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THE EFFECTS OF INFORMATION AND COMMUNICATION TECHNOLOGIES ON THE BANKING SECTOR AND THE PAYMENTS SYSTEM

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PhD thesis

The Effects of Information and Communication Technologies on the Banking Sector and the Payments System

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El Dr. Jaume Valls i Pasola, professor del Departament d'Organització, Gestió Empresarial i Disseny de Producte de la Universitat de Girona,

Certifica

Que la llicenciada en Administració i Direcció d'Empreses Anna Arbussà i Reixach ha dut a terme el treball amb el títol "The Effects of Information and Communication Technologies on the Banking Sector and the Payments System".

El treball que es presenta en aquesta memòria constitueix la seva tesi per optar al grau de doctora per la Universitat de Girona.

Dr. Jaume Valls

Abstract

This dissertation studies the effects of Information and Communication Technologies (ICT) on the banking sector and the payments system. It provides insight into how technology-induced changes occur, by exploring both the nature and scope of main technology innovations and evidencing their economic implications for banks and payment systems. Some parts in the dissertation are descriptive. They summarise the main technological developments in the field of finance and link them to economic policies. These parts are complemented with sections of the study that focus on assessing the extent of technology application to banking and payment activities. Finally, it includes also some work which borrows from the economic literature on banking. The need for an interdisciplinary approach arises from the complexity of the topic and the rapid path of change to which it is subject.

The first chapter provides an overview of the influence of developments in ICT on the evolution of financial services and international capital flows. We include main indicators and discuss innovation in the financial sector, exchange rates and international capital flows. The chapter concludes with impact analysis and policy options regarding the international financial architecture, some monetary policy issues and the role of international institutions.

The second chapter is a technology assessment study that focuses on the relationship between technology and money. The application of technology to payment systems is transforming the way we use money and, in some instances, is blurring the definition of what constitutes money. This chapter surveys the developments in electronic forms of payment and their relationship to the banking system. It also analyses the challenges posed by electronic money for regulators and policy makers, and in particular the opportunities created by two simultaneous processes: the Economic and Monetary Union and the increasing use of electronic payment instruments.

The third chapter deals with the implications of developments in ICT on relationship banking. The financial intermediation literature explains relationship banking as a type of financial intermediation characterised by proprietary information and multiple interactions with customers. This form of banking is important for the financing of small and medium-sized enterprises. We discuss the effects of ICT on the banking sector as a whole and then apply these developments to the case of relationship banking.

The fourth chapter is an empirical study of the effects of technology on the banking business, using a sample of data from the Spanish banking industry. The design of the study is based on some of the events described in the previous chapters, and also draws from the economic literature on banking. The study shows that developments in information management have differential effects on wholesale and retail banking activities.

Finally, the last chapter is a technology assessment study on electronic payments systems in Spain and the European Union. It contains an analysis of existing payment systems and ongoing or planned initiatives in Spain. It forms part of a broader project comprising a series of country-specific analyses covering ten European countries. The main issues raised across the countries serve as the starting point to discuss implications of the development of electronic money for regulation and policies, and in particular, for monetary-policy making.

Acknowledgments

I am most thankful to my supervisor, Jaume Valls, for his advise throughout this dissertation and for encouraging me all this time. I value very much that he has been extremely available, even when his work agenda was very tight. I also value his generosity. He has helped me go on research stages in several occasions, while he has stayed in Girona and taken care of the meetings and the administrative work. I have had the opportunity of working with him for already five years, during which he has introduced me to the technology topics. The other person to whom I owe very special thanks is Ricard Torres. I thank him very much for his patience and for his help. I enjoy very much working with him and I value him greatly. I am indebted to him for most economics in the dissertation.

There are many people to whom I feel obliged for their comments on the contents of this dissertation. I thank Marc Humbert (Université de Rennes), Silvana Stefani (Università di Brescia), Patrick Roger (LARGE, Université Louis Pasteur), Rohit Rahi (London School of Economics), Patrick Van Cayselee (Katholieke Universiteit Leuven), Tridib Sharma (Instituto Tecnológico Autónomo de México –ITAM), Jordi Molas (Science Policy Research Unit -SPRU, University of Sussex), MªAngels Xabadia (Universitat de Girona), Marc Sáez (Universitat de Girona) and John Stevens (former Member of the European Parliament).

I am also grateful to my colleagues in the department: Rudi, Martí and Gerusa, who are best friends; together with Rafel, Sussi, Christian, Pilar, Jordi and Dolors. I also thank Quim, who is now in a different department, but we still go out together for lunch.

Girona, July 2001

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Introduction

Introduction

I. General overview

Information and Communication Technologies (ICT) have been a current issue for the past few years and hardly a day goes without a newspaper covering news referring to the "new economy" or the "Information society". ICT are also widely talked about in academia and governmental bodies. This is as a consequence of their influence in many aspects of our society, from on-line shopping to virtual chatting.

This dissertation concentrates on the effects of ICT on the banking sector and the payments system. The aim is to identify and understand the changes that ICT are causing on the banking sector and the payments systems, in order to examine in detail how the recent (and foreseeable) advances in ICT are affecting the sector and can affect its future evolution. As ICT are having a strong influence on the evolution of the financial sector as a whole, financial markets and banks, some characteristics of the evolution of markets will also fall within the scope of this study. Similarly, we will also consider other forces, like deregulation and the introduction of the single currency in Europe, that influence significantly the banking sector and the payments system.

There exist various approaches to studying the effects of ICT on banks and payments systems. In this dissertation, we combine the technology assessment (TA) and the economics approach. The aim of TA is to state, as objectively as possible, the positive and negative impacts, the costs and benefits, the risks and advantages associated with (present or foreseeable) technical challenges."[1]. TA is an appropriate conceptual framework for analysing the multiple aspects of the relationship between technology and banking and payment systems. It is specially so given the novelty of the issue and the rapid path of change to which it is subject.

The choice of the economics of money and banking approach comes naturally given the object of the study. We do not build on theoretical literature. Rather, we use some concepts that enable us to explain various trends in the banking business and the payments systems, that are apparent in the descriptive parts of the dissertation. We deal mainly with economics of banking and monetary policy. In particular, we use monetary policy as the basis for some policy challenges arising from changes in payment systems, while we rely on the economics of banking to analyse the effects of ICT in lowering the information asymmetries that explain financial intermediation.

Overall, this dissertation recognises the link between technology, economy and society, and attempts to bridge the normally separate disciplines of technology and economics. We feel strongly that an interdisciplinary study is a good approach to a fast changing reality. The drawback, of course, being that a more specialised approach would have allowed more in depth analyses of some issues. Finding the correct balance is a difficult task. Yet, we hope that this dissertation has produced some valuable output and that also helps to identify concerns that can be the subject of further research.

[1] OECD "Technology and the economy. The key relationships" The technology /economy programme (1992)

II. Technology assessment

Technology is a social process and therefore should not be left exclusively in the hands of engineers and technicians. We live in a society that is ruled by science, and the technological options and strategies that are carried out have a clear impact on the environment, on social relations, on economic matters, and so on. Although this idea is by no means new, it brought no direct influence to bear on the democratically elected parliaments of Europe until quite recently. The growing role of science and technology in the 1980s led to recognition of the importance of technology assessment (TA) activities. According to the classical definition by Coates (1976), TA is "a type of research that systematically analyses the possible effects on society of the introduction, expansion or modification of any specific technology, and in which particular stress is given to the study of the unexpected, indirect or retarded consequences of such technology." TA has been gaining ground ever since as a conceptual framework for the analysis and assessment of the potential impact, whether positive or negative, of new technologies. TA can be applied to any area that is potentially affected by the use of technology and changes in scientific or technological activities, whether the affected area be the economy, public health, politics, cultural affairs, the natural environment or any other. TA is not a scientific area in itself but rather an instrument to be used by policy makers. When in-depth analyses of the impact caused by scientific and technological progress are made available to them, governments are then better able to manage the process of development in modern society. Indeed, in the framework of scientific and technological policy planning and implementation, the growth of TA responds to the demand for more democratic decision-taking on scientific and technological matters and also to increasing government spending on activities connected to science and technology, such as research and development (R&D), public health, the environment, technological infrastructures, communication networks, and so on.

Over the last two decades, TA has become *institutionalised*. At a European level, this institutionalisation was seen in the creation of TA offices and services in different countries during the 1980s. These TA organisations were set up in order to carry out TA activities on request from the parliaments and the governments in European countries.

On the whole, the assessments carried out by these organisations are based on external assessment criteria. The term "external assessment" mainly refers to two concepts. In the first place, the term refers to the analysis of the properties of the different technologies (the *suitability* or *appropriateness* of the technologies). In the second place, it refers to the analysis of the consequences derived from the use and expansion of the technologies (i.e. the *consequences* of any one technology). These consequences are mainly analysed in terms of risk, environmental impact and social impact[2].

In any case, it is becoming more and more difficult to "measure" and quantify these impacts in a highly complex and increasingly globalised scientific and technological environment, where any technological change can have grave social implications. In general terms, researchers on the subject all agree that one of the most significant changes in TA activities during the 1990s was the tendency to move from a reactive TA

[2] See Quintanilla, 'El desarrollo científico-técnico en una sociedad democrática', in *Estudios sobre sociedad y tecnología*, ed. by Sanmartín and others (Barcelona: Anthropos, 1992)

towards an active TA. This change involves moving from studying and analysing the positive and negative effects derived from the introduction of some new technology (as well as the existing alternatives) and collecting information for policy makers, towards carrying out other activities to assess the needs and problems of different human groups and pinpoint the answers that science and technology can provide for such needs.

III. Economics of money and banking

Money and Monetary policy

The definition of money as a means that is generally accepted in making payments implies that what constitutes money depends on the behaviour of consumers and firms. New technology-based payments instruments, if generally accepted, have the potential to modify what constitutes money.

We are currently moving towards an electronic payments system. This has the potential to increase overall efficiency in the economy and also raises new concerns regarding other essential -besides efficiency- attributes of payments systems, in particular, their safety. Both the safety and the efficiency of the payments systems have become a fundamental concern for policy makers. Issues that can be examined include changes in the existing measures of money, the relevance of monetary aggregates in monetary policy making, the potential for e-money to replace "fiduciary" money, and institutions that should be allowed to issue e-money. The introduction of the euro may also have implications on the adoption of new electronic payments instruments in Europe.

ICT developments have strongly influenced international capital flows. These developments have prompted a debate on the role that national and international institutions should play in the new framework of a globalised economy. The current international institutional framework has proved inadequate to deal with the new environment created by the globalisation of capital flows. Policy options are required at European and international levels. The volume and speed of international capital flows and the structure of international financial system also affect monetary policy. Exchange rate considerations now play a greater role in the conduct of monetary policy. Because of the growing interdependence between economies around the world, a country's monetary policy can not be conducted without taking international considerations into account.

Bank theory

Banks, together with other financial intermediaries, are essential in the allocation of capital in the economy. A very powerful tool to explain how banks work is provided by the literature on financial intermediation. This literature is centred on information asymmetries, an assumption that "different economic agents possess different pieces of information on relevant economic variables, and that agents will use this information for their own profit"[3]. The presence of asymmetric information leads to adverse selection and moral hazard problems. Adverse selection is an asymmetric information problem

[3] Freixas, X. and J.C. Rochet "Microeconomics of banking"(1998)

that takes place before the transaction occurs an it is related to the lack of information about the lenders' characteristics. Moral hazard takes place after the transaction occurs. It is related with incentives by the lenders to behave opportunistically.

The financial intermediation literature explains that financial intermediaries exist to overcome the informational asymmetries in markets. Banks, as a particular type of financial intermediary, perform different tasks related to these information asymmetries, among which are the provision of liquidity through deposits; and the supply of finance to households and firms, by the means of loans. Among the different issues analysed by the financial intermediation literature is the relationship between bank and customers and the monitoring (including screening) activity that implies that firms and financial intermediaries develop long-term relationships, thus mitigating the effects of adverse selection and moral hazard.

Recent developments in ICT, together with new financial instruments, have lowered informational asymmetries. In this dissertation we use economic concepts in the financial intermediation literature to explain the observed trends in the banking industry.

IV. Motivation for this work

This dissertation is the result of the research work that I have undertaken since I started working at the University of Girona, in 1996. The inputs throughout these years have been wide. The first step were the PhD courses which I took both at the University of Barcelona and at the University of Girona. These courses provided me with a good insight on technology assessment issues and some finance topics. Besides the courses, during these years I have also worked closely with Jaume Valls and Ricard Torres, being part of their research team, here at the University of Girona.[4] Some of the results that I present in this dissertation originated from various research projects charged to this research team.

Chapter 2 forms part of a broader project entitled "Technological Innovation and Money" that was charged in June 1996 to the University of Girona by STOA[5] (Scientific and Technological Options Assessment Office) – European Parliament. The project had been proposed to the STOA Panel by the Committee on Economic, Monetary and Industrial Policy Affairs. The report was monitored by John Stevens (Member of the European Parliament) and presented before the Monetary Affairs Subcommittee of the European Parliament in 1997.[6] This project constituted an early instance of what has later on proved to be a good research topic, as is the study of the economic implications of technology-based new payment systems.

[4] "Grup de Recerca sobre la Dinàmica i l'Impacte Econòmic de les Noves Tecnologies a les Organitzacions" (Gradient). This denomination is an entry in the official register of research groups at the University of Girona. The register was set up in November 2000.
[5] See Annex 1.
[6] PE document number 166483. Presented before the Monetary Affairs Subcommittee of the European Parliament in March 1997 and presented before the STOA pannel of the European Parliament in June 1997.

Next, I had the opportunity to participate in a study by the European Science and Technology Observatory (ESTO) which is a network of 14 European organisations which share in the responsibility of providing timely access to information on the socio-economic implications of selected scientific and technological advances. ESTO is an initiative of the JRC's Institute for Prospective Technological Studies (IPTS) which is responsible for the Technology Watch mission of the European Commission. The project, carried out in co-operation by the European Commission's Joint Research Centre, Institute of Prospective Technological Studies (IPTS) and ESTO, had the title "EMU and Information Society: Key Questions About the Opportunity to Combine the Introduction of the Euro with New Electronic Payment Technology Options" and was requested by the Committee on Economic and Monetary Affairs and Industrial Policy of the European Parliament in June 1998. At the time, the committee was debating a proposed directive on "The taking up, the pursuit and the prudential supervision of the business of electronic money institutions". The parliamentary committee provided a set of six questions related to electronic commerce and the introduction of the single European currency, which guided the research performed for the project. While IPTS carried out a broad mail survey aiming at key actors in December 1998, the ESTO partners mainly prepared country reports based on expert interviews[7]. Researchers from the following institutions contributed to this study: University of Girona, TNO Strategy, Technology and Policy, the Netherlands; Global Electronic Finance Management, S.A., Brussels, covering France; Forschungszentrum Karlsruhe, Institut für Technikfolgenabschätzung und Systemanalyse (ITAS), covering Germany and acting as operating agent; NUTEK, Technology Policy Studies, Stockholm, covering Sweden and Finland. An adapted version of the country report on Spain, and of the main implications for regulation and policies are presented in Chapter 5 of this dissertation. Co-operation in research activities between the University of Girona and IPTS continues after the ESTO project, with Jaume Valls and myself being correspondents to the electronic payments system observatory newsletter (ePSO-N), which is edited by ITAS and charged by IPTS. The project is funded by the DG ENTER (Directorate General Enterprise) and is part of the ISIS (Information Society Initiative in Standardisation) programme.

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The third project in chronological order in which I have participated is the STOA report "The impact of rapid technological change in information technology on the stability of world trade and international capital flows"[8]. The project was a request of Mr. Herzog and Mr. Seppänen on behalf of the External Economic Relations Committee. The project started in May 1999 and was submitted in January 2000.[9] This project constitutes the basis for Chapter 1 in this dissertation. An article based on the project was published in the IPTS Report[10].

Some of periods in between of those during which I worked on the chapters above, I had the chance of going on stages and work on fundamental research. The first stage

[7] These country reports were edited by K. Boehle, M. Rader and U. Riehm, "Electronic Payment Systems in European Countries. Country Synthesis Report" (ISNN 0947- 8630).

[8] PE document number 168.395

[9] The project was jointly developed with Jaume Valls i Ricard Torres and the final version was also reviewed by Marc Humbert (Université de Rennes), Patrick Roger (Université Louis Pasteur) and Silvana Stefani (Università di Brescia).

[10] The IPTS Report, "The impact of Information Technologies on the stability of international financial markets", issue n. 44, May 2000. It was also presented at the congress "I Encuentro Iberoamericano de Finanzas y Sistemas de Información", Universidad de Cádiz, Jerez de la Frontera, November 2000.

was at the Laboratoire de Recherche en Gestion (LARGE), Université Louis Pasteur (Strasbourg), from September to October 1998, where I worked on financial topics under the direction of Patrick Roger. A second, most enjoyable research stage, was at the London School of Economics (LSE), from May to September 2000, to where I was invited by Rohit Rahi, and where I also benefited from comments by many of the researchers that participated in the seminars held during that time of my stay.[11] I started working on the contents of Chapter 3 and Chapter 4 of this dissertation during these stages and I have finished them at the University of Girona, where I have also benefited from comments by various researchers invited to the seminar series of this PhD programme: Patrick Van Cayselee (Katholieke Universiteit Leuven), Tridib Sharma (Instituto Tecnológico Autónomo de México –ITAM) and Jordi Molas (Science Policy Research Unit- SPRU).

At the beginning of each chapter of this dissertation, the reader is referred again to the research work being the basis for that chapter.

Disclaimer

On discussing certain topics in this dissertation, the names of private companies are mentioned one or more times. The reason for this is just because they have intervened on the issues discussed, or simply as an instance of firms engaged in the operations that are commented. Unless it is explicitly written, in no case the authors try to imply that these companies are the only ones operating on this particular area, or have any significance above any other companies that are not mentioned.

[11] I acknowledge the financial support from the programme "Beques per a la recerca a fora de Catalunya", of the Departament d'Universitats, Recerca i Societat de la Informació, Generalitat de Catalunya.

Chapter 1.

The effects of ICT on financial markets

Chapter 1. The effects of ICT on financial markets

This chapter seeks to explain the impact of developments in ICT on the financial sector at international level[1]. As a starting point, the first section deals with a statistical overview of recent developments in international figures. The second section describes the major information technology innovations for the banking sector and for international capital flows. It comments on new products and new risks, for example derivatives and hedge funds. The third section analyses the fluctuations in exchange rates and international capital flows with special attention to the question of whether these fluctuations are related to developments in ICT. The fourth section presents available policy options to deal with the globalising trend in financial markets.

1.1 Globalisation of financial markets

1.1.1 Introduction

Within an economic framework, globalisation points to the accelerating growth of economic activities across national and regional borders. Over the last decades, there has been a tendency towards the globalisation of financial markets, whose turnover has soared during the 1990s. Even after the crises that have shaken the system, the financial markets have continued their expansion. The main reasons are:

- Governments have reduced restrictions on capital flows and eased financial markets' regulations.
- Barriers to trade in goods markets have been lowered.
- Sectors that used to be strictly controlled, notably telecommunications, have undergone a liberalisation process and are being increasingly opened to international competition.
- The expectation of high rates of return on investment in developing countries, together with macroeconomic stabilisation policies by their governments, have attracted foreign capitals.
- Technological developments in the computer and telecommunications industries, and the spread of sophisticated infrastructures, have eliminated many barriers created by physical distance, allowing *virtual* closeness. This has had important consequences as regards the behaviour of both firms and markets.

In sum, liberalisation policies coupled with technological developments in information technologies are the main forces underlying the expansion and increasing integration of the international financial markets. However, the huge boost in turnover of capital markets has raised concerns about financial stability[2].

[1] This chapter is based on the STOA project "The impact of rapid technological change in information technology on the stability of world trade and international capital flows", PE document number 168.395. (See section Ivin Introduction). The original project was developed in 1999. It included an overview and statistical analysis of recent developments in trade, and was hoped to provide the necessary information to enable the European Parliament to participate in the WTO Millenium Round in Seattle, on the liberalisation of trade services.

[2] The global financial turmoil of recent years has prompted a number of initiatives: the Group of Seven established the Financial Stability Forum; in June 1999, the BIS issued a proposal for a new capital adequacy framework to replace the Capital Accord of 1988; the European Commission has recently issued an Action Plan aimed at easing the integration of capital markets throughout the European Union (cf. sections 3 and 4).

1.1.2. Main indicators

Table 1.1 - Main features of international claims of BIS reporting banks[1]

	Stocks at end Dec. 1998
Claims on outside area countries	1200.7
Claims on inside area countries	9630.6
Claims on non-banks	2935.1
Banks' borrowing for local onlending[2]	1132.3
Interbank redepositing	5563.2
Unallocated	216.9
Gross international bank claims	11048.2
Net international bank claims[3]	5485

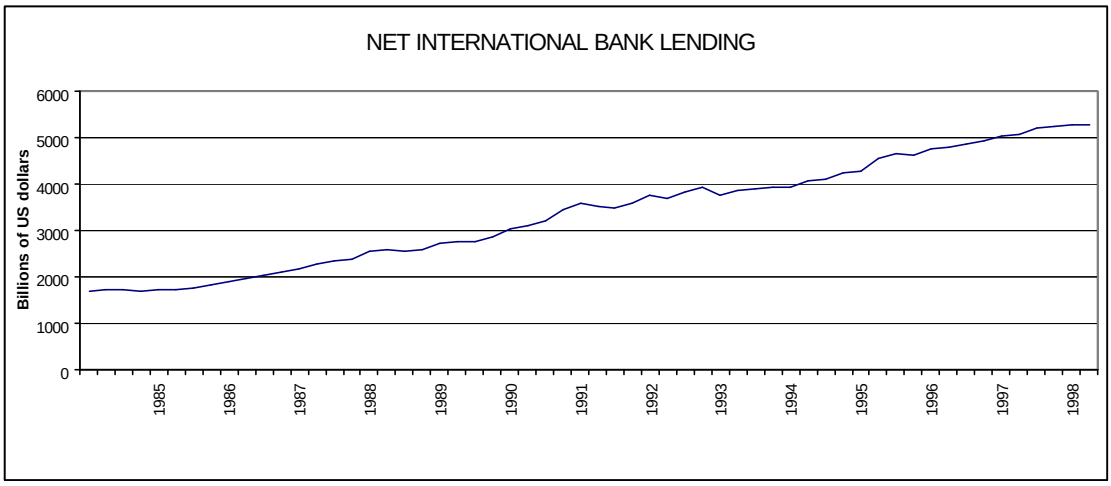
1 Changes in amounts outstanding including exchange rate valuation effects

2 Estimates of international borrowing by reporting banks, either directly in domestic currency or in foreign currency, for the purpose of local lending in domestic currency

3 Defined as total international claims of reporting banks minus interbank redepositing

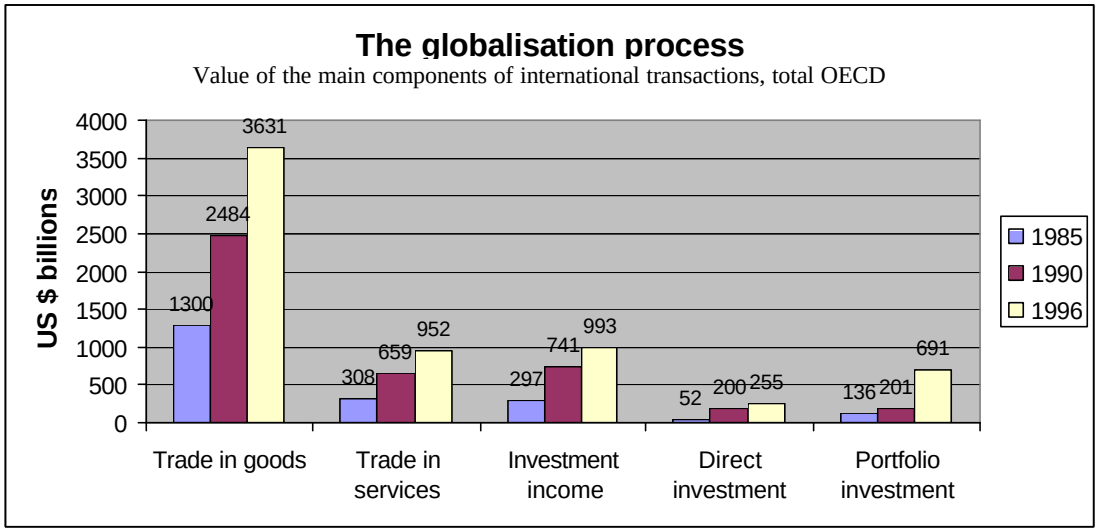
Source: BIS - International banking and financial market developments. June 1999.

Graph 1.1



Source: BIS - International banking and financial market developments. – Statistical annex. June 1999.

Graph 1.2



1.1.2.1. Financial Markets

Net *international bank lending* has been growing apace since 1985 (Graph 1.1). The bulk of such lending has remained inside the BIS reporting banks area, which at the end of December 1998 accounted for 87% per cent of total outstanding claims. While bank lending to developing economies has been increasing on average for the past 15 years, the occurrence of crises has temporarily reversed this tendency in some regions. That was the case for Asia in 1997 and for Latin America and Eastern Europe in 1998. Furthermore, during the fourth quarter of 1998, it was the global stock of international bank claims that declined in response to concerns raised by the Russian crisis, the closing of a major Chinese investment corporation, the currency crisis in Brazil and debt restructuring in Asia. In the aggregate, the bulk of claims remain on interbank redepositing.

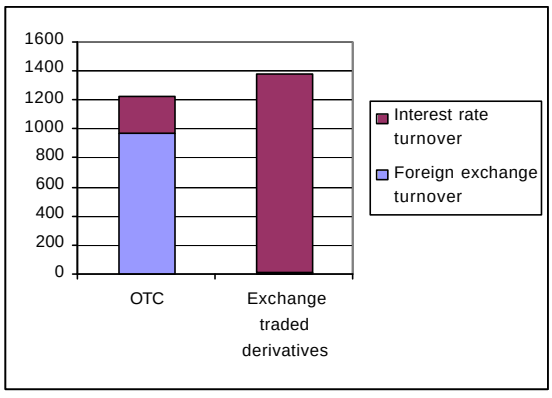
The *globalisation process* (Graph 1.2) helps to put into perspective the composition of investment for the OECD economies as a whole by comparing it to the figures for trade. Notwithstanding the growth of international investment, it should be noticed that these figures correspond to *real* investment abroad and are thus entirely different from turnover in capital markets. In capital markets, the majority of turnover corresponds to transactions that do not end up in investment in physical capital. The most relevant growth in capital markets turnover has been the expansion of derivatives markets. Current figures for those markets are commented below.

As regards *derivatives markets*, Table 1.2 shows the pre-eminence of over-the-counter (OTC) derivatives over exchange-traded products. By *notional amounts* the table refers to the open positions, and indicates the size of the market; the *gross market value* of outstanding positions measures the replacement costs of all outstanding positions had they been closed on the reporting dates. The data (Graph 1.3) indicate that interest rate contracts account for the largest share in derivatives markets (both at OTC and exchange-traded markets), when looking at daily average turnover. Foreign exchange contracts are the most traded products in OTC markets ($1.3 trillion). This is so because of the very short nature (less than one week on average) of currency positions, in comparison with the much longer maturity of interest rate products. U.S. commercial and investment banks are the leading players in the derivatives markets, accounting for about 40% of the market volume.

Table 1.2 GlobalOTC derivative market
Amounts outstanding, in billions of US dollars.

	Notional amounts	Gross market values
Foreign exchange contracts	18011	786
Interest rate contracts	50015	1675
Equity – linked contracts	1488	236
Commodity contracts	415	43
Other	10371	490
Grand total	80300	3230
Gross credit exposure		1329
Memorandum items		
Exchange traded contracts	*13549*	

Graph 1.3 Derivatives market turnover
Daily averages, in billions of US dollars.

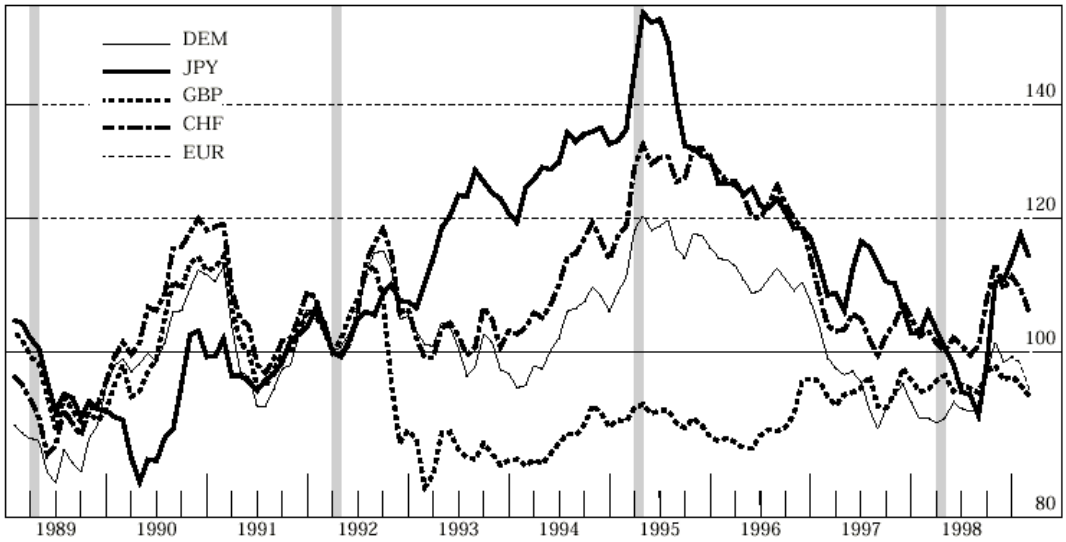


Source: BIS International banking and financial market development June 1998

Graph 1.4

Bilateral exchange rates with the US dollar

April 1992 = 100, semi-log scale



Source: Central Bank Survey of Foreign Exchange and Derivatives Market Activity 1998 (BIS)

Table 1.3 Foreign exchange market turnover[1]

Daily averages in billions of US dollars

Category	**April 1989**	**April 1992**	**April 1995**	**April 1998**
Spot transactions[2]	350	400	520	600
Outright forwards and forex swaps[2]	240	420	670	900
Total "traditional" turnover	590	820	1190	1500
Memorandum item:				
Turnover at April 1998 exchange rates	*600*	*800*	*1030*	*1500*

1. Adjusted for local and cross-border double counting.
2. Including estimates for gaps in reporting.

Source: Central Bank Survey of Foreign Exchange and Derivatives Market Activity 1998 (BIS)

1.1.2.2. Exchange rates

The evolution of exchange rates. Since the collapse of the Bretton Woods system in 1971, the major world currencies[3] have been on a floating exchange rate regime, that is, the exchange rates are basically determined by market demand and supply, but under the monetary authorities' control. For example, there were pressures from the United States for the yen to appreciate from 360 yens/dollar in 1971 to 80 yens/dollar in 1995. That year there was a shift in American exchange rate policy when the U.S. Treasury announced a "strong dollar." The tendency was then for the yen to depreciate against the dollar. In recent months, the Bank of Japan has been intervening in the spot market, trying to limit the yen appreciation to around 120 yen to the dollar, close to today's PPP (purchasing power parity) rate.

With regards to the euro, there have been concerns recently about its external value. The fall in the value of the euro against other major currencies has been accompanied by a rise in the dollar and, when taken together, the two movements magnify the change that has occurred. The Maastricht Treaty established that the euro would take the market value of the ecu and the market settled the value at 1.1789 dollars. Then the market valuation has shifted and the euro has depreciated to an approximate parity with the dollar. There are economic reasons behind the depreciation of the euro: differences between the U.S. and euro economies in terms of economic growth expectations, and differences in interest rates (currently 5.5% in US and 3% in the euro area). Furthermore, exchange rates depend on expectations on the evolution of interest rates, which were until recently were in the U.S. and a fall in Europe. A future change in macroeconomic variables like inflation or economic growth, may induce a shift in expectations, and reverse this tendency of the exchange rates. A lower value of the euro increases the competitiveness of European exports and makes imports and investment abroad more expensive. In terms of the trade balance, a low euro contributes to raise the euro-zone current surplus and the U.S. current deficit. On the other hand, the high dollar has helped to keep U.S. inflation low in a period of economic growth with tight labour markets in America. As discussed in section 3 of this study, there are many constraints on governments that try to influence exchange rates in open economies.

Foreign exchange markets. The expansion of foreign exchange markets is a natural by-product of the growing internationalisation of the economy with operations being increasingly conducted on a multicurrency basis. In terms of notional principal amounts, global turnover in traditional foreign exchange market segments (spot transactions, outright forwards and foreign exchange swaps) reached an estimated daily average of $1.5 trillion in April 1998. Out of the total of foreign exchange products, the share of short-term contracts went up to 88%, cross-border transactions accounted for 54% of the total operations and the dollar was the counterpart to 88% of foreign exchange transactions. The introduction of the euro on 1 January 1999 has considerably modified the configuration of markets and related trading strategies. The EU accounts for 16% of world GDP and 30% of world trade. Whether the euro will eventually match the importance of the dollar in international transactions will depend on the role it comes to play as a reserve, investment and anchor currency.

[3] In a narrow sense, the major currencies are the U.S. dollar, the Japanese yen, the British pound, the Swiss franc, and, until the appearance of the euro, the French franc and the Deutsche mark. In a wider sense, other countries' currencies should be included.

1.1.3. Information technologies and the economy

1.1.3.1. Information technologies and globalisation

GDP values show that the structure of the economy is moving towards knowledge-based activities. The output and employment shares of agriculture, mining, and low-technology manufacturing industries have been declining for years and continue to do so. Technology-intensive manufacturing industries maintain steady growth. At the same time, parts of the services sector –primarily finance, insurance and business services and community, social and personal services– continue to grow in importance, owing both to growing demand for these services and to slow productivity growth in some cases. The growing importance of services and information in the world economy has meant that an increasing proportion of economic value is weightless; that is, it can be transmitted over computer networks.

The effects of technology on the economy and its globalisation are two highly inter-linked phenomena. Advances in information technologies (semiconductors, computers, software, telecommunications) reduce the costs of communication, leading to more global goods and capital markets. Globalisation, in turn, increases competition and contributes to the spread of technology (for example through Foreign Direct Investment) and to its further development.

Information technologies are transforming the way companies operate, and also their internal structure. The facilities for information transmission have brought about more flexible organisational structures, with closer ties and coordination with both suppliers and customers. Earlier stages of technology innovation were about lowering transportation costs. Today's innovations are about lowering communications costs.

Box 1.1 Information technologies and the economy

The knowledge-based economy. The structure of OECD economies will continue to change, and the role of information technologies, services, health, environment and business services will increase in importance Information and communication technologies will take on even more importance as they are further integrated into the work and home environments, becoming the core technology in the transition towards a knowledge-based economy. Certain sectors may experience rapid growth, albeit with differences in individual countries. This is most obviously the case for information- related goods and services, where many new technological advances are projected. Information and communication will remain a very dynamic part of the economy.

Competitive pressures and productivity. Owing to continuing globalisation and deregulation, competitive pressures are likely to intensify in many parts of the economy and increasingly affect previously sheltered sectors such as energy, transport, communication, and distribution. This will create further pressures to adjust and could lead to transition problems in economies insufficiently able to change. The OECD report points out that there is considerable diversity between industries as well as across countries. These may be indicators of structural barriers, such as regulations that, inhibit productivity growth in some sectors through lowering competition. In the case of the American economy, it is estimated that in coming years almost half of the American workforce will be employed in industries that are either big producers or intensive users of IT. The "new economy" sectors are growing fast, but their productivity is shooting up too. Value added per worker in American IT producing industries grew at an annual average of 10,4% in the 1990s, far higher than in the rest of the economy.

Source: OECD Annual Report 1998 and self-elaboration.

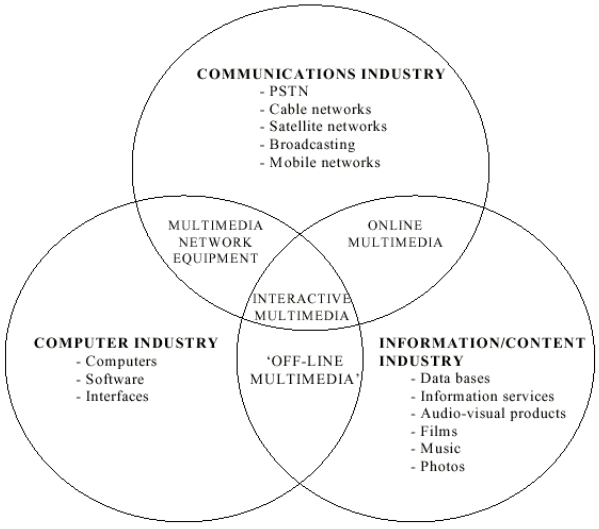
Communications have become cheaper and more efficient –less constrained by geography or time– and have done so at an impressive rate. Modern information technologies deal with encoding and diffusing knowledge. Some of the economic consequences of such technological progress are well known and visible. For trade, it

means a reduction of the need for physical contact between consumers and producers. Services that can be conducted through a screen or a phone become tradable: computer programming, secretarial services, education or medical attention. Companies can base different parts of their business in different countries, decentralising production of goods or services such as processing records or insurance claims. Other effects refer, for example, to new methods of production, new products or new forms of industrial organisation. Among the developments that are expected to occur in the near future, one of the most important in terms of its economic effects is the process of technological convergence among different sectors (Box 1.2).

Although there is widespread agreement that technology is one of the determinants of productivity growth,[4] the precise contribution and the measurement of its impact is not very clear, especially in the service sector. According to existing data, among the service sector, the most outstanding results are found in distribution services, telecommunications, and transportation. In manufacturing, it is high-technology industries that tend to have the highest productivity growth rates. In general, productivity growth in manufacturing has been higher than in services. Overall, the improvements in productivity have been slow for the aggregate of the economy in the last decades.

Box 1.2 Technological convergence, mergers, and strategic alliances

According to many analysts, the path of technological development in telecommunications and information technologies, is leading towards a process of *technological convergence* that will bring together the sectors of telecommunications, the computers and information technology, and the information diffusion and multimedia industry. Firms in all those industries want to be well positioned for the upcoming events, and this has originated, starting a few years back, a process of strategic alliances and mergers among them. This process is expected to continue, giving rise to international and intersectorial mergers involving companies with very large market values.



Source: Devotech "Developpement d'un environnement multimedia en Europe"

1.1.3.2. Internet and the nature of business

Computers and especially the Internet will change the way companies deal with suppliers and customers. New management techniques will appear. Although the trend is hard to isolate statistically, evidence on the impact of information technologies, and more specifically the Internet, is accumulating fast. Internet is more versatile than telephone and fax, and is spreading faster due to lower costs and delivery times. Internet offers communications on an interactive basis with one or more people, unconstrained

[4] Together with investment in physical capital, training and education level, infrastructure and openness to trade and investment and the degree of competition in the economy.

by time or space, in a multimedia environment with sound, image, text transmission and at relatively low and declining costs (time online has the cost of a local telephone call). The growth of electronic commerce is linked to development and diffusion of new information technologies and of telecommunications infrastructure[5].

According to Forrester Research surveys, 90% of top managers believe the Internet will transform or have a big impact on the global marketplace. It is forecasted that intercompany trade of goods will double every year over the next five years. The boost in Internet use will be in business-to-business transactions, while business to consumer figures will remain modest. Business to business spending in the economy is far larger than consumer spending, and businesses are more willing and able than consumers to use the Internet.

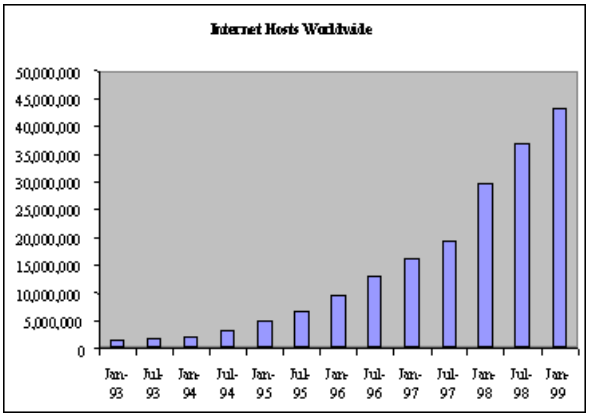
Companies that conduct their business exclusively via Internet, will have the ability to reorganise entire industries. Their future is based on their ability to exploit the Internet's most salient characteristics. Internet shifts power from sellers to buyers by reducing the cost of switching suppliers and freely distributing a huge amount of price and product information. Since sellers' advices can be suspected of bias, there are business opportunities for a third party: an *infomediary*[6] (Box 1.3).

Box 1.3 Internet, infomediaires and the supply chain

Infomediaries. The new channels allow new agents to appear. First, there *are aggregators*, which help buyers in fragmented markets select products by providing up-to-the minute price and product information and a single contact point for service. Next, there are *on-line auctioneers*, which offer reliable channels for sellers to dispose of perishable or surplus goods or services at the best possible prices, and for buyers to get bargain prices without taking a leap into the unknown. And lastly, there are *exchanges*, that create liquidity in otherwise fragmented markets, lower average stock levels by matching bid/ask offers and act as neutral third parties, enforcing market rules and settlement terms. All these agents have in common that consolidate buyers and sellers in markets that are fragmented either geographically or because of the absence of any dominant firms. They act as *infomediaries*, that is intermediaries who sell information about a market and create a platform on which buyers and sellers can do business.

Source: The Economist (1999) and self-elaboration

Internet Hosts World-wide



Source: Internet Domain Source, January, 1999

[5] Telecommunications now involve either fixed-line or radio-based networks that can be both used for electronic commerce. Fixed line networks encompass telephone networks supplied through cable or wire links, cable TV networks, wire-based networks established by transportation utilities, radio based networks include cellular telephony, fixed-point radio based networks, and satellite communication systems. In terms of infrastructure capacity requirements, the telephone and the Internet rely on relatively low capacity (narrow-band) networks, whereas television uses broadband cable networks.

[6] According to the terminology of *The Economist*.

Internet is significantly different from former communications systems in that it is based on open standards. Former information technologies investments in the 1990's, particularly ERP, have been inward looking, concentrating on making each enterprise more efficient on isolation. With e-business, the benefits are not only from automating a company's own internal processes but from its ability to spread the efficiency gains to the business systems of its suppliers and costumers. E-business is about business strategy and implies a degree of openness and transparency that is new to most business organisations.

The development of commerce through the Internet (electronic commerce) is expected to have a significant impact on existing economic structures, and to stimulating the appearance of new markets.

Electronic commerce facilitates not only business-to-business relations, but also sales by companies to consumers, and even transactions between consumers. In fact, the appearance and success of online auction Internet sites exemplifies this last point.

Effects on trade and businesses of Internet and electronic commerce are:

- Increased capability of transferring information. The scope of what is tradeable through Internet will be extended.
- Improved internal organisational and management efficiency of firms.
- Reduction in transactions costs for both suppliers and buyers.
- Increased competition between suppliers and intensified relationships with some of their trading partners.
- Closer contact with customers; in particular, faster adjustment to changes in demand.
- Increased ability to customize products to each client's needs.
- Markets more transparent due to better informed parties. Consumers' search costs significantly reduced.
- Costless access to much larger markets by consumers from all countries.

A number of reasons suggest that electronic commerce, and in particular the Internet, will boost international trade. Internet will extend the scope of what is tradeable to all goods and services that can be digitalised: medical, legal, architectural, travel, accounting, education and many other services (music, films, stocks and bonds, publishing, advertising). But the scope of electronic commerce will be much wider, because of the widespread information and the possibility of ordering many products over the net (and the continued reduction in transportation costs).

Nevertheless, there are still many legal and regulatory challenges to be overcome, from consumer protection to the collection of taxes.

1.2 Innovation in the financial sector

We begin by considering the banking industry, which in Europe is the main financial intermediary. In spite of this fact, there is a general tendency towards a decrease of the share of banking in the financial sector, in favour of other intermediaries such as mutual funds and pension funds.

In section 2.2, we are concerned with the developments of financial markets. Financial markets include the money market, as well as the markets for stocks, bonds (government and corporate), foreign exchange and derivatives (futures and options). The importance of capital markets relative to the banking industry is higher in the United States than in Europe. In turn, financial markets are more developed in Europe than in Japan, which has a strong dependence on the banking industry. Capital markets tend to be narrower in developing economies because they require well-developed financial infrastructures[7].

1.2.1 Trends in the development of the banking industry

Since the 1980s, the banking industry has been in a process of significant transformation that started in the United States, and moved later on to Europe, where the single market and the introduction of the Euro have contributed to accelerate the process of change. The main forces behind this transformation of the banking industry are deregulation and innovation in information technologies. Both forces have brought about increased competition, not only among banks but also from other financial, and even non-financial, institutions. As a result of increased competition, the banking business has changed and, for example, while margins in lending operations have lowered, banks rely increasingly on income from fees services rather than interest rate spreads.[8] Additionally, competition has, in some cases, encouraged banks towards taking higher risks (for example, by lending to developing countries) for which there might not be enough compensation. This issue, the higher risks[9] banks may be incurring in their operations, matters especially to regulation authorities, because of the safety net they intend to provide (which was recently applied widely to Japanese banks, for instance).

On the other hand, the transformation of the banking industry has contributed to blurring the differences between retail, wholesale and investment banking. Yet, banks in America have tended towards specialisation, while in Europe it is the concept of universal banking (one bank for all) that prevails. The main characteristics of the banking sector in Europe, United States and Japan are summarised below. Box 5 includes examples of developments in information technology that have been behind the transformation of the banking industry by providing the means to unbundle risks, diversify assets internationally (though this practice is only in its infancy), or conducting financial transactions on a multi-currency, global level.

[7] A discussion on the workings of financial intermediaries and financial markets can be found in Rogoff (1999).
[8] See also Chapters 3 and 4.
[9] See Box 9 of this report on the revision of the 1988 Basle Accord on capital adequacy for banks.

Europe

Continental Europe remains a highly bancarised economy with the most part of savings and investment in the economy being channelled through banks[10]. The restructuring of the banking industry has gained momentum after the introduction of the Euro and the single market. The number of mergers and acquisitions in the sector has grown, as the consolidation has intensified. Moreover, while up to recently concentration remained mainly domestic, cross-border operations have begun (for example, the Portuguese Champalinaud group and the Spanish banking group Banco Santander Central Hispano), and are expected to intensify in the near future, in spite of governments' resilience in some cases.

Between 1994 and 1997, the number of credit institutions in the EU has moved from 10,080 to 9,109, a 10% decrease. Analysts still consider Europe overbanked, yet the consolidation of European banking may not go as far as economic considerations might suggest, because of the differences in languages, cultures and regulatory environments among EU countries. Today's banking markets in Europe, especially retail banking, are not very homogeneous and, in fact, remain quite fragmented.

