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TNO report

01-40

E-commerce in the banking sector

Date 23 July 2001

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Copy no
No. of copies
Number of pages 43
Number of appendices

Management samenvatting

Het doel van de studie is het verschaffen van inzicht in de effecten van e-commerce in de Nederlandse banksector. Elektronische transactie omgevingen als zodanig zijn niet nieuw voor banken, en financiële dienstverlening heeft altijd al te maken gehad met intermediëring door elektronische netwerken. Echter, de meeste van dergelijke systemen zijn alleen beschikbaar binnen 'gesloten' gebruikers groepen en zijn gebaseerd op private (vaak EDI) protocollen. Een primair doel van de studie is na te gaan welke de effecten zijn van de open architectuur van het internet op zowel gevestigde en nieuwe vormen van financiële diensten netwerken. De studie richt zich dus op veranderingen in deze omgeving die toegeschreven kunnen worden, in meer of mindere mate, aan het toegenomen gebruik van internet. De nadruk ligt op ontwikkelingen met betrekking tot horizontale expansie (schaal voordelen) en wat beschreven kan worden als diagonale expansie (in termen van product diversificatie).

Centraal in dit rapport staan drie onderzoeksvragen:
- Hoe ontwikkelen de karakteristieken van de bancaire activiteiten zich binnen de financiële sector, als gevolg van e-commerce?
- Wat is de invloed van e-commerce op de toegevoegde waarde structuur van de bank sector?
- Wat zijn de gevolgen voor overheidsbeleid en voor het Ministerie van Economische Zaken in het bijzonder?

Op basis van literatuuronderzoek, gesprekken met sector experts en gesprekken met een aantal bedrijven worden een aantal conclusies geformuleerd over ontwikkelingen die momenteel in de bank sector plaatsvinden (onder invloed van e-commerce):
- Ontwikkelingen zoals die momenteel plaatsvinden in de Nederlandse bank sector zijn vooral het gevolg van algemene trends en niet specifiek toewijsbaar aan e-commerce. E-commerce is in deze meer een katalysator dan een oorzaak. Consolidatie zoals die momenteel plaatsvindt is vooral het gevolg van factoren zoals liberalisatie van nationale markten, internationalisatie van zowel banken en als ook hun klanten en harmonisatie van de Europese markt. Naast consolidatie vindt er ook vertroebeling plaats van grenzen tussen financiële instituten en specifieke productgroepen, waarbij banken zich steeds meer positioneren als geïntegreerde leveranciers van een volledig scala aan financiële diensten;
- De waardeketen in de bancaire sector blijft in hoge mate geïntegreerd, waarbij banken veel van de functies in de waardeketen zelf vervullen (productie, coördinatie en distributie functies). Alhoewel e-commerce uitbesteding van functies in de waardeketen mogelijk maakt gebeurd dit in de praktijk nog maar op kleine schaal;
- Het verworden tot commodities van basis bancaire diensten en de daar uitvloeiende druk op winstmarges zorgen ervoor dat banken zich gaan richten op die segmenten van de markt waar hogere omzet te behalen is. Voor standaard bank producten krijgen de banken meer concurrentie van zowel gevestigde concurrenten (ook niet-banken) en van gespecialiseerde nieuwe toetreders in de on-line segmenten. Echter alhoewel niet-banken (zoals telecommunicatie bedrijven, ISPs, nutsbedrijven, supermarkt ketens, etc.) in de positie verkeren dat ze in meer of mindere mate bancaire producten kunnen aanbieden lijken de focus op kern competenties en de structurele positie van de banken in de waardeketen nog steeds bepalend voor de overlevingskansen in deze sector.

Uit het onderzoek blijkt dat de toepassing van e-commerce in de bank sector voornamelijk een geleidelijk karakter heeft, voortbouwend in meer of mindere mate op bestaande commerciële en technologische trajecten. In het algemeen kan wel gesteld worden dat e-commerce initiatieven vooral gedreven worden door commerciële motieven en in mindere mate door de beschikbaarheid en mogelijkheden van technologie en netwerk faciliteiten als zodanig.

Banken hebben altijd al in een gereguleerde omgeving gefunctioneerd en zijn gewend aan het ontwikkelen van nieuwe commerciële producten en processen in een dergelijke omgeving. Ondanks het feit dat banken e-commerce als onderdeel zien van hun reguliere activiteiten en dat deze bancaire activiteiten gereguleerd zijn, zijn er naar aanleiding van het gebruik van e-commerce een viertal uitdagingen voor beleidsmakers die uit de studie naar voren komen:

- Concurrentie - in een virtuele omgeving rekening houden met de sterke positie van de gevestigde partijen;
- Marktontwikkeling - faciliteren van nieuwe mogelijkheden tot waarde creatie door middel van e-commerce;
- Consumenten bescherming - zeker stellen dat technologische ontwikkeling in de sector rekening houdt met wensen van consumenten;
- Internationalisering - toezicht houden op de nieuwe omgeving voor grensoverschrijdende elektronische handel in bank diensten.

Alhoewel bovenstaande uitdagingen niet los te bespreken zijn en oplossingen niet pasklaar beschikbaar zijn, kunnen ze worden vertaald in een viertal aandachtgebieden voor beleidsmakers:

- *Toezicht op de sector* - de overheid heeft de taak de belangrijke (vertrouwens-) positie van banken te beschermen. In het verleden gebeurde dit door het uitgeven van banklicenties die verantwoordelijkheden oplegt aan zowel de overheid alsook de banken. E-commerce kan dit onder druk zetten door enerzijds de banken zelf die nieuwe gebieden verkennen en anderzijds door nieuwe intreders;
- *Toegang en transparantie* - e-commerce wordt gezien als een nieuwe vorm van universele toegang tot financiële diensten, maar kan ook meer gesofisticeerde klant selectie en diensten ontwikkeling mogelijk maken. Dit zou kunnen leiden tot toegangsasymmetrie tot het bak systeem en dient daardoor door beleidsmakers nauw gevolgd te worden. Door betere mogelijkheden tot bundeling van diensten en standaardisatie van het aanbod kunnen vragen ontstaan naar transparantie van de markt en de mate waarin financiële instrumenten die beschikbaar zijn aan bepaalde financiële groepen ook daadwerkelijk zijn toegespitst op de wensen van die groep;
- *Risico management* - alhoewel de discussie omtrent e-commerce zich vaak richt het ondernemersschap element van nieuwe intreders, ontstaat hier ook een risico. Onervaren of onvoldoende kapitaalkrachtige intreders in de virtuele omgeving kunnen tot mislukkingen leiden die het publieke vertrouwen ondermijnen;

Technologie monitoring - De banksector is al lang leidend op het gebruik van ICT en een van de grootste afnemers en ontwikkelaars van IT systemen. Dit kan ertoe leiden dat technologisch beleid geen prioriteit heeft bij betrokken partijen. Alhoewel internet in potentie een ‘open’ netwerk omgeving biedt, kan deze omgeving op een dusdanige manier geconfigureerd worden dat beveiligde ‘gesloten’ netwerken mogelijk zijn. Beleidsmakers zouden in een dergelijk geval in de gaten moeten houden in hoeverre deze ‘gesloten’ configuraties van netwerken economische omstandigheden creëren die een grote gevestigde speler bevoordelen door ‘insluiting’ van klanten te bevorderen.

Contents

1 Introduction

1.1 Background and context of this study

The Dutch Ministry of Economic Affairs, Direction Electronic Services and Information Policy, has asked TNO-STB as participant of the Telematica Institute to carry out a study to assess the strategic and economic impacts of electronic commerce in the financial sector.

The Ministry commissioned this study in the context of the work initiated by TNO-STB and the Telematica Institute in the Impacts and Perspectives of Electronic Commerce (IPEC) project and subsequently transferred to the Electronic commerce Business Impacts Project (EBIP) which is currently being done by TNO-STB as participant of the Telematica Institute and in collaboration with the OECD. The revised and enlarged IPEC methodology was adopted by the OECD last year as the basis of its multi-country study of e-commerce in business-to-business contexts.

Assessing the dynamics in the value chain

The EBIP methodology is oriented towards two principal questions:

(1) How does the introduction of electronic commerce affect the control that firms can exercise over the organisation and operation of value chains?

(2) What are the implications of changing patterns of control in e-commerce for business practice and public policy?

Electronic commerce is defined broadly in the EBIP context as the application of information and communication technologies (ICT) to any of the activities involved in making commercial transactions. The potential importance of electronic commerce has been widely acknowledged, particularly in an Internet environment, and it is expected that e-commerce will have profound social and economical impacts.

The driving force behind our interest in electronic commerce is the Internet. In principle, the Internet offers possibilities to transfigure economic and industrial practices. The ‘closed’ business network paradigms of the past could be replaced by the ‘open’ environment of the Internet, or otherwise be replaced by a new logic of open commercial networking. Most often, the most visible effects of new business technologies are related to the new ways in which business functions are performed. In today’s economy, for example, there is a growing demand for customisation, service and speed, all of which can be facilitated by ICT. Developments such as individualisation and globalisation are prominent among the driving changes in business concepts and in the business environment.

Although many predictions are being made about the impact of electronic commerce, an empirically grounded understanding is still at an elementary stage. Much of our knowledge about the dynamics and impacts of e-commerce are based on anecdotal experience, short-term observations of individual behaviour and

selective case studies that have not been viewed in the context of the economy as a whole, or even in terms of industry sector and asset characteristics.

The EBIP project proposes a more systematic approach to case study research. It is based upon a conceptual framework that was developed for assessing the dynamics and impacts of electronic commerce in the value chains of products and services (a copy of the conceptual and methodological paper is included as a supplement to this report.

The EBIP approach focuses on examining technical changes in transaction structures and how this relates to the evolution of electronically mediated business relationships in the rapidly developing Internet environment. This approach works outward from the observation of *proactive* firms, defined as firms who are pivotal in their respective sectors and who have already implemented e-commerce solutions. Although we do not assume that all other firms in the sector will follow these leaders necessarily, there are substantial theoretical and empirical reasons to expect that the behaviour of these firms will substantially influence future directions in e-commerce adoption in their sectors.

The basic conceptual framework was first applied in several case studies of Dutch industrial sectors - flowers, music, textiles and job mediation – as part of the IPEC project. These sector studies were finished in September 2000. Some of the more significant and in some cases counterintuitive conclusions were[1]:

- Most business to business electronic commerce still occurs in closed proprietary networks. The use of the Internet is at this point confined mainly to additional of supplementary communication and information services.
- With few exceptions, most of the observed effects were concentrated at the level of process and relational innovations, not on product innovation.
- Industry and asset-specific characteristics influence the concentration of electronic commerce activity in the value chain.
- Electronic commerce does not have automatic positive effects on market access and competition.

The EBIP project: gathering empirical data on an international scale

Results such as the above from the IPEC studies in the Netherlands generated interest in the OECD to using the IPEC approach, methodology and conceptual framework as a basis for comparative case study work that would be international in scope. Applying the methodology internationally offers the opportunity to examine many of the assumptions about e-commerce impacts in different commercial and market environments. This increases the likelihood of that we could isolate systemic effects and impacts from purely local and perhaps product specific effects.

In 1999, the OECD secured the co-operation of Ministries in several member countries to participate in the research and to apply the methodology across a range of industries.

