A Cost-Saving Machine: Computing at the German Allianz Insurance Company

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This article provides a close study of information processing at Allianz, a West German insurance company, in the two decades following World War II. It contributes an international perspective to the history of information by analyzing corporate information technology decisions outside the United States and by tracing exchanges about information technology between insurance managers in the United States and Germany. The article argues that Allianz managers, claiming that electronic information processing would reduce office operating costs, meticulously sought to document these savings to legitimate their computer acquisition in an otherwise adverse economic and political climate.

The German Allianz insurance company presents a case of unlikely computerization. Following World War II, companies in war-torn Germany needed to rebuild and reorganize their operations. Many office buildings in urban centers and transportation networks had been destroyed during the war, the processes of denazification and restitution cast uncertainty about future staff and assets, and the division of Germany in 1949 forced companies that had operated nationally to sever parts of their business. The Allianz Insurance Company was one of the companies in this situation. In the cash-strapped German economy, where credit remained scarce and unemployment high, Allianz could be expected to follow the advice of German office rationalization professionals to streamline the company's operations by employing large numbers of low-paid young female workers for routine tasks, as many other Germany companies in the financial sector did. Instead, Allianz embarked on a capital-intensive strategy. In early 1956, the company installed an IBM 650 computer as part of a rationalization

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program to achieve "savings in personnel, time and space" to cut the company's operating costs.[1]

This article provides insights into information processing in a business environment outside the United States. It offers a case study of office automation in postwar West Germany, traces transatlantic interactions and German perceptions of information processing in the United States, analyzes corporate decisions about information technology, and investigates how the introduction of new information technology affected corporate structures and labor. Allianz was the first German company to install an electronic computer, and it reported its first cost savings after three years.[2] Allianz managers claimed and sought to document that the computer reduced Allianz's costs, and that their cost-consciousness allowed them to legitimate the computer acquisition in an otherwise adverse economic and political climate.

Allianz managers meticulously calculated the costs and cost savings of the IBM 650, counting everything from operating hours to personnel costs. They reported this information in lengthy reports full of numerical details. As Theodore M. Porter has shown in his now classic study of quantification in science, numbers and quantification lend an air of objectivity, seemingly subordinating personal interest and subjective judgment to public standards.[3] Accountants and actuaries were among the professions embracing quantification in the nineteenth century, and the life insurance industry was particularly dominated by quantification, given the need to calculate long-term risks and to assess the validity of a company and its ability to pay future insurance premiums based on current income. Allianz managers thus operated in a business culture long acquainted with quantification, and they used numbers to make their case for computerization. They attempted thorough cost calculations before acquiring an electronic computer, and after it was installed, they documented its effects. In the larger economic and political climate of postwar Germany, cost savings was the argument that allowed Allianz to acquire a computer, and numbers were the language in which to make the case for the computer.

Allianz's approach to computing also differed from that of American companies, many of which appeared to embark on the acquisition of an expensive unproven technology after limited cost calculations, seemingly treating this new cutting-edge technology not as a cost-saving rationalization tool but as a luxury object that they installed and exhibited in their entrance halls behind glass covers with palm tree decorations.[4] It appears that, unlike its American counterparts, Allianz was able to avoid the so-called productivity paradox that JoAnne Yates examines in her masterful study of computers in the American life

insurance industry. Yates argues that although insurance companies introduced ostensibly cost-saving computers in the 1950s, the companies' costs—expressed as the ordinary renewal expense ratio (ordinary RER)—continued to rise into the mid-1970s, when life insurance companies finally began to realize productivity gains from their computer installations. Most insurance companies opted for an incremental introduction of computer technology, merely shifting tasks from punch card equipment to electronic computers, which in Yates's view explains the productivity paradox in the life insurance industry. Not until the 1970s, when insurance companies consolidated and integrated computer applications, were they able to realize cost savings.[5]

The Allianz insurance company seems to have already defied the productivity paradox in the 1950s. Although Allianz adopted US computer technology in an incremental fashion, the company claimed to have realized cost savings after only a short transition period of three years from installing its first computer, an IBM 650. In this respect, Allianz differed from many insurance companies in the United States. From the perspective of the historical actors at Allianz, the culture of deliberate assessment and decision making along with the gradual and labor-conscious introduction of computing technology allowed for these productivity gains. A decade later, cost considerations were one of the reasons for the company's delaying the transition from its second to third generation of computers. The company thus turned from a pioneering computer user at the forefront of technological adoption into a laggard in following technology trends in the industry. This transition suggests that Allianz did not obtain an electronic computer for the typical first-mover advantages—access to parts, suppliers, and particularly staff, the ability to shape technological and other standards, and a head start on the learning curve and early profits—but to reduce the cost of office operations.[6] The company achieved cost reductions through careful planning and use of staff and facilities, thereby also increasing office productivity through the computer introduction.

The following discussion begins by describing Allianz's situation in postwar Germany and the company's considerations in introducing US rationalization technologies to reduce its operating costs. Allianz managers thought US companies overrationalized to compensate for what the German managers conceived of as lower staff education and discipline in the United States. Analyzing the interactions with US computer vendors, the article then discusses Allianz's reasons for selecting an IBM machine over alternative models and examines staffing and organization patterns in Allianz's computing center. The center employed a comparably small staff, limiting operating costs while also occasionally

overworking its employees. Its management sought to centralize the company's data processing to control costs as well as operations. The article concludes with a review of Allianz's computer operations during the 1960s. During this time, Allianz twice updated its computer systems, installing a large IBM 7070 with several IBM 1401s for support in 1962 and an IBM System/360 in 1968. While Allianz managers continued to travel to the United States for technological information, their rationalization and cost reduction goals led them to veer away from US trends and delay the installation of new computing technologies.

