Divergent paths to a networked world: computers from the perspective of the European savings bank industry prior to the Internet

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Introduction

Many topics within the information and communication technologies (ICT) sector demand a detailed, historical assessment.[1] This article provides insight into the evolution of computer technologies in the commercial sector. The main purpose is to examine the adoption and use of information processing in retail banking, and more specifically, through the prism of one of its industries, the savings bank industry, as it has taken shape in Western Europe since the 1950s. The need for this study lies in the fact that works of this type are not commonplace, in spite of the importance these technologies have had in shaping business practices in the late 20th century.

The ground-breaking study by James W. Cortada, "The Digital Flood", provides us an integrated view of Western Europe's experience with IT. It concludes that ICTs in Western Europe during Wave One and part of Wave Two had an intense impact on the economic growth and investments as a whole.[2] Adopting this framework, this article follows the guidelines set by JoAnne Yates in her study on the life insurance industry in the USA.[3] The industry as a whole is therefore emphasized over any one specific company, thus focusing on the corporate users of these technologies and their role in shaping computing history as opposed to the traditional focus on producers. The literature on savings banks seldom considers the issue of technological change from the perspective of the industry as a whole, and in a wide range of competitive environments.[4] To broaden this vision, this research considers twelve Western European countries.

The role played by knowledge dissemination in the development and adoption of IT has been sufficiently corroborated, and it is within this framework where industrial organizations are important.[5] The savings banks offer us a similar scenario. The national savings bank industry associations and the sector's worldwide association (the International Savings Banks Institute, ISBI)[6] play an important role in facilitating the sharing of information amongst their members, aggregating industry data, lobbying and other specialized initiatives. This profile is accentuated by an institutional culture deeply rooted in the collaboration between "sister institutions" and a strong impact on civil society.[7]

A review of the history on an industry level makes it possible to discriminate which specific elements are detected in the dissemination of office automation within this industry, as well as the mechanisms that drive the process of adoption, use and technological dissemination. As has been indicated repeatedly in the literature, involved in this dynamic, at different levels and different intensity, are users, vendors, governments, industry associations, specific firms, and engineers and scientists.[8] This focus reveals the reciprocal influence of IT and its use, and the influence of past practices on the adoption and use of new technologies. In short, the study of savings banks enables us to make comparisons between the insurance and savings bank industries. We can also observe whether an incremental technology migration path occurs in the latter as it has in the insurance industry, or if there are indications of disruptive processes in the dissemination of technology.

Along similar lines, the study of an industry in the framework of Western Europe offers a unique vision of transnational cooperation in the old continent. Echoing the recently-presented pan-European approach to IBM's business in Europe,[9] this paper permits us to observe a pan-European user network and the diffusion of information

technology.[10] In a certain sense, these can be effective steps to deal with the problems that prevent compiling a pan-European history of IT, difficulties that, as indicated by Cortada, are the consequence of a certain national exceptionalism, that is to say, the philosophy that "my country is unique."[11]

The savings banks were late adopters of technology, but as an industry, they followed certain original guidelines of their own in the adoption of computers. As a result, they offer an unprecedented perspective that suggests new points of view on the processes of technology adoption by business users.

In terms of documentation, this paper incorporates unpublished primary sources that have a solid foundation in the proceedings, publications, minutes, and reports of the ISBI international committees on automation and related associations between 1950 and 1995. The research has been based on first-hand material from the organizations themselves, including interviews with the individuals involved in the creation and development of this technological transformation. In order to avoid the inclusion of a massive amount of descriptive material from primary sources, the most representative cases have been selected, based on a balanced criteria that has enabled me to consider only those countries that were the most involved in the processes being discussed. On a similar note, the tables included also contain some information not discussed in the text.

We address the proposed topic in the following manner: the second section highlights the collaborative bases of these institutions, the third investigates the transition of savings banks to the computer era, the fourth addresses the late adoption of computers in the industry, the fifth deals with the impact of teleprocessing, and the sixth considers the role of electronic fund transfers and new services; finally, in the last section, this article draws some conclusions.

Institutional and cultural bases for collaboration in savings banks

As noted, this approach highlights the role of trade and industry associations in mediating the spread of ideas and techniques. In this regard, collaborative processes are important to understanding the adoption and diffusion of computers in the industry. Savings banks had special conditions in this regard, as non-profit banks that were founded as private and charitable trusts, and their capacity to amass savings and make use of savings accounts by the public converted savings banks into the largest retail intermediaries in the Western world in the 20th century.[12]

The associative framework of savings banks and some mutual institutions revealed characteristics that were very different from those of the industry associations formed by commercial banks groups and related institutions.[13] The competitive pressure experienced by the latter was greater, however mutual and non-profit banks either did not compete with one another (or were exposed to less competitive pressure) or, as in most cases, complied with their territorial boundaries until approximately the end of the 1980s.[14] In Europe these non-profit institutions and some of the mutual institutions participated in an ideology and culture that identified their business as a quasi-public service.[15] As a result, during the interbellum period, the associative and organizational capacities of the savings banks were sufficiently mature for them to strengthen their position in the face of banking regulatory policies; they could compete with other financial intermediaries,[16] and they could further develop their technological, marketing and managerial strategies. This momentum gained force along two courses of action: one involving the development of industry associations, and the other implementing central savings banks that operated as wholesalers of retail finance with clearing functions (see Table 1). A key development in the phenomenon of association among savings banks was the inauguration of the First International Thrift Congress (Milan,

October 1924), which would lead to the birth of the International Savings Bank Institute (ISBI), a body consisting of a significant portion of savings banks worldwide.

Table 1 Savings Banks Associations and Central Savings Banks in Europe

Country	Entity	Headquarters	Established	Status
Austria	Reichsverband Deutscher Sparkassen in Österreich" (Imperial Association of German Savings Banks in Austria)	Vienna	1905	Savings bank association
	Hauptverband der österreichischen Sparkassen (Federal Association of Austrian Savings Banks)	Vienna	1923	Savings bank association
	Girozentrale und Bank der österreichischen Sparkassen AG	Vienna	1938	Central savings banks
Denmark	Fællesbanken	Copenhagen	1919	Central savings banks
	Danmarks Sparekasseforeningen	Copenhagen	1947	Savings bank association
Finland	Suomen Säästopankkiliitto	Helsinki	1823	Savings bank association
	Skopbank	Helsinki	1908	Central savings banks
France	Caisse de Dêpot et Consignations	Paris	1816	Central savings banks
Germany (F.R.)	Deutscher Sparkassen - und Giroverband e.V. (DSGV)	Bonn	1924	Savings bank association
	Landesbanken (12 *Länder Banks)*	Frankfurt et al.	1948	Central savings banks
Italy	Associazione fra le Casse di Risparmio Italiane (ACRI)	Rome	1911	Savings bank association
	Istituto di Credito delle Casse di Risparmio Italiane (ICCRI)	Rome	1921	Central savings banks
Netherlands	Nederlandse Spaarbankbond	Amsterdam	1907	Savings bank association
	Bank der Bondsspaarbanken (BdB Bank)	Amsterdam	1971	Central savings banks
	International Savings Banks Institute (ISBI)	Amsterdam	1924	World savings bank association
Nordic Countries	Nordic Central Savings Bank Association Delegation	Copenhagen Helsinki Oslo Stockholm	1931	Regional central SBs association
Norway	Sparebankforeningen i Norge	Oslo	1914	Savings bank association
	Union Bank (ABC Bank)	Oslo	1919	Central savings banks
Spain	Confederación Española de Cajas de Ahorro (CECA)	Madrid	1928	Savings bank association
	Instituto de Crédito de las Cajas de Ahorro Españolas (ICCA)	Madrid	1933-1971	Central savings banks
Sweden	Svenska Sparbanksföreningen	Stockholm	1900	Savings bank association
	Swedbank	Stockholm	1942	Central savings banks
UK	Trustee Savings Banks Association	London	1887	Savings bank association

Source: ISBI. Automation in Savings Banks. Situation report at the beginning of 1969. Results of an Investigation (Amsterdam: International Savings Banks Institute, 1969 (mimeo). ISBI, International Savings Bank Directory, Amsterdam: International Savings Banks Institute, 1987 and author.

Some authors have noted the fundamental role played by technology committees in implementing information technology processes at the companies in the banking industry.[17] The ISBI structure provided a solid framework for these committees. Under the auspices of their corporate bodies, they established five permanent committees: the Savings Banks Central Banks Committee, the Development Cooperation Committee, the Business Organization and Automation Committee (BOAC), the Marketing and Publicity Committee, and the Education Committee. Supervised by these permanent

committees, different ad hoc working groups built a collaborative structure for ISBI members.[18]

This collaborative mentality was deeply rooted in the savings bank tradition. The words of ISBI President Per Olov Rimvall of Sweden in the early 1970s attest to this fact: "The Chairman stressed that co-operation is vital for savings banks to express their own opinion as distinct from those of commercial banks, so that their own ideas are taken into consideration in international negotiations in the banking field."[19] The savings banks established an open and flexible system of technical collaboration that allowed each entity to opt for certain projects, according to their own interests, and to participate in different committees and groups.

