dominate information processing in the global financial services industry. The flow of assets to global financial markets, the widespread adoption of the principles of neoclassical financial theory, and the role of third parties in channelling information have, over the past two decades, reinforced confidence in formal models of governance and investment management. So significant, in fact, has been the development of third-party systems of information processing that it has been possible to talk of an “end to geography” in financial markets (O’Brien 1992). In doing so, it has been suggested that the position of financial institutions in time and space relative to global centres of financial trading has been made much less significant by the information architecture and systems of information flow integrating market players around the world. This argument matches observations made by economic geographers about the compression of time and space characteristic of advanced industrial capitalism (see Harvey 1989 and Warf 2006, 2011).

Coase and those following in his footsteps suggest firms tend to grow in size so as to compensate for the search costs involved in finding and retaining market partners. Those concerned about the scope of large multinational firms have argued that outsourcing and off-shoring have been made possible by the development of cheap and efficient systems of transportation and communication. Specifically, Grossman and his colleagues argue that these types of search costs have been radically discounted, particularly in distant but large developing economies. One effect of the global diffusion of electronic information and processing has been the incorporation of distant sites of production into production systems whose ‘homes’ are to be found in the core markets of western economies. Here, again, it is argued that pipelines of information have radically discounted the virtues of buzz.

The object of our analysis is the information architecture of western financial institutions and markets. It was noted that these types of institutions are rather different than the firms commonly associated with commodity producing industries. Whereas industrial, manufacturing, and retail firms typically claim market advantage by virtue of their tangible assets, financial institutions have few obvious tangible assets and rely upon intangible assets such as human capital, their systems of decision making (governance), and their systems of information processing. This point is developed elsewhere with regard to the governance of human capital and decision making (see Clark and Monk 2013). Here, we have focused upon information processing, noting that, at one level, financial markets are simply massive information-processing machines. There is an extraordinary premium on managing information—internally and externally to the institution.

It is commonly held that buzz dominates financial markets. For example, in stories told about the importance of coffee houses in 17th-century London through to the importance of family and old school ties in the years leading up to the big bang in 1986 (Dale 2004), buzz was and remains important. This is especially true for those whose careers are reliant upon networks that bind together financial institutions with the institutions that manage and invest those assets. Nonetheless, we contend that pipelines have come to dominate buzz in part because of the sheer volume of information to be channelled and moved around institutions within and between networks of market providers. Indeed, some of the world's largest financial service providers are either sites of asset holding and switching (like State Street Bank of Boston), or sites for market

information and data (like Thompson Reuters), or sites of asset placement with portfolio managers (like CalPERS). This is neither a benign process nor does it result in a uniform surface of stocks and flows (Clark 2005).

Throughout, our argument is framed with reference to the authority of senior managers who set institution-wide investment and management policies. For them, information is a vital ingredient in the governance of financial institutions, enabling oversight and control of portfolio managers either internal or external to the institution. Whereas this may be conceived in terms of coordinating complementary elements of an overall investment strategy, equally important is the control of information as a means of exerting authority over the elements that make-up the realisation of planned target rates of return. This is as important internal to the institution as it is external to the institution; portfolio managers are highly specialised and, in their own domain, often uniquely placed with respect to the skills and competence of those that oversee their activities. The flow of information over time and space internal and external to the institution can give rise to management strategies that mix-and-match pipelines of information with buzz.

It was noted that the doctrines underwriting modern portfolio theory and the information architecture sustaining the flows of financial assets within and between global financial centres have faced very challenging circumstances over the past few decades. In the aftermath of the Asian crisis of 1997, the LTCM debacle, the TMT bubble, the sub-prime bubble and bust, and now the Euro crisis, financial markets have become extremely hostile environments. Conventional models of market processes and behaviour are unreliable, even as the premium on ambitious target rates of return has significantly increased over the past decade. In this context, investment at the margins of markets has become an essential element in many institutions' investment strategies. However, these types of environments are just as challenging as the core markets of the global financial system (but for different reasons). These types of markets are, quite obviously, relatively inefficient and characterised by significant information asymmetries.

In this world, buzz has reappeared as an issue of significance. But many financial institutions are ill-equipped to operate in this type of environment, especially when entry to emerging markets and adoption of the protocols that typically govern relationships with hedge funds disturb internal systems of management and the complementarities between portfolio managers. As a result, institutions have developed a variety of strategies to deal with these management conundrums. One has been to rely upon the pipelines of information of global investment managers, providing financial institutions the opportunity to piggyback on third-party information infrastructure through to emerging markets. Another strategy has been to combine information pipelines with the collection of market-specific information and data involving (in some cases) the establishment of off-site and offshore (but internal) portfolio managers. At the limit, financial institutions have abandoned their own strategies and rely almost entirely upon external portfolio managers that claim proprietary advantage in terms of their information processing over the bulge-bracket investment houses.

