

# Intangible Economy and Financial Markets

**Charles GOLDFINGER**

Global Electronic Finance, Brussels

## ■ Intangible Economy

That the economy is undergoing a far-reaching, rapid and ubiquitous change is a largely controvertible statement. What is considerably more controversial is the nature of change. Knowledge Economy, Digital Economy, Information Society, Experience Economy, names for the new economy proliferate to the point of becoming ubiquitous buzzwords. Yet, can we say that we really understand today's economy? Do we agree on its rationale and development path? The answer to those questions is clearly no. Economists and statisticians, whose role is to explain the workings of the economy and to provide performance and value metrics, are perplexed and bewildered. Despite data sophistication and availability, substantive deficiencies, concerning such key variables as productivity, foreign trade, investment and financial accounting measures, remain.

The need for a new conceptual framework for the modern economy remains paramount. Such a framework should build upon the contributions of the service and information economy approaches but should be broader to encompass other significant trends such as the financial markets explosion and development of entertainment industry.

I would like to suggest an alternative framework, based on a single defining trend: the shift from tangible to intangible. The economic landscape of the present and future is no longer shaped by physical flows of material goods and products but by ethereal streams of data, images and symbols. The well-known three stages theory of Colin or three waves vision of Alvin

Toffler can thus be reformulated (CLARK, 1985). At the core of the agricultural economy, there was a relationship between man, nature and natural products. The core relationship of the industrial economy was between man, machine and machine-created artificial objects. The intangible economy is structured around relationships between man and ideas and symbols. The source of economic value and wealth is no longer the production of material goods but the creation and manipulation of intangible content. We live in the intangible economy.

The shift to the ethereal is general and long lasting. It affects all sectors and all aspects of economic life. According to Danny Quah, professor at London School of Economics, we live in an "increasingly weightless economy", where greater and greater share of GDP resides in "economic commodities that have little or no physical manifestations" (QUAH, 1997). A striking example of this shift is the increase of value per unit of weight as shown in the table below.

	<b>Price (in USD)</b>	<b>Weight (in lbs)</b>	<b>Unit Price (USD per lbs)</b>
Pentium III	851	0,001984	0 42 893,00
Viagra	8	0,00068	11 766,00
Gold	301	0,0625	48 277,00
Mercedes Benz E-class	78 445	4134,00	19,00
Hot rolled steel	370	2000,00	0,20

Source: G. Colvin. *Fortune Magazine*

The intangible economy is too often seen as a purely technology-driven phenomenon. The new economy is thus seen as the triumph of bits over atoms (NEGROPONTE, 1995). Some, such a Canadian consultant, Don Tapscott, go as far to propose a notion of the Digital Economy (TAPSCOTT, 1996). This is a dangerous oversimplification. I do not seek to deny the key contribution of In-formation Technology (which we will discuss further below) to the advent of the intangible economy but it is important to avoid a fallacy that the intangible economy is technology-determined. While the technological trend toward digitalisation is unmistakable, its economic and business impact remains unclear and the range of potential outcomes is wide open. Moreover, the development of the intangible economy owes at least as much to basic trends in consumer behaviour and in business environment. Shift toward higher relative demand for leisure, information and knowledge is a strong and long-lasting trend in consumer

behavior: for instance, the share of services in household consumption in France has increased from 42% in 1970 to 51% in 1990 (GADREY, 1992). Business innovations such as brand-driven competition and unbundling of computer hardware and software have been a major dematerialisation factor. The intangible economy is non-deterministic and transcends the opposition between bits and atoms the same way that quantum physics transcends the opposition between particles and waves.

### **Three dimensions of intangible economy**

The intangible economy is all around us. Yet, we have great difficulty to apprehend it: by definition, intangible phenomena are elusive. Not limited by physical constraints, they defy attempts to fit them into standard economic categories and taxonomies.

To understand the intangible economy, we propose to approach it from three different perspectives (GOLDFINGER, 1994):

- Demand perspective: Intangible artefacts: final output for consumption.
- Supply perspective: Intangible assets, used by firms to establish and maintain their competitive position and survival. They include: the brand, the intellectual property, the human capital, Research and development information and know-how.
- Economic system perspective: Logic of dematerialisation: an interrelated set of trends and forces that affect all economic activities, changing the nature of economic transactions and market structures.

Intangible artefacts include different forms of information and communication, high and low culture, audio-visual media, entertainment and leisure, without forgetting finance, the ultimate intangible.

All artefacts are joint products, combining intangible content with physical support: song with a magnetic tape for an audiocassette; history and a building site for a classical monument. Traditionally, content and support were tightly linked, making them either unique or reproducible on a small-scale only. The development of technologies of storage and content replication has loosened the links: the same content can now be easily and cheaply replicated and associated with various physical supports. Like a dragon in a fable, artefacts with an identical content appear in various disguises: a song can be sung live, pressed on a CD or shown as a video-

clip. A payment can be made in cash, by cheque, via card or wire transfer. Not only is the cost of replication very low, and getting lower, but the replication devices are widely available. The dissociation of content and support leads to the proliferation of intangible artefacts in two ways. First, it lifts capacity constraints limiting consumption of intangibles. Previously, a theatrical show or a sports game could be only watched by those who could physically attend the theatre or the stadium. Today, television can multiply the number of spectators ad infinitum. One could argue that a stadium attendance and a TV watching are two different artefacts, with different consumption and pricing characteristics. That is precisely the second vector of proliferation: the same content provides a source for a family of artefacts: a book can be offered as a hardcover, as a paperback, as a CD-ROM or on-line.

The consumption of intangible artefacts displays specific and interrelated properties:

- it is joint (always consumed with other products, tangibles or intangibles);
- it is non-destructive: the same artefact can be consumed repetitively either by a same consumer or by a different one;
- it is non-subtractive (or non-rival): one's consumption does not reduce anyone else's consumption. In other terms, the opportunity cost of sharing is zero.

Intangibles such as information are often presented as a "public good," such as fresh air or national defense, whose consumption cannot be limited to a single consumer and therefore is inherently collective (OLSON, 1973). We prefer to use the term of a "shared good." In effect, although intangible artefacts are often produced for the use of a specific consumer, this exclusivity cannot be durably maintained. Sharing can be sequential or simultaneous. However, simultaneity in time does not mean simultaneity in space: it is possible to consume the same artefact in several locations, as shown by television or on-line networks. Intangible artefacts create their own space-time that lifts the constraints of geography.