Savings banks transition to the computer era

In Europe, during the interbellum years, the technological transformation in the banking sector was led by the commercial banks. Banks incorporated mechanical calculating machines, book-keeping machines, and other electro-mechanical devices, such as punched-card systems for back office management. They expanded the use of European- and American-style tabular bookkeeping (Astra, Rheinmetal, Borroughs, NCR, Remington, and MADAS).[20] Savings banks adopted these processes sometime later, during the post-war period. This comparative delay allowed some companies to incorporate the next generation of machines, which are now considered to be the first forays into the field of digital computing technologies.[21]

Table 2 presents the case of four European banks, which are representative of the mechanization processes in the savings banks of the post-war years. These banks were located in Italy, Switzerland, France, and Spain, and each had a great historical tradition and a strong impact on their areas of influence.[22] The Board of Directors of CPVA ordered to visit these three banks because of their degree of technological

implementation at a time when the CPVA (known as "la Caixa" in 1975, and as CaixaBank today) proposed a shift in its technological structure, which was just as antiquated as that of other Spanish banks (which relied on traditional mechanical-based technology).[23]

Table 2 An approach to European Savings Banks Business and Technology in 1957

	Caisse d'Épargne de la République et Canton de Genève (Switzerland)	Caisse d'Épargne de Lyon (France)	Cassa de Risparmio delle Provincie Lombarde, CARIPLO (Italy)	Caja de Pensiones para la Vejez y de Ahorros, CPVA (Spain)
Year founded	1816	1822	1823	1904
Headquarters	Geneva	Lyon	Milan	Barcelona
Account holders	122 138	487 188	2 506 198	1 902 276
Annual operations	191 626	700 000	10 710 947	4 544 625
Deposits ($USD)	54 185 715	130 770 086	522 035 334	205 381 633
Branch offices	-	65	241	216
Business diversification	Saving accounts (notice and limited amount) Securities safekeeping Mortgage loans Loans for commercials banks	Saving accounts Check transfers Giro post Coupons (securities)	Saving accounts Time deposits Professional accounts Loans, Discount, Mortgage loans	Sight and time deposits Pension funds Personal loans Mortgage loans Securities services Pawnbroker
Technology	Punched-card systems and vacuum tubes (CPC)* IBM 604 (from 1957)	Punched-card systems BULL (from 1951)	Punched-card systems and vacuum tubes (CPC)* IBM 604 (from 1948), and IBM 650 - 1st generation computers (from 1959)	Mechanical-based devices

Sources: AHC, Report to the Board of Directors on the visit to Europe by the commissioners of the Board on January 7, 1959. Ruiz Kaiser Interview and author.

* CPC: Card-Programmer Calculator

The Cassa de Risparmio delle Provincie Lombarde (CARIPLO), one of the largest savings banks in the world, is a good illustration of the dynamics of technological options for larger companies prior to the computer era (see Table 2). In 1948, CARIPLO installed an IBM 604 (electronic calculating punch) machine in its home office in Milan. The IBM 604 was the height of tabulating technology, which was introduced shortly before the appearance of the early commercial computers.[24] The choice of any specific model was a matter of trial and error. Indeed, one decade after the arrival of the IBM 604, the accounting branch of the bank was highly dysfunctional. It had created bottle-necks in its administrative and accounting processes that derived from only partially implementing the electronic system (i.e., the data entry processes

were not mechanized). Moreover, the core services lacked the organizational capacity necessary to centrally manage branch office operations. In 1959, this situation reached critical mass and the bank chose to install new equipment, with the understanding that this option would allow it to take the step forward and overcome this critical situation. Note that this implementation occurred with the first generation of computers, the IBM 650 (card-and-drum-based computer), which were perfectly adapted to the pre-existing facilities and favored an overhaul of the administrative and accounting operations of the company itself. [25]

However, other banks, such as the smaller Caisse d'Épargne de la République et Canton de Genève in Switzerland, were more cautious. It was not until 1958, a decade after the CARIPLO, and once this model had already been proven on different market levels, that this particular entity also opted for the IBM 604. In this case, it created a completely integrated and mechanized system. The IBM electronic calculating punch was installed along with two National 2000 (NCR) models using five-channel teletype, which allowed data entry for every operation via an alphanumeric keyboard.[26] This system eliminated the manual perforation that continued to be used in other banks, thus enabling the bank to have the end-of-year balances ready in five days' time, with the help of only five employees (the previous Burroughs system had demanded a workload of 45 days for 25 employees).

In France, the Caisse d'Épargne de Lyon had begun mechanization in 1951, utilizing the French-made system produced by the Compagnie des Machines Bull (punched-cards). This bank was much smaller than either the CARIPLO or the CPVA, and its business model was as basic as that of the rest of the French savings banks (Table 2).[27] According to its director, Léon Rigot-Muller (1945-1973), in 1957, "The punched-card system […] solves the serious problem of the volume of operations, specifically the

problem of small-amount impositions."[28] In addition, there were few doubts when it came time to select the equipment. End-users suggested that there were no large differences between the performance of the IBM machine and the Bull machine. For example, the opinion of the director of the savings bank in Geneva, Mr. Rangemont, was that, given the similar options, the Board of Directors opted for the IBM machine because it "offered quicker guarantees for cleaning service, repairs, and obtaining replacement parts."[29]

This timeline repeats itself for the rest of Europe. German savings banks, which had been early technology users before the war, resumed their progress along the same path after the war − despite the terrible consequences of the conflict. In 1948, the District Savings Bank Kreissparkasse Saarbrücken (DSB) incorporated punched-cards into its bookkeeping equipment supplied by Dehomag (a German subsidiary of IBM). Its local competitor, Stadtsparkasse Saarbrücken (CSB), did not do so until 1955, and other banks waited even longer. Some years later, in 1957, the DSB was already combining punched-card machines and first generation computers. As noted by Paul Thomes, German banks benefited from their staffs' know-how, and some of these banks became leaders in change processes, but others maintained a traditional reliance on mechanical-based machines.[30] Throughout the 1950s, some Swedish banks, such as the banks in Stockholm and the bank in Gothenburg, implemented the mechanization process; the rest did so towards the end of that decade.[31] The bank in The Hague (Netherlands), for example, installed electronic accounting in 1957.[32]

In observing the delay between savings banks and commercial banks, the documented cases seem to confirm how, after the war, there was a two-part trend in the modernization patterns of the savings bank industry: first, a traditional mode that supported the mechanical-based systems (such as what occurred in the Spanish CPVA

and some German savings banks) until the end of the 1950s; and second, an innovative mode that incorporated punched card-based bookkeeping and even some machines that served as a bridge to the first generation of computers, the latter being introduced at the end of the decade (the CARIPLO and some German and Nordic banks). With regard to the factors that motivated these changes, the cases presented suggest that they occurred regardless of the size of the banks, the increased volume of small-amount impositions and the diversity of their operations, since mechanization was introduced, with greater or lesser speed, indistinctly in the different institutions. However, as reflected in the literature, during the post-war period, a series of common factors occurred that provided incentives for the mechanization of the savings banks and the use of punched-card based systems. These factors were, on the one hand, the result of rapid growth of the business and, on the other hand, the existence of a very tight labor market (labor shortages).[33]

The results obtained also suggest that the larger savings banks (in terms of savings volume and the number of branches) at the end of the 1950s obtained access to the first digital computers. As a result, in spite of having adopted tabulating devices late in the game, they enthusiastically accepted the arrival of the computer era. Likewise, it also seems that this was not the general rule; most of the savings banks adopted them in the 1960s, once second-generation computers appeared on the market, as we will see later. In general terms, the introduction of electromechanical systems, and later, the latest advances in tabulating device technology and the early commercial computers, shows a gradual trend according to which the savings banks adopted new systems that were adapted to and integrated with previous practices and processes. Consequently, the available data suggest that the savings banks industry followed an incremental technological migration path, as indicated by Yates for the insurance industry.[34]

Late Adoption of Computers: Owning Computers versus Shared Data Centers

Generally speaking, the savings banks were late adopters of computers, as compared to the rates with which these devices were incorporated into commercial banks and other financial industries, such as the insurance sector. Nonetheless, as we have seen, some savings banks were adopters of the first generation of computers, especially certain Italian, German and Swedish institutions. The meetings of the ISBI's Study Group on Automation in the early 1960s reflected intense interest among the European savings banks to find out about the advantages of the new computers, and especially, how to implement the migration to the new computers from previous practices, based on the use of electromechanical devices. During this era, some European savings banks started to incorporate second generation computers, a trend that was firmly established by the middle part of the decade.[35] Among their advantages were faster processing speeds and a magnetic-core memory that could store information and program instructions written ad hoc. They fully incorporated third generation computer languages (such as Formula Translator (FORTRAN) and Common Business-Oriented Language (COBOL), among others).[36] This boosted their use by savings banks, who began to use them to manage customer account files (initially, saving accounts).

