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# **In Digital We Trust: The computerisation of retail finance in Western Europe and North America<sup>1</sup>**

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## **Abstract**

This paper tells of the contents of a forthcoming volume, which offers a new and original approach to the study of technological change in retail finance. Most business history studies of businesses for the last 50 years note the emergence of computers and computer applications, but they do not analyze their role in shaping business practices and organizations. In this book we look directly at the processes of mechanisation and computerisation of retail financial services, throughout the 20<sup>th</sup> Century while articulating an international comparison. We bring together young, well established and independent historians, who come from different traditions (that is, economic, business, accounting, geography and political histories as well as historians of technology). Contributors look at stand alone and comparative case studies from different parts of the world (namely Britain, Denmark, France, Germany, Netherlands, Spain, Sweden, Mexico and the USA). The outcome is a rich survey of the broad literature examining different aspects of the technological and business histories of retail financial markets from a variety of perspectives.

## **The making of the digital bank**

This volume offers a new and original approach to the study of technological change in retail finance. It offers a massive research base reflecting not only breadth of contributor interests, but also a unity of purpose that comes from several workshops and comments on each other's work. The contribution of this volume is particularly novel in that no comparable titles investigate how computers have transformed the internal workings of financial service organizations in different competitive environments. Indeed, much has been said about the effects of computer technology in banking and other financial services but with the exception of contemporary case studies for the UK, documented by Fincham *et al.*(1994) and the longitudinal

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<sup>1</sup> Forthcoming in “Technological Innovation in Retail Finance: International Historical Perspectives” (2011) by Bernardo Batiz-Lazo, J. Carles Maixé-Altés, Paul Thomes (editors), New York and London: Routledge, pp. 3-14. See further: <http://www.taylorandfrancis.com/books/details/9780415880671/> (accessed 26/Oct/2010).

Anglo-US comparison study by Booth (2007), the current ‘state of the art’ in the study of the computerization of financial services from an historical perspective is overwhelmingly focused on developments in the USA: the path breaking studies of Chandler (2001) and Chandler and Cortada (2000) and are of a general nature and do not offer case studies of individual organizations. Yates (2005) investigates the insurance market and Cortada (2006) offers evidence on ICT in retail banking.

While the majority of contributions to this volume reflect European experience, other countries are not neglected. Hence, contributions to this book confirm the need to consider the histories of computer use within the broader contexts of nations, industries and societies (e. g. Yates 1989; 2005). This as early computers were purchased, configured, and applied not by isolated individuals but by large organizations. But every country has its own story of computer use and adoption as it cannot be assumed that adoption of similar hardware in two nations implies that both countries would make similar use of computer technology or experience equivalent results.

Without a doubt, the continuity in the evolution of information and telecommunication technologies (ICT) infrastructure noted by Chandler and Cortada (2000) populates the competitive environments of North America and highly industrialised European nations. Indeed, there is evidence of networks of innovation spreading across the Atlantic dating to early modern capitalism (e.g. Meyer 2006) while, more recently, there was intense exchange of ideas around the introduction of computer technology between US and British financial intermediaries (see further Bátiz-Lazo and Wardley 2007). However, we cannot brush aside other competitive environments, although marginal to the construction of that continuity, where individual organisations were also successful in assimilating new technology to, first, speed up internal operations and, second, reconstruct and intensify the flow of information within and across organisations. Considering organisational characteristics and sources of competitive success of firms populating both inside and outside the construction of Chandler and Cortada’s continuity, the research documented in this book offers to enhance our understanding of the links between technological change and competitive advantage while avoiding the rationalisation of success often associated with a ‘Whig’ interpretation of history.

Our proposal overcomes the usual bias towards the so called ‘Atlantic continuity’ in the understanding of technological change related to applications of ICT by offering a number of sources of distinctiveness, namely:

- Documenting developments in the USA side by side with stand alone and comparative case studies from different parts of the world, specifically Mexico and Europe (Britain, France, Germany, the Netherlands, Spain and Sweden).
- Addressing the variety of financial institutions that populated the markets for retail finance.
- Envisioning technological change in banking as a long-term process of evolution, with the changes resulting from the two World Wars acting as accelerators to that process.
- Articulating an interdisciplinary approach to the study of technological change in banking.
- Developing recurrent themes. These emerged as authors debated their ideas at length in three forums convened specifically for that purpose (namely Aachen, 2007; Bordeaux, 2008; Leicester and Utrecht, 2009).