An American Computer in Postwar Germany

When US computer companies sought to expand into European computer markets in the early to mid-1950s, economic and political conditions meant that there was virtually no demand for electronic computers. In Germany, urban centers and transportation infrastructure had been subject to bombing attacks that destroyed office buildings as well as dwellings and impeded travel and communication; bank credit for rebuilding this infrastructure—not to mention for acquiring cutting-edge technologies—was not readily available; abundant clerical and other cheap labor rendered manual processing comparatively profitable; and most companies were of small or medium size with limited information processing needs.[7] Business historians such as Alfred Chandler have suggested that the acquisition of computers was an integral part of corporate growth, offering a technical solution to the increasing information processing and communication needs as corporations grew to gain benefits of scale and scope.[8] While this may have been true for many US companies, Martin Campbell-Kelly has shown that in Britain, for example, the Prudential Assurance Company had built large-scale data processing operations in the nineteenth century, even before electromechanical or electronic data processing machinery existed.[9] By contrast, Allianz presents a case of a European company that installed office machines as it grew, conscientiously adapting US technology to German conditions.

The first German company to acquire an electronic computer, Allianz stood out among German firms and particularly German firms in the financial sector. Like financial institutions in Germany and other European companies, Allianz had enthusiastically introduced punch card and other office machinery during the 1920s.[10] But while insurance companies and banks in the United States and Britain were among the early adopters of computing technologies for their massive data processing needs, German banking institutions often delayed

introducing the new technology. German regional savings (*Sparkassen*) banks, for example, reorganized their office and data processing operations in the 1950s with the help of abundant low-paid and mostly female staff, an approach generally recommended in postwar German office organization literature. In the cash-based German economy, in which companies continued to pay wages in weekly cash envelopes into the 1960s, banks did not face the same urgent need to process rapidly increasing numbers of checks, for which banks in the United States and Britain turned to electronic technologies.[11] Allianz's early decision to introduce electronic computing technology was an unusual step in this larger German context.

Allianz was the largest insurance company in postwar Germany. Founded in 1890 by Munich Reinsurance Company, Allianz had grown through a series of acquisitions during the 1920s. The company offered various kinds of property insurance, from fire and machines to liability, and the company had also added life insurance to its portfolio through a merger in 1922. In a first rationalization wave in the late 1920s, Allianz decentralized its office operations, which had formerly all been handled in the company's headquarters. By 1939, Allianz held 5.6 million insurance contracts, but wartime disruptions and the loss of insurance sales areas in the Soviet-controlled occupation zone shrank Allianz's business volume during the next decade. In 1950, Allianz held 4.8 million insurance contracts, a number that would nearly triple to 13.1 million by 1960.[12] It was thus a medium- to large-size insurance company, ten times bigger than midsized US companies such as Franklin Life or Pacific Mutual, with 400,000 and 350,000 policies respectively, but only a tenth the size of Metropolitan Life, the largest US company, with 44.5 million policies in 1952.[13]

During World War II, Allianz's former headquarters, located in the Russian sector of Berlin, were completely destroyed, as were many other company buildings. In mid-May 1945, Allianz employees congregated at the building to clear the rubble, as well as the corpses of soldiers who died in the last days of battle, and to restart the company's operations. In a cloak-and-dagger operation in February 1946, the company transferred its business records to the western sectors. Slowly, the corporate administration moved to Munich, and in 1951 Allianz acquired real estate west of the English Garden for new corporate headquarters, which were completed in 1954. In addition, for several years after the war, denazification hearings limited Allianz's staff, at both the rank-and-file and executive levels. In Munich, for example, seventeen of the fifty-one middle managers were suspended for the duration of their hearings (some cases were not decided until 1949). Some chose retirement

over submitting themselves to the hearings; others were found to be offenders and remained unemployable; most were found to be followers and, often after paying a fine, were reemployed; and a few were exonerated despite their having held prominent positions in Nazi organizations, because they could prove that they had worked against Nazi goals from within these organizations. Finally, the process of restitution tied up time as well as assets. In some cases, it took into the early 1960s for Allianz to settle compensation cases for "Aryanized" real estate, claims from Jewish holders of property and life insurance policies with Allianz or their heirs, and salary and pension claims of former Jewish employees and business associates. This work demanded both employee time and assets that could not be devoted to other goals.[14]

In 1954, Allianz founded a new department of management, the Betriebswirtschaftliche Abteilung (BWA) to respond to operational challenges posed by growing business volume. BWA was charged with simplifying—by coordinating or standardizing—business operations across Allianz's local branch offices. In addition, BWA oversaw the considerable punch card operations for Allianz's property insurance, while an Allianz subsidiary, Allianz und Stuttgarter Lebensversicherungsbank-AG, independently directed the life insurance punch card operations. Heinz-Leo Müller-Lutz, a member of the Allianz board of directors, became the first head of BWA. Joining Allianz in 1934 with a doctoral degree in economics and social sciences, Müller-Lutz had shown his managerial skills by rationalizing the company's handling of block policies and successfully organizing the accident and travel weather insurance business.[15] He now led the company's renewed effort at reducing operating costs and looked to the United States for rationalization technologies and organizational models.

In October 1954, Müller-Lutz and his colleague Otto Ladner flew to the United States to study insurance technology. While mechanization was not officially part of BWA's mission, Müller-Lutz believed that Allianz's office administration was too costly and lagged behind the American benchmark. He had concrete ideas about technological changes that would help cut costs, particularly in the punch card area. After nine weeks, however, he returned to Germany convinced that Allianz should install an electronic computer. BWA eventually decided to install an IBM 650 computer as part of a program that introduced other American-style rationalization methods at Allianz, from simplified and unified work processes and dictation machines to the green wall paint that was thought to increase the staff's resistance to the noise of office machinery.[16] Allianz managers also implemented

the computer and other rationalization measures in ways that departed from the American model, enabling them to realize productivity gains that had escaped many US insurance companies.