Tables 3 and 5 show the situation and the impact that computers had on savings banks in Europe and the US. They refer to a dynamic moment at the end of the 1960s: most computers were second generation machines, while approximately 20% were third generation (see Table 5).[37] The introduction of computer resources in the European savings banks industry occurred in two different ways: on the one hand were banks that developed their own infrastructures, with their own computers (Table 3), and on the other hand, banks that shared resources through Savings Bank Data Center Companies (Table 4). Through one method or the other, by the end of the decade, nearly 40% of

European savings banks had computer systems. These large-scale computers needed to be located within appropriate infrastructures: the so-called data centers.[38] The first banking data centers in Europe opened thanks to second-generation computers. These movements were led by the large banks, which implemented their own computing resources. In 1961, Barclays activated the first financial data processing center in Great Britain, installing an IBM 1401 computer.[39] Shortly thereafter, a few German savings banks launched their first shared data center, and in 1962, the CPVA opened its first computer center in Barcelona, which housed an IBM 1410.[40]

Table 3 European and US Savings Banks with their own Computer Systems (listed in order of the percentage of total savings banks) at the beginning of 1969

	Total number of entities in each country	Entities with own computer systems	% of all savings banks	% of all savings banks deposit accounts	% of all savings banks transactions	Online systems (teleprocessing) - batch processing		
						Number of savings banks	Number of offices	Number of accounts
Italy	89	48	53.9	89.4	NA	5	677	5 267 607
Spain	86	30	34.8	29.0	NA	8	50	1 557 056
Germany	861	210	24.4	NA	NA	3	158	1 807 300
United States	493	115	23.3	NA	NA	31	NA	NA
Austria	170	4	2.3	48.5	42.0	3	124	2 209 461
Netherlands	201	4	2.0	35.0	30.0	1	45	536 000
UK	77	1	1.3	6.2	7.9	1	26	481 000
Sweden	325	2	0.6	3.0	3.0	1	12	120 000
Denmark	384	2	0.5	22.5	32.5	1	87	600 000
Finland	346	1	0.3	3.0	2.2	1	40	181 500
Norway	518	0	-	-	-	0	-	-

Source: International Savings Banks Institute. Automation in Savings Banks. Situation report at the beginning of 1969. Results of an Investigation. ISBI, Amsterdam, 1969 (mimeo). Ibid., Appendix Report of Spain, and author.

Note: including the imminent implementation of new computers in 1969.

Table 3 shows, beginning in 1969, the countries that had the largest concentration of savings banks with their own computer systems were Italy, Spain, Germany, and the United States (between 23.3% and 53.9% of the institutions). In the case of Italy, for example, the level of computerization reached 89.4% of the deposit accounts. Other countries show a lower number of institutions with their own computer resources, however, the percentage of accounts managed by computers is high. This is the case of Austria (48.5%), the Netherlands (35%) and Denmark (22.5%); in all three cases, the

savings banks with their own computer resources are large institutions, which concentrate the largest number of customers. In other words, from a total of 3,550 institutions in Europe and the USA, 417 had their own computer resources (11.7%, or 9.9% if only Europe is considered). The computerization process soon accelerated; by 1971, 70% of Italian and Spanish savings banks and 75% of American savings banks already had their own computer resources at their disposal.[41]

In 1969, the rest of the countries studied had a lower percentage of banks with their own computer resources. However, this does not imply that these banks were averse to the adoption of new technologies, but rather their computer services were being provided to a larger extent by savings bank data center companies, most of which operated on a regional level. In fact, of all the savings banks with computing resources in Europe, 73% accessed them through shared computer centers (see Table 4). Danish savings banks particularly stand out, in which 52.5% of their transactions and 45.4% of their accounts were managed through computer centers. Something very similar occurred in the Netherlands and Germany, however the most developed case is that of Swedish savings banks, in which 87% of their savings accounts are managed using this method.

Worthy of special attention are the German and Austrian cases, in light of the difficulties they had to assume the costs of adopting computers in the case of small local savings banks, which are abundant in both countries. In Germany, the support provided by the Institut für Automation proved essential, along with the support of the German savings bank industrial association, which spearheaded the setting up and development of different regional data centers. In 1974, 11 data centers had been established, with which 81.4% of German savings banks were affiliated (all small in size). In Austria, the problem was similar, and the creation of SPARDAT (Austrian Savings Banks Computer

Center) in 1968 was a collective solution that was able to be implemented, thanks to the support of the large savings banks, which had acquired great experience in the use of computer resources.[42]

Consequently, European savings banks showed a preference for adopting computer resources through shared computer centers, with the interested savings banks themselves participating in their financing and support (see Table 4). However, other countries failed to resort to this system (for example, Spain, whose savings banks developed their own data centers), while most European countries adopted a combined system in which large institutions with their own computer resources existed alongside small banks that contracted computer services through savings bank data center companies. As the Austrian SPARDAT representative argued: "It was realized that institutes too small to justify the use of their own electronic data processing department had the same need for information as the large-scale institutions".[43] In short, the shared computer centers ended up being the most efficient option in terms of investment and results for the smaller savings banks, which saw them as an answer to their demand for installations with batch-processing mechanization. An intermediate option was to rely on a manufacturer's service bureau or a non-savings bank institution. Their function was similar to that of the others, but their services were less in-demand from savings banks.[44]

Table 4 Data Center Companies Serving European Savings Banks in 1969

	Company	Legal entity	Data centers	Participating savings banks				Financing
				Number	%	% Deposit accounts	% Transactions	
Austria	Sparkassen-Datendienst (SPARDAT), Gesellschaft m.b.H.	Limited Co.	Linz (Graz and Innsbruck were operative in 1970)	NA	NA	NA	NA	Capital shares - Central Bank Association
Denmark	Sparekassernes Data centraler	Cooperative Society	Copenhagen, Aarhus, Odense	112	29.2	45.4	52.5	Loans from the participating banks
Finland	Department of Säästöpankkien Keskus-Osake-Pankki	Savings Banks Central Bank	Helsinki	38	11.0	17.1	23.6	Savings Banks Central Bank
Germany (F.R.)	Buchungszentrale der Westf.- Lippischen Sparkassen GmbH	Limited Co.	Münster (Wesfalia)	360	41.8	NA	NA	Capital shares
	Data centers (59)	Cooperative, Ltd Co. and S.B. Central Bank	Different cities					Differed according to each legal entity
UK	MANCAP, West Midland, Scotland, SPOT, Eight Bank Group (Data centers in their initial stages)	No formal*	Manchester, Shrewsbury, Glasgow, Rawley (Sussex) and Southport	20**	27.3	25.2	28.3	MADCAP and WEST MIDLANDS: treasury loans. Scotland: contributions from participating TSB
Spain	CECA Computer Center	Savings Banks Central Bank	Madrid	1	-	-	-	Savings banks and industry association
Netherlands	Coöp. Administratie Centrale voor Spaarbanken (CAS)	Cooperative	Amsterdam	55	26.5	40.0	50.0	Loans from the participating banks
Norway	Fellesdata A/S	Joint stock Co.	Oslo	33	6.4	-	25.0	200 shareholders and the Central Bank
Sweden	Sparbankernas Datacentrales AB (SPADAB)	Joint stock Co.	Stockholm, Göteborg, Malmö and Linköping	140	43.0	87.0	-	Small share capital and loans from participating banks

Source: International Savings Banks Institute. Automation in Savings Banks. Situation report at the beginning of 1969. Research results. ISBI, Amsterdam, 1969 (mimeo), and author.

* The largest bank in the group acts as contractor, and the other banks have agreements with the main bank.

** Excluding the Eight Bank Group.

Table 5 shows the consolidated introduction of second generation computers in savings banks in the 1960s. It also reflects that a rapid transition to third generation machines occurred. The ISBI survey presented a total of 344 central computers belonging to savings banks in nine European countries, of which approximately 20% were third generation machines. The survey reflects the moment when the transition to the third generation of computers, the IBM System 360, and the development of actual operating systems (the OS 360) occurred. The new architecture offered tremendous advantages with its commercial applications. Of particular interest for the banking industry were the multitasking function and the installation of remote terminals that could access the central computer, providing direct-access storage and inquiry capacities — a crucial step towards managing the savings bank branch network, as we will see in the next section. These advances favored the development of software and made collaboration between vendors and bank users more flexible in terms of the implementation of new applications.[45]

This stage appears much more closely linked to IBM than the previous one, in which the variety of brands was more noticeable (including the North American brands Burroughs, General Electric, HONEYWELL, NCR and UNIVAC, and the European brands BULL and Siemens, Table 5). Around 1968, an important percentage of savings banks opted for different models of IBM's 360 series, and to a lesser extent, for equivalent models from other brands, such as Burroughs, Olivetti-General Electric and models from NCR's Century series. There was little doubt about the leadership of the North American brand in the European savings bank third generation computer market.

