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### Introduction

Over the past few years the future of money has received considerable attention. Many important questions have been posed and many answers pro- vided. The findings presented in this chapter build on previous efforts to clarify a number of crucial issues and add a dimension that has been largely ignored up to now – to what extent might major advances in economic and social conditions, two to three decades from now, depend on as well as give rise to the use of digi- tal money in most (if not all) market transactions? Consideration of this latter question follows directly from the mission and preceding conferences of the OECD International Futures Programme, in particular the findings of the recent 21st Century Transitions conference series on the prospect that there may be technological, economic, social and governance changes on a par with the radi- cal transformations that characterised the transition from agricultural to indus- trial society. This introductory chapter offers a four point overview of the main findings.

### Defining the issues

Fairly often, discussions of the future of money get sidetracked by confusion over the definition of money – its many functions, various forms, and the multi- tude of mechanisms for effecting transactions. Without offering a systematic review of the numerous strands of thought and differences in vocabulary, it is worth cov- ering three basic points that together provide a solid analytical foundation for approaching the subject. First, for most economists, money serves three classic functions – as unit of account, means of payment, and store of value. In the future there is little prospect of change in these basic attributes. Second, there are a

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range of forms of money, not all of which must serve all three of money’s primary functions. In the future there is a good chance that current forms of money will be joined by new ones, although it is difficult to ascertain the likelihood of wide- spread acceptance. And third, there will doubtless be a proliferation of monetary media or transaction methods, both physical and digital, over the next few decades.

These points of departure are helpful for clarifying the issues at stake in the discussion. However, two additional concepts make it much easier to assess the many possible trajectories that monetary forms and means of payment might take over the coming decades. One is the idea of a “monetary space” which refers to a domain, understood both in the physical sense of a particular territory and in the virtual sense of a specific market, within which a particular money serves one, two or all three functions. For instance, the territory of Japan defines a territorial mone- tary space that uses yen, while oil markets define a virtual monetary space that uses American dollars. The second useful concept is that of a “monetary hierarchy” that exists within a monetary space. This notion helps to distinguish different forms of money and the relationships that exist among them.

Dominating the hierarchy is the form of money that inspires the greatest confidence and can perform fully all of money’s primary functions. Here it is worth recalling that money is a form of credit, with state debt in the form of issued currency usually having the highest degree of credibility in terms of the expectation of future redeemability. Legitimate and stable political authority has two strong advantages when it comes to ensuring that its money constitutes the common denominator of the monetary hierarchy. First, the state can specify that the payment of tax liabilities must be in a specific currency. Second, in so far as a government maintains its fiscal balances within acceptable limits, respects the prevailing rules of political legitimacy and seems well positioned to maintain its territorial sovereignty, there is usually widespread confidence that the currency will be a generally accepted unit of account and means of payment in the future (often this acceptance is a legal requirement within a territorial monetary space).

Other forms of money occupy a less dominant or less central position in the hierarchy, either because of less credibility or due to an inability to per- form one or two of money’s general functions. For the most part, the position of a particular form of money in the monetary hierarchy is determined by two attributes: its liquidity, which means the ease with which it is redeemable into the dominant currency, and its effectiveness in performing money’s different functions. To take one example, the tokens stored on the smart cards used by some phone companies do not function at all as a generalised unit of account (no prices are posted in these units) and are limited as both a store of value

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(to the extent that they expire) and even as means of payment (no one else accepts them). Furthermore, these tokens are not at all liquid in that there is no redeemability back into the original currency. Frequent flyer miles and loy- alty “dollars” are another example of a form of money with relatively narrow functionality. However, despite such limitations, these private tokens are a genuine form of money, while a credit card or other transaction mechanism, like a debit card, simply facilitates exchange using, in most cases, the dominant form of money.

Looked at in terms of monetary spaces and hierarchies it becomes clear that most current discussions of “electronic money” are not about new forms of money at all but rather about new ways of executing transactions with existing forms. Gen- uinely new forms of money emerge when a person or institution offers to create a token which has no prior record and which they promise to redeem at a particular value in the future. In most circumstances this new token starts at a very weak position in the monetary hierarchy. By way of contrast, new tools or technological means for engaging and recording transactions often try to overcome the steep hurdles to widespread acceptance by using the most familiar and dominant form of money. So when credit cards were introduced there was no effort to compound the problems of gaining users’ confidence by attempting to introduce a new form of private money at the same time. Credit cards simply offer an easier way to use the currency that dominates the monetary hierarchy.

Figure 1 below uses these concepts to provide a graphical context for map- ping possible directions for the future of money. The bottom left quadrant of the figure applies to situations where most transactions use the dominant currency of the monetary hierarchy, occur within a particular territory and are conducted using a physical medium. Historically, most societies have operated in this quadrant and even today this is the sphere of the majority of transactions involving individ- uals, retail merchants and small businesses. However, over time the weight of transactions measured in terms of value has moved more towards the bottom right quadrant. In specific markets such as oil, foreign currency and financial markets more generally, transactions have become less territorially circumscribed and more virtual, although for the most part the strongest currencies of the monetary hierarchy have continued to dominate.