Like those Germans and other Europeans who traveled to the United States before and after World War II, Müller-Lutz and Ladner were cautious in their assessment of how far what they observed in the United States could be transferred to Germany. They recognized that business conditions in the United States differed from those in Germany and that many American methods and technologies were not directly transferable. For example, many companies in the United States were larger than German companies and pursued mass production; relations between management and labor were better in US companies; Americans were more open to new technologies; and the United States' large size and scale of resources made a notable difference as well.[17] "Economic, legislative and insurance conditions were largely different from the ones in Germany," according to Müller-Lutz and Ladner, who recognized the "dependence of administration on organizational conditions and their close connection to general economic relations." They concluded that "the American insurance system and its modern equipment are only understandable under consideration of local circumstances."[18]

As a result of the differing economic and cultural conditions in the United States and Germany, insurance companies in the two countries had different data processing needs. For example, the insurance business in the United States was subject to state regulation and oversight, requiring insurance companies that operated nationwide to follow fifty-two different tax and other regulations and to file financial reports to fifty-two different state departments of insurance at the end of the year—none of which was required of German insurance companies. American insurance companies therefore organized their records so that they could access them state by state and perform extensive data processing at the end of the year, an organizational system that was not necessarily appropriate for German companies. Also, US insurance companies worked with short-term contracts that needed to be renewed regularly, requiring correspondence when the contract expired. In addition, in the US agency system, independent agents worked for several insurance companies and owned their accounts and records. One of the effects of the agency system was that agents, rather than the home office, wrote insurance policies; the decentralized policy writing posed an obstacle to automation. Furthermore, in the United States payments were usually made by handwritten check, which required handling and processing, whereas Germans usually made payments with

standing money orders. Finally, contact with clients in the United States was mostly by phone, while in Germany it was more often through written correspondence, which required filing.[19] With this array of differing data processing needs, US and German insurance companies clearly had differing needs for computerization.

In the eyes of the Allianz organizers, American companies tended to oversystematize and overrationalize. Müller-Lutz and Ladner saw the explanation for this tendency in American employees' qualifications and attitudes toward work. In comments rife with generalizations and prejudices, Müller-Lutz and Ladner claimed that Americans were not *fleissig* (assiduous or hard-working in a way that accomplished results) but *geschäftig*, that is, they were "busy," engaged in continuous activity without accomplishments. Their "ingrained laziness" promoted rationalization; Americans "only worked hard to achieve convenience within a short time." In other words, Müller-Lutz and Ladner accused Americans of working hard only to install rationalization technology so that they could benefit from the conveniences of mechanization. They also regarded the quality of Americans' work as poor: insufficient education led to deficiencies in orthography and arithmetic among staff, causing a high number of mistakes and making mechanization more desirable as a means of achieving greater accuracy. Finally, Müller-Lutz and Lander believed that lack of assiduousness and accuracy on the part of American clerical employees meant that they required close supervision, adding the cost of an additional layer of management, the removal of which would make mechanization even more profitable.[20]

Müller-Lutz and Ladner criticized Americans for overusing simplification and rationalization measures to compensate for staff deficiencies. In their eyes, Americans simplified and rationalized even in cases in which individual treatment would be more suitable. Convinced that standardization had more advantages than disadvantages, Americans accepted all of its shortcomings in order to exploit its benefits as much as possible. In addition, a general cultural bias in favor of technology led Americans to mechanize work even when individual—that is, manual—work would be "cheaper, quicker, and better." While such cases of oversimplification and overmechanization often caused a rejection of office organization and technology in Europe, Müller-Lutz and Ladner argued that the US model should not be judged by its excesses but by its overall success. They admitted that, for various reasons, American methods were not directly transferable to the German context but urged that they be "transferred in a logical way with consideration of the peculiar homeland conditions" in Germany.[21] It would be up to men like Müller-Lutz and his colleagues at BWA to bring computer

technology to Germany, despite their apprehensions about American rationalization. Although Müller-Lutz clearly did not intend Allianz to become an exact copy of a US insurance company, he and his staff eagerly adopted those American methods and technologies they deemed appropriate.[22]

Selecting a Cost-Saving Rationalization Machine

Müller-Lutz and his colleagues followed their own agenda when they recommended the acquisition of an electronic computer. One of their primary goals was to reduce the costs of Allianz's office operations. Electronic computers—together with a range of other rationalization machines and methods from filing cabinets, typewriters, and dictation machines to lighting systems and wall paint—promised to make steps toward this goal.[23] Thus motivated by cost considerations, BWA turned Allianz into a European pioneer of computing. Allianz adopted its computer early compared to other insurance companies both in Germany and in the United States, where the first insurance company to install a computer, Metropolitan, had only acquired its computer two years earlier, in 1954.

When Müller-Lutz and Ladner traveled to the United States in 1954, they visited insurance companies and associations as well as office machine manufacturers to survey office equipment. They sought solutions to two concrete problems related to punch card technology: the capacity of punch cards with eighty or ninety columns was too small to capture the information necessary to process insurance contracts, and the processing speed of Allianz's punch card machines was too slow. Müller-Lutz and Ladner were looking for larger punch cards that would eliminate the need for use of a costly second punch card for each contract, as well as for special-purpose machinery that would process simple but large-quantity insurance operations at a higher speed. When they saw the Metropolitan Life Insurance Company's UNIVAC computer (the only computer installed at an insurance company at that time) and spoke to office machine manufacturers, Müller-Lutz and Ladner realized that technological developments were taking a different direction. There would be no 100- or 120-column punch cards because punch cards were being replaced by magnetic tape and electronic technology was solving the problem of processing speeds.[24] The future of data processing was electronic.