On the other hand, sharing does not signify homogeneity. The same artefact can be consumed by very different groups, as anybody who attended a football match can testify.

The pervasiveness of sharing creates extensive externalities. One's willingness to consume and to pay is strongly affected by consumption or

non-consumption of others. Moreover, it is often very onerous for the owner of artefact to limit its consumption and exclude those who want to consume without paying. Thus the traditional equality "purchase equals consumption," which is the cornerstone of consumer behavior approach in the market economy, is no longer universal. For intangible artefacts, purchase does not equal consumption (how many people read all the books they buy?) and consumption does not imply purchase: in newspapers or in broadcast television, the number of "free riders" routinely exceeds that of paying consumers by a factor of three or four.

Sharing affects not only consumption but also production. Many intangible artefacts are produced through interaction between consumers and producers. Consumers not only often provide elements of content but they create their own combination of content as well as a content-support association. Facilitated by the low cost and the availability of replication technology and the content-support dissociation, such interaction becomes the prevailing mode of creating and consuming intangible artefacts.

The widespread sharing changes the concept of property, as the acquisition of an artefact does not preclude its ownership by others. Hence, the emergence of the concept of intellectual property, whose value is created by sharing. Intellectual property rules applies to scientific and technological innovations, to artistic creation but also to the management of brands and other intangible assets.

Economic characteristics of intangible artefacts render conventional pricing and transaction mechanisms largely inadequate to capture their economic value. The two standard approaches are difficult to apply. Production costs cannot be used as a pricing guide, as there is no proportionality between inputs and the output. Mass consumption does not imply mass production. Best-selling books, records or movies are created by small creative teams and their revenues are not related to their costs. Economies of scale for intangible artefacts are determined by consumption not by production. Yet, the other approach based on the willingness to pay also has serious pitfalls, given the ease of replication and sharing and associated externalities. Another problem, which particularly affects informational artefacts, is what Joseph Stiglitz called the "infinite regress": it is impossible to determine whether it is worthwhile to obtain a given piece of information without having this information (STIGLITZ, 1985).

Traditionally, the pricing of intangibles was a function of convenience and was based on the support rather than on the content. Thus, the price of

a book was determined by its thickness and the printing quality. The advance of dissociation created opportunities for unbundling: content can now be priced separately from the support. Price discrimination, based on the estimated value of content, becomes more common. On-line services, for instance, differentiate between standard and premium services, which are sold at higher prices. Yet, the bundling has its advantages. It facilitates pricing of composite artefacts, comprising several types of content (multimedia software or amusement parks). It also allows cross-subsidies. In financial services for instance, equity research is bundled into brokerage commissions. Thus, the range of intangibles pricing schemes is getting broader and more complex. Furthermore, depending on the supplier-consumer relationship, different pricing arrangements can apply to apparently similar artefacts. Computer software can be sold as a stand-alone product or it can be bundled with hardware or be distributed as a shareware or freeware over a network (DYSON, 1992; VARIAN, 1994, 1995, 1999). Internet provides a fascinating laboratory of various approaches to pricing through various combinations of selling, sharing and giving away. The debate about the respective merits of those approaches is lively. Some argue that the development of technologies such as metering, which measure the detailed use makes feasible fully variable usage-driven pricing (COX, 1994). Others plead in favour of a fixed access charge, independent of the actual use. Still another group considers that the ease of replication makes content practically free and therefore the only feasible approach is to charge for ancillary services (DYSON, 1995) or for "eyeballs" via advertising and other forms of third party pricing. These approaches should be seen as complementary rather than mutually exclusive.

As pricing of intangibles focuses on content, it highlights its inherent volatility of valuation. Although physical goods show variation in price, the amplitude of changes is considerably larger for intangible artefacts. Their value is highly time-sensitive and can change dramatically: the same financial information (about a company merger, for instance) can be worth millions of dollars in the morning and nothing in the afternoon. Economists have grappled with this issue and came up with theoretical solutions. However, their implementation may be costly, due to the need for demand data, thus raising the issue of the trade-off between allocative efficiency and operational cost-effectiveness (MITCHELL & VOGELSANG, 1991).

The ascent of intangible artefacts is accompanied and stimulated on the supply side by the growing importance of intangible assets. Today, these are considered more important to business performance and survival than the physical assets. For consumer goods companies, Coca-Cola, Nestlé or

Danone, brand management is the top priority guiding all their strategies. Brand is also essential for IT companies such as Intel and Compaq, which are spending substantial sums to build it. Leading marketing specialists, such as David Aaker, consider brand an integral part of firm's equity (AAKER, 1991).

Acknowledgement of the importance of intangible assets is not limited to brands. Intellectual property - patents, trademark, technological know-how - is considered as a critical competitive weapon, particularly in software, electronics and biotechnology. The control of intellectual property rights is often a matter of life and death for companies. It is through intellectual property litigation that AMD managed to preserve its foothold in microprocessors, despite Intel's domination. In merger and acquisition transactions, the book value has become largely irrelevant to the company valuation, which is determined primarily by intangible assets (PETERSENS & BJURSTRÖM, 1991). Apparently extravagant amount paid for media assets, such as Hollywood studios or newspapers, can be explained by the crucial role attributed to brands, contents and publishing rights in the emerging realm of infotainment, combining information and entertainment.

While managers live and die by intangible assets, many accountants refuse to include them in official accounts. Thus, the total amount of intangible assets in the published 1992 accounts of Coca Cola was 300 million dollars, while its brand was valued by Financial World at 35 billion dollars. The 1992 value of Intel brand, as measured by Financial World, was more than 200% higher than the total value of its 1992 balance sheet, 8 billion dollars. Intel carries no intangibles on its balance sheet. Similarly, Microsoft considers software development, its core competence, as an expense and writes it off in the year incurred. In its 1996 Annual Report, Reuters, the leading provider of electronic information, acknowledges that its balance sheet does not include such strengths and resources as its neutrality, its software and other intellectual property, its global databases of financial information and integrated global organization including skilled workforce. Is it therefore surprising that the average market value of Reuters represented in 1995 and 1996 some 600% of its book value? (Reuters Annual Report, 1996).