For the future, as [Figure 1](#_bookmark2) makes clear, the question is to what extent trans- actions will shift towards other quadrants – particularly the upper right, where conditions contrast the most with those that pertain today. Two distinct and mutually reinforcing answers are dealt with in turn in the following sections: one based on the long-run trends of monetary development, and the other rooted in an assessment of the implications for money of future economic and social changes.

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**transaction**



Implications of long-run historical trends

The likely path money might take in the future can be partly assessed by looking at three non-linear but nevertheless persistent trends, considered in detail by Michel Aglietta in Chapter 2, that have marked money’s long history. First is the gradual dematerialisation or abstraction of money from a tangible object to an almost entirely intangible sign or digital record. Initial steps along this path can be found in some of the earliest written records. For instance, Plutarch describes how monetary reform in the 6th century BC, aimed at easing the debt load of poor peasants to their landlords, involved reducing the weight of the drachma by 30%. Another prominent step along this same path came with the Italian Renaissance and the introduction of bills of exchange that dematerialised money into entries in the accounts of creditors and debtors. Over time money has steadily moved towards the lower right quadrant of Figure 1, gradually becoming less material and increasingly digital.

The second long-run historical trend relates to the efficiency with which the relationships between creditors and debtors are managed, particularly within the financial sector which plays a pivotal role in sustaining confidence in a specific monetary hierarchy and space. The key development here has been the steady.

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improvement in the agreements and standards that ensure mutually acceptable and routine resolution of daily interbank obligations. This trend displays two dimensions, one towards greater centralisation of the management of system- wide clearing, and the other a growing capacity to support complex, decentralised forms of money and payment mechanisms. The first is most clearly seen in today’s networked national payment systems, where central banks and a specialised public regulator are usually the backstop and supervisor. The second dimen- sion, made possible by the high integrity of the core financial sector’s payment systems, is manifested in many OECD countries by the proliferation of new finan- cial instruments (like mortgage bonds and hedge funds) and payment technolo- gies (like smart cards and the new person-to-person Internet-based payment intermediaries – *e.g.* Paypal).

From the perspective of Figure 1, this twofold movement of centralisation and decentralisation does not suggest a particular trajectory for money. However, there can be little doubt that steady improvements in the capacity to ensure the integrity of a diversified and continuously evolving financial sector is a crucial enabler of movement from one quadrant to another. The successful introduction of both new forms of money and new means of payment depends, in large part, on the ease with which an issuer or medium can become part of a credible and effi- cient financial system. Without such a base, or when the system is regulated in ways that make it difficult for new entrants and innovation, there is little scope for movement in the possibility space described by Figure 1. This is why, as dis- cussed in the concluding policy section, payment system rules and standards (including how they are governed) are likely to play such a crucial role in deter- mining the pace and extent of the movement towards the upper right quadrant of the figure.

The third trend that marks money’s historical record also points towards the importance of regulatory conditions. Here the story is one of the enhancements made to governance capacity, not only in the relatively narrow field of interbank clearing and the integrity of the financial sector, but broadly in terms of how money and the financial sector interact with the rest of the economy and society. Today’s monetary spaces and hierarchies rest on governance systems that have the capacity to handle challenges combining broad economic and monetary dimensions such as controlling inflation, dealing with bank failures, and resolving the conflicts of interest that divide different constituencies (*e.g.* importers vs. exporters, debtors vs. creditors). For instance, in most OECD countries, the credi- bility of the rules and institutions that underpin a specific monetary space and hierarchy is realised through the regular publication of dependable economic sta- tistics (*e.g.* the consumer price index), the establishment of clear lines of account- ability and transparency (*e.g.* in state budgets, stock markets and central banks), and open processes for resolving disputes among competing interests

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(*e.g.* legislative debate and judicial remedies). In this system the state is the lender of last resort, legal enforcer of the national currency as means of payment, supervisor of the integrity of the financial sector and guardian of macroeconomic stability. Based on its legitimate political authority the state can make decisions that have a major impact on who are the winners and losers in society, including choices in the monetary sphere that at times favour creditors over debtors, bank shareholders over taxpayers, exporters over importers, and even owners over cre- ators of intellectual property (by, for instance, failing to introduce a level playing field for micro-payments).

For the future, however, governance capacities may need to be significantly enhanced. The biggest challenges seem likely to arise from the need to negotiate new rules and reform or launch institutions capable of setting the standards and supervising the operation of a universally accessible digital currency. Many issues will need to be resolved, from the best method for establishing universal systems for verifying people’s identities and providing effortless access to a digital money account, to ensuring high levels of interoperability on both the software and hard- ware sides of the monetary network. These challenges will require concerted efforts on the part of public authorities. At the national (or in the European case, regional) level, most of the governance capacities in terms of rule-setting, institu- tion building and dispute resolution are in place, even if the experience of the existing system is largely confined to dealing with the issues that arise in the lower left quadrant of Figure 1, the sphere of territorially defined monetary spaces with state-dominated monetary hierarchies. At the global level few of the requisite decision making and implementation mechanisms are in place. The extent to which this could pose a problem will depend, as discussed in the next sections, on the nature of the changes and public policy goals likely to prevail.