[1] IPEC, General conclusion: building scenario's for electronic commerce, TNO-STB, http://www.stb.tno.nl/projects

At the present time, 11 countries are involved in this research – France, Spain, Italy, Portugal, Norway, Sweden, Canada, Mexico, South Korea, the UK and the Netherlands. Owing to administrative hurdles, the US was unable to participate directly in the first round of studies, but the US Department of Commerce participated in kind by forging links with complementary projects at the Brookings Institute and the Berkeley Round Table on the International Economy (BRIE).

Each of the participating EBIP countries selected several industries for research. The research projects were financed by various Ministries and carried out by consultants and research organisations. The Ministries and researcher teams were visited and trained in the methodology by OECD and TNO-STB personnel. The first draft of the EBIP results are expected in July 2001. The Dutch Ministry of Economic Affairs is a key EBIP participant, and funds TNO-STB to do the international co-ordination and reporting for this project. This involves maintaining a help-desk function, as well as collecting, comparing and analysing the national findings.

Although all of the EBIP countries have an interest in the results of the international study, most also have domestic agendas. These are reflected in the choices of sectors for study, which often are sectors of special importance or interest to national Ministries. The EBIP methodology has the advantage of being constructed on a state-of-the-art assessment of a wide range of current theoretical and empirical work in electronic commerce. As a result, the research instrument focuses on questions that have a high likelihood of yielding new and objective observations of emerging behaviours in e-commerce adoption and operation, along with scope to collect significant numerical data in cases when and where these are available.

All of this together makes the EBIP instrument as useful for assessing individual sectors in individual countries as it is for assessing international and inter-sector developments and trends. The present project and report fills this dual role – it comments on the specific dynamics of a selected range of banking services in the Netherlands, and it also forms one of the inputs from the Netherlands into the wider EBIP study.

1.2 Sector study – Electronic commerce in the banking sector

The objective of this study is provide insights into the effects of electronic commerce in the Dutch banking sector. As such, electronic transaction environments are nothing new for banks, and financial services have been heavily intermediated by electronic networks for many years. However, most of these systems are available only within ‘closed’ user groups and are built upon proprietary (mostly EDI) protocols. A primary goal of the study is to observe what effects the ‘open’ architecture of the Internet might have upon both established and new forms of financial services networks. Thus, the study focuses on change in this environment that can be linked in whole or in part to the increased deployment of the Internet. The emphasis is on developments with regard to horizontal expansion (scale advantages) and what we could call ‘diagonal’ expansion (i.e. in terms of product diversification).

Banks now provide a huge variety of financial services in the market and it would be impossible in one study to cover them all. Furthermore, in the Internet environment it is as yet very unclear which on-line service providers are merely re-packaging existing

service types and customer relationships, as opposed to developing new business concepts.

A further complication is injected by the fact that in addition to providing financial *services* of various descriptions, banks also constitute a *structural function* in the economy as a whole. Normally under terms set out by a central bank, licensed or chartered banks function as guarantors and distributors of money, and as facilitators of all types of transactions. Only some of these transactions involve the actual purchase of specific financial instruments from banks. For a bank, this structural function is also the basis of many of its internal business functions as well as of many of the instruments in its services portfolio.

Throughout this study, the term 'banking services' refers specifically to financial instruments that customers purchase from banks, rather than to the banking function to which they are related. In some cases, these definitions involve rather fine distinctions. For example, the payment *system* (i.e. the money transfer facilities that are provided by banks) is part of the banking function, whereas payment *services* are specific value-added applications of this function. As such, they can be sold to customers as 'products' that meet specific user needs.

In keeping with the overall aim of EBIP to examine e-commerce relationships between firms, this study focuses on the supply of banking services to commercial customers rather than to consumers as such. That said, many commercial services have analogues in consumer banking, and many of the services provided by banks to other firms have an orientation to final consumers (card payment facilities are a good example).

Research questions

This sector study is structured around three main research questions:

1. How are the characteristics of banking evolving within the financial sector as a whole as a consequence of e-commerce?

The financial sector involves a wide range of actors and products – in addition to banks there are insurance companies, credit companies, money managers, securities and exchange services and many more besides. Like banks, some are traditional actors who have always specialised primarily in financial mediation. Others are non-traditional actors who in the liberalised banking environment can offer financial services as only one part of a much larger product and/or service portfolio. The situation gets complicated very quickly in that many of these actors now buy and sell amongst each other, often creating new wholesale markets for services that formerly were distributed only by their originators.

The sector is described in terms of the dominant characteristics of the 'product' group (i.e. the types of services being traded in the market by banks), and of the characteristics of the transaction structure (i.e. how these services are traded in specific markets). The focus in all cases is on value-added activities in financial services supply.

2. What is the influence of electronic commerce on the value-added structure of the banking market?

Proactive companies are examined in the study in terms of their current and potentially evolving positions in the banking services value-chain. The value chain itself is described in generic terms, such that fundamental areas of value-added can be identified. Within this chain, it is assumed that a range of new value-added activities is possible, both within banks themselves and via new types of intermediaries, that could reshape the alignment of actors within the existing value chain. At the analysis stage, the observed changes are depicted on a model 'footprint' that relates innovation in the transaction structure with various effects on business practices and functions.

3. What are the consequences for public policy and for the Ministry of Economic Affairs in particular?

Changes in the structure of the market could have important policy consequences, e.g. with regard to competition, market concentration, prices, and innovation policy.

Structure of the Study

The results of this study are grouped in the following way:

- A general analytical overview of the banking sector.
- An aggregated presentation of the case study findings
- An analytical summary of observations and trends.
- Conclusions and considerations for public policy.

Research approach

The research approach is described in detail in the *Study plan and Questionnaire for Firm-level Case Studies* developed for EBIP (a copy of this document is included as a supplement to this report). To summarise, the research protocol includes:

- desk-research (review of documents and reports)
- informal telephone interviews with sector experts
- face to face interviews with proactive firms
- verification as and when required through telephone interviews with suppliers and clients of proactive firms.

For several reasons, it was decided to focus the methodology on proactive firms that are already established in the banking industry:

- Most new on-line banking service providers are either divisions of established high-street or commercial banks, or otherwise 'customers' of these banks in that they re-sell services.
- Functions in established banks have been heavily intermediated by ICT for at least 30 years. Banks are historical leaders in financial services technology, and some are leaders in Internet banking.
- As established banks control the basic backbone networks of the industry, fundamental change that does not involve these banks is unlikely (certainly in the short to medium term).

- The established firms are known to carry all but a few percent of the total amount of business for banking services.
- Banks do business with other banks and with intermediaries, but tend to be in a prime contractor relationship, thus motivating the supply chain for many types of new and established services.
- Significant leverage of banking services markets as acquired by new entrants will appear as competitive pressures on established banks. Thus the established actor perspective is potentially the most efficient vantage point for observing trends regarding new entrants.

1.3 Determining the scope of the study

The EBIP methodology revolves around a generic description of a value chain oriented to a specific group of products. The choice of product groups sets parameters for the scope of the study. In this particular case, however, determining the scope in this way raises three issues:

- The financial services sector (of which banking is a part) is an intermediate sector – i.e. it provides a service to customers that is valuable only in specific context as defined by the customer for these services at a given point in time. Several contexts for the same basic service can coexist within and between customer groups, and, moreover, these contexts can change. Thus, describing the chain in terms of the sequential production of added-value is not possible in the same way as for physical goods. Accordingly, the value-added structure of these services is described in terms of various types of processes and functions that add value to services.

- Financial mediation supports and supplies services across the whole spectrum of industry sectors. Furthermore, not all purveyors of financial services are financial institutions by primary orientation (for example, telephone companies and large retail stores now also sell financial services). These cross relationships make the market structure complex, with many potential opportunities for collaborations, mergers, and other forms of industry concentration.

- As discussed in the previous section, one must always differentiate between banking *services* and the basic banking *function* that that underpins many of them. For example, payroll administration is a business function, but when a bank provides payroll services to a firm, this is also a ‘product’ in that similarly constructed services could be sold on the same basis to other customers. Furthermore, additional value-added services such as pay-linked estate and pension planning might be offered as part of the same product platform, thus adding still further value. In this study we encounter many types of services, but we do not attempt to depict each in terms of a separate value chain. Instead, ranges of related or similar services are seen as being part of specific value-added tiers, each of which is defined largely by the type of business function they serve in a banking context.

Our depiction of the value chain for the banking services sector is developed in the next section.

2 Characteristics of banking within the financial sector

2.1 The financial sector in this study

In this study financial service supply is defined as the performance of activities by a financial service supplier (an intermediary) in interaction with a customer where finance and information are important elements. Services are intangible, and tend to require the involvement of the customer is a condition of service provision. In services, the production and consumption functions are not separable. Although some aspects of services can be standardised, the 'production' process can only start at the moment that the customer expresses demand.

The exact role of the customer in a services supply chain also largely determines the extent to which face-to-face contact can be replaced by technological interfaces. It is usually accepted that the more routine transactions (like cash withdrawal) are more amenable to automation, whereas negotiated transactions (like loans) require individual and personal attention. For some commercial banking services, this may be an accurate description, but many elements of the person-to-person interface have been standardised for many years. With the exception of the merchant banking sector, which tends to devise client specific solutions, most loans are allocated on the basis of computer analysis of responses to pre-programmed questions.

Because of the importance of information in the financial sector, the use of ICT and electronic commerce could be expected to have important effects on the structure of the market. The Internet could weaken the role of traditional financial institutions by allowing new entrants, or by making it possible for more information about banking services and costs to be distributed directly to clients. The Internet makes it possible for customers to compare services offered by financial intermediaries more easily and to shop around for the best offer. But service providers can use this facility also, leading to new concerns about discriminatory pricing and price fixing. Also, the Internet makes it possible for new intermediaries to enter the market quickly and cheaply because they can avoid the need for an extensive branch network. On the other hand, incumbents can gain these advantages also, and they have the added bonus of an established brand image, built-in customer mass, and enormous customer databases upon which new services can be designed and targeted to specific clients. On-line banks, both new and established, have the clear option of selecting only the most profitable customer profile ('cherry-picking'), and marginalising the rest.

However, the introduction of electronic commerce is determined also by customer and transaction characteristics. Routine transactions are relatively easy to automate, negotiated transaction less so. The complexity of the intermediation functions required from the bank, and the relative importance of specific expertise and support, may determine the range transactions that ultimately are possible in an on-line environment.

Assessing the performance of actors in banking services is potentially more complex in the emerging environment because the range of actors involved in

financial mediation is getting larger. The CBS uses a standard statistical nomenclature of financial intermediaries:

- Financial institutions (such as retail banks, investment banks, etc., but excluding insurance and pension funds);
- Insurance and pension funds (excluding obligatory social insurance);
- Activities related to or in service of financial institutions (e.g. exchanges, stockbrokers, mortgage lenders, credit agencies etc.).

As long as on-line banks are formally registered as such under Dutch or other national law, this nomenclature would still pick up their data. But the nomenclature may not pick up sales of banking-*like* services that were offered by new entrants who are not otherwise banks as such. Some basic banking service functions, for example, need not be tied to the 'deposit system' that differentiates banks from other financial institutions. A telephone company, for example, could also offer bill paying services to a variety of consumers and commercial clients.

Non-traditional players typically try to expand their grip on the market by using a product diversification strategy. For example, Shell is diversifying its business from the supply of automobile related financial services (car insurance, payment systems for filling stations) to general financial services. Internet initiatives include start-ups by new companies providing financial or financially related services (although often backed up by one of the major financial service suppliers)

2.2 The added value of banking services

In the business literature, banking services are normally separated into 'retail' and 'wholesale' markets. The retail market is mainly comprised of standardised services oriented primarily to individual consumers (sometimes to smaller firms and organisations). The wholesale market is comprised of various services, most of them configured to the needs of predominantly business clients. Included are commercial and investment banking, asset management, stockbrokerage and insurance. In many respects, this application of the term 'wholesale' to describe how these services are distributed is idiosyncratic to this sector – the term refers more to the sale of capacity rather than to the distribution of products as such.