The main reason for the non-inclusion is the lack of agreement among experts on how to treat intangible assets. At the risk of stating the obvious, intangible assets are not like tangible assets. First, they are highly heterogeneous, not only between categories but also within a given category: one hour of software programming does not equal another hour

of programming. The revenue-generating capacity of an intangible asset is much more uncertain than that of a physical investment. When a plant adds another machine, it can easily quantify the potential increase in output. On the other hand, when a computer department hires another programmer, it cannot predict with certainty either the quantity or, more importantly, the quality of his/her contribution.

Because intangible assets are, by definition, non-physical, they do not follow the classical progressive depreciation rules. Some assets depreciate very rapidly, others, like a good wine, appreciate with age, stills others follow non-linear and often unpredictable life cycles.

Thus traditional ways of valuing assets cannot be applied. The historical cost of acquiring or creating an intangible asset is largely irrelevant. Opportunity costs are difficult to apply in light of asset heterogeneity. A market or transaction-based approach also has serious pitfalls. For most intangible assets, markets are very narrow and extremely imperfect. This approach also raises the issue of separability. Market transactions only rarely concern just one category of intangible assets. Usually what is being bought or sold is a bundle of assets. Most frequently, the transaction concerns the control of the firm, in which case it is extremely difficult to isolate contributions of brands, intellectual property or publishing rights as distinct from the "pure" control premium paid by the acquirer. Finally, transaction-based values are subject to wide fluctuations.

Lat but not the last, intangible assets raise the issue of ownership. Physical assets are fully and exclusively owned by the firm, which justifies their placement on the balance sheet. The situation of intangible assets is considerably more ambiguous. For instance, a firm owns its brands and other forms of intellectual property. But does it own its labour force, its human capital? And some intangible assets are completely outside the legal perimeter of the firm. This is the case of customer base, which constitute the main asset of banks, telecom companies, retailers and many other organisations. For Frederick Reichert, a strategy consultant, customer loyalty is the critical determinant of firms' profitability (REICHERT, 1993).

Thus the issues of accounting treatment of intangible assets remain largely unsettled. Many experts feel that the traditional accounting approaches are inadequate to handle these assets. Their specificity have spurred the emergence of alternative approaches (LEV, 1999).

***Dematerialisation logic***

The impact of the intangible economy is pervasive and ubiquitous and affects all sectors and activities. Intangible economy does not eliminate agriculture or industry. However, its underlying logic affects all economic relationships and profoundly transforms the ways firms and markets are organized and transactions are carried out. The dematerialisation logic is unsettling to the extent that it runs squarely against some of the key tenets of the conventional logic of economics. The conventional logic stresses equilibrium, the dematerialisation logic, disequilibrium. Phenomena such as obsolescence or redundancy, which had been perceived as peripheral and pernicious, are now pivotal and essential, moulding consumption patterns and guiding asset deployment. The three fundamental features of dematerialisation logic are: abundance, interpenetration and indeterminacy.

Intangible economy is structurally abundant. Abundance, of course, is not a new phenomenon. The productive potential of industrial economy is enormous and clearly exceeds the demand absorption capacity. However, physical goods are subject to physical decay and their consumption marks the beginning of the end of their economic life. Intangible artefacts, on the other hand, are not only extremely cheap to replicate but furthermore are not destroyed through consumption. The intangible economy superimposes on the abundance of production the abundance of accumulation. Contrary to a popular belief, intangible does not signify ephemeral. The lifecycle of popular intangible artefacts is considerably longer than that of material goods: we will forever read Balzac books, listen to Bach music or watch Bergman movies.

Financial systems generate too many transactions, Hollywood, too much entertainment, Internet, too much information. The gap between supply and demand of intangible artefacts is so huge that it has created an "infoglut": "the inability to absorb the torrential and continuously swelling flood of data, images, messages and transactions" (TETZELI, 1994). The on-going deregulation of markets for intangibles along with the technological evolution continue to aggravate the overload. For instance, the number of television channels in the European Union has increased from 40 in 1980 to 150 in 1994. Progress in transmission and distribution techniques makes it feasible to increase the number of channels to 500 or even more (HEILEMANN, 1994). Moreover, the overload is self-perpetuating: to navigate through it we need catalogues, indexes, documentation, whose very proliferation calls for more cross-references, hypertext links and so on.

Efficient information management requires more rather than less information. Information about information is a growing business.

To cope with abundance, new modes of consumption have emerged: zapping, surfing or browsing. They are characterised by a short attention span, latency, high frequency of switching and capriciousness. They blur the distinction between consumption and non-consumption, rendering pricing problems even more intractable.

The expanded range of output makes consumer choice more difficult, by continuously raising the cost of acquiring information about the output. To minimise this cost, the choice is increasingly determined by criteria other than product characteristics such as brand familiarity or mimicking and fashion (BIKCHANDANI, HIRSCHLEIFER & WELCH, 1993; VEBLEN, 1899). These criteria are discretionary, generating rapid and massive shifts in demand, which are hard to anticipate. The result is an uneasy coexistence of stability, for products and artefacts associated with a strong brand, and volatility for the others. The trend is clearly toward the latter.

Product cycle is becoming shorter. Obsolescence is no longer an external constraint, it becomes an instrumental variable. In areas, such as microcomputers, obsolescence leads to cannibalisation: new products are introduced to replace products that are still successful. Intel and Compaq are particularly skilful in the use of cannibalisation to keep their competitors off balance (CHREIKI, 1995; ALLEN, 1992).

A crucial implication of supply abundance is the ubiquity of failure. Flops are the rule, successes, an exception. In Hollywood, one movie is made out of a hundred scenarios under development, and only one in six movies released makes money. The flop rule is not limited to intangibles. In the pharmaceutical industry, only one in 4000 synthesised compounds ever makes it to market and only 30% of those recover their development costs. In consumer goods industry, over 80% of new products launched in the United States fail within two years (MOORE, 1995; POWER, 1993). And yet, despite this dismal outlook, the pace of introduction of new products has not slackened. This has become a wager economy: higher and higher stakes against lower and lower odds.

The wager analogy helps to explain why most companies continue to generate new products at a rapid rate. As long as a player remains at the table, he has a non-zero probability to recoup his losses. Only if he walks away, his loss becomes final. Also, what really matters is not so much how many times one plays but the overall magnitude of the gain (or loss).