### The imperatives of economic and social change

If money’s long-run trends signal that major shifts in monetary spaces and hierarchies are possible, it is the strong connection to socioeconomic change that offers a way of assessing the probability and desirability of such movement over the next few decades. There is a clear interdependency between specific socio- economic conditions and the success of specific forms of money as well as pay- ment mechanisms. For instance, intercity trading during the Italian Renaissance helped to both inspire and diffuse the use of bills of exchange. Taking more cur- rent examples, there is a mutually reinforcing relationship between credit cards as a payment mechanism and the conspicuous consumption patterns characteristic of certain social groups. Meanwhile the use of American dollars in parts of the world where the state lacks sufficient fiscal credibility (Argentina) or the “legal” economy is weak (Russia) also demonstrates that there is a close connection between specific socioeconomic and monetary systems.

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In the future, three sets of potential developments seem likely to exhibit a strong interdependency with the emergence of new payment systems and, per- haps, forms of money: *a*) technological advances that open up new possibilities for payment and settlement mechanisms; *b*) the transition to a global knowledge- intensive economy; and *c*) the demands for equitable access in more diversified societies.

#### Technological possibilities

Recent interest in new forms of money has arisen rather naturally from the explosion of economic activity that is closely associated, at least in popular accounts, with advances in information technology and the Internet. Looked at from a purely technological point of view there is much to be excited about, both in terms of new supply-side innovations capable of delivering most if not all of money’s primary functions and – maybe more importantly – on the demand side, where the full use of technology’s potential will likely require the introduction of new payment systems. Without losing sight of the fact that technological advances are highly contingent on significant economic, social and governance changes, it is helpful to consider what the new tools and techniques might be.

Looking at the supply side, it is worth keeping in mind, for the sake of clarity, that there is nothing new about the dematerialisation of money. Nor is the shift into electronic form much of an innovation. Interbank settlement systems started along the road to a completely dematerialised electronic form of money with the introduction of the telegraph. Indeed, the monetary hierarchy of today is already dominated by electronic money.[1](#_bookmark3) For central and commercial banks, most transac- tions are electronic. For the many companies and individuals now connected directly to banks through the Internet, the lion’s share of transaction value is in digital form, although in many cases this low-cost simplicity has not penetrated to back-office accounting and clearing procedures. Where innovations based on digital technologies can be expected to gain almost entirely new ground is at the consumer or individual level, where cash, cheques and credit cards remain predominant as means of payment. Competition at this level is fierce and the judgement of consumers, somewhat hesitant to change and very sensitive to gains or losses in convenience and security, have gone strongly against new payment systems.

Two categories of product can be distinguished. The first only involves changes in the transmission mechanism – the medium or method for conveying information. The second category of products concerns the issuing of new tokens that are not existing government-issued legal tender, or privately issued certificates of deposit, or any one of the many forms of money that are already in circulation. The innova- tions in the first category are due to advances in technology that can handle infor- mation much more efficiently. In the second category there is no pretension of

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innovation at a conceptual level: private and local community tokens serving as money have been around a long time. The new products in this category are simply those of new issuers trying to gain acceptance for their private token in the overall hierarchy of money. Perhaps what sows the seeds of confusion is that it is often the same companies trying to introduce the new media and the new tokens.

Considering the first category of new media, future prospects look relatively bright. Even though acceptance has been slow, there is good reason to expect that the long-run trend towards dematerialisation will continue. As Zachary Tumin notes in Chapter 3, electronic purses, which are simply digital memory that can be located in a plastic card with an embedded memory chip, a home computer or any computer connected to the Internet, are highly convenient ways of recording credit and debit transactions. However, for the time being the efficiency of this approach to storing information about money, regardless of the specific issuer or denomination, largely fails to outweigh problems with trust, network economies of scale (lack of a critical mass of participants), privacy and anonymity. Despite these growing pains, and without going into excessive detail about specific technologies

– biometrics, intelligent agents and the like – there can be little doubt that full- fledged digital payment systems for consumers will be technically feasible.

What might these new systems look like? In the second decade of this century it is plausible that in many parts of the world the physical computer will have faded into the background of basements, broom closets and industrial ware- houses. Users may only deal with video, audio and touch screen interfaces that are either scattered everywhere, like today’s light switches and electrical outlets, or integrated into their clothing or watch. Using biometric identification systems that verify voice, face and fingerprint patterns during the course of perfectly nor- mal discussions, the buyers and sellers will be able to confidently instruct their intelligent agent to assess all of the variables that enter into a monetary transac- tion, such as creditworthiness, consumer satisfaction levels, recent prices, alterna- tive suppliers, current demand conditions and preferred forms of payment. Based on preferences expressed over a long period of time the intelligent agents can use individualised profiles to signal personal expectations regarding the conditions for a deal. Finally, upon approval and verification of identity, the funds transfer directly from the buyer’s account (in a bank or some other verifiable, trusted source of funds) to the sellers, clearing and settling instantly.