Table 5 Computer Equipment in European Savings Banks in 1969 (own computer systems)

Country	No. of pieces of equipment	Central computers, memory (K)* - storage system	Online terminals and modems
Austria	2	BULL-GE Gamma 30, 20 K - magnetic tape system	IBM 1062 (26)
	1	BULL-GE 415, 16 K - tape drives	IBM 2260 (180)

	1	BULL Gamma 10, 4 K - card system	Olivetti TC 349 (260)
	3	**IBM 360-40**, 128 K (2) - disk system; **IBM 360-50**, 256 K - direct access storage	Modems: ARE
	1	UNIVAC 9300, 16 K - magnetic tape system	
Denmark	2	BULL-GE Gamma 30, 20 K - magnetic card/tape system	IBM 1062 (40)
	1	**IBM 360-40**, 256 K - magnetic disk/tape system	Modems: IBM 3976
Finland	1	UNIVAC 9300, 16 K - magnetic disk storage 8410; tape and card units	BURROUGHS TC 700 (43)
	1	**BURROUGHS B 3500**, 60 K - disk and tape drives	Modems: NOKIA OY
Germany (Federal Republic)	39	BULL-GE Gamma 30, 2K-32K/word - card (21), tape (18)	IBM 2260 (6)
	14	HONEYWELL, 8-128 K - tape (13), disk (1)	IBM 1062 (24)
	133	IBM, 2K-256K - card (46), tape (21), disk (29), disk/tape (37)	
	6	**IBM 360-40** (4) - **IBM 360-30** (1) - IBM 360-20 (1), 128-64 K; disk and tape drive	
	7	SIEMENS, 16K-256K - tape (3), disc (4), tape/disk (1)	
	12	UNIVAC, 1K, 32K/word - card (5), tape (7)	
	4	NCR, 10K-20K/Slabs - CRAM units (disk) and tape drives	
Italy	1	IBM 7070, 10 K - (rented)	IBM 1030 (4)
	18	IBM 1401 (16), 4K - IBM 1440 (2), 8K (rented)	IBM1050 (3)
	7	IBM 360-20, 8-16K	IBM 1052 (19)
	23	**IBM 360-30** (12), 64K - **IBM 360-40** (9), 64K (rented) - **IBM 360-50** (2), disk/tape drivers	
	6	OLIVETTI-General Electric : ELEA 4001 (4), 12K - ELEA 6001 (2), 10K (rented)	
	12	**OLIVETTI-GE 115** (11), 8K (one purchased)- **OLIVETTI-GE 415** (1), 16K	
	2	UNIVAC (Remington) 1004, 4K (rented)	
Netherlands	2	BULL GAMMA 30, 10-20 K - magnetic tape system	SIEMENS 8220 (60)
	1	BURROUGHS B 200, 9600 characters (rented)	
	2	NCR 315-45, 40K - CRAM 5 units	
Spain	5	BULL GAMMA 30, 20 K (1) - Mod. 55, 5 K (1) - Mod. 115, 8 K (1) - Mod. 425, 130 K (2), magnetic tape system	IBM 1060 (145)
	1	IBM 1620	NCR 42 (20)
	2	IBM 1410, 40 K (1) - IBM 1440, 8 K (1)	Olivetti TC 101 (42)
	4	IBM 360 20, 8-16 K	Modems: ITT, IBM 3976,
	7	**IBM 360 30**, 16-64 K - disk/tape drivers	NCR, Thomson, and
	5	**IBM 360 40**, 64-128 K - disk/tape drivers	Standard Electric
	12	NCR 390, 2400 characters (1) - NCR 315, 15-60 K (6) - NCR 500, 400 cells (5)	
	2	**NCR Century 200**, 32 K	
Sweden	1	BURROUGHS B 200, 9.6K (purchased)	
	1	NCR 315-45, 15K - CRAM units, tapes drives and card units (purchased)	
United Kingdom	1	BURROUGHS B 502, 19 200 characters - disk and tape drives	BURROUGHS TC 700 (32)
	1	HONEYWELL 200-201/2/6, 24K - 6 tape drives, 1 card unit	Modems: General Post Office 1, mod.5

Sources: International Savings Banks Institute, Automation in Savings Banks. Situation report at the beginning of 1969. Research results. ISBI, Amsterdam, 1969 (mimeo). Ibid. Appendix Report of Spain. ISBI, State and Prospects of Automation, Amsterdam, 1969.

Notes: The equipment with the capacity to support teleprocessing systems (third generation machines) is shown in bold type.

Including the imminent implementation of new computers in 1969. Number of units in brackets.

* 1 K (kilobyte) is equal to 1000 bytes and represents 1024 memory positions.

A New Milestone: Teleprocessing

European savings banks offer us new ideas about a controversial topic, namely the introduction and adoption of online business systems. The analysis of these topics, like many others concerning technological innovations in the computer era, have often been influenced by trends of opinion that project a certain vision of the future.[46] As a result, a brief overview of the literature regarding online and real-time computing may contribute to contextualizing the contribution presented here.

In the 1960s, a trend of opinion was generated that mistakenly speculated with hypothetical horizons that opened the door to corporate real-time computing (e.g. the Air Force Logistic Command in the USA and totally integrated managerial information systems).[47] In the banking sector, a well-known example is the failure of Barclays in the same decade.[48] Some authors suggest that the interest in real-time computing in banking originated with the cash dispensers and ATMs and as a result of the previous experiences with batch-oriented accounting methods that anticipated real-time accounting in the 1970s.[49] In a general sense, a commonly accepted vision in the literature on the computerization of retail finance presents this problem as a step-by-step process in which several phases occurred, characterized by batch processing in the 1960s and a progressive adoption of online and online real-time processing in the 1970s and 1980s.[50]

The insurance industry in the USA offers us a solid point of departure. These companies established connections that joined their home offices with the agencies, in order to coordinate the national billing processes in the late 1960s. Technically, they combined a central computer with telecommunications equipment to allow remote access, but not yet providing full-time sharing.[51] In the area of online accounting systems, the savings banks also obtained very good results, even a little ahead of the

commercial banks. Therefore, the study of some significant cases could illustrate the gradual introduction, adoption and use of this combination of computers and telecommunication in the savings banks. From the early stages of banking information transfers until the end of the 1980s, experts most often referred to this technology as "teleprocessing." We will consider three examples: on the one hand, the teleprocessing network used by "la Caixa", the leader in the Spanish savings bank system; on the other hand, the Nordic Terminal Project (Datasaab), which gives us a very insightful view of the teleprocessing initiatives in the Nordic countries, and finally, the case of computer centers in the UK and Germany.

Prior to this, as a general overview, the survey reflected in Table 3 and 5 shows the impact of online terminal-based systems and services in the savings banks industry.[52] In 1968, 31 European and 50 North American savings banks were in the midst of adopting teleprocessing, a system that in Europe affected a total of 606 bank offices and 7.94 million customer accounts (Table 3). Along these same lines, the ISBI survey underscores the impact of the new online teller terminals (Table 5). These were still first generation machines, referred to as “dumb terminals”, since they had no processing or data storage capacities.[53] Although only a partial sample, it includes a total of 904 teller terminals that were installed in savings bank offices, accompanied by an impressive collection of modems (analog-to-digital signal decoders and vice versa) needed to connect the terminals to the central computers.