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The seemingly irrational product development strategies reflect the need for brand preservation. New products can be considered as visible signals of both brand continuity and renewal. Another factor is what can be called a "bookstore" effect. The best bookstore is the one that offers the widest choice. Furthermore, a well-stocked bookstore stimulates browsing which leads to greater book consumption. The bookstore effect explains for example while Reuters maintains 20 000 pages of data in its on-line financial information services, while the overwhelming majority of its clients use only four or five. The value of its databases is derived not only from particular pieces of information but also from the total inventory of data.

Structural abundance has also a major impact on the notion of capacity and the use of productive assets. Redundancy and excess capacity become the rule. For instance, over-all use of the capacity of traditional telecommunications network is of the order of 1 to 5%. While in the industrial economy, excess capacity is synonymous with costly inefficiency, to be avoided, in the intangible economy it is widespread, functional and inexpensive. It is functional, even necessary, because it enables users and producers to cope with demand volatility and to accommodate the new consumption modes. Excess capacity is inexpensive because in the intangible economy the key flows are that of information rather of physical goods. The economics of adding additional capacity for information flows are very different from that for physical goods handling. The latter is clearly subject to diminishing returns and thus its marginal costs are high. In the realm of Information Technology, there might be diminishing returns at some point but they are unlikely to be reached in the foreseeable future. The long-term trend is for an exponential progression mode and for a dramatic fall in unit processing and transmission costs. The ongoing shift from 32 bit to 64 bit processors will increase the addressable memory ability by a factor of four billion. In telecommunications, fibre optic cable offers ten orders of magnitude greater bandwidth than copper wire with ten orders of magnitude lower bit-error rate (GILDER, 2000).

The intangible economy undermines traditional frontiers and distinctions. Sectoral boundaries are crumbling: previously separate activities of telecommunications, informatics, electronics and audio-visual entertainment are now overlapping. Time-honoured distinctions between work and leisure, home and work-place, intermediate good and final output, consumer and producer, product and service, become blurred. Not only are the boundaries porous and overlaying, they are unstable.

This is not a one-off effect of transition to a new environment but a fundamental trend. The intangible economy does not follow the rules of binary logic of exclusivity but that of fuzzy logic of overlapping (KOSKO, 1993).

The interpenetration profoundly changes the nature of the firm and its relationships with the environment. Internal links, between firm and its employees, become weaker; external links, between firms and its suppliers, stronger. While employees are told to work at home, suppliers are invited to work on premises. Functions traditionally considered as central to the very existence of the firm are now subcontracted or outsourced. Nike, leader in sport shoes, does not manufacture any shoes. Nor does Dell, a leading supplier of computers, own any production plant. In the semiconductor industry, many leading firms are "fables", concentrating on chip design and subcontracting their production (RAPAPORT & HALEVI, 1991). In computer services, outsourcing is one of the highest growth sectors.

This development suggests that the traditional rationale for the existence of the firm, articulated by Ronald Coase as the minimisation of transaction costs, is no longer universally valid (COASE, 1937; WILLIAMSON & WINTER, 1993). Not only has Information Technology dramatically reduced transaction costs but the intangible economy has altered the nature of the markets (see below) and enlarged the range of transaction mechanisms, blurring the well-known distinctions between markets, hierarchies and networks. An alternative and broader rationale for the firm needs to be developed, which would stress the brand umbrella, the intellectual property repository and the control of distribution channels as key cohesion factors and functions of the firm.

Dematerialisation logic modifies the market power balance and the value chain structure. In the industrial economy, the central position in the value chain was that of final product assembly, while the position of subcontractor was subordinate. Despite the fact that Michelin contributed more to the development of the automobile, by facilitating road travel with maps, signs and guides, than Renault or Citroen, the latter gained greater market power: few people ever buy their cars in function of the brand of its tires. In the intangible economy, a subcontractor often assumes a dominant position. Thus, in personal computers, Intel and Microsoft, are in a considerably stronger position, and are more profitable, than IBM or Compaq, which control final assembly. Their dominance is due to their ability to establish intellectual property rights over key product components, in this instance microprocessor architecture and operating system software.

These changes in the value chain structure reflect a fundamental trend: the weight of the value chain is moving closer to the consumer. This trend has led to the emergence of "power retailers" such as Wal Mart in the US or Ikea in Sweden. They decide which products are put on the scarce real estate of store shelves. They also set prices and become increasingly involved in product design.

The transfer of market power does not stop at the check-out counter and frequently crosses the producer-consumer divide. In the personal computer industry, between 1986 and 1991, customers captured 49% of value added, against 31% for software and services suppliers and 20% for equipment manufacturers (McKINSEY & Co, 1992).

The intangible economy brings about a momentous change in the relationship between suppliers and consumers - the end of information asymmetry. Today in many businesses, the customer knows as much about products and markets as the supplier. This entails not only substantial end-user price falls, due to the loss of the market power of supplier, but also an unbundling of the production and assembly process, which becomes interactive. The unbundling is particularly apparent in the Information Technology area. Software applications and corporate data networks are often designed and built by customers, using inputs from different suppliers. Of course, they can also be created by suppliers with inputs from customers. "Make-or-buy" decisions are becoming more prevalent and more convoluted. The nature of competition changes: for computer services suppliers, such as IBM or EDS, their biggest competitors are not the other suppliers but their clients.

### **Markets for intangibles and intangible markets**

Changes in the consumption mode, in the production function and in interfirm relationships necessarily entail - and also reflect - a change in the nature of the markets. The main purpose of markets is no longer to support the trading of physical goods but to facilitate exchanges of intangibles. This does not mean that markets for physical goods have disappeared or became irrelevant. They are alive, well and growing. However, markets for intangibles are growing considerably faster. Furthermore, the evolution of physical goods markets is heavily influenced by the logic of intangibles trading.

Is not a notion of markets for intangibles an oxymoron? In physical goods markets, it is easy to identify discrete transactions. Buyers and sellers are usually distinct. This is not universally true in markets for intangibles. There, transactions form a continuous process. For many artefacts, the distinction between buyers and sellers is tenuous. Academics exchanging data over Internet or financial institutions on a trading network are in turn producers and consumers of information. We have seen above the difficulties of establishing appropriate pricing mechanisms for intangibles. Give-aways, subsidies, cross-subsidies, indirect (third-party) payments or bundled prices are the rule rather than an exception. The peculiar characteristics of intangibles lead many analysts to argue that they should not be traded through traditional markets. Ronald Coase, Nobel Prize laureate, attacked this argument and suggested that the market for ideas should be approached in the same manner as the market for goods (COASE, 1974). We would like to suggest a variation of this suggestion: markets for goods should be treated as a special case of markets for intangibles.