The supply of banking services is not easily translated into a clear chain. Rather, the financial service supplier acts as a transformer of customer requirements into various desired services. Virtually every kind of financial transaction involves an intermediary of some kind (like a bank) who facilitates the exchange of value by providing monetary instruments (including cash) and/or by supplying auxiliary transaction administration and management services.

Each transaction has a number of stages. The stage structure of a hypothetical electronic transaction could include functions like the following:

- *The customer interface*: this can be internet-based, but usually involves software provided by banks, or by third parties.
- *The information provider*: this could be a bank or a third party, like an on-line price comparison site.

- *Service/product supplier*: this can be a bank or any other supplier;
- *Transaction interface*: this facilitates the actual initiation of a transaction and the input of transaction-related data. It can be provided by the service/product supplier or by third parties.
- *Authentication:* this includes verification of the buyer and seller, as well as of the transaction information. There are a number of options for this function. Banks can offer an electronic token or card reader, or a third party certificate can be deployed (such as Verisign).
- *Transfer network:* This is the network used by member banks to transfer transaction information and funds (e.g. Interpay).
- *Transaction approval:* this process provides the final approvals that are necessary for completing the transaction (e.g. credit approval).

In groups of services like these, service providers might be active in any of the stages. At one time, virtually all of the functions were vertically integrated to some extent into the administrative structure of banks and other financial institutions. Over the years, banks have outsourced some of these service functions, and the Internet offers yet further possibilities for specialist intermediaries to acquire positive network externalities quickly, thus potentially lower the unit cost of individual functions and sub-functions through scale economies.

More generally, financial intermediation tasks can be categorised as follows:

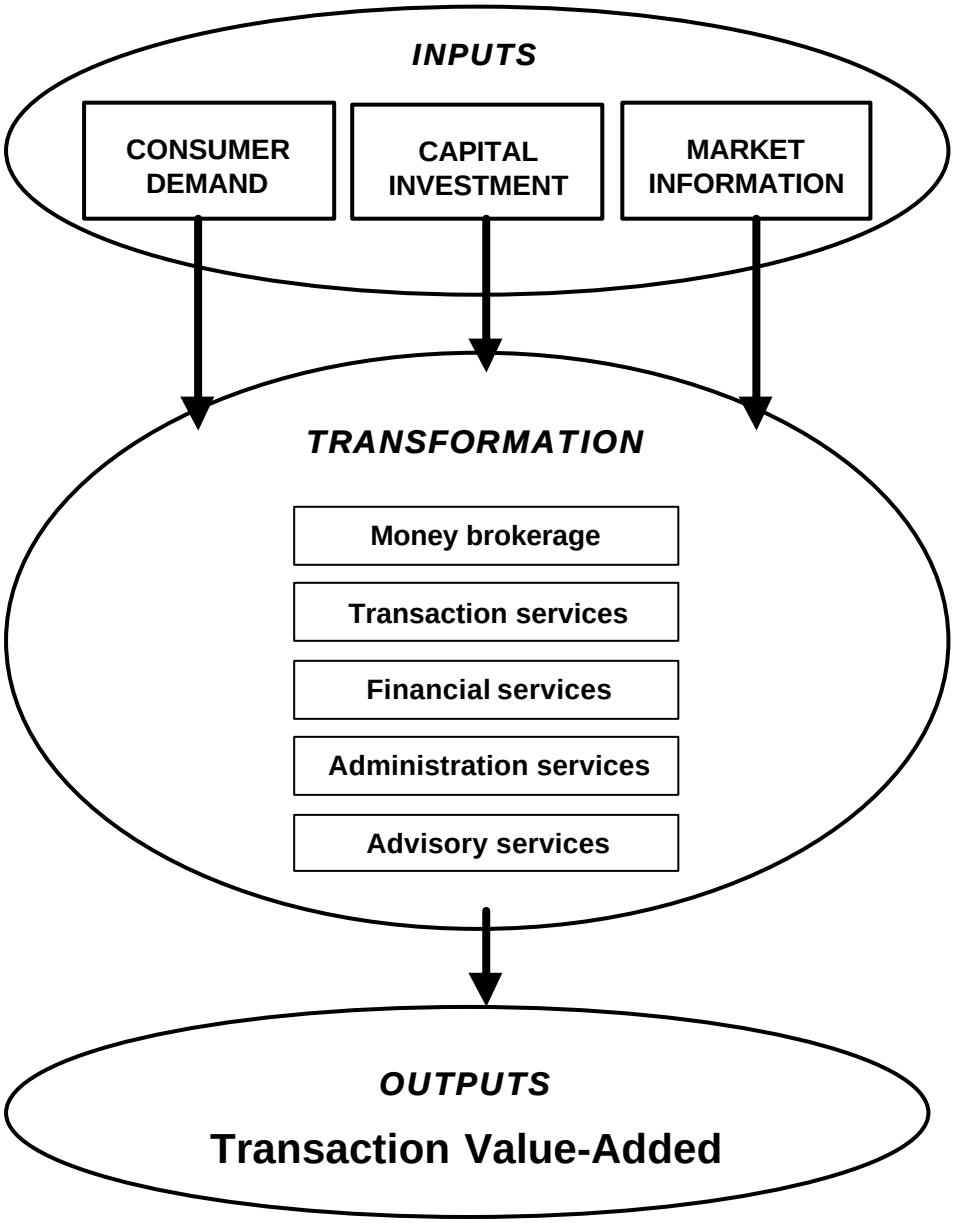
- *Money brokerage* – Intermediaries acquire capital (banks acquire capital mainly from deposits), the value of which is then placed on the market in the form of financial instruments, mainly loans, that are offered to various users. The main function for the intermediary is to assess and manage risk in these transactions.
- *Transaction services* – The intermediary facilitates commercial transactions through billing, payment and general administration systems.
- *Financial services* – The intermediary offers a portfolio of standardised and/or customised instruments to the customer, usually related to savings, credit and investments.
- *Administration and information functions* – The intermediary implements, manages and supports the financial affairs and administration of an individual or institutional customer.
- *Advisory services* – In connection with any or all of the above services, an intermediary may also offer advisory services, some of which may be tied directly to the purchase of specific financial instruments.

None of the above functions can be displayed easily in a value chain as each can be offered separately, sequentially or as complements to one another. Financial functions can best be organised according to process, and a scheme for classifying them in this way is given in Figure 1.

The intermediary functions are centred in the transformation process. Some of the input comes from the individual or institutional customer who expresses a demand for services (like credit, billing and funds transfer, savings, administrative functions etc.). Other inputs come in the form of information on the performance and dynamics of various financial markets. The ability to capture and process specific types of market information puts an intermediary in a strategically advanced position with regard to competitors and it is therefore an important input factor.

Capital inputs are the various material assets, including technology, that are required to operate a financial service enterprise. The outputs of the process occur in the form of *transaction value-added* either in the form of efficient transaction facilitation for customers, or in the form of revenues earned by the intermediaries.

Figure 1: Financial services classification scheme



Transforming the basic elements of this classification scheme into a generic value chain description can be accomplished to an extent by looking further at the relationships between the types of functions that apply generally to the provision of banking services. Basically, these consist of

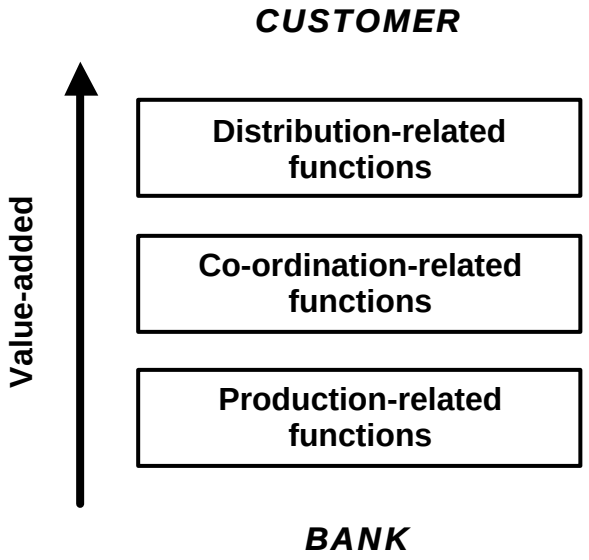
- ***Production-related functions*** – These refer to the design and structure of specific banking services. Traditionally, most of the 'product' was constructed within traditional banking institutions. Scope for inputs at the production stage by non-banks has increased steadily over the years and may increase rapidly in an on-line environment.

- ***Co-ordination-related functions*** – These refer to the administrative (back-office) side of banking services supply.

- ***Distribution-related functions*** – These refer to the interface with customers. Traditionally personal contact (banking offices) and the telephone have been used to distribute financial services to consumers. In commercial relationships, proprietary networks (e.g. EDI) have often been used. In both cases the internet added an additional distribution channel, enabling access to distribution also for non-banks.

With reference to these classifications, a simple value chain construction is given in Figure 2.

Figure 2 – Generic Value chain description

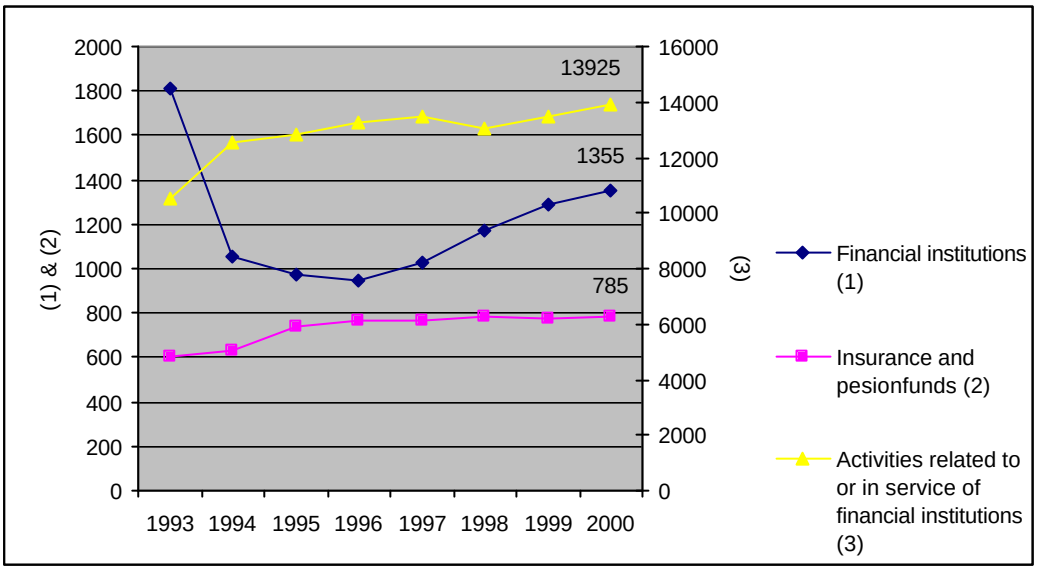


2.3 Size of the financial sector

Figure 3 depicts the number of recent registrations by CBS for financial institutions. However, this does not take into account the existence of a few major service suppliers that own many smaller companies. One should keep in mind that though Figure 3 provides a broad indication of size, the three major banks in the Netherlands (Rabobank, ING and ABN AMRO) service a major part of the total market.