There are many obstacles to realising this type of peer-to-peer digital money that is nework based, transparent, easy to use and highly secure. The difficulty most often raised when considering this trajectory is the contention that network transactions will never be able to acquire the virtues of anonymity, accessibility and security that characterise hard cash. Other developments, explored more fully in the following subsections on economic and social change, point to the solutions that might emerge as laws, institutions, cultural attitudes and technical fixes bring

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digital money onto a level playing field with cash. One potential for narrowing dif- ferences is in the area of traceability. Gradually the same degree of difficulty that now accompanies the recording of serial numbers of hard cash as a way of tracing each transaction will arrive in the digital world, as cryptography, legal safeguards and protocols for erasing identity become widespread and efficient.[2](#_bookmark4) Similar convergence can be expected in other problem areas like methods for tracking crime where cash is already a boon for black market activities. Eventually, with almost all of the current disadvantages of digital money out of the way, the vast share of consumer means of payment could tip over into the digital realm.

Turning to the second category of new money products, prospects seem less clear-cut. Although there is a good chance that certain sources for issuing private money, such as Microsoft or even Bill Gates, will remain richer and more stable than many sovereign issuers, there is little reason to expect that “Softs” or “Bills” will offer much competitive advantage when compared to the dollar, euro or yen. That is, of course, unless central bank money is abolished. Only in this case, as is convincingly argued by Geoffrey Ingham in Chapter 5, without central bank money there can be little expectation of either monetary stability or political legitimacy for the choices made in managing the monetary system. This does not mean that new technologies will not contribute to making it easier to issue private tokens (or for that matter, a new electronic form of legal tender). It simply means that the pri- vate or community-based monies will be tightly connected to the overall hierarchy of money and that the key to viability and diffusion will remain the soundness of the relationship to the primary unit of account that is issued (or, at a minimum, backed) by the central bank.

Digital money will only match the attributes of physical cash if there are major advances in the ease, cost and certainty with which digital transactions are handled. In particular there will need to be considerable progress in the following areas: verification, confidentiality, ease of use, interoperability and reliability – throughout the entire transaction chain. Many of these advances will require improvements in regulatory frameworks and related instruments. For instance, privacy laws can play a major role in ensuring that the required confidentiality levels for different types of transactions are met. The implementation of mandatory cryptographic, insur- ance, supervisory and other “safety standards” like those applied to so many other products, such as cars and food, could go a long way towards creating the necessary confidence in digital money. There is also a more scientific dimension, where technical progress in fields ranging from biometrics and ubiquitous com- puting to network protocols and intuitive interfaces can be expected to spur the invention of new payment systems and forms of money, as well as improving the chances that such innovations will be successful in gaining acceptance. In the end, however, the prospects for the diffusion of these technologies will depend on a profound set of economic, social and regulatory changes.

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#### Transition to a global knowledge-intensive economy

Assessments of the possible paths for 21st Century Transitions almost all emphasise the extent to which the economy is likely to be dominated by the value of ideas and other intangibles. Three distinct aspects of this transformation seem poised to both demand and help create the conditions for the introduction of new transaction systems that make digital money as accessible and easy to use as cash, as well as a broader range of private forms of money. First is the transfor- mation of the output and input attributes of all kinds of markets, including enter- tainment, utilities, transportation and even physical consumer goods. Second is the rethinking of the organisation, methods and even purpose of the firm. And third is the change that could occur at the level of macroeconomic and global rela- tionships as planet-wide integration continues. Perhaps the most direct way to show the connections between these economic transformations and the future of money is to provide a number of examples of how things might function by the second or third decades of this century.

*Markets*

One of the markets where the need for new means of payment and the space for a wider range of private forms of money is already apparent is music. The capacity to create and distribute music using digital technologies has wreaked havoc with the way this market was once organised. Right now if producers want to sell their music they have a real problem in setting a price and in getting payment. What is sorely missing are the mechanisms that recognise private property, provide information for consumers, negotiate prices (for rights, subscriptions, leases, etc.), pay royalties (dependably and automatically), and do all of this on a global basis. Solving these problems will require a wide range of initiatives. But clearly one helpful breakthrough would be the introduction of methods for consumers to pay royalties directly over the network. This type of peer-to-peer system for making payments that are sent automatically whenever someone plays a song could go a long way towards creating the decentralised revenue streams that are obviously desired by many music creators but could also make new internet (dotcom) business models more viable.

The already apparent problems in the music market, which is just the most prominently hit of the various entertainment markets, provide a clear example of how advances in means and forms of payment could play an important part in helping establish viable business models in the future. But entertainment is not the only market where economic and monetary changes need to go hand in hand. For instance, the purchase of electricity and water could be moved to a continuous pricing model where consumers direct their home manager (a computerised intel- ligent agent) to buy (and sell in the case of locally generated power) when the

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price is lowest (or highest for cogeneration) and matches their demand patterns. Linking the energy market to a consumer-level clearing and settlement system that enabled “peer-to-peer” payments – even in very small fractions and in a form of money that could be negotiated, including for instance credits or debits to a loyalty scheme – could make a decisive contribution to making these innovations happen. Another strong spur to innovation could be to link payment systems to smart highways communicating with smart vehicles; co-ordination with GPS moni- toring of traffic could allow the vehicle manager (another intelligent agent) to choose routes according to specified cost and time preferences using direct network micro-payments in agreed forms of money.