In any case, the distinction becomes more and more tenuous, all markets have become more and more intangible both in terms of underlying products traded and in the way they operate. Take their most visible form, the financial markets. Over last thirty years, these have become enormous: the volume of foreign exchange transactions is close to 1 500 trillion dollars a day, which more than seventy times the daily volume of international trade of goods. While the international trade is growing at a single digit rate and an annual increase of 5 % is considered as a good performance, international transaction grow at a double digit rate. Thus, according to the data gathered by central banks and consolidated by the Bank for International Settlements, between April 1989 and April 1992, the value of foreign exchange transactions has grown by 42% after doubling between 1986 and 1989. Capital markets (equity and bonds) have become a principal conduit of funding of technological innovation, accelerating its diffusion and, in the process, radically changing traditional notions of economic hierarchy and capital mobilization.

This rapid growth would not have not been possible without a massive use of information technology and a resulting substitution of intangible data for physical products. What changes hands in those markets are not banknotes or stock certificates but book entries in computerised databases of accounts. Furthermore, the progress in financial economics theory led to the creation of new markets that trade dematerialized derivatives of traditional products such as foreign exchange, interest rates or equity portfolios. Derivates markets, futures, options, swaps, etc. have dramatically expanded

the notions of tradeability and risk management. They have been growing more rapidly than cash markets in the underlying instruments (SCHOLTES, 1995).

## ■ Financial Markets Paradox

Financial markets, their rapid development and ubiquity, are at the core of intangible economy. Yet, their prominence constitutes a major paradox. On the one hand, they represent a good example of well-functioning market mechanisms as we ever are going to get. On the other hand, they are extremely controversial and many important and influential people argue that they are either parasitic or actually harmful.

### Ultimate triumph of the market paradigm?

For the economic profession, which has forever preached the virtue of markets, financial markets represent a dream come true, a real-life incarnation of the theoretical model of the perfect market, information-rich and cost-effective. Financial markets are ubiquitous, both local and global; they are accessible twenty-four hours a day, seven days a week; they are huge and diversified, covering a wide range of instruments and involving a large number of participants; banks and other financial institutions, industrial corporations, service companies, individual and institutional investors. More importantly, they offer an incredible wealth of information about the economy, both in the aggregate and in detail. Furthermore, financial markets are very cost-effective: transaction costs are low and falling.

### Widespread controversy

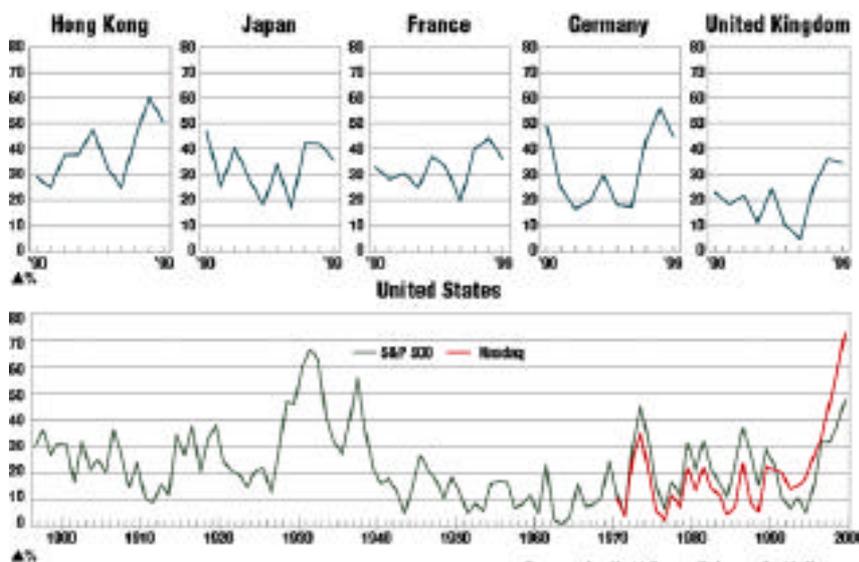
And yet, few people appear happy about the apparently irresistible surge of financial markets. This surge has generated a widespread controversy and dissatisfaction, not only among left-leaning politicians but also among economic policymakers, market regulators and even market practitioners. Dissatisfaction is based around three major accusations:

- markets have become too powerful;
- markets are too volatile and
- markets send wrong signals about economic performance and economic value.

According to these accusations, we live in the era of the dictatorship of financial markets. Economic policy is driven by financial markets operators, who are oblivious to long term development perspectives and are only concerned with short-term gains. Their increased power and influence imply that the policy decisions and business strategies are increasingly afflicted by short-termism, an excessive focus on short-term financial performance.

The second major accusation is that the financial markets are unstable. The volatility of financial prices is widespread, persistent and contagious. No segment of financial markets is immune: foreign exchange markets have been volatile since 1973, interest rates since 1979 in the United States and mid-1980s in Europe, equities have become more volatile during the 1980s.

Volatility in financial markets



Sources: Leuthold Group; Salomon Smith Barney

Stability appears practically impossible to maintain in the long run. Thus, the foreign exchange stability between European Union countries, brought about the creation of the euro in 1999, has been at least partially offset by strong variations of parity between the euro and the dollar.

Volatility results not only in wide swings of value but also in a persistent gap between financial and economic value. In the foreign exchange markets, "overshooting" and "undershooting", a high degree of divergence between the exchange rate - as determined by the markets - and the rate calculated on basis of purchasing power parities, are endemic. Even Milton Friedman, an ardent defender of floating exchange rates, acknowledged recently that the mark was "extraordinarily overvalued", relative to the dollar <sup>(1)</sup>. Similar divergence between financial value and economic value can also be seen in the equity markets and are often considered as a major reason for reticence of many companies to be listed on public exchange markets.

For many observers, these divergences are an evidence of the financial "bubble", the uncoupling of financial markets from the "real" economy. Markets are no longer a reflection of the underlying economic reality; they have become autonomous. Thus, the value of foreign exchange transactions is about seventy times higher than the value of physical trade flows. Autonomous, markets are self-centered and incestuous: the bulk of transactions in financial markets are carried out between financial intermediaries rather than between these and non-financial clients.