The technological base of "la Caixa" in the 1950s was reduced to the use of electromechanical accounting machines. Following the introduction of the first computer in 1962, the computer center in Barcelona processed on a daily basis the punched-cards that were the result of the mechanization of the daily savings transactions of the 250 branch offices in Catalonia and the Balearic Islands.[54] The automation of

files from the securities accounts, loans and the institution's staff payroll were gradually incorporated.[55] The practice during this first stage involved what Thomas Haigh defined as a "file management system," which more closely resembled office automation than the integration and management of the corporate data as a whole.[56] In short, file management was based on ad hoc programming that required a good sync between the corporate computing services and the vendor (in this case, the IBM laboratory in Barcelona).[57]

Teleprocessing took its first steps forward in late 1965, with the installation of the IBM 360-30. The new hardware was accompanied by the first generation IBM 1062 teller terminals that were installed in the home office. Based on the experiences previously acquired with the off-line processes, in January 1967, the new system began to process front office operations. The teller terminals were connected online to the central computer and had access to a disk with the file containing the account balances for the savings and current accounts of the home office customers (all 270,000 of them). Logically, the back office operations were carried out via batch processing solutions, a field in which the former IBM 1410 continued to provide services. The online system expanded very quickly, incorporating first the urban offices in Barcelona, using dedicated point-to-point lines, and progressively, the rest of the offices belonging to the institution. By 1978, all 547 offices had teleprocessing capacity, with an average of 1.85 teller terminals per office.[58]

This expansion was made possible thanks to the incorporation of the new IBM 370, with a more evolved architecture, and the IBM 2970 teller terminals with an alphanumeric keyboard, which could be connected to regular toll lines, which were much cheaper than the private leased lines that were previously used.[59] The incorporation of new mainframes continued to gradually occur through the incremental

migration path. In the field of teleprocessing software, ad hoc programming continued to be the norm, especially in relation to the management of data transmission lines (LCP), an area that was still experimental, in which vendors were very interested in collaborating with "la Caixa".[60] In general, banking operation support continued to be based on an electronic data file structure. Thus in the 1970s, in spite of the expansion of teleprocessing, the base of the file management system remained unchanged, although more complex transaction processing systems were gradually being developed.[61]

One unique element in the Spanish setting was the functioning of a data transmission network after 1972, operated by the public telephone company (the High Level Secondary Network, known as RSAN in its Spanish acronym). This network permitted many Spanish financial institutions, among them "la Caixa", to access what was one of the first public packet switching networks in Europe.[62] These infrastructures gave a strong impetus to the online banking giro/message-switching networks in Spain and also enabled "la Caixa" to begin a new era in teleprocessing, adopting high-speed lines that improved its performance.[63]

The years around the turn of the decade were when strong technological momentum was really observed in teleprocessing, as the result of the pressure stemming from the intense organizational change within the institution and its business expansion. It is at this time that quicker progress is made towards teleprocessing systems that were much more integrated, in which certain critical aspects of operations were progressively processed in real time. Applications were being implemented that were aimed at new financial instruments, intermediation products to capture funds and applications that were intended to provide support for ATM operations.[64]

This was accompanied by more powerful hardware, especially in the case of the IBM 3090 with which IBM began a new cycle from the 360 and 370 series,[65] and teller

terminals with greater management capacity, the so-called intelligent terminals, with characteristics similar to those of a minicomputer. Between 1979 and 1983, the adaptation of DOS applications was completed to the multiple virtual storage system (MVS), the new operating system that offers multitasking capacities when running programs.[66] Likewise, the new teleprocessing management systems and IBM's proprietary databases (IMS FastPath for the MVS operating system) were also adopted in a comprehensive manner. Consequently, in the second half of the 1980s a system became standard in which data were manipulated via a DBMS interface rather than by directly manipulating the files themselves.[67] This decision must be contextualized in the environment of the reciprocal influences that had habitually been established between vendors and users, and keeping in mind that "la Caixa" was a strategic client for IBM in Barcelona, due to the carry-over effects it had on other financial clients of the American multinational company in Spain.[68]

The Nordic financial terminal project, Datasaab (Saab-Facit), is another excellent example that illustrates the synergies that were generated surrounding the adoption of computers and teleprocessing in the savings bank industry in Europe.[69] The Datasaab teller terminal (which came out in the market in 1972), was one of the first common projects by Nordisk Spardata (Nordic Savings Data, NS), the Nordic savings banks' joint company for new technological projects founded in 1969. The managers of the Swedish and Danish savings banks were familiar with the North American experiences with teleprocessing, although their challenges were different, since the Nordic office networks were more numerous and disperse than the branch networks in the USA. The need to develop online systems and the related high cost of their development, which depended on the available equipment (especially teller terminals), were considered obstacles to isolated national solutions in both Sweden and Denmark.[70] The Project was

well-implemented by the Swedish manufacturers Saab-Scania and Facit between 1972 and 1975. As a result, approximately 15,000 terminals were installed in the Nordic countries and in Spain, USA, France, Great Britain, Austria, Belgium and Holland, both in savings banks and in other banking institutions.[71]

There is little doubt that the Nordic teller terminal generated value for customers and savings banks alike: the new systems provided a central information file from which the savings banks could acquire a picture of the customer's relations with the bank; the online system facilitated savings bank activities, such as updating entries; the data processing centers would be able to process transactions more quickly; a customer's account could be automatically adjusted via the central system, and the answer would be then displayed in a few seconds; and the installation of the new equipment created the necessary infrastructure to develop and apply the new products which were installed in the payment systems.[72] In short, this case shows the impact that some of the initiatives by the savings banks had, which went beyond the savings banks industry itself.

Throughout the 1970s, in most of the computer centers belonging to European savings banks, online processes took on greater importance. As an example, we will consider the case of the British and German savings banks. In the UK, in the early 1970s, the Trustee Savings Bank (TSB) was involved in implementing two solutions, one based on batch processing systems, while other TSBs opted to install online teller terminals in their branches, connected to the computer center. Altogether, this amounted to 7 regional centers that managed 9.96 million accounts (of which 6.6 million had online access, covering around 750 branches).[73] In Germany in 1974, 22.3% of the savings banks belonging to one of the 11 existing data centers had online teller terminals connected to the computer center.[74] Years later, in 1982, the online coverage,

with real-time access to certain operations, already amounted to 91.9%, through 18,100 online teller terminals.[75]

The case of the Nordic countries, "la Caixa" and the German and British computer centers illustrate the role that the adoption of online computing played in the European savings banks industry as a basis for developing online business systems. The Nordic savings banks exemplify the intense collaboration that occurred between national industry associations and the savings banks themselves, a pattern that extended throughout Western Europe and is a sign of the synergies created by the introduction of computer technologies on the entire continent. Similarly to the case of "la Caixa," it gives us an idea about the establishment of an incremental migratory path in relation to teleprocessing, from off-line to online procedures; it also provides valuable information about the active participation by the savings bank industry in the adoption of computers and software for commercial use. In short, it allows us to see the reciprocal influence between users and vendors referred to in the literature.

In brief, the concept and application of the online processes in the savings banks industry stemmed early on from the need to automate and centralize the information exchange processes between the branch and the main office balance sheets. The objective was to obtain centralized “daily” data on transactions in every customer account.[76] Savings banks led this movement, because they had a greater need for online processing of passbook savings account transactions that tellers performed at their windows in their office networks.[77]

A Networked World: Electronic Funds Transfers and the New Retail Services

The banks had used computer technologies to greatly reduce paper-based transactions, however, at the dawn of the 1970s, a new practical horizon had already opened up for

the use of computers with regard to electronic funds transfer (EFT) systems. The savings banks did not remain on the sidelines of this trend; as indicated in the literature, the use of computers beyond back office batch processing offered financial institutions new ways to participate in the area of cash dispensers, ATMs and EFTs at the point of sale (EFTPOS), as well as in a wide range of financial services that they would gradually consolidate.[78] According to David L. Stearns, initiatives such as VISA changed the ways in which banks and consumers related to one another. A payment instrument like credit cards, which initially consisted of a simple credit vehicle of a local nature, was transformed into an instrument that provided access to a "global electronic value exchange network".[79] The bank card companies integrated multiple competitors that, through them, could offer services that they were not individually in any condition to offer, due to their high cost of implementation.

In fact, there was sufficient evidence in the 1970s and 1980s, especially in the US, Europe and Japan, to confirm the role the savings banks were playing in the area of EFT and new retail services (Table 6).[80] Consequently, their analysis in terms of the industry offers new perspectives on the use and application of computers in the banking business. Many of the Central Savings Banks and Savings Banks Data Center Companies were interested in developments in Savings Bank Clearinghouse Systems (see Table 6). They were created as message exchange networks to provide services for exchange processes among the different affiliated institutions. They were normally centralized and were under the technical control of the central savings banks or the industry association itself. Simultaneously to the establishment of these clearing structures, the industry also saw, first, the expansion of networks supporting cash dispensers, and second, EFTPOS.

The first banks in Europe to experience these related events were the Nordic savings banks, and the resulting collaborative experience of NS throughout the Scandinavian countries encouraged new projects.[81] Another case of an expanding bank-owned network was the Spanish *Tarjeta 6000*, supported by the savings bank industry association (CECA) and the savings bank giro/message-switching network (SICA), which, in 1978, had distributed 230,000 cards and had 110,000 businesses registered on the system.[82] However, a short time later, the savings bank network reached strategic agreements with the other Spanish credit card networks: 4B and Servired (headed by different banking groups). Finally, the German savings banks had online systems that provided support for a growing ATM network in Munich, Stuttgart and Hamburg. In the early 1980s, the German savings bank association created a nation-wide savings bank-time-sharing system, following the model in the Rhineland region.[83] Throughout the decade, the cash dispenser pool gradually built up an interbank network on a national level.[84] During the same period of time in the rest of Europe, countries such as Belgium, France, Italy and the UK had similar developments (see Table 6).