In this edited volume we highlight the relative importance of European actors in the globalization of technological change by comparing cases in different competitive environments. Specifically the UK (Bátiz-Lazo & Maixé-Altés; Booth & Billings; Martin; Pardo-Guerra), France (Bonin), Germany (Thomes), The Netherlands (Mooij), Spain (Bátiz-Lazo & Maixé-Altés) and Sweden (Appelquist). Developments in Europe sit side by side with those in Mexico (del Angel) and the USA (Poon; Stearns).

In many countries the commercial or clearing bank was traditionally the organisational form with the largest share of the market for retail deposits. It was also common that the latter had a monopoly in managing payment systems. The combination of regulatory change and technological innovation during the 1980s resulted in the geographic, product market and customer group diversification of participants in retail banking (among others Ballarín 1985; Hoschka 1993; Canals 1997; Bátiz-Lazo and Wood 1999). Diversification effectively meant that a large number of intermediaries accepting low-value, high-volume deposits increased the

services offered to individuals, households and small and medium sized enterprises (SME). However, throughout the 1980s and 1990s, deposit-taking remained the most important factor in maintaining an established customer base in retail banking (Gardener and Molyneux 1990; Walter 1997; Bátiz-Lazo and Wood 2003). Moreover, it is possible to speculate that in the absence of ICT applications, financial intermediaries would offer a limited range of services while the intensity of competition in retail banking would be quite different.

But however important ICT applications have been to the delivery of competitive and organizational change in banking, systematic studies which have examined the specific role of ICT in shaping business practices and organizations have been few and far between. Surprisingly, detailed documentation and analysis of the role of automation and information processes within financial intermediaries as well as the role of bankers in shaping technology has been largely neglected. This edited volume directly addresses the processes of mechanization and computerization of retail banks throughout the 20<sup>th</sup> Century (Bonin; Martin; Appelquist; del Angel; Thomes) while articulating an international comparison.

We reject the view that considers commercial/clearing banks the only organizational form worth studying. This because before and after regulatory change, in many nations the retail financial market was populated by among others savings banks (Thomes; Bátiz-Lazo & Maixé-Altés), mutual banks (Mooij), state-owned banks (Booth & Billings). All these competed directly with clearing/commercial banks in the market for low-value, high-volume deposits and sat side by side with a host of non-banking intermediaries (Stearns; Pardo-Guerra) as well as suppliers of industry-specific hardware and software (Poon). However, these other financial intermediaries often had a less diversified portfolio and/or focused on different market segments than commercial banks.

Another common characteristic of this edited volume is noting retail financial intermediaries' response to regulatory change and new technology is their common assumption of a rather deterministic nature of technological change in banking. On the whole, this assumption is often expressed in the form of new technology having been developed independently of the strategies of financial intermediaries. However, there is increasing evidence to the contrary in the form of systematic studies documenting episodes throughout the 20<sup>th</sup> Century in which financial intermediaries were not just reacting but actively shaping the development of general purpose

and industry specific applications (Campbell-Kelly 1992; Fisher and McKenney 1993; McKenney 1995; Campbell-Kelly 1998; Bátiz-Lazo and Reid 2010).

We therefore reject ideas which are synonymous to disruptive innovation. We articulate the process of evolution, first, by mapping the introduction of mechanical, electromechanical and digital (including computer) technologies. Second, we identify the aspirations and realities of technological change in retail finance. A wide range of cluster of actors lived within and outside the participant organisational forms above mention (such as managers, operations and methods, accountants in financial intermediaries, engineers at manufacturers, politicians and regulators). These actors and clusters contributed to the shaping of new applications. The intensity of their involvement varied through time but so did individuals' and individual cluster's expectations of what new technology could deliver. These aspirations were shaped by a process of trial and error associated with greater use and familiarity with new applications as well as changes in the wider environment and in the strategic priorities of individuals and clusters.