Bubbles cannot inflate indefinitely, they have to burst periodically and often brutally: hence the increasing frequency of financial crashes. Global equity markets have crashed in 1987, in 1989 and again in 1998 and 2000, bond markets collapsed in 1987, 1994 and 1998 every time wiping hundreds of billions of dollars of market value. Losses caused by crashes are so large as to become immaterial. This immateriality is accentuated by an apparent lack of impact on the real economy. Thus, US economy experienced excellent macro-economic performance in 1988 and 1994.

The accusations against financial markets need to be taken seriously. Clearly, the evolution of financial markets has worrisome aspects. Their rapid development accentuates the lag between the speed of the evolution of economic systems and that of political and social structures, creating strong tensions and conflicts and perpetuating a specter of worldwide "meltdown". National and international regulatory authorities such as central banks, Finance ministries and international organizations (IMF or the World Bank) appear unable to control market evolution, particularly as

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(1) Declaration to Reuter Press Agency, reported in *L'Echo*, 15-17 April 1995.

regards international transactions. They live in the mode of permanent crisis management. A feeling of loss of control is widespread and persistent. Numerous projects to remedy this situation have been formulated, including many by high-ranking government officials. Yet, since the early 1980s, practically every ambitious project to reform international monetary reform and to eliminate price volatility has failed.

### **Conventional explanations**

One of the reasons for failure of reform attempts is the lack of understanding of fundamental dynamics of financial markets. Conventional explanations can be classified in two broad and radically opposed schools of thought.

The first school postulates the rationality of financial markets. It is built upon the classical economic theory, according to which a combination of pure competition and abundant information lead to efficient pricing which reflects economic value. The rationality view was used to justify the "floating" exchange rates and underlies the "random walk" theory of securities markets. This theory postulates that in an efficient market, all available information is incorporated in the quoted price of a security and thus at any given time, this is the optimal price<sup>(2)</sup>.

The second school postulates the irrationality of financial markets. This theory looks at the behavior of market participants and takes a pessimistic view of human nature. Financial markets are driven by speculation, by a mix of greed and fear. Market participants indulge in strategic behavior: their actions are determined not only or primarily by their views of the market but by assumptions about the attitude of other participants. Herd instinct is prevalent and explains the constant undershooting or overshooting. According to the irrationality view, abundant information and low transaction costs create excessive liquidity and overabundance of transactions, many of them have no economic justification and only create "noise" which reduces the signalling capacity of the markets. Holders of this view do not believe in self-correcting market mechanisms. Left to their own devices, financial markets will produce pernicious results. They need to be controlled or even restrained. For instance, one of the more prominent members of

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(2) The classic presentation of Random Walk Theory can be found in MALKIEL(1992).

the irrationality school, James Tobin, Nobel Prize in Economics, suggested in 1978, that in order to reduce excessive liquidity, a tax on international financial transactions of speculative nature (TOBIN, 1978). This proposal has become particularly popular in France, where it has been endorsed by Jean Peyrelevade, a leading French financier and present CEO of Crédit Lyonnais, and *Le Monde Diplomatique*. In June 1998, a group of Left-wing intellectuals founded an association, ATTAC, to support the Tobin tax <sup>(3)</sup>. ATTAC has become one of the most active promoters of anti-globalisation movement, which vehemently criticizes the World Bank, IMF and WTC.

Both schools of thought appear somewhat unconvincing. They fail the reality check and lack explanatory power. In fact, markets are simultaneously rational and irrational. It is true that due to the volatility, intrinsic values become difficult to establish, yet markets are often right. Their predictive and corrective power is widely recognized. Thus in the case of pound sterling devaluation in 1992, markets were right and the UK government was wrong: the strong pound was strangling the British economy and the devaluation has had a positive impact on growth and employment, without creating undue inflationary pressures.

In case of securities markets, despite crashes and aberrations, markets do send useful signals about relative performance of companies and economic sectors. These markets have a critical role in the development of technologies, whose impact have been far reaching and long-lasting: personal computers, new media, biotechnology and Internet. One can apply to financial markets the Churchillian definition of democracy: it is the worst solution, except for all the others.

A more important shortcoming of conventional approaches is that they do not provide to key questions about financial markets:

- Why is the volatility so pervasive and persistent?
- What are the pernicious effects of financial markets? For instance, does the exchange rate volatility hamper international trade?
- What are the growth drivers of international finance? Why financial transactions grow more rapidly than underlying "physical" exchanges?

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(3) Association for Financial Taxation for the Aid of Citizens – [www.attac.org](http://www.attac.org)

## ■ An Alternative Approach: Financial Markets as Information Markets

In order to provide at least some elements of answer to those questions, we need a new approach. We would like to recommend such an approach, based on the view of financial markets as information markets.

The starting point for such approach is simple: we should not consider financial markets evolution as a temporary aberration. Markets are too large to consider that they are driven by a small bunch of greed-crazed speculators. Furthermore, market trends have been at work for over twenty years. There is an underlying logic that explain the key features of financial markets.

Our key hypothesis that the information is not only the support for trading of physical goods and services. It has become the principal object of trading. Financial markets are essentially, but not exclusively, information markets. Financial markets are not only in-formation-driven, they are information-focused. Exchange of information, viewpoints, judgments and opinions has become their main function.

This hypothesis is not entirely new. It has been first formulated by Walter Wriston, eminent American banker and Chairman of Citicorp between 1974 to 1984. In a famous statement, Wriston said that "information about money has become more valuable than money itself" (WRISTON, 1992)

The information market hypothesis appears quite helpful in understanding of financial market dynamics. Thus, it provides an explanation of market incestuousness, the pre-dominance of transactions among financial intermediaries. These transactions can be seen as elements of a search process, described by George Stigler in his classical article on the Economics of Information. According to Stigler:

"The larger of the fraction of repetitive (experienced) buyers in the market, the greater the effective amount of search (...)" (STIGLER, 1961).

Furthermore, Stigler shows that the amount of search (the number of transactions in our case) is proportional to the level of expenditures. In our case, this means that biggest players, large financial institutions, are also the most active players. It also means that an increased level of volatility (which increases the level of risk and uncertainty) entails a greater number of transactions. We will come back later to this relationship.

In the information markets, the principal strength of participants is not a detention of financial assets but the mastery of price information. Such mastery can only be acquired through extensive practice of numerous transactions. The growing importance of price information also explains why the providers of this information such as Reuters or Bloomberg have become so powerful and profitable, considerably more than most of their banking clients.