Another innovation with potentially profound economic implications that will also require a leap in the reach and performance of digital money networks is the solid-object-printer which “prints” sophisticated three-dimensional objects based on instructions from a computer. Commercial versions of such machines already exist, if only at the Model-T level of sophistication, where a physical object is built up by spraying layer upon layer of carbon composite in a technique that recalls the method a dot-matrix printer uses to lay down two-dimensional letters by put- ting dots along a horizontal line. With advances in materials science, computing and design, there is a possibility that objects now produced in large manufactur- ing operations could be decentralised to home or corner “copy shop” solid object printers. But if this type of distributed manufacturing is to flourish, there needs to be a safe and efficient way for making automatic, rapid and transparent micro- payments for the designs (and the small custom modifications that are traded across the net) that people download for local printing. The ramifications of this kind of change are immense (for transport of traded goods, for the manufacturing sector, etc.), but what is important from the perspective of money is that today’s relatively narrow problem of paying for entertainment in digital form could develop into a fundamental obstacle to the functioning of many parts of the mar- ket economy. The introduction of consumer-level, peer-to-peer clearing and set- tlement systems is important because it corresponds more fully to the needs of tomorrow’s markets.

*Firms*

A second area where the economic transformations that are part of 21st Century Transitions may call for new payment systems and forms of money concerns the future functioning of the business enterprise. Here the potential for changes to the way today’s typical company operates are not confined to outsourcing (make- or-buy) or disintermediation (cutting out the middleman). What is at stake is a fundamental change in the logic that comes from the non-exclusivity and almost costless reproducibility of the intangibles that may dominate the economy of the future. The much wider reach of digital transaction systems and forms of money

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could open up considerable scope for firms to experiment with new ways of set- ting prices, collaborating with suppliers, defining markets, improving efficiency, and generating revenue from intangibles.

Under conditions of abundance rather than scarcity, firms must reconsider both the organisation of production and the business model used to set prices in ways that make a profit. Already the bursting of the dotcom bubble and the paths taken by a wide range of Internet-based enterprises show the difficulties of adapt- ing to the new environment. As detailed by Charles Goldfinger in Chapter 4, intan- gible inputs, outputs and assets follow different rules when it comes to depreciation, capacity utilisation, risk calculations, searching for economies of scale and setting prices. New means of payment and forms of money, by facilitat- ing greater diversity of pricing and transaction models – particularly for intellec- tual property and intangibles – could offer important ways for firms to manage the ambiguity, volatility and decentralised diversity of tomorrow’s economy.

Although at the moment there are more examples of firms that have failed to make this transition, the signs of ferment remain strong. In the business literature, on stock markets, at conferences and in the public media much searching is going on to find ways for firms to manage knowledge. However, if past transitions are a guide, the techniques, organisational structures, incentive systems and behav- ioural patterns will likely emerge from outside the existing frameworks and institu- tions. As the composition of the economy shifts, the new methods adopted spontaneously by those outside the existing systems begin to gain more weight overall. Gradually through ascendance and diffusion this periphery becomes the core. Early signs of the transition can be found in the new career expectations of young people, changing investment patterns like the huge boom in start-ups, and the unsettling cultural breaks that arise when notions of status differ markedly across generations and occupations. Getting beyond yesterday’s “company cul- ture” is a question not only of waiting for the old to renew from within and the new to take a larger part of the action, but also of introducing the tools that facilitate the transition. Digital money systems that correspond more closely to the unbundling of the functions once united so efficiently within the firm are clearly one of the important developments for facilitating the emergence of tomorrow’s enterprises.

*Global integration*

The global dimensions of 21st Century Transitions may have equally impor- tant implications for money as the changes, discussed above, in the nature and organisation of economic activity. Two sets of developments stand out: it seems natural to expect, first, that the changes in the functioning of markets and firms will be projected to the global level, and second, that the process of global integration will alter the economic, social and political underpinnings of money in ways that

are likely to call for considerable innovation. Overall, a more integrated world will need appropriate means of payment and forms of money. But progress has been very slow, in large part because it entails major changes to the global financial infrastructure.

Turning first to improving the functioning of global markets, the current situa- tion is that consumers as well as most small and medium-size enterprises still conduct transactions using expensive and cumbersome wire transfers, postal cheques and credit cards. On top of the delays and uncertainties of these systems must be added the costs and risks of foreign exchange conversion. Certainly there are powerful clearing and settlement systems that are entirely digital operating at a global level, but they make no pretence of extending beyond the narrow inter- bank monetary space. However, making good on the promise of global electronic commerce, not to mention the more ambitious transformations of markets and firms discussed previously, clearly requires the development of a much more extensive planet-wide network of sophisticated transaction systems. Only, as is apparent, over the short to medium term the ambitions of both the private and public sectors – with only a few exceptions like Singapore – remain very modest.

