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**INTANGIBLE ECONOMY AND ELECTRONIC MONEY
By Charles Goldfinger**

**OECD Forum for the Future Conference on
"THE FUTURE OF MONEY"**

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OECD FORUM FOR THE FUTURE

Conference on

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INTANGIBLE ECONOMY AND ELECTRONIC MONEY ?

BY

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INTRODUCTION : FULCRUM OF PARADOXES

Money is a fulcrum of paradoxes. It is, in famous characterisation by Simmel, heartless and yet, according to Zelizer, deeply emotional, ubiquitous but elusive, uniform as well as endlessly varied. The paradox we shall explore here is that of the relationship between money and economic systems. This relationship is simultaneously tight and loose. It is tight, to the extent that money appears as a fundamental dimension of the economy, a yardstick by which its growth and wealth accumulation are being measured. The difference in monetary systems can be used to discriminate among various economic systems. Thus, fiduciary money was the dominant monetary systems in the feudal economy and the emergence of capitalist economy was accompanied and facilitated by the development of scriptural money. Monetisation of the economy, general use of money to effect transactions and establish prices, was seen as a major vector of transition from the feudal to capitalist economy. But the relationship goes deeper. Money has been the lever of power, whether economic and political, in what Carlyle (and more recently Ferguson) called the “cash nexus.” It is also a vector of expression and measurement of social value and preferences.

And yet, relationships between money and economic systems can also be characterised as if not loose at least relatively autonomous. Both fiduciary and scriptural money have been created in the antiquity, long before the emergence of feudal and capitalist systems. The path of their evolution has been long rather than short, circuitous rather than linear, agitated rather than smooth. It is rarely guided by a grand overriding design. Most often, changes in monetary systems result from limited actions aiming to solve particular problems. It is an accumulation of incremental changes that periodically leads to massive systemic shifts. Money itself is a multifarious phenomenon. The two broad categories cover a wide variety of specific currencies, which are backed by distinct institutional arrangements for issuing and settling them. Over time, these arrangements have become ever more complex. This complexity stems partially from the coexistence of various currencies and forms of money. Thus fiduciary money managed by central banks coexists and interacts with scriptural monies managed by commercial banks. National, regional and global monetary systems are all composite, their internal structure and boundaries constantly changing.

Clearly, the evolution of monetary systems has been strongly shaped by economic and political requirements: trade facilitation for the private sector, debt funding for the public authorities. But the causality has been bi-directional, monetary developments strongly impacting economic systems and their performance. This impact has not always been symbiotic. Money often proved a recalcitrant instrument, its logic defying goals imposed by its putative masters and triggering, in the apt sentence of Charles Kindleberger, “manias, panics and crashes”. Management of money has never been a deterministic endeavour that could be put on automatic pilot. Rather, it is a discretionary undertaking requiring constant attention and a deft touch.

The relationship between monetary and economic systems is a dynamic process. There is a broad public consensus that the underlying trend is one of a growing importance and visibility of money. As money becomes more ubiquitous throughout the economy, it morphs into a self-sustained financial system, where money is simultaneously the support and the object of economic exchanges. Its complexity increases, transparency decreases and behaviour becomes ever more difficult to comprehend and to predict. Omnipresence of markets has changed the nature of value determination. Value is no longer established by reference to some objective and immutable rules and yardsticks. Instead, it is a result of a trading process, which makes it unstable and path-dependant.

As a result, the economic system is subject to chronic volatility and frequent shocks. The invisible hand becomes conspicuous, but more importantly its benevolence can no longer be assumed. For many observers, the financial system got out of hand and the hypertrophied “artificial” financial economy is literally a vampire that drains the “real” economy. And money, electronic, global and uncontrollable, is the weapon of destruction. For instance, Joel Kurtzman, who, having worked as Editor of Fortune and Harvard Business Review and having collaborated closely with Michael Milken, can hardly be suspected of an anti-

capitalist bias, deplores the emergence of "megabyte money", which he believes will destabilize the world economy and provoke financial chaos.

Criticism of the excessive importance of money is a long-standing tradition in social sciences. There is however a crucial difference between past and current criticism. Thinkers such as Marx or Simmel accused money of being a tool that put society at the service of the economy. They saw money as the all-powerful lever of economic uniformisation and integration. New critics agree on the pervasive nature of money but paint the financial system as a mechanism that destructures and destroys the economy. They question its utility and rationality.

The financial economy also has its vocal and enthusiastic defenders, who applaud its ability to transfer resources and allocate capital rapidly and massively. They see it as a vehicle of creative destruction, a ruthless but efficient mechanism to promote innovation and eliminate obstacles to growth and development.

In any case, the view that the financial economy is running amok is an oversimplification. The hypergrowth of the financial economy has not taken place in a vacuum. It is favoured by the peculiarities of the evolution of the real economy, which we shall discuss below. Furthermore, this evolution has also impacted the nature of financial markets.

The history of the relationship between money and the economy is instructive as a general framework to provide broad analogies. Revolutionary change is an useful example of such an analogy. We live in a period of radical transformation of the economy, which is comparable to that of the earth-shattering transition from feudal to capitalist economy. To the extent that this transition was accompanied by and stimulated by the emergence of an institutionalised banking sector and the concomitant development of scriptural money, we can ask ourselves whether the current economic transformation will stimulate the emergence of the new financial intermediaries and of a new form of money. We believe that this is the case: the emerging new economy, which we call the "intangible economy", fuels the spread of the market as the primary intermediation mechanism and the deployment of electronic money, both of which in return accelerate the transition.

History can also enhance our understanding by highlighting critical differences between the past and the present. One such a difference is the technology of money. Both fiduciary and scriptural money require specific technologies and infrastructure to produce, circulate and settle currency. However, these technologies were confined to the monetary realm and thus tightly controlled by the money issuers, who did their best to keep them out of sight and public scrutiny. In the case of electronic money, technology is pervasive and transcends the monetary domain. The technology of money becomes more visible and hence more widely used. At the same time that technology becomes embedded in money, it becomes more difficult to control by those who traditionally regulate the monetary and financial systems.

This paper will elaborate on the postulate of a close and mutually reinforcing relationship between the intangible economy, the triumph of markets and the flow of electronic money. We will first review the key characteristics of intangible economy, before looking at the dynamics of markets. We shall then look at various definitions of electronic money, before providing an alternative definition, stressing its systemic character. Afterwards, we will outline the core alternatives for future developments of money and highlight their interactions. Future developments will then be reviewed from the viewpoint of the risks and opportunities they are likely to generate. In conclusion, we shall take a look at the future trajectory of electronic money and its critical policy challenges, the need for new technology based governance frameworks.

1. BACKGROUND: THE NEW ECONOMIC LANDSCAPE

Measurement gaps and Griliches' paradox

That the economy is undergoing a far-reaching and ubiquitous change would seem a largely incontrovertible statement, practically a conventional wisdom. Knowledge Economy, Digital Economy, Information Society, Third Wave... names for the new economy proliferate to the point of becoming omnipresent buzzwords. Yet, can we say that we really understand the current economic evolution? Do we agree on its rationale and development path? The answer to those questions is clearly no. Economists and statisticians, whose role it is to explain the workings of the economy and to provide performance and value metrics, are perplexed and bewildered. Despite increased data sophistication and availability, substantive deficiencies, concerning such key economic variables as productivity, foreign trade, investment and financial accounting measures, remain. According to Zvi Griliches, author of ground-breaking work on measurement, the share of economy measured with a degree of accuracy by official statistics fell from 50 to 30% between 1947 and 1990. Weaknesses are most pronounced in the areas which are most dynamic and trend setting such as services or information technology. Call it Griliches' paradox: in this age of "information revolution" and "knowledge economy," measurement systems shed little light on activities where information and knowledge are generated.