In general terms, European banking continues to be highly regulated. Many banks are owned or participated by the state, or receive indirect support from it[11]. The emphasis on banking policy has been on stability rather than efficiency. State-owned institutions and mutual banks are especially significant in France and Germany. The situation in the peripheral countries such as Italy, Ireland, Portugal or Spain, is generally different, and retail banking tends to be a more profitable business. Because they have been more profitable, banks in these countries have generally stayed out of investment banking and emerging-market lending.

The United States

In the United States, the banking industry has changed considerably during the 1990s in a process of growing competition and specialisation. Restructuring and consolidation of the sector have occurred to a greater extent than in continental Europe, with the number of banks declining from 36,103 to 22,140 during the period 1980 to 1997.

Increased competition has contributed to changing the composition of products in the industry. In this manner, as margins on corporate lending have been declining, banks have increased the share of their revenues coming from non-interest sources such as commissions on asset management, trading or securities underwriting. A second tendency in the industry is securitisation, that is, banks transform their loans to companies, credit cards or mortgages, into tradeable securities, instead of keeping them on their balance sheets. Another feature of the American banking industry is the increasing disintermediation: companies go directly to a financial market to raise funds, instead of getting them from a financial intermediary like a bank.

[10] See White (1999), "The coming transformation of European Banking".

[11] In Germany, for example, less than one third of deposits by value are held within the privately owned banking sector.

Box 1.4 Information Technologies and the banking industry

Information technologies are having a great impact in the reshaping of the banking industry (see also chapter 3), by leading to the development of new financial products and of new means of delivering them.

With regards to the delivery of products, for instance, the last decades have seen the appearance of Automated Tellers Machines (ATMs) and telephone banking, and are now seeing the spread of Internet banking. These new channels for the delivery of products have the advantage for costumers of longer hours of service, but are also a more efficient, cheaper means of delivering the products. According to a study by Sybase, a transaction at a traditional "brick-and-mortar" office costs 1.07 euros, the same transaction costs 55 eurocents over the telephone, 27 eurocents at an ATMs, and 1 eurocent only through the Internet. Quite in accordance with these figures, many banks already report a majority of transactions being conducted electronically without personal contact between client and bank employee. This assertion is especially true with payments systems, and above all in Europe, with direct debit systems, than in the United States. Moreover, further effects from technology developments are envisaged. For example, with regards to means of payment, Barclays, a British bank, in a similar strategy to that carried out by American Express in the United States, announced in late 1999 that the bank was considering handing out free smart card readers to their credit card holders, so that these cards could be used to pay for transactions over the Internet. It is expected that, in the near future, all PCs will come with a slot capable of accepting smart cards, which would contribute to the expansion of electronic money products such as Mondex or Visa Cash.

In Europe, technology developments have combined with the arrival of the Euro in influencing the transformation of the banking industry. In this manner, for instance, with the arrival of the Euro, there has been a concentration of the cash management business, which was previously spread among a range of banks in different European countries. In 1999 Société Générale, a French bank, set up a joint venture (Hubsys) with PwC, an accounting and consultancy firm, to handle the bank's cash management and payment processing and to sell similar services to other banks across the euro-zone. It is envisaged that the cash management market will be formed by a few institutions only, that will be able to handle the large volume necessary to achieve economies of scale that can pay for the necessary investments in technology.

Finally, it should be noticed that while the rapid development of information technology has made some banking tasks more efficient and cheaper, technological investments are taking a larger share of bank's resources. Currently, apart from personnel costs, technology is usually the biggest item in the budget of a bank, and the fastest growing one.

Internet

Internet is expected to have a strong impact on the banking business in the coming years. Although its market share is still very small (Table 1.5), Internet banking is expected to grow fast. Banks on the Internet can be classified into banks that are exclusively online (as for example the American E-LOAN, or in Europe, First-e, Egg, or Smile) or traditional banks for which Internet is an additional distribution channel (in Europe, Bankinter, Barclays or SEB).

Although Internet banking originated in the United States, on-line banking in Europe does not lag behind. It is in the Scandinavian countries and Germany where Internet banking is more advanced (Table 1.4). More than a quarter of Merita Nordbanken, a Finnish-Swedish firm, clients use its online bank, and in Germany, the biggest four banks operate online. It should also be noticed that in France, the progress of Internet might have been slow, but there Minitel offers since the 1980s some of the online banking services that are now provided by Internet.

Box 1.4 Information Technologies and the banking industry (Cont.)

With regards to the banking business, far from being only an additional distribution channel, Internet is expected to influence significantly the industry. For instance, Internet is shifting power from banks to their costumers, by allowing them to search out the best price for products. The range of choice is already quite complete, and somehow shocking: there are web sites consisting of a search engine for best products/prices, but also websites where the banks offer their own products only, and web sites where banks offer both their own products together with products from competing firms. That is, in terms of sales strategies, cross selling (or selling a bundle of products rather than a single product) is being substituted by "open finance": banks selling not only their own products, but offering the best available products, whoever the provider is. If banks were to adopt this strategy, it could be expected that products like loans and mortgages would increasingly have the characteristics of commodity products, low-margin, high volume products. Another tendency is for banks to re-think cross-selling, by adapting it more to each costumer's needs, that is, bundling products together but in a manner that satisfy the needs of individual consumers. With this strategy, it should be expected that banks would be offering services for which a long term relationship and trust are important.

With the development of Internet banking, competition is expected to increase in the sector. Yet competition will not only originate within the banking industry, but also from other financial intermediaries such as insurance companies (for instance Prudential, a Britain's biggest life insurer launched in 1998 a telephone and internet bank called Egg). Moreover, competition may come as well from non-financial firms, such as technology companies that control communications networks and the gateways to them. Such companies could set up themselves as brokers, directing consumers to the most suitable product for them. In this respect, Sony is moving into Internet banking after setting up a joint venture online brokerage firm. It should be noticed that even before the development of the Internet, non-financial companies had entered the financial business: car manufacturers (General Motors is a provider of credit), department stores or supermarkets (In Britain, supermarket chains as Tesco and Sainsburys take deposits). On the other hand, banks are in turn considering using the Internet to widen the scope of their businesses to include, for instance, shopping. For example, Banesto, a Spanish bank, provides electronic access to stores from the bank's web site, trying to become an e-commerce portal.

Table 1.4.

Customers of electronic banking as of June 1999

Country	*Number of customers*	*Percent of total*
Austria	33,500	2.1
Denmark	260,000	5.8
Finland	610,000	17.4
France	131,125	0.9
Germany	780,000	4.2
Italy	36,500	0.2
Netherlands	130,000	3.6
Norway	54,000	3.1
Spain	277,059	1.1
Sweden	705,000	6.9
Switzerland	140,000	2.3
EU total (excepting UK)	3,162,184	2.8

Source: J.P.Morgan

Instead of the prevalence of "one-bank-for-all", as in Europe, U.S. banks are mostly specialised on investment banking, corporate finance, venture capital, or asset management. Even within the group of retail banking, there are banks that specialise on consumers, on small businesses or on credit cards.

Deregulation has been one of the underlying forces in the transformation undergone by the United States' banking industry in the past years. Yet the deepest restructuring in the financial sector may still have to take place. In 1999, there has been a profound shift in regulation with the removal of the enforced separation of commercial banking, investment banking and insurance. With the retracting of the Glass-Steagall Act (which dates back to the times of the Great Depression) major new affiliations in the financial industry are expected.

Japan.

Japanese banks are still facing restructuring plans after a poor performance record that left them in a difficult financial situation. Yet the worst of the severe banking problems in late 1997 and 1998 might be over, as almost all of the Japanese largest banks obtained profits in the first half of 1999. However, these results are partially due to implicit and explicit support from their government. The biggest banks received public funds of around 7.45 trillion yens during 1999, a sum equivalent to half their equity. Also contributing to results are the cheap costs of obtaining funds: the "zero interest rate policy" implemented by the Bank of Japan in 1999. Additional factors that might have contributed to improvement of results are better management of bad loans and tighter cost controls. Yet Japanese banks require further restructuring if they are to become globally competitive again.

During 1999, the Financial Supervisory Authority took over the Finance Ministry in the regulation of Japanese banks. The FSA injected funds in the banking industry that were intended to clearing out bad debts, and also help in the restructuring process involving a reduction in costs as well as the closing of some banks.[12]

Concerning the technological challenge, Japanese banks have been under-investing in technology for several years, as considerable amounts of funds had to be applied to write down bad debts.

[12] The restructuring plans estimate a cut of 20,000 jobs by 2003.

1.2.2. Trends in the development of financial markets

The increase in demand for financial services and the appearance of new products (especially derivatives) have contributed to drive up the stock of financial assets (shares, bonds, banks and deposits), which have been increasing more than twice as fast as the GDP in developed economies, from US$12 trillion in 1980 to almost US$80 trillion in 1999[13]. Market turnover for the group of equity, debt, derivatives and foreign exchange markets has grown even faster (see data in section 1).

The growth of capital markets has been accompanied by a tendency towards globalisation, which offers both new benefits and new problems. On the one hand, globalisation of capital markets allows better possibilities for resource allocation. On the other hand, global capital markets raise concerns because of the volume of funds involved in their workings and the speed at which capital can be withdrawn from an economy.

The main forces behind the transformation of capital markets into more global and competitive markets, have been technology innovations and deregulation. These forces have not acted separately but interacted in determining the directions of change. For example, deregulation of capital markets on the part of domestic authorities owed primarily to the willingness of raising market efficiency. Technology also had an influence by allowing existing regulations to be circumvented in various ways, for example by easing the conduct of unauthorised transactions offshore. Such deals would in turn raise pressures for deregulation to a "level playing field", and in the end result in increased competition.

The combination of trends towards deregulation, increased competition and technological innovation, has in principle rendered markets more efficient, making it easier to buy and sell risks. Technology has been a key factor, for example in the development of the screen-based systems that have been gaining share of market at the expense of outcry floors. Moreover, recent events, as Internet trading summarised below, point at how the physical location becomes less relevant as communications allow to simultaneously access different markets from a computer.

With the increase in competition, exchanges have looked for alliances and mergers. For example, in the derivatives markets, the Chicago Board of Trade allied with Eurex (Europe's largest derivatives exchange) and, in response, the Chicago Mercantile Exchange and LIFFE announced a partnership including the cross trading of their exchange products. In the equities markets, the London Stock Exchange (LSE) and the Deutsche Börse also announced a link-up.

In reaction to competitive pressures, some exchanges (LSE, New York Stock Exchange and NASDAQ) are planning to shift their structure, from mutual institutions to shareholder owned companies, seeking a more efficient decision making procedure. There have also been major developments in the clearing sector.[14]

[13] BIS (1999a) and The Economist, October 23rd 1999.

[14] In the area of clearing, Euroclear published in May 1999 a plan for the creation of a pan-European clearing and settlement system that would be based on a hub-and-spoke model involving Euroclear at the centre and national depositories at the rim. Shortly after this announcement, Cedel and Deutsche Börse Clearing announced a merger of their clearing, settlement and custody operations. Once the new entity was legally established, the European Clearing House would be joined by SBF/SICOVAM. Other national and international depositories were invited to participate,

These movements summarised above have been partly a reaction to the threat of disintermediation that exchanges are facing, and that have their origin in technology developments, such as Internet trading. For example, on July 29 1999, 19 of the world's largest institutional investors formed E-Crossnet, a "crossing-network", whereby clients in the network will deal directly with each other–skipping brokers at an exchange. Other examples of electronic communication networks (ECNs) are Island, Archipelago, or Posit.

Internet has facilitated access to information on financial markets through free access to online information services. Brokers who used to sell integrated services (perform the trade plus advise the client on what to sell/buy) now have to compete with on-line brokers who simply conduct the trade, but provide no advice or information. In summary, Internet has changed the securities trading business, enhancing competition on the basis of price rather than on the quality of service.

Up to now, the volume of electronic trading remains low, and traditional exchanges retain as a competitive advantage their higher trading volumes that make them more liquid. Yet ECNs have recently applied, and been granted, to be regulated as Exchanges.

Internet and ECNs are simply the latest developments contributing to information being transmitted faster and traders and investors responding almost instantaneously to news internationally. This makes today's capital markets highly interlinked. Because of this, and because of the decreasing differences among the various capital markets and among financial intermediaries, the possibility of re-regulation or the imposition of protectionist measures might be complex, sometimes even not feasible, as it would have to acknowledge international competition. Even regulation aimed at reducing tax evasion might face some difficulties of the sort.[15]

1.2.3. Effects of technology on the stability of financial markets

Advances in technology have enabled the development of a wide range of financial products that have rendered markets more efficient. When considering international operations, the composition of international flows has been widening in the past years from the more traditional foreign direct investment and bank lending towards increasing the share of flows in securities transactions. The broader range of products for international investors translates into more opportunities for borrowers and lenders to match their desired pattern of risk and return. Not only has the range of products available at the international level broadened, but also the players in these markets have extended from banks to include insurance companies, pension funds and hedge funds – or institutional investors–, among other financial institutions.

However, as financial markets become more sophisticated, it may result more difficult for investors and regulators to evaluate the risks incurred by the agents. This is particularly important, because advances in technology allow instantaneous

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either through electronic links or by merger. Source: BIS, International Banking and Financial Market Developments, August 1999

[15] In November 1999 Europe's finance ministers failed to agree on a European Union-wide withholding tax aimed at reducing tax evasion, but which raised British fears of a major upset to the international bond market based in the City of London (a tax on international investors drove the international bond market from New York to London in the 1960s).

communications by which large amounts of money can be moved from one country to another in a very short time. Complex new products, such as derivatives, allow even investing in markets without the need to move the money there. With the globalisation process, international markets have become more inter-linked and more complex, and national boundaries are no longer clear barriers.

Moreover, the globalisation of markets that we are witnessing is more complex than the globalisation of the economy that occurred at the beginning of the century. The current globalisation process is characterised by financial flows, more intangible and very liquid. In addition to that, many more countries are now participating in the global exchange, gross capital flows are larger than were are at the beginning of the century and market reactions are much swifter than they were before.

New products, risks and management techniques

Derivatives are among the new products that have more significantly contributed to the transformation of the financial markets in the past years. Financial derivatives can be classified into two broad categories: forwards and options. By a forward contract, one party agrees to buy something from another party at a specified future date for a specified price. By an option contract, one party agrees to provide the right, but not the obligation, to another, to buy or sell something in the future at a specified price. Combination of forwards contracts (like swaps), option contracts (like straddles), or both, abound.

Table 1.2. in section 1 details the figures of turnover for derivatives markets. As can be seen in that table and in Graph 1.3, derivatives are traded in two types of markets. The first type are the institutional exchanges. At exchanges, derivatives contracts are standardised –instead of a specific contract to suit individual needs, investors buy and sell the same contract, so as to make it more liquid. Since the contract is with the exchange-clearing house, derivatives traded on exchanges involve no credit risk (the risk that the counterpart does not honour the contract). When they are traded on exchanges, forwards contracts are called futures. The second type of market for derivatives is the over-the-counter (OTC) market, where investors trade directly with one another. In the case of OTC markets credit risk remains high. Among the main derivatives markets (by volume of derivatives traded) are Eurex, CBOT, CBOE, CME, AMEX and LIFFE.

Financial derivatives are attractive for two features: they facilitate the implementation of leveraged strategies, and are a specially suited instrument for unbundling risks. With regards to the unbundling of risks, banks can use derivatives to manage mismatches in interest rates between fixed rate assets and floating rate liabilities. Similarly, a firm wanting to raise capital may find it cheaper to issue debt in dollars and then use a currency swap to translate dollars into its domestic currency. A firm can use derivatives to insure against price movements in commodity imports, for instance. In summary, investors can use derivatives to hedge against risks by shifting them to investors willing to take these risks.

Thus, derivatives contribute greatly to enhance the efficiency of the market through the production of a range of products and prices that widen considerably the investors'

choices in a manner that enhances the differentiation of risks and allows its more efficient allocation to the preferences of consumers. The spread of financial derivatives has been made possible by advances in technology as well as developments in theoretical finance related to the pricing of risk. Despite the above explained benefits of derivatives products, the spectacular growth of their markets and their leveraged condition have sometimes generated concerns about the risk they entail[16]. As confirmation of the concerns for the stability of financial markets, analysts mention that systemic risk for the markets as a whole may have increased. Several elements explain this effect. It has been mentioned that advances in technology and the appearance of new products have transformed considerably they way financial institutions work and invest. In the area of risk management, technology developments have made it easier to keep track of the overall value of positions of an investor. Some years ago, calculating the overall risk for an institution in one location only, would take more than a few hours; nowadays, the technology allows a financial institution to compute almost instantaneously the value of its positions around the world. Similarly, technology and portfolio theory have had an impact on risk management by providing the means for an institution to diversify risk. The problems for market stability appear when these advances are implemented by institutions without accounting sufficiently for some of the techniques' flaws. Recent research, as well as market evidence, suggests that these techniques tend to underestimate the level of risks of an investor by not accounting sufficiently for recurrent episodes of financial turmoil. For example, using highly leveraged instruments will cause losses to rise sharply when markets move in an unfavourable direction; in this case, the risk management models used by financial institutions would advise the trader to sell risky positions in other markets in order to protect the capital. When markets are stable, a management practice like this one would work fairly well. But it has been observed that, at a time of financial distress, markets suddenly become more inter-linked and diversification becomes less useful than it was expected. Moreover, when risk management models suggest cutting positions at a time where markets are in turmoil, and traders are forced to sell in one market, they find that their own operations tend to drive markets against them, forcing them to sell even more, and spreading the vicious circle across markets. Some hedge funds are among well-known investors that were using risk management techniques based on some assumptions on correlation of risks that have proved not quite right.

The concerns on the stability of financial markets have somehow abated in the past three or four years, as regulators have grown better acquainted with the workings of derivatives markets. However, important issues regarding the regulation of the financial system still remain high on the agenda of international regulators. See the discussion in section 3.

[16] In this sense, Figures in chapter 1 should be read noting that notional values are not meaningful measures of the risks associated with derivatives, as risk should be measured on an overall portfolio basis, taking into account both derivatives and cash market positions and the offsets between them

1.3 Exchange rates and international capital flows

1.3.1 Recent financial crises

Following a period of increasing international integration of both goods and financial markets, several crises have successively shaken the international financial system, and their consequences are still very visible today, and will continue to be so for years to come.

The first signal of the crises were the speculative attacks launched in 1992-93 against several European currencies that were integrated in the Exchange Rate Mechanism. This had as a consequence a depreciation of the currencies of several European countries (including Sweden, that was not a member of the EU), and the modification of the bands that limited the movement of the exchange rates of the countries that adhered to the ERM.

In 1994 occurred the Mexican currency crisis, which resulted in a big drop of the Mexican peso, whose consequences were felt all over Latin America. In 1997, the depreciation of Thailand's currency gave rise to the Asian crisis, the worst financial crisis for many years. More recent events include the depreciation of the Russian ruble in August 1998.

One of the most remarkable characteristics of all the above-mentioned crises, is the *rapidity of the contagion* from the original point to other economies. There are several causes for this contagion; for instance, in many cases it affected trading partners, or countries with similar characteristics as the original one. And, as we discuss in more detail below, the "herd behaviour" typical of financial markets aggravated the contagion. But the most important factor explaining the *rapidity* with which the contagion took place, is undoubtedly the influence of the Information Technologies.

All those events affected, and were influenced by, the Exchange Rates of the corresponding currencies. To be able to discuss the influence of the Exchange Rate regimes adopted by the different countries, we will first comment briefly on the international capital flows of recent years.

1.3.2 International capital flows

We have seen in previous chapters the important surge of international capital movements in recent years. We saw how this phenomenon is attributable to the conjunction of several factors, notably the increased liberalisation and elimination of restrictions to trade that has taken place all over the world, and the advances in computer and telecommunications technologies.

The spread of information technologies has reduced by discrete orders of magnitude the transaction costs of many financial operations, and at the same time has allowed information to be more widely and instantly available. The effect of these factors on both domestic and international financial markets has been extremely important. The operation of financial markets is essentially based on information. The influence of the

new IT has resulted in major competitiveness and quantifiable gains in efficiency in the most developed domestic and international financial markets.

According to first principles, the function of the financial markets is the allocation of savings to its most productive uses. Authors that have studied the development of the modern industrial society, notably Chandler, have emphasised the important role played by the financial markets in allowing private savings to be used towards productive investments. The elimination of barriers to international capital mobility should, from this perspective, be beneficial both to investors in developed economies, and to emerging market economies. For emerging economies whose economic activity is concentrated on a relatively small range of markets, the opening up of international capital markets should allow them to engage in less conservative productive activities (that is, to undertake projects with higher risk, but higher expected return), which should positively influence their long-run growth, and therefore the welfare of their citizens.

Whether or not these theoretical effects translate into actual happenings, depends much on the behaviour of the financial system. Financial markets are, in some respects, essentially different from other goods or services markets, and experience has shown that their efficiency depends much on a good regulatory and supervisory system. Even though the benefits from the increasing liberalisation of international markets seem so large (and more so for emerging economies), these benefits might never be reaped if the international financial system proves to be unstable and susceptible to speculative attacks and deep crises. The challenge that international institutions face at this moment is how to overcome these difficulties. We will discuss this in more detail in the next chapter. For the remainder of the present chapter, we will accept the extended consensus that the most sensible solution to this puzzle consists of maintaining the tendency towards market openness but at the same time strengthening the international and domestic financial systems.

Box 1.5 Liberalisation of financial markets

The process of liberalisation of financial markets that took place during the 1970s and 1980s, has benefited many economies, allowing greater efficiency in the allocation of resources to investment, but has shown that the risk of financial crises can be increased, if precautionary measures are not adopted.

The scope of liberalisation covers the following issues:	- Lifting credit controls. - Deregulating interest rates. - Lowering barriers to entry into the banking industry and other financial institutions, and diminishing intervention. - Privatising banks and other financial institutions. - Opening capital accounts.
Pre-requisites to liberalising the financial markets are:	- Liberalising trade. - Fiscal discipline. - Satisfactory regulation and supervision.

Still, sound economic policies have not been sufficient. In most countries affected by crises, the financial system was weak, badly supervised and inadequately regulated. In other cases, some countries were hurt by contagion despite having their economies in good shape. The international mechanisms for resolving the crises were found wanting: the IMF lacked the resources, mandate and expertise to deal with a global capital-market problem.

Liberalisation is a broader process than just abolishing capital controls, and deregulation must be adapted to the financial system of each particular country and accompanied by a consistent economic policy and structural reforms.

1.3.3 Some economics of financial markets

Traditionally, financial markets have been under strict regulation and supervision by governments. The main economic reason is that financial markets are very sensitive to information problems. Uncertainty is inherent to those markets by their very nature, and when information asymmetries are added, the result is the tendency towards volatility. Market participants infer information from the actions of others, and the result is "herd behaviour" that at best amplifies the influence of small events or even rumours, and at worst can end up in bank runs or panics.

To overcome these problems, domestic governments have set up two kinds of measures: on the one hand market rules and supervision mechanisms, and on the other hand deposit guarantees.

Basically, the rules and supervision mechanisms are intended to ensure fair play, that is, to mitigate the perverse effects of uncertainty and asymmetric information. Therefore, its main objectives are to help the spread and reliability of information, and to avoid abuses of all sorts. Information Technologies allow not only the (almost) instantaneous access to information to a wide audience, but also the ability to process this information.

In this sense, information technologies can be a big help in enhancing the competitiveness of the financial markets. The problem is that the *reliability* of the information must be assured, otherwise the perverse effects of asymmetric information and "herd behaviour" may dominate, and the overall effect of the IT may end up being negative. With this aim, new regulatory and supervisory measures must be devised.

In the case of the banking industry, regulation and supervision are not sufficient to prevent bank runs, since at any given moment the total amount of credit given exceeds the deposits received. Therefore, governments have set up some form of deposit guarantees, that allow (some) depositors to recover all or part of their savings. Deposit guarantees have, nevertheless, their drawbacks: they may create incentives both for institutions and depositors to take less preventive action than would be optimal, that is, they generate a moral hazard problem. Economists (e.g., Milgrom and Roberts, 1992) have attributed the huge Savings and Loans crisis of the USA in the 1980s to this factor.

International financial crises involving the sudden withdrawal of capital from emerging economies, have much in common with bank runs. Therefore, the experience from domestic financial regulation should help in designing a more stable international financial framework. When considering the possible actions of institutions like the IMF in the case of an international payments crisis, both economists and policy-makers must be wary of the possible consequences of the policies adopted in terms of the moral hazard incentives. We will come back to this problem in the next chapter, when we discuss policy options.

1.3.4 Exchange rates and financial crises

The current architecture of the global financial system has been inherited from the floating exchange rate regime that followed the collapse of the Bretton Woods system. Since then, financial markets have changed dramatically and so have arrangements governing global finance.

Nowadays, the most important currencies are mainly subject to a floating Exchange Rate regime. In principle, this leaves more room for economic policy to be decided by national authorities. In the face of open international financial markets, the flexibility of Exchange Rates goes parallel with the degree of independence of monetary policy. Countries are better armed to mitigate the effect of external shocks under an exchange rate flexibility regime.

Nevertheless, many emerging economies have chosen a regime of some rigidity for their exchange rates; in some cases, the rigidity is extreme. We should point out that the choice is not only about the degree of flexibility, but that there are other types of institutional arrangements. One such arrangement, actually, is the way European countries under the EMU operate. Currency Boards constitute a very important form of institutional arrangement, characterised generally by a very rigid Exchange Rate regime, and intended to yield credibility to a policy of monetary stability.

Why would emerging economies subject themselves to an exchange rate regime that limits their capacity of reacting to a financial crisis? The problem is that, if the governments of those countries want to attract investments, they should render credible the commitment that those investments made will not be endangered because of changes in the future monetary or fiscal policies. A regime of fixed or semi-fixed exchange rates is one way (within the framework of macroeconomic policies intended to provide stability) adopted by emerging countries to gain this credibility. A Currency Board, by which currency is only issued as long as foreign assets back it, is a more extreme form of commitment. Another common mechanism adopted is pegging the currency to the dollar.

With open markets and rigid exchange rates, governments cannot use monetary policy to fight shocks and ensure macroeconomic stability; therefore, there should be instruments at the international level that serve this purpose. The setting up of such instruments is one of the challenges that nowadays face the international institutions. If this represents a problem for the European Monetary Union, it is much more complicated at the international level.

In industrialised economies, the extended opinion is that monetary policy such not respond automatically to changes in the exchange rate but focus on domestic price stability, unless it were temporarily applied to ease market turmoil or exchange rate movements could have an impact on future inflationary pressures.

In the context of highly integrated markets, for economies with floating exchange rates that set explicit inflation targets, the exchange rate may act on the effects of monetary policy in different manners. For example, the more open an economy is, a policy that raises interest rates will have more effect on inflation. That has influenced most authorities towards using a shorter-time and narrower inflation target.

During the last years there has been a debate about the difficulties of conducting monetary policies in a scenario of low inflation and volatile financial markets. There is not much experience of monetary policy in such a context, as there have not been virtually any episodes of declining prices since the end of WWII.

With regards to developing economies, the recent crises have raised concerns on the effects of capital flows on exchange rates, especially on those linked to major currencies. For example, before the 1997 crisis, most Asian currencies were linked to the dollar, and therefore, when the US dollar appreciated against the yen, those currencies appreciated as well. This caused a loss in competitiveness that exerted pressure on the exchange rate and finally led some governments to detach their currency from the dollar (though the Chinese yuan and the Hong Kong dollar maintained the link, and Malaysia pegged its currency to the dollar in September 1998 while introducing strict controls on capital movements that have been partly relaxed this year). In August 1998, there was the debt crisis in Russia and its spread to Mexico with the consequent depreciation of the peso, and in January 1999, speculative pressures also forced the devaluation of the real in Brazil. As a result, emerging market currencies remain vulnerable and activity in these markets is still subdued.

The case of Asian economies illustrates the difficulties posed by fixed but adjustable exchange rate regimes. During the 1990s, and to take advantage of international interest rates spreads, market participants obtained financing in foreign currency loans (many times short-term) and invested heavily in domestic emerging economies assuming that exchange rates would remain fixed. When the direction of flows shifted, as a result of changes in the perception of risks for those economies, the lending rates to those countries boosted and this exerted pressure on the exchange rate.

The difficulties in maintaining fixed but adjustable exchange rate regimes are not new to economic history. However, modern technology-driven financial markets, may just have contributed to strengthen them. Small open economies with no restrictions on capitals movements, that maintain exchange rates pegged to a main currency, are especially susceptible to speculative attack. Because their markets are less liquid, their stability may be threatened if confronted with large capital outflows. Moreover, highly leveraged funds know that their performance may influence the market, raising the chances for herd behaviour.

In this sense, and tough at a general level movements in exchange rates are generally determined by current and prospective business cycle developments, there is evidence on other than cyclical factors influencing exchange rates fluctuations.

Despite recent crises have shown that the global financial system has flaws, it is necessary to point that instability appeared because of macroeconomic and structural problems. In Asian countries, bank lending was often directed according to political- or personal-relationship considerations, and implicit government support for some banks contributed to the distortion of markets while less than transparent markets also hindered the appraisal of risks.

To sum up, we should say that an exchange rate regime is not good or bad *per se*, but should be evaluated taking into account the structural characteristics of the economy,

and within the framework of the whole macroeconomic policy carried out by the country.

The limited scope of monetary policies under a regime of rigidity of exchange rates, renders credibility to policies of maintaining low inflation and macroeconomic stability, and requires authorities to exercise a strict fiscal discipline. On the other hand, most of the financial crises we have been discussing occurred under a regime of semi-fixed exchange rates. This hindered the ability of the countries to make adjustments, and therefore worsened the effects of the crises on them.

Exchange rate flexibility places more instruments at the disposal of the authorities. This allows them to deal better with, for instance, country-specific shocks. Additionally, the risks of borrowing in foreign currencies are more explicit under this regime, so economic agents are more likely to take the necessary precautions.

Finally, it should be pointed out that many aspects of the behaviour of exchange rates that are still controversial by the current economic theory. Some authors (Meese and Rogoff , 1983, and Rogoff, 1999b), have pointed out that the current monetary models are no better predictors of the exchange rate behaviour than a simple random walk. Some references and discussion of this can be found in the November 1999 issue of *The Economic Journal*.

1.4 Impact analysis. Policy options

1.4.1. General effects of IT developments on capital flows

International capital flows have soared owing to deregulation of financial markets during the 1970s and 1980s, combined with technological progress in IT. Deregulation of financial markets led banks and financial institutions to innovate and develop new products, such as junk bonds or increasingly sophisticated derivatives contracts, and technological advances and theory contributions in the are of risk pricing provided the means to undbundle risk into a variety of increasingly complex securities, causing turnover in financial markets to rise sharply.

Since pressures towards further deregulations and technology developments are likely to intensify further, the widening gap between trade and currency transactions can be expected to grow. The intangible nature of financial transactions and the speed at which they can be conducted makes financial markets more suitable to increase its turnover than other markets. Demand for financial products has soared as IT improvements have made new kinds of financial transactions possible and cost-efficient.

To sum up, all signs seem to indicate that the tendency towards a progressive liberalisation and global integration of financial markets will continue in the foreseeable future. Both the development of new and more powerful IT technologies, and the determination of the most influential governments involved, point in this direction.

To reap the efficiency gains of more open economies in an increasingly globalised environment, economic policies intended to regulate capital flows, must be based on

international agreements that take into account the new framework of international competition.

1.4.2 Policy options regarding the international financial architecture

The two basic issues that must be tackled are:[17]

- The excess volatility that affects individual countries, mainly emerging markets.
- The high degree of contagion present in the system, through which the excess volatility is propagated.

The main problem when financial markets have begun to integrate at an international level, is that the regulators and supervisory institutions have continued to be, to a great extent, the national governments. The non-existence of an "international government" with full legislative and executive power, is a constraint that cannot be ignored when thinking about the architecture of international financial markets.

The disparities among different national legislations and traditions, have created apparently paradoxical facts. For example, it has proved extremely difficult to merge institutions like the main European stock exchanges, but at the same time many operators residing in the different countries are increasingly accessing directly the other countries' markets. That is, in many respects international financial integration is taking place more through economic agents participating in the different markets, rather than by sophisticated institutional arrangements.

Ideally, the regulation and supervision of international financial markets should follow closely the patterns existing for domestic markets. But the parallels break at decisive points. For instance, international regulations should not contradict national rules that sometimes differ widely in certain particulars. Additionally, there are different bodies with overlapping efforts towards designing a new set of rules for the international markets.

In spite of all those problems, there is wide agreement on certain lines:

- Increase the transparency and accountability at both the national and international levels.
- Harmonise and strengthen financial regulation and supervision in all countries. Disseminate the use of internationally accepted standards.
- Involve the private sector in the prevention and resolution of financial crises.
- Improve the crisis resolution mechanisms at the international level.
- Continue with the movement towards international financial integration, in an orderly fashion.

[17] Fischer (1999).

Box 1.6 International Financial Architecture

In response to the financial crises that began in Asia and then spread to other regions, Finance Ministers and Central Banks Governors from a number of significant economies examined in April 1998, at a meeting in Washington, issues related to the stability of the international financial system. Three key areas were identified: enhancing transparency and accountability; strenghtening domestic financial systems; and managing international financial crises.

Three working groups were formed comprising representatives from finance ministries and central banks of industrialised and emerging market economies; international organisations were invited to participate in the discussions; and contributions and views from other international groups, countries not represented in the working groups, and private sector representatives were sought.

The Working Group on Transparency and Accountability discussed the contributions that transparency and accountability can make to improvements in economic performance, and recommended that priority be given to compliance with and enforcement of high-quality accounting standards.

There was recognition of the need to improve data on foreign exchange reserves, external debt and finacial sector soundness. Additionally, the working group recomended that consideration be given to appropiate data on international exposures of investment banks, hedge funds and other institutional investors.

Members recommended that the IMF prepare a Transparency Report summarising the extent to which an economy meets internationally recognised disclosure standards.

The Working Group on Strengthening Financial Systems discussed principles and policies intended to foster the development of a stable, efficient financial system. Some key areas that require improvement were identified: corporate governance, risk management and safety net arrangements.

Members emphasised that the implementation of sound practices is best fostered through market-based incentives backed by official sectors actions. Members also agreed that co-operation and co-ordination at the international level are crucial to strengthening domestic financial systems.

The Working Group on International Financial Crises analysed policies that could help prevent international financial crises or alternatively facilitate their resolution.

The report also encourages better management of risk by private and public sectors, and recommends that governments limit the scope and clarify the design of guarantees offered by them.

The report recommends effective insolvency and debtor-creditor regimes to limit the effects of financial crises or ease the workouts from excessive indebtedness.

The group also considers that countries should make the strongest possible efforts to meet debt contracts in full and on time, and in this direction sets out a framework dealing with the collective interest of debtors and creditors in cooperative and orderly debt workouts.

Source: BIS, October 1998

1.4.3 Some monetary policy issues

As we are well aware at the European level, there is a trade off between financial integration and an independent monetary policy. The consideration of issues like the exchange rate regime is intimately connected with this basic fact. The main lesson to be learned is: if governments consider the benefits of some extent of international financial integration to be sufficiently large, then they have to renounce in the same degree to their capacity to use monetary policy.

Should controls of capital flows be established?

One of the policy issues that have raised more debate, is the desirability of some control of capital flows. There are many forms such controls could adopt, such as restrictions on FDI, on securities acquisition, on dividends repatriation, on external debt transactions, on deposit accounts.

Some authors, like J. Bhagwati,[18] have pointed out that financial markets are different from other goods or services markets, and that therefore there is no reason why full international liberalisation should be advocated.

The basic points in favour of international capital mobility are a better allocation of savings and hedging of risks. From a small country's perspective, it means access to cheaper funds, insurance against shocks affecting the markets in which it operates, and protection against questionable domestic policies. As the bulk of international capital flows take the form of foreign direct investment, it should have as a consequence the improvement of the productive structure of developing economies.

On the other hand, liberalisation of international capital flows makes countries more susceptible to volatility and shocks originating in other economies. Therefore, such measures should be accompanied by the strengthening of the international financial system.

Some authors (notably Krugman[19]) have proposed a control of capital flows, as a means of keeping more degrees of freedom for domestic policies to deal with crises. The idea is to try to avoid having to resort to sharp rises in interest rates, which are more harmful to the economy, to defend the country's currency against speculative attacks. But analysts have reservations about the long-term influences of such policies.[20]

The problem with measures of this kind is that, if permanent, they impede the benefits we have mentioned above, and if temporary (to deal with particular crises), their influence over expectations can neutralize the benefits of liberalisation.

Should exchange rates be subject to a different regime?

In the face of open international financial markets, the flexibility of exchange rates goes parallel with the degree of independent monetary policy. Countries are better armed to mitigate the effect of external shocks under an exchange rate flexibility regime. As this leaves more room for monetary policy, more flexibility should be accompanied by a commitment to policies that promote macroeconomic stability. Actually, we discussed in the previous chapter how the rigidity of exchange rates has been used as a signal of such commitment by governments of emerging economies.

Therefore, the discussion about exchange rate regimes cannot be conducted in isolation of the overall macroeconomic policy.[21] What seems definitely necessary is the setting

[18] Bhagwati (1998).
[19] See, for instance, Krugman (1998).
[20] Fischer (1999), p. 564.
[21] See the discussion in Fischer (1999).

up of both domestic and international mechanisms and regulations that protect the domestic economies of financial crises. One of the lessons of the recent crises has been that they were aggravated by deficiencies of the financial markets and institutions of the nations involved.

Box 1.7 Financial Stability Forum.

The Financial Stability Forum was initiated by the G7 Ministers and Governors in February 1999, based on a recommendation by Mr Hans Tietmeyer, former President of the Deutsche Bundesbank, and is chaired by Mr Andrew Crockett, General Manager, Bank for International Settlements.

The Forum was established to promote information exchange and co-ordination among national authorities, international institutions and international regulatory or expert groupings. Its initial membership included the finance ministries, central banks and leading regulators of the G-7 countries, together with the chairs of the international regulatory organisations, and representatives of the international financial institutions.

On April 1999, the forum appointed three Working Groups that comprise officials of developing market economies, international financial institutions and supervisory groupings.

The first group has been asked to recommend actions to reduce the destabilising potential of institutions employing a high degree of leverage in financial markets.

The second group has been asked to evaluate measures in borrower and creditor countries that could reduce the volatility of capital flows and the risks to financial systems of excessive short-term indebtedness.

The third group has been asked to evaluate the impact on global financial stability of the uses made by market participants of financial offshore centres, and the progress made by such centres in enforcing prudential standards and in complying with cross-border information exchange agreements.

The forum has been recently expanded to include representatives from Hong Kong, Singapore, Australia and the Netherlands, who will participate in the next meeting in Paris on 15 September 1999.

Source: BIS, various press releases 1999.

What should the role of the IMF be?

Crises like the one that shook the world's financial systems in 1997 have many characteristics in common with a bank run. This is the reason people have argued that the IMF could play the same role internationally as the institutions that guarantee deposits play nationally. But here the problem of moral hazard we discuss above is also present, and more acutely so. Therefore, the setting up of a mechanism that guarantees the countries' capacity of honouring their payments in time of crisis, should be accompanied by other measures that mitigate the effect of moral hazard, much as it is done in domestic economies. Other proposals for the IMF to act as a “deep pockets” international lender of last resort can be confronted with the same objections.

On the other hand, the leading role of the IMF in setting up a new regulatory framework and promoting the adoption of international standards and information transparency is widely accepted.

Box 1.8 The 1988 Basle Accord on capital adequacy for banks and proposal for a new capital adequacy framework

A. The 1988 Basle Accord and its flaws

The 1988 Basle Accord was intended to strengthen the soundness and stability of the international banking system and to enhance a level playing field among international banks.

During previous decades, the amount of banks' capital had been declining steadily and was growing increasingly inappropriate to match the risks undertaken. Protectionism and seeking a level playing field also had something to do as Japanese banks were rapidly gaining market share in Europe and the U.S.

Without disregard to the benefits brought by the Accord in terms of enhanced banks' regulatory capital, the agreement had some flaws in the sense of providing undesirable incentives. It has been accused of inducing banks to adopt higher risks, as lower-quality assets are not properly charged in terms of regulatory capital, and also of providing incentives for short-term lending, particularly to banks in emerging economies.

Currently, the amount of costly capital that banks need to put aside when lending, depends on the type of borrower as classified into three categories that are not sufficient to reflect the wider scope of risk exposure. This incentivates banks towards engaging in operations that their internal models evaluate as riskier than the Accord does. Moreover, the Accord is not uniformly implemented across countries, hindering level playing field conditions.

Overall, there is broad agreement on the need to revising the Accord towards setting capital requirements that reflect better the risk exposure of banks. This goal is, however, not easily attainable. Leaving aside technical difficulties in the assessment and regulation of risks in an increasingly sophisticated banking system, there are also political discrepancies that will require reaching a compromise among different positions. Up to now, the Basle Committee on Banking Supervision has come up with a proposal to review the Accord.

B. The Basle Committee's New Capital Adequacy Proposals

In June 1999, the Basel Committee on Banking Supervision (BIS) issued a proposal for a new capital adequacy framework to replace the Basle Accord. The new framework proposes a more refined correlation between credit risk weights and the credit exposure's true risk in banks' loans portfolios, and incorporates the possibility of using of internal ratings by banks. The proposal has three main pillars:

Minimum capital requirements: developing and expanding on the standardised rules set in the 1988 Accord;
Supervisory review of an institutions' capital adequacy and internal assessment process;
Market discipline as a lever to strengthen disclosure and encourage sound and safe banking practices.

In the new framework, the level of regulatory capital should not decline on average. On the contrary, it would increase for the riskiest institutions.

Overall, the goal of the report is to increase the correspondence of risks incurred by banks and the associated capital requirements, and intends to reduce capital arbitrage situations by fixing some wrong incentives established in the 1988 Accord. The proposal increases the number of the different sorts of credit risk to which banks are exposed, and changes the weightings. The proposal also opens the door for the use of banks' internal models to determine the amount of capital appropriate to be put aside.

C. On 22 November 1999, the European Commission issued a proposal to update regulations on banks' capital requirements. This proposal is closely linked to the recommendations of the Basle Committee.

Source: BIS, International Banking and Financial Market Developments (quarterly review, August 1999) and self-elaboration.

Should financial transactions be subject to special taxes?

If one considers that there are more than desirable financial transactions, one possibility to limit them, and at the same time obtain funds to repair the damages created by the financial crises, could be the introduction of new taxes. First of all, the possibility of effective implementatin of these taxes in the framework of a globalised financial system should be seriously considered. Recent experiences (see box number 10) give food for thought.

Some analysts question why policy-makers should worry about the widening gap between trade and financial transaccions. The range of products transacted in financial markets has exploded in the last two decades, but this in fact indicates a movement towards efficiency, if the apparition of derivatives' markets is interpreted as a move towards solving the basic market incompletenesses that affect transactions subject to strong uncertainties. The widening gap between financial transactions and trade parallels closely the difference in the number of new markets created.

An issue that has received special attention is the possible introduction of a *Tobin Tax*. "A Tobin Tax is a permanent, uniform, ad-valorem transaction tax on forex[22] transactions, which is aimed at diminishing the speculative element of forex flows".[23] The tax is intended to "help reduce exchange rate volatility and concomitantly curtail he intensity of 'boom-bust' cycles, while not adversely impacting longer-term ('productive') capital".[24] The discussions about the advisability of the Tobin Tax are merely theoretical, as there are no practical experiences of its implementation. What seems clear is that, in the context of globalised markets, its introduction should be agreed among a number of countries, or its possibilities of success would be diminished.

Box 1.9 The difficulties of introducing new taxes on financial transactions.

In the context of today's highly interlinked capital markets, re-regulation or the imposition of protectionist measures might have unexpected effects if domestic governments fail to take into account the international competition. Here is a recent example.

In August 1999, the Brazilian government introduced a tax, called CPMF, which consisted of a 0.38% on any financial operation conducted in Brazil. Brazilian stockbrokers protested, arguing that its effect was simply to induce investors to migrate to the New York markets. In the end, the effect has been to reduce tax revenues instead of increasing them. The main Brazilian companies used to deal simultaneously in Brazil and Wall Street and, when the tax was introduced, they just shifted all their operations to New York. According to the *Bolsa de Valores de Sao Paulo*, since June 17, the date the tax was introduced, the volume traded has gone from a daily average of $700 million to $200 million.

1.4.4 The role of International Institutions

International agreements in the area of banking and finance are the natural by-product of the deregulation of the financial sector. Both private and public institutions have participated actively at the international level in the production of agreements. The role of private institutions has generally being centred on agreements to facilitate the conduct of cross-border financial transactions, while the public sector has in general promoted agreements aimed at encouraging the expansion of cross-border competition and maintaining financial stability.

The General Agreement on Trade in Services (GATS), the OECD Codes of Liberalisation, and some relevant directives in the European Union Legislation are mainly intended to expand cross-border competition in banking and finance.

Other agreements have as main objective to promote and maintain financial stability. Various committees, such as the Committee on Banking Supervision and the Committee

[22] Foreign exchange.
[23] Rajan (1998), p. 20.
[24] Rajan (1998), p. 21. See also references therein.

on Payment and Settlement Systems, operating at the BIS under the aegis of the Governors of the Group of Ten, have produced significant work. These agreements have moral authority, but are only by enforceable by domestic regulation.

Currently, discussions on closer coordination of authorities' work is also in progress in what is known as the Group of Thirty-Three, consisting of the participants in the G-10 and some twenty emerging market countries. Apart from liquidity provision in times of financial tourmoil and management and surveillance of the global international financial system, recent talks on the reform of the International Financial Architecture have added new "roles" to the IMF.

For example, with regards to the development of the financial system, the IMF in co-operation with the World Bank will improve the appraisal of national financial sectors that will be based on the current minimum standards for banks and other financial institutions, a broad review of developments and risks in the country's financial sector, and other conditions such as legislation, accountancy rules, payment systems and financial markets.

Additionally, the IMF will contribute to public sector transparency with the implementation of the Special Data Dissemination Standards, or SDDS, a standard for countries wishing to participate in the international capital markets. Voluntary compliance with SDDS by all countries will provide some assurance that economic transactions are not being based on misleading or incomplete information. In this respect, it should be noticed that a misleading account of both private debt and the size of foreign exchange reserves in a number of countries have been among the causes of recent crises. Thus the SDDS is being revised to give a better account of the level of foreign reserves and the debt position in individual countries. At the country level, moreover, a code for monetary policy transparency and measures for maintaining financial stability is being drawn up by the IMF together with the BIS, central banks, supervisors, the World Bank and the OECD.

