Electronic finance: an overview of the issues

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1. Introduction

A BIS workshop on e-finance was held in Basel on 2-3 July 2001, focusing on current and potential changes in exchanges and trading systems, payment systems and financial institutions. This overview is based on the presentations given during the workshop, some of which are included in this volume, and the ensuing discussions.

1.1 Perceptions and reality

Since the latter half of the 1990s, the internet and other innovative information technology (IT) have affected the financial system greatly, such as by moving from restricted proprietary systems to open networks. Since mid-2000 there has been a correction in public perceptions about internet-related activities in general, as reflected in the sharp falls in the price of high-tech stocks and disillusion with the earlier e-commerce euphoria. However, there was less speculative mania surrounding applications of the internet in the financial industry, perhaps due to the moderating role of supervisors and improved IT management following the Y2K experience. In many ways e-finance would seem one of the most promising areas of e-commerce as financial services are information-intensive and often require no physical delivery. It is now realised that there are some relatively simple but time-sensitive products such as broking where e-finance is very successful and others where it has been very slow to catch on (eg e-money, e-insurance).[2] There are some areas where new internet-based technology may be transformational, allowing (or forcing) a fundamental redesign of market architecture. In others it will give rise to new business models. But in some areas it will have little impact (eg banks' corporate advisory work). As well as its transformational impact, the internet could represent a modern example of an old problem for banks: a very rapid expansion of lending to a single industry based on excessive enthusiasm about a new technology (earlier examples include steam, rail, electricity, cars and radio) whose implications are hard to predict. The difference this time may be that the technology also directly affects the banking system itself.

It is an irony that while e-finance is all about more efficient transmission and use of data, statistics on e-finance itself are so lacking that analysis of developments is difficult. As a result, many articles merely repeat exponentially extrapolated estimates of dubious provenance and cross-country comparisons are often based on differing definitions. The many gaps in knowledge about the current position exacerbate the uncertainty about the nature and speed of future developments. For the private sector, this provides a reason for caution. However, as initial systems may quickly build up a dominant market position, there is also pressure for market players to adopt quickly the latest technology without awaiting a full evaluation of costs and benefits.

Policymakers face uncertainty about which parts of the financial system will come under stress (see Turner (2001)). They generally wish to be "technology neutral", balancing the desire to set regulatory guidelines before market developments go too far and too quickly (given that with financial crises, prevention is better than cure) against the risk that a heavy-handed regulatory approach may stifle innovation. There are differences in the way authorities in various economies have responded to these

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[2] See Banks (2001) and Sato et al (2001) for further discussion.

trade-offs. Some Asian and European economies favour limiting e-finance to regulated institutions while the United States tends to favour a more hands-off approach (albeit with frequent on-site reviews of unregulated service providers).

1.2 Comparative e-finance developments

Some idea of the extent to which e-finance has developed in various economies is given in Table 1, but it must be emphasised that these numbers may not be fully comparable and should be treated with caution. In general, as would be expected, the use of computers and mobile phones, and access to the internet, is in line with income, and the prevalence of e-finance follows a similar pattern.

Table 1

E-finance: selected indicators (1999)

	Real GNP per capita (US = 100)	Internet users as % of inhabitants	Mobile phones per 100 inhabitants	Bank customers using online banking (%)	Electronic brokerage transactions: % of total
Australia	75	32	34	4	22
Finland	71	41	65		
Germany	74	18	29	12	32
Japan	79	21	45		32
Sweden	69	41	58	31	55
United Kingdom	70	21	46	6	26
United States	100	27	31	6	56
Hong Kong	71	36	64	2	1
Korea	49	23	50		65
Singapore	70	24	42	5	10
Argentina	37	2	12		
Brazil	21	2	9	4	6
China	11	1	3		3
Czech Republic	40	7	19	3	
India	7	0	0		2
Malaysia	24	7	14	<1	
Mexico	25	2	8	4	41
Nigeria	2	0	0		
Poland	26	5	10	<1	
South Africa	27	4	12		
Thailand	19	1	4		

Source: BIS estimates based on data from the World Bank, central banks and Claessens et al (2000, 2001).

There are exceptions, however, such as Korea, which appears to have higher usage of high-tech equipment and e-finance than its income would suggest (partly reflecting relatively low internet charges by internet service providers there). It is very hard to predict the future growth of e-finance: whether it will continue to be PC-based or move towards mobile phones[3] or interactive digital

[3] See the survey by Standage (2001).

television, whether established financial institutions will account for a larger or smaller share of it and whether it will lead to greater or less concentration.