In particular, the 'financial institutions' category has witnessed an increase of 40 % in the number of companies, which marks overall growth in the banking sector (these data refer to new entrants who are otherwise 'traditional' companies in the financial services context). The reason for this is the growth in demand for financial services triggered by developments such as popularity of online services (e.g. online stock trading), increased cross-selling of financial products to existing customers and growing financial demands for credit. This increase can also be witnessed in category 3, the related activities which includes mortgage intermediaries and stock brokers.

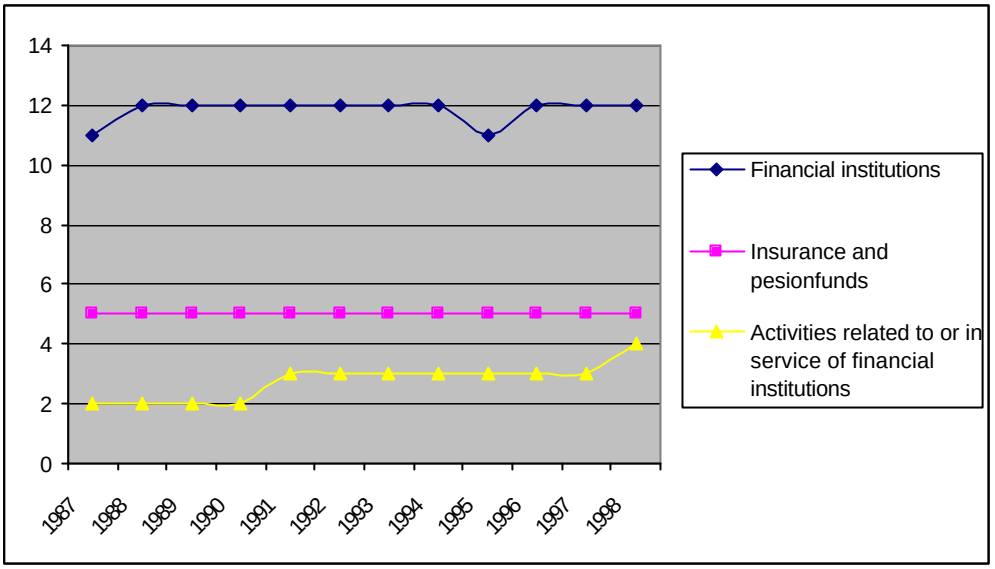
Figure 3 – Number of financial service suppliers (CBS)



Source: CBS

In terms of number of employees, most people are employed by companies that have activities related to conventional financial institutions (Figure 4). These include stock exchanges, stockbrokers, mortgage and credit intermediaries, and insurance agents. Again it should pointed out that these numbers may not entirely reflect reality. Employment in Figure 4 is measured by the number of employees (not full time equivalents) and therefore does not take into account the impact of part-time employment. Based on this figure, the number of employees has remained rather stable over the last 10 years. This suggests that operations in the financial sector have become more efficient, most probably through the further incorporation of ICT.

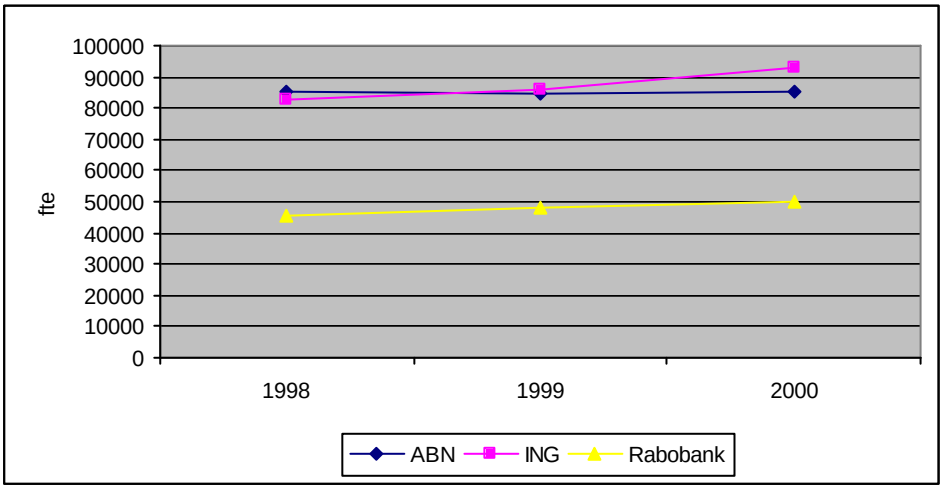
Figure 4 - Number of employees in the financial sector



Source: CBS

Employment in terms of full time equivalents at the three largest banks in the Netherlands shows a slight increase (Figure 5).

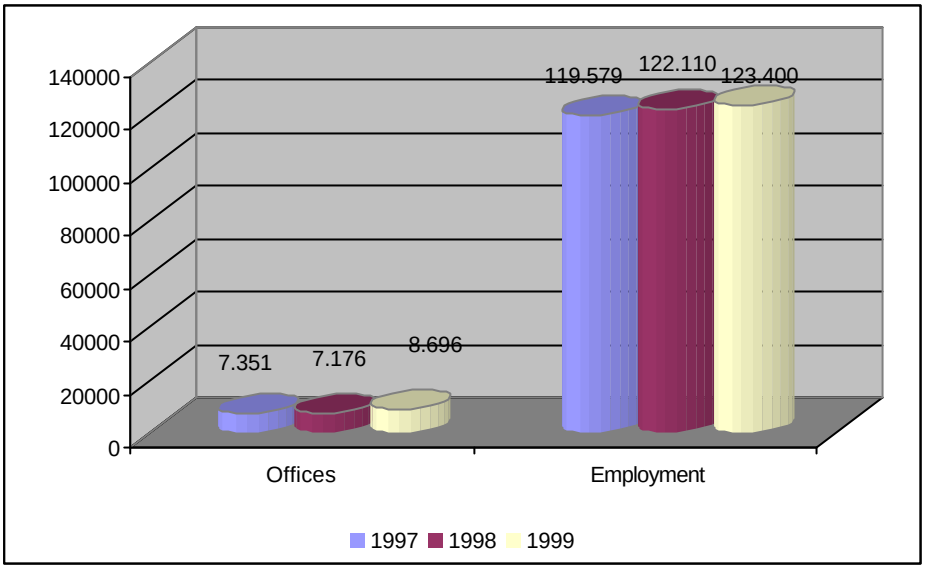
Figure 5 - Employment at the three largest Dutch banks (in fte)



Source: TNO-STB, based on corporate information

The stability in employment (in terms of number of employees) as presented by CBS is confirmed by the Dutch organisation of banks (NVB). Figure 6 provides an overview of the size of the banking sector in terms of offices and employment of Dutch banks (national as well as international). The increase in number of offices is mainly attributable to an increase in absolute numbers (e.g. trough acquisitions).

Figure 6 - Banking, number of offices and employment



Source: NVB

The Dutch market for banking services is saturated and rather stable with a number of large general banks offering a wide variety of services to companies as well as consumers and a number of smaller banks specialised on specific market segments or products. This translates into an environment where gains are specifically derived from size, brand name, and cost savings and efficiency improvements through the introduction of new technologies.

Moreover during the last 5-10 years there have been considerable (national) concentration trends in the banking sector and to some extent across different financial markets (e.g. insurance companies). Enabled by deregulation the Dutch market exhibits strong momentum towards the formation of conglomerates.

2.4 Trends and developments in the financial sector

In the last decade many strategic developments have occurred in the financial sector. These developments are not primarily related to electronic commerce as such, but they may help to explain its impacts.

For at least two decades, the financial market has been characterised by take-overs and mergers. In 1990, liberalisation initiatives throughout Europe encouraged the blurring of the banking and insurance markets offering many opportunities for product diversification. Many smaller and specialised intermediaries in a given market segment concentrate their efforts and form new companies. This practice has resulted in the dominance of a relatively small number of complex financial conglomerates.

Further deregulation in the last decade decreased the entry barriers for non-traditional players in the financial market. Mergers and take-overs lead to horizontal concentration (increasing economies of scale) and diagonal concentration (increasing product diversification). Horizontal concentration strengthens the position of the firms in the market because economies of scales cut down the costs

of production and service delivery. The motive for diagonal concentration is to introduce a new product in a new market, without stopping the production of existing products.

Concentration in the market resulted served to reduce co-ordination and search costs for customers in that now many kinds of services are offered by a single institution or intermediary. However, integrated services supply also has risks in that real price advantages may diminish. For customers, convenience may be paid for in generally higher prices than might be the case with a less integrated services market.

Currently concentration in the banking sector primarily takes place mainly on a national level (Table 1). In the Netherlands, currently the three largest banks service large part of the national market.

Table 1: Mergers and acquisitions in the banking sector 1995-2000

	1995	1996	1997	1998	1999	first half 2000
National	275	293	270	383	414	172
Within EEC	20	7	12	18	27	23
With a non EEC country	31	43	37	33	56	39

Source: ECB (2000)

Due to technological developments, scale advantages can improve efficiency, lower operational costs and enable synergy between operations. Integrating banking activities enables companies to integrate and centralise administrations and achieve cost savings. However international concentration is beginning to increase as the activities of major clients become more global in scope. Moreover concentration is expected to go even further as the single European market for banking services develops further.

This concentration trend and increase of scale does offer opportunities for large companies to integrate processes by using ICT, enabling considerable savings in costs. However investments in technologies supporting extensive back-office operations also requires sufficient scale in order to realise returns on investment within reasonable time frames.

2.5 E-commerce in the banking sector

The impacts of e-commerce on the banking sector potentially can be profound. Banking assets and products are primarily ‘intangibles’, many of which seem ideally suited to digitisation and on-line distribution. Wholesale banking already relies heavily on electronic systems, but these are mainly proprietary networks, open only to restricted groups of users. Internet-based banking applications are superficially ideal for many types of retail banking services, but this is as yet a relatively small segment of the banking market.

Use of the Internet in banking operations can be considered a logical step as the new technology is basically an increment in an already evolving operational

infrastructure. For a time, predictions were common that the increasing use of the Internet would shake up existing market structures and threaten the dominance of established companies. In the financial sector a myriad of internet start-ups quickly began tapping into product markets traditionally served by banks. Moreover, established companies from related markets (like insurance) and unrelated markets were expected to be well suited for offering online banking products.

The reality is that the established banks are still the major suppliers of banking products and services. Alternative suppliers (especially internet start-ups) have not (yet) been able to form serious competition in the Netherlands or elsewhere. There are a number of reasons for this. First, the supply of financial services through the Internet has similarities with the existing banking business and its infrastructure. Second, gaining and keeping new customers for banking services comes at great expense (Bagijn, 2001). Established banks hold a preferential position over newcomers in this respect. Also, start-ups have a number of disadvantages compared to the traditional financial service suppliers. Banks in general have the advantage of a well-known brand name and well-established customer trust.

Moreover, a number of factors can make large companies (such as banks) better suited for implementing new technologies. Comparing small companies (Internet start-ups) with the large banking organisations, Wolffenbuttel and Stegwee (2001) mention a number of reasons why the larger banks generally are more innovative if it comes to the use of e-commerce.

- The large traditional companies have large market shares to look out for, therefore they have more financial backup.
- Banks have the advantage and trust of an established name.
- Transaction volumes of banks are large, which can make cost reductions though automation worthwhile.
- Expectations regarding the image of banks motivate the introduction of new technologies.