The IMF has been recently provided with additional financial resources that may be needed to deal with market crises.

With the aim to reduce contagious effects, the IMF will be able to provide contingent credits to countries that are deemed to have a sustainable economic policy and face nonetheless financial distress.

Finally, the emergence of a number of new and important financial centres in developing countries should be reflected in international institutions dealing with global finance.

Chapter 2

The effects of technological innovation on money

Chapter 2. The effects of technological innovation on money

This chapter analyses[1] new forms of payments (e-money) instruments that have emerged with technological innovation . These new forms of payment are basically smart cards and software-based products to make payments over the Internet. Although these products could, in principle, improve the efficiency of payment systems, they also raise new concerns, like the need for standandaridazation or regulation, that must be considered. Another issue is the relationship with the introduction of the single currency. The views in this chapter show what were like the situation and prospects at the time when e-money was starting up, in 1996-1997.

2.1 Introduction

Technology is transforming both money itself and the way we manage it. The 1990s market crises of Mexico and other countries have shown the difficulties of Governments and central banks to control money flows. Electronic fund transfer systems have been widely used during the last decade and could be considered one of the main causes of these problems. The growth of internationally interconnected computer networks has to be seen as a new stage of the process. Commerce is increasing the use of these networks as a new field of business operations and thus, demand for new payment systems is stimulated. Consumers start to have a significant role in the so-called cyber-economy.

The introduction of electronic forms of payment entails a substantial alteration of the traditional concept of money. Money becomes information stored in a microchip or on a computer database. This bears some similarities with what has occurred with certain securities in mercantile trading, which have become detached from the document on which they were traditionally represented, and are now simply records kept in a register. This radical transformation of the traditional legal concepts, implies that legal treatment currently given to money by the various legislative systems is completely inadequate. It is necessary to devise new legal concepts, or renovate those already existing, to face a situation that is slowly but surely gaining ground in an increasingly globalized world.

We deal with two classes of objects: cards and network protocols, that in what follows will be referred to, somewhat imprecisely, as smart cards and Internet payments. When we talk about new payment methods or electronic money (e-money) we are referring to both systems. Electronic money seems the next step in the changing process of globalization of payment systems. The extension of different forms of digital cash could limit the possibilities of governments to monitor the economy. Most forms of e-money already in use have no clear legislation, and in many cases are being issued by non-credit institutions. Digital cash through Internet could lead to an uncontrolled creation of money. There are no laws guaranteeing the protection of deposits stored in e-money.

The future remains open to a number of options that must be weighed. Electronic money seems very convenient for consumers, but it could create a lot of problems for governments. For regulators and policy makers, technology assessment and options evaluation is needed to clarify the understanding of the different types of electronic money, and the consequences of the diffusion of new payment systems. While public

[1] This chapter is based on the STOA project "Technological Innovation and Money", prepared in 1997. PE document number 166483 (See section IV in Introduction).

institutions think whether technology is really remaking the monetary system, a set of relevant questions should be raised and action seems to be needed urgently. As an example, we could quote the following:

- What is going to be the role of banks in the new electronic world?
- Who will regulate the issuers of E-Money?
- How will taxes be applied in Cyberspace?
- How can governments guarantee that payments made in Internet will be secure?
- What could be the percentage of household expenditures taking place on the Internet way in the coming years?

We should be aware of the possible repercussions that all this could have on the introduction and development of the Euro as the future European currency. If we consider single currency as an important element in the process of European unity, we should be capable of anticipating the repercussions of a technological process that may render the notion of money as we know it today obsolete. In relation with the Economic and Monetary Union process, the key question seems to be if there is room for an "oriented" policy towards electronic money, and particularly pre-paid cards, in connection with the single currency.

We discuss here the following issues: A description and evaluation of the different payment methods, an analysis of the possible implications of these entities as a whole, EMU and the new payment methods, the private and public sectors, economic analysis, security issues and a regulatory framework.

2.2 Electronic money. Its characteristics

2.2.1 From Electronic Fund Transfer Systems to Digital cash

From a technical point of view the first system that could be considered electronic money is the electronic transfer of funds. This system is used from the late 1960s. It could also be called electronic checking. It is used by millions of consumers to pay domestic bills and also by banks and other institutions when transferring large amounts of money at the international level. Between the well-known advantages of Electronic fund transfer we could mention: saved time, reduced costs for paper handling, no bounced cheques, flexibility.

During the 1990s, and taking advantage of new information technologies two different groups of electronic money are being developed and introduced around the world: pre-paid cards and digital money through Internet. These two kinds of products are often classified under the generic label of electronic money or new payment systems. In certain cases they are labelled as digital cash or electronic cash. By using the word "cash" one common feature is underlined: the goal is to be the equivalent of paper cash. Ideally, two main characteristics of the paper cash should be maintained: anonymity and liquidity.

In the meantime, we are now seeing the introduction of intermediate products that coexist with some incipient experiences of pure digital cash. But, in any case analysts believe that transforming bills into electronics charges on people's PC electronic wallet or their intelligent pre-paid card is, without doubt, a major change since gold became the

standard of payment. Consumers' viewpoints related to the concepts of money, cash and value, are probably going to change. Following Linch and Ludquist (1996):

> "Digital money is an electronic replacement for cash. It is storable. transferrable and unforgeable. Digital money is numbers that are money".

In general, we can summarise the advantages and disadvantages of the new electronic payment systems with respect to the ones currently used as:

Advantages. Increased security, anonymity and preservation of privacy, reduction of transactions costs, easier international payments, Consumers have access to much larger markets (and therefore overall efficiency improves), better means of control of personal finances by users directly (instead of financial institutions).

Disadvantages. Everything is fairly new, and therefore untried. Problems will surely appear and have to be dealt with. Possibility of losses in case of hardware breakdown. In general, reliable backup systems have yet to be developed. Possibility of new criminal activities and better means to carry out other unlawful ones (tax evasion, money laundering).

About 50m people have access to the Internet, but this number is expected to reach 200m within two years[2]. There are many reasons to vouch for the importance of such a network in the future: the expected huge markets, the ability to offer 24-hour service across borders and the potentially enormous savings in operational costs.

Merchants, banks, financial institutions, credit card companies, and software firms are, obviously, greatly interested in keeping informed about the evolution of the Net, and in starting to operate in it.

2.2.2 Pre-paid cards

2.2.2.1 Smart cards. Technology and purposes

Smart cards consist of a plastic card with an embedded chip and represent a technological advance in comparison with cards with magnetic bands. The chip embedded in the card can hold memory features (as do magnetic bands) and can as well include a microprocessor. This latter allows for the use of cards being extended to new applications. The main use envisaged for smart cards is as a payment mechanism; with smart cards incorporating electronic cash. This issue is developed in the next subsection Other applications for smart cards are covered later in the report (See section 2.4).The following paragraphs explain the technological aspects of smart cards systems.

The architecture of a system is the structure of a scheme. The design of the structure establishes who will be the users (bank, individuals, and others) and the roles or options available to each user (acquirer, issuer, payee, payer, and other). It also defines the functional entities (for instance: purse, till, and reload station) and devices (for instance: bank terminal and smart card). Finally, it also establishes the relationships among them all.

[2]Financial Times, 5 September 1996. Recent prospects of Forrester Research are less optimistic.

The hardware of smart cards systems is centred on the chips contained by the card and the several devices related to the card. Some architectural features of smart cards systems vary greatly among different schemes. Regarding the types of microcircuit embedded in the card, four varieties of smart cards systems can be established: memory cards, shared key cards, signature-transporting cards and signature creating cards (See Box .2.1).

Schemes currently implemented in Europe have different levels of technology sophistication. Among the simplest systems are the single -purpose pre-paid cards and some multi-purpose cards schemes such as Dänmont in Denmark. Among the most sophisticated is Mondex. The CAFE system is even more sophisticated but its implementation has been lower (see Box 2.2). In between, there is a wide intermediary level range.
Although predictions are always difficult in the technology area there is broad agreement among experts on the future being based in chip technology. Predictions also indicate that as chip technology continues to improve more advanced systems will become economically feasible and will gradually be implemented.

Considerations on the suitability and consequences of technological innovation for Europe are drawn latter in the report.

2.2.2.2 Pre-paid smart cards as a new payment mechanism

Pre-paid cards can serve as a payment mechanism by loading and storing monetary value in the chip embedded in the card. The value loaded in the card can later be disbursed when paying for the provision of goods and services.

Pre-paid cards are mainly intended for some of the usual consumer transactions. When considering different levels in such transactions, we can establish: those involving a relative high value (which most consumers associate with credit cards), the medium value transactions (for which debit cards are currently used), and the low value transactions. Electronic purses are initially developed to work as a substitute for cash in such low value transactions.

Box 2.1 Smart Card Systems

- *Memory cards*. Have data storage space and some require a PIN for access. It is the simplest type of smart cards, and quite inexpensive to produce. Mainly suited for single purpose schemes. Most telephone cards are of this type.

- *Shared-key cards*. Store a secret key and can communicate with cards that share that key. Use standard microcontrollers with masked-in software for the cryptographic authentication algorithms. Cards are relatively low cost but the mechanism requires validation at the point of sale, for which some sophisticated equipment is needed, thus raising the overall costs of the system.

- *Signature-transporting cards*. The same chip hardware as in shared-key cards but with different software. Cards contain a ready-made supply of blank checks, which are large pregenerated random numbers that can be assigned a denomination and signed to use as digital money, one check at a time. It is also relatively low-cost and since blank checks are loaded in advance and checks need not be reverified, no point of sale validation is required, with equipment used there being less costly. These cards also maintain privacy for the users, and seems to provide good security and convenience levels at very reasonable costs

– S*ignature-creating cards*. Contain a dedicated coprocessor, which makes them capable of generating large, random numbers (the blank checks) to be used as digital money., i.e. instead of spending signatures created by the system provider, they create their own. This is the most complex type developed. At the current technological level, they are quite expensive to produce.

Source: Chaum (1995)

Table 2.1 classifies different types of pre-paid cards. The conclusion to be drawn from the table is how many possible combinations of the characteristics can result in different smart cards schemes. At the moment, only the CAFE project provides for the exchange mechanism in multicurrency cards. This mechanism could be of importance in helping the introduction of the Euro.[3]

Table 2.1 Different types of pre-paid cards.

Single-purpose: intended for the provision of one single good o service	Multi-purpose: multiple acceptors and/or multiple issuers.
Disposable: monetary value can only be stored once.	Reloadable when the value stored has been spent.
Pre-paid card only	Combination cards, which can as well be used as credit and/or debit cards.
Single currency : one single currency can be stored in the card	Multi-currency, allowing different currencies to be stored in different "pockets", and some as well incorporating an exchange mechanism among different currencies.
Limited value to be stored in the card	Unlimited value, with no restrictions in the value that can be loaded in the card.
User-identified cards.	Anonymous, not disclosing the identity of the user
Centralised systems: issuers can keep record of all transactions trough links of all terminals.	Untraceable systems: the issuer has no records of all transactions . Allows transfers from one card holder to another.
Compensation for loss: accountable systems trough records maintained of all transactions.	No compensation in case of loss.

Source: Adapted from Nicholson, Graham & Jones. Report to DG XV. 1995

Costs and benefits of the introduction of pre-paid cards

[3] See also chapter 5.

Pre-paid card transactions are relatively new. The first implementations of pre-paid cards were generally single-purpose, and some of the schemes, such as telephone cards, have experienced rapid growth. Acceptance has also increased in mass transportation systems, parking meters and others. However, for the majority of small transactions, cash remains the preferred method of payment.

The introduction of multi-purpose cards seeks to replace cash in most of the small transactions that are currently dealt with "real money". Its technology allows card holders to have an equivalent to the usual cash made more convenient, less easy to counterfeit but easier to count.

Three different parties are involved in pre-paid cards schemes: consumers, suppliers and issuers.

Consumers. They may adopt this new payment instrument if they are attracted by its convenience: it is surely easy to use, and will avoid the need to carry currency. For the instrument to gain acceptance, it should as well have some of the following characteristics: anonymity (no authorisation or signatures required), security (reliable authentication procedures, or solutions to compensate users in case of loss, theft or malfunction), liquidity (subject to wide acceptability), low transaction costs (consumers could benefit from lower costs of paper handling by institutions and lower costs of clearing), speed (time saving in transactions, giving higher financial flexibility to consumers, faster balance updating). Electronic purses in effect comply (see box above) with the core features of cash and add some additional benefits related to convenience, security, flexibility and financial control. With electronic purses there is no need for paperwork, authorisation or signatures.

Suppliers. Suppliers of goods and services could benefit from the use of pre-paid cards in the lowering of the costs of handling cash, interest lost on cash holdings, and others. No processing of payment is required, so there are minimal handling costs. It is an ideal means for small payments, where the costs of processing credit or debit cards made those inefficient. By inserting the card into a point of sale terminal, the value is immediately transferred from the card onto an electronic purse inside the terminal. Potential benefits for businesses include:

- greater efficiency at the point of sale: payments are exact and fast (no need to give change), authorisation is not necessary, customer identification is not required
- low start up costs (for some schemes)
- marketing opportunities: in some schemes smarts cards can be used to run customer loyalty schemes. If costumers choose to join such a scheme, a merchant can automatically record each use of their cards. Merchants can then use this information to implement their marketing strategies.
- security and lower costs of handling cash: some terminals can be electronically locked, reducing both the store and security risks associated with storing, counting and transporting physical cash. The intakes can be banked at any time using the telephone network.

Issuers. Issuers can benefit form pre-paid multipurpose cards in the following manners:

- fee charged for issuing the cards
- gain interest on the money received in return for loading value in the card
- commission charged to suppliers of goods and services
- commission on loading value
- licensing and franchising the schemes
- lower the number of errors and costs of handling paper
- avoid queues at branches
- eliminate cash transportation costs.

The introduction of this new payment mechanism will go through different stages. On a first phase, work will concentrate on changing consumer habits. Once reasonable acceptance is attained it would then follow a wide spread of the point of sale terminals.

For multipurpose pre-paid cards to be developed, distribution of costs and benefits between the parties must occur. Among the costs and drawbacks of this instrument's market are the following: it is a low margin operations business, it requires some investment funds for terminals at point of sales, and also for developing the chips incorporated to the cards. Questions that remain open are whether institutions will pay for them or whether the costs will be born by the final users or by the providers of goods and services.

Interoperability of smart cards

There is currently in Europe a variety of schemes which are in principle incompatible. Although predictions on how the market will evolve are necessarily risky, technology experts participating in the elaboration of this report agreed with the following scenarios:

> - In the short term, the current situation will prevail, with different, some incompatible, schemes being implemented in Europe. Companies developing such schemes will balance the convenience of alliances with other schemes, with expected benefits derived from maintaining their own incompatible systems. Strategic alliances may seek to impose standards in a competition that would be leaded by market forces. On the other hand, running your own incompatible scheme may be of interest for companies interested in developing loyalty schemes.
>
> - In the long run standards will probably be determined by the market, prevailing the system /s that gain greater acceptability by the consumers. With this situation there could coexist other schemes that would have a market niche".

Technological issues

Technological difficulties in making smart card systems compatible are in principle higher and costlier to solve than it was the case for cards with magnetic bands. Making terminals accept different systems goes before than having cryptographically compatible systems.

Efforts needed in making the systems interoperable will differ accordingly to "how different" the systems are initially and to further developments in technology. It is beyond

the scope of this report to treat this matter exhaustively . However, some points are worth mentioning:

- Some systems provide already for use at different terminals, for example: Dutch telephone cards can also be used in Germany, and Switzerland, and vice versa.

- The CAFE project (developed under ESPRIT programme of the European Commission, see Box 2.2) provides a framework for interoperability between various electronic purse systems. As an example we have that Mondex and Protime are incompatible systems. At the same time, both systems are compatible with CAFE. Thus, CAFE structure could be used to operate simultaneously with the two of them. The same idea, could in general work for the rest of the systems.

- The choice of making systems compatible obeys not only to technological feasibility, but also to economic concerns derived from high investment costs required in developing smart cards schemes.

- It is the opinion of technology experts participating in the report that legislation imposing standards for technology would not work, mainly due to difficulty of making any predictions in this field.

Additional concerns about smart cards are dealt with in part 2.3.1 and sections 4 and 5 of this chapter.

Box 2 2 The CAFE Project (Conditional access For Europe)

The research project CAFE was launched in December 1992 in the framework of the ESPRIT Programme of the European Commission. The project's main goal was to design and actually demonstrate an "electronic wallet", to be used as a pan-European device for payments, access to information services and -if required- identification. The CAFE architecture was designed as an open one, easily usable for all types of users and most of the specifications are publicly available.

CAFE has produced results on two main levels: on one side results in asymmetric cryptographic techniques (see annex 1) in order to develop secure systems that ensure security and privacy of users. On the other side technological results; trials are under way to show the validity of the developed architecture. CAFE has to be seen as a Technological platform with which final institutions could define final commercial products

.

Trials are testing the CAFE card, a multi-currency pre-paid card using ECU as the currency of reference. The wallet in its basic form has only two button, a small LCD screen, a card reader slot and is capable of communicating with payment terminals and other consumer devices trough an infra-red communication link. Some banks have already shown their interest in testing this system.

Members of the CAFE Consortium. Centrum voor Wiskunde en Informatica (NL), Cardware (UK), Gemplus (F), SEPT (F), Royal Dutch PTT (NL), SITEF DELAB (N) Digicash BV (NL), Institut fur Sozialforschung (D), Institut fur Informatik (D), Ingenico (F), University KUL (B) Mathematic Institute of Aarhus University (DK) and Siemens AG (D).

2.2.3 Digital Money and Internet

2.2.3.1 Main features of Internet digital money

At least a dozen cyber-banks are in the Internet system conducting transactions in an existing currency, mainly dollars. Internet payment mechanisms could be grouped into 3

broad classes: electronic cash systems, credit-debit systems and systems supporting security through credit-card (see table 2.2.). Following Tanaka (1996) four groups of problems appear when comparing a credit card payment through Internet with a cash payment in the real world: security problems, charge of fees, peer-to-peer payments and untraceability. Security problems. in particular those related with the “digital signature” issue are analysed in section 4.

Table 2.2 Electronic Payment Schemes through Internet

Type of Electronic Money	*Payment Protocol Model*
Electronic Cash	Cash Cash consists of a token that may be authenticated independently of the user
Credit-debit systems	Cheque Payment instruments whose validity requires reference to the issuer
Systems supporting security presentation	Card The scheme provides a payment mechanism through the existing credit card infrastructure

Source: Hallam-Baker (1995); Neuman and Medvinsky (1995), Tanaka (1996) and self elaboration

Electronic Cash systems

Customers purchase electronic currency certificates from a currency server. They purchase for certificates by using credit cards (or other systems). Once issued, the electronic currency could be spent with merchant who deposit the certificates in their own accounts or spend the currency elsewhere.

Digicash or Netcash are two examples of this system. In the case of Digicash, the system uses the so-called public-key cryptography that, like encryption, makes it possible to securely send a card number over the Net[4] . The Digicash approach is called "blinding technology", because the system lets the issuing bank certify an electronic note without tracing whom it was issued to. This means that the Electronic Cash preserves the anonymity in any transaction. Every electronic coin has a unique code of identification and it can only be used for one payment. In case of theft, it is possible to identify of the owner of the stolen electronic money.

The main advantage of the systems seems to be the absolute anonymity. Some disadvantages exist concerning the need to maintain a large database of past transactions to prevent double spending. In the case of Digicash it is necessary to track all the certificates that have been deposited. In the case of Netcash it is necessary to keep track of all the certificates that have been issued, but not yet deposited. These systems are the closer systems to what we could call pure digital cash.

Credit-debit systems

Customers are registered with accounts on payment servers and authorise charges against those accounts. Consumers pay on the Internet using their credit card. In order to protect the account numbers, the users register with the firm and receive ID. numbers in exchange

[4]D. Chaum, Digicash's founder, is one of the most renowned experts in this subject because of the " blinding technology". His article on "Achieving Electronic Privacy" (1992) is a compulsory reference on the subject. Chaum is also leading the CAFE project sponsored by the European Commission in the framework of the ESPRIT R&D programme (See Box No. 2.2).

of their card number. With this procedure, card numbers never pass over the network. In order to make a purchase, the customer only needs to supply their ID number to the merchant.

One key advantage of the system is auditability. Once a payment instrument has been deposited, the owner of the debited account can determine who authorised the payment and whether the instrument was endorsed by the payee and properly deposited. This model does not provide anonymity, but it is useful for certain kind of business activities, an even desired by a part of individuals.

First Virtual's InfoCommerce and Netcheque could be included in this category. In the case of the Netcheque, the system seems also useful for clearing payments between servers of different types.

Systems supporting secure presentation

A customer's credit card number is encrypted using public key cryptography so that it can only be read by the merchant, or in some cases by a third party processing the service. The systems seeks to leverage current credit cards systems by adding security.

The main advantage can be that the customers does not need to be registered with a network payment service. The customer only needs a credit card account. At the same time this could be considered a problem because without registration of customers the encrypted credit card transaction does not constitute a signature: anyone with knowledge of the customer's credit card number can create an order of payment. This sort of fraud is the same that can occur when somebody pays by giving the credit card number over the phone.

Cybercash is using this system. If security in encrypted credit card transaction increases, it is believed that many systems will follow this approach. From a diffusion point of view, this could be seen as the most interesting way. Through this procedure consumers get used to make payments with credit cards on the Internet. And after a trial period of essay, they may be willing to start using E-cash systems.

2.2.3.2 Commerce through Internet. Myths and realities

Commerce through Internet is increasing at an enormous speed. Some analysts believe that in the coming five years 10% of retail commerce will be done through Internet. The most optimistic forecasts even evaluate this in nearly a 20%. This is the case of a recent survey of Peat and Marwick with big British companies. At present, online electronic commerce is believed to be worth $300m annually and it is rising. Electronic commerce is going to change our lives in the coming years. Analysts announce a commercial revolution. Millions of buyers and sellers are doing business in the Cyberspace. Such a Network is supposed to widen markets, increase efficiency and lower costs.

Until now, all the systems quoted in chapter 2.3.1 are still at their infancy, and there is debate about the degree of dissemination that could take place in the coming years. Banks all over the world have understood the importance of such a market. Different organisations are striving to develop secure shopping and payments systems. Systems like

Digicash, renowned by its similarity to paper cash, are quite sophisticated, though some deem it too complex to be effectively managed.

The need for rules

One critical aspect of a big Cyberspace is the need for rules. As it has been said, shopping activities in the Cybermarket are supposed to widen markets, increase efficiency and lower costs. But to what extent the "promises" of this perfect market are becoming reality? The situation is still confusing. Spans and Bussgang (1996) have recently pointed out that rules are critical to commerce and without the order that rules create business cannot be conducted. At present there are few rules and regulations of the Cyberspace market. Companies should carefully design their strategy when entering this market. Rather than posting pages on the World Wide Web (WWW), companies may start to cluster into on-line communities where rules are clear and commerce can be done in a more secure way. These sort of on-line communities could lead to a very different kind of markets than the open Cyberspace. In the view of Spar: "commerce will move toward on-line communities simply because companies need a basic infrastructure to survive".This scenario is clearly different from the one of free access to Cyberspace envisaged by many.

From the consumers side, there is debate among analysts concerning the user base in the next years. For the American case Forrester Research estimated that it will take at least four more years for consumers to meet companies in the degree of Internet usage. Home consumers are the key for the take off of this market. Until now an Internet merchant could receive hundreds of visits per day, but round up only a few sales (Anderson, 1995). Commerce will have in the future a different nature, but networks and payment systems have to be more developed.

2.3 The banking system and the new technologies

2.3.1 Private banks, credit-card companies, software firms and electronic money. Main recent agreements

In the private sector, there is a fierce ongoing battle over imposing standards for new electronic payment methods. This seems to be the main arena in which companies are competing. In this struggle participate several kinds of firms: software companies (Microsoft, Netscape and Verifone), credit card suppliers (Visa, MasterCard), smart-card suppliers (Mondex[5]), E-cash suppliers (CyberCash, DigiCash, Open Market), and, finally, governments and other more or less officially sponsored institutions, like the World Wide Web Consortium. The map of relationships is complicated further by the fact that some companies collaborate on a certain issue, but compete in order to impose their own standard on a different one.

In any case going online provides an increasing number of advantages for the banking industry[6] like: electronic confirmation for payments and invoices, capability of answering

[5] In November 1996 MasterCard acquired 51% of the Mondex partnership with the idea that "Mondex could become de *facto* a global standard for chip payments products". Financial Times 19/11/96

[6] See, i.e., Information Strategy. November 1996.

via e-mail complicated or detailed requests, cash management, information on banking services or financial advice.

The search for standards

There are many encryption systems available. It is believed that Internet banking will take off when there is widespread use of public-key cryptology. Four significant agreements are summarised below.

EMV. Smart card-based credit and debit cards are being planned by major card payments organisations. Europay, MasterCard and Visa have been collaborating to establish a standard for smart cards (EMV). This could be seen as the planned transition of Europay, MasterCard and Visa from magnetic stripe to smart card technology. It will help a rapid spread of smart card reading devices and the reduction of costs. Costs rationalisation will occur provided that the various parties arrange for common terminals to be used throughout the system.

Secure Electronic Transactions (SET). Master Card and Visa are also involved in the project of developing Secure Electronic Transactions, a standard for using credit cards for Internet payments. SET is designed to protect the buyer and the seller. Buyers can have a clear identification of sellers and sellers would be able to get payment authorisation without getting the card number. The systems is based on public-key encryption. Other team members are: GTE, IBM, Microsoft and Netscape. This move towards common standards when the companies had been previously trying to impose their own incompatible ones, can be seen as a reaction to the spread of different payment systems sponsored by the companies that labelled as "newcomers" above. SET is expected to come into operation in late 1997. SET is supported by real key players in the arena and would be a *de facto* standard[7].

SEMPER- Secure Electronic Marketplace for Europe. Among actions undertaken, since November 1995, the European Commission has backed a research project, aimed at developing the basics of a secure electronic commerce service to operate over the Internet and other publisher info networks. 20 partners from the European industry participate in the project, together with academic institutions. Among the participants are the following: IBM's Zurich research laboratory (providing the technical leadership), Siemens, Phillips Europe, SGS Thomson, Gemplus.

World Wide Web Consortium (W3C). CommerceNet is one of the biggest organisations in relation to Internet Commerce. It has recently (April 1996) launched a joint initiative with the so-called World Wide Web Consortium in order to develop an Internet payment negotiation protocol. The project intends to deliver a working demonstration of payment method selection in the Internet transaction environment. CyberCash, Microsoft, Open Market and Verifone are among the companies involved in the project.

Some Internet banking experiences

[7]>From a technical point of view some criticism are done by experts concerning the usefulness of SET for small payments (i.e. less than 15 ECU). To solve this problem Anderson (1996) underlines the interest of the NetCard approach and of the “Tick payments” system developed within the CAFE project.

Denmark. Financial Internet Technologies (FIT), Olivetti and a Consortium of 80 Danish saving banks have formed a joint venture called FIT (financial Internet Technology). FIT has developed E-Bank, a system which uses the Internet for home banking from home and offers various levels of security, including passwords, PIN codes and encryption.

Box 2.3 Improving the links between smarts cards and Internet

In the coming years all the PCs will need a reading device for smart cards. Linking smart cards with the Net with a high degree of security is an activity in which significant R&D resources are now being devoted. What needs to be decided is the best system to locate the security keys when doing transactions: the PC or an external device. If the external device option is selected then two possibilities appear: the card itself or a sort of black box"·.

In any case if a system is clearly, and soon, defined the important thing is that governments have to encourage compatibility between the systems with the aim that all the PCs distributed in Europe could include (or have compatibility with) the same reading device. From a technological point of view, for the banking industry these seems to be a key issue in order to increase their internet services activities.

United Kingdom. In the UK, the UUnet Pipex system was launched during the Summer of 1996. The system is backed by National Westminster Bank which will act as the clearing house for online debits and credit card transactions. Internet merchants sign with UUnet Pipex and pay 5% of the purchase value of the transaction. After pressing the "buy" key, the customer has to enter his or her credit information. The information is stored securely by UUnet who instructs NatWest to pay the merchant for the purchase. Between other groups, Barclays Bank is already offering BarclaysNet shopping services though Internet. Barclay's system is based on protecting the credit card number. British Telecommunications is testing a large-scale on-line shopping service.

The Netherlands. Interpay, a recently implemented experience by a consortium of Dutch Banks in agreement with the communications company KPN. Interpay authorises the user to buy things up to a sum of 250 guilders. This money is deposited in a special "I" bank account of the user. When buying something, the user needs to give a password and money is debited in its account. The amount of 250 guilders is used for security reasons, and after a 6 months trial period the service will be redesigned in order to reach a large number of users.

Germany. Deutsche Bank started to offer a trial on electronic money services using Digicash technology in order to test the possibilities of innovative payment forms and procedures. Similar experiences using this type of technology are planned or under way with other banking institutions in other countries like Finland, Australia an Sweden.

In general terms banks and financial organisations seems to adopt a step by step approach in what concerns Internet First, they start by having information services on the web. Secondly this service becomes a sort of "point of sales terminal" doing similar functions as a credit card terminal in a shop. The majority of existing pilot schemes seem to be at this stage and SET is clearly expected to be a key issue in order to increase the diffusion of that function.. And finally, (in a few years?) real digital money would start to be circulate in the network. One key issue for the success of such an scenario is, obviously, the use of the PC as a key delivery channel together with smart card technology (see box 2.3)

2.3.2 Central Banks and real-time settlement systems

Central Banks are required to meet a certain number of conditions at every stage of the process towards convergence, in order to be ready for the EMU. One of the key advantages of introducing new technologies into the banking systems is the capability to offer real time operations. This is a major issue for Central Banks. The so-called EU Interbank Funds Transfer System is related to the requirements that the different countries will have to comply when the Monetary Union starts.

Developing EU payments systems towards EMU, needs adjustments in all the countries. In a report of November 1993, ten principles were set out and up to date all the countries are working in order to meet these principles by the time of the Monetary Union[8]. The ten principles relate to subjects like: direct access to Interbank funds transfer, no discrimination in access, transparency of access criteria, real-time gross settlement systems, legal and technical issues, pricing policies and operating hours. Some brief comments about these principles are contained in the following paragraphs.

Only central banks and credit institutions can be admitted as direct participants in the Interbank funds transfer. Many different institutions and types of organisations exist in the different EU countries. One important issue for future introduction of new payment systems is the nature of the existing links between card networks and public authorities.

Developing an EU payments system implies no discrimination in access. This refers to the fact that no discrimination can be made between home-based credit institutions and credit institutions licensed in other EU countries.

RTGS Systems is a key issue. The EU countries are implementing Real-Time Gross Settlement Systems and that action is seen by Central Banks and EMI as a main priority. The existence of a RTGS in every member country is a necessary condition for the implementation of TARGET, the Trans-European Automated Real-Time Gross settlement Express Transfer System. Analysis and actions have focused mainly in gross settlement operations and less in retail payments. TARGET testing is expected to begin in early 1997.

Diversity also exists in what concerns systemic risk control measures in the settlement systems. The same applies to the laws of any kind and to standards. Standards (in particular for retail payments) are important but EU central banks "were content to leave" this matter to the private sector[9]. EMI is monitoring the subject, trying to avoid the proliferation of non-compatible standards for cross border payments. Concerning retail payments, there is a substantial need for harmonisation between the various practices in EU countries. EMI may give advice in order to encourage the use of compatible standards.

From our point of view, the important thing is that this process of multi-domain harmonisation between central banks in order to reach the EU payments system, shows the existing diversity of approaches, laws and technical aspects of the EU banking systems. If we move to future legislative needs to meet the challenge of Electronic Money, this emphasises the need for legislation that would be needed at the European

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[8] As an example of how Central banks are preparing for EMU one can read the reports prepared by the Bank of England: "Practical Issues Arising from the Introduction of the Euro" (cf. Bibliography)

[9] See the Report “Developments in EU Payment Systems in 1995”. EMI. Frankfurt.

level. A deep analysis of the problems related to Interbank funds transfer system provides strong arguments to support the urgent need of common legislation for the advent of the massive dissemination of electronic money.

2.3.3 The control of electronic money. Implications for monetary policies [10]

The technological feasibility of both smart cards and Internet payments, has opened up new market opportunities that some firms have been quick to try to exploit. The lack of experience about these markets, as well as the legal and regulatory voids that affect them, have prompted established firms in the financial sector and public institutions (notably central banks) to act very cautiously towards them. A survey by Bozz, Allen and Hamilton shows that only 2% of the European Banks are offering full banking services trough Internet or Telecommunications networks.

But different reasons are pushing banks to enter these markets. On the one hand, the influx of newcomers in the financial world to take advantage of the new market opportunities, is changing this attitude of the established firms, who have decidedly entered the race so as not to be left entirely out of it. On the other hand cost reductions are so important that could lead to significant advantages to the entrants. Moreover, because of the lack of legislation some of these new payment systems could be launched and/or managed by non-credit institutions.

In general, the attitude of central banks up to the present has mostly been to wait passively for developments and just keep an eye on them[11]. But they too have started to look more seriously into the necessity of a more direct intervention. When analysing the monetary implications it is important to take into account the trends in the different types of electronic money.

Pre-paid cards have not particular consequences for monetary policy beyond the fact that they might change the proportion of cash people use in their spending. The only problem is security, and therefore European Monetary Institute (EMI) recommends that only authorised credit institutions should be allowed to issue electronic money. This need for restricting the issuance of electronic purses was underlined in the European Monetary Institute's Pre-paid cards report (1994). One of the conclusions of the Report was that central banks should take up a more active role:

> "However, EU central banks should not adopt a 'wait and see' approach to this problem because heavy investments are likely to be made in this field, and it would be very difficult in the future to modify developments which were later found to be inappropriate."

The Report of the Bank for International Settlements (October 1996) concerning the "implications for central banks of the development of electronic money" stated some key issues in the field. The following were raised up as issues of particular relevance to central banks: the oversight function for payment systems, seigniorage, the operation of monetary policy, the degree of supervisory responsibilities and the financial risks.

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[10] See also Chapter 5.

[11] See, e.g., "Internet's tangled money Web worries central banks", by Diane Coyle, in The Independent, on July 25, 1996.

Internet payment systems pose further problems, in addition to those mentioned above. The monetary policy makers need to pay attention to the problems of the creation of money and the difficulties of tax- control that are starting to appear in relation to digital money systems. Until now, little attention has been paid to these matters.

Commercial banks are restricted by monetary policies. They lend out more money than they have, but under the control of the Central Banks. But there is no regulation of Internet banks, and there is no reason to expect quick changes on this subject. What will happen if non-bank organisations start backing just a fraction of their digital cash with traditional money?

The effects of electronic systems seem to have been important in past financial market crises. Market problems could increase when money flows through Internet. The electronically generated monetary supply could grow at a swift pace without any control from Central Banks. Until now, there has been little possibility of collecting statistics, supervising and regulating. There is no reason to expect Internet banks to voluntarily set themselves the same prudential standards conventional banks abide by. So if some banks make unwise loans, it can result on a credit crunch that authorities would only discover when it was too late.

From the macroeconomic perspective, the most important aspect is the money supply. It is clear that the money supply will be affected, but it is not easy at all to predict how, though some people feel bold enough to advance their own predictions. For instance, Panurach (1996) states that as electronic payments become more widespread and increasingly available to the consumer, we might expect a similar long–term trend of increased price level for goods and services in the economy and for increased economic growth through increased velocity of transactions. This statement seems to be based on Fisher's quantitative identity, but even in this case it is not clear why the prices should increase. As a matter of fact, one would rather think that if markets are more efficient because its participants have better information and the transactions costs are lower, then the prices should go down!

MacKie-Mason and Varian, (1996), write laconically that

> "No one knows how the introduction of electronic cash will affect macroeconomic variables".

Coming from able economists, this quotation is not to be taken lightly. In any case, the money supply will be affected. Our opinion is that the question of how much and in what directions depends a lot on the legal and regulatory framework which is developed.

Due the weaknesses of the monitoring activities it is often argued that electronic cash through Internet will not be a significant phenomenon in the coming years. From our point of view, given the speed with which the market is advancing, regulators do not have much time to close the gap. Regardless of whether or not it is appropriate to authorize entities other than credit associations for the issue of electronic money[12], we believe that the necessary involvement of banks in the creation of electronic money holds certain advantages. In particular, since these associations are subject to strong discipline and

[12] In favour, Nicholson, Graham & Jones (1995). "The legal and regulatory aspects of the issue and use of pre-paid cards" Report to DG XV. (p.49)

administrative intervention, the authorities can exercise a degree of vigilance as regards tax and exchange control in order to avoid fraud and capital flight. Furthermore, in this way users can take advantage of the system of protection that most States grant for deposits placed in credit associations. In any event, in this first introductory stage, it seems prudent that if institutions other than banks are allowed to issue this kind of money, an authorization system and an administrative control regime should also be introduced that would make oblige them to provide the national authorities with certain information in order to avoid, as far as possible, tax evasion and capital flight. One of the major difficulties in the growth of digital money may precisely be the preoccupation of the central banks or the future European central bank with regard to these problems[13]. These illegal activities have always existed without the help of any digital network, but the question is whether the networks can lower its costs and make them more easily accessible. For this reason, it might be prudent and advisable, at least at the initial stages, to impose the above mentioned authorization regime and a series of obligations (notably concerning information) on authorized institutions, under the supervision of the public administrations.

One of the most controverted aspects of electronic cash is its role as some sort of privately issued money. Some authors have expressed some doubts regarding its acceptance by the public, on the grounds of its lack of credibility (see Tanaka, 1996, and references therein). However, *its most troublesome aspect from the standpoint of public interest lies precisely on its acceptance by the public without sufficient guarantees*. If the issuers of electronic cash are not subjected to the same tight controls and restrictions that central banks impose on financial institutions, in case of default or bankruptcy its users can lose their money because of lack of some form of deposit insurance. Moreover, if public funds are used to cover some of those losses should they occur, this could induce a big moral hazard problem on the other issuers of e-cash: knowing that they would end up by not bearing the full cost of their improperly managing the funds, they would have an incentive to undertake even riskier policies. The S&L crisis in the US should be a good warning against being careless in letting such a moral hazard problem appear. One of the most worrisome features of this sort of moral hazard problems, is that competition not only does nothing to solve the problem, but aggravates its harmful consequences (Milgrom and Roberts, 1992, chapter 6).

Another aspect that worries the experts is the easiness with which e-cash can circulate across national borders, which might potentially create big problems for the control of monetary flows between different countries (see Tanaka, 1996), and thus affect things like the exchange rates and the possibilities of money laundering.

We[14] think a necessary first (big) step towards solving the last two problems, as well as many others that relate to e-cash, would be to subject the issuers of any form of electronic means of payment (both smart cards and Internet payments) to the same regulations, and tight monitoring by central banks, that is used for other financial institutions. This might

[13]Several central banks have already expressed their misgivings in this regard, above all on account of the ease with which money can be sent abroad through the digital network, thus avoiding the payment of the taxes accrued in the various transactions. For more on this issue, see "The future of the money", in *Business Week*, 12th June 1995, pp. 40 and 46; Coyle, D., "Internet's tangled money Web worries central banks", *The Independent*, Business, 25th July 1996, p. 21.

[14]And many other people, of course. What we say here is in essence the recommendation of the Working Group on Payment Systems set up by the European Monetary Institute in 1994 to analyse the problem of prepaid cards.

not be sufficient, but it certainly is necessary. One problem pointed out by some,[15] is that many firms have started operating in the relative legal and regulatory void that still exists, and in a sense they have acquired some rights. Nevertheless, it is our opinion that dealing with these companies' situation is just a matter of negotiating a satisfactory compromise, and should not influence the necessary long term decision, whose benefits outweigh by far the costs of any transitional measures.

Not only this, but in order to be able to monitor the whole payment process (while still preserving its advantages in terms of privacy and anonymity), we think it is also very important that the central banks (or financial regulators) have the ability to control not only the issuers, but also the receivers at the other end, much in the same way as it happens with the payments made via cheques or credit cards: if there is a financial institution that can be monitored at each end of the transaction, then the problems for the control of payments across national boundaries would not be worse than they are now.

More radical possibilities have been advanced, like requiring e-cash to be issued by the central banks.[16]

2.4. Legal and social implications

2.4.1 Legislation[17]

As is emphasized elsewhere in this report, the phenomenon of electronic money will have many economic consequences, including the spread of digital money, which is starting to circulate in the network. Logically, the implications of the new types of money will not only be economic but also -- very markedly -- of a legal nature, since these new technologies will in effect make easily available to large sectors of the population the possibility (already existing, but not widespread) of performing economic transactions on a worldwide scale. It is very speculative as yet to predict what type of public control is possible, either technically or legally, over these huge movements of capital. Specifically, these commercial transactions will necessarily entail coding mechanisms that, in order to fight against crime and protect national security[18], some think should be susceptible to being decoded by governments if necessary.

The European Commission has made recommendations in connection with electronic payments[19]. However, a distinction must be made between the concept of electronic payments as used in the texts published by the Community and electronic money in the strict sense. The latter operates without the need of intermediation by a third party, has in itself the effect of fulfilling the payment due, and satisfies immediately the interest of the seller of the good or the provider of the service. However, other means of payment, notably credit cards, although they may have the effect of making the good or service available to the receiver and as such are equivalent to the fulfilment of the payment due,

[15] Like the working group on prepaid cards cited above.

[16] For instance, this proposal is mentioned in a report of the Bank for International Settlements.

[17] This section was developed by Guillem Ormazábal and Marc Tarrés. I include it in the dissertation merely to preserve the overall view of the study.

[18] See the report about "Europe and the global information society", by the EU.

[19] Namely, EEC Recommendations No. 87/598, on a code of conduct for electronic payments (OJEC, 24-12 1987) and No. 88/590, on systems of payment and, especially, relations between card holders and issuers (OJEC, 24-12-1988).

do not immediately produce the satisfaction of the seller or provider of the service, who is obliged to refer to a third party who actually makes the payment as such. In other words, instruments such as pre-paid cards or money on a computer base constitute, unlike credit cards, means of immediate payment, that is, direct forfeiture of debts.

From a legal point of view, the two types of electronic money (cards incorporating a chip and purely digital or computer money) constitute an essentially similar phenomenon, to the extent that the legal treatment of the two cases is substantially the same. This does not mean to say that the law should be indifferent to the technical differences between the two systems. With regard to their differentiated legal treatment, up to three forms of electronic money can be distinguished:

Pre-paid cards. Cards designed to operate in the framework of a physically direct and immediate relationship between the user and the seller or the provider of the service.

Money through networks. Money incorporated into a digital or computer medium and transmitted through a digital network (for these purposes, the Internet), therefore operating between individuals that are not in physical contact.

A combination of both systems. Money is contained in a chip incorporated in a card, and can be transmitted by digital means, specifically through the Internet.

In accordance with the above, in the next paragraphs a unified legal treatment of electronic money will be given, stating, when appropriate, the specific features inherent to each of the three types outlined. Only in this way --distinguishing precisely what they have in common and what is specific to each-- is it possible to overcome the existing confusion in the literature on the phenomenon we are studying. It seems reasonable to expect that any future regulation of this matter should follow the pattern given here, introducing first provisions common to all types of electronic money and then special regulations concerning each specific type.

The foreseeable spread of payment by electronic means, will put forward the need for action from public bodies in two directions: measures aimed at developing the networks, and measures aimed at legal harmonization.

2.4.1.1 Measures aiming at developing the networks

If networks are not equally accessible to everybody, the use of electronic money may be alien to some sectors of society, who would thus be subject to a potential situation of inferiority: the inability to trade electronically would mean having to turn to economically more costly channels. In this sense, public authorities might want to take steps towards developing the networks and avoiding situations of saturation that might result in the discouragement or inhibition of some users. Electronic trading must also include reclamation channels and the possibility of rapid compensation. The need would arise, then, for a major programme of *information awareness*, the organization of which would be the responsibility of the public authorities. Indeed, the report "*Growth, competitiveness, employment: the challenges and ways forward into the 21st century*"[20] voices this concern when it states that the transformation into the information

[20] "Delors" White Book, Bulletin of the European Communities, Supplement 6/93.

society is highly demanding with regard to the capacity to adapt. The risk of cultural alienation or, in general, the appearance of a two-speed society as a result of lack of training should not be underestimated.

2.4.1.2 Legal harmonization measures related to the exchange of data by electronic means and its security

Equipment compatibility and standardization of codes

The growth of electronic money will run parallel to the creation and growth of the basic infrastructures of information and communication. This will require action on a European level similar to the US National Information Infrastructure programme, already anticipated in the Delors White Book. Among the most significant points we would highlight: 1) the development of basic networks (ISDN and broad band); 2) assurance of interoperability between networks; 3) the concomitant acceleration of the standardization process; 4) assurance of the protection of private data and the security of information and communication systems.

This means: a) equipment compatibility, and b) standardization of codes.

a) Interoperability of equipment. The necessity for interoperability implies some degree of technological compatibility of the equipment operating on the network (servers, cards, etc.). In the case of cards especially, following Recommendation 87/598/EEC, full interoperability would be that situation in which the cards issued in a Member State and/or belonging to a given card system could be used in other Member States and/or on the networks of another system. This ideal situation would imply the compatibility of the cards and the card readers used in the different systems. The various models currently in use or being developed, are not based on common standards, and therefore we might expect in the future some degree of standardization, as occurred in the past with the cards with magnetic bands.

Interoperability is stressed by the Delors White Book:

> "the chief disadvantage of Europe lies in the fragmentation of the various markets and the absence of major interoperable links. To overcome this obstacle, it is necessary, on a European level, to mobilize the will and the means in a concerted effort by public and private sectors".[21]

b) Standard Codes. The existence of standard codes would be justified by the need for the standardization[22] of the language in which the message or document is expressed. Moreover, the circulation of data demands a technical treatment (cryptography)

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[21] Interoperability (regarding decoders, exchange of information and message security) is considered to be a matter of public interest within information and communication technologies (ICT), according to the Commission report *Standardization and the worldwide information society: the European approach*, COM (96), pp. 359-end.

[22] On the subject of standardization in information and communication technologies, see the Commission report *Standardization...* cited above. It is interesting to note that in this report it is stated that: "standardization is a voluntary process and reflects the dynamics of the market... in some circumstances, the market will prefer to adopt official standards, for example when large-scale investments are at stake, or when faced with the prospect of adopting international standards", p. 3.

guaranteeing its security, and a legal treatment enabling the constitution of evidence (regarding this, see 4.3.2.3 below).

Adoption of voluntary codes of conduct

Given the nonexistence, slowness or vagueness of legal regulations, the adoption of voluntary codes of conduct seems to be the most advisable solution. This would entail, in effect, establishing a code that is voluntarily assumed by those agents that wish to offer their products or services through the network. The idea, then, is to appeal mainly to self-regulatory mechanisms (for example, with regard to Internet servers and distributors)[23].