Even among the high-income economies, differences are evident. High ownership of personal computers, and especially high usage of mobile phones, have meant that the Scandinavian countries lead in e-banking and e-payments (see the paper by Leinonen in this volume). The long-standing stock-owning culture in the United States and wide computer ownership has seen e-broking become particularly popular there. In contrast, consumers in the United States appear not to have taken to e-banking in large numbers, perhaps because of the prevalence of small banks, the greater use of non-bank financial institutions and the facilities for automated funds transfer available before the internet. Some of the world's least developed countries may be able to use e-finance to leapfrog; moving straight to e-banking rather than establishing branch networks; see Claessens et al (2001).

2. Impact on trading in financial markets

2.1 Retail markets

Perhaps the area which internet technology has most transformed is the retail broking market. As Itoh (in this volume) discusses, costs here have been slashed and customers can now access vastly more information cheaply from the internet. As a result, online trading now accounts for over half of retail stock trades in the United States and a new category of investors - online day traders - has emerged. This has been associated with an unbundling of research, advice and transactions services by brokers.

2.2 Wholesale markets

E-trading is also transforming the structure of wholesale financial markets, most notably the foreign exchange and equity markets, introducing new architectures with new trading rules. The paper by Allen, Hawkins and Sato in this volume describes how it allows architectural aspects such as access and transparency to be more matters of design choice than the result of physical constraints. However, many new systems are owned by consortia of dealers seeking a stake in the platforms disintermediating them, raising questions about whether the design features may incorporate anti-competitive features.

Regarding foreign exchange, the BIS triennial survey shows that 20-30% of interbank trading in the major currencies was conducted using electronic brokers in 1995 and this rose to about 50% in 1998 and it is now likely to exceed 90%. Electronic systems have made far less impact on transactions between banks and their customers. Many banks have offered customers single-dealer platforms but customers have made known their preference for multi-dealer platforms and banks have feared competition from non-bank platforms. Several internet-based systems are now being rolled out, with the two multi-bank systems, FXall and Atriax, being most prominent. Electronic trading is now predominant in many equity markets and futures markets. It is rapidly gaining ground in bond markets, particularly markets for benchmark government bonds. It may gain further ground as new mechanisms develop whereby small, less liquid issues could be traded as part of bundles offering a set of risk-return characteristics; see the paper by Lin, Geng and Whinston in this volume and Fan et al (2000). Gu et al (2001) take this a step further, suggesting that such bundles could be constructed as a way of replicating an OTC derivative.

Changes to market architecture could affect the resilience of financial markets and price volatility in them. Liquid markets are more resilient than illiquid markets, and prices tend to adjust more smoothly. E-trading cuts trading costs, including through facilitating "straight-through-processing" (STP, ie allowing trades to pass automatically through to final settlement without further manual intervention), which should improve liquidity, even if there is less of a role for market-makers.

Some concerns have been expressed by market participants (for examples, see Morris (2001) and McNee (2000)) that electronic trading may degrade the quality of prices. Firstly, fragmentation of markets may spread transactions among more exchanges operating independently. However, as Allen, Hawkins and Sato (in this volume) note, this concern is most applicable to the heavily analysed

US equity market.[4] As trading there was concentrated on the New York Stock Exchange, the advent of new trading technology led to at least an initial fragmentation in the market. By contrast, markets in other products - notably foreign exchange and bonds - have been mostly bilateral and the advent of electronic trading has led to greater concentration in these markets and so has generally enhanced liquidity. A report by the CGFS (2001) found no evidence that electronic trading was having an adverse impact on market liquidity. The lower turnover observed in some markets is probably due to risk now being appropriately priced, and less need for transactions purely aimed at ascertaining the market price or passing around an unwanted exposure rather than any inherent problem with electronic systems.

The second concern is that a large proportion of transactions may not reach the main exchanges and so not contribute to price determination. They may either be transacted on satellite trading venues or a large broker may internally match buy and sell orders from its own customers, and send only the net balance to the exchange. The price applied to these transactions will be based on prices determined in another market, a procedure known as "crossing". While crossing offers lower execution costs, it has been sharply criticised on other grounds; Lin, Geng and Whinston (in this volume) condemn it as appropriating the outcome of other markets. This raises questions about the extent to which price information is a public good and how exchanges should charge for providing price information.