In short, the overview presented shows that by around 1987, the savings banks were fully immersed in maintaining their position in a world dominated by several major payment systems groups. These groups had forged strategic alliances with the major financial institutions in most developed countries.[85] EFT services were unquestionably becoming a real competitive weapon used among the different banking competitors (commercial bank groups, savings banks, postal giro and mutual banks). A representative example of this is the British Barclaycard, which in 1969 could be used as a credit card and a check guarantee card;[86] gradually more services were added, including a cash dispenser card in 1976.[87] Meanwhile, the German Post Office provided support in the mid-1980s to a Videotex network, Bildschirmtex, which was subscribed

to by the savings banks (see also Table 6, "Initiatives by other financial institutions").[88] This forced the savings banks to review their positions and analyze their perspectives, expanding their collaborative strategies beyond their own industry. This change in position occurred especially intensely in those areas in which there was a high cost associated with implementing EFT, such as in the case of credit cards, ATM and EFTPOS networks.

In the mid-1980s, retail banking was characterized by a strong trend towards service banking. In both the USA and Europe, pressure from non-banks was shrinking the competitive market for payment systems and other services targeting banking customers. The landscape for IT had changed, and the banking strategy was evolving, consequently the new competitive framework generated a fierce dispute over consumer services between the financial and non-financial intermediaries. Hence, the result was two sides of the same coin: collaboration to reduce network costs and strong competition in the area of direct services to consumers.

The most advanced developments in banking services occurred in USA and Europe. Many savings banks considered various ideas related to Videotex and Home Banking. These institutions considered multiple solutions, including telephone services (i.e., telephone bill pay in the USA), television use (USA, West Germany, Prestel in the U.K.), computer use (USA and Belgium), and Minitel (France and USA), all of which had their pros and cons. The information networks operated as public utilities and opened up a new market sector, supported by economies of scale in mass markets.[89] As a result, and with regard to these developments, in the decade prior to the advent of the Internet, savings banks pondered their role within the retail banking industry.

Table 6 Payment and Clearing System Services in Savings Banks and other Financial Institutions in Europe, circa 1980-1985

Country	Savings bank clearing-house systems	Savings bank networks	New projects	Other financial institutions initiatives
Austria	SPARDAT System (batch and online processes)	Cash Dispenser Pool (big banks and savings banks)		
Belgium	CEC-UCV Centre for Exchange and Clearing (entire banking system, including Postal Giro System and Central Bank) from 1974	Joint Cash Dispenser Network (with big commercial banks)	POS as a result of cash dispenser developments (Payment Terminal Outdoor). BANCONTACT ATM network (branches, gas stations, supermarkets)	Investment Trust (banks and savings banks). Compatibility between BANCONTAC and MISTER CASH networks. New frontiers of collaboration/competition
Denmark	PI - net: clearing network (banks and savings banks) from 1987 batch solutions	DANKORT (banks and SB card: ATM and POS) Joint Company PKK. VIDEOTEX (1986)	Printer telephone terminal project and Audio response project (business and private customers). PCs at branches	Paperless Bonds Danish Stockmarket (Vaerdipapircentralen)
Germany (F.R.)	Savings Banks Time-Sharing System (STS) and EZU, via Girocentralen - from 1978	Cash Dispenser Pool. Computer-based services using BTX network	Eurocheque cards. PCs at branches	Bildschirmtext, BTX (Videotext) - Deutsche Bundespot (German Postal Service)
Finland	Public Data Process Network. From 1986 Skopbank (a new clearing network)	3 networks: Skopbank, two savings banks, and cooperative banks	OLRT services to business clients (Skopbank system) and introduction of IBM software (IMS Fastpath). CAT: new ATM made in Finland	
France	Système Interbancaire de Telecompensation, SIT (big banks) from 1986	Cheque guarantee card. French Post Office: TELETEL (MINITEL terminal: home banking and telepayment). Carte Bancaire: access to national card system (ATM and POS)		Carte Bleue VISA (CB) and Chip-Card developments. New platform (national card payments): STERIA-THOMSON (end 1980s)
Italy	SIBI (IPACRI) and SIA (Italian Banks' Automation Co.)	CARISMAT (ATM network) and BANCOMAT (joint network)	First design of POS and Home Banking (IPACRI support). Multi services: LINEA APERTA System (IPACRI) from 1987	VIDEOTEX (the Italian public system of videotext). BANCOMAT (ATM national network). National Bank-Card
Netherlands	Spaarbanken Real Time Interactief Systeem (SPRINT) - Woerden Computer Centre (CB)	Savings banks were connected to Automated network of TELEGIRO'S (from 1985)	Shared network of savings bank computers: S-network	Discussion about fees in shared networks of ATM and EFTPOS (between savings banks and other banks). Philips POS terminal

Norway		BANKKORT (cards, with banks). MiniBank System (cash dispenser, POS terminals in gas stations)		
Spain	SICA (from 1976)	Red 6000 (cards and ATM). Motorway POS Network (ACESA). ATM with passbook facilities	Gyro System and national clearing (all banking institutions): magnetic tapes and SICA. Expansion of POS	4B Network and Servired (ATM and EFTPOS, banking groups)
Sweden	Savings Banks Giro	MINIBANK (from 1978). Savings Banks Consortium (Central capital markets). The Nordisk Spardata Cash Dispenser Project (Nordic countries)	New generation teller terminals: Ericsson System 2100. OLRT: TOBA RT. New Savings Bank System for Payment (SUS), 1986	Backup Centralen AB (commercial banks). Society's Integrated Payment Systems Online (SIBOL)
UK	TSB Group Project: to connect data processing centers	Agreement with Barclays and Bank of Scotland (use of ATM), and Clearing banks (check guarantee card facility from outside of UK and future POS service). TRUSTCARD (VISA)	Viewdata: Prestel System (30 branch offices)	POS System: UK banks and card companies. LINK (the UK ATM network) from 1986

Sources: Author's own work based on data from the ISBI Archive, Minutes of Working Groups and Meetings of BOAC, 1970-1990.

An example of a significant case is the Italian IPACRI, which offered banks a franchise arrangement that gave them technological access to a multi-service online real-time system beginning in 1987. The so-called *Conto Reale* (real-time account) was the first service provided that included both home banking and cash management, focusing not only on the savings banks themselves, but also on their business clients in particular.[90] However, the Corporate Electronic Banking Services (CEBS) option was not widespread. German, Austrian, Swedish, and Finnish savings banks showed only passing interest in the service because they already considered that "cash management did not offer as many advantages to the firm. It was only a little quicker than waiting for the daily statement, and more convenient to consolidate accounts."[91] Similar reactions came from the British TSBs, as Jack M. Large, head of Financial Services Development of the TSB Group PLC, London, and editor of *Cash Management News*, warned in 1987:

> "'What's new is best' is a silly and dangerous idea. Yet it dominates many banks' ideas on CEBS. The wrong use of CEBS can cost you millions and produce little or no benefit in terms of either new customers or extra revenue."

He therefore insisted on extrapolating the banks' strategic knowledge of the corporations' internal cash and treasury systems, as well as the costs and realities of payment processing in corporations.[92]

New product lines were created to attract more customers (both household and business). Belonging to payment networks had its benefits, but it also implied a loss of identity for traditional savings banks. It was difficult for any bank to go it alone; thus, know-how of the savings banks played in their favor, despite the pressures of deregulation and strong competition.[93] As noted by B. Hedberg of Sweden, Vice President of Svenska Sparbanksförenigen, at the 1984 International Automation

Conference in Tokyo, "The technology that is about to change the world – also the banking world – is a mix of computer hardware, communication systems, and decision support models."[94] Savings banks at this juncture had to decide how best to serve their customers, and how to manage technological investments; all in all, this contributed to growing uncertainties. Ultimately, there is evidence that in the years prior to the explosion of the Internet, IT affected not only how banks operated, but also what services they offered and where they were offered. ICT was creating trends that would later become hegemonic, while also determining which banking services were being offered.

Conclusions

The study of a particular industry, European savings banks, has provided us with new ideas about the processes of adoption and dissemination of computers in the commercial sector. Following the path of Yates, we have opted to study a set of users forming part of a single industry and located in a specific territorial setting, Western Europe, during an intense period between the post-war period and the years prior to the introduction of the Internet. In institutional terms, this industry has its own specific traits, of which we should emphasize two aspects: first of all, the strong integrative and pan-European nature of the savings banks studied; secondly, we have been able to define a complex framework of relationships – to date, relatively unknown – in terms of a pan-European network of corporate IT users.[95] This was a very participative network, woven around a base consisting of individual savings banks and their national industry associations, and articulated through technological committees under the supervision of the ISBI's corporate bodies. Many of the technological and organizational results outlined in this work can only be understood within this institutional framework, which takes on special

relevance with regard to other cases studied in the literature on industry and trade associations.