Installing an electronic computer was a large financial and organizational commitment that Allianz management did not make without careful consideration. BWA attempted to make thorough calculations

to ensure that any decision about computers was made on a sound economic basis. But the available information was incomplete, and given how new electronic technology was, many questions remained. Thus, Müller-Lutz noted with regret that US corporations often calculated their computing costs in dollar rather than manpower terms.[25] The need for currency conversion and different salary levels between the countries made the financial information difficult to apply to German conditions.[26] In addition, Müller-Lutz later criticized many US corporations for deciding to install electronic computers on the basis of what he considered superficial analysis; discussions were generally short and, if cost analyses were conducted at all, they were done in what he considered a rather shallow manner.[27] Yates concurs that some US life insurance companies neglected to conduct proper cost calculations. For example, Metropolitan considered its size a sufficient indicator that a computer would be profitable, and smaller companies treated the transition to an IBM 650 as a minor step that did not warrant exhaustive analysis, or they simply trusted the IBM name.[28] In Müller-Lutz's view, this approach corresponded with the general tendency of Americans to prefer practical experiments over theoretical considerations.[29] But with Allianz's top executives independently predisposed to electronic technology, the company decided to install an electronic computer despite the remaining uncertainties.[30]

The next question was which computer model would best meet Allianz's needs. With the German electronic computing industry in its infancy, BWA considered only US models.[31] After visiting five US office machine manufacturers, Müller-Lutz took two companies into serious consideration: IBM and Remington Rand. Both companies had sales and service organizations in Europe, and both had completed the development of electronic computer equipment—not just promised to do so.[32] But only Remington Rand could claim electronic computer experience in the insurance industry, and Müller-Lutz thought quite highly of the company. Remington Rand was the first company to recognize the potential of electronic computers. Because of its leading role in the field, the company had managed to break into IBM's market, and several IBM customers returned their rented IBM punch card equipment to acquire Remington Rand's UNIVAC. By contrast, IBM seemed slow in developing electronic equipment, and Müller-Lutz criticized IBM's dependence on its punch card equipment with outstanding orders for another two years. In 1954, IBM had only delivered a few large-scale IBM 701 computers, which compared unfavorably with Remington Rand's UNIVAC.[33] Still, Allianz went with IBM.

Several reasons may account for this seemingly irrational decision. First, the choice of IBM may have promised to ease Allianz's overall transition to computer technology and to help improve the position of BWA within Allianz. In the mid-1950s, BWA encountered major resistance from Allianz's Frankfurt punch card department against its efforts to standardize Allianz's work processes. Among Allianz's punch card departments, the Frankfurt department was the oldest one, able to claim experience working with Remington Rand equipment since the 1920s.[34] All other Allianz branch offices, including the Munich office, acquired punch card equipment only in the 1940s—partly during and partly after World War II—and they all worked with IBM equipment. Choosing the Remington Rand UNIVAC would have required the majority of punch card departments to change office machine suppliers and would also have boosted the more experienced Frankfurt office. Circumstances such as these complicate the common argument in computer history circles that punch card installations provided a built-in customer base for IBM computers.[35] Like Allianz, other European companies, such as British Airways, simultaneously operated IBM and Remington Rand punch card installations. Based on the assumption that punch card customers simply continued their supplier relations when they made the switch to computers, companies could have chosen either company when the expense of a computer installation made it impossible to continue to operate two different systems side by side. At Allianz, organizational circumstances favored IBM over Remington Rand equipment.

Second, Remington Rand's reception of Müller-Lutz compared unfavorably with that of IBM. IBM's highest executives personally welcomed Müller-Lutz and granted Allianz preferential treatment.[36] Watson (it is not clear whether Müller-Lutz talked to the father or one of the sons) assured Müller-Lutz that Allianz would be served directly by the US parent corporation, although IBM's German subsidiary would normally have attended to Allianz's needs. Müller-Lutz expressed confidence that this preferential treatment would improve Allianz's relations with IBM and solve problems that Allianz had experienced with the IBM 421 tabulator.[37] At Remington Rand, however, Müller-Lutz met with midlevel managers who were not able to make any concessions, although Remington Rand's European representatives sought to maintain Allianz as a customer.[38]

Third and most important, IBM offered a small computer, the IBM 650, which rented for only about $3,200 a month, while Remington Rand only offered the much larger UNIVAC. A larger computer such

as the UNIVAC or the IBM 702 would only be cost effective if Allianz computerized a significant portion of its operations, and it would require centralizing these operations at a single location, an impractical scenario.[39] Allianz, however, could use the smaller IBM 650 cost effectively by computerizing only one of its functions, statistical calculations. Computerizing only its statistical calculations also meant that the computer installation would not affect Allianz's day-to-day operations. The IBM 650 allowed for an incremental transition rather than a radical technological change, an approach that many US insurance companies also pursued.

In the United States, most larger insurance companies, such as Metropolitan and John Hancock, acquired large-scale UNIVACs because transitioning only one of their functions would max out a smaller computer's capacity. Most smaller companies purchased an IBM 650, using the full computer capacity by migrating only a single application. Only a very few small companies, such as Franklin Life and Pacific Mutual, took a more risky approach to computerization, acquiring a large-scale computer and attempting to integrate functions to use the computer to full capacity.[40] The volume of Allianz's operations was comparable to the larger US life insurance companies. With 8.9 million insurance contracts in 1956, Allianz did not reach the size of Metropolitan. But Allianz's volume by far surpassed that of John Hancock, the United States' fifth largest life insurance company, with two million policies in the mid-1950s. Renting a single small IBM 650 despite its large size, Allianz thus followed an even more conservative and risk-averse approach to computerization than most US insurance companies.[41] It was precisely this gradual, risk-averse approach that, according to Yates, prevented US insurance companies from realizing productivity gains until they finally integrated their information systems in the 1970s. Allianz, however, avoided this productivity paradox.

Managing a Productive Computing Center

Allianz installed the IBM 650 in early 1956, and thanks to BWA's cautious approach, the computer became a cost-saving rationalization tool within only three years. BWA documented the operations performed by its computing center in detail, including the scheduled tasks and the computer downtime. After overcoming initial technical problems, BWA proudly reported that the productive time of the 650 surpassed the regular work hours at Allianz. The computer operated 2,565 hours in 1959, which was 118 percent of the normal annual work time of 2,173 hours. Even after subtracting 12 percent for maintenance, Allianz still used the

650 productively for 106 percent of the normal work time.[42] Although these numbers document the industriousness of the computing center, they provide little indication of its profitability.