Three key trends

This paradox may seem amazing, to the extent that the key trends appear well-established and documented. We can identify three such trends:

- The changing profile of employment and the output structure. The share of industry and agriculture, both in total output and in employment, is falling steadily. Services represent the lion's share of both employment and output and constitute the principal source of employment growth.
- Globalisation. Foreign trade has been growing more rapidly than the world's output for decades. International organisations, such as the World Bank and IMF, base their activities on the assumption that world trade will continue to grow at roughly twice the rate of world output. The international trade of final goods is accompanied by a massive crossborder deployment of production facilities, distribution networks, technologies and people. Global deployment of supply resources, in particular foreign direct investment (FDI), has been growing at an even higher rate.
- The ubiquity of Information Technology. Information Technology (IT) - computers, telecommunications and associated products and services - is recognised as a structural vector that influences all economic activities. The speed and the magnitude of technical progress are staggering and combine tremendous increases in quality with a continuing decline in prices. A Pentium-based PC offers today several thousand times as much processing power as the mainframe of the 1970s, at a price that is less than 1% of the latter. Increase in the capacity of telecommunications and concomitant price reductions are even more impressive. The development of IT has engendered a huge economic domain, whose global size is estimated at between 600 and 1100 billion dollars. In the US, since 1991 capital investment in Information Technology exceeds investment in traditional machinery and equipment.

And yet, while there is broad agreement on the existence of these three trends, there is no real consensus on their magnitude, their underlying drivers and, more importantly, on their economic impact. Each trend is a subject of intense and yet inconclusive controversies.

Although services represent the largest share of GDP and employment in all OECD countries and their share continues to grow, their measurement remain based on what can be called a “residual” approach: services include all activities which cannot be classified as either manufacturing or agriculture. This results in a tremendous heterogeneity. Services range from low-paying, low productivity, labour-intensive and very local activities such as restaurants to highly-paid, high productivity, capital-intensive and global activities such as financial trading. Some services are immobile and non-tradable, others are extremely mobile and highly tradable. Certain services are subject to diseconomies of scale (household services), while others are the prime beneficiaries of economies of scale (telecommunications). This heterogeneity makes it difficult to agree on a meaningful aggregate definition of services.

In turn, confusion over the definition of services is a key element of the controversies about globalisation and Information Technology.

The conventional view of services is that they are less tradable than physical goods. This view is apparently corroborated by international trade statistics, based on IMF balance of payments data, showing that services represent some 20% of the world trade and this share remains relatively stable. And yet, evidence that trade in services grows much more rapidly than that in goods is compelling. More importantly, crossborder services flows – telecommunications, media and finance - constitute the very bloodline of globalisation. International voice traffic has been growing at some 16% a year. Based on firm-level information, the crossborder data traffic is growing much more rapidly than voice. According to study by Varian and Lyman in 2000, the global production of magnetic support data grows by 70% a year.

Direct satellite and mixed satellite-cable networks flood our TVs twenty four hours a day, seven days a week, with streams of images from around the world. Each year, some 40 millions hours of original TV programming are produced, corresponding to over 100 000 hours per day, of which 10% to 20% are exported.

Global financial transactions dominate physical trade flows: the value of foreign currency trading alone averaged 1.1 trillion dollars a day in 2000, more than fifty times greater than the daily physical trade volume of approximately 20 billion dollars.

Yet despite their size, visibility and intensity, global telecommunications, media and financial flows remain at the periphery of conventional economic measurement frameworks. This leads to misleading statements like the claim that the level of globalisation today is not higher than it was in the XIXth century. This assertion is based on physical trade data, but ignores the other flows, which weave an ever more dense global mesh of economic activities and entities.

The economic impact of Information Technology remains highly contentious. The controversy revolves around what Robert Solow called in 1987 a “computer paradox”: computers are visible everywhere except in the final output. Actually, the period of massive IT investment in the 1980s coincided with productivity slowdown, which was particularly apparent in services.

The computer paradox prompted a large number of studies, many of which were based on detailed sectoral and firm-level data. Yet, opinions remain as polarised as ever. One group of analysts affirms that the computer paradox is simply a by-product of inadequate data and that detailed studies show a significant technology pay-off, with return on investment often in excess of 50%. They believe that the IT investment was a major factor in the excellent performance of the US economy in the late 1990s. Thus, Dale Jorgenson believes that information technology has permanently raised the long-term growth rate of the US economy. On the other hand, sceptics persevere. For instance, Robert Gordon forcefully argues that the impact of IT has been limited and temporary.

Despite their intensity and the apparent wealth of data and the critical importance of their subject matter, controversies about the economic impact of services, globalisation and Information Technology remain

inconclusive. Beyond the arguments about data accuracy and measurement approaches, the core issue is the relevance of underlying conceptual models and assumptions. The crucial assumptions of the existing macroeconomic framework - focus on physical goods production and trade, stable sectoral groupings and classifications, neglect of non-material cross-border flows - are grounded in a specific vision of the economy, which has not fundamentally changed since Adam Smith and which postulates the production of physical goods as the main source of value. These assumptions and the underlying vision can no longer be considered universally valid. Alternative approaches such as the service economy or the information economy are widely known yet little progress has been made in making them conceptually more robust and operationally more relevant. Both approaches remain largely on the periphery of mainstream economics and statistics.

Defining trend: shift to the intangible

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

We would like to propose an alternative framework, based on an all-encompassing 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. On the demand side, we consume more and more content-based artefacts of information and entertainment. On the supply side, intangible assets such as brand, human capital, intellectual property and knowledge have become major determinants of companies' performance and value. Welcome to the intangible economy.

The well-known three stages theory of economic evolution can thus be reformulated. 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.

The shift to the intangible is general and long-lasting. It affects all sectors and all aspects of economic life. According to Peter Drucker, the relative share of raw materials in manufacturing output has been decreasing at an annual rate of about 1% a year since the end of World War II. Conversely, since the 1880s, the relative contribution of information and knowledge to manufacturing output has been growing at the same rate. The upshot of this trend is the remarkable increase in economic value added per unit of weight, as shown in the table below.

EVOLVING PRICE-WEIGHT RELATIONSHIP

Product	Price in USD	Weight in lbs	Unit price USD per lbs
Pentium III	851	0,001984	42 893,00
Viagra	8	0,00068	11 766,00
Gold	301	0,06254	827,00
Mercedes Benz E-class	78 445	4134,00	19,00
Hot rolled steel	370	2000,00	0,20

Source : G.Colvin, Fortun

The shift to the intangible is often seen as a purely technology -driven phenomenon, hence the frequent characterisation of the new economy as the Internet or digital economy. This is a misleading oversimplification. Although IT is a cardinal vector of the intangible economy, it is not the only one. The emergence of the intangible economy owes at least as much to basic trends in consumer behaviour and in the business environment. The shift towards higher relative demand for leisure, information and knowledge is a long-lasting trend in consumer behaviour: for instance, the share of services in household consumption in France has increased from 42% in 1970 to 51% in 1990. Business innovations such as brand -driven competition and cost-based accounting led firms to pay greater attention to the management of intangible assets.

The point here is not to argue a specific causality relationship, an arduous and ultimately futile task, but rather to avoid the fallacy of technological determinism. While the trend toward digitalisation and network proliferation is unmistakable, its economic and business impact remains unclear and the range of potential outcomes is wide open. The intangible economy is non -deterministic and transcends Negroponte's opposition between bits and atoms the same way that quantum physics transcends the opposition between particles and waves.

Difficult to ignore, the intangible economy remains nevertheless hard to define and does not easily fit into standard economic categories. To understand the intangible economy, we propose to approach it from three different but complementary perspectives:

- Demand perspective: Intangible artefacts: final output for household consumption.
- Supply perspective: Intangible assets, used by firms to establish and maintain their competitive position and survival. They include: brands, intellectual property, 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.