An important safeguard for the user-consumer could be introduced which would consist of the identification of those offering goods or services on the network with a "logo" signifying that they accept the conduct of code. This acceptance would be guaranteed by public or private controls or audits and a freely consultable register. A good example could be provided by the Community system of granting eco-labels and the systems of eco-audits[24]).

In this field the European Community can, therefore, make a decisive contribution. On one side by maintaining a clear policy in relation with the role to be played by private agents; on the other side concerning the profile of public authorities as regards the accrediting and control of those private concerns and the definition of their conduct.

Harmonization of legislations

In criminal matters. Intervention of State authorities and international co-operation in judicial and police matters

However, the prevention and prosecution of illicit activities concerning pre-paid cards or conducted through the network (in the case of digital money) falls to the authorities of the Member States[25]. What means do these authorities have at their disposal to exercise this control and guarantee that operations with digital money respond to certain standards of conduct?

The penal codes of the States that make up the European Union include laws penalizing the various offences that can be committed with regard to electronic money (removal or use of the card without the consent of the holder, forgery, fraud, etc.). However, a comparative study of these legislations reveals considerable differences in the treatment

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23 On the same subject, see the INFO2000 report on illicit and harmful contents on the Internet, presented to the European Parliament on 16th October 1996. In this report it is proposed to set up an organisation to invigilate the regulation that the users of the network should impose upon themselves. This organisation, of an independent and transnational character, should include representatives of the industry and the users, in order to inform of the existence of possible breaches of the code of conduct, without affecting any legal action taken. This self-regulatory organisation would also serve to safeguard the legality of transactions conducted on the Internet. On detecting fraudulent contents, the necessary action would be taken to expel the offenders from the network and inform the servers accordingly.

24 Set forth in Regulation 93/1836 of 29 June 1993 (OJEC) L 168

25 The INFO2000 report on illicit and harmful contents on the Internet, presented to the European Parliament on 16th October 1996, attributes to Member States responsibility for monitoring, in their territory, the legality of the contents of the Internet and for taking action to avoid conduct that might distort the correct functioning of the market and of economic transactions.

of these crimes and, on occasions, legal loopholes and unclear provisions with regard to certain types of offence[26]. Since the organs of the EU do not have regulatory powers in this matter, it would be advisable at the very least to promote the harmonization of legislations and, above all, for the efforts of the Member States to be coordinated to ensure the effective pursuit and penalization of criminal operations. It must be borne in mind that this is an entirely supranational situation in which offences can be committed in a State from outside its borders, notably in the case of money circulating through a digital network.

In effect, the problem lies in the essentially international nature of the network. States can be completely powerless to stop certain activities that affect their territory directly. States can exercise their authority over local network distributors, but not over distributors in other countries, who can give membership of a server, and therefore allow access, to organisations or persons whose conduct is considered to be illicit according to the legislation of one or other State. Certain operations may be permitted in some countries while in others they are completely illegal. And finally, at present it appears to be technically very difficult to prevent the information supplied by a server from reaching particular points of the network. The only way would be to expel the corresponding web page from the server, thus rendering this information or service unavailable to users in other countries where the activity concerned may be entirely legal[27].

The authority and legislation of States is limited, then, to the actions of local distributors[28]. These must comply to national legislation and the corresponding administrative controls, and are liable to be penalised according to the provisions of the national laws. Clearly, however, these laws and administrative powers can easily be obviated simply by hiring services through a foreign distributor. Under the circumstances, it is out of the question to forgo the worldwide framework of the Internet phenomenon if electronic money operations are to function normally. The only solution is to adopt codes of conduct on a supranational level, harmonize legislations and elaborate international treaties, and also, naturally, to definitively step up international co-operation, on the police and judicial levels, so that conduct considered illicit according to the corresponding codes or international treaties can be duly pursued and penalised in any State in the world[29]. The role of the European Union would appear to be fundamental in this context, firstly because it is the most appropriate framework for obtaining consensus in Europe as a whole, and secondly because it fulfils all the conditions to act as a catalyst for a more global agreement, triggering consensus between the other members of the triad (United States and Japan)[30].

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[26]On offences relating to pre-paid cards, the *Report to the European Commission* mentioned above is most illustrative. op. cit. pp.11-14 and 19-21.

[27]The events of December 1995 in Germany are sufficient illustration of this: CompuServe temporarily blocked worldwide access to certain pages with pornographic content, in response to a German court order for its suspension from the corresponding directory. This was the first time CompuServe, who supply on-line services from the United - States to more than four million subscribers in 140 countries, suspended access for reasons of content, given the impossibility of doing so for one or several countries. See *Communications of the ACM*, June 1996, vol. 39, no. 6, p.75. Also in Germany, at the request of the district attorney of Mannheim, T.Online, a subsidiary of the telephone company Telekom, blocked all access from Germany to a Nazi discussion forum on the Internet. See *El País*, 27 January 1996.

[28]Moreover, censorship by States of the content of the information is very difficult, as the attempts that some have made in this direction show. On this subject, see *Communications of the ACM*, June 1996, vol. 39, no. 6, pp. 73 ff.

[29]In this regard, see the INFO2000 report, op. cit.

[30] In connection with this, see the French proposal of 23 October 1996 to the OECD, to elaborate a charter for international co-operation on the Internet:(http://www.telecom.gouv.fr/francais/activ/techno/charteint.htm).

Establishment of an institutional infrastructure designed to identify on-line operators in order to guarantee trading security and evidence in court. Digital signature systems

In order to enable the circulation and trading of digital money, the transmissions of money on which the transactions are based must be conducted with a high degree of security. In other words, a mechanism is required that enables anyone operating through the network to ascertain the authenticity of the document and the identity of the other contracting party, with whom relations are not direct but merely digital; and also enabling the legally binding provision of consent and the file of information on an electronic medium to be accredited in judicial proceedings by some evidential means[31]. This need can be met by introducing a digital signature system (see annexes 1 and 2), which requires, when it involves an indeterminate number of users, the intervention of a so-called trusted third party or (TTP). The services of this mediator can be considered as a value-added communication service, available to users who wish to increase trust in the services they use. TTPs would offer value added with respect to availability, integrity, confidentiality and guaranteed communications. Although TTPs can be set up in a given country on the basis of its own legislation, they ought to be capable of offering trust on a supranational level[32].

The State of Utah (USA) seems to be the first jurisdiction to pass a digital signature legislation at the international level. The legislation was based upon American Bar Association Guidelines. This legislation seems to be a compulsory reference in the legislation that are being developed throughout de world. In Europe, the German Ministry of the Interior (*Bundes-ministerium des Innern*) has prepared a bill on digital signatures with the aim of guaranteeing security in electronic legal trading[33]. We are not aware of the existence of any similar legislative initiatives in other States in the Union. However, it would appear to be highly recommendable for the European Community to encourage the creation of this type of infrastructure, by setting certain standards allowing compatibility and interoperability between all the digital signature systems to be introduced in Member States. This process, like any standardization process, should involve the participation of manufacturers, users, the Administration and other agents connected with universities, research bodies, etc. A particularly important part would be played in this process by both the CEN/CENELEC[34] and the SOGITS (Decision 92/242/EEC).

2.4.2 Internet and the next generation of multipurpose cards. Some social aspects.

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31 Although the issue cannot be dealt with here, it should be noted that there is considerable diversity between the value attributed by the procedural laws of European States to evidence by electronic document, to the extent that the harmonization of legislation in this regard is also an issue. For further reading on the subject, see J.W. Blitz's study, which includes an overview of the treatment of this means of evidence in the legislation of several European States and other countries. See also *Urkunden-beweisrecht und Elektroniktechnologie. Eine Studie zur Tauglichkeit gesetzlicher Beweisregeln für elektronische Dokumente und ihre Reproduktionen im Zivilprozess_*. C.H. Beck, Munich 1996.

32 See Izquierdo Loyola, V., "La normalización de la seguridad de los sistemas de información en Europa", in *Novatica*, no. 115, 1995, p. 19.

33 *Vor-Entwurf eines Gesetzes zur digitalen Signatur* (*Signaturgesetz-SigG*), of 19 August 1996, is intended as a contribution to the debate on the bill concerning the information and communication service, *Informations- und Kommunikationsdienste-Gesetz* (IuKDG). A commentary on the bill can be found in Bieser, "Bundesregierung plant Gesetz zur digitalen Signatur", *Computer und Recht*, 9, 1996, pp. 564 ff

34 Standardization bodies recognized by European legislation (Directive 83/189/EEC).

It has already been explained that multipurpose pre-paid cards can incorporate uses other than that of electronic purses. Some of the electronic purses already on test combine the pre-paid storage of value with debit or even credit functions, and others are also operable on the phone. Prior to smart cards, it was already possible to send details of a credit card via electronic mail or down a phone link, but the disadvantages were that a record of the transaction was kept (no anonymity, while some smart card schemes allow for that) or the danger of credit card numbers being used for non authorised purposes (low degree of security). Furthermore, with the old system the seller must waste some valuable time in processing the card information. Information processing costs made credit cards too costly for payments below US$2.25 to be worthwhile (Retail Banking Research, 1995). Processing cheques is even more costly. This amount is too small as to be economically feasible on a centralised credit or debit card system, as the ones currently in use.

The technology in the chip should allow secure remote transactions. In general, security systems developed for smart cards are much more sophisticated than the ones in magnetic bands, though there is an obvious security disadvantage in the fact that no checking is made with a remote system each time a transaction.

Smart cards have also been used for different purposes in fields such as health and insurance. The technology embedded in the chip can allow new markets to develop in areas such as the Internet or multimedia services for home users.

- Payments across the world via the Internet or cable TV
- TV shopping: smart cards will allow consumers to pay as they buy on TV shopping.
- Video on demand: where you can pay for watching a video whenever you choose.
- Personal Computers: the addition of a standard slot into a personal computer that will transmit cash securely will provide unprecedented access to the largest shopping mall in the world: Internet.
- Home banking, through telephone lines.
- Also adapting telephones to accept and transmit cash among private holders, with high security levels.
- Files of personal information

Overall, the widening of the use of smart cards and the strong links that are expected between smart cards and Internet will bring some changes to social issues. Benefits derived from additional applications of these technologies have been mentioned above. The following paragraphs focus on some threats that smart cards and Internet may pose. Governments and policy makers may want to adapt their actions as to cover these new concerns.

Forgery. Chip technology offers greater protection to forgery when compared to "traditional" technologies. Approaches to security vary greatly among schemes. Sometimes it is based on making forgery not economically feasible, by limiting the benefit from breaking in the chip. In other occasions, efforts concentrate on the protection of the chip against tampering.

Recovery of loss. In general, accountable systems provide for recovery of lost, stolen or damaged cards. Most non-accountable systems, which are designed to keep privacy, have the drawback of not providing recovery for loss, much like it happens with real cash. If the relevant information is stored in a chip on a card, or on the hard drive of a computer, and this hardware breaks down, the user might lose everything. This problem is not acute as long as balances are relatively small, but the greater convenience of the systems can induce users to increase those balances, and thus the losses in case of failure. This problem is so evident, that we may expect the development of some sort of backup mechanisms for the methods that suffer from it. Regarding forgery and recovery for loss governments can analyse whether current legislation in these issues could be modified as to apply to new technologies.

Privacy with smart cards and at the Internet level. It has already been stated that some schemes allow for anonymity (by being untraceable by the issuer) and some other schemes are centralised (the issuer can keep record of all transactions).

Data protection. To gain people's trust on smart cards access to personal information should be restricted to institutions that have obtained costumer's authorisation. Equally important is the fact of consumer having access to their personal information held by institutions. Also, consumer's consent should be required for any additional uses of personal data that consumers provided for specific purposes. In this sense, extending current data protection regulations to the use of these new payment methods should contribute to gaining consumers' acceptance of these technologies. Box 2.4 summarises threats and opportunities of digital money.

Box 2.4 Risks and failures of Digital money

The Good

Convenience and flexibility	E-Cash is more convenient and flexible than traditional money.
Costs	Banks that issue E-Cash could find it much cheaper than handling cheques and the paper records that accompany traditional money. With conventional systems it is estimated that a significant part (30-40%) of the interest rates are needed to cover the management costs. The use of electronic money systems should have a clear impact to on the reduction of these costs.
Privacy	Consumers doing business on the Internet will find some forms of electronic money afford much greater privacy than using ordinary credits cards.
Theft and counterfeiting	If the E-cash system works as planned there would be low risk of theft. The same applies for counterfeiting. Paper cash is threatened by new generations of high quality copiers, while E-cash could avoid this risk.

The Bad

Growth control	An increase without control in the number of Electronic Cash systems, could undermine bank -and government- controlled money systems, leading to a confuse and inefficient situation. Systems for electronic transfer of funds have played a significant role in past financial market crises. The risk of such market problems could increase with the widespread of Internet systems.
Technological reliability	Electronic Cash may be less secure than bank money. If the system crashes, the money stored on a PC could be lost forever.
Dual society?	Electronic Cash could foster a have and have-not society: Those with PC would have ready access to the digital money, while those without, many of them low-income consumers, would not.

The Ugly

Tax evasion	Money laundering and tax evasion could proliferate in stateless E-Money systems as criminals use untraceable cyber dollars to hide assets elsewhere.
Counterfeiters	If systems do not work as planned, counterfeiters could create their own personal brands of Digital money that would be indistinguishable from real money.
Damages to innocent consumers:	If computer hackers or other criminals were to break into Electronic Electronic Cash systems, they could instantaneously filch the electronic wealth of thousands or even millions of innocent consumers.

Sources: Business Week, 1995, Panurach, 1996, Tanaka, 1996 and self elaboration

2.5 The single currency and electronic money[35]

2.5.1 E-money and the introduction of the Euro

It should be stated unambiguously that, making abstraction of the many problematic issues that are discussed in this paper, the new electronic payment methods can be a great help in reducing the frictions associated with the implementation of the EMU. Prior to the introduction of the single currency, smart cards and Internet payment systems can raise efficiency in the settlement of small transactions. One needs only consider the use some of these methods (smart cards, Internet payments) could have for the settlement of small transactions:

- Users would not have to worry about physically carrying different currencies when travelling within the EU.

- There would be no need for users to calculate exchange rates (between their own and other countries' currencies, and the European–wide currency).

- Everything would be settled transparently (given proper regulation), i.e., ideally there should be little difference between transactions carried out between EU members or within one of them.

Another side-benefit of Internet commerce and payments for the EMU, will derive from the enlargement of the markets. Via Internet, users have easy access to all the relevant information about markets geographically remote and, if the payment methods were reliable (at least within the EU framework), the transactions costs associated with operating with remote markets would basically be negligible, even for small transactions. Therefore, so far as the new methods represent the spread of information and facilitate the convenience of the payments, they work decidedly towards the lowering of the costs associated with the transition to the EMU.

In the EU countries there are currently more than 82 different notes and many more different coins. The new electronic money technology could work towards the simplification of this heterogeneity, and therefore facilitate the transition to the single currency. Cash handling costs (year 1992) in the EU economies were estimated at around US$45 billion a year (APACS, July 1993).

One fact we must take into account is that the main difficulties with the introduction of the single currency will in all likelihood come not from the consumers' side, but from the firms, the financial institutions and the public administrations. The main problem for consumers derives from the necessity of having to deal simultaneously with two different scales of value, but the other institutions we have mentioned have more substantial problems, like having to modify their information and accounting systems.

The spread of the new electronic payment methods, coupled with the advantages of electronic commerce, will facilitate the introduction of firms to European-wide markets, and in this sense will greatly enhance the benefits of the monetary union in terms of efficiency of firms and consumer welfare.

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[35] See also Chapter 5

Europe has a relevant experience in the smart cards market[36]. It is, in many ways, ahead on this field. This experience should provide an advantage in competing on this technology in the worldwide markets. However, European Union policies should provide the additional support for successful development and implementation of the new technologies.

With the introduction of the Euro in mind, special consideration must be given to the new payment instruments. The timing issue can be of great importance when introducing the Euro, and advanced technology, such as pre-paid cards, can help at speeding up the introduction of the new currency. One of the big challenges posed by the transition to the single currency, is the production of physical units of currency sufficient to meet its demand as the Euro is being adopted. Another technical problem is the need to implement changes in automated teller machines throughout the continent. A widespread use of electronic money could contribute to considerably soften both problems.

The spread of smart cards and e-money in Europe, will encounter difficulties due to the heterogeneity of approaches to banking and card issuing in different countries: the system in Italy is hugely fragmented; Germany has four banking associations, which consult in a congress called the ZKA; France has a sole payment association, the Groupement des Cartes Bancaires; in Spain, different smart card schemes have appeared (Sistema 4B, Visa-Semp, and the one supported by CECA).

At this early stage of implementation, the fragmentation can be more easily overcome than at later stages. Achieving this goal would help in the development of a smart card European technology, and would give Europe a better stake in setting international standards.

The European Commission has already approached the issue. In a report by the Commission, recognition is given to the fact that the community itself can play a catalytic role in the development of a European payment systems technology. It also recognises that delays could have negative effects on the socio-economic development, growth and employment in the EU.

2.5.2. European central banks, electronic money and standards

An active role in the framework of monetary policies

Many different analyses insist about the fact that central banks should take up a more active role as regards e-money. The Report of the Bank for International Settlements (October 1996) concerning the *Implications for central banks of the development of electronic money* pointed out some issues that require particular attention from central banks: how could the role of central banks as overseers of payment systems be affected, the possibility of losing seigniorage revenues because of a substitution of e-money for

[36] In Europe, smart card technology has been in use for some years. France, has had since 1984 smart cards based pay phones. And since 1994, smart card technology has been incorporated into the Cartes Bancaires. In Germany , smart card technology has also been widely introduced, as with the case of The Versicherungs Karte for health insurance, introduced in 1993. Other smart card schemes include Avant card in Finland (originally developed by the Finnish Central Bank; and recently privatised), and Denmark's Danmont. Prepaid multipurpose cards schemes are currently developing in Belgium, Portugal, UK and Spain.

cash, the necessary adjustments of monetary policy that would have to be made, the degree of supervision by central banks of the emission and circulation of e-money, and the control of the risks that can arise.

The involvement of banks (or other recognized credit institutions) in the creation of electronic money holds certain advantages. In particular, since these organisations are subject to strong discipline and administrative intervention, the authorities can exercise a degree of vigilance as regards tax and exchange control in order to avoid fraud and capital flight. Furthermore, in this way users can benefit from the protection granted to deposits placed in credit institutions.

From an economic point of view, another very important aspect of electronic money is the future compatibility of the current initiatives, and the standards that end up prevailing, either because of market forces or by legal imposition. Whatever happens now can have a decisive impact on the future. The large majority of recent analyses point in this direction. Economists (Farrel and Saloner, 1985) have studied the difficulties of switching to a new and improved standard when an old one dominates the market, and have shown how there may be an important inertia effect that causes the better standard not to be adopted at all.

Economic analysis of compatibility and standardization

In general, the presence of incompatible standards represents a limitation for the end users, and there are social gains associated with a move towards compatibility. Personal computer users of a few years ago may remember the great difficulties of sharing information and resources between Macintosh and IBM-MSDOS users. The use of compatible systems would mean that the markets are larger, and therefore the risks for companies of introducing new products or technologies would be smaller. Also, the larger extent of the markets would promote efficiency.

Therefore, there are good reasons for a EU policy of setting certain standards pointing towards the compatibilty and interoperability between the systems to be introduced in the member states. This process should involve the participation of manufacturers, users, the public administrations and other related agents (Universities, research bodies, citizens' groups) and a particularly important part would be played in this process by both the CEN/CENELEC and the SOGITS (Decision 92/242/CEE).

It should be pointed out, however, that there are good reasons too for *not* trying to impose technological standards, but letting market forces act. The paradox is only apparent. Some technological aspects related to e-money are currently undergoing an active process of R&D. Impositions on this field could create a legal lock-in in a technology that could be obsolete before long. On the other hand, there are some aspects of the new technology, roughly those having to do with software as opposed to hardware, whose standardization would only facilitate the task of researchers of concentrating on the technological challenges. The EU policy should be directed towards setting an environment propitious for innovation, promoting cooperation and avoiding unnecessary duplications in certain areas, but letting the competitive forces act elsewhere.

In those aspects where standardization can clearly result in benefits to all parties involved, a EU initiative could mean the necessary impulse for its world wide acceptance. The diffusion of smart cards is dependent not just on the cards themselves,

but on the proliferation of accessory devices to read and operate with the cards. The number of those devices that are currently in use is still relatively small, but is growing fast.

The CAFE system was a EU initiative, developed with the goal of providing a framework for interoperability between various smart card systems. When dealing with different card systems, a first step is to have terminals capable of operating with all of them. The next step is to have compatibility at the cryptography level. Legislative measures aiming at compatibility are under way, but is it not clear enough whether different activities like CAFE, SEMPER or EMI plans, are all moving on the same direction. Gearing Europe towards the adoption of compatible electronic money systems can help the development of electronic commerce, which in the long run could have a positive impact on jobs and work flexibility.

In the recent past, there has been a rush of new companies offering payment methods via the Internet. There are not many economic analyses of the problems related by the introduction of e-money, but the number of articles is growing. In a recent one, Spar and Bussgang (1996) view Internet payments as just a means to settle very small transactions. One can take a broader perspective and understand the current work on new payment methods as the early stages of the development of a new technology that may be intrinsically superior, for the better conveniences it might offer, to the prevailing ones. Therefore, there is some likelihood that the new means will end up by substituting the old ones, at least to some extent, in the future. The obvious flaws that still characterise all these new methods (lack of security, reliability and control) should not induce governments and official institutions to dismiss them as little relevant, because there is a danger that the standards that end up by imposing themselves are far from good from a social standpoint: there are many historical precedents of a technological lock-in a socially undesirable standard (e.g. the QWERTY keyboards; see David and Greenstein, 1990, for a survey of the recent economic studies about compatibility standards and innovation). In the conclusions of their survey, David and Greenstein state that:

> "It has been recognised that the attractions of sharing in "co-ordination benefits" may be a source of unexpected and sometimes perverse outcomes when standardisation is achieved de facto, by market rivalry among variant formulations of a technology; or when standards-writing organisations are influenced by on-going market competition among products embodying alternative design concepts".

The following quote from McKnight et al. (1995) makes a strong point of the necessity of intervention in order to guarantee the creation of open standards:

> Furthermore, in the guise of enhanced security and advanced features, proprietary systems and partitioned markets lead to a lack of interoperability that further compromises prospects for society to realise the aforementioned benefits. Many of these problems can be avoided by an open policy making process that is informed by collaborative research and development activities.

There are currently many attempts to set up common standards, most of them having been initiated by private companies. The fact that standards are set by independent private organisations is an advantage when there is the suspicion that governments can try to

influence a decision in favour of national interests. However, private organisations are not proof against influence by interested parties. In a recent study, Lehr (1990), gives some empirical evidence of the strategic manipulation of private-sector SDOs (Standard Development Organisations). This suggests that public institutions should have some involvement in the process of setting standards, and monitor it closely so as to guarantee that the general interest is respected.

These arguments seem to suggest a definite course of action: the EU should take an active role in trying to impose common standards, sufficiently flexible to allow future improvements, and open so that there would be no a priory entry restrictions.

As is discussed above, the public intervention in the setting of standards must observe some caution. As a general rule, common standards can and must prevail with regard to protocols, which in the e-money case correspond basically to a flexible common language and an agreement on parameters that will allow the exchange of information. It would be much harder, and probably incorrect even if it were feasible, to try to force full hardware compatibility. First of all, because there is every likelihood that on the hardware side there will be significant technological improvements in the near future, and therefore any legally imposed standards on this field would only hinder the use of better technologies.

Also, any imposition of standards at the hardware level could have a negative impact on the value of the investments made by companies that are already operating on the sector, or planning to do so in the near future. What the EU can do in this case is try to favour voluntary agreements among the companies. There are good reasons at this early stages for private companies to get compatibility agreements: on the one hand, this would lower the costs of introduction, by eliminating unnecessary duplications of R&D efforts and allowing firms to share the costs, and on the other hand the risks associated with the acceptance by the market and its speed of introduction would also be shared[37].

A sound economic criterion to judge the standardization problem, is to consider the competitive aspects associated with it, and more concretely the barriers to entry. If a certain standard raises the costs of entry, public authorities should not favour it. For instance, technical specifications that would prevent companies with cheaper and/or better technologies to participate in the market, would be socially harmful. On the other hand, when an open standard makes easier for companies to enter the markets and develop their new products and technology, there are social gains associated with it. For example, some journal articles have argued that behind the battle between the main Internet navigators, there is a different fight for the imposition of open versus proprietary standards, that would have strong implications for the entry of other companies in the future.

Another economic aspect of relevance regarding e-money, has to do with consumers' welfare. In a paper that generated a lot of interest, Ausubel (1991) discusses the reasons why the American credit card market, in spite of having many companies supplying a basically homogeneous product, displays consistently very high margins and profits.

[37]A good precedent of the type of common protocol mentioned here, is html (Hypertext Markup Language), which is the language used on the Internet (World Wide Web); the introduction of this language was what made possible the explosion of Internet usage by the general public, instead of just academic and research institutions. Actually, the html was developed at CERN, an European institution.

Basically, the reason he attributes for this is the behaviour of consumers, who do not expect to incur in indebtedment, but end up by paying high interest rates on their outstanding balances. One question we should try to answer is how would e-money affect, and be affected by, this problem. The key to Ausubel's argument is that consumers get the credit cards for the conveniences they offer, not mainly for its credit possibilities, but the credit is what originates the relevant cost to them of this financial instrument. The various forms of e-money do not automatically solve this problem, and could well aggravate it. But there are some reasons to think that e-money could benefit consumers. One factor could be the better facilities for controlling the personal finances that can be associated with the new electronic payment systems. The problem with the behaviour of consumers with respect to the credit cards, lies in the fact that they do not usually have accurate information about their balance when they make the payments. Certainly, *prepaid* cards would act here like cash, and would not incur in this problem. But other forms of Internet payments are made when the consumer is at home in front of a computer, where he can easily access all relevant information about his finances. Therefore, on this regard also electronic money could end up by increasing consumers' welfare.

2.5.3 Planning the future

Along this chapter, we have pointed out some aspects that in the near future will generate special attention by policy makers. The changes in the payment systems originated by the spread of electronic means of payment, will be increasingly important. A variety of options are available in order for the systems to operate with guarantees:

Developing technological controls systems. A mix of technologies can be used to ensure security and privacy, and prevent fraud. The selected technological option will have a clear impact on cost, performance and the number of functions and purposes that the system will provide. These technological controls could include, among others: tamper-proof cards and circuits, encryption, digital signatures, threat and vulnerability analysis and biometrics.

Administrative controls. A system to authenticate the digital cash units (or electronic tokens) is needed. When an electronic token is deposited remotely in an account, institutions could authenticate themselves to customers, as well as have the customers be authenticated to the bank. Smarts cards could require methods for the point-of-sale terminal device or computer to authenticate itself to the smart card. "Watch lists" of bad cards or tokens could be maintained to facilitate early interception of known fraudulent activities.

*Audits***.** Anonymity does not mean untraceability. It could be useful that the systems were able to provide an audit trail of the exact path an electronic token had travelled. This audit trail could be used to detect double-spending and to prove that payment was sent, received and accepted. In this case, should records be maintained on user cards or devices or in a central bank's or issuer database?

The advent of the *cashless society* will change the policies and legislation currently in use, in many more ways than we have been able to briefly suggest in this report. Many aspects will be affected: tax collection, rates of exchange, monetary policies, privacy rights, consumers' protection, control of digitally stored information, ...The payment systems based on fiduciary money have been in use for many years, and thus many of the problems associated with them have been recognised and policies have been designed to alleviate them. E-money, on the other hand, has had very limited diffusion at this moment. Therefore, it is to be expected that many problems will appear over which we little know. But, in any event, the way in which governments be able of anticipating future problems and creating a mechanism flexible enough to allow for improvements and corrections, will determine whether and how e-money will be increasingly adopted and its potential gains in terms of quality of life and economic efficiency will be realised.

Box 2.5 Cryptography and policy challenges

Cryptography is another very important aspect of public policy about which we think the EU should adopt a clear attitude. We comment elsewhere on this report about the essential role of cryptography in permitting electronic payments to exist with sufficient guarantees. In anything that relates to cryptography, there is an important impediment: the US government's policy of export restrictions. The effects of this policy on the computing world are visible: some protection routines in many systems outside the US are considerably weaker than inside. For instance, the most widely used Internet navigator, Netscape, has incorporated in newer versions the possibility of encryption in order to protect the transmission of data through the net, but for the versions distributable outside the US the encryption is much weaker (i.e. a lot easier to decrypt)

A (legitimate) concern of governments is the potential use of cryptography for criminal purposes. Governments are also concerned about the use of cryptography to secure communications by other (potentially enemy) governments. On this regard, many people have argued that the public interest much outweighs all of these security considerations, though this is obviously a matter for citizens and legislators to decide. One of the most compelling arguments used is that the basic scientific facts of cryptography are no secret, and therefore any restrictions on the spread of cryptography will have a basically null effect on any governments or criminal organisations of sufficient entity, but will negatively affect many people who might benefit from it for lawful uses. For instance, it is very difficult to evaluate, but certainly very high, the amount of information that has been insecurely circulated through the nets because of the Netscape limitation we have mentioned.

One of the features of US policy about cryptography, is its intend to make people use cryptographic methods that would allow the government to hold a sort of "master key", in order to be able to better monitor criminal uses. For instance, this is discussed in the report entitled "Cryptography's Role in Securing the Information Society", available on the Internet, of the US National Academy of Sciences. Whether this policy can be sustained against the world wide spread of and technical advances in cryptography is doubtful. But again, it is up to legislators to decide on the relative weight of the advantages of this policy with respect to the defence of the citizens' rights to privacy.

Chapter 3.

The effects of ICT developments on relationship banking: implications for the financing of small and medium-sized firms

Chapter 3. The effects of ICT developments on relationship banking: implications for the financing of small and medium-sized firms.

In many ways, the ICT contribute to a significant lowering of the transaction costs and also to a reduction of the information asymmetries. With regard to transaction costs, we must take into account not only the improvement in the storing capacity, availability and processing of information, but also the changes in the way banks relate to its clients, with the great savings this implies in infrastructures. As to information asymmetries, they appear in lending operations, be it in the form of adverse selection, or in the form of moral hazard. The extent and usage of the ICT has opened up a process of standardization that has allowed loans to be traded in financial markets. This is limited, however, to the domain of big firms. For small and medium enterprises (at least in European markets), the main source of financing consists still of banking loans, based on a long-term relationship that allows mitigating the effects of information asymmetries. It is on this subject, the so-called relationship baking, and on the changes that ICT may bring about in it, that we focus this chapter.

3.1 Introduction

Together with financial liberalisation and internationalisation, advances in ICT have changed the banking business by lowering transaction costs and reducing asymmetric information. In this chapter, we explain how these changes may have implications for the viability of relationship banking, by examining the economies of scope and the duration of loans, that are essential to relationship banking. We find that ICT developments may reduce the importance of relationship lending for banks as a share of their total business. We are interested in examining these changes in relationship banking because of the relevance that it has in the financing of small and medium size enterprises (SMEs).

In the next section, we describe the main characteristics of relationship banking and outline the benefits and costs of this activity, with especial emphasis in the case of SMEs. In Section 3, we summarise the effects of ICT developments on the banking business. In Section 4 and 5, we link the changes in the banking business brought about by ICT developments to changes in relationship banking and summarise the consequences for the financing of SMEs. Section 6 concludes.

3.2 Relationship banking

Bhattacharya and Thakor (1993) explain the existence of financial intermediaries as a response to the inability of market mediated mechanisms to efficiently resolve informational frictions of different types. Accordingly, different types of informational frictions will be dealt with by different types of financial intermediaries (banks, venture capitalists, financial newsletters, investment banks, and bond rating agents, among others). To explain relationship banking we are interested in describing the type of informational frictions that are characteristic of this type of banking activity.

Boot (2000) defines relationship banking as the provision of financial services by a financial intermediary that:

- invests in obtaining customer-specific information, often proprietary in nature; and

- evaluates the profitability of these investments through multiple interactions with the same customer over time and/or across products.

According to this definition, there are two essential aspects in relationship banking: *proprietary information* and *multiple interactions*. By proprietary information, we refer to information that can remain confidential, is specific to a borrower, and is acquired by a bank through a costly information process. Multiple interactions refers to banks reusing the information learnt about a customer over time and / or through the sale of various products to the same customer. The existence of information that is reusable over time and across various products allows banks to share the costs of information production across various services or the subsidisation of a single service across time.

Boot (2000) also establishes three conditions on "information" for the existence of relationship banking as defined above:

- The intermediary gathers information beyond readily available public information;

- Information gathering takes place over time through multiple interactions with the borrower, often through the provision of multiple financial services;

- The information remains confidential (proprietary).

Another way of looking at characteristics of relationship banking is as in Degryse and Van Cayseele (2000). This is an empirical paper on European small businesses, that defines two measures of relationship strength: duration and scope. These measures relate to the conditions above and reflect the core characteristics of relationship banking. Duration is a measure of how long has been the lending relationship between a bank and a borrower; while scope refers to the extent of the relationship and is measured by the number of different services that a borrower purchases from a lending bank. These two dimensions of a relationship are also present in Petersen and Rajan (1994).

3.2.1 Relationship banking and SMEs

The conditions above suggest that relationship banking is likely to be valuable specially for SMEs (see also Boot and Thakor (2000)), because SMEs are the type of companies that have the kind of information asymmetries that match the conditions above. Moreover, SMEs have limited or not at all access to other forms of funding, which makes relationship lending the more valuable for them.

In the case of SMEs, for instance, information on the borrower quality is not publicly knowledgeable and therefore the information that the bank may learn on the borrower will be specific of this borrower and remain known to the borrower and the lender only. To gain information about the borrower is a costly process for the bank, but given condition three, a specific bank will be able to keep the benefits arising from the information search. The bank's comparative advantage in gathering information about a potential borrower arise from the range of services (economies of scope) that banks provide to a same customer, for instance letters of credit, deposits, check clearing and cash management services. Through selling all these services, banks can expand the information available about the customer and use it when lending funds. Similarly, the longer the time (duration) that a customer has been a client with a bank, the more information will be available to the bank to use in lending activities with this customer.

3.2.2 Benefits and costs of relationship banking

In the following paragraphs we briefly examine the benefits and costs of relationship banking. Boot (2000) indicates that relationship banking can facilitate a Pareto-improving exchange of information between the bank and the borrower. Bhattacharya and Chiesa (1995) explain that relationship lending enables the revelation of proprietary information that would not be revealed in transaction lending or capital markets funding. This reduction in informational asymmetries is the first benefit of relationship banking. Relationship banking also incorporates several beneficial contractual features:

- relationship lending leaves room for flexibility and discretion permitting the use of subtle, non-contractable information.

- relationship lending includes extensive covenants that allow for a better control of potential conflicts of interests.

- relationship lending makes possible to include collateral that needs to be monitored.

- relationship lending makes possible value-enhancing inter-temporal transfers in loan pricing, in the sense that permits the viability of loans that are not profitable in the short - term but can be profitable if the relationship last longer.

Two main costs can result out of relationship banking:

- the soft-budget constraint problem, which refers to the potential lack of toughness on the part of the bank in enforcing credit contracts. This may occur because it might be in the interest of the bank to extend further credit to the borrower when this latter encounters difficulties in paying back the loan. It can also give rise to perverse ex ante incentives on the part of borrowers.

- the hold-up problem has to do with the information monopoly the bank generates in the course of lending, and which may allow the bank to make loans at non-competitive terms in the future for the borrower. An empirical study by Degryse and Van Cayseele (2000) suggests that the hold-up problem might be quite significant in Europe. A potential solution to this problem is for firms to have relationships with several banks. However, that may worsen the availability of credit (as in Ongena and Smith, 2000.)

In the next section, we present the effects of ICT developments on the banking business. Our discussion is not limited to the effects of ICT on relationship banking (or the traditional activity of banks) because these latter are in turn related to changes in the various functions performed by the banking sector.

3.3 Effects of ICT on the banking business.

Recent trends in the banking business

ICT developments have had a strong influence on the structure and the activities of the banking sector (ECB, 1999). The elements that have changed are several. Besides allowing transactions to be conducted more efficiently, technology allows banks to market their products more effectively. For example, banks build up sophisticated databases containing information about their consumers, and through data mining they are then able to target their commercial efforts more precisely, knowing which range of products individual consumers might be interested in buying. Technology also affects the very products that banks sell. For example, technology allows banks to apply credit-scoring techniques to consumer credits, mortgages or credit cards, automating part of the process; in this way, products that used to be highly dependent on the institution's evaluation of its customer, have become more standardized. This process is known as *commoditisation.* The commoditisation of products is also encouraged further by technology allowing the unbundling and re-bundling of products, and their separate delivery to the customer. Similarly, technology allows these same products -for example a loan to a company- to be traded in capital markets *(securitization)* instead of remaining in the bank's balance sheet.

Another result of the new environment has been the process of *disintermediation.* This process has various dimensions. By disintermediation we normally refer to banks losing share of financial intermediation to institutional investors (investment funds, insurance companies and pension funds). This is true for both bank assets and liabilities, although it is in the collection of savings where this process has been the most pronounced with mutual

funds, pension funds and life-insurance policies capturing funds at the expense of bank deposits. This tendency should however be evaluated with care. In several EU countries, most of the institutional investors are included in banking groups, and therefore the loss in share of financial intermediation might not be so when considered at the level of banking groups which, in fact, can offer to their clients traditional deposits, investment funds and pension funds as alternatives. On the assets side, disintermediation has also occurred in the provision of credit, where capital markets have been gaining share at the expense of banks. Yet, banks continue to have a natural advantage in the financing of households and SMEs, as in this activity asymmetric information and transaction costs remain important. There are two more additional dimensions of disintermediation and these are not linked to institutional investors. These are disintermediation at the level of back-office operations and in the distribution of banking products. With regards to disintermediation of back-office operations, information technologies play an important role because they allow gains from centralising activities with large economies of scale (for instance, payments processing may be pooled between several banks or contracted out to specialists). Disintermediation regarding distribution activities involve the deployment of new distribution channels by banks (some Internet banking sites) as well as outsourcing of these channels (for instance, some ATMs in the United Kingdom are not owned by banks and some banks use supermarket chains as a distribution channel in Spain) or through alliances with firms in the ICT sector (for instance some Internet portals (See also below).

The tendencies above have produced changes in the structure of bank income [1]**.** As a result of increased competition that has lowered margins in lending operations (the banks' traditional business) banks have diversified their sources of income and rely increasingly on income from fees services rather than interest rate spreads. Fees charged for services include typical banking activities like payment transactions, safe custody and account administration. These activities are, in general, less volatile than fees and commissions charged on activities which are affected by economic and cyclical developments (e.g. underwriting activities, brokerage services, treasury management, transactions on derivatives, private banking, credit card business). This change is also reflected in the increasing size of off-balance sheet items in the banks' financial accounts.

Overall, changes in the structure of bank income are indicators of changes in the range and composition of activities undertaken by banks. We discuss changes in banks activities by looking at the main functions of banks.

[1] See also chapter 4.

3.4 Effects of ICT developments on relationship banking

Freixas and Rochet (1998) list the functions performed by banks as:

- Payment systems

- Transforming assets

- Managing risk

- Monitoring and information processing

We examine the influence of ICT on each of these functions in turn. We then summarise the implications for relationship banking originating from a combination of the changes in the functions described before.

3.4.1 Payments systems

Among the functions performed by banks is the provision of a payments system, the method of conducting transactions in the economy.

The payments system is centred on banks and, currently, the banking system intervenes, directly or indirectly, in practically all payments, both domestic and international. Although electronic means of payments have been around for many years, continuing ICT developments mean that, increasingly, hard currency is being substituted by accounting entries that are later settled among institutions. In this manner, cash remains the preferred means of payment for transactions involving increasingly smaller amounts. This is a consequence of a reduction in the transaction costs of paying by electronic means (credit cards, electronic purses, etc.), which result in more efficient payment systems.

Besides a contribution to the efficiency of the payments system, ICT developments have also implications on liquidity. As a matter of fact, the provision of a payments system originates from the function of banks as providers of liquidity. Banks, and depository institutions more generally, can be seen as "pools of liquidity" that provide customers with insurance against liquidity shocks[2].

Summarising, we have that, on one hand, ICT developments contribute to a more efficient payments systems. On the other hand, a more efficient payments system has effects on liquidity and thus on banks' liabilities[3].

[2] As, for instance, Diamond and Dybvig (1983).
[3] Declines in transaction costs brought about by payments technologies have had an important effect on the liabilities of banks (Mishkin, 1999).

At the core of the European universal banking industry is the payments system, and the core of the payments system is the demand deposit (checking or current deposit account). Demand deposits are characterised by their liquidity feature, which gives customers the possibility of withdrawing funds when needed. Banks have various means to charge for the provision of liquidity. They can do so through charging customers directly (management fees, or low interest paid on funds) or indirectly. This latter will occur when deposits serve as a means of selling other bank products, or because deposits can be seen as inputs to the production of other services.[4]

With regards to banks charging directly for the provision of deposits, the starting point is to remind that because banks have the monopoly for deposit taking, deposits have traditionally constituted a natural source of funding for banks. Electronic payments will contribute that deposits are less profitable for banks because technology (for instance, Internet) has lowered the costs for customers to gather information on banks' offers and to move accounts to a new bank. As a result, there is increased competition in capturing deposits which makes banks sometimes to compete for new accounts at a price above cost. On the other hand, through allowing a faster and cheaper spread of information, ICT have also affected the demand side of the banking business. Lower switching costs for customers might bring changes in the traditional customer inertia in the sector, and increase competition.

Some implications of these trends for relationship banking can be found, for instance, in Berlin and Mester (1998). They suggests a complementarity between deposit taking and lending in the sense that rate-insensitive core deposits allow for inter-temporal smoothing in lending rates. If this were the case, increased competition on deposits would threaten the viability of relationship lending.

Another instance of possible implications for relationship banking refers to lower switching costs and duration, and is studied for instance in the loan commitment literature where it is emphasised the importance of inter-temporal tax-subsidy schemes in pricing to resolve moral hazard (Boot et al (1991)) as well as the complementarity between deposit taking and *commitment* lending (see Kashyap et al. (1999)).

With regards to banks not charging directly for the provision of payments services and liquidity, it is worth noting that in Europe it is an extended practice that traditional banks run current accounts as loss leaders, on the basis that they can cross-sell other products such as credit cards, retail brokering services, savings accounts and consumer loans, to their existing account holders. This clearly points at economies of scope originating with the provision of deposits. In this respect, ICT will reduce the amounts of deposits that households are willing to hold[5], at the expense of growing participation in pension funds and mutual funds[6]. From the point of view of banks, deposits may cease to be the main source of funding, whereas funding from insurance and mutual funds will gain in

[4] In the empirical literature of Industrial Organisation on banking, deposits are sometimes considered inputs to the production function, and sometimes considered outputs (For instance, see a review by Neuberger (1998)).
[5] Mishkin and Strahan (1999)
[6] ECB (1999)

importance. Again, this lowers the possibility of the economies of scope between deposits and loans in relationship banking.

On the other hand, economies of scope may also appear in relation to other aspects of the above events. The development of mutual funds has allowed banks to maintain market share in capturing savings, increase efficiency of their distribution network by using it to distribute new products, and reduce the impact on their income deriving from spread margins towards other from more sophisticated intermediation measures. With regards to the traditional range of banks products, there are new competitors entering the market which skip the provision of current accounts (that, as said, tends to be a non-profitable service) and focus on commercialising other more profitable products like credit cards, consumer loans, or savings accounts.

What is essential to note in the instances above is that the economies of scope that originate with ICT are not related to activities with information asymmetries, and thus not characteristic of relationship banking.

A further indicator of banking businesses reducing services characteristic of relationship banking, is provided by the banks' new trend of unbundling the different services that were traditionally embedded in a current account. Thus, they offer an increasingly wide range of deposits that pay various returns depending of management costs associated with the account. This might be a threat to the bundled and cross-subsidised model of traditional banking, by similarity to the situation modelled in Berlin and Mester (1998).

An additional issue to consider regarding ICT, is the monopolistic situation of banks in the provision of payments services. Technology has undoubtedly brought about changes in the production of payment systems. Because electronic payment technologies require large fixed investments and often require networks that exhibit increasing returns, banks have already started centralising and outsourced parts of the payments services, like for instance cash management and, more significantly, established alliances with other banks, financial firms and software and telecommunications firms. Thus, although nowadays banks continue to be at the heart of the retail payments in Europe, the role of financial intermediaries in the provision of payments systems is changing. This, of course, may also affect economies of scope between deposits and lending activities.

Since the pace of technology development in this field is expected to continue we should expect that the importance of electronic payment systems will increase. Moreover, given the tendency for telecommunications and other non-financial firms to participate in payment systems (Van Hove, L., 2000), it would be interesting to review the feasibility of maintaining the payments systems centred on banks deposits. In Europe, with the introduction of the European Union Directive on electronic monetary institutions, a first step has been taken to ease the participation of non-banks in the issuing of payments instruments that is very limited in many countries (Liedevelt, 2000). If this trend were to continue, banks would increasingly loose access to the information on customers that is embedded in their record of payment activities. Then, banking activities relying on access to customer specific information gathered through the provision of payments services

would be more difficult or more expensive. Banks could react by engaging less in activities with economies of scope with deposits.

At the limit, if economies of scope between banks' liabilities and assets where non-existent, the role of banks in the economy as it is now (including public subsidies in the form of deposit insurance) could be questioned. In this direction, Gorton and Pennachi (1993) argue that the traditional structure of banks of borrowing short and lending long, may become obsolete. Alternatively, two set of institutions, some of which provide loans and some of which provide liquidity services could do the same job as financial intermediaries. This idea also is also related to the asset transformation function of banks that we examine below.

3.4.2 Transforming assets

One of the aspects of asset transformation is related with what is sometimes called an indivisibility: a loan that is demanded by a large firm should be made up of sums of money that many small savers are willing to lend. If there is a moral hazard (imperfectly, or costly, observable behaviour of the borrowing firm) problem, then a market solution would not be implementable. And even if the savers could communicate and decide on a system of monitoring, there would still remain a strong incentive to free ride on it (let the other do the monitoring). In this setting, a banking institution appears as an efficient way to collect the deposits from the savers and perform the monitoring. Here, the effects of ICT on deposits discussed in section 3.4.2. apply also; with mutual funds and insurance companies' activities also dealing with indivisibilities: mutual funds and insurance companies collect small amounts from savers and can then lend large sums to banks or invest in financial capital markets.

