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## Infrastructure: Financial Sector and Payment Systems

An efficient and sound financial structure is the second service-sector infrastructure critical for the growth and development of electronic commerce. Such a structure is in fact a key ingredient for general economic well-being. A country's financial system intermediates between savers and investors and helps allocate and discipline capital to yield economic benefits to both individuals and the economy. The financial system is also the conduit for monetary policy, which affects the overall level of a country's macroeconomic activity. Domestic policies that encourage a deep and resilient financial system support economic development. Global forces and the liberalization of financial systems, including through electronic commerce, can augment and support these objectives, although policymakers need to be wary: The pathway is not without potholes.

Electronic commerce directly influences the financial structure of an economy in several ways. First, just as for businesses that produce goods, electronic commerce affects the range of products that financial intermediaries offer. It affects how businesses and buyers interact with each other. Since electronic commerce is global, financial intermediation is more likely to involve cross-border transactions and nondomestic institutions. Second, financial intermediaries interact with each other and with the central bank via payments systems. The faster pace and the greater international component of electronic commerce place greater demands on a country's financial plumbing.

More broadly, the multiple components of the financial system—banks and nonbank financial intermediaries and markets—play a very important role in supporting the development of firms that, on the one hand,

participate in the global value-chain of production and, on the other, innovate electronic commerce products to best meet the needs of local users. Government policies that influence financial intermediaries and the range of financial products will materially affect the development of electronic commerce in a country.

## Finance, Development, and Electronic Commerce

The questions of how finance and development are linked, and what impact international competition might have on domestic financial markets are not new. However, the results of an increasing body of research on these questions have implications for how policymakers might use electronic commerce to help create a financial environment conducive to development, and moreover, how an environment conducive to electronic commerce also supports financial sector development.

Development of the financial sector, particularly where there are clear legal and accounting systems, improves long-run economic performance by raising productivity growth (Beck, Levine, and Loayza 1999; Levine, Loayza, and Beck 1999). At the same time, higher income tends to be associated with a deeper and more resilient financial system that includes a rich array of both bank and nonbank institutions and markets (Demirgüç-Kunt and Levine 1999). This type of financial sector can better withstand economic volatility and downturns.

Competition, domestic or foreign, makes the financial sector better at disciplining capital to achieve higher economic rewards with greater efficiency. Argentina demonstrates that domestic financial institutions remain active in the domestic marketplace even after the market is opened to foreign competition (Claessens, Demirgüç-Kunt, and Huizinga 1998; Clarke et al. 1999; Denizer 1997). The domestic institutions have unique knowledge of the domestic marketplace, allowing them to thrive by adding value to local firms and consumers. This combination of international reach by some institutions coexisting with local reach of domestic institutions is a feature of the Internet and electronic commerce more generally. (see chapter 1).

On the other hand, evidence from other countries, including Turkey and Morocco, finds that domestic banks can remain collusive even after local and foreign competition is allowed, with deleterious effects on domestic financial intermediation and growth.<sup>1</sup> The Internet and electronic commerce enable lower-cost cross-border financial activities that may not yet have been liberalized sufficiently by foreign presence and domestic

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1. Denizer 1997; field research by Catherine Mann in Morocco, September 1999.

entry; thus, it can play a part in improving financial and overall economic performance. As discussed in more detail in chapter 8, even if countries have not explicitly liberalized the financial sector through their commitments in the WTO under the General Agreement on Trade Services (GATS), they can allow the liberalizing features of cross-border financial transactions via electronic commerce to move toward greater liberalization without going back to the negotiating table.

## Electronic Banking and Financial Services

Electronic commerce technologies affect individual financial institutions in a number of ways, which together push them to alter the mix of services they offer. Electronic commerce technologies significantly reduce the cost of providing financial services, but they also turn traditional products offered by financial institutions, such as some loans, into commodities. For example, a 1997 study by Booz Allen (corroborated in 2000 by Arthur Andersen) suggested that a transaction at a teller window costs a bank \$1.07, an automatic teller machine (ATM) transaction \$0.27, and an Internet banking transaction only \$0.01. At the same time, margins on some loans, particularly those backed by real assets such as homes, are falling. Competition by lenders for the right to offer loans to borrowers who fill out standard forms for standard loans has become intense. For securities trading as well, full-service brokerages charge \$150 for executing a trade, but online brokerages like E\*trade charge only \$10 (ITU 1999, figure 3.7).