To an extent, Internet start-ups have managed to separate some service types from the integrated banking value chain (such as the creation of independent investment funds). In general, however, most of these successes have been in retail markets. Substantial new markets for new intermediary services have developed within the established chain. In contrast to many other industries, banks still prefer to keep most of the basic operations in-house. One of the reasons for this is that customer information is subject to strict privacy regulation and banks are hesitant to outsource those parts of their operations that are sensitive to client data.

In the Dutch market a number of Internet companies offer financial services. Two types are most visible, (1) product comparison sites that offer information on financial products from different suppliers, and (2) online investment sites. However, many of these companies are part of or backed up by established financial services suppliers (e.g. WelloWell by ING, Mr. Finch by Achmea insurance, and ALEX by the investment bank Labouchere). This raises questions as to the reliability of much available proprietary data on the growth of online banks, which typically does not investigate the source of banking products sold by these companies. Following initially over-optimistic revenue predictions, most Internet

enterprises in the sector have revised growth expectations downwards (Bagijn, 2001).

One of the expected effects of the introduction of price comparison sites is that there will be an increase in transparency of the market and a stronger separation of commodities (which can be easily compared and used to draw new clients) and negotiated financial products (Abbringh & de Boer, 2001). The latter implies that there are different markets with different characteristics, where commodities have high volumes, low margins and can offer possibilities for scale advantages. The market for negotiated products, where involvement of the client is larger, has higher margins but lower volumes. Moreover the extent to which tasks can be automated will be more limited compared to the market for commodities. In the Dutch market the model of offering standardised financial products has been applied by Postbank (part of ING), while the other banks offer a wider variety of products.

The introduction of e-commerce does, however, create opportunities for new companies by creating niche markets or new functions in the value chain. One example is Bibit, a company offering a virtual ‘cash register’. The company basically manages the payment segment for online purchases. The advantage for client companies is that there is no need to build their own payment applications. Bibit offers a variety of payment methods from several financial institutions to client companies and their customers. This example illustrates some of the possibilities for unbundling financial transactions. Another example is verification and authentication of users and information through certificates (e.g. VeriSign).

3 Aggregated case study findings

Taking into account the rationales explained above in Section 1.2, five major institutions in the banking sector in the Netherlands were interviewed for this study using the comprehensive EBIP protocol. Four were banks and the other was an intermediary body in the banking sector that is significant in the e-commerce context.

For two reasons, we have we have aggregated the results of these case studies and have not identified individual companies. *First*, as most of the companies occupied relatively similar positions in the value chain of the banking industry (typically banks occupy the whole chain), many of the responses presented different perspectives or experiences concerning a very similar range of phenomena. Inevitably, however, this kind of 'closure' makes writing up individual case studies needlessly repetitive. *Second*, although most respondents were happy to be identified in the study, others wished to remain anonymous. In order that these parties not be identified by association, it was decided not to refer to any of the firms by name.

Thus, the following section is an aggregated case study of e-commerce activities in the Netherlands banking sector, rather than a collection of studies relating to individual banking institutions. Accordingly, the case study is presented in a discursive fashion, observations being discussed and placed in context as they arise. Moreover the results are complemented to some extent by informal telephone interviews with sector experts.

Positioning banking institutions in the value chain

All of the major banks in the Netherlands are international companies who integrate most of the production, co-ordination and distributions functions in the value chain. Products are designed and assembled by the banks themselves, and the back-office administration and (multiple) distribution channels are all managed in-house. In contrast to other parts of the financial services sector (insurance, for example) banks make little use of intermediaries. Although many administrative processes potentially could be outsourced, banks prefer to keep them in-house in order to ensure the security of client information.

The banks we interviewed have, in effect, two home markets in that they operate independently in different national markets. Their primary home market is the Benelux countries, but their second home market is the US. Together, the banks service the full range of clients in these markets – individuals, SMEs, corporate clients, institutional investors and the public sector – but some of the banks focus on specific market segments like large multinationals, personal banking, or SMEs. All banking activities are generally pursued under one strong brand name which expresses the trusted position that banks have built up in the financial services sector. As will be seen, this is an important intangible asset when implementing e-commerce.

There is a strong globalisation trend among the major banks. Major advantages of operating internationally include the spread of risk by entering different markets

and better market positioning to service major multinational corporate clients. An added advantage from the US presence is that the US generally leads in the application of Internet-based banking systems. This keeps the Dutch banks who compete in this market in touch with leading edge technology, and provides them with a test bed for all types of e-commerce applications, for example through alliances with technology providers. Interviewed companies stressed, however, that the internationalisation trend is not specifically attributable to e-commerce. Rather, it stems from the general trend for many large business customers to be active in several national markets.

The banking sector is highly saturated and a few major companies service a large part of the market. Although the introduction of e-commerce has increased the number of new companies entering the market, it is still rare for *major* competitors to enter or exit the market. Relationships with clients can also be described as stable because, likewise, major clients rarely enter or exit the market. Individuals as well as companies are faced with switching costs when changing banks, which can be high depending upon the extent and level of service that has been established between the client and the bank. This implies that major shifts in the customer base rarely take place. For individuals, the administrative details involved in changing banks can be regarded as an imposition of switching costs. For example, in the banking sector there is no account number portability (comparable to number portability between telecommunication companies). Relationships with business customers, particularly large corporations, is often based on intense co-operation, involving client specific services and long term contracts. These conditions tend to discourage frequent shifts in financial service suppliers.

The new companies that do enter the market for banking services can be divided into three groups:

- other existing financial service suppliers (e.g. insurance companies),
- existing non-financial companies, usually with a strong brand name (e.g. telecommunications companies and retail chains), and
- new companies, often internet start-ups.

Companies in these three categories have different backgrounds and differ in the extent to which they have assets that are complementary to becoming competitive in the banking sector. However, these new entrants have created a sense of urgency or awareness in existing banks, as they identified new service demands and exploited product niches that were amenable to e-commerce.

The interviews pointed to the development of new markets for intermediaries in the e-commerce environment, motivated in the first instance by the lack of standardisation in payment methods used in different parts of Europe and throughout the world. The lack of standardisation, when coupled with the administrative demands of internationalisation (e.g. different languages and currencies) made the prospect attractive to banks to outsource as many of these processes as possible to one intermediary.

Business profile

Financial services are intangible by nature and for many years have been very heavily dependent upon supporting ICT applications. Some banking services are standardised. Basically, these involve matching a client need with an existing service that is also offered to other clients. Other services are configured on an individual basis according to the needs of specific clients. Depending on the complexity of the product, some aspects can be automated whereas others will depend on personal contact with the client. For example, management of bank accounts can be done easily through an Internet interface, whereas mortgages typically require personal contact. The degree of automation that is possible is partly influenced by the perceptions of customers and the extent to which they are comfortable with using an on-line interface for specific banking functions.

One of the interviewed banks regards the limited availability of banking licenses as an advantage for existing banks when starting up Internet initiatives. Although it is not necessary to have a banking license in order to offer some kinds of financial services, the holders of these licenses can benefit because customers regard these licenses as tokens of trust.

In order to deal with the new opportunities offered by e-commerce, most companies started up separate, specialised e-commerce units. In general, however, e-commerce was considered to be important for all units and products lines.

Technology profile

To some extent, technology is used to replace personal contact, particularly for more routine tasks. However, individual communications remain necessary at some point in many banking service areas. Banks have been historical leaders in the application of ICT systems, and they have built-up significant EDI-type networks over the past 30 years for intra-bank functions like funds transfer. The main technological shift that has occurred in recent years concerns communication with the customer. The use of traditional methods like telephone and fax is being substantially enhanced by the use of e-mail and WWW interfaces. However, technology also enhances the capabilities of more traditional communication modes. The use of facilities like tele-service centres, voice response systems and, more recently, mobile banking has extended the use of the telephone, which, historically, has been the most basic distribution platform. The Internet offers the company the key new advantage of being able to reach customers both at home or at work, and to provide them with 24-hour/seven-day-per-week service.

The use of the Internet varies with the type of customer and with the degree of standardisation that is possible for specific services. For individuals and smaller commercial clients, a straightforward Internet interface can be used that is backed-up by specialised banking software applications. For larger corporate clients, extranet configurations are often employed, especially for longer-term services like asset management. Large clients operating globally try to reduce financial service suppliers to the minimum number that can provide their required services portfolio on a world-wide basis.

Motivations and expectations

The interviews indicated clearly that there were four primary reasons for engaging with e-commerce:

- need to respond to new customer demands (often as triggered by the activities of new entrants),
- need to preserve and enhance the image of banks as an institution in the electronic marketplace,
- desire for lower costs through efficiency gains in banking processes,
- increased revenue possibilities from increased levels of service to customers.

For the major established banks, the sudden increase in new entrants was taken as a sign of increased demand for web-enabled products. This created a sense of urgency in the sector as a whole, to which various banks responded to various extents with new investment. Moreover by becoming active in new service areas and modes, banks were able to articulate new strategies aimed at becoming suppliers of fully integrated ranges of financial services.

The 'image' issue has two elements. The *first* was reactive – generated by concern that if established banks appeared to be lagging in the introduction of e-commerce, new entrants would gain a competitive advantage from appearing to be technology leaders. The s*econd* element was proactive – banks realised that image can be an important asset in an open Internet environment were security and trust are important components of the transaction process. Banks recognised that they were in a preferred position when exploiting e-commerce, based on their existing relationship with clients.

It is important to stress that e-commerce was perceived in the industry to be a natural development of banking practice. Banks used extensive ICT systems long before the widespread availability of Internet services. However, the banks expected that Internet-based e-commerce would improve efficiency, enable better internal co-ordination and yield cost savings. Banks operate enormously complex back-office systems to manage administrative processes. and better co-ordination of these systems is an efficiency goal. E-commerce became part of a on-going process to achieve better internal and external communications and process co-ordination.

One of the interviewed banks expected that substantial cost savings would be a source of competitive advantage, particularly in those market segments involving standardised products. As new entrants increase competition, pressure on margins increases. Standardised products become particularly vulnerable in this environment. These products become virtual commodities (trading mostly on price), thereby necessitating the most efficient form of delivery in order to sustain viable margins. However, new technologies can be used also to reintroduce an element of product differentiation by emphasising particular product aspects or features, or by devising more efficient sales interfaces directed at specific client groups. This confers at least a short-to-medium term competitive advantage, particularly if the technologies concerned are not (yet) used by competitor banks.

A somewhat different efficiency argument was referred to by one of the other banks in the interview group. This concerned what was done with capacity in the system

that was opened up as a result of efficiency gains. One approach is to use the efficiency 'dividend' to stabilise, or even to reduce the capacity of the back office system. The other approach (followed by this particular bank) is to commercialise the excess capacity in its own right by selling it on to clients (such as SMEs) who wish to outsource some of their administration functions to the bank.

The last motivation for adopting e-commerce solutions is to increase revenues by raising client service levels. Offering additional value added services to existing customers was expected to be beneficial for the image of a company and increase loyalty. Moreover, expectations were that product bundling or cross selling would increase the revenues per existing client. One bank expected the introduction of e-commerce to provide a new impulse to the banking business. According to this company, much of the client-base (particularly individuals) had become dormant, i.e. they used the bank for traditional basic services, but did not explore higher value-added services. E-commerce was expected to create a new awareness of customers within the bank. By improving the opportunities for informing clients on additional and supplementary banking products, the level of revenue per client could be increased.