Nor, looking at the second set of developments, is much progress being made in improving the alignment between the global monetary space and the first ten- tative steps towards the creation of planetary public markets aimed at internalis- ing key externalities of the global commons. In fact, strictly speaking, there is no global monetary space. The global monetary system is a collection of exclusively national (or quasi-national/regional) monetary spaces. Without a shared unit of account and its political underpinnings, it is exceedingly difficult to introduce the kinds of transparency needed for functional markets in, for instance, pollution per- mits or fishing rights. Here, steps towards the creation of a global monetary space could help with the introduction of markets aimed at coping with global warming by trading carbon emission rights or preserving bio-diversity by recognising and paying for the intellectual property rights associated with the genetic assets in dif- ferent parts of the world. Getting such markets up and running begs the question of which monetary space will apply.

Indeed it is not surprising that global integration, in terms of both private and public markets, poses a challenge to monetary systems. Once again, as the euro clearly shows, economic and political changes both require and depend on advances in the scope and functioning of monetary space. Despite the discomfort of some, the ever increasing flows of goods, ideas and people across the arbitrary boundaries that make up the world’s political units are calling into question the meaning and effectiveness of 19th and 20th century concepts and tools of national sovereignty. In addition, the planet as a whole, in terms of its atmosphere, oceans, temperature and biodiversity, is increasingly focusing attention on global “prop- erty” that by definition encroaches on the national sphere. Money’s important

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social and political dimensions also point towards the eventual introduction of universal and global clearing and settlement systems.

#### Equitable access in a more diversified society

Tomorrow’s global knowledge economy and society is likely to be character- ised by a much more highly differentiated, continuously evolving social tapestry where the introduction of new means of payment and forms of money could play a central role in either overcoming or exacerbating inequality and conflict. On the positive side, as already discussed, rules that ensure easier access and wider dis- tribution of tomorrow’s sophisticated range of digital payment systems could help integrate many groups into both the knowledge and the global economies. On the negative side, monetary rules that privilege entrenched interests and narrow access to new means of payment and forms of money could reinforce inequality and exacerbate the risk that social diversity will provoke conflict rather than creativity.

Looking at the positive contribution first, the introduction of a universally accessible, consumer-level peer-to-peer digital payment system could help not only to extend the market in ways that improve the viability of new business mod- els as noted above, but to do so in ways that include groups that have either been marginal or entirely excluded in the past. Easier access via the network to trusted units of account and means of payment could improve market access for both holders of low per-unit value intellectual property rights and producers and consumers in developing countries. At the level of businesses, introduction of the appropriate regulatory frameworks and institutional choices could significantly improve the chances of new entrants competing with the dominant players in the financial sector, particularly if the rules help them to gain the widespread public confidence that is a precondition for success in the financial sector. At the level of consumers, the introduction of legal tender in digital form could help to ensure that fewer people run the risk of being permanently excluded from the new virtual markets because access to Internet transactions pass exclusively through private intermediaries like credit card companies.

A profusion of new payment methods and issuers of money could also have a perverse impact on social dynamism by further fragmenting and ghettoising cer- tain communities and regions. More sophisticated and differentiated monies might be used to discriminate and reinforce the existing correlation between hier- archies of creditworthiness and social status. Under these circumstances there is the risk that the political legitimacy and ultimately the viability of the monetary space are called into question. Without careful attention to the governance of new transaction systems there is an increased danger, already heightened by the social dislocation of a transition period, of a political backlash against changes which are seen as undermining cherished symbols, like the national currency, without suffi-

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ciently opening up new horizons. Alternatively, network money could be specified and implemented in ways that make it both less expensive to use than physical cash and a means of achieving greater social inclusion. Granting all people the right to a verifiable Internet identity and a basic money account, in the context of a much more universally accessible network, would put in place a strongly inclusive foundation for a monetary space that uses predominantly digital money. The pur- suit of this more accessible path illustrates not only the close connection between changes in the socioeconomic and monetary spheres but also the determinant role of public and private innovation in setting the direction and pace of change.

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Overall, putting the analysis of money’s long-term tendencies together with an assessment of the possible direction of future technological and socioeconomic changes points towards a future more likely to be in the upper right than bottom left of Figure 1. How far, at what pace, and with what kind of complications will depend largely on the vigour and effectiveness of the public policies that are fundamental for shaping monetary systems.

### Time for policy breakthroughs?

The answer to this question depends in part on expectations regarding what might be accomplished by accelerating the transition to more fully digital mone- tary systems, and in part on the plausibility that new policy approaches are both available and likely to be effective. Regarding what might be accomplished, the results of this conference suggest that there would probably be a fairly high payoff from a more rapid transition, particularly in terms of encouraging the emergence of an Internet-enabled global knowledge-intensive economy. Moving fairly quickly to introduce the appropriate policies can be justified on both short- and long-run grounds. Looking to the shorter term, policies for accelerating the diffusion of digi- tal money have taken on added urgency for three reasons. First, actions to re- establish confidence and encourage investment are now more important in light of the present global economic slowdown and the “new economy” backlash in partic- ular. A second and equally important current reason for an activist stance is that governments need to find ways to support the creation of worldwide markets in ways that facilitate inclusion and participation. And third, the events of September 11th, 2001 have drawn attention to the importance of introducing more effective control over monetary transactions. Looking to the longer run, by pushing for policy breakthroughs in this domain, governments can make a major and timely contribution to bringing the monetary system into closer alignment with changing socioeconomic conditions. In doing so there is a good chance of both reducing the costs and expanding the benefits of the fundamental economic and social transformations under way.