On the other hand, electronic commerce technologies and lower transaction costs allow financial institutions to treat clients individually. In this age of online mortgage applications and stock trades, financial institutions can retain their relationships with clients by creating bundles of services unique to the needs of individual clients. Such bundles can include traditional savings and checking accounts that can be tracked and updated electronically, as well as online bill-pay. For example, about 90 percent of German consumer bank Web sites offer online transactions. Rather than use the cost savings from the Web sites to expand beyond the local environs, these institutions are consolidating their relationships with their traditional customer base at the city and village level (BlueSky International, 12 July 1999; field research by Catherine Mann, June 2000). Similarly, the range of services brokerages must offer to keep customers rises as difficulties in executing trades falls.

Online banking developments in developing countries show some technology leapfrogging, although the importance of securing customer trust is paramount. Banks in some developing countries have been at the forefront in providing online banking. Brazil's Banco 1 offers a full range of bank services over the Internet, and Brazil is one of the few countries

where individuals can “bank” with the government (that is, pay their taxes) over the Internet. In Mexico, 5 percent of Internet subscribers use Internet banking services, with 95 percent of those citing convenience, 67 percent reputation of the bank, and 63 percent attractive fees as the reason. Of those not using the services, 45 percent wanted to try Internet banking, but it was not available through their bank. Yet 39 percent of nonusers had security concerns, and about 30 percent thought the situation was too new and wanted to wait and see (ITU 1999, 53, figure 3.8). In short, customers generally want to do Internet banking but also want their financial operations to take place in a secure environment with an institution they can trust.

Increasingly demanding customers mean that financial institutions must continually enhance the services that they offer. For example, use of online banking services via PCs in the United States is expected to triple from 7 million households to more than 24 million households by 2004. But many new users are discontinuing their online banking services. In fact, over one-third of on-line bank users in the United States discontinued their accounts between July 1998 and July 1999 because the services were too cumbersome and insufficiently comprehensive to be worthwhile.<sup>2</sup> To reap the cost savings, and to develop relationships that create value to both customer and bank, online banking services must be user-friendly and meet customer needs, which may require an extension of the traditional bounds of “financial services.”

The fragmented relationship between customers, their bills, and the banks that clear their payments stands in the way of a greater uptake of electronic commerce, Internet banking, and a more efficient financial services sector. In Sri Lanka, customers take payments in cash directly to businesses like the telephone company or the utility company: Only if they directly deliver the cash do they receive a receipt. Although domestic banks in Sri Lanka have telephone banking in place and are gearing up to offer PC banking, the population remains unwilling to use these services in part because they do not get a receipt, and often payment is delayed.<sup>3</sup>

In the United States, a different problem arises because so *few* transactions are cash-based. Whereas a debtor household or business might do its banking online, the creditor may not bank online, or at least not through the payer’s bank. Therefore, there is no direct link between the payer and the payee. An effort to consolidate bills in a clearinghouse is a good example of the principal of network effects (see chapter 2): Chase Manhattan, First Union, and Wells Fargo are building an alliance of 11 banks (which presumably account for a large share of both payer and payee

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2. Based on research by GartnerGroup’s Dataquest, Inc. and CyberCitizen Finance, a division of Cyber Dialogue.

3. Field research by Catherine Mann, Sri Lanka, October 1999.

accounts) into a bill-clearing network. Bank customers would have a single site to use and the alliance will do the back-office operations necessary to present bills on the site and then transfer payments at a designated time (*Infobeat*, 23 June 1999).

Whereas on-line bill presentment and payment seems straightforward, significant difficulties have arisen and no service is currently considered acceptable. This case offers a good example of where expectations of what technology should be able to do exceeds what it currently can do. In addition to technical challenges associated with bringing together multiple parties, there remain issues of security and trust. In some cases, online bill payments are not made in a timely fashion, so that banks make money on the “float” between the time that the payer requests the transfer and the payee receives the funds.