This book documents detailed evidence that financial intermediaries were significant actors in the design, use and diffusion of new technology. We explore the business, economic and social dimensions of technological change within participants of retail financial markets offering a long term view of the process that led to the adoption of computers and computer applications. We thereby demonstrate how these processes had a major role in the shaping and developing of administrative processes, procedures and organisational capabilities in banking organisations. We show when and how technological change altered the competitive intensity in the markets for retail finance. As a result, we are uniquely positioned to evaluate the scope and consequences of these phenomena in an international context.

We achieve all these results by:

- Discussing the diffusion of mechanical and digital technology across different organizational forms that populate retail financial services (namely commercial/clearing banks, savings banks, co-operative banks and postal banks);
- Comparing developments in the same organizational form across different competitive environments;

- Analysing the interaction of financial services organizations and manufacturers of ICT in the creation, use and diffusion of new hardware (e.g. tabulators, mechanical accounting machines, automated teller machines, mainframe computers, credit cards and point of sale terminals) as well as software applications (e.g. the creation and use of credit scoring algorithms);
- Querying the impact of mechanical, electromechanical and computer applications on the management of banks, non-banks, non-financial intermediaries and their interaction with retail customers;
- Critically explore the sometimes complex relationship between globalization, national goals for the development of strategic industries, technological innovation (particularly computer applications) and the development of internal management control systems.

Addressing these themes draws out issues regarding the relative importance of institutional setting, staff and gender, the process of technological innovation and change, the use of general purpose technology to reduce scale disadvantages and contest bank markets, the supply of capital as a differential factor on the extent and pace of mechanization and computerization, the reshaping of existing processes, procedures and control systems (with particular attention to the accounting function), division of labour, and the role of the State.

Accordingly and given the variable intensity of technological change in retail financial sector, some contributions focus on individual organizations, others on changes in the competitive process, and others at the collaboration between several organizations. Some cases provide an overview over an extended period of time while others are interested in specific activities taking place in a rather narrow time-span.

Although the majority of contributions fall under the umbrella of business history, this approach is not exclusive. Contributions and contributors embody different branches of learning and specifically economic history, the history of technology, the sociology of finance and economic geography. Different analytical approaches sit side by side in a respectful dialogue around the central theme.

To conclude, the scarcity of contributions on the theme of innovation in financial services and the fact that we offer an international comparative study suggests that this research monograph proposes a new area of study. This novelty is not solely thematic. The contributions in this co-authored volume build upon questions and multiple source material usually expected in business history (e.g. surviving company documents, contemporary publications, oral histories, official reports, trade journals, etc.). But at the same time, we extend the range of questions and materials that have dominated other studies of this type as reflected in accommodating studies from other research traditions as well as the use of alternative sources such as interpreting political memoirs, design blueprints, images and many others. As a result we offer a solid research base, consistent academic quality across the breadth of contribution interests and unity of purpose. As a result, the proposed publication of these contributions under a single title offers innovative scholarship, thematic unity, organization and a debate that runs across chapters.

## **The computerisation of retail finance in Western Europe and North America**

Considering the effects of technological change in diverse organizational forms in multiple banking systems is the back-bone of this edited volume. This dive is reflected in the three-part structure of the book reflecting what we consider are the most significant organizational forms active in retail bank markets across nations, namely commercial/clearing banks, other deposit taking institutions, and non-financial intermediaries.

Part I is entitled “digitalising commercial banks”. Hubert Bonin begins this section in chapter 2. Evidence from French banks is the basis to argue that much of the recent work done by industrial economists on the history of the banking establishment is mostly limited to the last three decades of the 20th Century and leaves much to be desired regarding the process by which these heavy-footed, staid banks turned into the sleek “firms” of today. To fill this lacuna, we need to delve into what may be called a “prehistory” of the banking establishment and its managerial practices. We will try and see how the banking establishment grew from being a rather informal structure which used administrative tools and accounting practices dating back to the 15th-18th centuries, to the highly “organized” edifice we see today. “Streamlining” was the keyword which instigated and determined this progression towards an entirely new type of service economy – from being “informal”, if not downright “disorganized”, to very much

“formalized” and “streamlined”. The entire process was kick started when banks suddenly realized that they could no longer keep track of the extent of the risks they were running. The identifying, understanding, and coming to terms with this became the cornerstone of their business. It made for the rapid adoption of “industrial” methods and the establishment of a true “service organization”. The introduction of mechanical accounting machines formed only part of the entire streamlining process.