Based on the data from the interviews, it is clear that the banks were focussed primarily on existing customers and existing products when introducing e-commerce. The internet interface was perceived as a tool that would enable the company to support its existing products and business processes better, and not necessarily as a venue for the development of whole new business areas. One of the banks interviewed regarded the Internet interface mainly as a more cost efficient substitute for the traditional retail channel. The other banks expressed the view that the Internet interface was intended to provide an additional distribution channel that is always accessible, thereby increasing access to the client.

Obstacles and advantages

Interviewees identified several factors that facilitated and impeded the adoption process for e-commerce. On balance, the main sources of *advantage* were seen to be:

- extensive existing banking sector experience and capability with ICT systems,
- pro-active management
- relatively clear expression of demand.
- strength of brand image and client trust,

On the other hand, also on balance, the main *obstacles* were seen to be:

- differences in regulatory systems,
- lack of standardisation for particular banking systems.
- human factors.

In general, existing experience with ICT systems gave the companies interviewed sufficient knowledge, experience and confidence to develop new systems, either internally, or in outsourcing arrangements with ICT supply companies. Although e-commerce implementations demand considerable investment, these were easily justified in most cases. One bank mentioned also that the capability to integrate new

technologies and interfaces with the existing ICT systems provided an added advantage to existing banks in the introduction of e-commerce.

Senior management in all of companies we interviewed was very proactive in steering the development of electronic commerce business plans. In each case, there was a strong top-down vision as to what should be accomplished. In two of the cases, however, this was accompanied by a strong emphasis on the bottom-up identification of the importance of e-commerce to the banks and their customers. The overall process of e-commerce adoption was facilitated in that the market was giving relatively clear signals as to what was likely going to be expected of banks in the e-commerce milieu. In particular, customers could express new preferences by purchasing services from some of the new entrants in the sector. Although the exact shape of the new markets was not necessarily clear, the existence of real demand for enhanced services could be demonstrated.

The brand image of banks was considered to be a very important advantage in developing the e-commerce side of the business. In an on-line environment, client trust and security concerns can be minimised by evoking an established brand name. This applies both to retaining existing customers and attracting new clients. Most banks have the option to integrate most operations under the overall brand while distributing other operations to additional brands that have strong reputations of their own in the market. This strong brand can be in asset when banks become active in new areas made possible by e-commerce, such as authentication and identification services.

In terms of obstacles, some were structural and some were more transitional. The banking sector is extensively regulated in most markets, although the type and extent of regulation, and of public policy in the sector generally, varies from country to country. Differences in national regulatory or judicial systems have presented problems for banks in developing the off-shore dimension of their e-commerce business. These differences can make it difficult for banks to service foreign markets from the home market, for example, which in effect constitutes a barrier to exports. Lack of regulatory harmonisation and the non-transparency European level banking policy is also mentioned as an obstacle to the internationalisation of e-commerce in the EU.

Lack of regulatory harmonisation is mirrored by (although not necessarily related to) lack of standardisation in some of the technical systems that underpin services in the sector. Several on-line payment systems do not work well together, for example, and there are currently two competing standards for chip cards.

The last obstacle cited in the interviews was human factors, referring specifically to the problem of getting both employees and clients to accept new technology and new ways of working, and also to co-ordinate adoption of these elements. Banks are limited in the widespread introduction of new technologies by various client acceptance factors. Some of these relate to socio-economic factors (i.e. access conditions) and other relate to problems of critical mass regarding the market penetration specific systems and interfaces.

Impacts

None of the interviewees were able to provide concrete measurements of changes in the structure or performance of the sector as a result of e-commerce. Nevertheless, perceptions that e-commerce has yielded benefits were generally very strong. In some cases, proxy measures of e-commerce effects were suggested. For example, interviewees pointed to the observable reduction in the number of bank branches and offices in the Netherlands as evidence that customer access has undergone considerable transformation in a relatively short time. Banks also claim that the number of users of electronic products is increasing, as is the value of sales through the Internet interface. There is no *prima facie* reason to doubt these figures, although some of them would be difficult to corroborate independently.

In general, however, the primary impacts of e-commerce were perceived by all interviewees primarily in terms of more efficient operations, cost savings and the provision of additional distribution channels for financial services. Widening customer access is strategically important to the banks. By offering clients a wider choice of distribution channels, the banks gain greatly increased access to the customer. One result of this increased access is probably reflected in the increasing number of new business areas that banks told us they have begun to explore. Typically these focus on extracting more value from relationships with existing clients.

With respect to the structure of the banking industry in general, our interviews indicate that although Internet start-ups created a sense of urgency in the established banks, none of these initiatives have yet formed serious competition. Entry into the sector requires high investment costs, and likewise the costs of attracting a critical mass of customers is high. Banks acknowledge that although e-commerce ventures have saved costs, the investments have been considerable considering that overall increases in revenues have been modest. This consideration increases the difficulty of attributing specific benefits specifically to e-commerce operations.

Most third parties entering the banking domain through e-commerce focus on consumer services such as electronic banking, electronic savings, electronic stock brokerage and electronic payments. These services often require less domain specific knowledge and can be standardised, making it easier for non-banks companies to enter. However, specialisation of this kind also limits the scope of these companies to generate revenues (in comparison to large banks who have many revenue streams). This was seen as one of the reasons that new entrants have not been able to form serious competition to the established banks. Basically, it costs more to acquire new customers than to retain existing ones. Thus, banks can compete effectively with new entrants to maintain their market share. Moreover it has become clear that for many new ventures reaching the break-even-point is taking much longer than expected. This favoured the existing banks who had a strong existing financial position and alternative revenue streams.

In a number of areas (e.g. electronic payments), third parties where expected to be able to perform financial functions in a value chain. In principle, telecommunications companies, utility companies and Internet service companies are in positions to move in on parts of the financial service value chain, particularly co-ordination and distribution which are easiest to unbundle from the traditional

banking services value chain. However, high investment costs and competition from banks make it more difficult to sustain a position in these markets. Banks are active in a number of these areas (such as financial portals, industry portals, and payment methods and intermediation services). This illustrates that one potential impact of e-commerce is for existing banks to reassert themselves in a number of areas that formerly they may have outsourced to other companies.

4 Analytical summary

This section discusses the research findings with reference to the first two research questions as posed above in section 1.4. The findings are put in the context of future trends and scenarios for the banking services industry. It should be recalled at this point that our original research questions were generated from observations first made nearly two years ago in the original IPEC project (the fore-runner of the EBIP approach used here). These observations were to the effect that the impacts of e-commerce implementation were closely related to existing industry practices and trends, market structures, and to the asset characteristics of particular sectors.

It is instructive to use these relatively early observations as a base-line from which to assess the observations made in the present study. Most of the impacts observed in IPEC related less to the competitive structure of the market (entry and exit conditions, prices, new product development etc.) and more to the efficiency of business enterprises, particularly as regards internal and external information flows. It is worth noting also that most of the effects observed in IPEC were 'potential' rather than 'actual' – i.e. most firms had not yet learned to map and measure the impacts of e-commerce in any rigorous and comparable way. Overall, in amongst our more detailed findings, the observations below tend to demonstrate that these earlier conclusions still basically hold, but that some of their implications are more far reaching than might originally have been expected. The impacts of e-commerce on the banking industry look certain to be greatest in those areas that are not immediately visible to the customer.

4.1 The value-added characteristics of the banking sector

The basic value-added characteristics of the banking industry are shaped by the fact that in major banks most of the production, co-ordination and distribution functions in the value chain are vertically integrated. Banks can generate added value by providing services within the context of the banking sector itself (e.g. savings and current accounts) or by providing intermediate services in other value chains (e.g. financial administration and funds transfer). As every financial transaction involves some form of financial intermediation, banks become involved in the value chain structure of virtually every industrial and personal transaction. Banking services differ mainly in the extent to which standardised components are involved, and in which context these services are supplied to the clients.

Many of these value-added characteristics are built upon the structural function of banks in the economy as a whole. This is reflected in the historically close relationship between banks and the economic governance system. This arrangement gives banks a strong incumbent position with respect to new competitors, but it does not preclude non-banks from offering some types of banking services, and nor does it preclude banks from offering services once offered mainly by non-banks. The general trend over the past 20 years has been for banks to offer am increasing variety of financial services within an otherwise integrated market structure. More recently, however, aided to a large extent by new technology, banks have also been able to target service delivery much more effectively, and to focus more upon high value clients who are more likely to purchase financial products at higher value-

added levels. Coupled with branch closures in many areas, this could give rise to concern that banks are concentrating less on their retail products and more on their wholesale products, thus restricting access to their financial function for some users. Our analysis in the next section will suggest that reality may be far more complex, and that the immediate role of e-commerce in this context is ambiguous.

Arguably, the scope for the new entrants is potentially greatest in the retail services arena. Non-banks can also contract generic products from banks that are then sold under the brand of the non-bank, thus creating secondary markets for some services. However, from the results of our study, the primary source of competition in this sector is still either from other established banks, or from new entrants to the banking sector who are otherwise large established commercial institutions – like insurance companies.

4.2 The influence of e-commerce on the value-added structure of the banking sector

The effects of e-commerce on the banking value chain vary according to whether the market is for retail or wholesale services (according to the definitions in section 2.2 above). For both segments, the impacts of the introduction of e-commerce varies with market conditions, but both segments have their own specific characteristics that influence how e-commerce is used. These general considerations also can influence the choice of technology and how it is deployed. The following summary will examine each segment separately, and then comment upon the position of e-commerce innovations in the transaction structure as a whole.

Retail banking services

Retail banking is composed mostly of standardised financial components. Experience has shown that these are the most suitable service environments for immediate migration to an Internet environment. Many of these services have been available by telephone for many years and customers can visualise the Internet interface as an extension of the telephone.

Successful new entrants in retail banking tend either to be other financial institutions who simply extend their product range to include banking services, or existing companies from unrelated industries that offer banking services on the basis of their established brand name. Entry barriers are probably lowest to existing financial institutions, who not only have brand confidence, but also experience of trading in financial products, and an existing base of customers specifically for these products.

In order to compete with established financial services firms, other retailers, like supermarket chains, must rely on strong consumer association of their brand with the quality of products from many sources. But a new entrant like a supermarket can also bring advantages to the market. It too would have an established client base. Typically also, it would have analytical data on the commercial behaviour of these clients gathered through various devices like loyalty cards. Thus, new entrants may actually be in a better position to design new consumer-oriented services than are the banks. Moreover, although the banks we interviewed claimed to have a strong brand image with consumers, none advanced the prospect that this could be

damaged by, for example, the steady erosion of neighbourhood branches. This despite recognition that human factors were critical to the success or failure of e-commerce ventures. It must be considered that the ubiquitous physical presence of some types of retailers, coupled with their specialisation in the needs of individual consumers, might give them new entrant advantages in capturing new service markets in both on-line and off-line environments.

One of the potential strengths of new entrants in these markets is that they are not dependent on any particular bank to provide either value added services or basic banking functions. For some (new) services, this provides opportunities for new entrants to tap into business areas that might not be suited to banks, particularly where the sale of competitive products is involved. One example is financial portals that provide value-added information and advice on financial products form different suppliers. Banks and other financial institutions would be in an obvious conflict of interest if they were to engage in this activity. Another example is integrated payment services which co-ordinate the competing national and international payment systems.

Where new entrants do not already have a sufficiently large or suitable client base for retail banking services, the investment costs of acquiring these clients are likely very substantial. In the first place, the number of completely new customers in the market is small and does not grow – most people who have an income also have bank accounts. This means that the new markets lie either in targeting segments (age, socio-economic grouping, location etc.) of customers already services by banks, or by generating new levels of value-added that banks will or can not emulate.