Unfortunately, BWA had to report in the first year of the computing center's operations that computerization had increased rather than decreased costs. The computing center performed the company's statistical analyses 50 percent faster than the punch card system, but it was about 20 percent more expensive. Given Allianz's cost-consciousness, this was a troublesome result. Müller-Lutz argued that the additional costs were justified because the computer provided essential corporate statistics much faster and because the increasing business volume would soon reach the limits of manual processing. Drawing a rare analogy, he compared the computer to a premium x-ray machine that allowed an immediate insight into the "healthiness" of an insurance branch. He suggested that, given the constant flux of business in a fast-moving world, this insight was essential, like the instant diagnosis of the human body.[43] Although US insurance companies faced increasing competition in the 1950s and might have benefited from fast risk calculations, there is no evidence that Allianz made different or faster decisions that would have changed its competitive situation in Germany. Müller-Lutz thus created a futurist story to discount the cost increase.

Fortunately for BWA, the computer began to be profitable as more tasks were transferred to the machine. BWA was happy to report, in the computer's third year, that it was finally cheaper than punch card operations. Comparing the cost for machine rental, personnel, and other costs, such as technical and office supplies, the IBM 650 saved Allianz DM 33,892 in 1958. The next year, savings almost doubled to DM 64,437; the total savings surpassed the losses accrued in the first two years by DM 19,254.[44] BWA estimated that in 1960 the computerization of car insurance rate adjustments would save an additional DM 100,000. Retrospectively, BWA reported that over the lifetime of the 650 (which was returned to IBM in 1961), the computer saved Allianz about DM 500,000.[45] Although Allianz's cost calculations, as detailed and political as they were, are not directly comparable to US calculations, the company achieved what almost no American insurance company did at the time: a return on investment.[46]

BWA's personnel policies contributed to the computing center's extraordinary cost structure. BWA ran Allianz's computing center with a remarkably small (and young) staff. This was a conscious deviation from the staffing that Müller-Lutz had observed in the United States. Indeed, he criticized US corporations for what he saw as overly systematic and expensive preparations for a new computer, an attempt, he

believed, to compensate for a lack of initial analysis. Large teams of programmers, operators, and office space for the new machine were often provided months before the arrival of the computer, requiring US companies to bear costs without return. Müller-Lutz thus rejected US staffing patterns during the introduction of new computers, suspecting that US insurance companies did not maximize their savings of personnel, time, or space.[47]

At Allianz, BWA initially operated the IBM 650 with a staff of only three: the director of the computing center, Hans-Willy Schäfer, who had been hired from Darmstadt University's Institute for Practical Mathematics, one of the preeminent punch card installations in Germany, and who performed management as well as programming tasks; Friedrich Gebhardt, a college-trained mathematician for programming tasks; and Mrs. Buchwieser to operate the computer. Over time, Allianz added to the 650 operations one more part-time position for a work-study student.[48] This was a surprisingly small staff of only 3.5 people; in the United States, even small computers such as the IBM 650 were run with at least five programmers, plus operating and other support staff. For example, Pan-American Life sent seven employees to a one-week IBM programming class and eventually employed four methods analysts.[49] Large US computer installations employed as many as sixty or seventy programmers.[50] Allianz, however, managed to run the 650 with a much smaller staff, helping to reduce the computing center's operating costs. Frugal staffing decisions turned the IBM 650 into a rationalization machine aimed at cutting costs, although, as we will see later, BWA chose to disregard the growing group of keypunch employees required for data entry.

In addition to reducing operating costs, BWA used the IBM 650 as an argument for further centralizing the operations of Allianz's punch card departments.[51] From its inception, BWA had been in charge of Allianz's punch card departments, which in 1955 comprised more than three hundred machines for an annual rental of DM two million and about 350 employees at ten locations who maintained and processed data on about eleven million punch cards. Planning the installation of the IBM 650, BWA demanded that all punch card departments document the organization of their data and the workflow for certain data processing operations and that they report on the daily use of their machines. Based on these records, BWA identified which operations each punch card department performed and how often.[52] BWA then determined the four data processing operations that were profitable for an insurance company of Allianz's size—the writing of insurance

policies, the writing of invoices for all insurance branches, accounting, and statistical calculations—as well as the most "rational" (that is, cost-effective) way of performing each operation. All punch card departments were then required to limit their operations to the approved four and to conduct them in the prescribed way.[53] Local punch card departments were no longer allowed to take on new tasks on their own or to change or improve their operations without BWA's approval.

The installation of the 650 strengthened BWA's claims that the reorganization of Allianz's punch card operations should be centralized. While the punch card work would remain regionally distributed, generating the statistical analyses centrally on the new computer would now require all punch card departments to provide uniform data to the computing center. The local punch card departments were therefore to follow the same systems and procedures, from using the same method of numbering insurance branches to recording the information at the same location on the punch cards.[54] The 650 thus extended BWA's control over even the daily work processes of the branch offices' operations.

Not surprisingly, BWA's centralization efforts met with resistance from the local administrators, who were losing control over their departments. The Frankfurt branch office was especially adamant. Based on its long experience, the Frankfurt punch card department had developed a number of special data operations, and its pioneering role had given it a leading position among Allianz punch card departments. Although BWA acknowledged the Frankfurt experience when it implemented the process of insurance policy writing according to the Frankfurt model, it also demanded that the Frankfurt department cease performing data processing functions that went beyond those approved by BWA and that it cease developing new procedures. BWA eventually emerged strengthened from the conflict; by 1957 Müller-Lutz would triumphantly note that the work of the Frankfurt branch office had been proven insufficient, while BWA's work had been recognized for its high quality.[55]

Müller-Lutz generally expressed an understanding that fear of losing prestige and independence caused resistance to centralization; he tried to emphasize that the technical work process, which remained decentralized, was unrelated to the centralized decision-making power. But he also suggested that the departments ought to be grateful for being relieved of the tedious detail work that nobody in management cared for.[56] To overcome resistance, Müller-Lutz and his staff frequently visited branch offices to foster personal relations through face-to-face

contacts rather than rely on large group meetings, which were time- and cost-saving but more anonymous.