There is also another aspect of asymmetric information related with imperfect observability of the firms characteristics (adverse selection). The bank may have better knowledge about a lender's situation, if the latter is a regular client of the bank. The longer the time that the lender has been a client to the bank, and the more products (including demand deposits) that it has bought, the more the bank will know about the client. Thus, relationship banking appears as a means to overcome adverse selection problems.

That is, when asymmetric information is important, a bank's loan to a firm becomes a specific (that is, a non-standardized) product. But currently, mainly thanks to the influence of ICT, there is a standardization process under way in the procedures related with credit markets.

For large (and/or longer-term) credits, firms rely increasingly on debt markets, in which they can obtain cheaper financing than via bank loans. This process has been made possible because information about large businesses is more easily obtainable. In Europe, with the introduction of the euro, the corporate debt markets have achieved a critical scale that allows them to operate efficiently.

As regards small short-term credits, banks themselves have been using increasingly standardized credit scoring techniques that automate the decision process. Part of the process relies on credit history information which is widely available, and it is efficiently processed by computers. The standardization has helped the process of *securitization* of these loans, by which the financing and part of the risk of the operation are spread through financial markets.

Therefore, we are in a process in which the importance of banks (and, in general, of financial intermediaries) diminishes and the financial markets play a more relevant role. For relationship banking, the trend is even stronger, with relationship activities remaining mainly where standardization, and then securitization, can not yet be applied.

Another aspect of asset transformation is the change in maturities. That is, banks used to transform deposits with short maturities into loans with longer maturities. But financial markets are more efficient at playing this role, if there are no obstacles to their working, like asymmetric information problems. Since long maturities increasingly do not imply long- term relationships with banks, we might expect that duration, as a characteristic of relationship banking, might be more difficult to attain.

3.4.3 Managing risk

Freixas and Rochet (1998) list the following sources of risks affecting the banks: credit risk, interest rate risk, liquidity risk, and the risk deriving from off-balance-sheet operations.

The management of risks in the banks is nowadays much more sophisticated thanks to the much wider possibilities offered by financial markets than in the past, and also thanks to the computer technology. The wide range of financial products existing in the markets, facilitates a very precise valuation of risk, and banks are able to decide at each moment which is the amount of risk they are willing to take, and which is the amount they will shift through the markets.

The development of non-interest income by banks is accompanied by a relative reduction in the classical intermediation activity of banks. This is likely to contribute more to changing the mix of risks than to reducing the total amount. In any case, this development is expected to make the management of banking activity more complex, the same as the monitoring activity of banking supervisors. Since relationship banking is among the classical intermediation activity of banks, we can make a plausible assumption that the type of risk embedded in relationship activities is becoming less important as a share of total risk incurred by banks.

Considering relationship banking from the point of view of expertise on risk management is in accordance with recent literature on this issue. Allen and Santomero (1998) argue that financial intermediaries should be studied focussing on risk trading and participation costs rather than institutions taking deposits and channelling funds to firms. This would be in response to declining transaction costs and asymmetric information, combined with an

increase in arms' length intermediation activities. In our analysis, this implies that relationship banking is no longer the core activity of banks.

3.4.4 Monitoring and information processing

Banks traditionally developed long-term relationships with their clients, intended to mitigate the effects of informational asymmetries (moral hazard and adverse selection problems). As said, this long-term relationship was also related to the exploitation by the bank of economies of scope, in the activities of collecting deposits, facilitating payments, and lending to the client. Another way of viewing this long-term relationship was as introducing switching costs on the banks' customers.

As information about banks' clients and their activities is more easily obtainable (something in which ICT play a relevant role), the economic reasons for this long-term relationship become less strong. We have also seen that the moral hazard side diminishes in importance with the availability of information and the standardization of credit scoring techniques, and the increasing reliance in the financial markets that is a consequence of securitization.

Another relevant aspect that has a negative incidence on the importance of the long-term relationship between a bank and its clients is the increased competitiveness of the banking sector, in part due to the availability of information about the different banks' products and services and their pricing policies. For instance, some of the new Internet banks and portals that are appearing, present their clients with a list of different alternatives, allowing easy comparison.

Therefore, the switching costs lose importance because of changes both in the demand side (increasing standardization and reliance on markets) and in the supply side (more transparency).

Chan et al. (1986) argue that anticipated shorter relationships might inhibit the reusability of information and thus diminish the value of information. With increased competition, banks may find it less worthwhile to acquire costly proprietary information. Increased competition may also have a negative impact on the inter-temporal pricing of loans, because of constraints on the ability of borrowers and lenders to share surpluses inter-temporally.

3.5 Effects of increased competition on relationship banking.

The trends presented regarding the various functions of banks, show that ICT have increased competition among banks and competition from the financial markets also. Although there is a clear intuition that relationship banking might loose importance, the more precise results will depend on the combination of the various trends suggested.

An interesting study on this issue is Boot and Thakor (2000). They present a model to study the effects of competition on relationship banking which distinguishes between relationship (qualitative asset transformation) loans and transaction (brokerage) lending. In their study, high quality borrowers receive transaction loans, which are less costly. For them, relationship lending adds little value and does not warrant the additional cost to the bank. Banks give loans to low and intermediate quality borrowers if it can capture the rents from the incremental value these loans add for borrowers relative to transaction costs. How much banks engage in both relationship and transaction banking is dependent on technology, competition, regulation and others, and is a strategic choice of the bank. The paper examines both the effects of banks and capital market competition. It finds that as inter-bank competition increases, banks make more relationship loans, but each has a lower added value per borrower. Competition due to capital markets reduces relationship lending, but each relationship loan has greater added value for borrowers.

In summary, the impact of increased competition on relationship banking is ambiguous and the effects on SMEs lending can be good or bad depending on the conditions under which greater competition occurs.

3.6 Conclusion

ICT developments applied to the banking industry are affecting relationship banking to a considerable extent. Relationship banking is turning from the main activity in the industry to a more specific service of all those provided by banks. Over the past years, relationship banking has been loosing volume but continues to be a value-enhancing intermediation service. Instead of being a general banking activity, it continues only where asymmetries of information remain important despite advances in ICT. ICT developments have affected the economies of scope and duration that are characteristic of relationship banking through changing transaction costs and information asymmetries in the various banking functions.

Relationship lending can enable funding for valuable investment opportunities. This applies especially to the funding for SMEs, for which banks' financing is many times the only available financing source. The effects of ICT on the viability of relationship lending are not clear. Given the significance of SMEs in most economies it would be interesting to continue research in this field.

Chapter 4.

An empirical study of the effects of technology on the Spanish banking sector

Chapter 4. An empirical study of the effects of technology on the Spanish banking sector

The structure of the Spanish banking market, and of the European banking markets in general, has substantially changed over the past decade, mainly as a result of the creation of EMU and of the application of technology developments in the industry. Typically, the Spanish banking sector has two sets of institutions with different corporate structure and aimed at different market segments. Both have been subject to transformation processes in the past years. The motivation for this chapter is to analyse empirical evidence of these changes for both commercial and savings banks.

4. 1. Introduction

This chapter[1] studies the effects of technology on banks in Spain during the period 1990-2000. We review first the main trends in the evolution of the Spanish financial sector in recent years.

The main forces affecting the Spanish financial sector during the 1990s have been financial liberalisation and technological change. With regards to financial liberalisation, an essential event during the 1990s has been the development of the successive stages of the European Monetary Union (EMU): the abolishment of the restrictions on the movements of capital in 1990 (First Stage), the establishment of the European Monetary Institute in 1994 (Stage Two) and the adoption of the single currency in 1999 (Stage Three).

The 1990s have also seen the follow up of the deregulation process that had begun some years before. Until the mid 1980s, the Spanish banking system, -as most European banking systems- was subject to important government restraints and controls that hindered competition significantly. Protectionism measures included control of interest rates and geographical restrictions. Preparation for and arrival of the EMU favoured the reduction of barriers and the establishment of a new regulatory setting based on minimum requirements across EU banking systems. Despite the implementation of the Single Market Program by January 1993; different taxation and legal regulation systems remain across the EMU. As a result, the integration of banking services has only accrued partially, and to a greater extent in wholesale than in retail banking. Currently, the two main banking institutions in Spain, commercial banks an savings banks, are still subject to differentiated regulation.

Aside from banks, the EMU has also brought about the integration of money and capital markets at European level. Technology has contributed to this process by improving the dissemination and the speed of information The integration of money and capital markets has eased access to both international investment opportunities and sources of funds for financial and non-financial institutions and for households.

Thus, financial markets in Spain have experienced tremendous growth during the last decade, whereas financial intermediaries have seen their share in channelling funds in

[1] I thank Mª. Angels Xabadia, Lluís Planas and Marc Sáez for their help with data analysis

the economy reducing (about 43% of GNP in 1999)[2]. Within the group of financial intermediaries (banks[3], investment funds and pension funds, dealers and brokers agencies, insurance companies and others), the trend during the 1990s has been the reduction of banks' market share at the expense of securities businesses and investment and pension funds.

In Spain, the disintermediation –or lower role of financial intermediaries- process should be evaluated taking into consideration that most non-bank financial intermediaries are part of banking groups. Even then, disintermediation has brought about important changes in the banking sector. In this respect, on the liabilities side of the balance sheet, banks have seen their natural (inelastic and at low-cost) source of funding -demand deposits- decline as investment substitutes have been made available to firms and households. In this instance, the percentage of households' wealth held in bank deposits and cash, declined from 61.4% in 1990 to 39,5% in 2000[4]. With regards to bank assets, corporate bank lending has partially been replaced with corporate debt. This market has expanded considerably in years 1999 and 2000, at a % annual rate; and is expected to continue growing.

4.2. Classification of the effects of technology on banking

In chapter 3[5], we have identified three main trends in the banking business. These were commoditisation, securitisation, and disintermediation. These trends were responsible for changes in banks' activities and, correspondingly, for changes in banks' income structure.

Following ECB (1999), and adding the trends above, we classify the various effects of technology on banking into:

a) the effects of technology on the management of information. These include: collection, storage, processing and transmission of information. Of the trends above, this category is related to commoditisation, securitisation, and disintermediation (excluding disintermediation of distribution activities).

b) the effects of technology on the way in which customers access products and services. This refers to the appearance of distribution channels other than physical branches, or remote banking. These distribution channels are: automated teller machines (ATMs), telephone banking and PC banking (proprietary software and Internet. It includes both distribution channels managed by the own bank, and distribution channels disintermediated.

In general, remote banking is expected to continue to develop in the next years and to become increasingly important to small and medium-size businesses. However, up to today, its scope is limited.[6] On the other hand, changes in the management of information have been taking place since a few years and their effects on the banking

[2] Bank of Spain, annual report 1999.
[3] Throughout this chapter by "banks" we refer to commercial banks and savings banks together.
[4] Source: Bank of Spain and INVERCO
[5] See section 3.
[6] See also Box 4, in Chapter 1.

sector are very perceptible. Because of that, we focus this study on the first type of technology effects on banking.

To assess the effects of technology on information management we will distinguish between their impact on wholesale and retail banking, which correspond to banking activities characterised by distinct types of information asymmetries and transaction costs. We summarise the main differences below:

4.2.1. Retail banking:

For small and medium-sized enterprises (at least in European markets) and for households, the main source of financing consists of bank loans based on a long-term relationship. Because for small and medium firms and households there is scarce publicly available information, long-term relationships efficiently permit to mitigate the effects of information asymmetries, that appear in the form of adverse selection (lack of information about the lenders' characteristics), or in the form of moral hazard (incentives by the lenders to behave opportunistically). Because information asymmetries remain important in this segment, it is not likely to be contestable. Some empirical studies on European banks find evidence in this direction (Lloyd-Williams and Molyneux ,1994, Degryse and Van Cayselee, 2000).

Yet, technology do has brought about changes, that are already apparent in the form of increased competition in retail banking, for instance, through lowering barriers to entry in the supply side of services. Because of information being specific to a customer and not publicly known, there have traditionally been important sunk costs to information gathering. Technology has pushed downwards costs in the collection of information and thus lowered the costs that new entrants must face. Similarly, technology has reduced the adverse selection problem of attracting the loan applicants that have been refused by their usual bank supplier, because of risk considerations. Moreover, also a lessening of the hold-up problem[7] could result as an instance of lower costs in information management.

On the supply side of retail banking, direct contact with customers is often important in the distribution of the traditional (loans and deposits) services. As a result, the geographical extent of the retail banking segment is local rather than national (Neuberger, 1998). In the next years, developments in the electronic delivery of retail financial services may reduce the importance of physical proximity. This would occur as a result of a broader range of services being made available through remote banking. Currently, remote banking is used mainly to distribute only non complex products and services (which are less complex in the case of ATMs than in telephone banking). This in turn would result in a more competitive market, through reducing barriers to entry. Traditionally, sunk costs of branch distribution have been especially high in continental Europe banking systems [8].

On the demand side of bank liabilities (like current accounts and time deposits), we find that customers have low market power when compared to the case of wholesale

[7] The hold-up problem results from the information monopoly the bank generates in lending, that may allow the bank to make loans at non-competitive terms in the future to the borrower.
[8] Number of branches as compared to the UK and the US.

banking. In this market segment, gathering information on banks' products is costly for customers, the comparison of offers among banks is complex and the expected return is low as the products have a small weight in the consumer's budget. As a result, switching costs are important and empirical studies show that customers react slowly to interest rate differentials (Sharpe, 1997). This "bank loyalty" may weaken in the near future with the emergence of direct banks, that would lower switching costs (Neuberger, 1997).[9]

Overall, as a result of improvements in information management, we should expect that intermediation margins be reduced in retail banking, although not reaching competitive levels. Banks continue to have a natural advantage in the financing of households and small and medium-sized enterprises (SMEs) as alternative sources of funding are not available in this segment. Consequently, disintermediation will be limited to the liabilities side of the balance sheet, where we would expect the percentage of deposits in the funding of banks to have diminished. As regards small short-term credits, banks have been using increasingly standardised credit scoring techniques that automate the decision process on some type of loans. Part of the process relies on credit history information which is widely available, and it is efficiently processed by computers. The commoditisation of some type of loans should result in increased non-interest income. The standardisation has helped the process of securitization of these loans (mainly credit cards loans and mortgages) by which the financing and part of the risk of the operation are spread through financial markets. Yet, securitisation has occurred to a lesser extent than in wholesale banking.

4.2.2. Wholesale banking: the customers in this market segment are corporate firms. Because information on these customers is often publicly available or obtainable at low cost (for instance, from rating agencies), information asymmetries are less important. Consequently, the segment is more contestable and intermediation margins are narrower. On the demand side, switching costs are lower than in retail banking and the banking business is not characterised by "bank loyalty". Rather, demand is more price sensitive. Competition is not limited to the banking sector but comes also from financial markets. For large (and/or longer-term) credits, firms rely increasingly on debt markets, in which they can obtain cheaper financing than via bank loans. This disintermediation process has been made possible because information about large businesses is more easily obtained and transmitted and this has contributed to the growth of debt markets[10] (Mishkin and Strahan, 1999). Until the 1980s, most studies indicated that banking markets were local as opposed to regional or national. This approach has lost relevance as advances in telecommunications have broadened the geographic extent of the wholesale segment. Currently, the relevant market size in this banking activity is national or European level, rather than local.

With regards to securitisation, improvements in information management have reduced information asymmetries in bank assets and, in doing so, have lessened the free-rider problem[11] which is particularly important in capital markets (Mishkin and Strahan, 1999). Currently, it is easier for investors to assess risk and value bank assets, and thus

[9] During the period of our study, market share of direct banks was non-existent or negligible.
[10] With the introduction of the euro, the corporate debt markets in Europe have achieved a critical scale that allows them to operate efficiently and contribute to the disintermediation process.
[11] This problem occurs when people that do not spend resources on collecting information can profit from information collected by other people.

barriers to the securitization of bank assets are lower. Securitisarion of wholesale products (as commercial paper and industrial loans) started earlier and has occurred to a larger extend than securitisation of most retail products. Apart from securitisation, banks have also engaged in other off-balance sheet operations to offset the lower importance of loans in the financing of corporate businesses. These include loan syndication and operations in derivatives markets. In the income statement, this corresponds to a growing share of non-interest income.

4.3. The case of Spain

Within the Spanish banking sector, there are two sets of institutions -commercial banks and savings banks- which can, as a generalisation, be identified with two different business strategies. These distinctive business strategies have not originated with technology induced changes; they are rather the continuity of historically different businesses strategies; widely recognised in the literature.

Until quite recently, commercial and savings banks were subject to different regulation. Lozano-Vivas (1998) analyses the effects of deregulation[12] in Spanish banks during the period 1985-1991. She examines frontier cost efficiency and technical change and finds evidence of differential response to deregulation of commercial and savings banks. During the period of the study, commercial banks focused on adjusting their deposit and loan rates as a response to increased competition; while savings banks focused on expanding the size and convenience of their branch operations and undertook a series of mergers following the removal of geographical restrictions. The study shows that, in a sense, commercial banks could be approximated to wholesale banks, whereas savings banks could be characterised more like retail banks.

We use these empirical results that show the distinctive features of commercial and savings banks in the late 1980s, to design our study which will assess whether the responses to technology developments during the 1990s, by commercial and savings banks, have paralleled those observed in the previous years. Notwithstanding the fact that commercial banks also engage in the retail services, and that the opposite is true for savings banks, we will examine whether technology has affected the two groups of institutions differently, as could be hypothesised given the differential effects of changes in information management on wholesale and retail banking, presented in the previous section.

An obvious caveat is that the differences observed between commercial and savings banks might not be exclusively attributable to technology effects. For instance, although

[12] Some of the hallmarks of the deregulation process are the following:
- On March 1987 started the liberalization of interest rates. This marked the beginning of increased competition in short-term bank liabilities. Until then, interest rates were regulated in the case of demand deposits and time deposits with maturity less than 6 months, or, for longer maturities, those of amount less than 1 milion ptas and maturity under a year. Those deposits represented about 45-55% of savings banks' liabilities, and 35% of commercial banks' liabilities.
- In 1987, the interbank interest rate increases significantly. Commercial banks reacted by increasing their intermediation margins, while the savings banks strategy consisted of reducing margins as a means of gaining market share.
- By the end of 1989, there is another considerable increase in competition affecting bank liabilities. This starts with the new "supercuentas" launched by Banco Santander. As a result, margins are reduced further.

the main deregulation phase started in the mid-80s and the most effects of this process must have been observable by 1992, some effects may have only appeared later on. Moreover, as we have already mentioned, the evolution of the banking industry during the 1990s will also reflect the effects of EMU. Because retail banking has a more local character, we would expect that EMU would have affected it to a lesser extent than wholesale banking. Another consideration is the legal status of Spanish savings banks. Together with German savings banks, Spanish savings banks are alone in the EU in maintaining their traditional status of mutual banks.[13]

Other empirical studies are main references in the literature on the Spanish banking sector. Among the most relevant are the studies that measure bank efficiency. Because of the relationship between technology and efficiency, a common approach to assess technological impact is through estimating production frontiers. In this line of research are: Grifell *et al*. (1992) and Grifell and Lowell (1996) and Prior and Salas (1994).

Additional relevant literature on the Spanish banking sector are studies of the market structure. For instance, Gual and Hernández (1991) conduct an efficiency study that uses cluster analysis to show that competitive strategy –in addition to size- is a determinant of the differences in production costs among Spanish savings banks. Also on competition are Espitia, Polo and Salas (1991), Lloyd-Williams and Molyneux (1994) **,** and Fuentelsalz (1996). This latter analyses changes in market concentration in local markets for savings banks between 1986 and 1992, that come as a result of increased competition in response to the deregularisation of the financial sector. He finds that increased competition leads incumbent banks to merge, and that new entrants in the market obey to differences in business opportunities between local markets.

Bergés *et al*. (2000) describe the business of Spanish savings banks during the 1990s, and compare it to that of commercial banks. They find that while results obtained by savings banks during that past decade have been satisfactory, there might be difficult to maintain in the future. As competition increases in the core business of savings banks, diversification into other business areas would seem an appropriate strategy. It is not clear whether savings banks might enjoy possibilities for strategic growth similar to those of commercial banks. This would be so because their mutual status makes it more restrictive for them to obtain new funds, compared to the case of commercial banks. A related discussion can be found in Vives (2000), which comments on the corporate governance of Spanish savings banks. He sketches the various options available on a debate about the adequacy of the mutuality status of savings banks.

Based on the evidence summarised above, we are interested in designing a study that allows us to empirically evaluate whether changes in technology management are a fundamental force explaining changes in the business structure of commercial and savings banks. This is done in the next section.

[13] For instance, in France, mutual savings banks have changed their legal form, becoming co-operative banks. In Italy, the sector has been privatised, with mutual savings banks becoming stock savings banks

4.4. Data

We use data from the aggregate income statements and balance sheets of commercial and savings banks.[14] The data are quarterly observations, covering the period 1990-2000.

We choose the following variables as indicators of technology induced effects on the composition of banks' activities:

- the intermediation margin -financial services minus financial expenses-, measured as a percentage of total assets. This variable is a relative measure of the importance for the institutions of the traditional banking business of borrowing short and lending long-term.
- net non-interest income, measured as a percentage of total assets. This variable is an indicator of product diversification and it is related to commoditization of banks products and services;
- off-balance sheet operations, measured as percentage of total assets. This is an indicator of the degree of securitization of the banks' operations.

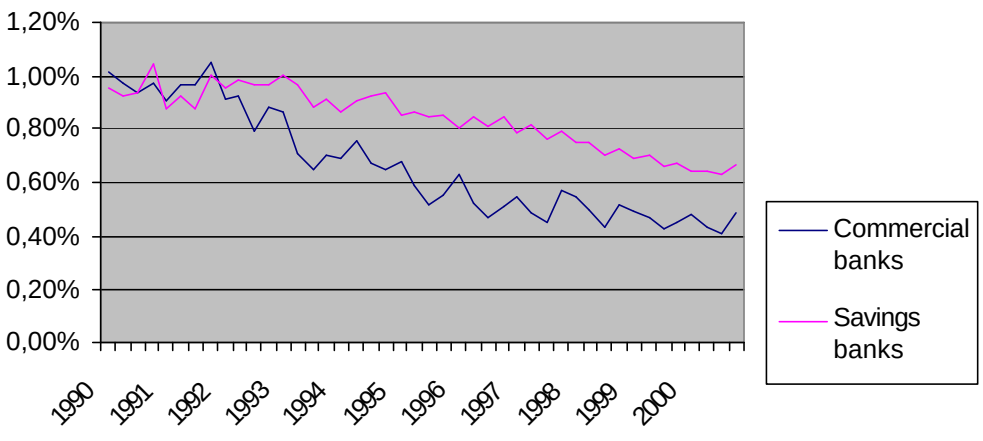
We also use two variables that are indicators of the production technology used by banks:

- number of branches as a percentage of total assets. This variable is used as an indicator of physical capital in the production technology function
- personnel costs measured as a percentage of total assets. This variable is an indicator of the degree of automation of bank operations.

We first draw the evolution of these variables, and of related indicators, during the period of the study. These are depicted in Graphs 4.1 to 4.9.

Graph 4.1 and 4.2 show the evolution of intermediation margin and of non-interest net income as a percentage of total assets, respectively. The figures indicate that banks'

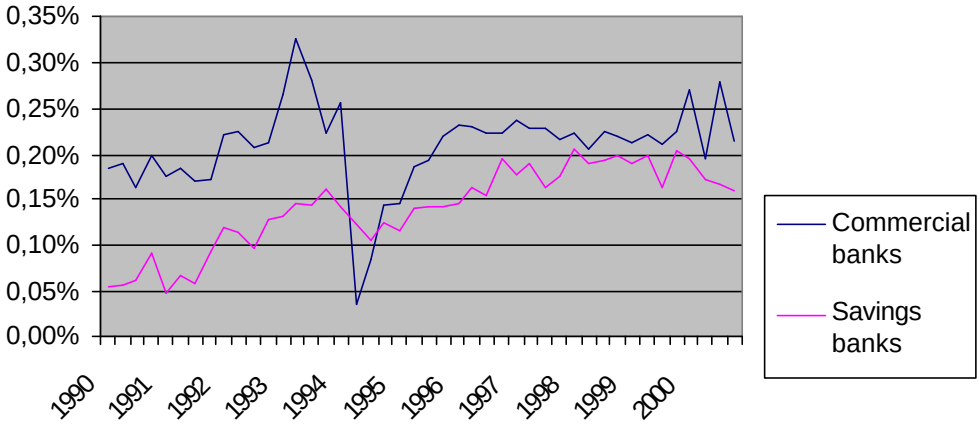
Graph 4.1 Intermediation margin as a percentage of total assets



[14] Source: Boletín Estadístico del Banco de España

income structure has evolved from being based on interest rate spread to increasingly relying on fees (non-interest income) for services. This suggests that the traditional business of borrowing short and lending long has lost weight.

Graph 4.2 Non-interest net income as a percentage of total assets



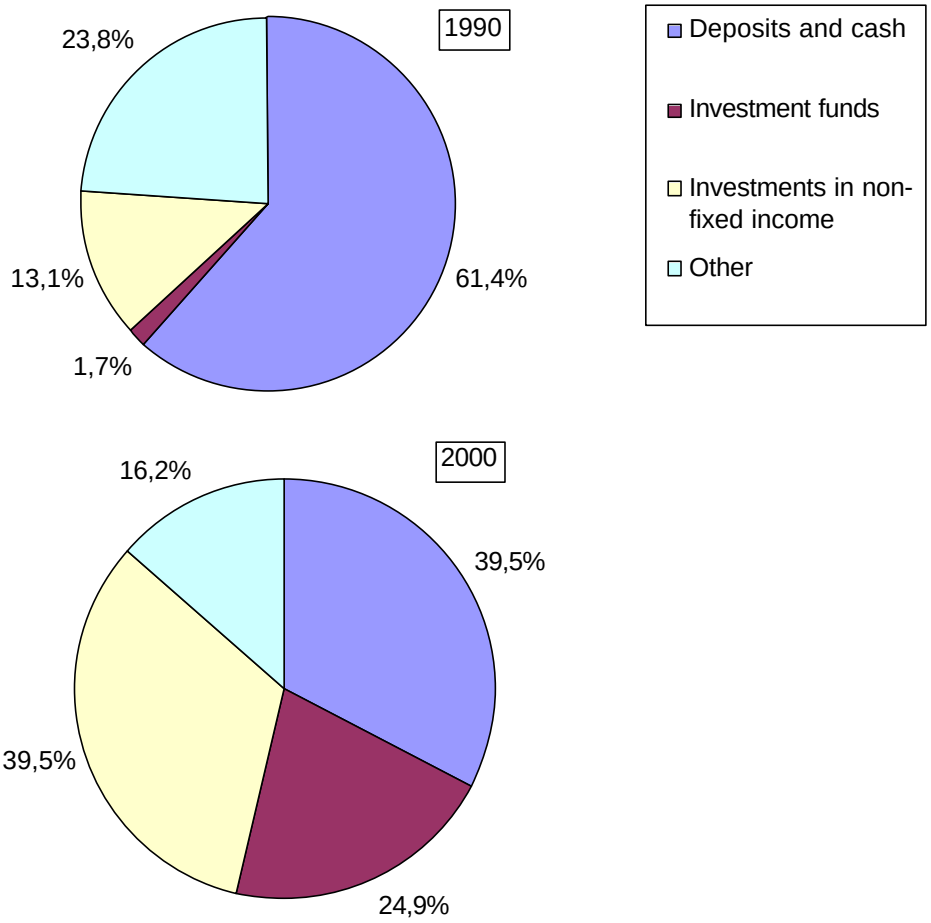
The intermediation margins represent the market conditions for loans and deposits, in amounts and prices. Intermediation margins in Spain have been decreasing during the period of study.

The decrease in intermediation margin is larger for the case of commercial than savings banks. In the case of commercial banks, the reduction in intermediation margin has been so significant that nowadays the net interest income earned was insufficient to cover operating expenses. In the case of savings banks, the pressure on the intermediation margin has been less strong, although the trend has also been downwards. The intermediation margin has been under pressure not solely as a result of technology improvements, but also as a consequence of a situation of low interest rates in the economy, which have made the interbank market and investment in public debt less attractive.[15]. Additionally, the low interest rate environment has induced customers to look for alternative (to deposits) investment opportunities (See graph 4.3). A result of this has been the growth of mutual and pension funds, and the changes in banks' funding ratios which have occurred to a greater extent in wholesale banking than in retail banking.[16].

[15] The interbank market has been traditionally used by savings banks as a benchmark to set lending rates and by commercial banks as a reference for pricing other sources of funds. The evolution of the interbank market is highly related to the prices of public debt.

[16] On the liabilities side, both sets of institutions have increased their share of funding coming from capital and interbank markets, at the expense of lower funding from deposits. Yet, deposits still account for almost 70% of savings' liabilities compared to less than 50% of commercial banks' liabilities.

Graph 4.3 Distribution of households' financial assets

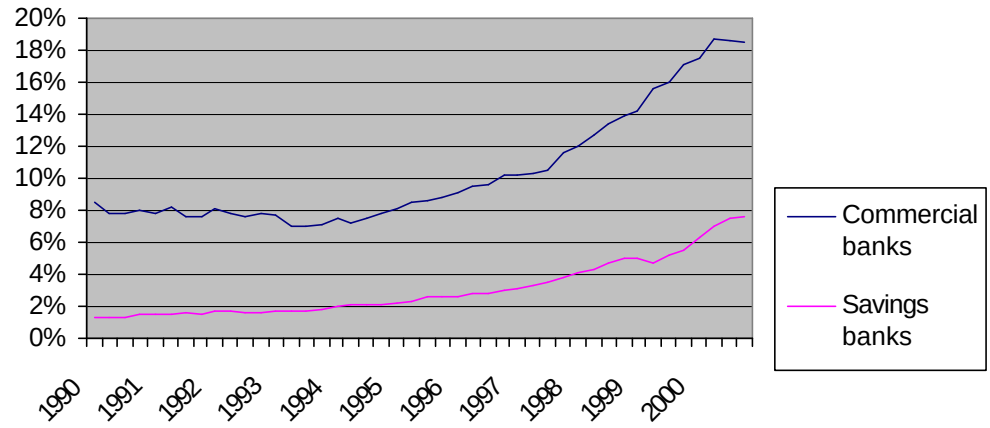


The growth in off-balance sheet operations has been a domain of commercial banks (See graph 4.4). Indeed, the bank assets that can be more easily securitised are those corresponding to corporate customers. Notwithstanding this, also retail products like credit cards or mortgages are increasingly securitised.

With regards to the variables in the production function, Spanish banks have the second-largest (behind Germany) number of branches per inhabitant in the EMU. The number of branches has been a trademark of the system and has often been used as an strategic variable as shown in Lozano-Vivas (1998) and Vives (2000). This is true specially for the case of saving banks. Contrary to the prediction towards a shrinking network of branches in most EMU economies[17], the number of branches in the case of Spanish savings banks has continued to increase (see graph 4.6), although not when measured as a percentage of total assets (see graph 4.7). The importance of branches is linked to the geographical extent of the market segments and also to the degree of product standardisation.

[17] ECB (1999a) and ECB (1999b)

Graph 4.4 Off-balance sheet operations as a percentatge of total assets



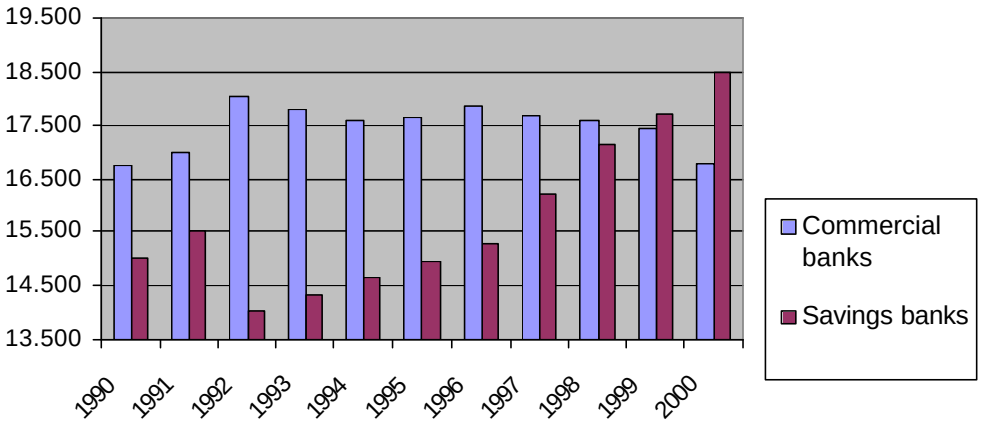
Personnel costs as a percentage of total assets are a consistent indicator of the degree of automation of bank operations. There exists the possibility for banks' to use technology to centralise computer operations and consolidate large scale processing operations and design of products, while maintaining their local branches and staff. In this respect, we include in the production of banking services both the design and the sale (See graphs 4.8 and 4.9).

Finally, graph 4.10 shows aggregate results (return on assets – ROA) for both commercial and savings banks.

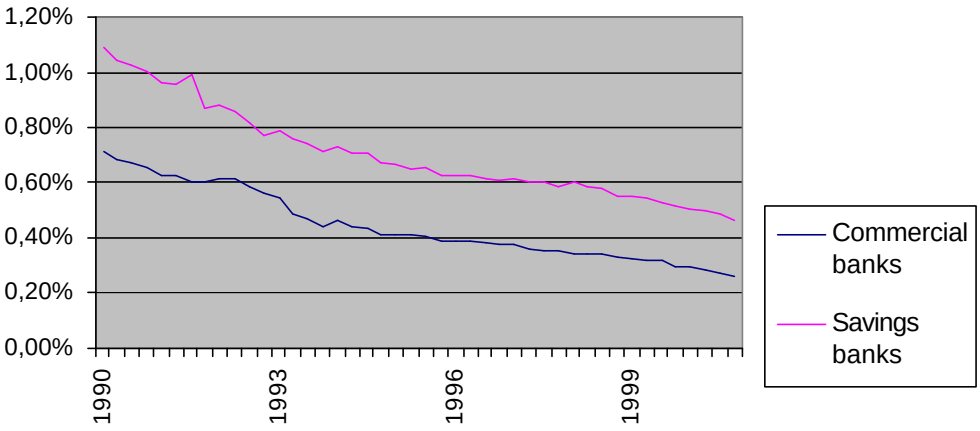
There are some interesting features on the use of technology by commercial and savings banks. Regarding the production variables, the two sets of institutions show opposite evolution, with personnel costs and number of branches increasing in absolute values for savings banks and decreasing for commercial banks. With regards to outputs, we find that savings banks are leading in intermediation margins while commercial banks are leading in non-interest income and in off-balance sheet items. This is consistent with evidence presented in various studies (for instance Vives (2000)) on the different business strategies followed by commercial and savings banks during the 1990s. Namely, commercial banks focused on costs reductions while savings banks focused on gaining market share. Indeed, Bergés *et al*. (2000) contains data indicating that savings banks did gain market share in the traditional banking business (loans and deposits) during the 1990s[18], while commercial banks dominated investment funds.

[18] Although banks continue to have bigger market share of total assets (59% versus 38% savings banks) and also of lending activities (54% versus, 41% savings banks) saving banks gained market share at the expense of commercial banks which were the traditional leaders in these activities. On the other hand, commercial banks gained market share in mortgages during the 1990s.

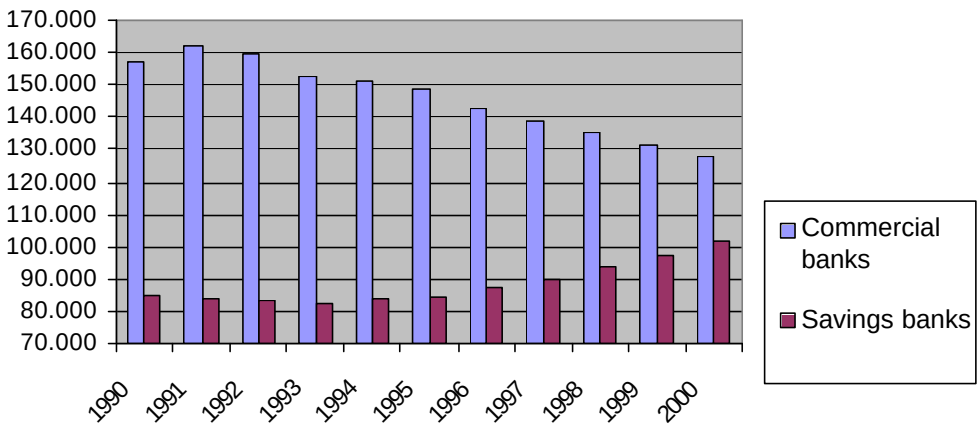
Graph 4.5 Number of branches



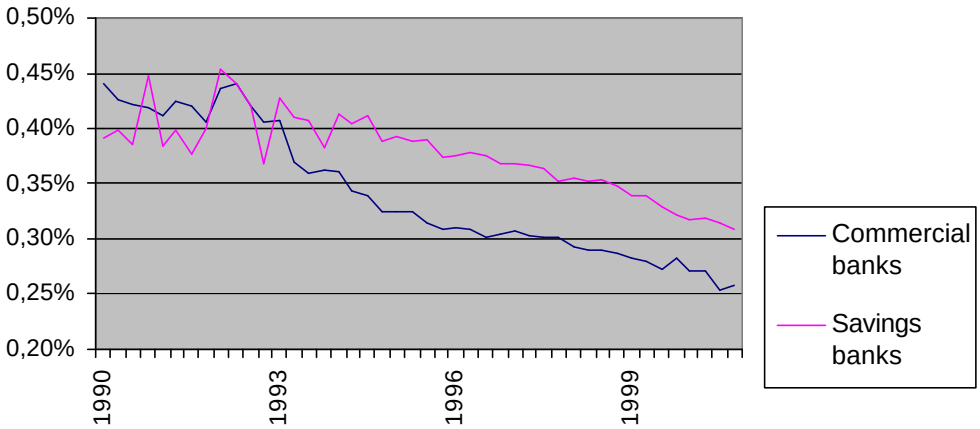
Graph 4.6 Number of branches as a percentage of total assets



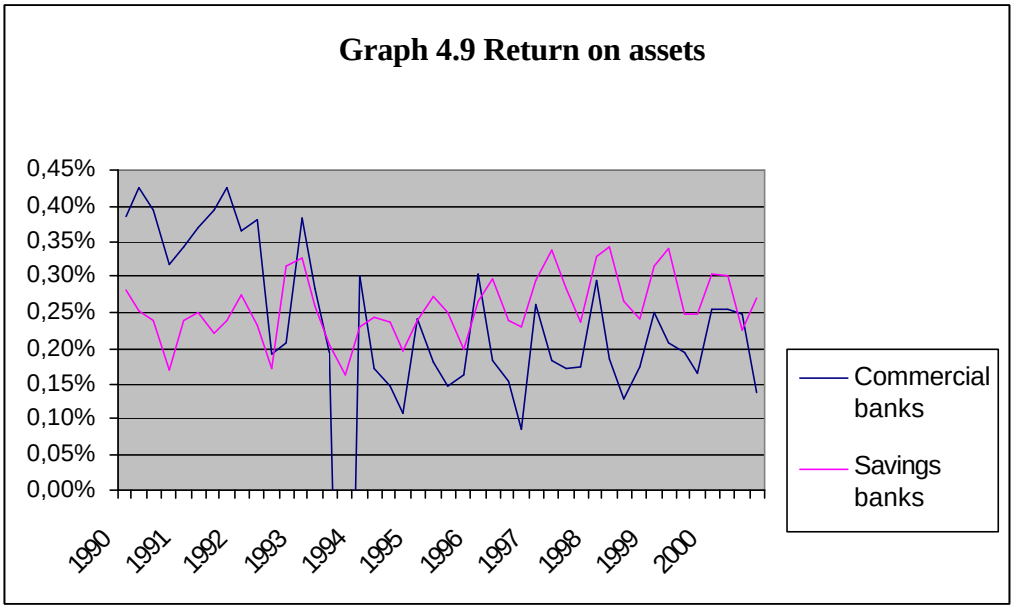
Graph 4.7 Number of employees



Graph 4.8 Personnel expenses as a percentage of total assets



Graph 4.9 Return on assets



4.5 Econometric model

In this section, we use a linear mixed effects model fitted by REML (Restricted Maximum Likelihood) to evaluate the differences in the production technology of commercial and savings banks on intermediation margin, net non-interest income and off-balance sheet items separately. We work with the following production function:

$$Y_i = b_0 BRANCH^{b_{1i}} AUTOMA^{b_{2i}}$$

where Y_i is the dependent variable in each model, *BRANCH* represents the number of branches as a percentage of total assets, *AUTOMA* denotes personnel expenses as a percentage of total assets and b_{1i} and b_{2i} are elasticity measures of the explanatory variables. Finally, i=1,2 corresponds to commercial and savings banks respectively.

The result of the different models are shown in Tables 4.1 to 4.3.

Table 4.1 Intermediation margin –Model 1

	Commercial banks	Savings banks	Pooled
Intercept	2,3211*	2,3211*	2,961991275*
LAUTOMA	0,8335993*	1,1016196*	1,151665069*
LBRANCH	0,4820443*	0,1926983*	0,266553452*
Q2	-0,003591632	-0,003591632	-0,003542204
Q3	-0,4371675*	-0,4371675*	-0,041433716*
Q4	0,05197242*	0,05197242*	0,055086128*

Table 4.1 contains the parameters estimates [19](*)of the model where the intermediation margin is the dependent variable:

$$lINTMG_{it} = lb_0 + b_{1i} lBRANCH_{it} + b_{2i} lAUTOMA_{it} + b_3 Q2_{it} + b_4 Q3_{it} + b_5 Q4_{it} + U_{it}$$

Where the variables are in natural logarithms and we have added a dummy variable accounting for the possible stationality of data, the reference value being the first quarter of the year.

The model explains about 89% of the association of between and within groups. With regards to the two explanatory variables (*lBRANCH* and *lAUTOMA*), each account for about 50% of the variability explained by the model. The model indicates that there is a positive relationship between changes in the number of branches as well as personnel expenses and the intermediation margin. However, this relationship is significantly different for commercial and savings banks. Personal expenses have affected more the intermediation margin in the case of savings banks, while the number of branches has had more impact on the intermediation margin of commercial banks.

[19] Variables significative at 95%.

Table 4.2 Non-interest income –Model 2

	Commercial banks	Savings banks	Pooled
Intercept	-5,539164*	-5,539164*	-2,79372820
LAUTOMA	0,7439736*	2,1159025*	2,09770190*
LBRANCH	-0,6613364*	-2,1603818*	-1,57863882*
Q2	-0,08371436	-0,08371436	-0,08119607
Q3	-0,07551164	-0,07551164	-0,06390368
Q4	-0,0104139	-0,0104139	0,01004729

Table 4.2 contains the results of the model with net non-interest income as the dependent variable. Quarters are not significative in this model, which has the following expression:

$$lCOMMOD_{it} = lb_0 + b_{1i}lBRANCH_{it} + b_{2i}lAUTOMA_{it} + b_3Q2_{it} + b_4Q3_{it} + b_5Q4_{it} + U_{it}$$

The model explains about 88% of the association of between and within groups. Again, the two explanatory variables (*lBRANCH* and *lAUTOMA*), each account for about 50% of the variability explained by the model. The model indicates that there is a positive relationship between changes in personnel expenses and net-income from commoditization, and the relationship is negative for the number of branches. Both effects are larger in the case of savings banks than in the case of commercial banks. These results suggests that there are personnel expenses associated with centralised design of products -not associated with staff at branches; and that commoditization is affecting retail banking to a larger extent than wholesale banking.

Table 4.3 Off-balance sheet operations –Model 3

	Commercial banks	Savings banks	Pooled
Intercept	-16,91828*	-16,91828*	-4,66946499*
LAUTOMA	-3,7720730*	-0,8018088*	2,39143529*
LBRANCH	1,258288*	-1,775636*	-2,91611016*
Q2	-0,01138484	-0,01138484	-0,03262232
Q3	-0,03368445	-0,03368445	-0,00763011
Q4	-0,03867091	-0,03867091	0,04766107

Table 4.3 shows the results of the model where the dependent variable is the natural logarithm of off-balance sheet items as a percentage of total assets:

$$lSECURI_{it} = lb_0 + b_{1i}lBRANCH_{it} + b_{2i}lAUTOMA_{it} + b_3Q2_{it} + b_4Q3_{it} + b_5Q4_{it} + U_{it}$$

There is a negative relationship between personnel expenses and off-balance sheet activities. This relationship is more important in the case of commercial banks, where securitisation has occurred to a larger extent and where the activities securitised are more likely to correspond to large volume operations. We find a positive relationship between branches and securitisation in the case of commercial banks and a negative relationship in the case of savings banks. These results might be related to securitisation of retail products (like mortgages and credit cards) distributed at branches, in which commercial banks are leaders, using their expertise in the securitisation of wholesale operations.

Finally, we conduct in the three cases a likelihood ratio test that compares the results obtained with the mixed effects model with the results obtained with the linear model (pooled data from the two sets of institutions). Results show (see table 4.4)that in all cases we can reject null hypothesis given by $H_0 : b_{j1} = b_{j2}, j = 1,2.,$ implying that mixed models are best. Thus, there are significative differences between the estimated parameters of commercial and savings banks for the two explicative variables and for the three models.

Table 4.4 Likelihood ratio test.

Model 1	χ^2= 210.218 p = 0
Model 2	χ^2 = 24.629 p = 4.4 e-006
Model 3	χ^2 = 29.583 p = 3.7 e-007

4.6 Conclusions

The role of technology on the activities of commercial and savings banks in Spain has differed. The two sets of institutions are representative of different market segments - wholesale and retail banking respectively- which can be characterised by information asymmetries of different type. Data from the 1990s shows that commercial banks in Spain have responded to changing market conditions by lowering costs while savings banks have responded by expanding market share. In this study, we link these business strategies to the different use of technology by commercial and savings banks and, correspondingly, to the role of information management on wholesale and retail banking. Differences between commercial and savings banks are tested statistically to assess their significance. We find that differences in the production technology explain differences in the composition of banks' income that have changed with ICT.

In the next years, we may expect that ICT continue to influence banks activities and their income structure. Among the activities that may be subject to stronger pressures for change are those that, up to today, have remained relatively insulated from ICT developments. This applies mainly to some retail banking activities that are suitable for standardisation, and also to developments in remote banking. Hence, it would be interesting to continue research on technological developments that might transform the existing distribution networks of Spanish banks.

Chapter 5.

Main issues on electronic payments systems in Spain and the EU.

Chapter 5. Main issues on electronic payments systems in Spain and the EU.