Demand: Intangible artefacts

Intangible artefacts include various forms of information and communication, high and low culture, audio-visual media, entertainment and leisure, and of course financial services, the ultimate intangible.

All artefacts are joint products, combining intangible content with physical support: a song with a magnetic disc for an audio CD; history and a building site for a classical monument. Traditionally, content and support were tightly linked, making them unique or reproducible on a small-scale only. The development of storage and content replication technologies loosened the links. Like a dragon in a tale, identical content appears in various shapes and disguises: a song can be sung live, pressed on a CD or shown as a video-clip. The dissociation of content and support led to the proliferation of intangible artefacts in two ways. First, it lifted capacity constraints limiting. A sports game could be only watched by those who could physically attend the stadium. Today, television can multiply the number of spectators ad infinitum. One could argue that stadium attendance and watching a sport event on TV are two distinct artefacts, with different consumption, distribution and pricing characteristics. That is precisely the second dimension 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 ability to generate such families is what makes companies such as Disney successful: each film concept generates not only movies but also videos, park attractions, books, toys and other sources of revenues, thus leveraging the content by a factor of two to four.

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," comparable to fresh air or to national defence, whose consumption cannot be limited to a single consumer and therefore is inherently collective. We prefer to use the term "shared good," to the extent that sharing is a notable property of intangible artefacts. It can be sequential or simultaneous. However, simultaneity in time does not mean unity in space: information technology makes it possible to consume the same artefact in several locations. Intangible artefacts create their own space-time which lifts the constraints of geography.

Sharing affects critical aspects of intangible artefacts transactions such as the allocation of property rights. While a seller of a physical good loses his property rights to it, an intangible artefact seller continues to hold them.

Intangible assets

The shift to the ethereal is not limited to demand. On the supply side, it is stimulated by the growing importance of intangible assets.

At first glance, intangible assets appear better defined than intangible artefacts. Statisticians and accountants have long recognised that capital accumulation and asset deployment means more than the acquisition of physical plant and equipment.

The share of intangible investment is expanding relative to physical investment. According to INSEE, intangible investment represented 30% of total investment in 1992 in France and was growing at a quicker rate than the traditional fixed assets. Partial evidence suggests that in other countries, such as the UK, the percentage is even higher.

The notion that the intangible assets are more important to business performance and survival of a firm than its physical assets is now a conventional wisdom. 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. Attempts are being made to quantify this “brand equity.” An American business monthly, Financial World, publishes each year a brands valuation survey. For leading brands such as Coca-Cola, Marlboro or Intel, brand valuation largely exceeds their total balance sheet.

Acknowledgement of the importance of intangible assets is not limited to brands. Intellectual property - patents, trademarks, technological know-how - is considered a critical competitive weapon, particularly in software, electronics and biotechnology. Its control 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, apparently extravagant amounts paid for media assets, such as Hollywood studios or newspapers, is justified by the value attributed to brands, contents and publishing rights.

The problem of intangible assets is not the dearth of measurement. Rather, it is the consistency of approaches. While managers live and die by intangible assets, many accountants are still reluctant to include them in official accounts. Microsoft considers software development, its core competence, as an expense and writes it off in the year incurred. English football clubs do not include the value of their players in their accounts. Reuters, the leading electronic information provider, acknowledges that its balance sheet does not include the global databases of financial information or its software and other intellectual property.

Just as intangible artefacts differ markedly from material goods, intangible assets are not like tangible assets. First, they are heterogeneous: 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 one. When a plant adds a machine, it can easily quantify the potential output increase. On the other hand, when a computer department hires a programmer, it cannot predict with certainty either the quantity or, more importantly, the quality of his/her contribution. Also, intangible assets are difficult to separate from current expenditures. Whether an advertising outlay can be classified as current expenditure or investment depends on its purpose. Similarly, not all training or software expenditures can be treated as investment.

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, still others follow non-linear and often unpredictable life cycles.

Thus traditional asset valuation methods cannot be applied. The historical cost of acquiring or creating an intangible asset is largely irrelevant. Asset heterogeneity makes it difficult to calculate the opportunity costs. A market or transaction-based approach also has serious pitfalls. For most intangible assets, markets are very narrow and extremely imperfect and transaction-based values are subject to wide fluctuations. Thus, the range of methods used to value intangible assets is getting larger, making the consensus on measurement of their value ever more elusive.

Dematerialisation logic

The impact of the intangible economy is not limited to intangible artefacts and assets. The logic of dematerialisation is omnipresent and affects all sectors and activities, new and old. It profoundly transforms the ways firms and markets are organised and their economic transactions are carried out.

Dematerialisation logic is unsettling: it runs squarely against some of the key tenets of the conventional logic of economics. The conventional logic is concerned with scarcity, the dematerialisation logic with abundance. The former stresses equilibrium; the latter, disequilibrium. Obsolescence, redundancy and volatility, which have been perceived in the past as pernicious epiphenomena now constitute essential and necessary vectors which shape consumption patterns and supply-side resource deployment.

Abundance: the wager economy and the bookstore effect

The intangible economy is structurally abundant. Abundance, of course, is not a new phenomenon. The productive potential of the industrial economy is enormous. 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 eliminated through consumption. The intangible economy superimposes on the abundance of production the abundance of accumulation. Financial systems generate too many transactions; Hollywood, too much entertainment; the Internet, too much information. The ongoing deregulation of markets for intangibles along with technological evolution continue to extend the magnitude of the gap between supply and demand of intangible artefacts. For instance, the number of television channels in the European Union increased from 40 in 1980 to 150 in 1994 and over 200 in 2000. Moreover, the gap is self-perpetuating: to navigate through the information overload we need catalogues, indexes, documentation, whose very proliferation calls for more cross-references, hypertext links and so on. Information about information is a growing business.

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, one in 4000 synthesised compounds ever makes it to market and only 30% of those recover their development costs. In consumer goods, over 80% of new products launched in the United States fail within two years. Furthermore, the cost of new product launch is rising rapidly: 50 million dollars for a movie, 250 millions for a new drug, several billions for a new car.

And yet, despite this dismal outlook, the pace of introduction of new products is not slackening. This has become a wager economy: higher and higher stakes against lower and lower odds. As long as a player remains at the table, she has a non-zero probability to recoup her losses. Only if she quits does her loss become final.

Another reason for a continuous new product generation is what can be called the "bookstore" effect. The best bookstore is one that offers the widest choice and thus stimulates browsing, which leads to greater consumption. It is however not enough to have a wide assortment, it is also important to keep it current, hence the need for continuing new product introductions. The bookstore effect explains for example why 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 also has a major impact on the notion of capacity and the use of productive assets. While in the industrial economy excess capacity is synonymous with costly inefficiency, in the intangible economy it is widespread, functional and inexpensive. It is functional, as it enables users and producers to cope with demand volatility. Excess capacity is inexpensive because the key flows are those of information rather than 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 Information Technology realm, 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 changing nature of the firm

The intangible economy undermines traditional frontiers and distinctions. Sectoral boundaries are crumbling: previously separate activities of telecommunication, informatics, electronics and audio -visual media 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 but a fundamental trend. The intangible economy does not follow the rules of binary logic, of exclusivity but that of fuzzy logic, of overlapping.

The interpenetration profoundly changes the nature of the firm and its relationships with the environment. Internal links, between firms and their employees, become weaker; external links, between firms and suppliers become 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, a leader in sport shoes, does not manufacture any shoes. Nor does Dell, a leading supplier of computers, own any production plants. In computer services, outsourcing is one of the highest growth sectors.