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Another crucial force likely to drive the diffusion of digital money over the long run is the pursuit of the general public interest in lower transaction costs, less crime, and easier collection of taxes. The introduction of monetary systems where digital money predominates could achieve these goals. The most evident link between lower transaction costs and digital money arises from the potential to eliminate the significant costs associated with printing, handling and back-office accounting of physical cash and cash-like cheques. Further considerable savings might be possible if the clearing and settlement systems could be improved to reduce the costs of delay, intermediation and enforcement. There is also a clear connection between the “underground economy” in all its forms and physical cash. The marginalisation of physical cash, perhaps even to the point where it is no longer used for everyday transactions, could serve to make many types of ille- gal financial activities (including the financing of terrorism) much more difficult. Tax collection and verification methods that hinder criminal activity could also be automated in a variety of ways if the vast majority of monetary exchanges take place digitally through interoperable, secure and authenticated network-based clearing and settlement systems. Finally, given the appropriate standards and reg- ulations, the shift to the predominant use of digital money could both facilitate the entry of new competitors into the financial sector and encourage the emergence of new revenue models for many intangibles, including intellectual property.

Turning to the issue of the plausiblility that government policies could effec- tively accelerate the diffusion of clearing and settlment systems, two avenues seem fruitful: first, making rapid extension of the use of electronic money through- out the economy a clear policy goal; second, as the primary method for imple- menting this goal, working closely with the private sector to introduce the necessary rules and institutions; and third, accelerating the development and dif- fusion of economy-wide instantaneous clearing and settlement methods, similar to the ones that have been taking over in the sphere of interbank transactions. Government efforts in this direction will need to use technology-neutral approaches that rigorously maintain interoperability (like that of the Internet, where one standard for communication – TCP/IP – allows for a vast range of con- nections and uses); meet key social criteria with respect to privacy and universal access (judicial protection for individuals, mandatory technical safeguards); and fulfil basic economic criteria regarding transparency and trust (monitoring of mon- etary aggregates, tax collection, illegal activity, authentication). This means that there will be a crucial role for the processes and institutions that develop and approve standards within and across monetary spaces.

At least two major concerns have been voiced about the risks of rapid move- ment towards more fully digital monetary systems. One relates to the potential undermining of both macroeconomic goals and tools, and the other to the magni-

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tude of the governance challenge (how to make and implement the necessary decisions), particularly at the global level.

Considering macroeconomic policy first, an initial analytical distinction needs to be made between monetary spaces that are isolated and those that are perme- able. In the case of a relatively autonomous monetary space that has a stable, state-dominated monetary hierarchy, there seems little reason to worry. Even if physical currency becomes marginal or disappears altogether, most experts agree that a state-supported central bank would be able to control short-term interest rates by buying and selling financial obligations, at a loss if necessary. With respect to the implications of a predominantly digital monetary system for assess- ing monetary aggregates and the velocity with which money circulates in the econ- omy, there is a case to be made that the clearing and settlement systems that underpin a virtual monetary space could offer authorities greater transparency. Current efforts at data collection encounter substantial problems because physi- cal cash remains very costly to trace and is still in use for a very large number of day-to-day transactions. Shifting to much more sophisticated digital money sys- tems that depend on universal accessibility to network clearing and settlement opens up the opportunity for real-time verification of almost all transactions by volume and kind, without necessarily abandoning confidentiality. Contrary to some expectations, digital money could appreciably facilitate the tracking of mon- etary aggregates and thereby improve the effectiveness of policy adjustments aimed at meeting macroeconomic objectives.

In the case of a much less isolated monetary space there seems, at least in theory, to be a more serious threat to the effectiveness of certain macroeconomic management tools. Experience with the interpenetration of monetary spaces shows how the use of “outside money” can threaten to displace the local currency. This in turn can lead to situations where the effectiveness of the central bank’s tools for controlling monetary policy are weakened. Recent examples where an outside currency, in this case the American dollar, has been disruptive can be seen in Russia, and even more so in Argentina with the adoption of a currency board. Projected to a global level, the introduction of universally accessible and accepted networked money could increase the risk that strong outside currencies would replace weaker local currencies. Pushed to its logical conclusion, this path might create a single worldwide monetary space and hierarchy. Without pronounc- ing on the desirability or not of this outcome, an issue long debated by advocates and opponents of a “gold standard”, it is clear that many formidable obstacles stand in the way. Two are worth highlighting here. First, the creation of a fully open global transaction system that is entirely agnostic regarding the particular currency being used runs counter to strong perceptions of national or regional interest. Sec- ond, the strength of the dominant money within a monetary space rests on the extent to which people have confidence that the policies of the issuer will serve

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the general interest in a politically legitimate way. Despite the views of some that the American dollar, in more or less competition with other currencies like the euro and the yen, could serve as a global digital money, the institutional founda- tions for a global monetary space and hierarchy remain a long way off. The first monetary hierarchies did not spring to life simply because money is more efficient than barter; nor will the global digital currency suddenly appear. Creation of a global monetary space and hierarchy, like national ones before, would require a legitimate and credible authority.