A challenge for regulators is the blurring distinction between intermediaries, markets and exchanges; (see the paper by Lin, Geng and Whinston in this volume). Exchanges are often "demutualising" into profit-making companies. This raises questions about their former multiple roles in provision of information, clearing and settlement, listing and regulation. A commission of stock exchange experts in Germany concluded that no special regulations are necessary for new types of markets but investors should be warned if the trading system is unsupervised, informed of the size of the trading volume and warned about posting quotes. Wahrenburg (in this volume) notes that often (eg in European equity markets) each exchange has its own regulator but nobody regulates competition between exchanges and trading systems.

It is hard for the authorities to nominate, much less mandate, a preferred market structure. It is possible for sub-optimal market structures to develop. A quandary is that regulations influence market structure but it is necessary to understand the market structure to set effective regulations.

The implications for market microstructure literature of e-finance are discussed by Lin, Geng and Whinston (in this volume). They regard information asymmetry as a competitive advantage in production rather than as a market imperfection, and point out that internet technology is reducing such asymmetries.

3. Impact on financial intermediation

3.1 The nature of e-banking

The opinion that traditional banks were "dinosaurs" that the internet would drive to extinction is no longer widely held. A study comparing new internet-only banks with a peer group of new branch banks by DeYoung (this volume) shows the internet-only banks have been substantially less profitable. They generate lower business volumes and any savings generated by lower physical overheads appear to be offset by other types of non-interest expenditures, notably marketing to attract new customers. However, internet-only banking could eventually prove to be a viable business model: De Young finds that profitability improves more quickly over time for the internet-only start-ups and they may benefit more from gaining experience and be better placed to realise economies of scale than their peers.

The current conventional wisdom is that the "clicks-and-mortar" model (a combination of internet delivery channel with focused bank branches) will prevail, at least in the medium term. There is now

[4] It was noted during the workshop that a lot of academic work had been undertaken on equity markets, especially for the United States, and it would be useful to have more on foreign exchange and bond markets.

increased recognition that, as public trust is so crucial to banking, an established brand name is important and many customers wish to be able to do some banking physically. There is no longer talk about closing all bank branches (indeed their numbers have actually been increasing in the United States), although they are becoming smaller and their focus is shifting to advisory roles. In a developing country, one banker reported that a third of customers cited internet access as an important factor in choosing a bank, albeit much less important than access to branches and ATMs. Once marketing and set-up costs have been incurred, transactions costs (admittedly, excluding the cost of customer support) appear much lower for e-banking, especially in high-wage economies (Table 2). A managerial challenge for "clicks-and-mortar" banks is incorporating IT-savvy, creative staff and visionary managers within more traditional banking hierarchies.

Table 2

Relative costs of banking transactions

	United States[1]	**India**
Physical branch	100	100
Postal	..	40
Telephone	50	18
ATM	27	18
PC dial-up	8	na
Internet	1	12

[1] Simple average of three studies by (i) US Department of Commerce; (ii) Booz, Allen & Hamilton; and (iii) Goldman Sachs and Boston Consulting Group.

Sources: Sato et al (2001); ICICI Bank.

Paradoxically, while many individual banks claim to be making efficiency gains and cost savings from e-banking, there is little sign of it in aggregate banking statistics or in the national accounts. Comparisons of US banks with and without internet operations by Furst et al (2000) and Sullivan (2000) find that large banks offering e-banking have similar costs and profitability to those not offering such facilities. Among smaller established banks, those offering e-banking had higher costs and lower profitability than those not offering it. Nor is there any indication yet that banks' operating costs are falling as e-banking becomes more common, or that they are lower in the e-banking leaders than in other advanced economies (Table 3). One analyst at the workshop went so far as to assert that no major bank had achieved cost reductions through e-finance initiatives.

This may be a temporary phenomenon. Adding e-banking services requires high initial set-up costs (both technological and marketing) with the savings following later. A fundamental restructuring of banks' business models and operations (such as clearing and settlement procedures) and significant retraining may be necessary to reap the full benefits.[5] Or it may be that banks have invested too much, too quickly in new technology without a clear business plan. In some cases, banks may not be achieving potential cost savings because they are not providing strong price incentives for customers to switch to e-banking; they seem to be promoting it more as offering convenience and this is not proving enough to overcome customer inertia or concerns about security. One banker suggested that over 20% of customers would need to be online to cover the cost of a large bank providing such services; Table 1 suggests that in most economies overall penetration is still well below this, although some individual banks would have achieved it. E-banking is likely to grow, but as with telephone and PC banking there may be many customers who prefer not to use it.