Dematerialisation logic ends the information asymmetry between producers and consumers. and thus alter the market power balance. Today in many businesses, the customer knows as much about products and markets as the supplier. This entails not only substantial end -user price declines, due to the loss of the supplier's market power, but also an unbundling of the production and assembly processes. The unbundling is particularly apparent in the Information Technology domain. Software applications and corporate 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 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.

These developments suggest 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. 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.

Changing nature of value and value discovery mechanisms

The intangible economy changes not only the fundamental nature of economic value but also the value discovery and capture process. Conventional pricing mechanisms are largely inadequate to capture the economic value of intangible artefacts. The two standard approaches are difficult to apply. Production costs/marginal costs cannot be used as guide for pricing when marginal costs are falling or nil. Moreover, there is no proportionality between inputs and outputs. Mass consumption does not imply mass production. Economies of scale for intangible artefacts are often determined by consumption rather than by production.

The willingness to pay approach also has serious pitfalls, given the ease of replication and sharing and associated externalities. For intangible artefacts, purchase does not equal consumption (how many people read all the books they buy?) and consumption does not necessarily imply purchase: in newspapers or in broadcast television, the number of "free riders" far exceeds that of paying consumers. Another problem,

which particularly affects informational artefacts, is what Stiglitz called the “infinite regress”: it is impossible to determine the value of a given piece of information without having this information.

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 quality of the printing, and largely ignored the content variation: the price for an excellent book was the same as the price of a bad one.

The greater dissociation creates opportunities for unbundling: the content can now be priced separately from the support. Price discrimination becomes more common. Commercial on-line services, for instance differentiate between standard and premium services, which are sold at higher prices. Yet, bundling has its advantages, in particular the simplicity of administration. It facilitates pricing of composite artefacts (multimedia software or amusement parks). Bundling also allows cross-subsidies between artefacts that are profitable and those which are less profitable but nevertheless essential for a full service offering. 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, 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 shareware or freeware over a network.

The Internet provides a fascinating laboratory of pricing approaches through various combinations of selling, sharing and giving away. The debate about the respective merits of those approaches is quite lively. Some argue that the development of metering technologies, which measure the detailed use of a given software, makes variable usage-driven pricing feasible. 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.

As pricing of intangibles focuses more on content, it highlights the inherent instability and volatility of valuation becomes structural. Fixed yardsticks and benchmarks lose their pertinence and relevance. It is no longer possible to define absolute value, everything becomes relative. Economic value is now highly context-dependent and time-sensitive: from one transaction to next, the price can change dramatically. This structural volatility contagion affects not only intangible artefacts but also traditional industrial goods as well as production inputs.

Markets for intangibles and intangible markets

The loss of stable benchmarks leads to greater use of markets as the prime value discovery and transaction mechanism. The growing importance and visibility of markets constitutes one of the essential traits of the intangible economy. This is the era of markets triumphant and, as Bryant and Farrell put it, unbound.

At the same time, markets themselves undergo a substantive alteration. Their main purpose is no longer to support the trading of physical goods but to facilitate exchanges of intangibles, such as information. This does not mean that markets for physical goods have disappeared or become 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 dematerialisation logic.

Peculiar characteristics of intangibles lead many analysts to argue that they should not be traded through traditional markets. Ronald Coase attacked this argument and suggested that the market for ideas should be approached in the same manner as the market for goods. We would like to put forward a variation of this suggestion: markets for goods should be treated as a special case of markets for intangibles.

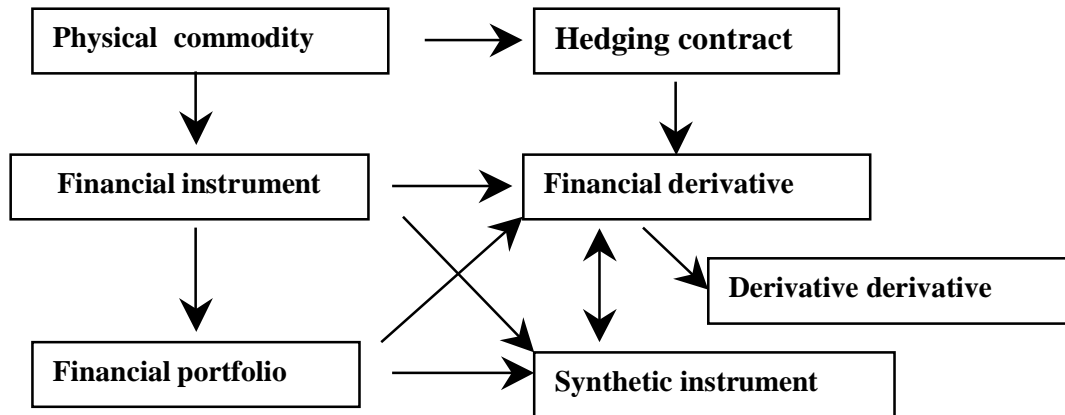
In any case, the distinction becomes more and more tenuous, all markets become more and more intangible both in terms of underlying products traded and in the way they operate. Take their most visible form, the

financial markets. Over last thirty years, these have become enormous: foreign exchange transactions volume is close to 1 100 trillion dollars a day. While international trade is growing at a single digit rate, international financial transactions grow at a double digit rate. Capital markets became a principal conduit for funding 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 been possible without a comprehensive substitution of intangible data for physical objects, made possible by the massive use of information technology. What changes hands in those markets are not banknotes or stock certificates but book entries in digital databases, holding bank or securities accounts. This dematerialisation and resulting drop in transaction processing costs is one of the explanatory factors of the explosive growth of financial transactions.

Furthermore, progress in financial economics theory has led to the creation of new markets that trade dematerialised derivatives of traditional products such as foreign exchange, interest rates or equity portfolios. Derivatives markets, futures, options, swaps, etc. have dramatically expanded the notions of tradability and risk management. They are growing more rapidly than cash markets in the underlying instruments.

GROWING ABSTRACTION OF MARKET INSTRUMENTS



Source: GEF

The financial markets explosion is information -driven. The globalisation of the economy and the increasing variety of economic transactions create greater uncertainty and thus generate a strong and continuous demand for information. Financial markets are a web of conduits for displaying and exchanging such information. Exchange of information, viewpoints, judgements and opinions has become their main function. Higher levels of risk and uncertainty also create a strong demand for information about the future. Derivative markets can be seen as an aggregation of collective views about the future

2. FINANCIAL MARKETS AND ELECTRONIC MONEY

Money in the intangible economy

Now that we have outlined the new economic landscape, let us return to money. Not surprisingly, in the intangible economy, money is also becoming increasingly intangible. The relative weight of non-cash monetary transactions now exceed the value of cash money by a factor of ten. Money and payments are overwhelmingly delivered via electronic networks as data bits and database entries. At the wholesale level, money representation and manipulation are fully automated. Dedicated payment networks such as SWIFT and payment clearing systems such as TARGET or CHIPS are at the core of scriptural money.

Beyond the alteration of the appearance and mechanics of money, there are deeper structural changes. The triumph of markets means that money is increasingly used to settle multilateral market transactions rather than bilateral commercial transactions. This functional evolution in turn leads to profound modification in the design of clearing systems and networks, which need to handle larger volume, work in real time and offer more open access. While banks continue to play a key role in the management of these systems, external pressure to open these systems to other actors grow more intense.

Moreover, money itself became a tradable commodity. Markets for various forms of money and monetary instruments are bigger than markets for equity or for any commercial goods and they fix the key money variables, interest rates and exchange rates.