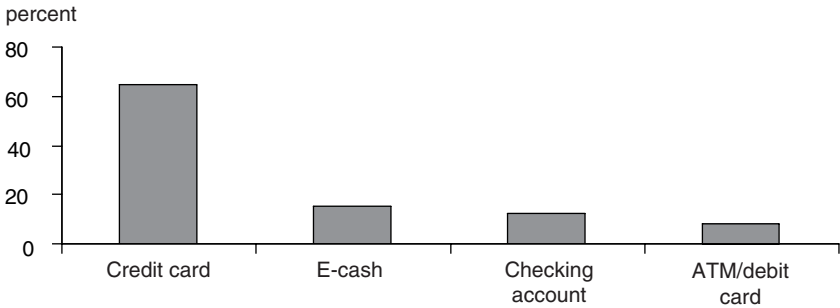
## Payment Vehicles and Security

Beyond electronic banking or electronic brokerage, the financial sector is intimately involved in the broader realm of electronic commerce in its role as enabler of online payments for transactions between businesses, consumers, and governments. The fast-paced global environment of both the electronic and physical worlds demand that financial intermediaries offer easy-to-use payment tools that allow rapid electronic funds transfer across borders. However, the more anonymous real-time business environment also demands a high degree of client verification as well as security and authentication of funds transferred. Financial partners or payment vehicles that cannot deliver both these services will not be competitive. Are there tensions between the need for speed and the desire for secure, verifiable transactions? Can security and speed be put on a virtuous cycle where technology designed to enhance the one also enhances the other? What if this does not happen?

Speed is crucial. Electronic commerce operates in a 24-hour, 7-day a week (“24/7”) environment. Increasingly it is composed of digitally delivered inputs and outputs, where offline cash-on-delivery simply is not an option. The efficiencies and cost reductions promised by electronic commerce, particularly B2B, will not materialize without an online payment vehicle.

Moreover, Internet businesses must authorize transactions through payment institutions (e.g., banks or credit card companies) in real time so as to allow immediate delivery of digital products. A financial system that cannot provide this will stymie the development of electronic commerce and of the economy generally. Speed of authorization and clearing is also important at the macro level: The shorter the time between authorization and actual payment, the more efficient the transaction and the lower

**Figure 4.1 United States preferred consumers' online payment methods (percent)**



Source: *The Economist*, 19 February 2000, E-cash 2.0, 68, using data from Jupiter Communications.

the institutional risk (see more discussion of payment systems in the next section).

Although there are a number of online payment techniques (see figure 4.1), about 80 percent of electronic commerce transactions currently use credit cards. The international credit card is currency-neutral; it is recognized in nearly every country, which is of particular value in global electronic commerce. Consequently, in the near term, countries where credit or debit card penetration and usage are low may be less able to achieve maximum benefits from global electronic commerce, unless an alternative, equally interoperable mechanism is available. On the other hand, online verification, fraud, and charge-backs are becoming more serious, with particular relevance for small and medium enterprises (SMEs) in both industrial and developing countries. If the credit/debit card mechanism is to remain the premier method of on-line payment, these problems must be resolved.

Credit-card penetration varies widely by country for various reasons including both culture and policy. In many countries, such as China, consumers prefer cash transactions, in part to avoid audit and tax trails; credit card usage for electronic commerce remains low, even as usage of the Internet (such as for e-mail) has risen sharply. Consumers are also concerned about the security of their card numbers online, particularly if they are not protected from liability in the case of fraudulent use of their card. In the United States, the cardholder is liable for \$50 if a card is lost or stolen, and is usually not liable for any fraudulent transaction. In contrast, in Taiwan and El Salvador, the cardholder is liable for the full amount of any fraudulent purchase and must go to court to obtain redress. In some countries, such as Sri Lanka, banks put very low limits

on credit cards, in part to limit the development of a credit culture and in part to limit exposure to fraudulent use.<sup>4</sup>

Where there is aversion to credit cards, other on-line and Internet payment mechanisms are taking shape. In Sri Lanka, IBM is teaming up with a company in Malaysia to develop a secure on-line debit mechanism (direct debit to the bank account using the bank routing number and a PIN authorization). IBM plans to guarantee redress in case of fraud—an interesting blurring of the distinction between a product and a financial services company. American Express “Blue” card comes with an on line “purse” and hardware to securely debit the smart card. A person using a cell phone in Finland can buy soda from a vending machine, and the charge will show up on the phone bill.

Finally, in some countries, the additional charge for international credit card services can be quite high, as much as 5 to 7 percent. Whether these charges are passed on to the buyer or absorbed by the seller, the price differential undermines incentives for electronic commerce. In Bulgaria, for example, the service charge may be high because of currency risk, as well as the inability of credit card companies to prosecute fraud cases.

The government in some countries is intervening with regard to fees, although perhaps not at the source of the problem. In Bulgaria and Taiwan, policymakers are setting up a domestic credit card clearing facility that would offer lower fees on cards issued by domestic financial institutions. They argue that the lower fees are possible because the domestic clearing and issuing institutions will be better able to prosecute fraud, avoid losses, and manage foreign exchange exposure than international companies.<sup>5</sup>

Such government-backed projects, by reducing the spread in credit-card transactions, could in theory help the country by jump-starting electronic commerce. The problem is how to ensure that the symbiosis between domestic financial institutions and the clearing facility does not hinder the integration of the financial institutions into the global environment. Taiwan is planning to partially privatize its domestic clearing facility. The competitive value remains in doubt, however, given the low penetration of foreign financial institutions in Taiwan. In the end, the worry is that although the domestic facilities may not charge high clearance fees, the financial institutions that are members will not be operating in an internationally competitive way. Either way, businesses and consumers do not benefit from globally competitive financial intermediation.