Here, we suggest that outsourcing and off-shoring result in very different contractual systems and governance regimes compared to industrial, manufacturing, and retail networks (see Grossman and Helpman 2005). Whereas commodity supply chains are apparently accompanied by detailed rulebooks that establish the ways in which tasks and functions are produced relative to the home firm, in the global financial services industry rulebooks tend to disallow certain activities, limit risk exposures, and seek to impose authority over performance and reporting. These rulebooks do not seek to determine how third parties produce rates of return; rulebooks are designed to allow considerable discretion for those charged with realising agreed targets. As such, rulebooks are used

to control the activities of external portfolio managers, which may harm the positions of institutional clients.

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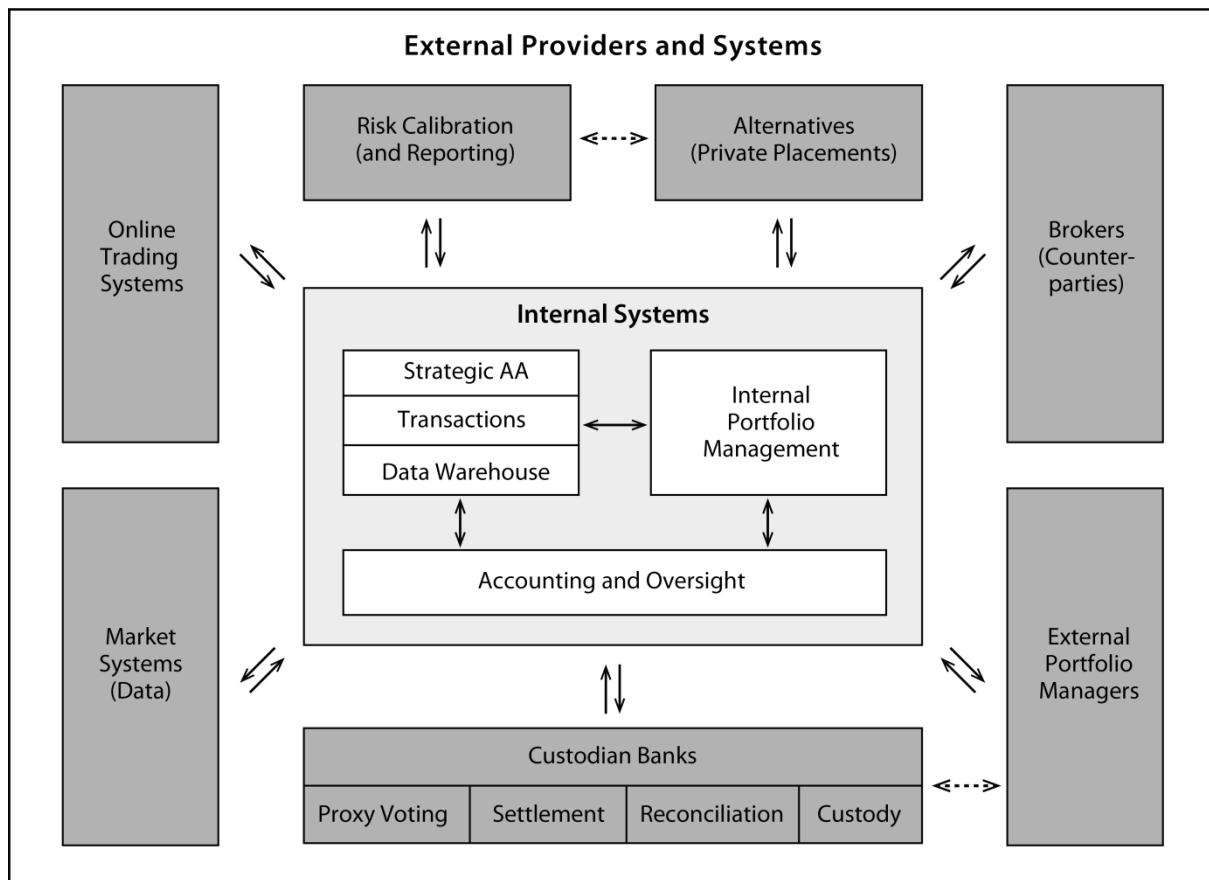
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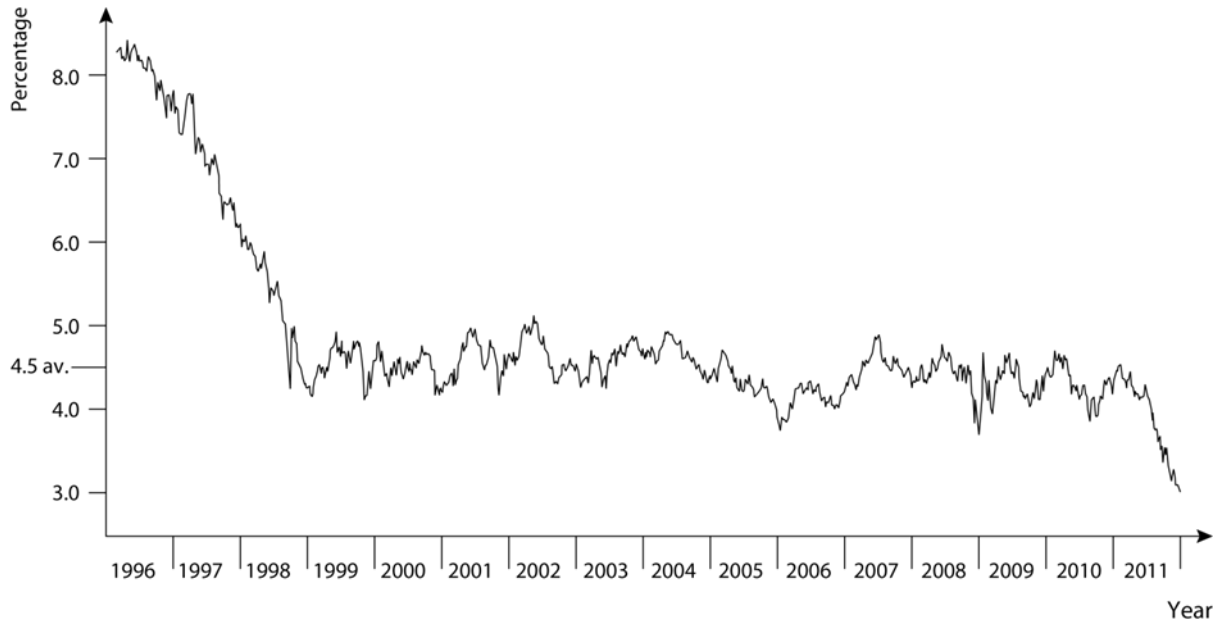
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Figure 1. Financial Institutions – Pipelines of Information