Governance is the second challenge to policies aimed at accelerating the dif- fusion of digital money. Here again the problems posed at the national level look to be more manageable than those at the global level. In a national monetary space, many of the necessary institutional, legal and regulatory starting points are already in place. For example, Singapore’s bold moves to introduce digital money that is universally accessible, clears in real-time, and allows for peer-to-peer trans- actions among all economic agents – described by Low Siang Kok in Chapter 6 – offer a useful set of guidelines for bringing together the key constituencies and setting out technical goals for accessibility, interoperability, etc. Authorities in larger, more heterogeneous jurisdictions may encounter a few more hurdles. Initial resistance can be expected from banks and other intermediaries that generate significant revenues from the delays and service charges that are associated with physical cash and near-cash instruments, usually in the context of rather anti- quated clearing and settlement systems. Digital systems can drastically reduce many of these transaction costs, including the time it takes for cheques to clear, the service charges added to foreign exchange activities, and the expenses incurred trying to stop criminals from both stealing and using cash. Faced with the advantages of digital money there is a good chance that the champions of change will at least get the ball rolling.

The more stubborn obstacles may arise further down the road, with the efforts to actually introduce the rules and standards that make economy-wide and uni- versally accessible digital monetary systems workable. Serious conflicts are likely to emerge because these parameters determine the competitive conditions that apply both at the basic level, at which institutions have the right to issue digital currency, and at the operational level, at which companies will supply the technol- ogy (hardware, operating systems, etc.). Resolving conflicts in this arena, in ways that sustain confidence in the monetary space and hierarchy, poses the most sig- nificant challenge to policy makers. Part of the problem stems from the paradoxi- cal situation of central banks. On the one hand, these are the institutions with the credibility and knowledge to champion change in the monetary sphere. On the other hand, actions that might destabilise the monetary system or undermine con- fidence in the central bank risk undermining the bank’s central functions. This means that policy leadership will likely fall to the legislative and executive

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branches of government which are, in any case, better suited to the challenges of overcoming entrenched interests, opening up new fields for competition, and rep- resenting the broader societal interest in socioeconomic transformation. Indeed, recalling money’s second and third long-run trends, namely the development of regulatory infrastructures, it is to be expected that supervising the integrity and functioning of the clearing and settlement system is a job for central banks and/or oversight institutions. The challenge of setting out the goals and rules that link the monetary system to society as a whole falls naturally to less specialised parts of government. In short, the governance capacities at the national – or in the European case, regional – level are probably both appropriate to and capable of introducing universal digital money.

Looking to the global level, the challenge is severely compounded by the limited decision making and implementation capacities of today’s international political institutions and processes. This global governance deficiency is mani- fested across a broad range of international issues, from the supervision of com- petition and the redesign of the financial architecture to environmental protection and social equity. Indeed, it is this inadequate governance capacity that leads to fears that the rapid introduction of digital money without the requisite codes and standards will simply serve to facilitate illegal activities like tax evasion, money laundering and violations of privacy rights. One approach that might overcome some of these fears and governance inadequacies involves the development of a common global framework for the introduction of national digital money networks. Building on this shared foundation in national monetary spaces might make it easier to knit together a global network that dispenses with the kind of central authority that has so far been a prerequisite for an efficient and durable monetary space and hierarchy. In this case the global clearing system would operate in ways that are similar to other networks, from social to digital, that use common protocols to create the transparency and understanding that are essential for communication and exchange.

Confidence in such a global network might be sustained, in part, by spreading risk over an immense number and diversity of transactions and participants. How- ever, setting the rules and supervising decentralised global networks, particularly with the degree of certainty and transparency required for sustaining trust in a monetary system, will also call for policies that go beyond national interests. Cur- rent circumstances are already spurring innovative efforts of this kind, such as the International Corporation for Assigned Names and Numbers (ICANN), the organi- sation charged with supervising key aspects of the Internet’s technical infrastruc- ture. Although this experiment is encountering great difficulty in finding ways to legitimately articulate a global view, the imperatives pushing this kind of institu- tional evolution seem unlikely to diminish. In the interim, while global governance capacities mature, the challenge for national policy makers is to accelerate the

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introduction of universally trusted and accessible peer-to-peer, instant clearing systems for all transactions throughout the entire economy. Information technology makes this goal feasible, but in the end only the appropriate rules and institutions can make it practical locally and globally.

**Notes**

* 1. Electronic money has today become digital money, just as the telegraph or telephone’s electronic transmission of information has given way to computer code made up of zeros and ones.
	2. Traces of virtual transactions are at least equally difficult to reconstitute, requiring the same kind of human testimony as physical transactions, once the records are defini- tively destroyed. Eventually digital money might be viewed as more anonymous than physical cash that needs to be laundered, literally, in order to erase telltale signs like DNA or radioactivity that can be used to trace material objects.