[5] See McFadden (2001). An analogy is with the introduction of electric power, which only led to big improvements in efficiency once factories had been redesigned to capitalise on it. See Cohen et al (2000) and Shapiro and Varian (1999).

Table 3

Banks' operating costs as a percentage to total assets

	1993-97	1998	1999	2000
E-banking leaders[1]	1.8	1.5	1.4	1.4
Western Europe[2]	1.6	1.5	1.6	1.8
United States	3.2	3.1	3.1	3.1
Hong Kong and Singapore	1.2	1.3	1.3	1.2
Emerging east Asia[3]	2.2	2.5	2.1	1.9
Latin America[4]	6.2	5.3	5.4	5.8
Central Europe[5]	2.9	3.2	3.1	2.7

[1] Simple average of Finland, Norway and Sweden. [2] Simple average of France, Germany, Italy and the United Kingdom. [3] Simple average of Indonesia, Korea, Malaysia, the Philippines and Thailand. [4] Simple average of Argentina, Brazil, Chile, Colombia, Mexico and Peru. [5] Simple average of the Czech Republic, Hungary and Poland.

Source: update and extension of Table 4 from Hawkins and Mihaljek (2001), based on Fitch-IBCA data.

Views differ about the nature of e-banking customers. Most participants at the workshop thought they were more demanding about prices and the quality of services, made more transactions and opened multiple accounts, making them expensively fickle customers, only staying with a bank so long as it offered the highest interest rate available. However, one banker reported that online customers were more loyal, although it was not clear whether this was due to better tailored services, banks underpricing to build volume or higher switching costs. In either case, banks are looking for new products that will increase customer "stickiness".

3.2 New business models

Banks currently have exclusive access to customer information that they can use for evaluating and pricing loans. E-finance has the potential to create new and radically different business models that will challenge this advantage of banks. *Vertical portals* allow customers one-stop shopping for financial and other products offered by a range of firms. They reduce search costs dramatically and so increase competition in banking and strengthen the position of the customer. But they also pose a further threat to banks. They are able to build up a profile of the tastes and financial status of customers by monitoring their transaction patterns, and would therefore be in a better position than banks to target marketing of financial services and make credit assessments. *Smart agents* automate the comparison process offered by vertical portals to choose the intermediary offering the best deal. *Aggregators* - which may be operated by non-banks such as Yahoo and Microsoft - allow individuals to obtain horizontally consolidated information about their financial and non-financial accounts across institutions. A customer using an aggregator's site for monitoring their account may no longer see the bank's marketing messages unless the aggregation is done on its site. Banks also fear being held responsible for the misuse of confidential customer data by the aggregator. Aggregators are likely to become more important in the United States with its many banks[6] whereas in Europe and other universal banking markets many customers already have all their accounts with one bank. Over time, these new entities may evolve further in ways that make them greater competitors for banks. For example, if non-bank aggregators are allowed to transfer funds between bank accounts or become involved in bill payments, policymakers will need to decide whom, if anyone, should regulate these new entities.

One response of banks to these challenges is to broaden their own range of activities so as to maximise use of their brand names. Internet technology allows more targeted cross-selling of other

[6] In the United States the average customer uses more than three banks and the number is higher still for internet customers. Surveys there and in Singapore showed that a majority of consumers wanted to use an aggregator and many would be willing to pay for it.

financial products (partly by outsourcing and relabelling), or even services such as certification, digital signatures and secure communication. This raises a problem for bank supervisors, who have usually been reluctant to allow banks to expand into non-financial services. This problem becomes more acute when non-financial firms are increasingly encroaching on banking business. For example, in Japan there is now a network of around 10,000 small convenience stores connected by a sophisticated information network which offer basic banking services (see the paper by Itoh in this volume). Telecoms and IT companies are also likely to become important rivals to banks, as they possess the necessary IT skills and have an extensive customer base. This raises questions about whether they need to be brought within the supervisory net. In some cases, these firms may be allies of banks rather than rivals, which then raises the issue of which institution, and which supervisor, is responsible if problems arise.[7]