Chapter 3 is by Ian Martin who looks at the first British computer centre. In this chapter he traces the life of this building starting with its official opening on 4 July 1961 and ending with its protracted closure a decade later. From initial status as the most advanced bank bookkeeping system in the world serving as a highly visible symbol of the bank’s technological power, to a final repurposing of its grandiose reception as a distribution point for pre- and post-decimalisation output, the building’s various meanings are revealed. Making use of written, oral, and visual sources Ian explores the centre’s spatial characteristics, its relation to the distributed structure of the branch, and its place as a first dedicated working home for a newly emerging computing subculture. A blend of multiple perspectives internally from the top down and bottom up, and externally from customer and competitor, provide a detailed analysis that uncovers the part played by the first computer centre place in the British banking automation race.

In chapter 4, Joakim Appelquist investigate the relation between the implementation of ICT applications and organizational change in the Swedish banking industry from 1975 to 2003. The analytical framework focuses on the complementary nature between major trends in the organization of work and general developments in computer technology during the last 40 years. To structure the analysis, a de-skilling/re-skilling hypothesis is formulated and discussed. The analysis identifies three techno-organizational stages and refutes the hypothesis as the level of skills of employees in Swedish continues to increase during the entire period of study. This is a result of a combination of technical investments, strategy decisions and labour relations.

In chapter 5, Gustavo del Angel documents the computerization of commercial banks and the building of an automated payments system in Mexico between 1965 and 1990. Adoption of mainframe computers in Mexican banking began in 1965 opening a route of continuous technological change in the industry. The central argument of this chapter is that computerization of retail operations and data processing responded to the massification of bank services and that

this technological platform allowed building an automated payments system in that country. On the one hand, the massification of services (in particular savings and checking accounts and the introduction of credit cards) required computer applications that gave greater speed and precision to established procedures. On the other hand, the integration of different fragmented systems resulted in the creation of a national automated payments system towards the end of the period under study. The chapter also shows how computerization required redesigning various operational methods and how banks used adoption of computers as an emblem of modernization. However, it is unclear how the implementation of computer technology represented a strategy to reduce operational costs of banks. The chapter centres on the experiences of the two largest Mexican banks, Bancomer (today part of BBVA group) and Banamex (today part of Citigroup).

Chapter 6 is the first instalment of Part II, “digitalising savings, co-operative and state owned banks”. In this chapter Paul Thomes tackles the German savings banks. He investigates the development path of mechanization and digitalization which began around 1900. The analysis includes an outline of the German banking system. It embeds the case study of savings banks in their wider socio-economic, business as well as political contexts. It addresses commercial and technological issues. The two world wars played an important role because of different reasons. The 1950s and 1960s saw the complete restructuring of individual organizations. This included the adoption of the most modern equipment – mostly of US origin. Another important incentive for the computerisation of savings banks was a need to respond to rising costs associated with servicing their large numbers of retail customers, shortages in the labour market, the introduction of cashless (direct to account) payments as well as a private giro banking system in the early sixties. Although “Nobody had a master plan” (Cortada 2006) a specific German IT path in banking developed with the savings banks – as intermediaries of the ‘common people’ – spearheading the move to digitalization.

In chapter 7, Bernardo Bátiz-Lazo and J. Carles Maixé-Altés dwell on organizational changes associated with the automation of non-bank financial intermediaries (namely savings banks) in the UK while making a running comparison with developments in Spain. This international comparison helps to ascertain the evolution of the same organizational form in two distinct competitive environments. Changes in regulation and technological developments (particularly applications of information technology) are said to be responsible for enhancing the competitiveness of retail finance. Archival research on the evolution of savings banks helps to

ascertain how, prior to competitive changes taking place, participants in bank markets had to develop capabilities to compete. Moreover, assess the response of collaborative agreements to opportunities opened by technological change (in particular to resolve apparent scale disadvantages to contest bank markets). Of particular interest are choices made between applications of computer technology to redefine the relation between head office and retail branches as well as between staff at retail branches and customers.