These changes make money more visible and ubiquitous but also less stable, more volatile in its value and more elusive. Monetary policy becomes more important as a lever of economic management at the same time that the classical monetary aggregates – M1, M2, M3 - lose their reliability as signals of future

economic growth and inflation. Charles Goodhart has formulated a monetary equivalent of Heisenberg's uncertainty principle:

“ Any observed statistical regularity will tend to collapse once pressure is placed upon it for control purposes.”

Because information is its key resource and output, the intangible economy is highly data-sensitive and intrinsically self-reflective: it continuously monitors and measures its own behaviour. As soon as authorities announce a monetary aggregate target, financial intermediaries adopt strategies that minimize its pertinence and causality.

Electronic money debate

The elusiveness of money explains the persistence of controversy as to whether or not the transformation of money has led to the emergence of a new category: electronic money (or e-money). Like the other controversies mentioned above, disagreement is deep and remains inconclusive, due essentially to the difficulties of definition. Academic, business and regulatory experts appear deeply divided over the question.

Some analysts define electronic money as any form of money that is stored and moved over computer systems and data networks. This implies that the bulk of scriptural money is now by and large electronic. One example here is Kurtzmann's "megabyte money", which are nothing else than large-amount of cross-border interbank payments.

Others use more restrictive characterization. One commonly used definition stresses innovative use of technology. Frequently mentioned examples of technology driven e-money are the smart-card based electronic purses for small value payments (Proton or Mondex) and encryption software-based digital cash (token) schemes (Digicash or NetCash). Another definition focuses on novel uses, using examples such as air miles, more than half of which are generated and used on the ground, or multibrand loyalty schemes. The interest of use-based e-money schemes is that they are originated and operated by non-banks.

The differences in definition are of more than academic interest. They have substantial regulatory implications. In September 1998, the European Commission (EC) issued a proposal for an electronic money directive. The result of several years of discussion between official bodies and between the public and private sector, the proposed directive offers a legal framework for regulation of e-money issuance by potential non-bank actors.

In the directive proposal, the EC defines e-money as a multi-purpose instrument. In other words, e-money is construed as a payment instrument that can be used to settle more than one kind of transaction, while the traditional definition of money stresses its universal dimension. The new definition leads to a broader and more ambiguous definition of the issuer of electronic money. A non-financial institution, a retailer or an ISP that issues an electronic instrument, which can be used in several types of transactions (buying physical goods with selected merchants, buying intangible goods such as information, participating in an auction, etc.) can thus be considered as an electronic money issuer. The proposed directive explicitly acknowledges the possibility of non-banking e-money issuers and defines a specific regulatory and prudential framework for them.

The proposed directive is still under discussion. It is highly controversial and afflicted by the middle-of-the-road syndrome. For e-commerce enthusiasts, it may create an additional burden and deter innovation. For regulators such as Central Banks, it may be too light. Thus the European Central Bank (ECB) would prefer that the issuance of electronic money be limited to credit institutions and that the definition of credit institution be enlarged to include all issuers of electronic money. Under this approach, electronic money is

assimilated to scriptural money on an electronic support and as such does not require a fundamental overhaul of the regulatory and institutional framework of monetary systems. According to many central banks within the European Union such as Banque de France, e-purse or e-cash are prepaid instrument that resembles in substance traveller checks, except that the latter are not divisible. No new status or regulations were required for traveller checks, and therefore no new status is necessary for e-money.

As for loyalty schemes, their use is restricted and they are not broadly redeemable (except within the designated set of merchants). Therefore, they cannot be considered as money.

Beyond questions of definition, technology-based and use-based schemes raise other substantive issues.

Both e-purse and e-cash ran into serious market acceptance hurdles. The most successful financial e-purse scheme, Proton, has achieved less than 5% cash substitution rate and its transaction rate is insufficient to attain profitability. E-cash schemes fared even worse. Despite considerable media coverage and excitement among the digerati, practically all the systems run into sometimes fatal difficulties. Digicash, tireless promoter of E-Cash, which had moved from Amsterdam to the promised land of Silicon Valley in April 1997, acquiring substantial funding and prestigious investors, including Negroponte, was liquidated in September 1998. The early market leader, Cybercash, is struggling, has changed its strategy and top management several times and in early 2001 delisted itself from NASDAQ. In France, KLELine, which specialised in e-merchant acquiring was closed by its owner, BNP-Paribas in spring 2000. Another company, backed by all the French banks and which sought to combine Internet and smart card technologies, Cyber-comm, was wound down in early 2001. Micro-payments, which was considered in mid 1990s as a potential killer application, a preferred mechanism for intangible goods transactions (information, on-line entertainment...), has failed to take off so far.

The main problem with these Internet payment initiatives is that they have not focused enough on customers' behaviour and attitudes. As a result, most of them appeared as solutions in search of a problem, suffering from technological overkill, while lacking marketing and business sophistication. They were aimed primarily at a small-value business-to-consumer payments and were basically conceived as substitutes for card or cash based payments. Thus, even if they were successful, it is not sure that they would radically transform the existing monetary systems.

Use-based e-money schemes, many of which can boast millions of loyal users and are becoming ever more sophisticated, raise the same question: what difference do they make for existing money systems ?

As new generation of e-money initiatives emerges, some of them quite successful (Paypal, for instance, which claims over 8 million customers), the question of what is electronic money becomes ever more topical.

Electronic money: elements of a definition

We believe that electronic money should be defined as a new category and its starting point should be reference to two existing categories – fiduciary money and scriptural money. Such definition should be systemic, considering the ways in which the given category articulates the three basic money functions – unit of account, exchange medium and store of value - and its institutional framework. It is also essential to look at the entire monetary process, not only at the issuance, where most of e-money discussions tend to focus, but also at settlement and clearing. In effect, clearing and settlement are as essential in the determination of the scope of acceptability and universality of money (whether fiduciary, scriptural or electronic) as the issuance. Furthermore, it is in this area that widespread IT use has had the strongest impact. Back-office automation facilitated and stimulated the explosive growth in volume and scope of electronic payments, wholesale and retail, national and global.

Fiduciary money tightly links the three functions. Its issuance is strictly controlled. To the extent that cash is self-referential, the clearing and settlement process is quite straightforward and seeks to ascertain that the currency is genuine. Fiduciary money is not really suitable for multilateral market transactions.

Scriptural money combines unit of account and exchange medium functions. The value is immobilised. The issuance of scriptural money is regulated. The clearing and settlement process becomes more complex: not only the instrument needs to be verified but also the identities of both the payer and the payee, exchange medium and underlying value need to be reconciled and exchanges recorded. Thus scriptural money requires detailed accounting and dedicated clearing and settlement systems. Such systems are tightly supervised by central banks and their access is hierarchical, with commercial banks acting as gatekeepers. When the scriptural money is paper-based, the system is costly and difficult to scale up. Hence, the emphasis on automation, in order to replace exchange of instruments by account transfers. However, automated clearing and settlement systems have for the most part retained access restrictions and banking control. On the other hand, dematerialisation of the exchange function made it easier to use scriptural money for market transactions settlement. It also facilitated the emergence of new instruments based on bank accounts such direct debit or debit and credit card.

Electronic money unbundles the unit of account function, which becomes completely dematerialised. In the intangible economy, where all values are relative, values are calculated as indexes and all index computations are widely and readily available. Furthermore, the value is not necessarily fixed at the time of the exchange. On the other hand, electronic money combines exchange medium and store of value functions. It is not tied to a single exchange medium but can be embodied in a variety of instruments. Similarly, the store of value is not limited to a banking deposit. Various types of intangible assets, information, intellectual property, etc. can be used as a counterparty for e-money. E-money can be seen as a digital value contract and e-money transactions, as a digital barter. The issuance of e-money is quite open. On the other hand, clearing and settlement systems are regulated to ensure redeemability and convertibility into other money categories. The access is no longer restricted to banking institutions. Nevertheless, those who have access privileges need to satisfy defined regulatory and prudential requirements. The distinction between commercial and market uses of e-money becomes irrelevant as most commercial transactions are mediated by the markets.