The information market hypothesis offers a plausible explanation of the growth dynamics of financial markets. The globalization of the economy and the increasing variety of physical transactions have created greater uncertainty and thus generated a strong and continuous demand for information. Financial markets are an ideal conduit for displaying and exchanging such information. Higher level of risk and uncertainty also create a strong demand for information about the future. Past can no longer be considered as a reliable guide to the future. Derivative markets represent an aggregation of collective views about the future. Since such views are more valuable to market participants than the information about the past, the demand for former is relatively greater the demand for the latter, hence the higher rate of growth.

### **Information as an economic good**

If the exchange of information is the focus of financial market transactions, it is useful to inquire about the nature of information as an economic good. Using the framework, developed above, information appears as an intangible good, to the extent that its value is determined primarily not by its physical support but by its immaterial content.

Consumption of information is non-subtractive. Moreover, their property is shared not only among many consumers but also between sellers and buyers. Why a seller of a physical good loses its property, a seller of information can continue to use it. Although information can be exclusive and produced for a use of a specific individual or a group, such exclusivity cannot be durably maintained. This is because the marginal cost of consuming an intangible artifact is very low. A fundamental reason is that intangible artifacts are fungible: separation into discrete units is difficult, arbitrary and unstable. They are simultaneously lumpy and infinitely divisible. Like a witch in the enchanted forest, artifacts with identical content can appear in various disguises and shapes, in function of their physical support: a same information can be printed, shown on television, spoken

over a radio network, distributed via an on-line network and so on. Each time it is the same information and yet, each time, it is a different artifact.

Traditionally, it was difficult if not impossible to dissociate content from its physical support. The growing dematerialisation of the economy means that content can now be more easily dissociated from the support; particularly if the former is in the digital form. Nevertheless, the property of jointness has not disappeared. Accessing information through Internet requires infrastructure and interfaces, which are distinct from the information itself.

### **Information markets**

Information is structurally abundant. Every economic activity produces more information than it consumes. Information supply and demand are self-sustaining and feed off each other in an ever-expanding growth spiral. This interaction is further stimulated by the way the information is valued and priced. The information value is content-based. But this value is largely determined, on the one hand, by the context and, on the other hand, by the ability to associate and to relate a piece of information to other information. The objective of search for information is not only to find the right information but also to establish correlations and relationships between different data. A data on a price of a given commodity is more valuable to us if it can be compared with its past evolution (time series) or with prices of related commodities. Information markets are associative. An association and comparison of data can be created either by the supplier or by the user. Thus the same information can be used as a final product or as a raw material. This means that the value of information cannot be firmly established prior to a buyer-seller transaction, because it changes as a result of the transaction. In technical terms, information asymmetry between the buyer and the seller evolves constantly through their interactions. More importantly, one of the main purposes of financial market transactions is the reduction of information asymmetry.

Not only different users value the same information differently but, over time, the same information can be valued very differently by the same user. Moreover, while the value of information changes continuously over time, this change is not linear. Financial markets provide numerous examples of major price discontinuities. Prior to market opening, an inside information about a given company's financial situation is worth millions or tens of millions of dollars. After the information has been published and for few

minutes during which the market is absorbing it, it is still valuable. Once the market has absorbed it becomes worthless. To make things even more complicated, one can observe in the information markets the coexistence of continuities and discontinuities. For a given financial instrument, a bond or an equity, one can observe small variations over short term, large variations over long-term and clear or even linear trends over long-term.

### ***Pricing difficulties***

Valuation problems are further compounded by difficulties of establishing appropriate pricing mechanisms. Information cannot be sold as a discrete and homogeneous good. It is always sold as a joint product, content and support and often sold in bulk. Pricing mechanisms are often determined by the supply considerations, the ease of capture of the physical support or the ease of delivery. A price of a book is not a function of its content but of the cost of its production. And yet, the value of information bears little relationship to the cost of producing it. Willingness to pay is very difficult to establish, not only because the value of information changes constantly over time but because of extensive externalities. Opportunities for freeloading are numerous and their cost is low. Conversely costs of controlling and policing the freeloaders are very high and often superior to the revenue generated. Furthermore, information is inherently incestuous; its producers are also its consumers. If we look around institutions seen as major producers of information, universities, medias, banks or insurance companies, is it not true that they consume internally the bulk of information 'output' they produce? This means simply that the very large share of information generated are consumed free of charge. Some information suppliers recognize it explicitly: thus all newspapers assert proudly that each copy of their paper is read by 4 or 5 people: one paying customer for three or five "freeloaders"! Even when payment actually takes place, different pricing arrangements can apply to similar information artifacts. In the information market, give-aways, subsidies (through advertising), cross-subsidies, indirect (third-party) payments, composite or bundled prices are a rule rather than exception.

Thus, information markets are simultaneously highly efficient and liquid and riddled with externalities and imperfections, which explains their complexity and instability.

Let us conclude this summary overview of information as an economic good by noting a schizophrenic way in which economists approach the

fundamental relationship between information and uncertainty. For the classical economic theory, the relationship is simple: the role of information is to reduce the uncertainty: more there is information, less there is uncertainty. Yet for the financial economists such as Charles Goodhart, the relationship is strikingly different: uncertainty determines the value of information (GOODHART, 1975). Higher the uncertainty, higher the value of information. This view is consistent with the Communication theory of Claude Shannon, which provides the theoretical underpinning for the development of modern telecommunications and informatics (SHANNON & WEAVER, 1947).

## ■ Some Implications

What implications can be drawn for this overview for this approach of financial markets ?