This chapter forms part of a broader project[1] investigating the interrelationship between the introduction of a single currency in the greater part of the European Union (EU) and certain aspects of the emerging "information society". Although the main objective was ostensibly to answer a set of policy challenges posed by the European Parliament's Committee on Economic and Monetary Affairs, it made sense to provide a background paper describing and analysing the status quo and recognisable trends in the domains concerned for a number of European countries[2]. In section 5.1, we do so for the case of Spain. Based on the main findings from this section, section 5.2 is dedicated to the policy challenges arising as a result of technological developments in payment systems. These are related to monetary policies.

5.1 Payments system in Spain[3]

5.1.1 Introduction

Data for 1997 taken from the Blue Book of 1999[4] indicate that Spain is particularly well equipped, and among the covered countries the leader, with ATMs (863 per million inhabitants, cf. Appendix, Table A.2.6), POS-terminals (16,691 per million inhabitants, cf. Appendix, Table A.2.7), and purchase terminals for electronic purses (1,960 per million inhabitant). The number of payment cards in circulation to use these facilities is also quite high (ca. 900 per 1,000 in-habitants).

At the same time the Blue Book indicates that the usage of these electronic means is relatively low compared to other member states of the EU. While the importance of electronic payments is slowly growing, the importance of cash remains very high in Spain with cash forming about 11 percent of the GDP, or 23.6 percent of narrow money M1(cf. Appendix, Table A.2.2). Even the use of payment cards underlines this cash orientation. On average, a Spaniard uses his payment card 15 times a year for cash withdrawal, but only 9 times for payments (cf. Appendix, Table A.2.6 and A.2.7).

The use of cheques for customer payments is not as widespread as in other EU countries, a fact which again underlines the role of cash. The direct move of many consumers from using cash to using payment cards, partially skipping the intermediate stage of frequent use of cheques, favoured extensive installation of ATMs by Spanish banks.

The dominance of cash goes well together with ATMs as a means of cost reduction of cash handling. The high importance of cash can also to some extent explain the

[1] This chapter originated with the project "EMU and Information Society: Key Questions About the Opportunity to Combine the Introduction of the Euro with New Electronic Payment Technology Options", finished in 1999. ISNN 0947-8630. (See section IV in Introduction)
[2] See Annex 2
[3] I acknowledge the contribution of Knud Boehle, in writing this section.
[4] ECB (1999) "Payments Systems in the European Union": Addendum incorporating 1997 figures (Blue Book), January. (See also Methodological note in Annex A.2.2)

relatively rare use of payment cards at POS terminals. Even so, the comparatively low use of payment cards given the highly developed POS-infrastructure remains a surprising finding. There might be one major explanation for this contradictory situation: the financial institutions have pushed the installation of POS terminals as they bear the costs of the POS terminals and of their maintenance, but at the same time the merchants complain about the high commissions, which reduce their interest in pushing cashless payments.

5.1.2 National framework[5]

One characteristic of the general situation in Spain is the existence of three groups of banks with corresponding processing and networking service providers.

- Sistema 6000 payment system network corresponds to the savings banks which are members of the Confederación Española de Cajas de Ahorros (CECA). The infrastructure of Sistema 6000 comprises 14,169 ATM and more than 300,000 terminals at point of sale. CECA reached an agreement with Europay in 1996 to issue cards with the logos Maestro (debit functionality) and / or MasterCard (credit functionality). More recently, some major savings banks members of CECA also reached an agreement with Visa Electron by which the former debit cards of Sistema 6000 (Tarjeta 6000) are being substituted by Visa Electron cards.

- Sistema 4B was established in 1974 by the, at the time, four main commercial Spanish banks. Today's members of Sistema 4B include Banco Santander Central Hispano, Banesto, Banco Popular, Banco Sabadell, and others, totaling 38 financial institutions which account for around a quarter of the Spanish banking market and have over 11,000 branches in Spain. Sistema 4B is a member of Visa International and MasterCard / Europay International.

- Servired is owned by financial institutions including 35 banks (Argentaria, Banco Bilbao Vizcaya, Deutsche Bank, Citibank España and Barclays Bank España etc.), 51 Rural Savings Banks (Cajas Rurales) and 11 Professional and Popular Saving Banks (Cajas Populares y Profesionales). The company is also in charge of administering the programmes of bank payment cards with the trademark Servired (combined with the trademarks Visa and Visa electron), and is also in charge of the CECA-Visa cards. The interoperability of the different ATM- and POS-networks is complete, al-though, like in Germany, commissions are charged at ATMs when operating with networks different from that of the issuer of the card. The situation of standardisation of electronic payment systems in Spain is clearly influenced by the market leadership of Visa España and the technological leadership of its subsidiary company SERMEPA. SERMEPA is owned by Visa España and other financial institutions. The company developed the electronic purse called TIBC ("tarjeta inteligente para bancos y cajas") in 1993. TIBC has been the "basis" for the Visa Cash e-money card, being able to manage multiple functions and multiple currencies (technically it supports different currencies but their use is up to now restricted to Spain). Visa España has also played an active role in the definition of standards like EMV and CEPS. Visa España/SERMEPA is a member of the CEPS

[5] The situations described in this section correspond to year 1999. Some of the instances included have changed since then.

group (also including Europay International, Visa International and ZKA Germany), that in December 1998 announced the agreement of a Common Electronic Purse Specification (CEPS).

Until now, in Spain there is no experience with non-financial institutions trying to issue e-money. The Bank of Spain holds that its position is the same as that of the ECB. With regard to institutions other than banks that can issue electronic money, the Bank of Spain does not consider them a problem, as, first they are non-existent in Spain at the moment, second, they would be subject to prior authorisation by the Bank of Spain in order to operate in Spain, and, third, they would be subject to oversight from the Bank of Spain.

In relation to Spanish monetary policy, one has to have in mind that elec-tronic money is expected to evolve slowly as long as cash is by far the out-standing means of payment. The Bank of Spain is of the opinion that electronic money is not a big concern for monetary policy in the short run.

Looking at the field of digital signatures, there is no specific legislation on this topic in Spain at the moment. But public notaries and related groups have worked on a proposal for a Spanish law on digital signatures. It has been also made public that if a common position could be reached for a European directive on digital signatures, Spain would immediately adopt it, and start legislation. As the proposed directive passed the European Council of Ministers of Telecommunications in April 22 nd 1999 legislation in Spain should develop within the near future.

It is possible to identify four institutions issuing (or planning to issue) electronic certificates: 1. ACE (Agencia de Certificación Electrónica – "Electronic Certification Agency"), which is, among others, supported by Telefónica, Visa and Europay; 2. Consejo Superior de Cámaras de Comercio – "The Council of Chambers of Commerce", which has developed its own project FIRMA; 3. Fábrica Nacional de Moneda y Timbre – "The National Factory of Coins and Notes", which has also developed its own project CERES; 4. Public notaries and related groups (among which are the Consejo General de la Abogacía – "General Council of Lawyers", University of Zaragoza and Intercomputer), which have established FESTE (Fundación para el Estudio de la Seguridad de las Telecomunicaciones – "Foundation for the Study of Security in Telecom-munications"). FESTE, owing to the nature of its members, also deals with legal aspects of electronic commerce in a broader sense.

5.1.3 Payment cards

Again, the three sections of the banking sector determine the variety of payment cards available in Spain.

Sistema 6000 issues Mastercard or Visa credit cards. Debit cards are branded Visa Electron. Electronic purses issued by savings banks in Sistema 6000 are branded either Euro 6000 or Visa Cash. Sistema 4B issues Mastercard and Visa credit cards. Debit cards bear the trade marks 4B or 4B Mastercard, and Sistema 4B has developed its own electronic purse trade mark Monedero 4B, which bears either technology Euro 6000 or TIBC. Servired administers the programmes of banking payment cards with the trade

mark Servired, combined with the trade marks Visa and Visa Electron. Credit cards are Visa and debit cards are Visa electron or Servired. Servired has issued Visa Cash electronic purses.

The influence of Visa across the different systems is striking. Worth noting is that all payment cards are basically debit cards, with about one third additionally being provided with a credit function. The combination of different functions into a single card is decided by the bank or savings bank issuing the card. You can find for example credit function with debit function, and debit function with electronic purse, and all the three functions combined into one single card. This sometimes leads to problems when analysing statistics. All payment cards, regardless of their type, can be used at ATMs and POS; no special cash cards are available.

The use of cashless payment instruments following the Blue Book can be characterised by the percentage of the total number of transactions: Direct debits are leading with more than 45 percent in 1997, followed by payment cards with approximately 21 percent, 14,4 percent credit transfers and 13 percent cheques (cf. Appendix, Table 3). Although the use of payment cards is not exceptional compared to some other European countries, 21 percent are equivalent to a position in the middle, and the growth rates (comparing figures from 1996 to 1997) are remarkable, being 18 percent (number of transactions) or 17 percent (value of transactions) respectively.

There are also retailer cards in use in Spain, but the exact number of cards issued and details of their use are not available. There is an estimation of about 11 million retailer cards with payment function by Barbara Devin in a recently published book (see Other Sources below, pp. 261-266). She indicates as most widely distributed ones the Corte Inglés card (> 4 million), the Galerías Preciados card (> 4.3 million) and the Cortefiel card (> 1.2 million) all designed for purchases in department stores. But other cards e.g. ACESA (highways) or cards for oil stations (with the trademarks Mastercard or Visa) are significant too. It is interesting to note that some of these retailer cards are issued directly without the intermediation of a bank or a savings bank.

5.1.4 Electronic purses

From a technological point of view there are two competing systems: Euro 6000 and TIBC. They are not interoperable at the moment. These two systems are issued under three trade marks: Euro 6000, Visa Cash and Monedero 4B.
Initially Sistema 6000 launched its own electronic purse, Euro 6000, and 22 savings banks developed specifications and procedures to ease the participation of suppliers / merchants.

In 1997, Visa Cash was adopted by some major saving banks, members of Sistema 6000, to substitute for Euro 6000. Banking institutions in Servired have also issued Visa Cash electronic purses. There is also the trade mark Monedero 4B of Sistema 4B that embodies one of the two technologies above, i.e. Monedero 4B sometimes is Euro 6000 compliant and sometimes TIBC/Visa Cash compliant. Visa Cash and Euro 6000 cards issued in Spain are only of the re-loadable type, no disposable purses are available. Visa Cash purses are re-loadable at some Sistema 6000, Sistema 4B, and Servired ATMs. Euro 6000 purses are re-loadable at some of Sistema 6000's ATMs. Electronic purses with trade mark Monedero 4B can be loaded at ATMs of the Red Telebanco 4B

(Sistema 4B). The maximum amount that can be loaded on to the Monedero 4B cards is 25,000 ESP (Euro 150.25) for multi-purpose cards, and 5,000 ESP (Euro 30.5) on cards for use at phone booths.

Most chips embedded in the electronic purse cards can also function as a telephone card. The product is clearly being pushed to the market by banking institutions, but acceptance and use by consumers is still low. There exists a possibility that consumers' acceptance might boost with the introduction of Euro coins and banknotes. By the end of 1998, Visa Cash was available in 37 cities, more than 4.3 million cards had been issued and could be used at more than 75,000 terminals at point of sale and 84.000 phone booths (source: Visa España).

One generalisable observation that can be derived from the Spanish case is that novel payment technologies have the tendency to weaken the traditional and well established structures of the financial services industries. In other words: once established familiar boundaries embracing brand names, specific technologies, service providers and banking groups tend to dissolve. Now there is a weaker correlation between the choice of e.g. purse technology on the one hand and the group of banks and network providers on the other hand. This is also true for products other than electronic purses. Increasingly, the overall picture of memberships and agreements gets intricate as a result of growing competition. In the end, decisions on which cards to issue and with which trade marks are up to the issuers of the cards, i.e. the banks or the savings banks. The great majority of banks and savings banks are members of one of the networks (Sistema 6000, Sistema 4B, Servired). These banks and savings banks, together with the few that are not in one of the three networks, can also deal directly (without intermediation of the network) with Europay or Visa for instance. As a very general rule, Servired deals mainly with Visa, Sistema 4B deals with both Visa and Europay, and Sistema 6000 with Europay. As mentioned before, this does not prevent savings banks in Sistema 6000 from, for example, dealing directly with Visa España and issuing cards with the trade mark Visa.

5.1.5 Internet payment systems/instruments

The major trend is the migration of "access products" into the Internet. For banking institutions, the Internet can serve as a new distribution channel to complement the traditional network of branches. For Visa / Mastercard, Sistema 6000, Sistema 4B and Servired, it might also help to compete against companies developing new technologies providing new means of payment like eCash or CyberCash. At present, such companies are non-existent in the Spanish market.

The main banks in Spain have developed on-line banking solutions which allow credit transfers. But in some cases credit transfers are already integrated into electronic commerce solutions. There are a few virtual malls set up by specific banks. If customers have accounts at these banks, then they might pay for goods brought at the mall directly by credit transfer. The majority of payment schemes however are credit card oriented with SSL or SET. The establishment in May 1997 of the Agencia Certificación Electrónica with memberships of Grupo Telefonica de España (40 percent), SERMEPA (20 percent), CECA (20 percent) and Sistema 4B (20 percent) was an important step, because ACE deals with certificates under the SET Protocol, associated to the use of

credit cards. ACE issues certificates to card holders, retailers / merchants, payment gateways, and to both the issuer and acquiring financial institutions.

Credit cards are the payment means preferred in Spain by companies and consumers when paying on the Internet. Cash on delivery and bank transfers come second and third in the ranking. In Spain, SET is clearly accepted by credit institutions, while merchants have been found to be concerned about the costs (e.g. of certificates), but the main problem for the dissemination of SET remains on the consumer side.

5.1.6 Main points

Cheque payments are not as widespread in Spain – outside business-to-business transactions – as in Italy, UK, and France. Partly because of that, Spain entered the stage of payment cards quickly. The dominance of cash despite the abundance of POS terminals and payment cards is however a surprising finding. There are some explanations for this contradictory situation: the large number of terminals may be due to the fact that the financial institutions bear the costs of the POS terminals and of their maintenance. Commercial policies of banking institutions often lead to a situation where several POS-terminals can be found at a single store. On the other hand, as merchants complain about the high commissions, their interest in pushing cashless payments might be restricted.

Spain is quite advanced in the implementation of electronic purse schemes. Currently, two incompatible purse schemes are marketed under three trade-marks. Broad acceptance on the users' side has not been observed. What can be stated however is that the relations between providers of payment networks and services, issuing banks and chosen purse technology are no longer a given thing. This pattern is observable in the sector of payment cards in general fol-lowing increased competition in the area. The role of Visa España (SERMEPA) in the standardization process of electronic purses is outstanding. SERMEPA is member of the CEPS group (Visa España, Europay International, Visa International and ZKA) and the work of the CEPS group has already led to Common Electronic Purse Specifications (CEPS). This standard is clearly an initiative with a European dimension. Internet users and Internet use do not differ significantly from those of other countries. But there are some remarkable political activities towards implementation of advanced technologies, namely the fomentation of ADSL as a prerequisite for charging a flat rate for Internet access, thus improving Internet usage and e-commerce. At the moment the driving forces behind e-commerce in Spain are mainly financial institutions and telecommunications companies.

5.2 Implications of the development of electronic money for monetary policy-making[6].

This section seeks to provide some insight into specific concerns posed by the European Parliament on the issue of electronic money and various policy options[7]. In particular, we address those concerning monetary issues. Implications of electronic money for monetary policies were already discussed in chapter 2. The approach there was to provide a general view. Now, we focus on answering specific questions posed by the European Parliament related to the European Commission Proposal for the European Parliament and Council Directive on the taking up, the pursuit and the prudential supervision of the business of electronic money institutions [8].

The wide-spread use of electronic money could affect the stability of money demand. This would further diminish the relevance of monetary aggregates as guides for monetary policy making. Another possible effect of the wide-spread use of electronic money is a smaller demand of commercial banks for central bank money. As a consequence, it would be harder for central bank to steer the money market.

There have been several solutions proposed in the literature for central banks to cope with these problems. If electronic money is only a substitute for "official" money, central banks could simply widen the definition of their monetary aggregates to include electronic money. And as the most far-reaching way to secure its grip on the money market, the central bank could impose reserve requirements on electronic money balances. The above raises several questions:

How likely is the widespread use of electronic money?; Will it only be a substitute for "official" money?; How can central banks monitor the use of electronic money?; How likely will central banks lose their grip on the money market?; Are measures proposed to secure central banks grip on the money market sufficient?; At what costs do these measures come?.

This section seeks to provide answers to the questions presented above. We do so by simultaneously commenting on the Directive[9]. Comments are also included on the relationship between electronic money and the introduction of euro.

5.2.1 Growth in the use of electronic money

The industry of electronic money is still in its infancy, and the current figures it has achieved in Europe can be considered as negligible for the purposes of current monetary policy[10] (see Table 5.1).

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[6] Methodological note: This document has been produced after research undergone consisting on personal interviews to key actors on the issue of monetary policy, questionnaires (See annex 3) to experts in the field of electronic money and additional information published in the academic literature and the economic press

[7] The set of questions posed by the European Parliament were the following: 1)Does the lack of a safe and widespread electronic payment system hamper the growth of electronic money?, 2) Will monetary union speed-up cross-border electronic commerce?, 3)What are the costs of non-standardization of electronic payment systems?, 4) Should markets or regulators impose future standards –if necessary- for electronic payment systems?; 5) How to regulate issuers of e-money?, 6) How will electronic money affect monetary policy-making?

[8] See annex 5.

[9] Throughout this chapter, by "Directive" we refer to the "European Commission Proposal for the European Parliament and Council Directive."

Table 5.1 Settlement media used by non-banks of some European countries

Belgium (BEF billions)	1995	1996
Notes and coins	416,2	435,8
Transferable deposits	1111,3	1150,1
Narrow Money Supply (M1)	1527,5	1585,9
Outstanding value on electronic money schemes	0,02	0,11
on card-based products	0,02	0,11
on network-based products	--	--

Spain (ESP billions)	1995	1996
Notes and coins	7535	7941
Transferable deposits	22605	24169
Narrow Money Supply (M1)	29638	31717
Outstanding value on electronic money schemes	--	0,07
on card-based products	--	0,07
on network-based products	--	--

Denmark (DKK billions)	1995	1996
Notes and coins	30,59	30,90
Transferable deposits	245,00	278,44
Outstanding value on electronic money schemes	0,015	0,021
on card-based products	0,015	0,021
on network-based products	--	--

Portugal (PTE billions)	1995	1996
Notes and coins	841	880,9
Transferable deposits	3348,8	3805,0
Narrow Money Supply (M1)	4254,3	4784,9
Outstanding value on electronic money schemes	0,4	0,4
on card-based products	0,4	0,4
on network-based products	--	--

Source: Payment Systems in the European Union. 1996 figures. European Monetary Institute. Frankfurt (January 1998)

[10] The majority of the European Countries are not providing any data on the "outstanding value on electronic money schemes". Only in the settlement media used by non-banks of six countries appear data concerning electronic money schemes: Belgium, Denmark, Spain, Portugal, Austria, Finland In any case, the weight of this media within the payment system still very low. (see table A.1.1).

At present, different systems are being developed and implemented by major players in the industry. Because technology is expensive, co-operation between organisations (VISA-Mastercard; Mondex-American Express….) is the norm, allowing firms to share the risks and the costs involved in R&D. A significant feature of most of these schemes is the involvement of financial institutions in its development and /or implementation. Co-operation also serves to make products with several co-participants more attractive to consumers and retailers, by delivering greater flexibility, and mainly, because the success of cards is dependent on the number of users taking on to them.

Although technological progress does not cease, and current technology available could provide satisfactory security levels, another number of variables also determine the path in the spread of electronic money. Among those are: access to Internet (people connected, how fast is the access), legal framework, and among all, the demand for such services on the part of consumers. Typically, changing consumers habits and gaining familiarity with the new technology requires time, and simultaneously the usefulness of these products increases with the number of individuals accepting and using it. Since, the growth of the industry will ultimately depend on the acceptance by the consumer.

Overall, if the pace of financial innovation observed in previous years were to continue at a similar rate, we should expect electronic money to effectively spread widely in the coming years.

Europe

The potential for the development of electronic commerce in Europe is inherently linked to the introduction of the single currency. Since in the long run the euro offers opportunities for firms to simplify and streamline their operations, it is reasonable to conclude that firms' efforts towards developing and introducing e-commerce technology, which are also decided for on a long-term basis, are undertaken with a view towards the single market.

The role of the euro is considered as an opportunity for the expansion of electronic money. On one hand, the unavailability of euro banknotes and coins until year 2002, may provide incentive for the use of electronic money products. On the other hand, the variety of coins that will be available all throughout Europe after year 2002, may also promote the use of electronic money as a more efficient means of adapting retail payment devices (vending machines, public transportation,….) Spread acceptance and use of electronic money would also help lowering the costs of introducing the new coins and banknotes, at the same time reducing the costs of their distribution.

It is therefore important that the measures undertaken by the competent authorities do not hinder the development of electronic money, but aimes at promoting it instead, as it could deliver improved efficiency for the European payment systems and thus for the economy as a whole.

5.2.2 E-money and official money

Acceptance and widespread use of electronic money would result in a new asset that could be used a close substitute for central bank money and hopefully not in a new "type" of money -but on a new payment means. In this sense, it is highly desirable that electronic money be only a substitute for official (central bank) money, if the public provision of the unit of account function of money is to be preserved.

Problems could arise in a scenario were issuers of electronic money were not obliged to redeem customers with official money, leading to a situation where electronic money would be traded at different values depending on the soundness of the issuers. Money of different "categories", traded at different values, would definitely not enhance the efficiency and soundness of the financial systems and not benefit economy as a whole.

Such situation where different "moneys" were widely accepted in Europe is not likely to arise in the current legal framework where issuers of e-money are subject to monetary authorities authorisation and supervision, and to reserve requirements. Furthermore, the participation of the financial sector on most the existing schemes operating and being tested in Europe contributes to lowering the chances of such a situation arising. This danger would however be avoided if redeemability of electronic money into central bank money were required.

Current stage of regulation

European monetary authorities have argued in favour of redeemability of electronic money. In addition to guaranteeing that central banks continue to issue the final settlement medium in the interbank market, a redeemability requirement would also lower the risk of overissue by e-money institutions by obliging them to possess central bank money.

On the other hand, the Directive, in its Article 2, "…provides that the contractual arrangements must specify if the stored value is redeemable and, if so, the specific contractual conditions."

Therefore we can conclude that the current regulatory framework does not establish redeemability as a requirement on the issuance of electronic money. As before, the nature of the contract as understood by the Commission renders redeemability requirements as not pertinent to the provision of e-money and the risk that it entails.

The decision of the Commission comes after appraisal of the current situation of e-money institutions operating in Europe, and is conveniently balanced by more stringent restrictions in terms of business activities and investments applying to non-bank providers of e-money.

Our opinion is in favour of establishing the requirement of redeemability for electronic money -issuers of electronic money would be obliged to redeem electronic money against central bank money at par at the request of the holder of the electronic money- in the near future if electronic money gains widespread acceptance in Europe.

5.2.3 The monitoring of e-money by central banks

As indicated in the presentation of this topic, the wide-spread use of electronic money could affect the stability of money demand, could diminish the relevance of monetary aggregates for monetary policies, could result in smaller demand for central bank money, and could pose some difficulties for monetary authorities to stir the money market. The likelihood for these forecasts to occur will in the end depend on the spread of electronic money, but also on the institutions authorised to issue electronic money, and the regulatory framework applying to them (Topic 5 of this project).

Before detailing the implications that electronic money may have for monetary policy, it should be stressed that such possible effects do not apply in the short term - the outstanding float of electronic money is currently extremely low in the context of monetary aggregates- and should be understood as to be potential implications for the long term only.

Within the framework of the current regulation –not considering now the issue of redeemability- the spread of electronic money should not endanger the efectiveness of monetary policy. Central banks in Europe can monitor the use of electronic money through granting authorisation for issuing institutions, supervising them, and imposing reserve requirements. At an international level, the Basle Committee on Banking Supervision keeps providing valuable insight into the development of risk management on electronic money activities.

In any case, whatever the appropriateness of the regulatory approach, which do can significantly contribute to lower potential problems and risks, a spread of electronic money would inevitably introduce changes for the conduct of monetary policy.

Some experts have argued that the effects that the spread of electronic money might bring about should not differ considerably from to those caused by other financial innovations, with the division between monetary and non-monetary assets getting increasingly blurred and posing difficulties in deciding what should be included in the definition of monetary aggregates.

Even the process of the adoption of the single currency in Europe introduced some difficulties in defining monetary policies. At least on a first period of the Stage Three of EMU, monetary policies affected economies differently, as a given change in interest rates does not have a uniform effect in the euro-11 markets, some of them being more responsive to changes in interest rates than others, obeying to their different financial structures. Over the time, however, the single currency should narrow these differences in the long run.

The monitoring capabilities given the current regulatory framework: Instruments

Monetary statistics reporting

Issuers of electronic money must supply the central bank in each country where the scheme operates with the information necessary for the purposes of monetary policy.

Supervision of electronic money issuers

Issuers of electronic money must obtain prior authorisation by competent authorities and are subject to prudential supervision.

In its Article 5, the Directive imposes a requirement on competent authorities to verify compliance by e-money institutions with Articles 3 (Initial capital and ongoing own founds requirements) and 4 (Limitations of investments) at least twice a year while Article 6 emphasises the obligation to have sound and prudent operations.

Also, in its Article 2, the Directive clarifies that the Consolidated Supervision Directive applies to e-money institutions.

Since in Stage Three of EMU, bank supervision is to be carried out by existing national authorities -in some cases central banks, in others a supervisory body or the finance ministry, it is these institutions that will be the competent authorities supervising the electronic money schemes operating in their countries.

In our view, a single remaining concern is that the decentralised structure of the financial-sector supervision, together with the potential for electronic money schemes to operate on a cross-border basis, will make it more difficult for national supervisors to monitor and assess e-money institutions overall risks, and therefore agrees with the need for co-operation that both the documents produced by the Commission and the ECB, abide for. This issue gains importance during the early years of monetary union, when there may be a tendency for systemic financial risks to increase temporarily.

Reserve requirements

The possibility exists for central banks to impose reserve requirements on all issuers of electronic money. Such possibility may however result difficult to implement in the future, given the above mentioned potential for electronic money schemes to operate on a cross-border basis.

A possibility for an even stronger requirement would be coverage on electronic money, by which its issuers would have to cover part or all of their liabilities with base money.

5.2.4 Implications of e-money for the control of the money market by central banks

In studying this issue it should again be remarked that the potential effects that electronic money may have for the functioning of the money market are to be understood on a long term basis, and that there is no concern at all on a short-term horizon.

Box 5.1 Monetary policy risks of e-money

Type of risks	Type of problem	Comment
Credit risk	Default of an electronic money issuer. Default of borrowers who applied for credit.	Most common risk relating to banking activity.
Liquidity risk	The e-money financial institution is temporarily unable to meet payment obligations.	Mainly incurred by issuers. May be a problem for banks that specialise in e-money schemes
Interest rate risk	Movements in interest rates may affect financial conditions of e-money related institutions	A decline in value assets could lead to redeemability problems.
Foreign exchange risk	Foreign exchange rates fluctuations could affect financial conditions of e-money related institutions	Linked to e-money schemes that accept multiple currencies or that accept foreign currencies in payment for e-money
Operational risks	Lack of internal control (system access, employee fraud…) Deficiencies in information systems (obsolescence of systems, security practices, low performance by staff…)	The nature of e-money makes this type of risk particularly high. Inadequate operational procedures and controls could lead to high losses for the e-money related institutions
Legal/ compliance risks	non-compliance of laws, rules, regulations, prescribed practices or ethical standards (money laundering, certificate authority risk, non-protection of customer privacy…)	The nature of e-money makes this type of risk particularly high. This risk is borne by the issuing, distributing and transaction-archiving institutions.
Reputation risk	Reputation of e-money related institutions may deteriorate (widespread system deficiencies, breach of security…)	Mainly incurred by issuers. Customers may leave the bank.

Source: Basle Committee on Banking Supervision (1998), ECB report (…) Directive and self elaboration.

The effect on supply would result from the impact of e-money on the size of central bank balance sheets, which will depend on the extent that e-money substitutes for cash. Since cash is a large or the largest component of central bank liabilities in many countries, a very extensive spread of e-money could shrink central bank balance sheets significantly. The issue is at what point this shrinkage might begin to adversely affect monetary policy implementation. The relatively modest size of open market operations on normal days suggests that a relatively small balance sheet might be sufficient. However, special circumstances could arise in which the central bank might not be able to implement reserve-absorbing operations an a large enough scale (for example, to sterilise the effects of large purchases in the foreign exchange markets) because it lacked sufficient assets on its balance sheet.

Were there to be an extensive substitution of e-money for banknotes, central banks could have to decide whether to take steps to offset the shrinkage of their balance sheets. This decision depends on the point at which such shrinkage becomes an impediment to the effective implementation of monetary policy; this, in turn, is likely to depend on a judgement as to the maximum size of open market sales that might be needed in special circumstances.

In conclusion, the likelihood of central banks loosing grip on the money market is very remote, however the possibility exists. The next section deals with the measures already in place that can help secure the central banks grip on the money market, and presents as well some additional possibilities.

Box 5.2 The money market in the European monetary policies

With regards to the implementation of monetary policies, the ECB criteria to use in setting interest rates favours a money supply target in which interest rates are changed to keep monetary growth within a specified range. The money supply is useful as a policy target only if there is a stable link between money and inflation. In the euro area, the introduction of the single currency may modify the definition of the money supply and its relationship to inflation.

Recognising the difficulties, the ECB has adopted two policy guides: a monetary target and an inflation target of 2% or less. To monitor its performance against the inflation target, the ECB will use a basket of economic indicators which includes an inflation forecast. Reliability of the data will need to be tested.

Difficulties in controlling the money market are only part of the group of implications that electronic money may have in the scope of monetary policy (See Box 5.2) .

The control of the money market lays within the operative goal of the central bank, which targets the short-term interest rate.

The effects of e-money on the implementation of monetary policy will depend upon whether its primary impact is on the demand for bank reserves or on the central bank's capacity to supply these reserves. The effect on demand would result from the substitution of e-money for reservable deposits or from a substantial reduction in banks' demand for settlement balances. It is conceivable that a very extensive substitution could complicate the operating procedures used by central banks to set money market interest rates. However, since e-money is expected to substitute mostly for cash rather than deposits it is highly unlikely that operating techniques will need to be adjusted significantly. And also, since e-money is subject to reserve requirements in the current regulatory framework, this aspect should pose no further problems.

5.2.5 Proposal of measures to secure the central banks grip on the money market

In principle, central banks have several policy options should the shrinkage of their balance sheets be judged to be a significant concern.

On one hand, they can expand the coverage of reserve requirements to cover e-money or other liabilities. However, reserve requirements are sometimes regarded as a tax that distorts competition and, for this reason, they have been or are being reduced or phased out in many countries. Central banks could also issue new liabilities, such as central bank bills, or pay higher interest on reserve balances in order to induce private sector banks to hold larger deposits at the central bank.

However, as long as the central bank has a position as a monopoly supplier , ie. electronic money to be only a substitute for central bank money- it should be feasible to control the money market. Even if it electronic money were not only a close substitute for central bank money, the confidence factor would presumably continue to maintain demand for central bank money.

In practice, virtually all e-money schemes under development will need inter-institution clearing and settlement arrangements. Many e-money schemes plan to use existing interbank arrangements.

Notwithstanding the above, adittional measures to help secure the central banks grip on the money market exist. On one hand, we have already discussed the possibility of establishing a redeemability requirement on electronic money. Additionally, reserve requirements currently applying to electronic money, could be extended to requiring full coverage. This latter is however a quite restricting requirement.

5.2.6 Costs of the proposed measures

Seigniorage. A substitution of e-money for cash (non-interest bearing central bank liabilities) would lower central bank asset holdings and therefore would also lower the interest earned on these assets (the central bank seigniorage revenue). In general, seigniorage revenues are substantially large relative to central bank operating costs. However, in the future, if the spread of e-money were extensive enough, the loss of seigniorage could become a concern to central banks. Obviously, the need for a response depends largely on the extent to which e-money will replace cash. If the spread of e-money is moderate, the decline in the seigniorage revenues and the shrinkage in central bank balance sheets should be expected to be limited.

Oversight and supervision. Central banks will add institutions issuing e-money to the range of those that are subject to prudential supervision. Estimated costs of supervising additional institutions are of small magnitude.

*Measures that would help to offset costs.*Were central banks to issue of e-money or expand reserve requirements, that could increase the size of central bank balance sheets and help to offset any loss in seigniorage (however subject to the interest paid on reserves).

Box 5.3 Issuers of e-money in Spain

With regards to specific institutions authorised to act as issuers of e-money, there are not in Spain experiences of non-financial institutions trying to work as e-money. The present approach of Bank of Spain to the subject is the following (Gil, 1998):

- This sort of money should be issued by institutions subject to a similar regulation than that of financial institutions.

- Interoperability of the systems can't be the object of regulation, but principles can be established and recommendations can be made.

- Full security would only exist if e-money would have redeemability into Central Bank's money. This would be only possible if the issuer had a direct connection with the Central Bank (financial institutions) or if he had a privilege relationship with some of the accounts of the Central Bank connected to banks.

- Overissuance risk is very low. This type of risk is related to the redeemability of electronic money. Issuers could issue without limit due to absence of interest rate on the value of money in the cards. This risk doesn't exist today, it would probably never exist in the future either as we should expect competence in the sector to establish a price.

The approach of the Bank of Spain to e-money monetary policy.

The Bank of Spain has started up the National System for Electronic Clearing in order to control retail payments. Electronic money lays mainly in this domain and the types of e-money included in the Bank of Spain control data bases are pre-paid cards and Network money. In relation with the Spanish monetary policy one has to have in mind that electronic money should evolve substantially if it were to eliminate the considerable volume of cash, coins and notes, that represents in Spain the 11% of the GNP, the highest in Europe.

Between the main issues related to monetary policy and e-money the Bank of Spain approach could be summed up as follows:

- *Strategic aspects of monetary policy.* Electronic money could affect certain strategic aspects of monetary policies. The definition of monetary aggregates and the velocity of money could be affected by the issuing of electronic money with possible effects over the demand of money and control of the aggregates.

- *The control the short term interest rate***.** Electronic money could also affect the control of operative goal of the central bank: the short term interest rate. An increase in electronic money would cause a substitution of cash with the consequent reduction of the balance sheet of the central bank. In a similar manner, the liabilities could also be reduced , therefore leaving the central bank without instruments to act accordingly in this area.

- *Seignorage.* The central bank could loose the volume of revenues (income?) coming from a decrease in the demand of coins and notes, if we take into account the current situation of liquidity deficit prevailing in Europe this could not be seen in the long term.

- *Liquidity risks.* Electronic money would cause liquidity risk associated with the difficulties of the issuing institution to manage the funds received in exchange for the issued electronic money. Some risks could appear linked to the people's confidence in the system.

From the point of view of monetary policy as many other central banks, Bank of Spain, is not seeing e-money as a concern for monetary policy in the short run.

Source: interviews with experts from the Bank of Spain and self-elaboration.

5.2.7 Conclusions

Electronic money will add uncertainty to the evolution of money demand, thus further complicating the definition and implementation of monetary policies. The European Council and the European Parliament have acknowledged this concern and have accordingly taken a proactive approach by providing regulation on the business of electronic money institutions.

The Commission proposal acknowledges the ECB's concerns on the significant implications for monetary policy that the issuance of electronic money may have in the future, and accordingly resolves to regulate the business of electronic money institutions.

Overall, the scope of the regulation adopted is slightly less restrictive than the approach proposed by the ECB. This less restrictive approach is intended not to hamper the development of e-money schemes, therefore establishing a legal framework that lowers the uncertainty faced by e-money institutions, while at the same time not contemplating some of the requirements expressed by the ECB, when those are judged not pertinent.

The Directive aims therefore at promoting a level playing field between the different types of institutions, ensuring stability and soundness of the issuers of electronic money, while at the same time avoiding a too burdensome regulation that could discourage the development of the industry.

At the current stage of development of electronic money, this section will conclude that the issue of electronic money with regards to the implications that it may have for monetary policy is being adequately monitored. Security could be enhanced further by imposing a requirement on the redeemability of electronic money into central bank money.

Due to the potential of electronic money to be used on a cross border basis, further international co-ordination is essential. In this respect, it is of high interest the work on the monitoring on the risk of electronic banking and electronic money activities conducted by the Basle Committee on Banking Supervision.

Experts interviewed generally agreed that the implications of electronic money for monetary policies are of concern on a long term basis only.

Chapter 6.

Concluding remarks and summary of results

Chapter 6. Concluding remarks and summary of results

6.1 General framework

Globalisation of financial markets

The increase in demand for financial services and the appearance of new products (especially derivatives) have contributed to drive up the stock of financial assets (shares, bonds, banks and deposits), which have been increasing more than twice as fast as the GDP in developed economies. Market turnover for the group of equity, debt, derivatives and foreign exchange markets has grown even faster.

The growth of capital markets has been accompanied by a tendency towards globalisation, which offers both new benefits and new problems. On the one hand, globalisation of capital markets allows better possibilities for resource allocation. On the other hand, global capital markets raise concerns about their stability.

Developments in ICT have been one of the major underlying forces that have contributed to the reshaping of international capital flows over the last decades. International capital flows have soared, owing both to deregulation of financial markets and to technological progress in ICT. Among the other forces that have been influential, we must single out the importance of liberalisation.

Instability of financial markets

Following a period of increasing international integration of both goods and financial markets, several crises have successively shaken the international financial system.

The first signal of the crises were the speculative attacks launched in 1992-93 against several European currencies that were integrated in the Exchange Rate Mechanism. This had as a consequence a depreciation of the currencies of several European countries, and the modification of the bands that limited the movement of the exchange rates of the countries that adhered to the ERM.

In 1994 occurred the Mexican currency crisis, which resulted in a big drop of the Mexican peso, whose consequences were felt all over Latin America. In 1997, the depreciation of Thailand’s currency gave rise to the Asian crisis, the worst financial crisis for many years. More recent events include the depreciation of the Russian ruble in August 1998.

One of the most remarkable characteristics of all the above-mentioned crises, is the *rapidity of the contagion* from the original point to other economies. All those events affected, and were influenced by, the exchange rates of the corresponding currencies.

Exchange rates and financial crises

The current architecture of the global financial system has been inherited from the floating exchange rate regime that followed the collapse of the Bretton Woods system. Since then, financial markets have changed dramatically and so have arrangements governing global finance.

Nowadays, the most important currencies are mainly subject to a floating exchange rate regime. In principle, this leaves more room for economic policy to be decided by national authorities. In the face of open international financial markets, the flexibility of exchange rates goes parallel with the degree of independence of monetary policy. Countries are better armed to mitigate the effect of external shocks under an exchange rate flexibility regime. Nevertheless, many emerging economies have chosen a regime of some rigidity for their exchange rates.

Why would emerging economies subject themselves to an exchange rate regime that limits their capacity of reacting to a financial crisis? The problem is that, if the governments of those countries want to attract investments, they should render credible the commitment that those investments made will not be endangered because of changes in the future monetary or fiscal policies. A regime of fixed or semi-fixed exchange rates is one way (within the framework of macroeconomic policies intended to provide stability) adopted by emerging countries to gain this credibility.

With open markets and rigid exchange rates, governments cannot use monetary policy to fight shocks and ensure macroeconomic stability; therefore, there should be instruments at the international level that serve this purpose. The setting up of such instruments is one of the challenges that nowadays face the international institutions. If this represents a problem for the European Monetary Union, it is much more complicated at the international level.

The limited scope of monetary policies under a regime of rigidity of exchange rates, renders credibility to policies of maintaining low inflation and macroeconomic stability, and requires authorities to exercise a strict fiscal discipline. On the other hand, most of the financial crises occurred under a regime of semi-fixed exchange rates. This hindered the ability of the countries to make adjustments, and therefore worsened the effects of the crises on them.

Exchange rate flexibility places more instruments at the disposal of the authorities. This allows them to deal better with, for instance, country-specific shocks. Additionally, the risks of borrowing in foreign currencies are more explicit under this regime, so economic agents are more likely to take the necessary precautions.

Policy issues

The two basic problems that the recent financial crises have brought fourth are:

- The excess volatility that affects individual countries, mainly emerging markets.

- The high degree of contagion present in the system, through which the excess volatility is propagated.

The main policy issues that are being considered are:

- Should controls of capital flows be established?
- Should exchange rates be subject to a different regime?
- What should the role of the IMF be?
- Should financial transactions be subject to special taxes? And, in particular, what are the advantages of the introduction of a Tobin Tax?

The main arguments in favour and against these measures are presented in Chapter 1.

While many arguments and proposals have been advanced, there are few points in which there is wide consensus, and even in these cases there is not full unanimity. In general, there seems to be agreement that the move towards liberalisation and globalisation has been beneficial for both developed and emerging economies, but that the experiences have shown the need for a revised international regulatory framework.

The challenge that international institutions face at this moment is how to overcome the difficulties created by the globalised markets. Ideally, the regulation and supervision of international financial markets should follow closely the existing patterns for domestic markets. But the parallels break at decisive points. For instance, international regulations should not contradict national rules that sometimes differ widely in certain particulars. Additionally, there are different bodies with overlapping efforts towards designing a new set of rules for the international markets.

In spite of all those problems, there is wide agreement on certain lines:

- Increase the transparency and accountability at both the national and international levels.
- Harmonise and strengthen financial regulation and supervision in all countries. Disseminate the use of internationally accepted standards.
- Involve the private sector in the prevention and resolution of financial crises.
- Improve the crisis resolution mechanisms at the international level.
- Continue with the movement towards international financial integration, in an orderly fashion.

6.2 The banking sector

Innovation in the financial sector

The banking industry is in Europe the main financial intermediary. In spite of this fact, there is a general tendency towards a decrease of the share of banking in the financial sector, in favour of other intermediaries such as mutual funds and pension funds.

Since the 1980s, the banking industry has been in a process of significant transformation that started in the United States, and moved later on to Europe, where the single market and the introduction of the Euro have contributed to accelerate the process of change. The main forces behind this transformation of the banking industry are deregulation and innovation in ICT. Both forces have brought about increased competition, not only among banks but also from other financial, and even non-financial, institutions.

The combination of trends towards deregulation, increased competition and technological innovation, has in principle rendered markets more efficient, making it easier to buy and sell risks. Technology has been a key factor, for example in the development of the screen-based systems that have been gaining share of market at the expense of outcry floors. Moreover, recent events, as Internet trading, point at how the physical location becomes less relevant as communications allow to simultaneously access different markets from a computer.

Deregulation of financial markets has led banks and financial institutions to innovate and develop new products, and technological advances and theory contributions in the area of risk pricing provided the means to undbundle risks into a variety of increasingly complex securities, causing turnover in financial markets to rise sharply.

Trends in the banking business

The new environment of deregulation and ICT developments has had a strong influence on the activities of the banking sector(ECB, 1999). For example, banks build up sophisticated databases containing information about their consumers, and through data mining they are then able to market their products more efficiently. Technology also allows banks to apply credit-scoring techniques to consumer credits, mortgages or credit cards, automating part of the process *(commoditisation).* Similarly, technology allows some products to be traded in capital markets *(securitisation)* instead of remaining in the bank's balance sheet.

Another trend in banking business has been the process of *disintermediation*. By disintermediation we normally refer to banks losing share of financial intermediation to institutional investors (investment funds, insurance companies and pension funds). This is true for both bank assets and liabilities, although it is in the collection of savings where this process has been the most pronounced. On the assets side, disintermidiation has also occurred in the provision of credit, where capital markets have been gaining share at the expense of banks. Yet, banks continue to have a natural advantage in the financing of households and SMEs, as in this activity asymmetric information and transaction costs remain important (see Relationship banking) . There are two more additional dimensions of disintermediation and these are not linked to institutional investors. These are disintermediation at the level of back-office operations and in the distribution of banking products.).

Overall, the tendencies above have produced changes in the structure of bank income. As a result of increased competition that has lowered margins in lending operations (the banks' traditional business) banks have diversified their sources of income and rely increasingly on

income from fees services rather than interest rate spreads. This change is also reflected in the increasing size of off-balance-sheet items in the banks' financial accounts.

Relationship banking

The trends in the banking business detailed above can be explained from the financial intermediation point of view. Financial intermediaries exist as a response to the inability of market mediated mechanisms to efficiently resolve informational frictions of different types. Accordingly, different types of informational frictions are dealt with by different types of financial intermediaries. Informational frictions differ for big firms and for small and medium enterprises. For the latter (at least in European markets), the main source of financing consists still of bank loans, based on a long-term relationship that allows mitigating the effects of information asymmetries. To explain relationship banking we describe the type of informational frictions that are characteristic of this type of banking activity.

Relationship banking can be defined as the provision of financial services by a financial intermediary that:

- invests in obtaining customer-specific information, often proprietary in nature; and

- evaluates the profitability of these investments through multiple interactions with the same customer over time and/or across products.

Among the benefits from relationship banking are the reduction in informational asymmetries, and several beneficial contractual features. Among the costs from relationship banking are the hold-up problem and the soft-budget constraint problem.

ICT developments applied to the banking industry are affecting relationship banking to a considerable extent. Relationship banking is turning from the main activity in the industry to a more specific service of all those provided by banks. Over the past years, relationship banking has been loosing volume but continues to be a value-enhancing intermediation service. Instead of been a general banking activity, it continues only where asymmetries of information remain despite advances in ICT.

Further research needed as current research falls short in differentiating between the various costs and benefits of relationship banking for SMEs. With regards to further research on relationship banking, it would be interesting to construct a theoretical framework that would incorporate the changes that ICT may introduce in this model of relationship banking, and allow an empirical testing of whether there have been structural changes in the empirical regularities described in this dissertation. The goal could be to focus on the financing of small and medium enterprises in the Spanish (and maybe later European) economy. Another question of interest would be to examine the regulatory options.

A second line for research would be to study the influence of virtual banking on the structure of competition of the commercial banking sector. With the advent of the ICT and

banking via Internet, a new phenomenon that may change the structure of competition in this industry is making its appearance. Banking via Internet has been concentrating mainly in one of the two activities that have traditionally characterized commercial banking: the collection of deposits; to invest their assets, those banks resort either to financial markets, or to loans that may be standardized, that is, loans for which the long-term relationship between bank and customer is not so important. Even though at present this new kind of banking activity is just being introduced and its influence on the sector is very small, it is possible that its long-term influence will completely change the structure of the industry.

Spanish banks

Within the Spanish banking sector, there are two sets of institutions -commercial banks and savings banks- which can, as a generalisation, be identified with two different business strategies. These distinctive business strategies have not originated with technology induced changes; they are rather the continuity of historically different businesses strategies; widely recognised in the literature.