This definition of electronic money is admittedly quite generic. Some of its elements are already in place, while others are still in various stages of gestation. Nevertheless, it provides a blueprint that should facilitate the understanding of the on-going e-money emergence process.

3. LOOKING FORWARD: FROM THE CASH NEXUS TO THE MARKET NEXUS

There is certainly no dearth of studies and essays about the future of money. Most of them however tend to confuse current innovations with long-term trends. Thus, discussions about the future money tend to oscillate between two extremes. On the one hand are the “apocalyptic enthusiasts,” who view e-cash, e-purse and similar initiatives as four horsemen of the apocalypse, which will destroy the financial system as we know it. For instance, Professor Tanaka argued in 1996 that digital cash has a “potential to cause conflict between cyberspace and nation-states.” On the other hand are the “skeptical incrementalists,” who, having ascertained the hard slog of e-money innovations, tend to see the future of money as more of the same, with technology-based innovations being assimilated into the mainstream of the scriptural money framework.

Our view is that neither of these extremes illuminates the way forward. Electronic money is a major systemic innovation. However, as with the other monetary system innovations, its deployment and dissemination will be a lengthy process that should be measured in decades rather than in years. Furthermore, electronic money will have a significant impact on the existing forms and categories of

money, without necessarily eliminating them. Various monetary systems will be closely integrated with intangible markets. The cash nexus will become a market nexus.

In order to highlight the systemic nature of electronic money, we shall start our peek into the future of money with a discussion of relevant intangible economy trends, in particular the evolution of intangible markets. It is against this background that we shall then take a look at emerging forms of money and the core alternatives of its evolution.

Cross-currents: strategic schizophrenia

The intangible economy has strong momentum. However, the logic of dematerialisation is not deterministic. It does not point to a single optimal trajectory. It actually widens the range of choices and alternatives. Instability and volatility which govern the demand for intangibles become pervasive and affect all aspects of the economy, national competitiveness, business hierarchies and market structures, prompting frequent and often brutal financial and economic shocks. The hierarchy upheaval is particularly dramatic in business: out of 500 American corporations that comprised the Fortune 500 ranking in 1980, 40% had disappeared by 1992. Market dominance can be achieved with unprecedented speed and lost with equal if not greater rapidity, particularly in fast growing sectors such as telecommunications and the Internet.

Upheavals in the market place are accompanied by radical reversals of opinions among business watchers. In the early 1990s, big multinational companies were called “dinosaurs” condemned to inexorable decline. By the late 1990s, size and global reach mattered again.

Instability and volatility are not only sequential but also simultaneous. At the core of the intangible economy, conflicting forces are at work: economies of scale and increasing returns, on the one hand, the shift of value to the consumer and market upheaval, on the other hand. Its trajectory is buffeted by contradictory cross-currents: globalisation and localisation, concentration and fragmentation, vertical integration and horizontal competition.

At times, it appears that the guiding principle of business strategies and economic policymaking is schizophrenia. On the one hand, competition has never been keener; the fight for market share, more brutal; the rivalry between firms, more intense. At the same time, alliances proliferate in all sectors and management theorists extol the virtues of co-operation and sharing. This coexistence of competition and co-operation has led to the emergence of a bridging concept - “cooperation.”

The intangible economy has not killed distance, instead it transformed its nature: topography is less relevant and topology has become essential. Distinctions between proximity and remoteness remains highly pertinent. Increases in connectivity do not necessarily lead to either a levelled or an uniform field. If anything, the communication landscape is becoming more picturesque and varied. The explosion of potential links leads to a greater selectivity and proliferation of communities. Density of links, connections and relations is highly uneven. Moreover, virtual and physical contacts are complementary rather than mutually exclusive.

Market and networks

Thus, contrary to some high-profile pronouncements, the intangible economy is not frictionless. Actually, the level and intensity of frictions is likely to increase. Specific intermediaries, such as travel agents, may be threatened by the wide availability of information and ease of communications, but this threat does not entail complete disintermediation. As matter of fact, the abundance of information, opportunities and relationships increases the need for new intermediation structures and mechanisms.

Markets are more important than ever. It is not an accident that one of the key players in electronic commerce, which emerged relatively unscathed from the dot.com debacle, is E -Bay, a wide open electronic marketplace, with 30 million users, seeking to trade “practically anything on earth.” In the B2B segment, proliferation of private and virtual marketplaces has been a dominant growth driver. Even if recently there has been a pronounced slow down in their deployment, it seems likely that the increasing proportion of inter-business transactions will be mediated through these marketplaces. If they follow the logic of dematerialisation, they may provide a platform for generalised asset trading, where companies will be able to acquire either the (tangible or intangible) asset itself or various derivatives offering defined rights to use it.

Toward netmarkets

As markets are growing increasingly dematerialised and virtual, traditional distinctions between markets and networks blur. The two concepts converge, each providing useful tools for the other:

- Markets as networks. Markets display strong network externalities: the greater the number of users, the greater the benefits to every user. In the case of networks, the primary benefit is connectivity, in the case of markets, it is liquidity. As markets become more open, they need to make their access rules less rigid and more similar to those of traditional networks such as telecommunications. Markets also have to address and implement smooth and transparent interconnection, the core competency of networks.
- Networks as markets. As networks become dissociated from the physical infrastructure, the management of access and capacity becomes more complex. Network designers use market negotiation mechanisms to optimise management and guarantee a defined quality of service. Similarly, the use of networks as a conduit for electronic commerce transactions creates a need to enhance counterparty identification and trust building procedures, long established in financial markets.

Thus, while markets seek to enhance their connectivity, networks look to embed in their design trading capabilities. Hybrid forms of business and economic organisations emerge, which can be called **netmarkets**.

Emerging forms of electronic money

e- fungibility and digital barter

In the intangible economy, the notion of fungibility acquires a new meaning. The traditional meaning refers to fungibility among various forms of money, say between cash and scriptural currency. The new meaning – e-fungibility - describes the possibility of substitution and exchange between various types of intangible value: money, information, intellectual property, communications. To the extent that they all share a common technological substratum of digital storage, it is easy and cheap to exchange money for information, information for access, access for intellectual property acknowledgement and so on. Each of these can be used alternatively as a store of value and/ or exchange medium. Thus, e-money can, for instance, take a form of:

- Intellectual property money, where the value is based on the content and its protection

- Communication money, where the value is based is on access and related services

E-fungibility makes it possible both to calculate exchange parities between different forms of value and to carry out exchange transactions, through what is really digital barter.

Intelligent money

As monetary transactions become more complex, the role of enabling technologies becomes more crucial. These technologies, network and database design more specifically, have allowed the creation of highly reliable and secure networks and systems. In the future, another technology is likely to play a critical role, object software design and programming that increases the intelligence of various system components. The intelligent agent technology is already frequently used in the design of trading systems to allow them to respond automatically and appropriately to delicate and complex situations (large trades or linked trades, where execution of one transaction is contingent upon execution of one or more other transactions).

It is only a matter of time before the intelligent agent approach is applied to the design of money systems and money instruments. These will be endowed with sets of behavioural rules and, at a later stage, with a learning ability. If successful, the intelligent agent application will result in the emergence of Intelligent money (I-money). Such money will for instance vary its value and response function, depending on specific transactions and counterparties. Monetary systems will consist of sets of I -money and rules for their interactions.

4. CORE ALTERNATIVES FOR FUTURE MONEY LANDSCAPE

Let us now try to put the future development of e-money into a broader perspective. If history provides any guide, it is to suggest two main lessons:

- The development of electronic money is unlikely to be a smooth, linear and harmonious process. In all probability, it will be a rough, meandering and contentious journey
- Various money systems will coexist and interact.