Source: Authors, fieldwork

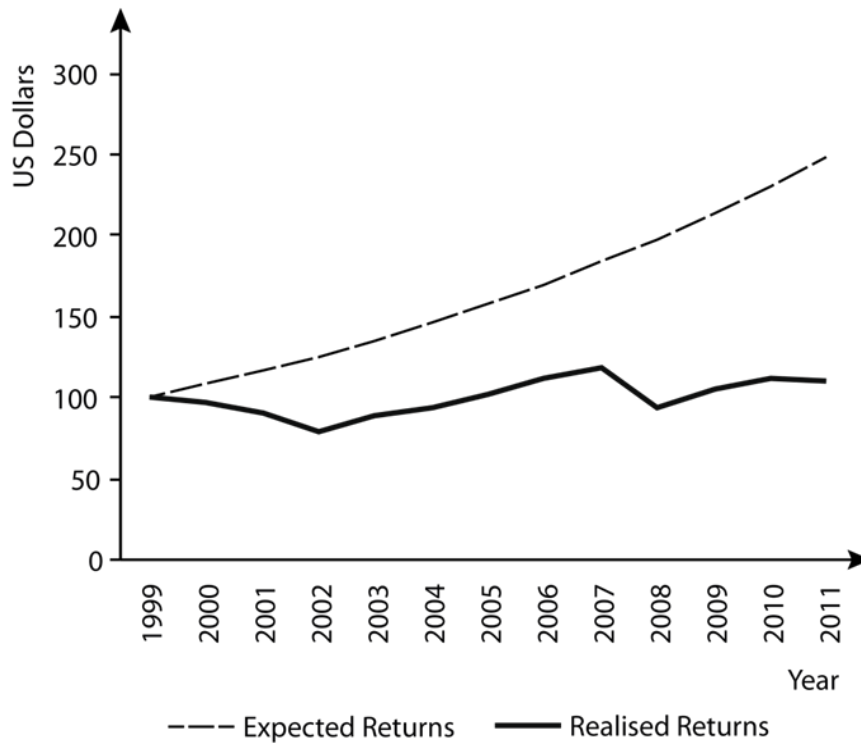
Figure 2. UK Monthly 30 Year Bond Yields, 1996 - 2011



Source: Authors, Bloomberg

Figure 3. Expected and Realised Returns

(\$100 Initial Investment; Portfolio of 60% Equity and 40% Fixed Income)



Source: Authors