It is clear that security for financial transactions is the *sine qua non* for electronic commerce. Without security, on-line payments simply will

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4. Field research by the authors Catherine Mann in Taiwan and China; Sarah Knight in El Salvador and Catherine Mann in Sri Lanka, August 1998.

5. Field research by the authors and colleagues in Taiwan, August 1998; Bulgaria, October 1999.

disappear and many of the benefits of electronic commerce will not be achieved.

Most discussions of security focus on the potential for theft of credit card numbers. But equally important, and receiving greater attention now, is the potential for a legitimate credit card holder to use a card fraudulently on the web. For example, Mohamed Mustafa & Shamsuddin Co. (a department store in Singapore) was one of the early adopters of on-line selling in June 1998. However, in under three months, while the store had made on-line sales of S\$2 million, credit-card fraud cases accounted for S\$300,000 to S\$500,000 (US\$174,900 to US\$291,500). Cardholders purchased and received goods, and then “charged-back” the transaction. (See below)(Yee 2000). Verification of the buyer by the seller is thus part of the security question.

What is the problem that sellers face? Suppose an online company receives a buy order with a credit card number. Although the number is encrypted (making the transaction secure from the buyer’s standpoint), if the seller does not verify that the buyer was authorized to use the card, the seller is liable for the full amount of the transaction should the buyer defraud the company by charging back the transaction. If the seller has sent the products already, the seller loses out on both the value of the products and the remittance to the credit card company. Because international electronic signature technology is not fully developed, the seller must verify through either signature or through other means (such as matching address of billing and parcel delivery) that the buyer is authentic and authorized. Mustafa’s no longer accepts on-line payment, but has fallen back to e-mail ordering, clearance, and then delivery. In the United States, some small electronics companies have been caught by the fraudulent buyer, the lack of authentication, and the charge-back liability to the credit-card companies. (*Business Week*, 4 March 2000.)

For small countries and SMEs to truly benefit from global electronic commerce they need global reach. Thus, security and authentication protocols have to protect them as both buyers and sellers and not be so expensive as to preclude their participation. Faster authorization from the firm to the credit clearing house will not solve the problem of authentication. Electronic signatures would allow authentication to travel electronically just as quickly as the authorization to buy and the funds to transfer. However, approaches to electronic signatures differ. Mutual recognition or common strategies have not yet emerged. Until they do, the financial infrastructure will be hobbled in its ability to deliver the services necessary to support electronic commerce.

Credit/debit-card companies clearly have an interest in ensuring that transactions are secure and authorized; indeed the major companies are important investors and users of the protocol Secure Electronic Transactions (SET). Yet this mechanism does not appear to meet the needs of

users. Businesses and buyers are seeking other mechanisms that more cheaply enable cross-border electronic commerce. If they succeed, the position of the credit card could erode. Chapter 8 discusses security and authentication in more detail.

## The Monetary Foundation of the Economy

Finally, financial intermediaries function as part of the monetary foundation of an economy under the direction and supervision of the central bank and regulatory authorities. Electronic commerce impacts the economy's monetary foundation and the conduct of the central bank, most notably in payment systems and also potentially in foreign exchange management (UNCTAD 2000; Group of Ten 1997.)

Full efficiency and realization of the benefits of electronic commerce depend on the rapid payment and settlement of accounts: The "plumbing" or payment-system relationships between the payment institutions (e.g., independent credit-card companies), financial intermediaries, and the central bank need to be efficient. If there is one clearinghouse for transactions, the most efficient use of that facility is to clear only the net transactions between the parties. This is the approach used most commonly by central banks and their domestic banks and by credit-card companies around the world.

Electronic commerce increases the demands on these clearing facilities. First, clearing needs to be speedy (because transactions are digital) and in real time (because transactions are 24/7). Thus the standard approach of settling accounts every day at, say, 4 p.m. exposes the financial system to "daylight" risks. Real-time gross settlement (RTGS) of transactions eliminates these exposures among intermediaries and the central bank, but requires much greater security and stronger technologies. Yet without RTGS, exposures representing uncleared transactions can build up at one point in the system, potentially destabilizing individual institutions and possibly the overall financial system if an institution becomes bankrupt between settlement periods. Without RTGS, exposures that build up during the day implicitly represent a subsidy to those with open "debts" to the clearing facility and a tax to those with open "loans" to the facility, unless a fee is charged or rebated in real time on those open positions—clearly something requiring very advanced technology.