### **Inherent and persistent instability**

First of all, under the information market approach, there is no stable price equilibrium. In physical goods market, it is easy to identify discrete transactions and there is a "natural" balance between buyers and sellers. Given the exclusive nature of the consumption of physical goods, buyers and sellers usually distinct and a connection between a given good and its price is direct and unequivocal. This is not true in markets for information. There, transactions form a continuous process and the relationships between goods and prices are complex. Furthermore, due to the shared nature of information, there can be multiple sellers for a single buyer and vice versa. The rapid diffusion of information encourages a disequilibrium between buyers and sellers: it is very dangerous to go against market consensus, to be a single buyer when everybody else is selling or vice versa. Hence the well-known propensity of financial markets to herd. There are many striking examples of herding. For instance, in February 1994, there was a huge crash in US government bond market, with worldwide losses totalling 1.5 trillion dollars. Following a Federal Reserve decision to increase short-term interest, long-term interest rates rose as well, thus lowering the price of long-term bonds. Because this rise was unexpected, the fall in bond prices was dramatic. In the aftermath of the crash, *Fortune Magazine* carried a survey of portfolio managers to find out how many of them correctly anticipated the evolution of interest rates and position their

portfolio accordingly. Out of some 1000 managers surveyed, they found exactly four who have correctly anticipated the direction of interest rate movement (EHRBAR, 1994). Thus, contrary to popular belief, the greater availability of information does not necessarily lead to a greater dispersion of views and positions and it may actually lead to greater homogeneity, which can only breed instability.

### **Anticipation**

Instability is further stimulated by anticipatory nature of financial markets. Information about the past is widely known and certain and its direct value is falling. Thus the views about the future, less known and inherently uncertain, become main objects of trading. This explains a paradoxical behavior of financial markets. For instance, the value of some stocks fall on good news, while the value of others rise on bad news. The reason that those news are compared to prior expectations. Thus, if market analysts anticipate that a given company will grow at 50% rate over the next year, and the company only grows at 40% rate, its stock will fall when the actual growth rate is announced. And, if the market anticipates that another company will experience substantial losses, should the actual losses be lower than the market anticipation, the stock price of the losing company would rise.

The search for information about the future has not only given existing markets a more anticipatory character but also led to the creation of markets dedicated exclusively to trading on future information: forward, future and options markets. As information about the future is fundamentally and irreducibly uncertain, anticipatory markets are inherently more volatile than markets that aggregate past information. Thus, derivative markets are more volatile than the cash markets.

Our analysis suggests that the volatility of financial markets is largely linked to their anticipatory nature. Higher the anticipatory content of information, higher the volatility. As anticipatory markets are more information-rich and efficient, higher the information content, higher its volatility. Thus the relationship between information and volatility mirrors the relationship between information and uncertainty. This explanation, while radically different from that offered by traditional economic theory, appears consistent with observed market behavior. It explains for instance not only the persistence of volatility but also the coexistence of volatility and liquidity. Traditional analysis of markets postulates that volatility limits

liquidity. While it is true that at some levels, volatility leads to market breaks, such as one seen in Chicago futures markets in October 1987, it can be argued that in anticipatory markets volatility is a necessary condition of liquidity, a fundamental mechanism to cope with information disequilibrium.

### **Strategic behavior**

Another reason for fundamental instability of financial markets is their structure and the resulting attitudes of market participants.

We have noted the incestuousness of financial markets. Under information market approach, the main reason for this incestuousness is that financial institutions are simultaneously largest producers and consumers of financial information. This means that they are simultaneously buyers and sellers. In technical terms, they are market-makers, displaying to the market two-way prices, the buy price and the sell price, the former being preferably lower than the latter.

This two-way approach reflect a fundamental ambivalence of information: for any market participants, information is their biggest asset but also their largest liability. They can make huge profits from the information trading but also huge, potentially fatal losses. Thus, they constantly grapple with major dilemmas: how much information to disclose? How active to be in the market? How to balance aggressive information trading and risk management? If they do not disclose their views and information they hold, nobody will trade with them. If they disclose too much, the size of position they hold in a given instrument, for instance, other participants will take advantage of it, causing large losses. Furthermore, in an information-intensive market, any advantage from exclusive access to information is short-lived and has to be capitalized upon quickly.

In order to cope with this dilemma and associated risks, market participants adopt a range of strategic attitudes. Not only they constantly look for new and more forward-looking information, they also seek to anticipate reactions of other participants. This goes well-beyond what Keynes described as "beauty contest" approach: in order to choose the most beautiful girl one need to consider not only his own preference but also that of other judges (KEYNES, 1936; ORLEAN, 1989 and THALER, 1991). Sophisticated players are looking for second and third order derivatives and seek manipulate the signalling aspects of their transactions.

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In the financial market context, greater information transparency does not reduce the risks to the participants, to the contrary it may increase it. Thus markets players often seek to limit transparency, to make market more viscous, by introducing zones and periods of opacity. The viscosity is a particular concern of marketmakers, who want to hide the size of their positions. In foreign exchange markets, where transaction size is very large, all prices quoted on broadcasting networks such as Reuters or Telerate are indicative and have to be negotiated on a bilateral basis. In equity markets, such as London Stock Exchange, price quotes displayed on public information networks are binding up to certain quantities but, until recently, market makers did not have to publish their large transactions. This ability to hide position has generated considerable controversy between partisans of transparency and marketmakers who argue that the premature disclosure created an unacceptable risk level and therefore they would be unwilling to engage in large transactions (London Stock Exchange, 1995).

The risk of transparency and marketmaking explains the persistence of brokers in a market with abundant information flows, and therefore *a priori* susceptible to disintermediation. Those brokers no longer intermediate between end-clients and financial institutions but between marketmakers (inter-dealer brokers).

Market regulators are continuously trying to strike a right balance between transparency and opacity but such balance appears elusive as it is quite difficult to set hard and fast rules, applicable all the time to all markets.

### **Network of networks**

The fact is that, in the world of global economy and geofinance, markets remain remarkably diverse and this diversity is growing. Financial markets should be seen as a loose set of interconnected markets rather than a single tightly integrated market. They constitute a network of networks, a financial equivalent of Internet. Not only, there are different markets for different instruments, foreign exchange, bonds, equities but within single instrument, market structures can vary considerably. For instance, within equity markets, it is customary to distinguish between order-driven markets, where all orders are transacted in a single market place, and quote-driven markets, where transactions are carried out by competing market-makers. A specific academic discipline, market microstructure analysis, has been created to deal with the issues of various structures of equity markets (COHEN, MALER, SCHWARTZ & WHITCOMB, 1986; GILLET & MINGUET, 1994).

The persistence of market diversity and fragmentation can be explained by the strategic behavior of market participants seeking to preserve their particular mix of transparency and opacity and the concerns of regulatory authorities, who want to maintain control of markets. But it is also a reflection of fundamentally heterogeneous nature of information. Information should not be seen as one large and undifferentiated flow of bits. Rather it is comprised of thousand of distinct if interrelated streams of data, images and symbols.

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