The European savings banks were late adopters of electromechanical resources for back office operations, while the commercial banks accessed electromechanical devices before the savings banks did. The documented cases suggest that the forces that led the change in the post-war period had more to do with the general economic conditions and the situation of the labor market than the operational characteristics of each particular savings bank. After the war, the European savings banks held a dual position, some maintaining traditional technology (mechanical-based systems), while others adopted punched card-based bookkeeping. The large savings banks manifested greater momentum and some of them, in exceptional cases, accessed the early commercial computers at the end of the 1950s. The results obtained suggest the existence of an incremental migratory path in the processes of technology adoption by the savings banks, introducing gradual improvements that favored the mechanization of back office processes. In this sense, unlike the practices previously experienced by industries such as the life insurance industry in the USA, there were no signs of what Yates terms "co-evolution" (in other words, the reciprocal interaction between tabulation technology and its use).[96] The cases presented here suggest that no special interaction occurred with the vendors because the savings banks were late adopters of said technologies. As a result, once they started using them, they were able to benefit from the prior experience of other financial intermediaries.

Access to computers occurred late, adopting those belonging to the second generation. In 1968, 40% of the European savings banks had access to computers, and by the beginning of the next decade, more than half already had them. This new process was marked by a strong dimorphism in the European savings bank system, according to

which large savings banks coexisted alongside a large number of small local savings banks. This article documents that the large mass of small savings banks showed a greater propensity to access computer resources via shared data centers, while large savings banks were self-sufficient and had their own computers. The great success of the savings banks was to opt for an efficient manner of accessing IT. Data centers as shared infrastructures reduced costs and made the investments more efficient, by being built with the financing of the affiliated savings banks, the support of industry associations and the technological assistance of the central savings banks.

The savings bank industry offers us a suggestive approximation to the adoption and use of online business systems in retail banking. This research documents the results of the savings banks in the field of online accounting systems, extending their use before some commercial banks and in a way that was less disruptive, through an incremental migratory path. This leadership is quantified at the end of the 1960s, when the industry begins to act as an early adopter in the European region, as acknowledged by contemporary authors such as Richard E. Sprague. As the ISBI reports highlight, at this point in time, the start-up of online processes should be understood as an evolution in office automation, alongside batch-oriented accounting, an aspect that has not been sufficiently stressed in the literature. These roots are evidenced in the transition from the off-line processes to teleprocessing (online processes), and the implementation of teleprocessing at "la Caixa" cannot be understood without the prior experience acquired with off-line processes prior to the arrival of the IBM System/360. File management through ad hoc programming and the use of point to point lines owes a lot to this experience and the need to have centralized access to the customer balance files for every office. The cases studied, including the aforementioned case, the Nordic teller terminals and the German computer centers, show no evidence that the primary motive

for establishing the online procedures was not the need to manage the customer and branch accounts in a centralized manner. However, as indicated by the literature and documented by this work, the teleprocessing networks were a solid base for the development of the EFT networks.[97]

Ultimately, the development of teleprocessing in the area of saving banks clearly reflects the predominance of an incremental migration path in the industry, from its initial steps in the 1960s until its development in the 1970s and 1980s. The research conducted makes it possible to point out three aspects that confirm this hypothesis, both from the point of view of hardware and software. First, a good example of this was the coexistence between the old and new mainframes during their service life, until the oldest ones were retired and the cycle was renewed. Second, the development of customer file management programs and the development of teleprocessing line control programs was a succession of applications that demanded different adaptations to the new operating systems (DOS and MVS) and to the new mainframe architecture. Finally, in the mid-1980s, the arrival once and for all of the DBMS and the growth of real-time processes as the result of the diversification of banking services and business expansion, demanded successive adaptations. The co-evolutionary factor was also very present in beginning in the early moments of teleprocessing (extending the concept of the computer era), as reflected by the case of "la Caixa": users and vendors reciprocally feed into one another, an aspect that is also perceived in other cases in the European environment.[98] The savings banks confirm the hypothesis by Yates: the reciprocal influence of technology and its uses was at work over long periods of time and throughout the technological changes.[99] If the life insurance association in the USA dealt with processes such as teleprocessing in the 1970s, including management science

and database applications, the evidence revealed suggests that the European savings banks were not far removed from these concerns.[100]

The savings banks gradually implemented a technological base that favored the development of savings bank EFT networks. This was an area in which the European savings banks were not starting from scratch, and therefore they were in a position to be able to compete and contribute added value to increasingly more extensive networks, thanks to the early developments associated with the online savings bank giro/message-switching networks and computer centers. These infrastructures favored the newly-established ATM and EFTPOS networks from the European savings banks and offer us a glimpse of a little-known aspect of the introduction of IT in Europe. The documented cases evidence that the savings banks lacked the long-term capacity to support their own networks in an environment of high maintenance costs and growing competition. As a result, they were forced to revise their traditional strategy, moving away from intraindustry positions to inter-industry collaboration, participating in joint banking networks to develop ATM and EFTPOS networks. This phenomenon was evident in the 1980s, with the development of a services bank that polarized the trend: interbank collaboration to implement the network infrastructures through joint companies and fierce competition in the offering of new services.

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[1] See Cortada, "How did Computing,” 53-58; Bátiz-Lazo et al., "In Digital We Trust” in *Technological Innovation*, eds. Bátiz-Lazo et al., 3-12.

[2] Cortada, *The digital flood*, 233.

[3] Yates, *Structuring*.

[4] The topic of technology in savings banks has been dealt with particularly in the cases of the UK, Spain Germany and certain Nordic countries; see: Bátiz-Lazo et al. "Organizational Change,” in *Technological*

Innovation, eds. Bátiz-Lazo et al., 117-150, and "The Origins," 100-137; Maixé-Altés, "La Opción Tecnológica," 175-186, and "ICT the Nordic Way," in *History*, eds. Gram et al., 249-262; and Thomes, "Is there an ICT Path?," in *Technological Innovation*, eds. Bátiz-Lazo et al., 119-136.

[5] Cortada, *The digital flood*, 210, 224-227.

[6] Today known as the World Savings and Retail Banking Institute (WSBI).

[7] Ross, "Penny Banks," 21-39; Maixé-Altés, "Enterprise and Philanthropy," 39-59

[8] With special emphasis on Cortada, *The digital flood* and Yates, *Structuring*.

[9] Paju and Haigh, "IBM rebuilds Europe," 265-300.

[10] Alberts, "Appropriating America," 4-7; Misa and Schot. "Inventing Europe," 1-19. Scott and Zachariadis, *The Society for Worldwide*.

[11] Cortada, *The digital flood*, 230.

[12] Ross, "Penny Banks," 21-39; Maixé-Altés, "Enterprise and Philanthropy," 39-59, and McLaughlin, "Profligacy," 569-591. Revell, *The Future of Savings Banks*.

[13] For more information on strategic alliances in European banking, starting in the 1960s, see: Ross, "Clubs and Consortia," in *European Banks*, ed. Battilossi et al., 135-160.

[14] See some reflections in this regard in Sprague, "Electronic," 29-35.

[15] See Ross, "Penny Banks," 21-39; Maixé-Altés, "Enterprise and Philanthropy," 39-59, and Yates, *Structuring*, 267.

[16] Such as private banks, merchant banks, clearing banks, and commercial banks, which gave preference to meeting the financial needs of businesses, upper classes and governments.

[17] Yates, *Structuring*; Bátiz-Lazo et al., "Managing," 117-150.

[18] ISBI Archive. Minutes of Working Groups (1965-1985), Amsterdam.

[19] ISBI Archive. Proceedings of 5th Conference on Automation, Vienna, November 9-10, 1971.

[20] Heide, *Punched-Card Systems*, 122, 193-194; Bonin, "From Prehistory," in *Technological Innovation*, eds. Bátiz-Lazo et al., 25; Booth, *The Management*, 126, 142; Wardley, "The Commercial Banking," 71-97.

[21] Bátiz-Lazo et al., "Banking," 177-205; Bátiz-Lazo et al., "Managing," 117-150.

[22] This sample includes the banks visited in 1958 by two commissioners from the Board of Directors of the main Spanish savings bank, the Pension and Retirement Savings Bank of Catalonia and the Balearic Islands (Caja de Pensiones para la Vejez y Ahorros de Cataluña y Baleares - CPVA).

[23] AHC ("la Caixa" Archive), Report to the Board of Directors on the visit to Europe by the commissioners of the Board on January 7, 1959.

[24] Bell, "The 'DUZ'," 9-11; Yates, *Structuring*, 115.

[25] AHC, Report to the Board.

[26] The first models appeared in 1922 and were the mainstays until the beginning of the 1970s.

[27] The business activity in the French savings banks were basically savings operations; Duet, *La Métamorphose*.

[28] AHC, Report to the Board.