3.3 Cross-border e-finance

In an e-finance world, cross-border expansion becomes cheaper and less risky. One banker went so far as to describe it as "the death of distance". The resources devoted to foreign e-finance are often situated in the home country so that the same resources can be switched from one foreign market to another. It is thus much easier to retrench quickly from a virtual offering than a physical one. Furthermore, it may be necessary for banks in smaller economies to expand their cross-border operations in order to reap economies of scale. However, so far there has not been that much cross-border e-finance. One reason is that it is harder for an offshore bank to build up trust and it is less familiar with the market conditions. Some bankers avoid international clients as the bankers are unwilling to be subject to dispute settlement rules and consumer protection requirements of unfamiliar jurisdictions. Cross-border finance, and the promotion of it, will require a degree of cross-border coordination of supervision, as evidenced by BCBS (2000). Such cooperation may need to extend to similar supervisory rules and disclosure requirements (for efficiency and to avoid regulatory arbitrage) and some harmonising of legal, accounting and taxation arrangements.

3.4 Outsourcing

Increased competitive pressures and the speed of technology changes are leading to rapidly increasing outsourcing relationships. Outsourcing allows small institutions to benefit from economies of scale and gain access to expertise. For larger institutions, the advantage is more that of being able to concentrate management time on core businesses. Increasingly services are being outsourced internationally; an account enquiry to a UK bank may be answered by someone in a call centre in India. However, supervisors are concerned about the adequacy of due diligence before entering into a relationship, poor documentation of rights and responsibilities and weak ongoing risk management practices employed by banks in conjunction with outsourcing activity. Some banks overestimate the cost savings from outsourcing, have unrealistic timetables and have given little thought to the potential disruption to their operations in the event of problems with the service provider. This in turn gives rise to operational and reputational risks for these banks. It may also give rise to systemic concerns where a large number of banks have outsourced to a single provider or critical aspects of banks' operations have been outsourced. (See BCBS (2001) for further discussion.)

3.5 Other challenges for bank supervisors

E-banking raises both familiar challenges for supervisors and some distinctive ones. The rapid growth into new activities stretches managerial capacity, particularly of smaller banks blindly following trends. Those banks which lose profitability by adapting poorly to e-banking (which could involve either under- or over-spending on new technology) may then be tempted to move into riskier business to maintain returns. This could be analogous to the excessive competition and excessive risk-taking seen during

[7] Banks (2001) gives as examples of alliances crossing supervisory responsibilities E*Trade with UBS, HSBC with Merrill Lynch, CompuBank with GE, NetBank with Fidelity, E*Trade with Ernst and Young and Royal Bank of Scotland with Tesco. Further examples in OECD (2001) include ABN AMRO with Trade.com, Dresdner Bank with eBay and BBVA with Telefonica.

phases of bank deregulation. The greater importance of economies of scale may mean that smaller banks are increasingly relegated to being niche players. While many could be taken over by larger banks, some may fail with disruptive consequences. Systemic risks may rise if e-banks are more vulnerable to runs on deposits. Their risk profiles can change dramatically in a very short period. In some cases, the new technology could be harnessed by supervisors to assist in their work. For example, supervisors could require direct access to banks' risk management systems.

Operational risks are another important area. Security concerns are an important factor discouraging many internet users from e-banking. Supervisors need to be assured that banks have conducted adequate assessments of the vulnerability of operating systems to hackers and denial-of-service attacks (ie deliberate overloading of websites) and their cryptography, back-up systems, firewalls and emergency procedures. The Basel Committee on Banking Supervision's Electronic Banking Group (EBG) has risk management principles but has not yet developed the desirable global but flexible security benchmarks.[8] Common criteria for laboratories certifying that IT systems are secure are being developed by 14 OECD economies. More work is needed on developing common and robust authentication standards for digital signatures and legal recognition for them.

The division of supervisory responsibilities may also be affected by e-finance. Claessens et al (2000) argue that greater competition from alternative e-lenders means banks are now less "special" and there is therefore less need for a safety net - an approach Neito (in this volume) describes as controversial.

E-finance also raises other public policy issues that may affect some central banks, depending on the width of their mandate. There is a risk of a "digital divide" emerging as the poor are excluded from the internet and so from the financial system.[9] E-banking could facilitate money-laundering, although electronic systems may also help in its detection. There are also dangers of false representation and identity theft. In the banking area, some central banks share responsibility for competition issues - see Marcus (2001) - and the growing importance of networks, and associated pressure towards consolidation heading towards undue concentration or monopoly, raises important issues here. Privacy and other consumer issues are involved if e-finance makes it easier for banks to trade information about consumers. Other consumer protection issues are the need to assure consumers that they have the same protection (cooling-off periods, complaints and compensation arrangements) as with traditional products and the development of codes of behaviour and sound practice.