This begs the question, however, of what the effects of new retailer proliferation would be on the banking value chain. On the face of it, there may be little change at all. Non-banks who retail banking products (like accounts and loans) typically either offer these products as a combined venture with an established financial service firm, or otherwise engage in resale of ‘white label’ (i.e. generic and non-branded) financial services obtained on the wholesale market. In either case, provided that the overall sales increase, banks and other established institutions stand to gain from these ventures by non-banks. Indeed, a future paradigm might well be that banks move away from the consumer interface altogether, concentrating instead on the wholesale market which, arguably, they are more uniquely positioned to exploit. Banks could be able to focus on the back-office processes while retail companies exploit their customer contact.

Furthermore, it must be stressed that not all new entrants into these markets use the on-line interface as a point of entry. In the UK, for example, Sainsbury’s bank (operated by the supermarket chain) is one of the few business areas operated by that firm that is *not* offered on-line (although there are plans to do so). Whether by design or circumstance in this case, the actual physical presence of the supermarkets was used as the first point of customer entry. This may point to the possibility that the ultimate future of the retail banking outlet many not be so much ‘on-line’, as simply ‘not in banks’. It is conceivable that a variety of on-line and off-line retail spaces could substitute for most consumer services without negatively affecting the overall financial performance of banks.

Wholesale banking services

Major banks are fully integrated suppliers offering a broad range of products that include commercial and investment banking, asset management, stockbrokerage and insurance. Some parts of these services are packaged into retail products, while others remain in the wholesale segment. A high degree of automation is an historical trait of many parts of this market segment, particularly for inter and intra-bank transactions like money transfer. Most of the automation is configured using non-internet 'legacy' systems, like EDI, which are oriented to closed trading groups.

Our interviews uncovered no strong incentive for firms to engineer a rapid switch to web based applications and interfaces. Such incentives as may exist for migrating to the Internet environment differ according to product and client type. For example, in commercial banking, smaller companies are used to dealing solely with local banks for finance and administrative services. This local orientation gives much discretion to the banks when determining client charges, the result of which may be higher charges. In principle, the Internet offers better access to a wider variety of sources for small business services. It also expands the geographical scope within which a firm (large or small) can search for the best price and service level. Again, in principle, this opens up opportunities for both banks and non-banks to be entrepreneurial in seeking new clients and developing new products.

Already, banks are starting-up business portals, geared towards the support of small and medium sized enterprises. This implies a strategy of assembling a potentially much enlarged client base by offering a line of integrated services to any buyer in any location. Many financial and administrative instruments (e.g. letters of credit, bills of exchange, insurance certificates, payrolls etc.) can be streamlined and automated by banks using excess capacity in the back-office. Some can specialise in specific instruments, offering them to a geographically distributed range of clients.

These possibilities provide established banks in particular localities or market segments with the option either to lower prices, or to increase the quality of the service. However, particularly for the more standardised products, it must be considered that the market may not be able to sustain the inevitable downward pressure on margins indefinitely.

In terms of effects upon the structure of the value chain, however, the above possibilities must be assessed in terms of two related factors. First, in the wholesale market for business services, there has been substantial consolidation of financial institutions. This development substantially pre-dates the current e-commerce debate, although e-commerce appears to be acting as a catalyst in future developments of this kind. Second, although in principle the Internet enables a global financial market, in practice this possibility is subject to local factors. The internationalisation of banking services is limited by a combination of national regulations, the structure of financial markets and the vested interests of incumbent banks in various countries. The primary current option for banks is to tap into international markets is for off-shore banks to engage with on-shore banks through mergers, acquisitions or alliances. The strategy is to profit form the knowledge base

of existing companies in specific national markets. Moreover, this process largely circumvents the costs of acquiring a new customer base.

The basic observation regarding the possibility of structural change in the value chain for wholesale banking services is that as e-commerce opens up the technical possibility of new and diversified markets, the major institutions who provide most of the services (banks and non-banks) continue to consolidate, thus potentially reducing the likelihood that products and sources of products will diversify.

Innovation in the transaction structure

Many e-commerce effects are difficult to disentangle from the effects of on-going general trends in the industry. Service to large clients with global business interests is certainly not possible without e-commerce of some description, but it is not clear how much of this is a consequence of e-commerce. For some time, larger companies have shown a tendency to do business with fewer financial services suppliers and to prefer those that can deliver a broad spectrum of financial services internationally. Accordingly, the interviews identified no entirely new business models. There is intensified competition in the financial sector, but this is not specifically attributable to e-commerce. Rather, it is the result of general developments in the industry, such as market saturation, internationalisation, and increased harmonisation of the European market. Regarding these developments e-commerce is considered more of a contributing factor than a cause in its own right.

Other impacts are more obviously related. For example, authentication and identification services is one area in which new demand was created as being a result of e-commerce. Verifying buyer and seller identities has provided opportunities for trusted-third-party intermediaries, and banks have stepped in to fulfil this role for both business and individual customers.

In order to unravel some of the effects of e-commerce from other ambient effects, we first have to summarise our observations in a systematic way. The EBIP approach treats e-commerce as an ‘innovation’ in the transaction structure. In other words, e-commerce enables transactions in various marketplaces to be carried out in different ways than before. Innovation is widely held to be of three types:

- *Product innovation* involves the development of new products and services and/or new product/service features;.
- *Process innovation* refers to how products and services are designed and made;.
- *Relational innovation* refers to new modalities and methods for buyer-seller interactions in the marketplace.

The transaction structure to which innovation is applied, or in some cases, in which the motivation to innovate is generated, is likewise composed of three distinct elements:

- *Transaction preparation* involves placing information about products and services in the market, and retrieval of this information by market participants.

- *Transaction completion* comprises two components: settlement and logistics. 'Settlement' refers to ordering, billing and the transfer of payments. 'Logistics' refers to the transfer of products and services from sellers to buyers both within supply chains and with final customers.

- *Production support* relates to the capture and use of transaction-related data to assess market trends, and to support the development, production and marketing of products and services.

As shown in Figure 9, the three generic innovation types can be related in a matrix to the three specific elements of e-commerce innovation.

Figure 9
Mapping the effects of electronic commerce

	Electronic Commerce Innovations		
	Transaction Preparation	**Transaction Completion**	**Production Support**
Product Innovation			
Process Innovation			
Relational Innovation			

The result of this footprint exercise for the present study is shown in Figure 10. To summarise the diagram, by far most of the effects were considered by interviewees to lie in the *process innovation* area, mainly as related to transaction preparation and transaction completion. This is consistent with the historical function of banks as structural intermediaries in the transaction process.

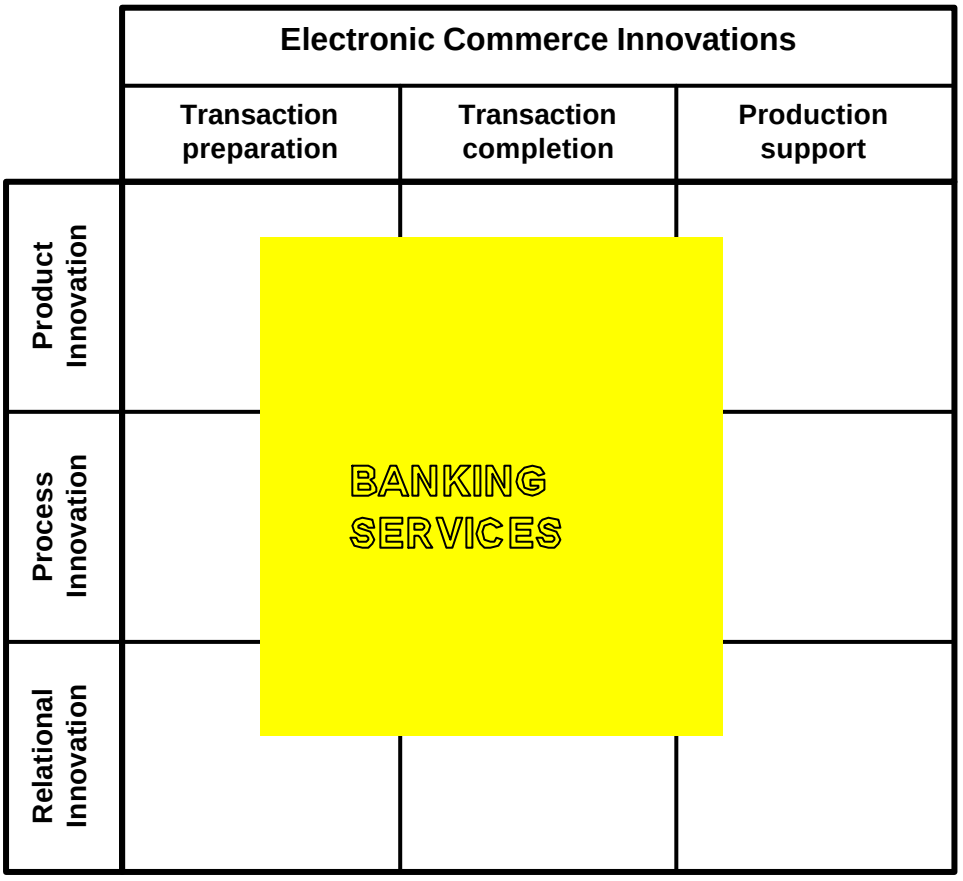
The central transaction arena in the value chain for banking services is the back-office function, which also was identified in the interviews as one of the main areas where efficiency gains have been made by introducing new technologies. Efficiency gains decrease the costs of providing existing products and services and can also free up capacity for new services. Thus, process innovations for transaction completion can be regarded as the core innovation arena in the sector.

Companies in the banking sector are nevertheless active in *product innovation* to some extent. Product innovation comes in two forms: (1) adapting existing products for new purposes, and (2) inventing entirely new products. Many existing banking products (often standardised components) are simply adapted for the virtual environment, either as part of the normal service offering of the bank, or for distribution via a third-party (‘white’ labelling). Banks also develop new products that are made possible only by the use of e-commerce (e.g. portals, exchanges, e-commerce consultancy services, etc.). Again, however, most of the innovation relates to the process by which products are delivered to clients. A degree of change

is observable also in how products are introduced onto the market and how customers are approached with product features (i.e. transaction preparation).

Relational innovation in the sector must be viewed against the historically high incidence of customer lock-in. The innovation strategy in this industry is less concerned to acquire new clients than it is to retain existing clients and extract more value from this relationship. This results in some innovation at the transaction preparation level (finding new ways to introduce clients to new products) but mainly at the transaction completion level (delivering services more efficiently and cheaply).

Figure 10
Footprint of e-commerce effects in banking



In general, most innovation in the banking sector takes place within the context of existing relationships. Most of the innovation regarding new client requirements is directed at process or product innovation, rather than at restructuring relationships with clients and other financial institutions as such. New technologies and services are used to save distribution and administration costs and increase the service level in order to strengthen relationships with clients in both retail and wholesale segments.

Production support shows up in the context of this report as the area where the least amount of innovation has taken place (hence the slight shadow on our diagram). This should not be taken to mean that banks are not generally technically advanced in the production support area. To the contrary, the capture and use of transaction generated information is a key aspect of the competitive advantages that banks enjoy in the market. In the context of the present study, however, the main area of technical development is to link existing trajectories for innovation in back office systems to evolving new internet-based service environments rather than to alter the back office radically as such.