Allianz's Second and Third Computer Generations

In 1962, Allianz installed its second computer generation, a combination of an IBM 7070 with several IBM 1401s. For the new computer, BWA continued many of the practices it had developed for the IBM 650. As with the IBM 650, the decision to purchase the IBM 7070 was based on information gathered in the United States. During his trip in 1957, Müller-Lutz learned that IBM planned a successor to the IBM 650, the IBM 660. Müller-Lutz communicated to IBM's management that rather than a large calculator, Allianz needed an economic data processing machine and a fast printer that achieved reasonable speeds at low costs rather than the highest speeds at astronomical costs. IBM acknowledged these demands but explained that the company focused on serial production rather than specialized machinery.[57] As before, IBM's technological development rather than Allianz's computing needs determined BWA's choice.

BWA's apparent reluctance to change computer manufacturers after having chosen an IBM machine as its first computer is an example of the lock-in effect that computer historians have identified as an impediment to the transition from punch card machines to electronic computers. Despite the limitations of the products that IBM offered, Allianz remained an IBM customer. Müller-Lutz observed in 1957 that Remington Rand had developed a smaller computer model with a high-speed printer, the UCT, that competed with the IBM 650 and was to be offered to European customers only. In addition, Remington Rand not only produced specialized machinery, which despite Müller-Lutz's requests IBM had repeatedly refused to do, but also extended its sales and service organization in Europe.[58] But by 1959, Schäfer reported that several US insurance companies changed their orders from a 700-series printer to a 1401 computer, which they planned to use as a peripheral for card-to-tape conversion as well as for high-speed printing, and which promised to cost no more than the 700-series printer.[59] These observations signaled to BWA that IBM's next computer generation had matured and that the future direction of IBM's computer development was clear. Following the US trend, Allianz eventually ordered the new computer, accepting a span of five years from BWA's first inquiries in 1957 to the final computer installation in 1962.

As with the earlier purchase of the IBM 650, BWA again conducted stringent cost calculations, although it now knew to expect that the

new machine would be most expensive during the initial transition period of two to three years.[60] BWA also continued the cost-rational and personnel-effective operation of its computing center. BWA again staffed the computing center sparingly and even struggled to adjust the size of the computing staff. BWA waited until after installing the new computer to double the computing center's staff within six months, adding eleven employees to bring it to a total of fifteen. Despite this rapid increase, the computing center went through a taxing phase of personnel shortages. Throughout 1962, the staff made "large personal sacrifices" by working night shifts and weekends.[61]

The overtime was necessary in part because existing staff needed to train new staff and familiarize them with Allianz's operations. Even experienced programmers required a half-year training period, which placed an additional burden on the senior programmers. Although the computing center staff had regularly worked overtime since 1956, the 1962 transition appears to have been an extraordinarily taxing time. The cost-consciousness that led the company to hire and train new staff after—rather than in preparation for—installing the IBM 7070/1401s had finally taken its toll, and three employees left the computing center during 1962.[62]

The mixed demography and background of the computing staff may explain the taxing work conditions and the staff's comparably low status. Of BWA's six new programmers, four were men and two unmarried—and presumably young—women.[63] Programming staff in the United States also included both men and women and distributed work among them by gender. At Metropolitan, for example, five men served as lead programmers, while one man and three women performed flowchart and coding functions in assistant positions.[64] The work distribution among Allianz programmers probably followed a similar gender division. In addition to the programming staff, BWA hired three new computer operators, including a man, a woman who transferred from the punch card department, and an unmarried woman; two unmarried women were hired for support functions, such as archiving magnetic tape and typing. Hiring women and former punch card operators as computer operators seems to have been a common practice in Europe. For example, at the British company Tube Investments Ltd. women usually took a keypunch exam, then worked for three years in the keypunch department and for about two years as tabulating machine operators, learning to operate virtually all punch card machines before they were trained as computer operators for the IBM 1401. The best 1401 operators later operated the larger IBM 7070.[65] Following these precedents, a large portion of Allianz's technical computer personnel had

the demographic characteristics of routine staff and were presumably paid at comparatively low levels.

BWA continued to emphasize its small staff as one of the reasons that the Allianz computing center was more cost efficient than typical computer centers in the United States. By the early 1960s, BWA found that US companies allowed the cost of programming personnel to amount to 50 percent of a computer installation's rental price. While direct comparisons are problematic because the currency conversion and different salary levels lead to an undercalculation of salary and overcalculation of machine costs, BWA emphasized that in 1963, even after the massive increase in personnel in the previous year, the programming costs only amounted to 20 percent of the machine rental. While this cost ratio was a slight decrease from the operations of the IBM 650, which had achieved personnel cost ratios of 16.9 percent in 1957 and 18.5 percent in 1958, BWA still celebrated it as a remarkable accomplishment.[66] By 1964 BWA had only minimally increased its computing staff to eighteen, thus running the computing center with less than a third of the staff common in comparably large computer installations in the United States.[67]

BWA's focus on the computing staff conceals another labor effect of computerization, particularly as Allianz's computing department took over more and more daily operations. For an electronic computer to process office operations, information first needed to be converted into a computer-legible format. At Allianz, as at most computer installations in the 1960s, this was done by transferring the information to punch cards and feeding it into the computer. As the computer took over more and more operations, increasing amounts of information needed to be entered into punch cards, which created an often neglected yet essential group of keypunch operators. At Allianz, BWA reported that the overall number of employees in the punch card departments remained stable at about 350 in the decade after the introduction of the IBM 650. This apparent stability concealed a shift within the departments: the proportion of keypunch operators within the departments increased from less than 50 percent in 1956 to almost 70 percent in 1966.[68] In other words, the number of keypunch operators grew by about seventy, creating a group that would have to be taken into account in productivity calculations. As noted earlier, however, BWA did not include the costs of the keypunch operations in its reports for the computing center.