4. Impact on the payment system

4.1 Retail payment systems

At present, the credit card system dominates retail internet payments despite being costly, open to fraud, poorly suited to micropayments or person-to-person payments (although new systems such as PayPal are attempting to address this) and not anonymous (see the paper by Spencer in this volume). It is run by an oligopoly displaying the typical characteristics of low innovation and charges poorly matched to the relevant costs. Looking further ahead, payments on the internet may be made by a virtual "cybermoney", which might be issued by banks, but also by telecommunication or IT companies.

Banks are now integrating retail payments into their systems. In Scandinavia it is now possible to have a reference number which flows through the payment system. A global standard with a common layout is desired, including a globally understood account number (see the paper by Leinonen in this volume). The goal is to achieve delivery-versus-payment at a retail level. In deciding between open and private systems, and centralised and decentralised typologies, a balance is needed between

[8] The EBG's e-banking guidelines are set out in BCBS (2001).

[9] Table 1 shows the digital divide between the wealthy countries in the upper part and the poorer countries in the lower part. It also exists within individual countries. In the United States the average income of people using online banking services is twice that of people not online, according to Forrester Research.

competition and cooperation. Regulation may be needed to promote open and common standards, minimise switching costs and allow flexible pricing.

Electronic money schemes have been around for a number of years. BIS (1996) pointed out some potential issues they raised, such as loss of seigniorage. However, any displacement of notes and coin by e-money is happening very slowly. Indeed, the ratio of notes and coin to GDP has actually risen in some countries. It is possible that this overall stability disguises two offsetting trends: a very gradual displacement of low-denomination notes and coins by e-money, but a greater use of high-denomination notes for various forms of bad behaviour or as a store of value offshore (see Goodhart and Krueger (2001)). The ECB's data for the euro area show e-cash outstanding is less than 0.1% of notes and coin on issue, and its spread has been slowing (see the graph on page 99 of this volume). More recent forms of e-money are more likely to succeed as they are better designed, more robust, may be linked to the internet and have a clear use. However, it still seems likely that they will coexist with physical banknotes for a long time yet, given the security, convenience and anonymity of banknotes and the lack of interoperability of diversified e-money schemes.

4.2 Wholesale payments systems

Critical issues in this area include the linkage of financial markets and payment systems to offer delivery-versus-payment and straight-through-processing. The execution, clearing and settlement of trades can be linked to the procedures for controlling market and operational risks. STP should reduce costs by reducing the amount of labour required and minimising the risk of errors from the different stages involved in reporting and recording trades.

5. Network effects and governance

A few speakers drew analogies between e-finance and industries such as telecoms, electricity and railways, stressing the importance of interconnectedness and network effects (see the paper by Wahrenburg in this volume). There is a tension between benefits and costs of allowing the natural tendency for monopolies to (re)assert themselves in such industries. Just as it would be inefficient for competition to take the form of multiple electricity or telephone lines running down streets into houses or parallel railway lines between cities, financial traders do not want multiple terminals on their desks, or even to have to switch between different sites, to see quotes. However, a monopoly raises the usual concerns about inefficient pricing, technical inefficiencies and abuse of dominant market positions. There may be a trade-off between static efficiency and soundness in a centralised system and dynamic efficiency and innovation in a fragmented system. This is also an issue for supervisors and regulators; a static environment with a well-established monopoly is more secure in the short-term but allowing new entrants is likely to lead to a more vibrant and responsive market. The key is to achieve a governance structure with competing but interoperable systems. This may involve a role for the authorities in setting common standards or at least ensuring they are not established in an anti-competitive way. However, as set out in Bar (2001), this may be difficult as, where the network is itself the market, anti-competitive features may be embedded in the architecture. Furthermore, new governance rules need to be both technically and politically feasible. They also need to be appropriate for the transitional phrase between old and new marketplaces, when experimentation means risks are particularly high; see the paper by Weber and Zysman in this volume.