To apprehend the future money landscape, we can try to identify what can be called “core alternatives.” These are not full-fledged and internally consistent scenarios, but narrow beams into the future, structured around a simple hypothesis. Three such alternatives can be identified:

- Private currencies alternative
- Global currency alternative
- Market nexus alternative

Private currencies

The private currencies alternative postulates a proliferation of issuers and currencies. It is a variation on the idea, first formulated by F.A. Hayek in 1976, who argued forcefully against the government monopoly on money and in favour of competing private issuers. This was seen as a way of avoiding the monetary manipulation which, according to Hayek caused inflation and the “boom and bust” cycle.

More recently, two other private currency models have emerged.

One is the community currency model, where the value store of money is constituted by a range of local services. Community money is then used to build a common account base and thus facilitate a broader exchange of these services. Nevertheless, community money remains fundamentally local and is not intended to be redeemed outside the boundaries of the community. Probably the best known example of community currency are the Local Exchange and Trading Schemes (LETS), which was first launched in the late 1970s in British Columbia and really took off in the 1980s, thanks to the efforts of Michael Lipton.

Another private currency model is the corporate currency model. The underlying idea is that many corporations have a stronger balance sheet than most banks and their activities are extensive and global. Thus, if a corporation such as IBM or Microsoft issued currency, to be redeemed against its products or products of affiliated companies, it would be as credible as any bank-issued money and the corporate issuer would have no difficulties attracting affiliated merchants, who would accept the IBM or Microsoft dollar. Another "natural" candidates for corporate currencies are the network suppliers and operators. It could be argued that loyalty programs offered by GSM operators, such as Vodaphone and which are redeemed either as additional minutes or against goods and services offered by affiliated merchants, constitute a private currency. Moreover, these operators operate sophisticated networks, which already offer financial functionalities such as micropayment accounting, real-time credit checks for international roaming, roaming clearing centers to settle operators' liabilities.

So far, private currencies remain either at the idea stage (Hayek) or are confined to marginal local situations. Corporate currencies also remain limited to schemes such as Disney dollars, redeemable in various Disney attraction parks, or GSM loyalty points.

Nevertheless, the wide availability of enabling technologies, providing tools both for issuance and clearing and settlement lead many analysts to believe that private currencies will take-off and constitute a preferred form of electronic money. Community currency in particular has attracted a vocal and passionate support. Keith Hart sees it as a lever of greater economic and political democracy.

Single global currency : the geo

This is a polar opposite of private currency: it postulates the emergence of a single global currency. This would be a logical consequence of a broad globalisation trend, a monetary translation of deepening economic integration. The example of the Euro demonstrates, even if some question how convincingly, the feasibility of a single currency in a multinational framework. It is interesting to note that another Nobel Prize winner, Robert Mundell, who played a major role in providing the conceptual underpinning for the euro, has more recently advocated creating a composite global currency, initially backed by gold. Thus from the euro, the dollar and the yen could emerge the geo.

The technology for the global currency is available (although not as widely as the technology for private money) and the task, while challenging, is not excessively complex. What would be required is a creation of a single clearing and settlement system for geo-denominated transactions. Such system would be based on Real Time Gross Settlements methodology adopted by all the major central banks and would be built on the architecture and experience of the TARGET system, used by the European Central Bank to settle interbank euro transactions.

The critical success factors for the geo are not technological, they are economic and political. Economically, countries entering a common currency system need to accept a common macro-economic discipline. Politically, there has to be a strong will to create a global common currency. The geo will not arise spontaneously from the interplay of market forces.

It is probably for this reason that this alternative has had a considerably lower profile than the private currencies one. However, over the next ten to twenty years, the question of a global currency is more than likely to return to the top of the public policy agenda.

Market nexus

This alternative builds upon the hypothesis of an ever growing integration of monetary systems and financial markets. It postulates strong development and ever broader coverage of e-money in the form of digital value contracts (DVCs). "Digital value" notion refers both to the medium -DVCs will be software based and electronic network-resident - and the substance - they encapsulate various types values which are e-fungible. Combining value and medium of exchange, DVCs are not unlike the Cheshire Cat of Lewis Carroll and obey the disconcerting rules of fuzzy logic : they are simultaneously value and representations of value, unique and ubiquitous, standardized and customized. Although they may be privately issued, DVCs are widely tradable on various public and private markets. This makes them distinct from private currencies. As markets interconnect, DVCs will be increasingly fungible with each other. This will enable their greater use as collateral and security and thus enhance their store of value function.

DVCs are used to facilitate exchange of value in a multilateral and uncertain environment. They are widely used for risk management, whether on the cautious (protection) or audacious (speculation) side. The marking trait of DVCs' evolution is their ever expanding coverage. After having conquered the realms of basic commodities and financial instruments, they are being readied for use in energy management and environmental protection. Thus, trading of carbon dioxide emissions permits is seen as a way of reducing pollution more rapidly and effectively than the better known alternative of the political process and tough regulatory regimes. This confidence is based on the successful results of the existing United States Sulfur Dioxide Allowance Program. This program achieved high rates of compliance with stringent environmental goals at a low overall cost to the economy. Regulated sources have enjoyed maximum flexibility to choose their means of compliance with environmental regulations and Government administrators have found emissions trading to be politically attractive, efficient, and simple to maintain.

Two other areas where DVCs are likely to play a major role are the B2B markets and social protection.

In the B2B domain, DVCs will enable the transition from procurement of direct and indirect inputs to generalised asset trading. By extending the range of contracts and applying financial derivatives techniques, DVC will enhance the liquidity of B2B marketplaces. Already, they are being used to reduce the volatility of markets for such critical components as DRAM memories and to better manage network capacity through bandwidth trading. A new category of DVCs are likely to be developed to allow greater tradability of such intangible assets as intellectual property or customer databases.

The use of DVCs for social protection is still incipient, in the concept stage really. One can argue that company stock options, widely used in technology companies, could be construed as a form of DVCs. However, as shown during the severe market correction, stock options offer less than perfect downside protection.

A more ambitious project to use DVCs for protection against long-term economic and social hazards such as unemployment or substantial drop in income has been formulated by Robert Shiller, who proposed setting a new market category for these hazards, which he called "macromarkets." Such macromarkets, designed to manage society's largest economic risks, could be used for instance to mitigate the transition from pay-as-you-go to funded pension schemes and to make these transferable. In the future, the use of DVCs as a tool for solving public policy problems will become commonplace.

Key questions*Displacement or coexistence ?*

Relationships between the three alternatives are ambiguous and highly context-dependent. Under certain conditions, they are conflicting even mutually exclusive. Hayek's vision of "denationalised" money runs clearly against the concept of a single global currency. Private currencies and DVCs are possible substitutes. Large corporates may prefer to issue DVCs rather than corporate currencies for the same reasons that they prefer negotiable instruments to bank loans.

In other circumstances, core alternatives are compatible and could actually be complementary. The geo can very well coexist with corporate currencies and with DVCs. Some observers argued for instance that the euro introduction should have been used as an opportunity to promote new forms of money, which could have reduced the demand for cash currency. Even if this opportunity has not been taken, introduction of the geo would entail major changes in the handling of traditional fiduciary and scriptural money and thus favour financial innovation.

How quickly and strongly will the new alternatives emerge ?

At present, DVCs have the strongest growth momentum and potential. Private currencies, despite considerable media coverage, remain a largely marginal phenomenon. They experience difficulties to scale, to expand beyond particular local circumstances. The geo is far from the top of public policymakers agenda. It should however not be assumed that over next twenty years the relative position of the three alternatives will remain unchanged. Private currencies may enter an explosive growth trajectory under the impact of new aggregation and peer-to-peer technologies. The geo could be catapulted to the forefront in the aftermath of a major global crisis.