BWA managerial staff also continued to use the computing center to elevate its own position in relation to other Allianz departments. When planning for the installation of the second computer, BWA even

advocated centralizing not only the organization of work but also the data processing operations. BWA argued that a centralized computer system—consisting of an IBM 7070 and two 1401s in Munich or elsewhere—would be the best system for averting personnel issues, assuring uniform work processes, and saving costs because space and air-conditioning would need to be provided at only a single location. If this scenario had become reality, the branch offices would have punched and tested the punch cards, and the computer center would have performed all other work. The considerations for centralizing Allianz's computer operations seem to have been inspired by foreign models. For example, Schäfer reported in 1959 that most American property insurance companies installed their computers at their home offices for statistical analyses in the expectation that a central installation increased the uniformity of work processes. BWA also observed that Groupe Drouot, a French insurance company, accepted considerably higher operating costs for its IBM 705 compared to previous operations because the company hoped that computer automation would help establish uniform work processes throughout its recently merged five insurance companies and thus help increase centralized control.

At Allianz, however, the centralization plans did not come to pass, and each branch office was eventually equipped with its own IBM 1401, primarily to print premium bills locally. By the early 1960s, as Müller-Lutz noted, such decentralization was also a common trend among property insurance companies in the United States. According to Müller-Lutz, US property insurance companies increasingly chose more decentralized systems with electronic "satellites" in branch offices, while life insurance companies centralized their operations in their home offices.[69] Allianz's data processing operations thus remained decentralized, and BWA continued to centrally control the local work processes.

BWA also continued to seek control over the office organization in other Allianz departments—efforts that did not pass without resistance. For example, the head of the Allianz administration, Rudolf Eversmann, defended continuing his direct interactions with IBM when Müller-Lutz made "a last effort" to convince him that all contacts with IBM and other organizational matters should be centralized with BWA. Likewise, conflicts with the chief accounting department—which maintained control over its own punch card operations—continued into the late 1960s.[70] BWA insisted throughout the 1960s that planning and coordination should be centralized, and to this end a new committee, the so-called structural commission (Strukturkommission) was formed in 1967.[71] The centralization of planning thus remained a contested issue at Allianz.

While BWA continued gathering information abroad, using IBM equipment, working with a small computer staff, and centralizing its control over Allianz's office organization, the new IBM 7070/1401 installation brought a significant change in its operations. In addition to the statistical tasks previously run on the IBM 650, the IBM 7070 also performed operations such as inventory management, premium billing, and, a little later, payroll. By computerizing these new areas of office work, BWA changed Allianz's daily data processing operations and directly affected operations in the punch card, filing, and other departments. It also created the kind of integrated data processing applications that, in Yates's view, allowed life insurance companies to overcome the productivity paradox.

Allianz's experience with its first two computer generations and their effects on operating costs contributed to the company's remarkable decision to delay the installation of a new computer generation when, in 1965, IBM offered early delivery of one of its third-generation computers, the System/360. BWA, however, estimated that Allianz's current computer would still provide sufficient capacity for several years. Undertaking another computer transition only three years after installing the 7070/1401s would have forced Allianz to forfeit the cost-efficiency that BWA expected to occur after three or four years of operations. In addition, Allianz had spent DM 1.5 million to upgrade its IBM 7070 into a larger 7074 system as recently as 1963.[72] An early delivery of the System/360 would have devalued this investment. Loath to undertake the extra programming work required for a transition, BWA preferred to optimize its current equipment and to implement uniform procedures across all branch offices to prepare for a smooth transition to the next computer generation at a later time. BWA's traditional cost-consciousness favored a more conservative, slower transition to the next computer generation.

BWA also seems to have been wary of being sold unproven technology. BWA members noted that sales for the IBM 360 did not measure up to IBM's expectations, despite considerable advertising, and they doubted whether IBM's assurance that 1401 programs could be transferred to the 360 without problems would prove true. Müller-Lutz found these suspicions confirmed during a trip to the United States a few months after rejecting IBM's offer. US computer experts stated that the transition to the 360 required considerable reprogramming, that the 360 was not yet fully developed, and that the severe competition in the computer market may have led to premature announcement and delivery of the 360.[73]

Last but not least, IBM's vice president, Manfred P. Wahl, extended the System/360 offer in an attempt to repair chilled customer relations with Allianz. BWA had learned several months earlier that IBM had installed a high-speed 1401 printer at Albingia, an insurance company in Hamburg. This high-speed printer increased the capacity of a 1401 computer to such a degree that Allianz would be able to return several of its rental 1401s. IBM discouraged Allianz from pursuing the printer because it was a special printer (not in serial production) that had many technical problems. But Müller-Lutz suspected that IBM sought to keep customers from enhancing their 1401s with the printer in order to prevent others from holding back their 360 orders.[74] Delivery delays, however, prevented Allianz from immediately acquiring the printer. Eager to install these new printers, Allianz disapproved of IBM's preferential treatment of Albingia, and BWA calculated that the delay cost Allianz DM 400,000–600,000, a considerable amount for the cost-conscious department. IBM's offer of a System/360 was an unwelcome consolation, because rather than optimizing the current computer system, yet another system transition would create disruptions and additional costs.[75] Allianz eventually installed an IBM System/360 in 1968, after a three-year deferral; however, this wait was a logical consequence of Allianz's priority for cost savings over the exploitation of first-mover advantages.