We use the distinctive features of commercial and savings banks in the late 1980s, to design a study that assesses whether the responses to technology developments during the 1990s, by commercial and savings banks, have paralleled those observed in the previous years.

To assess the effects of technology on banks, we focus on information management and distinguish between their impact on wholesale and retail banking, which correspond to banking activities characterised by distinct types of information asymmetries and transaction costs.

We examine whether technology has affected commercial and savings banks differently, given the differential effects of changes in information management on wholesale and retail banking, presented in the previous section.

We find that the role of technology on the activities of commercial and savings banks in Spain has differed. Data from the 1990s shows that commercial banks in Spain have responded to changing market conditions by lowering costs while savings banks have responded by expanding market share. We link these business strategies to the different use of technology by commercial and savings banks and, correspondingly, to the role of information management on wholesale and retail banking. We find that differences in the production technology explain differences in the composition of banks' income that have changed with ICT.

This study has been a first approach to empirical work on the effects of technology on Spanish banks. It seeked to identify what could be some indicators of tecnhology affecting the economics of banking business. Further research is needed on the nature of relationship between technology and banks' activities, and of income statements as indicator of banks' activities. This would help avoid a common problem in empirical investigation, which is the failure to deal with the inherent simultaneities. Another problem in empirical work is that the choice of measures of inputs and outputs of innovation is guided largely by data

availability rather than by a conceptual framework. It would be interesting to complete the study in this dissertation with a similar analysis with non-aggregated data.

In the next years, we may expect that ICT continue to influence banks activities and their income structure. Among the activities that may be subject to stronger pressures for change are those that, up to today, have remained relatively insulated from ICT developments. This applies mainly to some retail banking activities that are suitable for standardisation, and also to developments in remote banking. Hence, it would also be interesting to continue research on technological developments that might transform the existing distribution networks of Spanish banks.

6.3 The payments system

Electronic money

In recent years, and taking advantage of new information technologies, two groups of new payment methods, referred to generically as electronic money (e-money), have been developed and introduced: smart cards and software-based products to make payments over the Internet.

Until now, the most revolutionary systems of e-money are still at their infancy, and there is debate concerning the degree of adoption that could take place in the coming years. In the meantime, we are witnessing the introduction of mixed products that coexist with some incipient experiences of pure digital cash.

Costs and benefits of the introduction of smart cards

- Pre-paid cards can serve as a payment mechanism by loading and storing monetary value in the chip embedded in the card. The value loaded in the card can later be used to pay for goods and services. The introduction of smart cards seeks to replace cash in most of the small transactions for which hard cash is currently used. The introduction of this new payment mechanism will go through different stages. Initially, consumer habits must change. Once reasonable acceptance is attained, point-of-sale terminals would spread rapidly.

Three different parties are involved in smart card schemes: consumers, businesses and issuers.

- *Consumers.* They may adopt this new payment instrument because of its greater convenience. For the instrument to gain acceptance, it should have some of the following characteristics: anonymity, security (reliable authentication procedures, or solutions to compensate users in case of loss, theft or malfunction), liquidity (subject to wide acceptability), low transaction costs (from paper handling and clearing), speed (time saving in transactions, faster balance updating).

- *Businesses.* Suppliers of goods and services could benefit from the use of pre-paid cards because of lower costs of handling cash and no interest lost on cash holdings. Also, substantial savings result from the transition of credit card to smart card payments: while credit cards require connection to a remote machine each time a payment is made, with smart cards all payments are processed jointly at the end of the business day.

- *Card issuers*. Both consumers and merchants will be willing to pay for smart cards because of its many conveniences. Until the competitive pressure reduces the extra profits, smart cards can be a good business to entrepreneurs introducing new schemes.

Technological issues regarding smart cards

- The current situation of different, possibly incompatible, schemes, can be expected to last for some time. Strategic alliances will seek to impose their own standards. In the long run, standards will probably be determined by the market, prevailing the system /s that gain greater acceptance by the consumers. There might well coexist (a few) incompatible schemes.

- Developing compatible smart card systems presents more technical difficulties, and is costlier than it was in the case of cards with magnetic bands. Terminals must be capable of reading different cards and have the ability to decypher (hence decrypt) the information in them.

- Compatibility of the systems would allow companies to access a larger market, and therefore would lower their risks and costs of introduction. However, forceful imposition of a particular standard, could prevent or discourage the technological development of better systems in the future.

Digital Money and Internet

- For banks and financial institutions, offering online services has many advantages: electronic confirmation of payments and invoices, capability of answering via e-mail complicated or detailed requests, cash management, information on banking services or financial advice.

- Internet payment mechanisms could be grouped into 3 broad classes: systems based on credit card payments, credit-debit systems and electronic cash systems. In the first case, the payment mechanism works trough the existing credit card infrastructure; in the second one ,validity of the payment requires reference to the issuer; and in the third one, the system consists of a token authenticated independently of the issuer.

Technological issues regarding Internet payments

- In general, banks and financial institutions seem to adopt a step by step approach towards Internet. Firstly, they start by having information services on the Web. Secondly, this service becomes a sort of point-of-sales terminal doing functions similar to an automated teller machine. The SET standard is clearly expected to be determinant in order to speed up the diffusion of that function. It is supported by all key players. And finally, (in a few years?) the banks' own digital money could start to circulate in the networks. The success of this scenario will depend on the widespread use of home PCs as banking terminals, and the development of smart card reading devices that can be attached to them.

- The use of Internet for banking and finance by home users, will very likely be tied to the development of smart card reading devices for home PCs. A prerequisite for this is some degree of compatibility among smart card systems.

Payments system in Spain, in comparison to other EU countries.

Payment culture in Spain is characterised by the dominance of cash despite the abundance of POS terminals and payment cards. There are some explanations for this situation: the large number of terminals may be due to the fact that the financial institutions bear the costs of the POS terminals and of their maintenance. Commercial policies of banking institutions often lead to a situation where several POS-terminals can be found at a single store. On the other hand, as merchants complain about the high commissions, their interest in pushing cashless payments might be restricted.

Spain is quite advanced in the implementation of electronic purse schemes. Currently, two incompatible purse schemes are marketed under three trade-marks. Broad acceptance on the users' side has not been observed. What can be stated however is that the relations between providers of payment networks and services, issuing banks and chosen purse technology are no longer a given thing. This pattern is observable in the sector of payment cards in general fol-lowing increased competition in the area. The role of Visa España (SERMEPA) in the standardization process of electronic purses is outstanding. SERMEPA is member of the CEPS group (Visa España, Europay International, Visa International and ZKA) and the work of the CEPS group has already led to Common Electronic Purse Specifications (CEPS). This standard is clearly an initiative with a European dimension. Internet users and Internet use do not differ significantly from those of other countries. But there are some remarkable political activities towards implementation of advanced technologies, namely the fomentation of ADSL as a prerequisite for charging a flat rate for Internet access, thus improving Internet usage and e-commerce. At the moment the driving forces behind e-commerce in Spain are mainly financial institutions and telecommunications companies.

Given the rapid path of innovation on payments instruments, it is of interest to go into greater depth over a longer period of time on the developments occurring. This is partly done through participation in the electronic Payment Systems Observatory (*e*PSO) (see section IV in Introduction) which has as a primary objective to enhance the information

exchange in the field of e-payment systems, with a view to assist standardisation and regulatory bodies keep pace with the evolution of underlying technologies.

Prepaid cards and central banks

- Companies issuing smart cards should abide by the same regulations, and be subject to the same close monitoring by central banks and monetary authorities than any other recognised credit institutions. This has been stressed in reports by the European Monetary Institute (EMI), and later the European Central Bank (ECB) and the Bank for International Settlements (BIS). In principle, prepaid cards should have no major consequences for monetary policy, beyond the fact that they might change the proportion of cash people use in their spending.

- If the amounts stored on smart cards grow in importance, legislative measures should be taken to grant its users the same protection bank deposits enjoy.

Internet payments and central banks

- Internet payment systems pose further problems, in addition to those mentioned above. The monetary authorities must pay attention to the possibility of creation of money and the difficulties of tax control that are starting to appear in relation to digital money systems. Until now, little attention has been paid to these matters.

- Due the difficulties in guaranteeing their security, it is often argued that electronic payments through Internet will not be a significant phenomenon in the coming years, because users will not be willing to risk any significant sums through such an insecure channel. Nevertheless, the rapid growth Internet commerce is experiencing seems to cast doubts on this claim.

- Internet payments represent for monetary authorities a more serious challenge than smart cards. The ease with which digital money can be transferred through the nets, should be controlled to prevent not only tax evasion and illegal flows of capital, but exchange rate instability. Again, a necessary, but possibly not sufficient condition, is to have the organisations issuing e-money to comply with the same regulations that apply to other credit institutions.

- Moreover, it seems also very important that central banks (or financial regulators) have the ability to control not only the issuers, but also the receivers at the other end, much in the same way as it happens with the payments made via cheques or credit cards: if there is a financial institution that can be monitored at each end of the transaction, then the problems for the control of payments across national borders would not be worse than they are now.

- The foreseeable difficulties for the control of digital money, have prompted more radical proposals in the sense that its issuance could be limited to central banks.

The European regulatory response to e-money.

The European regulatory response to e-money is summarised on the European Parliament and European Council Directive on the taking up, the pursuit and the prudential supervision of the business of electronic money institutions. The view in the Directive very much coincides with what we have summarised in the paragraphs above. The approach of the Directive is a conservative one. Considering the trade-off between safety and efficiency in payments systems, the Directive is biased towards safety. Yet, by allowing for the existence of monetary (non-banks) institutions of e-money, it also opens a door to a more liberal regulation that would allow the existence of potential copmpetitors to banks, in the payments industry.

Central banks and the banking sector in general stick close to the position (more conservative than the Directive) that only banks should be allowed to issue electronic money. A more liberal regulation of the issuance of electronic money suffers from a lack of articulated interests by potential competitors There are slight differences within the banking sector too. Thus it appears as if some bankers would be satisfied if a level playing field between non-banks and banks issuing e-money could be established. In a way, the type of regulation regarded as adequate depends on the definition of e-money. Those who classify electronic money as an integrated part of scriptural money are more reserved towards a new type of credit institution. Those who want more competition within the financial service industries and those who believe that more competition leads to better services and lower prices for customers are in favour of new institutions issuing electronic money. So maybe representatives of telecommunications and of consumers will form a kind of “virtual” alliance. However, at the moment there are no elaborated position papers of industries or consumers articulating their interests to be discussed. Maybe it is worth stimulating such position papers, so that the discussion can be more open and comprehensive.

While only minor short term challenges are envisaged for monetary politics there are inherent risks to be watched carefully. With regard to the effect of e-money on monetary policy the most widespread opinion is that the process of substitution of fiduciary money by e-money will be so slow that it will cause no problems for monetary politics..

If there are rules for the issuers of e-money and basic requirements are ful-filled – like the inclusion of e-money in the central bank statistics – no major problems are foreseen. This peaceful picture shared by the majority has some underlying assumptions that may change over time. The fear of e-money issued by private unregulated companies circulating within electronic networks seems to have been exorcised by the current efforts of regulation. Money of this type does not exist and the ghost of true electronic cash has been domesticated. Furthermore, there is the underlying assumption that e-money is limited to smaller amounts. If this condition changes and high values can be transferred, the risks of anonymous e-money would have to be defined anew. Finally, even if e-money were safer and more secure than any other payment instrument, the risk of a worst case accident, a system break-down, has always to be taken into account and appropriate risk assessments have to be foreseen.

Chapter 7.

Bibliography and online information sources

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7.1 Bibliography

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Commercenet español. http://www.commercenet.es

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European Union, http://europa.eu.int/

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Annexes

Annex 1. corresponding to "Introduction". The STOA programme. Aims and activities.

The STOA (Scientific and Technological Options Assessment) office was set up by the European Parliament in 1986 after several reports stated the need for such an options assessment unit. The main arguments put forward in these reports were as follows:

-The growth of the scientific and technological dimension of many of the issues brought before the Parliament.

-The need to set up an independent advisory body for problems concerning science and technology.

-Awareness of the increasing number of scientific and technological issues to be debated by the politicians.

From the very beginning, the STOA activities have always been structured according to demand. Research work has been carried out and reports have been produced in response to requests from Parliamentary Committees or from deputies in the European Parliament.

The STOA programme began to operate as a pilot project with three pieces of research that studied European thermonuclear fusion, telecommunications in Europe, and chemical pollution, respectively. After an eighteen-month trial period (which ended in October 1988), the STOA office was restructured and was subsequently attached to the Central Research Agency of the European Parliament and endowed with its own budget. An overseeing *STOA panel* was set up, and the internal regulations were then drafted. These regulations define the present aims of STOA as follows[1]:

- To promote the circulation of information on subjects of European interest and to organise activities that will increase awareness of community problems, with special emphasis placed on science and technology.
- To provide an advisory service on scientific and technological matters for the deputies and committees of the European Parliament in order to help them in their assessment of political options. These options could refer to scientific or technological policies or could refer to other areas involving major scientific or technical factors, for example, transport or the environment.

The European Parliamentary Technology Assessment Network (EPTA) was set up in 1990 under the auspices of the European Parliament and comprises five parliamentary TA organisations as well as STOA. The members of the Network carry out TA research with the aim of providing an advisory service for the Parliaments on the possible social, economic and environmental impact of scientific progress and new technologies. The aims of the network were originally to contribute to the co-ordination of the different activities, to try to avoid needless repetition of tasks and to strengthen the links between the different organisations.

Since 1989, an annual work schedule has been drawn up, based on the STOA analysis of the proposals received from deputies and committees of the European Parliament.

The STOA advisory service for the deputies and the committees operates in three different ways:

a) Research studies and reports carried out by external experts contracted by public invitation to tender.
b) Brief reports on specific subjects drawn up by members of the STOA team.
c) Organisation of seminaries attended by external experts.

[1] Article 4. Internal Scientific and Technological Options Assessment regulations.

Projects can be carried out in any or all of the above ways. The projects are of a wide and diverse nature and, as has already been mentioned, must all be previously accepted by the STOA. When a project has been adopted by the Committee, a member of the STOA research team is appointed to carry out and co-ordinate the project. The project is monitored by the STOA Monitoring, members of which include the deputies by whom the project was requested and representatives of the technical staff of the Committees involved in each specific project.

The STOA technology assessment activities have a wide variety of aims. On the one hand, they must analyse the negative effects of the problems and at the same time they must study how technology can contribute to increase competitiveness in the European Community. The great diversity of tasks undertaken by the programme is due to the characteristics of the selection process (many proposals from different Committees) and the difficulties in finding a balance between the type of task to be carried out (short specific reports containing strictly relevant information versus lengthier reports including different policy options, for example).

Annex 2. corresponding to chapter 5. Summary of comparative results at EU level and tables.

A.2.1. Introduction / Main points

This annex is a synthesis of a series of country-specific analyses[1] by members of the ESTO network on existing payment systems and initiatives for electronic payment systems, including those suitable for use on the Internet, in ten European countries. Six of them belong to the eleven EU countries which have already adopted the Euro (Finland, France, Germany, Italy, The Netherlands, Spain), three have not done so (Denmark, Sweden, United Kingdom), and Norway is a special case, since it is not a member of the EU.

The use of cash has been declining steadily in all ten countries. Even so, it continues to be the most important single means of payment for everyday transactions. In the past, some countries have tended to make greater use of cheques for non-cash payments, while others have made greater use of debit or credit transfers. These different habits led to a distinction between "cheque-oriented" countries and "giro-oriented" countries. Today, with the spread of new electronic payment instruments based on payment cards, this difference is blurring. Recent years have seen the spread of debit and credit cards in all of the countries covered, although to varying degrees and following different patterns.

National "preferences" may be due to pricing structures, or to familiarity with the payment instrument concerned. During the past few years there have been enormous increases in the numbers of automated teller machines (ATMs) and electronic devices enabling direct funds transfers at points of sale (EFTPOS). Although in some countries, there were several networks for such devices, sometimes incompatible with each other, strong tendencies towards interoperability are prevailing. The implementation of an interoperable payment infrastructure in Europe would strengthen the competitive position of European financial industries. In most of the countries covered, electronic purses are now available on a regular basis. In Norway, France and the United Kingdom, however, their use is restricted to pilot schemes. All in all, few electronic purses have yet achieved widespread acceptance. In countries with more than one purse scheme, these are often not interoperable. Most significant in view of the single currency is that the use of each purses is still restricted to a single country. This is true even for the electronic purses of Finland and Sweden, although they can be loaded via Internet and in the case of Avant, the Finnish purse, may even be used for payments on the Internet.

The advent of a common European electronic purse however does not only depend on successful standardisation, but also on strategies how to shape this new payment instrument in a way that best fits in the context of the various national payment cultures. It is generally agreed that politics should not impose standards, but support such ongoing voluntary standardisation efforts as CEPS (Common Electronic Purse Specification). A possible exception are safety standards, where policy makers should ensure that proprietary standards are not misused to gain com-petitive advantages. There might also be a role for politics to involve not only the banking sector in standardisation activities with regard to payment systems, but to bring together players from different industries (e.g. smart card industry, networking) and application fields (e.g. digital TV, traffic, health, telcos, financial services) involved in payment technologies. The vast number of international retail payments on the Internet are made using credit cards, usually involving the safety features coming with standard browsers (e.g. SSL), but also completely unencoded or by such means as fax or the telephone. While there is interest from the side of the credit card organisations and some merchants in the SET protocol, adoption has been very slow and it is presently difficult to convince customers of its benefits. For domestic purchases, Internet buyers tend to use those "national access products" which are also used most frequently

[1] Chapter 5 of this dissertation being an adapted version of the analysis for the case of Spain..

for other purposes, in particular for conventional mail-order purchases. There is an astonishing variety of ways to pay within Europe and there are remarkable differences between countries. There is a lack of widely diffused and accepted payment systems for small amounts (micropayments): most software-based micropayment systems are still at the pilot stage and will probably face competition from electronic purses when card-reading devices for PCs are commonly available. In some countries Internet service providers operate schemes to collect such small payments with the monthly bill and to distribute these to the merchants involved against a commission. Beyond this, small value goods and services can be delivered free to customers if sponsoring schemes, such as banner advertising, can be set up to off-set the costs. The proportion of the population having access to the Internet varies be-tween almost four and over thirty percent for the ten countries, with the four Nordic countries having the highest rate of Internet "connectivity". When estimating the potential volume of electronic commerce, it is helpful to bear in mind the existing volume and tendencies in conventional mail-order commerce and experience with similar technologies, such as France's Minitel. Even so, the majority of the countries covered are at a very similar stage concerning the uptake of electronic commerce: people with Internet access are discovering and trying out electronic commerce, but it is not yet really anybody's preferred method of shopping and many enterprises are not yet ready for electronic commerce. Using different sources and surveys, experts estimate the amount of electronic commerce in 1998 in the covered countries at between 0.3 Euro and 17 Euro per head. In each case studied, consumer oriented electronic commerce as a percentage of the retail turnover did not even reach one percent in 1998. Among the main products traded on the Internet are airline tickets, books, CDs, software and computer components, all of which are in a sense suitable for "conventional" mail-order too. Lack of payment systems is not the main obstacle to the spread of electronic commerce at the moment. On the customer side the main barriers appear to be concerns about consumer and data protection, on the merchant side they are fear of "fake" and disputed orders. The major share of trans-border commerce seems to go to the USA. There is a need for more detailed investigation of the actual state and the potential for cross-border commerce, particularly within Europe. The majority opinion in the countries covered in this study is that only banks should be allowed to issue electronic money. Where more liberal attitudes prevail, possibly on account of experience with the issue of electronic purses by non-banks, there is agreement that such non-banks should be subjected to the same kind of supervision as banks. Nevertheless a minority opinion arguing in favour of more competition between payment systems exists, in most cases including technology providers and economists. The impact of electronic money on the money supply by central banks is currently not regarded as requiring intervention. More worrying to governments is possible loss of tax revenue due to electronic commerce.

A.2.2.Methodological note

The main objective of writing country reports of this type is to point to those factors which may play a role in giving birth to technologically based innovative payment instruments, in determining the acceptance of such instruments developed elsewhere, or acting as barriers to the diffusion of payment instruments with certain characteristics. Such factors could also play an important part for the success of efforts to create a common European infrastructure for transborder payments, which is likely to gain importance as the marketplace becomes increasingly global and monetary union and the single European market progress. The material contained in the country chapters was the result of a limited number of interviews with important actors in the countries covered, a survey of the literature and an analysis of statistics contained in the so-called “red” (on G10 countries, published by the Bank for International Settlements) and “blue” (on the EU15, published by the European Central Bank) books, which are supplied by delegates from the central banks concerned. While these statistics initially convey a most reassuring impression of accuracy and comparability, working with them, it soon became obvious that many of the figures collected under the same headings meant different things in different countries, a legacy of the different payment “cultures” in existence. For example an ATM in some countries is only a cash dispenser while in other countries ATM are complex self service stations for cash withdrawal, account information, credit transfers and, last but not least, for cash deposits. Another example of the problems using the available statistics is “narrow money”, which for most countries uses “M1”, but for two uses “M2”, because they no longer calculate this aggregate. “M2” is larger than “M1” by mere definition. Certain statistics simply do not exist for some countries, since the payment mechanism to which they refer does not exist or plays only a minor role in the country in question because there are preferred alternatives available. Other statistics are a compound of several original statistics at the national level and one can not be sure that the same type of thing is being counted for all countries concerned. Figures given for such things as “numbers of payment cards” have been found to vary widely.

This applies even more to figures on electronic commerce, for which official statistics do not as yet exist. Figures given here are frequently estimates or based on market research and may differ by as much as orders of magnitude, depending on the source providing the figure and the interests behind it. Where there is any doubt, we have indicated this and referred to the ranges for such statistics or estimates. Even where accurate statistics on numbers of cards exist, these do not necessarily reflect their genuine importance: large numbers of a certain card can be issued for strategic reasons, while many of them are actually unused since the infrastructure for this purpose is not yet in place, or such important matters as who is going to pay how much of the costs involved in their use have not yet been resolved.

For these reasons, the report makes very cautious use of the semi-official statistics, treating them as rough indicators rather than hard or fast fact. Monetary union and the existence of the European Central Bank might have an impact on such statistics in the future, partly because national differences might be levelled as a result of Monetary Union and due to the emergence of pre-dominant payment instruments for transactions of certain types in the European context. It should be pointed out that while the country chapters all conform to a common structure, the depth of treatment of the individual points might vary widely according to the data available.

In view of various constraints, it was not possible to cover the whole of Europe, including the various candidate EU members from Central and Eastern Europe, or such important countries as the USA or Japan. The selection of countries covered in the report is, however, reasonably well-balanced geographically and with respect to the very different state of diffusion of data-processing technologies in the banking and financial services sectors of the countries concerned. Experts on banking systems frequently distinguish countries according to predominant payment methods, employing such categories as “cheque ori-ented”, “giro oriented” or “cash oriented” to label “payment cultures”. The sample of countries includes examples of the first two categories.

None of the European countries is any longer classed as being “cash oriented”, despite a continued importance of cash in everyday financial transactions. The distinction is also becoming increasingly of historical nature as the diffusion and use of payment cards progress throughout Europe.

A.2.3 Comparative tables

Table A.2.1: Basic data on countries

Country	Inhabitants 1997 (million)	GDP per inhabitants 1997 (ECU)	Percentage of inhabitants with access to the Internet 1998
Denmark	5,3	26427	22
Findland	5,1	20145	31
France	58,7	21130	6
Germany	82,1	22497	9
Italy	57,5,	17508	4
Netherlands	15,7	20398	11
Norway	4,4	30817	23
Spain	39,3	11966	6
Sweden	8,9	22166	33
United Kingdom	59,0	19587	16
EU-15	374,6	19948	8
Japan	136,2	29984	9
United States	267,9	27524	30

Sources: Bank for International Settlements: Statistics on payment systems in the Group of Ten Countries. Figures for 1997. Basle: 1998 (Red Book); European Central Bank: Payment sys-tems in the European Union. Addendum incorporating 1997 figures. Frankfurt: 1999 (Blue Book); for Norway Statistics Norway http://www-open.ssb.no/english/;
EUROSTAT http://Europa.eu.int/Eurostat.html;
http://www.nua.ie/surveys/how_many_online/Europe.html;
other sources. Exchange rates per ECU 1997: 7.5 DKK, 5.9 FIM, 6.6 FRF, 2.0 DEM, 1.9 ITL, 2.2 NLG, 8 NOK, 165.9 ESP, 8.7 SEK, 0.7 GBP, 134 JPY, 1.134 USD

Table A.2.2 Notes and coins in circulation outside credit institutions 1997 in ECU

Country	Value per inhabitant	As a percentage of GDP	As a percentage of narrow money
Denmark	840	3,2	n.a.
Findland	480	2,4	6,7
France	673	3,2	13,5
Germany	1532	6,8	26,3
Italy	969	5,5	16,1
Netherlands	1121	5,5	18,5
Norway	812	4,8	6,3
Spain	1284	10,7	23,6
Sweden	972	4,3	n.a.
United Kingdom	571	2,9	4,6
EU-15	972	5,2	29,2
Japan	3159	11,6	28,7
United States	1426	5,3	39,5

Sources: European Central Bank: Payment systems in the European Union. Addendum incorporating 1997 figures. Frankfurt: 1999 (Blue Book); Bank for International Settlements: Statistics on payment systems in the Group of Ten Countries. Figures for 1997. Basle: 1998 (Red Book); for Norway: Norges Bank http://www.norges-bank.no/english/statistics/. Remarks: Percentage of narrow money relates to M1 with the exception of Norway and United Kingdom, which relates to M2. Percentage of narrow money for EU-15 without Denmark, Norway, Sweden and United Kingdom. Ireland (30.3 percent), Austria (32.3 percent), and Greece (45.3 percent) are those countries not covered in this study with a share greater than the EU average. Exchange rates per ECU1997: 1.134 USD "n.a." = not available or not applicable

Table A.2.3 Notes and coins in circulation outside credit institutions 1997 in ECU

Country	Cheques	Pay-ment Cards	Credit transfer total	*Credit transfer customer initiated*	*Credit transfer interbank/ large value*	Direct debits	Others
Denmark	15,3	62,6	n.a.	***n.a.***	***0,08***	21,0	1,1
Findland	0,4	38,2	58,0	***n.a.***	***n.a.***	3,4	Neg.
France	46,3	21,6	17,4	***17,4***	***0,1***	13,4	1,3
Germany	5,7	4,1	48,1	***47,9***	***0,2***	42,0	10,6
Italy	28,0	11,2	41,6	***41,2***	***0,3***	8,6	Neg.
Netherlands	3,0	18,2	51,7	***51,6***	***0,1***	27,1	n.a.
Norway	1,7	50,6	44,6	***n.a.***	***n.a.***	3,1	-
Spain	13,0	20,9	14,4	***14,2***	***0,2***	45,2	6,5
Sweden	n.a.	19,3	n.a.	***73,5***	***n.a.***	7,2	-
United Kingdom	30,5	31,1	19,6	***19,4***	***0,2***	18,7	Neg.
EU-15	23,1	18,2	n.a.	***n.a.***	***n.a.***	26,3	2,3
Japan	n.a.	n.a.	n.a.	***n.a.***	***n.a.***	n.a.	n.a.
United States	73,2	23,0	n.a.	***n.a.***	***n.a.***	1,3	n.a.

Sources: European Central Bank: Payment systems in the European Union. Addendum incorporating 1997 figures. Frankfurt: 1999 (Blue Book); Bank for International Settlements: Statistics on payment systems in the Group of Ten Countries. Figures for 1997. Basle: 1998 (Red Book); for Norway: Norges Bank http://www.norges-bank.no/stat/betaling/payment.html.
Remarks: "Credit transfers" includes large value and interbank payments; "Others" includes "electronic money payments" and others. Figures for Sweden are not really comparable because they do not include cheque payments and interbank, large value credit transfers. Figures for credit transfer in UK do not differentiate between customer initiated and interbank, large value credit transfers; row customer initiated credit transfer includes inter-branch items, row interbank, large value credit transfers includes only large value credit transfers. Table A.2.3 and Table A.2.4 give no indication on the payment instrument used by consumers for retail. "-" = Nil; "n.a." = not available or not
applicable; "neg." = negligible

Table A.2.4 Use of cashless payment instruments as a percentage of total value of transactions 1997

Country	**Cheques**	**Pay-ment Cards**	**Credit transfer total**	***Credit transfer customer initiated***	***Credit transfer interbank/ large value***	**Direct debits**	**Others**
Denmark	6,4	0,6	n.a.	***n.a.***	***91,6***	1,2	0,3
Findland	10,2	0,8	88,1	***n.a.***	***n.a.***	0,9	0,02
France	4,4	0,2	93,5	***3,8***	***89,7***	1,0	n.a.
Germany	1,6	0,03	95,9	***15,7***	***80,2***	2,5	Neg.
Italy	3,2	0,06	95,4	***8,8***	***86,6***	0,3	1,0
Netherlands	0,0	0,2	98,8	***9,8***	***89,0***	1,0	n.a.
Norway	4,2	4,2	89,0	***n.a.***	***n.a.***	2,5	-
Spain	2,1	0,05	96,8	***3,4***	***93,4***	0,5	0,56
Sweden	n.a.	1,7	n.a.	***95,8***	***n.a.***	2,5	-
United Kingdom	42	0,3	94,6	***3,8***	***90,8***	1,0	Neg.
EU-15	n.a.	n.a.	n.a.	***n.a.***	***n.a.***	n.a.	n.a.
Japan	n.a.	n.a.	n.a.	***n.a.***	***n.a.***	n.a.	n.a.
United States	10,5	0,2	88,5	***n.a.***	***n.a.***	0,8	-

Sources: European Central Bank: Payment systems in the European Union. Addendum incorporating 1997 figures. Frankfurt: 1999 (Blue Book); Bank for International Settlements: Statistics on payment systems in the Group of Ten Countries. Figures for 1997. Basle: 1998 (Red Book); for Norway: Norges Bank http://www.norges-bank.no/stat/betaling/payment.html.
Remarks: see remarks on Table A.2.3. "-" = Nil; "n.a." = not available or not applicable; "neg." = negligible

Table A.2.5 Number of debit or credit cards per 1,000 inhabitants

Country	With a cash functions	With a debit or a credit function	With a cheque guarantee function	Retailer cards
Denmark	583	583	10	n.a.
Findland	1002	693	1	308
France	515	473	n.a.	n.a.
Germany	n.a.	1038	508	61
Italy	301	426	16	n.a.
Netherlands	1540	163	26	n.a.
Norway	n.a.	(1376)	n.a.	n.a.
Spain	910	897	-	n.a.
Sweden	774	691	-	n.a.
United Kingdom	1641	1271	903	298
EU-15	741	786	354	n.a.
Japan	2243	1945	-	480
United States	2548	2628	n.a.	2233

Sources: European Central Bank: Payment systems in the European Union. Addendum incorporating 1997 figures. Frankfurt: 1999 (Blue Book); Bank for International Settlements: Statistics on payment systems in the Group of Ten Countries. Figures for 1997. Basle: 1998 (Red Book)
Remarks: for Norway no comparable data available; according to Norges Bank (http://www.norges-bank.no/stat/betaling/payment.html) there are 6.1 million payments cards issued by banks, card companies and oil companies, i.e. 1,376 payment cards per 1,000 in-habitants.National sources indicate other figures for several countries. "-" = Nil; "n.a." = not available or not applicable; "neg." = negligible

Table A.2.6 Cash dispensers and ATMs 1997

Country	Number of machines per 1 million inhabi-tants (end of year)	Number of transactions per capita	Average value per transaction (ECU)
Denmark	253	n.a.	n.a.
Findland	445	43,3	67
France	462	19,9	62
Germany	504	15,3 (1996)	146 (1996)
Italy	444	7,2	163
Netherlands	410	33,4	78
Norway	430	24,0	114
Spain	863	15,4	82
Sweden	268	35,3	92
United Kingdom	393	29,6	74
EU-15	488	19,5	97
Japan	1115	5,0	255
United States	616	40,7	60

Sources: European Central Bank: Payment systems in the European Union. Addendum incorporating 1997 figures. Frankfurt: 1999 (Blue Book); Bank for International Settlements: Statistics on payment systems in the Group of Ten Countries. Figures for 1997. Basle: 1998 (Red Book); for Norway: Norges Bank http://www.norges-bank.no/stat/betaling/payment.html.
Remarks: "n.a." = not available or not applicable; Exchange rate per ECU 1997: 8 NOK, 1.134 USD;

Table A.2.7 Cash dispensers and ATMs 1997

Country	Number of POS Terminals per 1 million inhabi-tants (end of year)	Number of transactions per capita	Average value per transaction (ECU)
Denmark	11923	57,7	46
Findland	10506	50,9	45
France	9555	39,3	46
Germany	1984	2,8	65
Italy	4896	4,4	94
Netherlands	7715	31,1	43
Norway	10589	58,4	52
Spain	16691	8,8	48
Sweden	7778	15,9	69
United Kingdom	8984	n.a.	n.a.
EU-15	7146	15,7	62
Japan	155	0,004	50
United States	4853	5,4	30

Sources: European Central Bank: Payment systems in the European Union. Addendum incorporating 1997 figures. Frankfurt: 1999 (Blue Book); Bank for International Settlements: Statistics on payment systems in the Group of Ten Countries. Figures for 1997. Basle: 1998 (Red Book); for Norway: Norges Bank http://www.norges-bank.no/stat/betaling/payment.html. Remarks: Germany “electronic cash” only. “n.a.” = not available or not applicable Exchange rate per ECU 1997: 8 NOK, 1.134 USD

Table A.2.8 Indicators for European retail trade including mial order and Internet trade

Country	Retail trade as a percentage of GDP 1991	Shops per 1.000 inhabitants 1990	Mail order Commerce as Percentage of Retail trade 1996	Internet trade 1998 In Euro per capita
Denmark	12,3	10,0	2,5	4,9
Findland	8,9	7,9	1,9	n.a.
France	12,6	9,7	2,4	0,3-1,0
Germany	10,5 (West)	8,5 (West)	5,8	1,6-6,1
Italy	15,5	17,1	0,3	2,8
Netherlands	12,8	8,0	1,8	1,5-16,9
Norway	24,5 (1996)	n.a.	n.a.	n.a.
Spain	15,4	13,4	n.a.	0,5
Sweden	12,0	8,5	2,6	7,5
United Kingdom	11,5	8,1	3,7	0,8-10,2
EU-15	12,7	11,3	n.a.	1,0-4,1
Japan	n.a.	n.a.	1,5 (1995)	3,5
United States	n.a.	n.a.	3,0 (1995)	50,0

Exchange rate per Euro 1998: 7.5 DKK, 8.5 NOK, 0.7 GBP, 146.4 YEN, 1.121 USD "n.a." = not available Sources for column "retail trade" and "shops per inhabitants": Europäische Kommission: Grünbuch "Handel". Brüssel: 1996 (KOM(96)530 endg); for Norway: 1996 retail trade counts for 250 billion NOK compared to 1,020.051 billion NOK GDP (Statistics Norway http://www-open. ssb.no/english/) Source for column "mail order": Bundesverband des Deutschen Versandhandels: Versandhan-del in Deutschland. Frankfurt: 1997 Sources and remarks for column "Internet trade": There is no established method and procedure for counting Internet trade. So we had many problems with the data because of different methods and delimitations. The figures in the table can only be a rough indication for the amount of Internet trade. In our opinion, some figures are not very trustworthy. We see the urgent need to establish some sort of international standardised statistics in the context of electronic commerce.

Denmark: estimates for mainly business-to-consumer web based trade (excluding EDI) in 1998 of 300 million DKK or 26 million Euro. Total retail trade accounted for 25 billion ECU in 1992.

Finland: Unfortunately the latest data available are for 1997, electronic commerce accounted for a mere 0.07 percent of the total volume of retail.

France: According to Datamonitor business to consumer electronic commerce in 1998 accounts for 20 million USD (17.8 million Euro) or 0.3 Euro per capita (http://www.datamonitor.com/ dmhtml/tc/tcpr06199914.htm); according to IDC in 1998 business to consumer electronic commerce accounts for 390 million FRF or 59,5 million Euro (http://www.idc.fr/presse/ cp_ce99.htm).

Germany: According to a market survey, "Telekommunikation" by Axel Springer Verlag in 1998, 251 million DM (128.33 million Euro) had been spent online by private households (http://www.wuv.de/links/1999/w&v_data_studien.html, 31.5.1999); Datamonitor: 1998 business to consumer electronic commerce accounts for 160 million USD or 142.7 million Euro or 1.7 Euro per capita (http://www.datamonitor.com/dmhtml/tc/tcpr06199914.htm).

Italy: According to ESTO partner Piero Bucci the total turnover of electronic commerce is estimated at 160 million Euro in 1998 (estimation based on data by Gemini Consulting including B2C and B2B, excluding EDI and financial EDI).

The Netherlands: 39 – 250 million Euro in 1998 according to different sources. We are of the opinion that 250 million Euro in 1998 in the business to consumer sector is a clear overestimation; see chapter on The Netherlands.

Norway: Unfortunately no data on electronic commerce and Internet trade are available.

Spain: According to ESTO partners Jaume Valls and Anna Arbussà and an announcement by Jose Manuel Villar, Secretary General of Communications (http://www.emarketer.com/enews/ enews_intere37.html#4) in 1998 electronic commerce amounts to 22.5 million USD or 21.04 million Euro. This figure surely includes turnover by incomplete electronic commerce (trade volume originated from on-line orders), and maybe part of the business to business segment.

Sweden: According to ESTO partner Anna Backlund (e-mail may 31, 1999) referring to a study conducted by the Swedish Research Institute of Trade in 1998, electronic commerce in the business to consumer sector was estimated at 600 million SEK or 67 million Euro, accounting for 0.2 percent of total turnover.

United Kingdom: According to Datamonitor, in 1998 electronic commerce in the business to consumer sector accounts for 50 million USD (44.6 million Euro) or 0.8 Euro per capita (http://www.datamonitor.com/dmhtml/tc/tcpr06199914.htm); Fletcher Research estimate total online sales, excluding financial services, at around 230 million GBP (329 million Euro) in 1998, or under 0.2 percent of the total market in the sector analysed; Verdict Research calculated that in 1998, over 666.5 million USD (594.6 million Euro) was spent online, also repre-senting also just 0.2 percent of overall retail sales (http://www.nua.ie/surveys/?f=VS&art_id=905354621&rel=true). EU 15: According to International Data Corp. (IDC) the business to consumer sector accounts for 1.85 billion USD (1.53 billion Euro) or 4.1 Euro per capita. Total turnover of electronic commerce including business to business was estimated at 5.6 billion dollars or 5 billion Euro (The Global Reach Express, 8 July, 1999); GfK cites figures for Europe of 7 billion USD electronic commerce in the business to business sector and 400 million USD (357 million Euro) in the business to consumer sector, representing 0.02 percent of total retail trade and mail order commerce (E-Commerce nicht immer von Erfolg gekrönt, July 13, 1999, http://www.gfk.de/).

Japan: According to a study by Japan's International Trade and Industry Ministry and Andersen Consulting in 1998, the consumer e-commerce market acccounts for 65,000 million Yen (444 million Euro) or 3.5 Euro per capita, representing 0.2 percent of total household expenditure (http://cyberatlas.Internet.com/big_picture/geographics/japan_ecom.html).

USA: According to eMarketer's eRetail Report, in 1998 consumers in the United States have spent 8 billion USD (7.136 billion Euro) on the Internet (http://www.emarketer.com/estats/ 092799_retail.html). This counts for 26,6 Euro per inhabitant. According to shop.org, the trade association for online retailers, based on a report conducted by The Boston Consulting Group, in 1998 US Internet users spent 14,900 million USD (13,291 million Euro) representing 0.5 percent of all retail sales or 50 Euro per capita (http://www.shop.org/nr/99/071999.html).

Table A.2.9 Characteristics of main European elctronic purses 1998

Country	Name	Disposable/ reloadable	Use on Internet	Multi-fucntion	Purses per 1,000 inhabitants	Purchases per 1,000 inhabitants and year (euro)
Denmark	Danmont	Disposable	No	No	95 (1997)	1400 (1997)
Findland	Avant	Both	For purchases And loading	Yes	48	51
France	-	-	--	--	--	-
Germany	GeldKArte	Reloadable	No	Yes	536 (issued cards); 6 (active cards)	1090
Italy	Minipay	Reloadable	No	Yes	14	(35) (1997)
Netherlands	Chipknip	Reloadable	No	Yes	764	n.a.
	Chipper	Reloadable	No	Yes	318	n.a.
Norway	-	-	-	-	-	-
Spain	VisaCash	Reloadable	No	Yes	87	(153) (1997)
	Euro 6000	Reloadable	No		n.a.	
	Monedero 4B	Reloadable	No		n.a.	
Sweden	Cash	Reloadable	Yes for loading		23	475
United Kingdom	-	-	-	-	--	-

Sources: ESTO-Project-Partners; ECB: Payment systems in the European Union. Addendum incorporating 1997 figures. Frankfurt: 1999 (Blue Book); ECBS: Overview of European electronic purse projects. Brussels: ECBS 1997 (TR 102, Version 2); other sources; column 6 and 7 based on own calculations.
Remarks: We have included only such electronic purse schemes of some importance which have left the pilot stadium.
Finland: Figures are related to the new multifunctional card introduced in March 1997 that replaced previous products. These products accounted in 1995 and 1996 for about 550 Euro purchases per 1.000 inhabitants.
France: There are trials announced for 1999, see chapter 2.8 on France.
Italy: Figures in brackets from the Blue Book for 1997 not related to MINIpay alone. In Italy there are also some local electronic purse systems.
Spain: Figures in brackets from the Blue Book for 1997.
United Kingdom: There are no nation-wide electronic purse schemes operating in the UK.
However, Mondex and Visa Cash are or were the subject of pilot trials. See chapter 2.5 on the United Kingdom.
"-" = Nil; "n.a." = not available or not applicable

Annex 3. Raw data and questionnaries used as inputs to chapter 5.

A.3.1 Background Information for Country Report Synthesis

University of Girona
2 February 1999

1. Basic Data on the "Information Society" in your Country

(a) "BLUE-BOOK" European Monetary Institute
"Payment Systems in the European Union" Addendum Incorporating **1996** Figures. January 1998
(b) AIMC ("Asociación para la Investigación de los Medios de Comunicación"- Association for Research in Communications Media). "Encuesta a usuarios de Internet"-Survey to Internet Users. (1998)
(c) AIMC (1997) "Marco 1998"-Framework 1998 with data from year 1997
(d) AUI ("Asociación Usuarios de Internet") Association of Internet Users

(These figures are often available in computer journals. However, if these are quoted, information on their original source should be provided)

Total population of your country	39.270,000 (a) 36.600,000 (c) of 14 years and over
Number of households in your country	11.854.845 (c)
Percentage of private households with PCs	21,9 % (c)
Percentage of private households with access to online-services	Around 4% (see note 1)
Percentage of private households with access to the Internet	n.a. (see note 1)
Number of WWW-servers per 1000 inhabitants	308,437 (see note 3)
Main consumer on-line services active in your country (e.g. AOL, Compuserve, others). Please provide ranking. **(not ranked)** See note 2	1. Arrakis – bought recently by BT 2. Intercom 3. Compuserve 4. Servicom 5. Jet Internet

Note 1: Datamonitor, year-end 1998, from statistics in www.aui.es. Additionally, Percentage of people (not households) using computers. Data for Oct/Nov. 1998. Source : (b)

Use computers	25,7 %
Use computers regularly	18,6 %
Have access to internet	7,1 %
Have accessed internet in the last month	5,1 %

Note 2: There are about 647 firms providing access to internet in Spain (Source: Press Release, AUI, Comisión del Mercado de Telecomunicaciones). A list of those servers preferred by users is available at www.areas.net

Note 3: Host counts by DNS domain. Source: RIPE NCC, February 4th 1999

2. The Banking Sector

Number of banking institutions	308 (a)
Number of branches of banks	36,788 (a)
Number of processing organisations for EFTPOS (electronic funds transfer at point of sales) transactions, credit cards, electronic purses	3 Networks Sistema 6000, Servired, Sistema 4B
Number of self service terminals for credit transfers and other forms of automatic funds transfer	All ATMs allow for credit transfers and other forms of automatic funds transfer. Nº of ATMs: 30.437 (a)
Number of on-line accounts for home banking	n.a. (See notes 4 and 5)
Number of direct banks in your country	n.a. (See notes 4 and 5)
Number of customers holding accounts at direct banks	n.a. (See notes 4 and 5)

Note 3: Main banks and savings banks offer banking services trough internet and telephone banking, which require no special accounts other than those held normally at branches. Before development of Internet, banks offered software packages to clients for home banking services. OPEN BANK, owned by Grupo Santander-BCH is the only bank to offer services exclusively trough telephone and /or internet.

Note 4: Source: La Vanguardia 18/01/99 according to data from a study by DBK consulting available through Europa Press.

Nº of people using on-line banking trough internet in Spain:

	1997	1998
Total	80.000	380.000
Banks	72.000	292.600
Savings Banks	8.000	87.400

Almost 50% of the banking business through internet is coped by the following banks: BBV, Santander and Bankinter, each with more than 50.000 costumers.

	1998
Costumers using telephone banking	5.000.000
Banks	3.275.000
Savings Banks	1.775.000

3. Payment Culture (TAKEN FROM Summary Country Report- in italics//added commnets and corrections are underlined))

Data for 1997 taken from the "blue book" of 1999 indicate that Spain is comparatively well equipped within Europe with ATMs (863 per million inhabitants), POS-terminals (16,691 per million inhabitants), and purchase terminals for electronic money cards (77,092). Also the number of payment cards in circulation to use these facilities is quite high (ca. 900 per 1,000 inhabitants). At the same time the "blue book" indicates that the usage of these electronic means is relatively low compared to other member states of the EU. While the importance of electronic payments is slowly growing, the importance of cash remains very high in Spain with cash forming c. 11% of the GDP. Even the use of payment cards underlines this cash orientation. On average, a Spaniard uses his payment card 17 times a year for cash withdrawal, but only 10 times for payments. The use of cheques for customer payments is also not widespread, a fact which again underlines the role of cash.

The spread of ATMs in Spain has a particular background. Due to a lack of appropriate legislation applying to cheques –cheques issued without funds were quite "widespread" – consumers went from using cash to using credit cards, skipping the stage of using cheques. This movement was the reason why banks in Spain started to install ATMs.

National Framework

One characteristic of the general situation in Spain is the existence of three groups of banks with corresponding processing and networking service providers.