The range of futures of money is quite broad. Nevertheless, one thing appears certain. Electronic money will continue to emerge, rendering the overall money landscape more intricate and multifarious.

5. OPPORTUNITIES AND RISKSOpportunities

The emergence of electronic money will create a wide range of benefits.

- It will align more closely the monetary system with the overall dynamics of the intangible economy, thus making resource and asset allocation more efficient.
- It will facilitate the development of new products and services, not only in the financial sector but also in various forms of electronic commerce. Many of these products and services are highly innovative and offer high growth potential.
- It will sustain the design and deployment of new business models such as multitier third party payments and multistream revenues generation, which allow easier capture of value of intangible artifacts and assets such as content and knowledge.
- It will offer speed, global reach and granularity which facilitates the customization of payment solution to particular customers and situations.

Risks

Yet, the progress of electronic money also creates risks.

Conceptual confusion

The first risk is one of conceptual confusion about electronic money and its implications. We have seen above the difficulties of defining electronic money and the more general problems of apprehending traditional money. The monetary system is increasingly complex. It never was really stable but the pace and the scope of change are now greater than ever. Historical precedents are only of limited relevance. Money practitioners, analysts and regulators all grope for conceptual tools, which would make those changes more intelligible and provide actionable guidelines. But their quest is far from over.

Unstable institutional framework and governance

One of the major symptoms of confusion is the concern about disintermediation. The latter has several meanings. Traditionally, it means the decreasing role of banks in financial activities such as lending. In the new economy context, it describes the sweeping elimination of all intermediaries and the generalisation of peer-to-peer relations. This type of disintermediation is unlikely. However, the changing role of banks in the economy is unquestionable. So far, while banks have been losing share in many of their traditional strongholds, they have maintained a dominant role in the management of monetary systems, particularly the clearing and settlement function. This was not only due to their market prowess but also to a firm stance taken by regulatory authorities, notably central banks. Nevertheless, political pressures to open the existing monetary system management and clearing system to a greater competition are growing. Both private currency and DVCs approaches do not place banks at the heart of their governance. In the electronic money context, the very notion of financial institutions becomes more ambiguous and difficult to define. The existing institutional framework is thus under pressure to evolve but there is no well-defined and agreed blue-print for an alternative framework. It is not even sure that a single framework will emerge. After all, financial markets and financial services often operate within different frameworks and distinct regulatory regimes. In any case, the governance, operational management and regulatory oversight are and most likely will remain in the state of flux.

Loss of control

The upshot of conceptual confusion and institutional instability is a widespread sense of the loss of control. This goes beyond the difficulties of conducting the monetary policy and supervising financial institutions, active across all continents and offering a huge range of services. Many observers, some of whom have extensive inside knowledge, believe that the evolution of monetary systems is undermining the traditional political structure of nation states. Walter Wriston, ex-CEO of Citicorp, called this the "twilight of sovereignty." Financial markets have taken away the economic policymaking power of governments. This power has not so much been transferred as diffused across a wide range of actors with often conflicting interests.

Extreme volatility and increased fragility

As results, financial markets are unstable. The volatility of financial prices is widespread, persistent and contagious: foreign exchange markets have been volatile since 1973, interest rates since 1979 in the United States and mid-1980s in Europe, equities became more volatile during the 1990s. Volatility results not only in wide swings of value but also in large gaps between financial and economic value. In turn,

those gaps lead to financial “bubbles.” As bubbles cannot inflate indefinitely, they burst periodically and often brutally: hence the increasing frequency of financial crashes. Global equity markets 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. So far, despite those crashes, the global economy continues not just to function but to grow and prosper. Nevertheless, the sense of fragility is exacerbated. National and international regulatory authorities live in a mode of permanent crisis management.

Social backlash

To the extent that the ascendance of global electronic markets is seen as a dictatorship of blind economic forces, it can and does generate social backlash. Electronic money is widely seen as one of the most pernicious aspects of globalisation. Hence, the continuing interest in the Tobin tax proposal. An international association to support this proposal, ATTAC, became one of the most active and visible promoters of the anti-globalisation movement, which vehemently criticizes the World Bank, IMF and WTO.

The development of the intangible economy is likely to further exacerbate the backlash, as it entails a continuing extension of the scope of intangible markets and DVCs. For many people, feelings and ideas should not be subject either to the economic calculus or to market vagaries.

Growing dependency on technology

Electronic money, in its different forms, becomes practically impossible to dissociate from its technology, which is not only its support but also its substance. This creates a strong dependency on technology and its evolution. In turn this dependency triggers risks. Some of these are well-known - system breakdown or security breach – and are being treated with a high degree of priority. Such treatment requires an extensive use of technology, thus aggravating the dependency.

The evolution of technology is likely to set off qualitatively new types of risks. Its major thrust will be to endow systems and its components with increased intelligence and ability to learn. Both markets and money will become intelligent. Transactions will be automated, carried through machine-to-machine, agent-to-agent dialogues and transactions. This entails a decreasing involvement of humans. It is even possible to envision situations of conflict between intelligent systems and their human operators. Some future watchers go even further. Thus, Bill Joy, chief scientist of Sun, conjectures a future that “does not need us.”

6. CONCLUSION

A new category of money is emerging: electronic money. Underpinned by the broad shift to the intangible economy, it is likely to become not only commonly used but a dominant system for determining and exchanging economic value. Its trajectory is clearly ascending. Yet, it is not linear or two-dimensional. There is no “one best way”: the range of its possible evolution is very wide. More importantly, both economic agents and public policy makers have latitude to act and to influence both the process and the outcome of electronic money’s gestation.

Electronic money The configuration of electronic money will be a result of interactions among economic agents, public policymakers and structural trends of the intangible economy. This configuration may be stable but will not be fixed: the ability to adapt will be its built-in feature.

To facilitate the emergence of electronic money, it is important to be open-minded, to accept innovative visions of money and monetary transactions. At the same time, it is essential to recognize that many of these visions will either never be implemented or fail the critical test of customer acceptance.

For policy makers, the critical challenge is that of new forms of governance. In the new landscape, the roles of financial and non-financial institutions as well as of the enabling technology providers and regulatory authorities need to be redefined. Does the combination of business and technological trends imply a ultimate banalisation of finance? Does it reduce barriers to entry to a point where any network can become a market, any computer a clearing system and anybody can issue electronic money? In the new environment, what is the meaning of: financial transaction, financial intermediary and money?

The openness of electronic money means that governance structures and conduct will need to be more open than they are at present. They are more likely to be structured as a network than as a hierarchy, interconnected rather than centralised. They may even include elements of competition and negotiation among various structures.

More importantly, they will need to integrate the technological dimension. Lawrence Lessig considers that information technology and computer code have regulatory power. In other words, computer code can be used to define and control the rules and behaviour of a given system and its components, not only in cyberspace but also in the physical world. For instance, privacy and decency rules built in to the system architecture constitute an efficient alternative to legislation and administrative laws and decrees. Financial systems already include code-based rules, which govern access and risk management in real time. Interbank clearing systems for instance verify funds availability in real time and automatically limit credit exposure of system participants. Such automated rules were introduced because usual rules and control mechanisms were simply impracticable. This approach may be extended and raised to a higher level of governance. The International Financial Architecture has been extensively, if rather inconclusively debated at the most senior levels of international cooperation with the aim of improving the stability and the security of the global economy. This discussion acknowledged the risk of technology but has not considered its potential advantages and in particular its integration into the regulatory framework. Is it naive to believe that one way to advance this debate is to introduce the concept of International Financial Technology Infrastructure?

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