In chapter 8, Alan Booth and Mark Billings investigate the early years of Britain's National Giro, which opened for business in 1968. The Giro's establishment and development is placed within the wider political, social and economic context, addressing commercial and technological issues at a time when techno-nationalist and wider macro-management concerns were far stronger than at the present time. The Giro was established to operate a national payments system, making use of the post office branch network. It provided an alternative to the traditional cheque-clearing system operated by the major commercial banks, which British governments in the 1960s regarded as uncompetitive, and inefficient hoarders of labour and constant threats to government attempts to control inflation. We add to the growing literature examining the role played by technology in financial institutions and extend existing scholarship by examining this unusual business organization: the Giro was established as a state-owned financial institution, rare in Britain; and it was designed to function from the outset on a computerized basis, a key element in the government's techno-nationalist stance (promoting Harold Wilson's "white heat of the scientific revolution"), which sought to nurture the British computer industry against US competition.

In chapter 9, Joke Mooij presents an overview of how mechanization and automation affected Rabobank's financial services in the period from 1945 to 2000. Rabobank is a broad financial services provider based on cooperative principles. Its roots lie in local cooperative farmers' credit banks which were founded at the end of the 19<sup>th</sup> Century and in the two central banks of 1898. The cooperative organizational structure, whereby the autonomous local banks are members of the central organization, gives Rabobank a unique vitality and has distinguished it from other banks from the very beginning.

Chapter 10 opens up the third part of the book, "socio-historical aspects of digitalisation". Here Martha Poon deals with the emergence of commercial credit scoring. The "scorecard" was

introduced in the late 1950s through the commercial initiatives of Fair, Isaac and & Company Incorporated. In its most general description, the scorecard is an algorithmic tool that allows credit managers to associate risk with individual consumers. What is remarkable is that the original techniques for credit scoring emerged out of a manual underwriting, prior to the reutilisation of computers and electronic infrastructures in business. The chapter shows how the early convergence of statistical approaches with manual practices demanded that order be put to raw materials through a series of physically demanding and materially intensive tasks. It suggests that to understand the innovation of risk management systems it is important to trace how risk management tools have grown, gradually, out of past managerial environments, through the intervention of external and often commercial actors.

In chapter 11 Juan Pablo Pardo-Guerra documents the technological history of the London Stock Exchange between c. 1969 and 1992. By exploring the development of the Stock Exchange's market information systems, this chapter presents a vivid case study of the introduction of digital technologies in finance institutions. In analyzing the Stock Exchange's development efforts, this chapter forwards an important lesson on technological change in finance. In particular, it demonstrates that technological change was not the result of the passive use of digital technologies in increasing economic efficiencies. Rather, change resulted from a process of organizational learning and co-adaptation associated to the implementation, maintenance and updating of market technologies in relation to pre-existing organizational imperatives that included providing equality of access to the membership of the Stock Exchange.

David Stearns examines in detail the origins of the electronic payment systems known today as VISA in chapter 12. Specifically, he describes how the system initially formed, how it became widely adopted, and how it transitioned from mostly paper-based to fully-electronic processing. Along the way, he points out ways in which the technologies that make the system function were shaped by the system's social dynamics, and the ways in which those technologies then began to reshape those social relations in return.

In the final chapter Lars Heide compares conclusions and observations from the preceding chapters and suggest their implications for the study of ICT in business organizations. First, based upon the stories in the preceding chapters, he summarizes the role of financial intermediaries, regulation and technology in the computerization of retail finance across Western

Europe and North America. The computerization strategies applied and their impact on intermediaries and their customers. Second, he discusses how this narrative fits into the general bureaucratization of Western Europe and North America and address the impact of computerization of retail banking on other businesses. This section is based upon published literature and a mayor inspiration is JoAnne Yates (2005) and Robbie Guerriero Wilson (2008). Third, he discusses the impact of the emergence of computerized mathematical models on financial intermediaries and their customers. Here the point of departure is Donald McKenzie (2005) and Trevor Pinch and Richard Swedberg (2008).

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