If all transactions between a clearing facility, financial intermediaries, and businesses were domestic, a daylight bankruptcy could be handled with relatively little stress to the overall economy. However, because electronic commerce is global, these transactions will involve foreign exchange. Daylight exposures could represent a risk to the foreign exchange reserves of a country (particularly a small country), and in any case can pose difficulties to end-of-day management of foreign exchange

through the central bank. While RTGS will not reduce the magnitude or volatility of intraday foreign exchange transactions, at least the central bank will not be surprised at settlement. Such surprises have been the source of much financial and macroeconomic distress, ranging from the Herrstadt Bank failure, to the failure of Penn Central securities, to the collapse of the Korean won in 1998.

This discussion of the need for real-time clearing, points to the near-term challenges facing governments that wish to maintain controls on foreign exchange usage in order to husband foreign exchange reserves. Full participation in electronic commerce for firms and consumers in these countries will be more problematic. Some countries allow exporters greater access to international exchange than other businesses (Morocco, for example). This strategy could limit the use of electronic commerce by indigenous small businesses that import in order to produce for a market niche in the external or even the domestic market. Saffron producers in the poor southern part of Morocco, for example, could retain more of the profits from the sale of saffron by developing a Web site to market their product internationally. To build this business, however, the saffron producers need imported hardware, web-design software, and perhaps marketing expertise; the present restrictions on foreign exchange may make it all but impossible to bring this to fruition.

A second problem of macroeconomic financial management that many developing countries face is the desire to maintain a closed capital account but an open current account. This strategy is made more difficult by electronic commerce because Internet transactions are not transparent to authorities. For example, government authorities cannot verify whether an on-line purchase was of computer software or a stock certificate. No product is delivered, and tracing the electronic trail to a bank yields relatively little information. In Sri Lanka, the authorities have approached this problem using both limits and voluntary compliance. Credit cards can be used to purchase anything from abroad, but the US dollar value is constrained by the relatively low SL rupee limits on the cards. In addition, the central bank has told domestic banks to remind their customers that purchases of foreign financial instruments are not allowed.<sup>6</sup> The authorities do recognize that these approaches are only buying time to put domestic and international clearing capabilities on a more solid footing.

Digital cash (chits created by selling on the Internet that can be used to buy on the Internet) can be created by agreements between firms and financial institutions. In some respects, digital cash simply continues the trend toward disintermediation of financial activity from traditional banks. Digital cash could become a new source of money and credit in

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6. Field research by Catherine Mann, October 1999.

an economy, just as changes in ATM and “sweeps” technologies<sup>7</sup> have affected fractional reserve banking and the conduct of monetary policy. Digital cash could one day change the velocity of fiat money created by the central bank and may change the leverage that the central bank has over economic activity through instruments of monetary policy; it should be considered in the monetary policy process. (Group of Ten 1997) While many believe that digital cash will at some point be significant, it has not yet caught on. Barter, cash, and credit are firmly entrenched as the means for engaging in commerce and electronic commerce.

Digital cash, money laundering, and other cash-transfer capabilities are more easily available to more people and businesses via the Internet and electronic commerce; they may be undertaken by financial subsidiaries and nonbanks outside the regulatory sphere. The issues are not new, particularly since global capital markets have been electronic-based for some time. Nevertheless, since the Internet presents a new venue, a review of supervision is warranted. As has been the case in the past, policy coordination discussed in the context of domestic and multilateral oversight bodies will help avoid forum-shopping (GAO 1999).

## Conclusion

In sum, the banking and payment systems need to be able to process transactions in real time, both domestically and in multiple currencies on international markets. One way to jump start this internally is to encourage participation in the local market by foreign financial institutions that already have this capability. The technology and knowledge transfers are important to improve domestic activities. Moreover, the partnership between international institutions with technology and local institutions with local expertise brings the domestic institutions into the global network of financial institutions.

As discussed further in chapter 8, allowing foreign competition via electronic means in the domestic financial marketplace is one way to achieve greater domestic competition. Many countries have only limited commitments for financial liberalization in the GATS. Electronic finance will enable domestic firms to access global capital markets for the benefit of the domestic economy. Therefore, countries should look upon electronic finance as a way to achieve global standards without using resources by a return to the WTO negotiations table.

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7. ATM—and “sweeps” technologies—which allow banks to sweep their reserves holdings into interest-earning assets overnight and on weekends—alter the money demand function.