Following the commercial launch of the internet in 1994 there were great expectations that it would shatter entry barriers. However, across a range of e-commerce areas it was found that while entry is easy, staying is harder. Bill Gates had said the internet would create a "frictionless economy" but as Bar (2001) points out, some friction is needed to get traction! Similarly, while it was earlier thought that e-banking would facilitate new bank entry and increase competition, it now seems more likely that e-banking will speed up bank consolidation as the fixed costs (including marketing) are high but marginal costs very low. Adding e-banking services requires high investment and a willingness to accept lower profits for a time. In the longer term, consolidation is likely to lead to a stronger, albeit possibly less innovative, banking system. However, while many existing banks might merge, some might fail, which would pose challenges for supervisors in ensuring such exits are orderly and do not challenge systemic stability and weaken overall confidence in the banking industry.

Views differ both about the size of economies of scale in the finance industry and how new technology and the network effects of e-finance are changing these. Older studies have generally found economies of scale exhausted at quite small sizes of banks.[10] E-finance is likely to be changing the pattern of economies of scale and scope but it is not obvious in which direction, with the answer possibly differing for different products. Nieto (in this volume) suggests that there are significant economies of scale in the market for large corporate loans (indeed, banks with a smaller capital base may be excluded from this lending unless they form syndicates). However, she believes "a consensus exists that a plethora of financial services (eg lending to small firms, brokerage services, trading systems) have witnessed a reduction in their economies of scale and an increase in competition due to the availability of IT."

6. Implications for central banks

Assessing and dealing with the potential risks posed by e-finance is a key challenge for central banks. The scope of these challenges will vary across countries, not just because of the differing developments in e-finance across economies (Table 1) but also because of differences in the responsibilities assigned to central banks. Monetary policy is a core responsibility of all central banks, and may gradually be affected by e-finance developments. Central banks are able to implement monetary policy in large economies by means of small transactions because they are the monopoly suppliers of liabilities with a special role in the economy. E-finance may lead to a decoupling of these transactions and real activity. If the public switches to using non-bank institutions for banking activities, particular problems will arise for central banks for which required reserves are important. While the central bank has a natural advantage in providing final settlement, this could move elsewhere. This would leave the central bank needing to perform very large transactions, or to try bringing new institutions within its control or to rely on the government requiring that payments to it continue to be made in central bank money. A further challenge would be privately issued e-money on the internet. Even if notes and coin, or indeed banks, were to disappear the central bank could still influence short-term interest rates as its government ownership gives it the ability to carry out large market transactions without regard to profitability. E-finance may also gradually change the transmission mechanism, involving, for example, a greater focus on changes in relative returns and less emphasis on credit rationing effects. (See the paper by Hawkins in this volume for further discussion of these issues.)

In addition, many central banks retain responsibility for supervision of some financial institutions, or at least a general interest in the overall systemic stability of the financial system. As mentioned above, the paucity of data makes assessing the impact of e-finance difficult. Even once the trends are identified, it is hard to distinguish between familiar issues in new guises and totally new challenges, especially given other concurrent forces changing the financial industry. The net impact will vary significantly by product, by player and by market. While retail financial services have been most transformed by the internet to date, there may be a major impact on transactions between businesses in the medium term. The business models for providing financial services will also keep changing as the enabling technologies evolve (eg internet access not just through PCs but also from mobile phones and interactive televisions). But it is very hard to predict which business models will succeed in normal times, and which will remain resilient under stress.

These uncertainties make it all the more important to have a regular exchange of information between central banks, supervisors and market participants. A periodic reappraisal of the global e-finance landscape and the main policy issues is desirable. Various committees meeting in Basel, such as the

[10] This is consistent with observations of equity prices following bank mergers, which often show the combined bank has a lower value than the sum of its components. However, empirical studies have concentrated on the US banking market, where a long history of restrictions on interstate banking has left a large number of banks. Western European banks have attracted more attention recently, but there are still only a handful of studies referring to emerging economies. Hawkins and Mihaljek (2001; see especially their Graphs 1 and 2 and Annex 2) show that in many emerging economies smaller banks are often more efficient on average than large banks. This is partly because the large banks include state-owned banks, which have often performed poorly. Removing these from the sample, it does appear that the average large bank has lower operating costs relative to assets, but there are many small banks that are just as efficient.

Basel Committee on Banking Supervision, the Committee on the Global Financial System, the Committee on Payment and Settlement Systems and the Financial Stability Forum, will play an important role in this assessment, with input from national authorities, the private sector and academics.

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