- Sistema 6000 payment system network corresponds to the savings banks which are members of the Confederacion Española de Cajas de Ahorros (CECA). The infrastructure of Sistema 6000 comprises 14,169 ATM and more than 300.000 terminals at point of sale. CECA reached an agreement with Europay in 1996 to issue cards with logos Maestro (debit

functionality) and / or MasterCard (credit functionality). More recently, CECA also reached an agreement with Visa Electron by which the former debit cards of Sistema 6000 (Tarjeta 6000) will be substituted by Visa Electron cards.

- Sistema 4B goes together with some of the major banks (Central Hispano-Santander, Banesto, Banco Popular, Banco Sabadell) adding up to 38 financial institutions which account for 25% of the Spanish banking system and have over 11,000 branches in Spain. Sistema 4B is member of VISA International and MasterCard / Europay International.
- Servired is owned by financial institutions including 35 banks (Argentaria, Banco Bilbao Vizcaya, Deutsche Bank, Citibank España and Barclays Bank España etc.), 51 Rural Savings Banks (Cajas Rurales) and 11 Professional and Popular Saving Banks (Cajas Populares y Profesionales). The company is also in charge of administering the programmes of banking payment cards with the trade mark Servired, combined with the trade marks VISA and VISA electron.

It is interesting that at the level of ATMs interoperability is complete (although commissions are charged when operating with networks different from that of the issuer of the card) The different POS-networks are also interoperable .(See point 9.2. dealing with costs for retailers for POS and cards)

The situation of standardisation of electronic payment systems in Spain is clearly influenced by the market leadership of VISA España and the technological leadership of its subsidiary company SERMEPA. SERMEPA is owned by VISA España and other financial institutions. The company developed the electronic purse called TIBC (”tarjeta inteligente para bancos y cajas”) in 1993. TIBC has been the ”basis” for the Visa Cash e-money card, being able to manage multiple functions and multiple currencies (technically it supports different currencies but their use is up to now restricted to Spain). VISA España has also played an active role in the definition of standards like EMV and CEPS.
VISA España/SERMEPA is member of the CEPS group (also including Europay International, Visa International and ZKA Germany), that in December 1998 announced the agreement of a Common Electronic Purse Specifications (CEPS).

4. Basic Data Concerning ”Conventional” Payment Systems

Cash (notes and coins) in circulation as percentage • **of GDP** • of ”narrow money” (M1)	 10,67 % (a) 25,03% (a)
ATMs (Automatic Teller Machines) . **Number of cards issued for use at ATMs** • Number of ATMs • Number of transactions → (Volume)	(All debit /credit and electronic purses cards issued in Spain can be used at ATMs; no cards are issued for specific use at ATMs) 34.533.000(a)(which can be used at ATMs) 30.437 (a) 582 (million) (a) 7924 (EPS billion) / 49,31 ECU(*) billion (a)

• Volume of transactions → (Value)	
EFTPOS (electronic funds transfer at point of sale with Debit Cards) • Number of cards issued for use at EFTPOS • Number of terminals • Number of transactions(absolute) → (Volume) • Volume of transactions→ (Value)	(As explained above, debit cards are not issued exclusively for use at EFTPOS, but for use at both ATMs and EFTPOS) 33.076,000 number of debit cards issued (a) 575.325 (all EFTPOS) (a) 294 (million) (debit + credit cards) 2.342 (EPS billion) / 14,573 ECU (*) billion (debit + credit cards)
Credit Cards • Number of credit cards issued • Number of acceptance points • Number of transactions • Volume of transactions *(It should be noted to what extent credit card and debit card functions are combined into a single card, also whether the debit card function is combined with other functions, such as the cheque guarantee function)*	(See Note 5) 10.645.000 cards 575.325 (all EFTPOS) 294 million (debit + credit cards) 2.342 (EPS billion) / 14,573 ECU (*) billion (debit + credit cards)
Retailer Cards • Number issued • number of different systems • number of transactions • volume of transactions • number of acceptance points, main areas of use. • Main examples (issuer, functions) • 1: El Corte Inglés • 2: ACESA (Autopistas) • 3: Oil Stations • 4:	(See note 6) n.a.
Other (please specify)	

* At average exchange rate vis-à-vis ECU for year 1996. Source: (a)

Note 5:

-On to what extent credit and debit card functions are combined into a single card.

The combination of different functions into a single cards is decided by the bank or savings bank issuing the card. Most combinations exist in practise (credit function with debit function, and debit function with electronic purse, and all the three functions combined into one single card).

At the same time, and regardless of the type of card, the transaction might sometimes be computed as debit or credit depending on the product /service purchased (for example: at supermarkets, oil stations, highways,…. since these are sectors with low operations margins, transactions could be settled as debit). It seems as well that the difference between credit and debit card is not as much what is "printed" on the plastic, but the agreement that the bank /savings bank reaches with the consumer. (we include this explanation because we find it helpful in presenting you with a picture of debit / credit cards in Spain, but do not recommend to include it in final report as we have no data to assess whether it is a widespread practise)

-On whether the debit card function is combined with other functions such as the cheque guarantee function.

Cheque guarantee function is not usual in Spain.

Note 6:

We have no quantitative data on retailers cards issued.

Most well-know are those stated in the rank.
.El Corte Inglés (commercial stores)
.ACESA (highways)
.Oil Stations (with trade marks Mastercard or VISA, and issued directly by those without intermediation of a bank or a savings bank)
With a similar pattern, other collectives reach agrements with Mastercard or VISA for issuing cards to their associates)

5. Basic Data Concerning Electronic Purses in Your Country

This is especially important in the context of our project. Please provide data on all e-purse schemes operating in your country.

Electronic Purses (complete for each system)		**System 1**	**System 2**	**System 3**
• Name		**Euro 6000**	VISA Cash	Monedero 4B
• Issuer		Some of the banking institutions in Sistema 6000 (*)	*Banking institutions* (**)	Banking institutions in Sistema 4B. (***)
• Number issued	1.334.000			
• Number of acceptance points/terminals	48.524		3.440.227 (e)	
• Number of transactions (Volume)	41.000		76.102 (e)	
• Volume of transactions	38.000.000	Retail, cafeterie, kiosck		
• Main areas of use (e.g. retail, vending machines, parking, cinemas, canteens, local transport etc.)		National	Retail, cafeteries kiosck	Retail, cafeteries,kiosck
• Validity (local, national, international) (National)		Routine	National	National
• Status (pilot, routine) (Routine)		No	Routine	Routine
• Validity for Internet payments (No)		Telephone	No	No
• Supplementary functions, beyond payment (Telephone, Carnets Universitaris)			Telephone University ID / library cards	n.a.

(e) Source : VISA España (data for 3rd trimestre /1998)

(*) Euro 6000 is the technology for electronic purses which has been promoted by Sistema 6000 (which is in turn "promoted" by CECA, which groups Savings Banks except for Cooperative and Rural Savings banks). Some of the Savings Banks in Sistema 6000 have chosen Euro 6000, while others have adopted VISA Cash.
(**) Banking institutions that have agreements with VISA España include banking institutions that are part of Sistema 6000, Servired and Sistema 4B. Additionally, a banking institution can set aggrements with VISA España or Mastercard directly, without either of the systems above being intermediates.
(***)Trade mark monedero 4B can use technology Sistema 6000 o technology Visa Cash. It is the issuing financial institution that choses the technology. Currently, Visa Cash has been found to be the main choice among banks in this group.

General Comments: Purses are not interoperable yet. Two technologies co-exist, one is Euro 6000 developed by Sistema 6000, and the other is VISA Cash. It seems that currently VISA Cash is leading the course. There are talks to reach an agreement which would allow interoperability..Mainwhile some savings banks which are traditionally in

Sistema 6000, have adopted Visa Cash. And Sistema 4B has developed its own trade mark which uses with both technology Euro6000 and VISA Cash.

Altough some pilot schemes were developed for use of electronic purses at mass transport, these have been found to be not useful in such area as were not quick enough. Currently, a project based on no-contact technology is been developed by SERMEPA to produce electronic payment means that can be employed in mass transport.

Electronic purses can be loaded at all Sistema 4B ATMs (VISA Cash) and at some of the Red 6000 ATMs (Euro 6000 and VISA Cash).

Electonic purses can also be used at about 84.000 telephone booths (about 90 % of booths existing in Spain, which belong all of them to Telefonica).

Electronic purses are clearly being pushed to the market by financial institutions, and up to now comsumers acceptance has been low. Reasons for explaining such low acceptance normally refer to the need for reaching a critical mass in this type of product. To cope with this difficulty, financial institutions are adopting “colonisation” strategies (as opposed to “mass implementation” strategies), such as those addressed at University campuses and also try to promote use of electronic purses as telephone cards.

6. Importance of cashless payment instruments

Please indicate trend for frequency of use, employing symbols: increasing (+), constant (=), declining (-)

Instrument Source: (a) notice that data is for year 1996	**Transactions (number)**		**Volume (value)**	
	Percentage	**Trend**	**Percentage**	**Trend**
Cheques	13,45 %	(-)	1,95%	(-)
Payment cards	19,28 %	(-)	0,046 %	(-)
Credit transfers	15,17 %	(+)	96,9 %	(+)
Direct debits	44,06%	(+)	0,44 %	(-)
Other (which) Bills of exchange	7,96 %	(-)	0,66 %	(-)
Total	100 %		100 %	

7. Electronic Commerce in the Context of Retail

Electronic commerce is, for the purposes of this project, restricted to the consumer sector, i.e. business – consumer transactions. The final order must be completed on-line. Payment need not, however, necessarily take place over the Internet.

	Turnover (in Euro)	**Trend** **Please use symbols: increasing (+), constant (=),** **declining (-)**
retail sector	n.a	n.a.
mail order	n.a.	n.a.
electronic commerce	n.a.	n.a.

Please rank the main products and services in the consumer sector of electronic commerce.

Main Products and Services Traded Via Electronic Commerce	**Ranking**
Main products traded in electronic commerce in your country (e.g. Books, Compact discs, Computers)	1. 2. 3. 4. 5. n.a. 6. 7. 8. 9.
Main digital goods traded via electronic. Commerce in your country (e.g. electronic software delivery (ESD), music on demand, information databases, online games, online technical support)	1. 2. 3. 4. 5. n.a. 6. 7. 8. 9.

(b)

. decision to buy products or services oriented, motivated or informed by contents on the Web: 46,8 of internet users in the sample.
.Percentual distribution of the products and services mentioned by people enquired that declared to have taken decision top buy induced by contents on the web:

Software	28,7%
Books /Magazines	21,2%
Hardware	17,8%
Music	14,7%
Videos/ films	4,9%

. 71,2% of internet users that participated in the survey had never bought products or services through internet
. percentual distribution of products and services bought by those who did in at least one occasion buy through internet

Software	30%
Books /Magazines	24,8%
Music	14,8 %

Hardware	9,9%
Videos/ films	4,4%

8. Export and import using electronic commerce (n.a.)

Volume of electronic commerce for suppliers from your country	(Euro)
• domestic sales (i.e. to customers from the same country	n.a.
• exports (i.e. to customers to other countries)	n.a.

Volume of e-commerce purchases (by customers in your country)	
• purchases from suppliers in your own country	n.a.
• purchases from suppliers in other EU countries	n.a.
• purchases from US suppliers	n.a.
• purchases from suppliers in other countries	n.a.

9. Use of payment systems in the retail and mail-order sector

1. Please rank the payment types from 1 to n in each category where 1 is the highest score and give indications for the trend, where "+" stands for increasing, "=" stands for constant and "-" stands for declining.

payment type	**retail sector**			**mail order sector**		
	turnover	**trans-actions**	**Trend**	**turnover**	**trans-actions**	**trend**
cash	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
cheque	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
debit card	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
credit card	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
electronic purse	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
credit transfer	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Cash on delivery	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Direct debit	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Others (specify which)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

2. Which costs are linked with the following payment instruments for the retailer?

Type of payment system	**Costs for Retailer**	
Credit cards	• Disagio for POS • Disagio for Mail Order / Telephone order	Free (including maintenance) Mail order sector is usually charged 5% as considered high risk.
Electronic purses	• Costs per transaction • Cost as percentage of payment	Depending on the sector. Average is 2%, always as percentage of payment

(e) Source: Press release "El País" February 21st 1999, including data from Secretaría de Comercio (Secretary of Commerce) based on estimates form the Bank of Spain.

Payment with cards for retail commerce in Spain is increasing and holds the majority in sectors such as shoes, textile, hotels,… and is raising in food stores and gas stations. Revenues for banks from issuing cards has boosted. According to official data, commisions for issuing cards and using ATMs were up to 155.000 milion ESP (993 milion Euro) in 1996. With regards to discounts charged to retailers, the Secretaria de Comercio estimates, with data from the Bank of Spain, that merchants paid banks 32.000 milion ESP (192,7 milion euros) in 1996.

Merchants in Spain have long been complaining about the commisisons that banks charge for the use of cards. Up to now, the complaints were without much result, but have recently managed that the Congress and the Government get involved in the issue. The Congress has

urged the Government to promote a working group formed with independent experts, banks and merchants that in three months should come out with proposal to solve the controversy.
For merchants, the goal is to lower commissions on the global. On the other hand, the 158 and savings banks grouped in Visa España, the main institution for payment systems, argue that average commissions are not high, but accept to debate /study if they are too high in a specific sector.
Data presented by the different parties in the controversy do not coincide. Merchants argue that they are charged an average 3,5% commission, and declare that this same average in Europe is 0,75%. Financial institutions desagree with the data above and declare that the average commission is 2%, and therefore even lower than the average 2,4% in the rest of Europe.
Commmisisons charged by banks and saving banks to merchants are based on contracts between the two parties and vary greatly . *"casas de masajes"* and *"saunas"* ¡!!!are charged 5,77% on average, for jewlery the average is 4,17%, and for big commercial stores the average is as low as 0,52%.

The situation can be summarised with small retailers –but also depending on the sector- being charged the higher commissions. As could be expected, when negociating with banks bigger companies get better deals.

A study by the Bank of Spain last year signals that the problem is not the average commission but the significant differences among the sectors in the economy. The range of commissions charged covers from 0% to 6% and it is wider than in other countries. Also the Bank of Spain points at a different feature form other countries: banks and savings banks install for free the device at point of sale and also take care of maintainance, while in other countries it is the merchants that pay for renting the device.

VISA España explains that commisions charged on the use of cards are reasonable as they represent the costs of transmiting data and the risks that the costumer' bank bears when anticipating the money to the merchant. VISA España also agrees to negotiate specific cases where commisions are higher and declares that they are actually in conversations with some sectors. With regards to the differences in commisions VISA adds that electronic costs of transmissions are logically the same in all sectors but that risks differ widely.

According to study by Bank of Spain from June 1997, it is the costumer's bank that bears the main risks of impago, fraud, or falsified card, togheter with the main share of the costs for services of the net and payment to the owner of the trade mark of the card. On the other hand, the merchant's bank bears almost no risks but pays the costs of installing and maintaining the POS and of the technical infrastructure.

Additional remark (self-elaboration after interviews held with banks):
It is not unusual that a store has more than one POS device. It is however not due to non compatible systems but to commercial strategies of banks, which are the institutions to bear the costs of the devices. In this manner, a bank offers a merchant a discount on commissions charged if he / she directs some payment transactions with cards issued by this same bank through its branches, and to make this commercial deal more fair-minded provides the merchant with an additional POS from the bank.

10. Payment Systems in and for the Internet and other Online Systems

Which payment systems are available for the completion of online electronic commerce transactions? Which are frequently used? Which find some use, and which are not used rarely?

Type of payment system	**Available**
Credit transfers	Yes
Direct debits	No
Credit cards use without security	Yes
Credit cards with SSL	Yes
Credit cards with SET	Yes (+)
Debit cards	No
Electronic purses	No
Ecash	No
CyberCash	No
Micropayment systems (which?)	No
Accounting systems, e.g. those available from ISPs (KIOSK in France, Btx/ T-Online accounting in Germany, etc.)	No
Others (e.g. telephone surcharges)	No

(+) Source: interviews. We have no data confirming this explanation so we would not recommend to include it in the final version of the report.

Credit cards with SET are moving very slowly. Apart from the usual constraints of changing people's habits, gaining its trust and understanding of the product…an additional reason behind the relatively low acceptance gained up to now (although the certificates are still quite a novelty in Spain) might be the price charged for them. In ACE (Agencia de Certificación Electrónica), each certificate costs 250 ESP (1,50 Euros), and a merchant's certification is priced at 25.000 ESP (150,25 Euros). The merchant must also pay for the "pasarela" (gateway).

Additionally, there is now controversy on the Telefonica membership of ACE, on whether Telefonica can play the role of a thrusted thrid party, while at the same time owning the main telecoms network through which people access internet in Spain (Infovia plus).

Normally it is possible to complete e-commerce transactions off-line? Which payment systems are used to complete purchases of electronically ordered goods? Which are frequently used? Which find some use, and which are not used rarely?

Type of payment system	**available**	**use**		
		frequent	**occasional**	**rare**
Credit (Bank) transfers	Yes		X (3rd)	
Direct debits	No			
Credit cards	Yes	X (1st)		
Cash on Delivery	Yes	X (2st)		
Others (which)				

Main payment mechanisms for on-line sales settled off-line are credit cards, cash on delivery and credit transfers as signalled above. The payment culture and "mechanisms"behind this pattern are as follows: credit cards are means proposed by retailers on the net. This is in accordance with promotion of electronic commerce by payment systems institutions operating in Spain. VISA and other payment institutions promote secure transactions and offer it to retailers. On the other hand, retailers are reluctant due to high commissions (average 5%) charged per transaction which payment institutions justify as due to the high risk involved. Cash on delivery comes second in the ranking. This reflects distruts and it is a feature that is also shared by the mail order sector. Third is credit transfer. Banks and savings banks in Spain are promoters of virtual malls. They act as platforms where retailers can settle their stores but than require that payment be made through cards issued by themselves (which most times will coincide with having current account with them too) or by having accounts at their branches.

Previous note to sections 11 and 12.

Some of the issues in these two sections are covered more extensively in the Spanish Country Report (SCR). We have identified no significant data applying to Spain on some of the questions below. On the other hand, the answers provided are sometimes quite broad. The aim was to supply you with a broad picture of the current situation and will be pleased to complete any information that may find of interest.

11. Main political and Legal Actions Related to Electronic Commerce and Electronic Payment Systems

1. Regulation of the issue of electronic money

The opinion of the Bank of Spain on the issue of electronic money coincides with that of the European Central Bank (see topic number 6 on monetary policy), which does not differ significantly from the position adopted in the European Directive (the main difference in our opinion is on the redeemability of electronic money). The Bank of Spain has transposed the legislation as to be in compliance with the Directive. Although the Directive allows for institutions other than banks to issue electronic money ("electronic money issuers"), this matter poses no major problems for the conduct of monetary policy in Spain as: 1) up to date, all issuers of electronic money in Spain are banking institutions 2) were other institutions other than banking ones to issue e-money, they would require authorisation from the Bank of Spain 3) the Bank of Spain would also be in charge on supervising these institutions.

2. Monetary policy

The Bank of Spain is not concerned about the effects that electronic money may have for the conduct of monetary policy in the short-medium term:

1) as e-money is not expected to spread substantially in the short run.
2) As it supervises institutions issuing e-money and, as said above, in Spain all these institutions are nowadays banking institutions. Moreover, were other non-banking institutions willing to issue e-money –and in accordance with the Directive-, these institutions would require prior authorisation from the Bank of Spain to operate in the country, and would also be subject to its supervision.

Confidence in the financial system in general, and ease for the conduct of monetary policy, were outstanding volumes of e-money to increase considerably, could be enhanced by requiring redeemability of e-money.

3. Validity of contracts in electronic media

There is no specific national law regulating the validity of contracts in electronic media. We should therefore conclude that general Commerce legislation applies to contracts in electronic media. We have neither identified relevant jurisdiction on this topic.

Although slightly marginal to this topic, we find worth mentioning the activities of FESTE ("Fundación para la Seguridad en las Telecomunicaciones" - Foundation for the Study of Security in Telecommunications -Membership of FESTE includes the Association of Public Notaries in Spain-). FESTE intends to offer a more sophisticated level of digital certification where contracts through internet would be authenticated by a public notary. (See also question 5)

4. Digital signatures

The European Directive on digital signatures (November 18th 1998) is the most widely quoted reference in Spanish projects, initiatives and media. The Spanish government has developed no specific legislation on this topic, although FESTE do has worked on a proposal for a Spanish law on digital signatures.

Main issuers of digital certificates in Spain can be grouped into the four following initiatives:

1. ACE (Association For Electronic Commerce) is, among others, supported by Telefónica, Visa and Europay;
2. The Council of Chambers of Commerce ("Consejo Superior de Cámaras de Comercio") has developed its own project FIRMA;
3. The National Factory of Coins and Notes ("Fábrica Nacional de Moneda y Timbre" – has also developed its own project CERES;
4. Public notaries and related groups have developed FESTE

4. and 7.Privacy and Consumer protection

LORTAD (Ley Orgánica de Regulación del Tratamiento Automatizado de Datos de Carácter Personal - Spanish law regulating the use of automated private data). The European Directive of 1998 has lead to a revision of the LORTAD. The LORTAD establishes a procedure according to which private data can only be used for alternative purposes if there is an explicit authorisation on the part of the consumer. Some associations, among which is AECE, are asking for a more flexible framework that would allow for alternative use of private data unless explicit denial on the part of consumers is stated.

The Data Protection Agency (APD-"Agencia de Protección de Datos") supports several initiatives that refer to both protection of the consumer and privacy issues through internet. Perhaps the most significant of these is the "Ethical Code on Protection of Private Date in Internet" jointly promoted by AECE (Spanish Association of Electronic Commerce), AAP (Association for Self-Regulation on Advertising Activities), and CECU, OCU and UCE these latter being the three main consumers associations active in Spain. This ethical code seems to be a pioneering experience within Europe.

The CERES project by the "Fábrica Nacional de Moneda y Timbre" falls somehow into a distinctive category as it aims at providing Spanish citizens with a sort of national digital identity card that would be used when addressing one-self to Government Institutions through internet.

8. Taxation issues involved in e-commerce and the Internet

No specific national legislation has been passed on taxation issues involved in e-commerce and the Internet.

9. Cryptography

The General Law on Telecommunications –("Ley General de Telecomunicaciones" –LGT) establishes a non-mandatory framework for the use of programmes and systems of encoding information to be transferred within the Spanish telecommunication system. Chapter two of the law determines the situations where the user has to notify algorithms and procedures to the Public Administration. Chapter three enforces telecommunications operators to provide the public administration with the de-codifying machines if required for supervision purposes.

Additionally, the National Committee on Securities Markets –("Comisión Nacional del Mercado de Valores"-CNMV), has developed CIFRADO -a codification system of mandatory use when transferring information through Internet to or from the CNMV.

10. Other political issues

This section intends to summarise the main issues that have gained public attention during the past moths.
(Sources: self-elaboration from various press reports)

The position of the government

-The President of the Government, José Mª Aznar, announced on February 2nd this year, that a flat rate – for which internet users will be charged a fixed rate independently of the time of connection- will be progressively implemented in Spain in a time limit of three years. According to Mr. Aznar, this calendar will turn Spain into the first country in the EU to introduce flat rates. Flat rates, which are already on the market in countries such as the United States, have been repeatedly claimed for by Spanish internet users during last months. Currently, connection to internet in Spain is charged the cost of a local telephone call. The recent rise in prices for such calls has lead to a considerable increase in the prices of access to internet. Since last summer, Spanish internet users have called for several strikes to complain about this situation.
The President also stated that advanced services in telecommunications were essential for the future of today's society and among the actions undertaken by the Government he emphasised the development of internet. The President recalled that the pertinent government commission approved last February 4th several discounts for fees to internet access. At this moment, there exists a flat rate which is mainly intended for companies, while Universities enjoy free access and schools can also benefit from offers of free access since June last year.

-Proposals
President Aznar together with his French counterpart have launched a common proposal to the EU for internet to be included by the EU in the concept of universal telephone services with the aim to allow access to internet to be subsidised. More specifically, the acceptance of such proposal would result in the announced deployment of technology ADSL, which would guarantee a flat rate, to be assumed by the Fund for Universal Service envisaged in the Ley General de Telecomunicaciones and to which all operators in the Spanish market contribute accordingly to their market share.

- Current prices /proposals ADSL
The Minister of Fomento, Rafael Arias Salgado, announced a proposal on a flat rate for access to internet at the price of 5.000 ESP (30,05 Euros) per month, which would be intended for users with connection time over 50 hours per month. This new fee will be based on ADSL ("línea de abonado digital asimétrica"- asymmetric digital subscription line) technology which will start being implemented in short. For internet users with less than 50 hours connection per month, discount bonds agreed with Telefónica will be available.
Forecasts by the Ministry of Fomento on the implementation of a flat rate for access to internet is that technology ADSL should reach this year 30% of Spain's internet users, 70% during year 2000, and cover the whole of Spanish market during the first half of 2001.
ADSL technology, which is 10 times faster the technology currently available, would need to be introduced by Telefónica in order to allow discriminate use of the telephone network for voice and data services, this way impeding that the basic telephone network gets saturated. Some sources from hardware manufacturers doubt that it is feasible to display in such a short time period four million ADSL lines.

Providers of Access to Internet

- Clear market dominance on the part of Infovia (now ceased)/ Infovia Plus of Telefónica de España. According to (b): 52% of Internet users usually access internet through Infovia.
- Agreement at Comisión del Mercado de Telecomunicaciones (CMT) with date March 12th 1998, that establishes the conditions for effective competence for the service of access to information, Telefónica de España ceases to offer Infovia service since December 1st 1998. Infovia is being replaced by alternative services of access (including Infovia Plus of Telefónica de España).

-Current main providers of access to internet in Spain (Infovia Plus–of Telefónica) , Retenet –of Retevisión and Interpista -of British Telecom)
-Infovia Plus of Telefónica de España continues to clearly lead the market (as it did with Infovia before its service ceased).

Complaints

-A 1/2/99 Spanish internet users disapprove of the faulty functioning of Infovia Plus. Third strike of internet users called for in Spain, this time jointly with calls in other European countries.
-AI (Association of Internautas)'s president, Victor Domingo, demands that access to internet be free as long as Infovia Plus does not work properly.
-AUI(Association of Users of Internet)'s president, Miguel Pérez Subías, demands lower prices of access to internet that suit different users needs.

12 Organisations, documents, projects

1. Which organisations (banks, technology suppliers) are the main actors in the national development of electronic payment systems?

Sistema 6000 (promoted by CECA -the association of saving banks), and VISA España –which includes Sistema 4B- are the main actors on the technology side if we take into that each of these organisations has developed its own system of electronic purse (Euro 6000 and Visa Cash). The significance of VISA España in the developement of e-purse technology through its subsidiary SERMEPA is widely recognised. VISA España is an autonomous institution which is also a member of VISA International. Some main saving banks have been adopting VISA Cash in the last three years. VISA España CEPS agreement on e-purses was promoted by VISA España, VISA International, Europay and ZKA.

The list of members of AECE (Spanish Association of Electronic Commerce) is a good reference for significant key players: VISA España/SERMEPA, banks (Banesto, Banco de Santander, BBV...), telecommunications companies (Telefónica, Retevisión...), commercial stores (El Corte Inglés) and media groups (El País, Hachette...).

Main banks and saving banks offer financial services through internet and promote commercial malls. Of particular interest are the payment systems schemes by Baneto (Virtualcash) and Argentaria (Argenvia).

2. Which suppliers are most important in the development of electronic commerce in your country (malls, mail order companies, etc...)

Among the most well-known schemes launched are the following: Escaparate (Banesto), Cibertienda, Superplaza (Banco Santander), la Tienda en Casa (El Corte Inglés) –(additional

platforms and projects have been included in the “mailing list of experts”). As a rule, it is banking institutions, telecommunication companies or a combination of both (such as Telefónica and BBV) that are promoting the main platforms for electronic commerce.

3. Which are the most important standardisation bodies in your country concerned with electronic payment systems and electronic commerce? With which aspects of electronic commerce are they dealing?

The telecommunications area lays within the competency of the Ministry of Fomento. For legislation issues the key body is the “Comisión Ministerial de Tecnologías de la Información y de las Telecomunicaciones”. Additionally, the Secretaría General de Comunicaciones del Ministerio de Fomento promotes, among others, the following initiatives: PISTA (Promoción e Identificación de Servicios de Telecomunicaciones Avanzadas) and ARTE / PYME project (Regional Telecommunications Pilot Schemes).

As explained in the SCR, ACE (Agencia Española de Certificación) is responsible for SET certificates and seem to play a key role between the different certification authorities.

4. Which are the most important documents, including those of standardisation related to electronic payment systems and electronic commerce in your country?

(see separated list of documents. “Bibliography and key papers”)

5. Which are the most important government an parliamentary bodies, in particularly commissions and task forces, active in the field of electronic payment systems and electronic commerce?

At the Parliament, subjects related to electronic payment are competence of three committees:
- Economics, Commerce and Tax ("Hacienda") Committee
- Infrastructure Committee
- Scientific Research and Technological Development Committee.

6. Which are the most important pilots for Internet payment systems in your country? Have any results on these pilots been published, or are they otherwise known?

Internet payment systems in the sense of software based systems or pure network systems are at the moment neither available nor on pilot trials in Spain.

7. Which are the most important scientific papers and research projects in this field? Specifically mention EU projects in which organisations from your country are involved?

(see separated list of documents)

The Secretaría General de Comunicaciones has launched the Information Society Initiative which groups, among others, the PISTA.

R&D European projects in which Spanish Organisations participate

. INFOSEC - ETS “Europan Trusted Services”. General Aim: ”Development of a European Service Infrastructure of reliable trusted third parties”.

. AEQUITAS European project leaded by the University of Zaragoza. Aim of the project: development of legal solutions that would permit encoded electronic messages with digital signature to be presented as legal prove in some trials. One of the outputs of the project is the before mentioned proposal for a Spanish law on digital signatures.

. PKITS European project of the INFOSEC Initiative (DGXIII/7) co-ordinated by the Fábrica Nacional de Moneda y Timbre

Telematic Applications Programme (TAP)

. Participation of the CA-CERT which is a Centre of the Universitat Politècnica de Catalunya in the following projects:

ICE-TEL (Inter-working Public Key Certification Infrastructure for Europe)
ICE-CAR (Inter-working Public Key Certification Infrastructure for Commerce, Administration and Research). This project has to be seen as a second step of the former one.

ACTS (DG XIII)

Multimediator (multimedia publishing brokerage service). Co-ordinated by the Spanish firm Logic Control.

DG XV

Electronic Commerce Legal Issues Platform (ECLIP). Participation of Universidad de las Islas Baleares.

A.3.2 Questionnaire to experts on payments systems

Direct interviews or fax surveys to José Luis Langa, Banco de España; Elena Gómez, Asociación Española de Comercio Electrónico; Jordi Pagés and Francesc Campos, Caixa de Girona; Josep M. Fernández, La Caixa; Celestino Tomás, Red IRIS; Santiago Guillén, BCN Internet Strategies; Luis Rodrigo, Bilbao Bizkaia Kutxa; José Miquel Mahave, Hewlett Packard; Víctor Camargo, IBM España; Jordi Buch, Manuel Medina, EsCERT – Universitat Politècnica de Catalunya; Miquel Puig i Raposo, Comissionat per la Societat de la Informació – Generalitat de Catalunya. Concerning the distinction between the brand name Visa Cash and the technology TIBC, we follow a remark made by Karsten Tietz of G&D.

Creu vosté que la inexistència d'un sistema de pagament electrònic segur i ampliament difós dificulta el desenvolupament del comerç electrònic?

Sí En part No

Comentari breu (si ho creu oportú)
……
……
……
……

Contribució de la Unió monetària al desenvolupament del comerç electrònic entre països

En relació amb la realització de pagaments a través d'Internet….

Accelerarà fortament el desenvolupament

No contribuirà de forma decisiva

No tinc una opinió formada sobre el tema

Comentari breu (si ho creu oportú)
……
……
……
……

Costos de la no estandarització dels nous sistemes electrònicos de pagament

Si els pagaments a través de la xarxa segueixen el "model de tarja de crèdit" probablement coexistiran nombrosos sistemes de pagament…

Creu que realment succeirà això? Si No

Quins són sota el seu punt de vista els principals costos de la no estandarització per

(resposta sintètica)

-els consumidors……..……
-les empreses……...
-els legisladors……..……...

No tinc una opinió formada sobre el tema

Comentari breu (si ho creu oportú)
……
……
……
……

Els estàndars en diner electrònic i nous sistemes electrònics de pagament…

Comentari breu (si ho creu oportú)
……
……
……
……

Com es poden regular als emissors de diner electrònic?

L'Institut Monetari Europeu proposa tractar als emissors com institucions financeres… però les diferències en els regíms de control dels sistemes bancaris dels països dificulten el tema. La Comissió Europea està planificant una directiva sobre el tema de la regulació…

¿Quines normes suggereix vosté que haurien d'imposar-se als emissors de diner electrònic?
……
……
……

Si coneix l'enfocament sota el que la comissió està afrontant el problema. Pot donar-nos el seu punt de vista sobre el problema?
……
……
……

No tinc una opinió formada sobre el tema

Comentari breu (si ho creu oportú)
……
……
……
……

Impacte del diner electrònic en les polítiques monetàries

El diner electrònic experimentarà una difusió….

Molt ràpida Ràpida Lenta Molt lenta

Control dels bancs centrals

Podrán controlar-ho fàcilment Tindran dificultats No podran controlar-ho

Les mesures que s'están adoptant

Són suficients
Són insuficients

Tindran costos baixos pels bancs centrals

Tindran costos elevats

Tindran costos molt elevats

No tinc una opinió formada sobre el tema

Comentari breu (si ho creu oportú)
……
……
……
……

Annex 4. corresponding to chapter 5. Standardization issues in Spain.[12]

A.4.1. Introduction

Questions

The situation of standardisation of electronic payment systems in Spain is clearly influenced by the importance of the market leadership of VISA España and the technological leadership of its subsidiary company SERMEPA. SERMEPA is owned by VISA España and other financial institutions. The company developed the smart card called TIBC ("tarjeta Inteligente para bancos y cajas") in 1993. TIBC has been the "basis" for the Visa Cash e-money card. The systems works under the EMV standard in what concerns security and under the ESCB electronic purse standard. As it is well known, VISA España has also played an active role in the definition of standards like EMV and CEPS.

A.4.2. Electronic money and standards. An Spanish overview

The need for standardisation could be seen from the point of view of the different types of developments e-money

Internet payments using credit/debit cards.

SET is seen as a key issue within the standaditzacion process for internet payment using "credit card models". SET guarantees confidentiality (through encryption of messages), integrity (through digital signatures) and authentication of the parts (through digital signatures and certificates).

In Spain, SET is clearly accepted as an standard. Since June 1998 SET certificates are issued by Asociación de Certificación Española (ACE). The aim of ACE is first, to promote the use and development of electronic commerce under sufficient security guarantees. Secondly, to issue, maintain and overrule accreditation certificates. Thirdly, to participate in the certification processes involved in electronic transactions in various environments other than electronic commerce. And finally, to develop consulting activities (Galan, 1998)

SET is, until now, the standard that solves the problem of security that is linked to distrust of the consumer about payment systems. In the words of Gabeiras (1998) "The SET protocol provides a solution to security problems on the Internet, but not necessarily the best." The main problem for the dissemination of SET seems to be at the consumer side. The system stills a quite "complex" procedure not easy to understand for certain types of consumers. The question now is how to persuade consumers about the advantages and the security of the system.

[1] This chapter sums up the main issues related to questions 3 and 4 of the European Parliament questions on the costs of non-standardisation of electronic payment systems and until which extent should regulators impose future standards for electronic payments.(See footnote 5 in chapter 5).

[2] Section 2.5.2 of this dissertation includes an economic analysis of compatibility and standardisation.

Electronic purses

The TIBC technology for smart cards (developed by SERMEPA) is the most diffused one in Spain. TIBC tries to follow the international standards. In this sense the EMV96 agreement on credit and debit applications of e-money card (chip-based card) is considered by Spanish players a key issue. VISA is also certficated through the ISO 7816 norm. There is another electronic purse, the so called Monedero developed by 4B.

TIBC technology has evolved and could be considered now in its third generation. The smart card based on TIBC was at the beginning a simple e-money card (1993/94). The system is multi-purpose and multi-currency, which will allow to move credit and debit functions from magnetic stripe to chip, and also add functions other than electronic purse such as purses to be used in mass transport or telephone. Stages:

- First stage, for cards issued since 1994, is fully developed and being spurred by banks and savings banks of VISA España.
- Second stage of this technology is based on a mask that complies with the international standard EMV 96 and has been offered to the financial institutions above.
- Third stage, to be available in the near future, is based on no-contact technology that will allow users to make payments, mainly in interurban transport, without the need to insert cards into terminals thanks to special sensors of radio frequency embedded in cards and terminals

The TIBC technology has also been adopted by the Social Security as the smart card operative system. Pilots schemes (trials) are also being developed in South America using TIBC cards technologies.

In December 1998 the CEPS group announced that specifications that will allow users of electronic purses to work under a common standard. The agreement of a Common Electronic Purse Specifications (CEPS) is a very important step towards a single global standard. Members of the CEPS group are VISA España/SERMEPA, Europay International, Visa International and ZKA)

This CEPS agreement will allow the Spanish financial system to be at the first row of international standardisation in the moment of the introduction of the Euro. This standard is clearly an initiative with an European dimension. CEPS will allow users to use the smarts cards through Europe. Organisations of 22 countries have accepted to use the CEPS standard. That means more than 90% of the electronic purses of the world.

CEPS defines the technical specifications needed for an organisation that wants to implement an electronic purse scheme with global interoperability. CEPS requires:
- Compatibility with EMV standard
- Defines cards applications
- Defines the interface card/terminal
- The use of terminals for the loading and consumer uses
- Data and formats recommended for the transaction process

Software-based methods

No significant experiences have been developed in Spain on the field of Software-based methods which can be regarded as the functional equivalent of electronic purses through Internet.

Protection of consumer data an standardisations processes

A group of organisations[3] has recently promoted the so-called "Ethical Code for Internet Data Protection" with the support of the National Agency of Data Protection. Companies that agree with the Code are committed to a set of behaviours rules when doing electronic commerce activities. Code rules concern: consumer rights, e-mail marketing activities, use of data , privacy and security. Companies that will sign the code could then use it as a "guarantee stamp" in their Web pages.

A.4.3. Regulation, standards and market forces

All the organisations involved in the e-money market are defending that standardisation has to be left to market forces[4]. The Spanish evolution of the credit cards market where complete interoperability was reached between the different systems seems to be the compulsory reference framework for the smart cards market. The importance of the market and the fact that main actors have a positive evaluation of credit card "standardisation experiences" is clearly pushing towards interoperability. The recent CEPS agreement seems to be the first result of the process.

[3] AECE (Asociación Española de Comercio Electrónico), AAP (Asociación de Autocontrol de la Publicidad), CECE (Confederación de Consumidores y Usuarios), OCU (Organización de Consumidores y Usuarios) and UCE (Unión de Consumidores de España).

[4] Banks, credit card companies, electronic commerce associations…

Annex 5. Corresponding to chapter 5. Proposal for European Parliament and Council Directive on issuers of electronic money

European Parliament and Council Directives on the taking up, the pursuit and the prudential supervision of the business of electronic money institutions. Comments on the relationship between electronic money and the introduction of euro.

The Directive recognises the opportunity that electronic money may represent for consumers to familiarise with the single currency, notably before coins and notes are in circulation in year 2002.

This opportunity should not be ignored. According to various recent surveys published on general press, a recent study some Europeans remain still confused about what is about to happen with the single monetary union. Only just over half know that euro banknotes and coins will not be introduced until 2002. About 25% of people interviewed believe that they will have to change euro notes and coins into their own currency in order to buy things with it. Although 95% of the French know that the single currency is called the euro, this percentage falls to only just over half among the Irish. In general, and according to the study, the Dutch, Finns, French and German were among the best informed.

Although the financial sector have already done the most to prepare for the single currency, the euro will erode some important bank revenues (intra-euro foreign exchange business, for instance, will disappear). Between 1999 and 2002 banks will exchange into euros any currency issued by the 11 euro countries, while no longer being allowed to charge commission. And starting on 1st January 1999, banks will handle accounts and conduct business in both euros and national currencies at the same time.
In 2002, when the euro is actually issued in the form of notes and coins, there will be practical problems with distributing the new currency.

Electronic money, if wide acceptance was gained, could substantially lower the costs of distributing the new currency. However, the problem would still remain for the ECB to estimate the demand for euros, as the need for notes and coins is dependent on habits which vary widely among euro-area countries.

International features

The European Union, through approval of the Directive on the business of electronic money institutions, has taken the lead at an international level in providing a regulatory framework that should encourage the development of electronic monetary institutions while at the same time helping preserve the soundness of the financial system.

In effect, as recognised in the same proposal for the Directive, “In the US for example there are no immediate plans to regulate electronic money issuance and there is, at present, no restriction on who can issue it.” And also, “The issue is currently being examined in Japan where a number of large pilot schemes are already in operation or will come on line in the near future. One of the main proposals being considered is the introduction of a regulatory structure for non-bank issuance of electronic money”.

The initiative of the European Union in this issue should be regarded as of most importance, taking in due account the potential for electronic money to develop in a cross-border basis,

especially after the introduction of the euro. Monetary authorities are concerned about the implications that electronic money can bring at an international level and stresses the need for international co-ordination in this field. More specifically, potential legal, supervisory and oversight implications of the development of electronic money are among the main concerns.

The opinion of this research team is that cross-border concerns could arise from the fact that schemes might offer e-money in more than one currency, which might make it more difficult for central banks to accurately measure the amount of electronic money outstanding denominated in their home currency. It is not clear either how the competent authorities can obtain the necessary information about schemes being promoted in the EU countries by institutions located abroad, and how they might be able to influence such schemes in accordance to European concerns.

Therefore, we shall conclude that although first steps have been taken in order to deal with potential implications from the wide-spread use of electronic money, there is still a loophole at international level that requires further co-operation.

Box A.5.1

Summary of the most relevant aspects for Monetary Policy of the Explanatory Memorandum of the Commission proposal for European Parliament and Council Directives on thetaking up, the pursuit and the prudential supervision of the business of electronic money institutions

> "…The amendment to the First Banking Directive defines electronic money institutions as credit institutions thus submitting them to the provisions of the First and Second Banking Co-ordination Directives thereby allowing them the European Passport. At the same time it creates a level playing field as between different types of credit institution. Because of the limited scope of the business of electronic money institutions some of the provisions of the banking directives are not applied or are more limited in their application…."

"… Article 1 suggests a limited scope of application restricting harmonisation of regulation to 'electronic money institutions', i.e. non-bank providers of e-money services".

"….Article 2 fully or partly waives application of some of the 40 Articles of the First and Second Banking directives. "

"…Article 2 also provides that the contractual arrangements must specify if the stored value is redeemable and, if so, the specific contractual conditions.

"…Article 3 introduces ongoing own funds requirements. These requirements are necessary in order to ensure that e-money institutions have own funds commensurate with the size of their operation. The suggested yardstick is set at 2% of the higher of the institution's current amount or the average of the preceding 6 months total amount of unredeemed e-money issued by the institution in question. In any event the amount may not fall below the initial capital requirement of 500,000 ECU…"

"…Article 4 proposes limitations on investments that reflect the need for a prudent investment policy of issuers of e-money, to contain in particular the exposure to liquidity risks of issuers. Accordingly, the proposal requires that funds received in exchange for issued electronic money should be invested only in highly liquid assets which attract a 0% credit risk weighting in accordance with the Solvency Ratio Directive. Hedging of market risks by highly liquid exchange-traded derivative instruments subject to a 0% credit risk capital charge would also be allowed.

In addition, electronic money institutions may invest in other highly liquid debt instruments and have ancillary liquidity in the form of sight deposits held with Zone A credit institutions. However, such investments are subject to a ceiling of twenty times the institutions' own funds and subject to large exposure limitations as least as stringent as those imposed on banks."

"…Article 5 imposes a requirement on competent authorities to verify compliance by e-money institutions with Articles 3 and 4 at least twice each year while Article 6 emphasises the obligation to have sound and prudent operations."

"…Article 7 affords an option to the Member States allowing for a waiver of certain of the provisions of the proposals commensurate with the risks inherent in small e-money schemes. The waiver may only be applied to e-money institutions underpinning relatively small schemes.

The underlying considerations are that the overall unredeemed e-money does not exceed ECU 10 million of unredeemed e-money and that the storage device has a capacity of ECU 150 of maximum loading amount.

The waiver only applies to business activities (Article 1(4)), application of the First and Second Banking Directives (Article 2(1)), initial capital and own funds requirements (Article 3(1)) and Article 8 which requires existing electronic money schemes to submit information to the competent authorities.

"…Article 8 provides for a grandfathering as regards the authorisation requirement for e-money institutions already operating at the date of the coming into force of national provisions implementing the European regulation."

Box A.5.2.
Summary of the most relevant issues for Monetary Policy of the "Report on Electronic Money" by the European Central Bank, August 1998.

The report of the ECB proposes, among other, the following minimum requirements

? ? Prudential supervision: issuers of electronic money must be subject to prudential supervision.

"…The current prudential supervisory framework defined for credit institutions is intended to adequately meet the need to promote the financial integrity of electronic money issuers."

? ? Monetary statistics reporting: electronic money schemes must supply the central bank in each relevant country with whatever information may be required for the purposes of monetary policy.

"Information about the amount of money available in the economy is indispensable for the conduct of monetary policy by the central banks. Thus, there is a strong case for electronic money, as a substitute for fiduciary money, to be included in the monetary aggregates. For this reason, all issuers of electronic money must supply the central bank in each relevant country with whatever information may be required for the purposes of monetary policy."

? ? Redeemability: issuers of electronic money must be legally obliged to redeem electronic money against central bank money at par at the request of the holder of the electronic money.

"In a scheme in which the issuer is only obliged to reimburse the retailer presenting electronic value, but refrains from redeeming the customer, a situation could arise in which the retailer only accepts electronic value below par, e.g. if the soundness of the issuer is at stake. In such circumstances, the private provision of the medium-of-exchange and store-of-value functions of money would no longer be consistent with the simultaneous public provision of the unit-of-account function of money.
Furthermore, without a close link to central bank money, there could potentially be an unlimited creation of electronic money, which could, in turn, lead to inflationary pressure."

? ? Reserve requirements: the possibility must exist for central banks to impose reserve requirements on all issuers of electronic money.

"The possibility must exist for central banks (for the ECB in Stage Three of EMU) to impose reserve requirements on all issuers of electronic money, in particular in order to be prepared for a substantial growth of electronic money with a material impact on monetary policy. Such a requirement would be one way to limit the risk of unrestricted growth in electronic money and thus to help to maintain price stability. It is also necessary in view of the need for equal treatment as compared with issuers of other forms of money, which are already subject to reserve requirements."