5 Conclusions and policy implications

Evolution in the markets for electronic banking services are part of a strategic trajectory in the sector which started long before the advent of Internet-based e-commerce and in which the Internet is more of a *catalyst* than the prime driver. Much of this trajectory involves the consolidation of financial institutions, spurred on by a variety of factors like the liberalisation of national markets, the internationalisation of banks and of the banking client-base, and the harmonisation of the European market. Along with consolidation, boundaries between financial institutions and specific products have blurred. Major banks have now positioned themselves as integrated suppliers of a full range of financial services, usually in several national markets. Underpinning all of these developments are the increasing client demand for integrated services, and, on the supply side, the extra revenues that can be generated from a comprehensive portfolio of high value-added services.

The value chain in the banking industry remains highly integrated, with banks continuing to assume most of the production, co-ordination and distribution functions. Although in principle e-commerce increases outsourcing possibilities, in practice banks still tend to restrict this practice. Banks still largely configure their own retail and wholesale products. New entry into the co-ordination tier is mainly limited to fields like the international co-ordination of payment systems where banks gain collectively by acquiring a neutral intermediary. However, the contestability of these new intermediation markets is not certain, as too many new entrants could impose high co-ordination costs. In the distribution tier, there is evidence that banks are developing new ways of dealing with customers, although their strategies are predominantly oriented to existing rather than new clients. Some wholesale (white label) products facilitate some new entrant operations at the retail level, and may be part of a developing trend to outsource more-and-more of the distribution network for retail banking. Importantly, not all new retail outlets are on-line, thus adding to the difficulty of assessing the specific influence of the Internet in either new entrant or incumbent strategies.

Commoditisation of basic banking services and the resulting pressure on profit margins is causing many banks to focus on the higher revenue producing segments of the market. For standardised banking products, traditional banks are facing increased competition, both from established competitors (non-banks) in the sector, and from specialised new entrants in the on-line segment, although the latter is not yet significant. However, even though non-banks (e.g. telecommunications companies, internet service providers, utilities companies, supermarket chains, etc.) are capable of offering selected financial services, core banking competencies and the structural position of banks in the value chain for basic transaction services still appear to be prime determinants of overall viability in this sector.

For the moment, Dutch banks are well placed to meet the challenge of new entrants. Trusted brands (which are even more valuable in the on-line domain), a large installed customer base, investments in state-of-the-art technologies, experience in operating complex financial transaction systems, and a secure financial base offer substantial competitive advantages. The question is how new forms of competition may arise in an Internet environment. Our study suggests that competition will not be a simple matter of displacing traditional brick-and-mortar banks with on-line

ones. Rather, it will involve constructing even more highly complex alliances of services and service providers. Early indications are that it might involve the restructuring of relationships between the retail and wholesale service environments (e.g. selling basic banking services wholesale to retail companies). E-commerce can be expected to play a prominent role in this process, but this role looks likely to be played out within a hybrid structure in which various types of on-line and off-line banking interfaces support each other.

To sum up, our overall finding is that the application of e-commerce in the banking sector is progressive and incremental rather than revolutionary – building to varying extents upon existing business and technology trajectories. In general, however, e-commerce is driven primarily by business considerations rather than by the availability and capability of technology and network facilities as such.

Challenges for public policy

Our interviewees did not comment extensively on the policy dimensions of e-commerce in banking, and did not point to policy issues and/or initiatives (at domestic or EU levels) as being either significant catalysts or impediments to e-commerce adoption. However, banks are used to operating in a regulated environment, and used to developing new business products and processes within this structure. Certainly, the Dutch banks regard e-commerce to be integral to the core banking business, which is already regulated by the Dutch central bank.

However, the relatively low profile of policy for our interviewees does not mean that e-commerce in banking raises no policy issues. Many of the most obvious implications for the security, privacy and integrity of the financial services environment have been discussed at length in numerous policy documents and reports. As our respondents provided no additional insights into these generic issues, we will not review them here. Rather we will highlight four main challenges that arise from our study for the governance of the emerging electronic marketplace for banking services. In no special order of importance, these are:

- *competition* – compensating in an evolving electronic environment for the structurally dominant position of incumbents in the sector,
- *market development* – facilitating new wealth creation possibilities in the sector though e-commerce,
- *customer welfare* – ensuring that technological evolution in banking system is responsive to customer needs,
- *internationalisation* –supervising the new environment for cross-border electronic trade in banking services.

None of the above issues can be discussed in isolation, and, accordingly, no policy option is likely to be clear cut. To show how complex the policy problem can be, we can start from the finding that banks have a decided incumbent advantage in the emerging electronic marketplace. Not only do banks import significant existing positive network externalities into the development of markets for their own products, but they are significant providers of generic products that are resold by many of the new entrants into the banking services markets. In many industries, this would be cause for concern among competition policy officials, as the new electronic marketplace may become structurally biased against new entrants.

However, if market development and customer welfare considerations are taken into account, there are several positive reasons for policy-makers not to upset this structure too much. In the first place, customers do not just purchase financial products on the basis of price; factors like security, reliability and risk avoidance play major roles in purchase decisions. When the structural function of banks is taken into consideration, the assumed benefits of more open entry into the sector must always be weighed against these trust and confidence factors. Moreover, from a purely pragmatic point of view, the banking industry is very significant to the Dutch economy and several Dutch banks are very competitive internationally. In other words, there are compelling arguments in this case against 'fixing' something that may not be 'broken'.

Taking this subtlety and complexity into consideration, the main arenas for policy action regarding the above four challenges would appear to be:

- *General sector governance* – Clearly, governments have a continuing responsibility to protect the pivotal functional role of banks. In the past, this has largely been accomplished through the granting of banking licenses that impose responsibilities on both governments and banks to sustain public confidence in the banking system as a foundation for economic activity in general. E-commerce may eventually generate pressures on this system, some of them initiated by the banks themselves as they strive to exploit new markets in new ways. There are already obvious pressures for international harmonisation of banking regulation as more-and-more (particularly wholesale) services involve complex inter-institutional and international deal-making. E-commerce can be expected to contribute to these pressures.

- *Access and transparency* – E-commerce is promoted as a new form of universal access to financial services, but we have seen above how e-commerce also facilitates more sophisticated client selection and service design. This situation has the potential to generate socio-economic access asymmetries to the banking system and it bears watching by policy-makers. Likewise, we have seen how e-commerce seems to favour service bundling and product standardisation. This leads to questions about transparency in banking products, and about the degree to which the financial instruments that are available to specific economic groupings (SMEs for example) are indeed designed to be responsive to the actual needs of these constituencies. It should not be assumed that increased access to comparative information on services, or increased access to alternative (including off-shore) service providers will result necessarily in better or more responsive services.

- *Hazard management* – Although much of the current discussion about e-commerce is focussed upon the entrepreneurial element, new-entrant trading in the on-line banking segment carries risks. Clearly, inexperienced or under-capitalised new entrant trading in the on-line segment could lead to failures that compromise public confidence. Likewise the emerging complexity in the alliance structure (which can include many types of institutions in diverse locations and regulatory jurisdictions) can increase both bank and client risk.

- *Technology monitoring* – 'Technology policy' (n the sense of R&D support and/or diffusion and implementation initiatives) did not seem to be a priority for

any of the firms we interviewed, save for some concerns about the lack of standardisation of some systems and interfaces. The relatively low profile of technical issues is potentially significant in that many current e-commerce policy initiatives (particularly at the EU level) are heavily oriented towards technology development and adoption programmes. Part of the reason for the apparent lack of concern in this particular industry is the fact that it is an historical technology leader and one of the single largest buyers and developers of IT systems. In other words, technological competency is not as much of an issue here as it might be in other less IT intensive industries. Following on from this, however, another reason is that the banks are well positioned to influence or direct the technological evolution of e-commerce in the sector. We have seen that although the Internet is in principle the provider of an 'open' network environment allowing the interoperation of many diverse systems, it can be configured to support secure closed networks. Policy-makers should probably also be interested in the extent to which proprietary configurations of this technology impose economic conditions that favour incumbent service providers by promoting customer lock-in.

The overall observation regarding the policy implications for e-commerce in the sector is that most of the significant changes involve a degree of participation (often substantial) by banks who are already subject to existing regulations. Moreover, most of the change in the sector due to e-commerce is related in various ways to broader issues like consolidation and internationalisation that in themselves already inform regulatory reform agendas at domestic, EU and international levels. E-commerce is a contributing factor in these contexts, but it does not appear to be a major causal factor. Thus, e-commerce activities in themselves do not yet appear to justify any radical restructuring of the banking policy regime. More appropriate at this stage is continued critical monitoring, perhaps with more detailed analysis of specific electronic service environments within the context of overall policy review and reform for the sector.

List of references

Bughin, J.R. (2001), *Giving Europeans an on-line push*, in: McKinsey Quaterly, 2001, number 2;

Canals, J. (1994), *Competitive strategies in European banking*, Oxford University Press, Oxford;

CBS, www.cbs.nl;

De Nederlandse Bank (DNB), www.dnb.nl;

ECB (2000), *Mergers and acquisitions involving the EU-banking industry - facts and implications*, december 2000;

Farkas, L., Pappas, G. & M. Wodzicki (2000), *Greenfield banking in Poland*, in: McKinsey Quaterly, 2000, number 4;

Gardener, P.M. & J. Falzon (Eds.) (2000), *Strategic Challenges in European Banking*, MacMillan Press, London;

Hovinga, M. (2001), *Betaalmiddelen op internet*, in: Controllers Magazine, jabuari/ferbuari 2001;

Ministerie van Economische Zaken (2001*), ICT-toets electronisch betalingsverkeer 2000, januari 2001*, uitgevoerd door CMG Finance;

Nederlandse Vereniging voor Banken (NVB), www.nvb.nl;

PriceWaterhouseCoopers, *Protect and Survive - Regulation of e-commerce in the financial services industry*;

Steinherr, A. (ed.) (1992), *The new European financial market place*, Longman, London;

Stroeken, J.H.M. (1993), *Informatietechnologie in het bankwezen*, in: Horn, L.A., Stroeken, J.H.M. & F.R.H. Zijlstra (eds), Informatietechnologie in de maatschappij (tweede herziene druk), Deventer 1993;

Stroeken, J.H.M. (1995), *Informatietechnologie en bedrijfstak*, in: Informatie en Informatiebeleid, dertiende jaargang, 1995 no 1 (voorjaar);

Verhoest, P. & R. Hawkins (2000), *A transaction structure approach to assessing the dynamics and impacts of 'business-to-business electronic commerce'*, Telematica Instituut, Impacts and Perspectives of Electronic Commerce (IPEC) project, Working Paper, May;

Wolters, M. & C. de Koning, *Consolidatie in de financiële sector*, in: ESB, 19 januari 2001, 86e jaargang, nr. 4291;

E-strategy brief: Merill Lynch, in: The Economist, june 2001;

The economist (19XX), a survey of online finance;

www.bankingreview.nl

Abbringh, D.J. & F. de Boer, *Creatieve zelfdestructie vereist*?;
Bagijn, K. (2001), *De strijd tussen David en Goliath*, maart 2001;
Franssen, F. (2001), *Backoffice-fabrieken voor e-finance dienstverleners*, maart 2001;

Lensink, A. (2000), *"Enige zekerheid voor banken is dat ze iets moeten ondernemen*", november 2000;
Prast, H. (2001), *Bankwezen in Nederland*, april 2001;
Prinsen Geerlings (2000), H., *Internet banking naar een volgende fase*, november 2000);
Wolffenbuttel, T. & R. Stegwee (2001), *E-business bij banken en verzekeraars*, april 2001;

Annual reports:
Nederlandse Vereniging voor Banken, 1999 & 2000;