[29] Ibid.

[30] Thomes, "Is there an ICT Path," in *Technological Innovation*, eds. Bátiz-Lazo et al.,119-136.

[31] Körberg, *Förnyelsen*.

[32] Herrera, "Modernización," 6.

[33] Wardley, "The Commercial Banking," 71-97; Booth, *The Management*; Bátiz-Lazo et al., "Banking," 177-205; Thomes, "Is there an ICT Path," in *Technological Innovation*, eds. Bátiz-Lazo et al., 119-136.

[34] Yates, *Structuring*, 262.

[35] ISBI Archive. Minutes of the 11th Meeting of Study Group on Automation, Copenhagen, November 26-27, 1968.

[36] Cambell-Kelly et al., *Computer*, 188; Philipson, "A Short History," in *Management*, ed. Barrett, 13-44.

[37] These tables are a synthesis of an exhaustive survey the ISBI administered to its associates throughout all of 1968 and early 1969.

[38] Balodis et al., "History," in *Reflections*, ed. Tatnall. Appelquist, "Technical and organizational change," in *Technological Innovation*, eds. Bátiz-Lazo et al., 71-91.

[39] Martin, "Britain's," in *Technological Innovation*, eds. Bátiz-Lazo et al., 37-70.

[40] ISBI Archive. German Papers of the 5th Conference on Automation, Vienna, November 9-10, 1971. Maixé-Altés, *Innovación*, 113.

[41] ISBI Archive. Minutes of the 4th Meeting of the Business Organization and Automation Committee, Frankfurt, February 2, 1972.

[42] ISBI Archive. Minutes of the 11th Meeting of the Business Organization and Automation Committee, Bonn, April 17-18, 1975. Minutes of the 5th Meeting of the ICA, Vienna, November, 1971.

[43] ISBI Archive. 5th Conference on Automation, Vienna, November 9-10, 1971.

[44] A very different strategy than that followed by some banks in the USA; see Yost, *Making IT Work*, 125-126. ISBI Archive. Minutes of the 4th Meeting of the Business Organization and Automation Committee, Frankfurt, February 2, 1972.

[45] Cambell-Kelly et al., *Computer*, 188; Philipson, "A Short History," in *Management*, ed. Barrett, 13-44.

[46] Bátiz-Lazo et al., "How the future shaped the past," 102-131.

[47] Yost, "Materiel Command," in *History of computing*, ed. Tatnall, 89-100. Haigh, "Inventing Information Systems," 15-61.

[48] Martin, "Too Far," 5-19. However, Barclays started a diversification strategy in 1962, and since then it has demonstrated an unusual capacity to manage innovation as a retail bank (Ackrill and Hannah, Barclays, 184, 205).

[49] Campbell-Kelly and Aspray. *Computer*, 175; Bátiz-Lazo and Reid, "The Development of Cash-Dispensing," 32-45 and Bátiz-Lazo et al. "The Origins," 100-137.

[50] Heide, "Retail banking," in *Technological innovation*, Bátiz-Lazo et al., 275-85; Cortada, *The Digital Hand*, vol. 2, 54; Yates, *Structuring*, 203-206; Bátiz-Lazo et al. "The Origins," 100-137; Maixé-Altés, "ICT the Nordic Way," in *History*, eds. Gram et al., 249-262.

[51] Yates, *Structuring*, 203, 223

[52] This aspects was always highlighted by Sprague, "Electronic," 29-35.

[53] IBM, 1060 *Data*.

[54] A large body of information mobilized by conventional means; in 1964, 6.3 million operations were recorded and verified.

[55] Maixé-Altés, *Innovación*, 116-117, 126.

[56] Haigh, "A Veritable Bucket of Facts," 33-49.

[57] Munt Alvareda, Interview.

[58] An operation that ended the conventional logistics of the off-line phase.

[59] Maixé-Altés, *Innovación*, 264-265.

[60] Munt Alvareda, Interview.

[61] For more about this problem, see: Haigh, "A Veritable Bucket of Facts," 33-49; "Inventing Information Systems", 15-61; Bergin and Haigh, "the Commercialization," 26-41.

[62] Most data transmission networks that were being implemented with public support at this time in Europe formed part of the circuit switching network technology. Vidaurrázaga, "La primera red pública", in *25 años de la transmisión de datos,* eds. Martín Bernal et al., 137-141; Adanero, "Algunos dinamizadores de la industria," in *Crónicas*, eds. Rico, 602.

[63] Frank, "IBM Subsystem," 1.

[64] Munt Alvareda, Rius Palleiro and Lacasta Interviews.

[65] Tucker, "The IBM 3090 system," 4-19.

[66] AHC, Computers Department, Projects: White Book, October-November 1979. Haigh, "A Veritable Bucket of Facts," 33-49; and Maixé-Altés, *Innovación*, 260-261.

[67] Bergin and Haigh, "the Commercialization," 26-41.

[68] Munt Alvareda and Ruiz Kaiser Interviews.

[69] See Maixé-Altés, "ICT the Nordic Way," in *History*, eds. Gram et al., 249-262; Bátiz-Lazo et al. "The Origins," 100-137.

[70] ISBI Archive, P.E. Larsen (Nyköbing), "EDP Cooperation between Nordic Countries," 5th Conference on Automation, Vienna, November 1971.

[71] ISBI Archive. Minutes of the 11th Meeting of the Business Organization and Automation Committee, Bonn, 1975. Mellbring, *Nordiska Terminalprojektet.*

[72] ISBI Archive. Report : The Nordic Terminal Project by Palle Lundberg, Project leader. Copenhagen, Helsinki, Oslo, Stockholm, 5 November 1972.

[73] ISBI Archive. G. D. Burton (London), "The establishment by TSB of regional data processing centres in UK", Proceedings of the 5th Conference on Automation, Vienna, November 1971.

[74] Ibid. T. Mainz (Nürnberg), "Project for a computer-based information system for savings Banks." Minutes of the Meeting of the BOAC, Bonn, April 17-18, 1975.

[75] ISBI Archive. Minutes of the Meeting of the Business Administration Committee, Geneva, April 20, 1983.

[76] Maixé-Altés, "La Opción Tecnológica," 175-186; Martin, "Too Far," 5-19.

[77] Sprague, "Electronic," 29-35.

[78] Heide, "Retail banking," in *Technological innovation*, Bátiz-Lazo et al.,275-285; Bátiz-Lazo et al. "The origins," 100-137; Bátiz-Lazo et al., "How the future shaped the past." Maixé-Altés, "ICT the Nordic Way," in *History*, eds. Gram et al., 249-262.

[79] Stearns, *Electronic value Exchange*, 136.

[80] ISBI Archive. Minutes of the BOAC, from the 4th Meeting (1972) to the 39th Meeting (1989).

[81] Maixé-Altés, "ICT the Nordic Way," in *History*, eds. Gram et al., 249-262; Bátiz-Lazo et al., "The Origins," 100-137.

[82] CECA Library and Archive. Annual Report, CECA, Madrid, 1978.

[83] At the end of the 1970s, time-sharing processing was offering a new interactive model that facilitated access to computers by small organization and improved the performance of batch processing, Yost, *Making IT Work*, 175.

[84] ISBI Archive. Minutes of the Meeting of the Business Administration Committee, Geneva, April 20, 1983.

[85] ISBI Archive. Simon Evans (Price Waterhouse), "Competition and cooperation in international card systems,"12th International Automation Conference, Amsterdam, May 18-22, 1987. See also Stearns, *Electronic value Exchange*, 213.

[86] A card issued as a part of a check guarantee system.

[87] ISBI Archive, Barclays Presentation (authorless), Business Administration Committee Meeting, 1976, June 15.

[88] ISBI Archive. Minutes of the Meeting of the Business Administration Committee, Geneva, April 20, 1983.

[89] ISBI Archive. Linda K. S. Moore, "What's Happened to Home Banking," 12th Automation Conference, Amsterdam, May 18-22, 1987.

[90] ISBI Archive. F. Chiusa, "Automating Banking Services to Firms. A client point of view," 12th Automation Conference, Amsterdam, May 18-22, 1987.

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[93] ISBI Archive. Simon Evans (Price Waterhouse), "Competition and cooperation in international card systems,"12th International Automation Conference, Amsterdam, May 18-22, 1987.

[94] ISBI Archive. B. Hedberg, "Computers & Communications Plus Organization Design Times Business Ideas. A Formula for Successful Banking," 11th International Automation Conference, Tokyo, October 22-25, 1984.

[95] A study that is far from exhausted by this work.

[96] Yates, "Co-evolution," 1-51.

[97] Bátiz-Lazo et al., "The Origins," 100-137.

[98] Maixé-Altés, "ICT the Nordic Way," in *History*, eds. Gram et al., 249-262

[99] Yates, *Structuring*, 259-263.

[100] Ibid., 220-223.