Conclusion

Allianz was an unlikely computer pioneer in 1956, cost conscious and risk averse. In 1956 postwar West Germany, Allianz acquired an electronic computer despite conditions that might have weighed against its doing so: the company had only completed its new headquarters two years earlier; denazification and restitution had bound up corporate manpower and financial resources for years; bank credits were scarce; and low salary levels and abundant labor made manual information processing a viable alternative to machine operations. At Allianz, the computer became an ultimate arbiter of numeric objectivity. Computer calculations also projected an air of objectivity, giving Allianz management the aura of making its managerial decisions on the basis of computable (that is, universal) information.[76] Finally, Allianz's meticulously quantified reports expunged any fear that the decision to acquire the computer would have been uncertain or risky. Allianz's management helped boost BWA's position by allowing the department to assert centralized control over the company's office operations. And although a closer historical reading casts doubt over some of the quantified claims,

the numbers seemed to speak for themselves, making the rational argument of cost reduction.

Promising cost savings without requiring risky changes in Allianz's daily operations, the IBM 650 met Allianz's needs in the mid-1950s. As BWA continued to adopt electronic computers and other rationalization technologies and methods, the company stayed true to its principle of cost reduction. By the early 1970s, an Allianz executive still emphasized that the company wanted not only to "replace human labor with machine labor" but also to achieve "appropriate cost savings."[77] Combining the computer installation with an extensive rationalization program enabled BWA to acquire an electronic computer in 1956 in an economic and political climate that was otherwise hostile to the acquisition of unproven capital-intensive machinery. It also caused Allianz to deviate from the technological trajectory toward ever faster and more powerful systems that IBM and other computer manufacturers pursued. Instead of acquiring the latest equipment at the earliest possible time, BWA sought to optimize the use of its current computer system, turning Allianz from an early into a late adopter by the late 1960s.[78]

Allianz displayed remarkable cost-consciousness in its computer operations. BWA's countless reports sought to show that Allianz realized significant cost reductions through its computing operations. The extraordinarily sparse staffing of BWA's computing center certainly contributed to this cost reduction. Nevertheless, despite BWA's meticulous documentation of the computing center operations, any attempt at calculating the company's productivity increases has to remain incomplete because of a lack of information on factors that BWA managers did not take into account—for example, the work of the increasing number of keypunch operators who provided essential support functions for the computing center. Allianz's example thus demonstrates the problems of historically determining productivity increases from information technology.

Finally, BWA's managerial staff used the computer installation to assert their control over Allianz's punch card and office operations. Previously, local punch card managers and the heads of Allianz's line departments oversaw the operations in their departments; they decided which operations were done and in which way. Now, BWA argued that the central computer operations required standardization of punch card and other clerical work that produced the data for automatically processing; only if the data were uniform could automatic processing be efficient. Not surprisingly, BWA's pursuit of more control met with resistance, and it pitched BWA's managerial staff against managerial staff in other Allianz departments. Technology historian David Noble

has shown that industrial automation in the United States increased the control of corporate management over shop floor operations. Similarly, automation at Allianz increased the control of BWA management over Allianz's office operations. Although in industrial automation the changes in control pitched white-collar against blue-collar employees, the changes in control at Allianz occurred within the white-collar workforce; they pitched the often young, college-educated BWA staff against experienced managerial staff who had mostly started as apprentices in the insurance industry and who had risen through the ranks of Allianz management.

Notes

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1. "Niederschrift über die am 22. August 1955 abgehaltene (13.) Arbeitsbesprechung der Betriebswirtschaftlichen Abteilung" [Minutes of 13th Working Meeting of Betriebswirtschaftliche Abteilung on August 22, 1955], in Betriebswirtschaftliche Abteilung, "Bericht der Betriebwirtschaftlichen Abteilung," 1955–56, 4, Jahresberichte BWA [BWA annual reports], Allianz Firmenarchiv, Munich, Germany.

2. Allianz's IBM 650 was directly delivered from the United States. Another electronic computer, a Remington Rand UNIVAC, was delivered to Germany later the same year but installed in a computing center in Frankfurt with the goal of renting time on the computer to German and European companies unable to afford their own computer installation. For a discussion of IBM's and Remington Rand's corporate strategies in Europe, see Corinna Schlombs, "Engineering International Expansion: IBM and Remington Rand in European Computer Markets," *IEEE Annals for the History of Computing* 30, no. 4 (2008): 42–58.

3. Theodore M. Porter, *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life* (Princeton, NJ: Princeton University Press, 1995).

4. Herman Lukoff, *From Dits to Bits: A Personal History of the Electronic Computer* (Portland, OR: Robotics Press, 1979), 139.

5. JoAnne Yates, *Structuring the Information Age: Life Insurance and Technology in the Twentieth Century* (Baltimore: Johns Hopkins University Press, 2005), 8, 168–71, 252, 262. Yates refers to a debate among economists, management scholars, and business and computer historians about the apparent paradox that productivity numbers in the United States had slowed since the early 1970s despite the increasing use of information technology at the same time. Nobel Laureate Robert Solow opened this debate with a famous quip: "We see computers everywhere except in the productivity statistics." Robert Solow, "We'd

Better Watch Out: Review of S. S. Cohen and J. Zysman, *Manufacturing Matters: The Myth of the Post-Industrial Economy*," *New York Times Book Review* (July 12, 1987): 36. Some argued that the benefits from computer investments occurred with a time lag, only after a corporate learning and adaptation phase, and that information technology investments benefited individual firms in relation to their competitors and therefore had redistributive effects at the industry-wide and national economic level, without having increases in overall productivity. In addition, management scholars addressed questions of how to appropriately manage information technology. For further discussion of the productivity paradox, see Stuart Macdonald, Pat Anderson, and Dieter Kimbel, "Measurement or Management? Revisiting the Productivity Paradox of Information Technology," *Vierteljahrshefte zur Wirtschaftsforschung* 69, no. 4 (2000): 601–17; Erik Brynjolfsson, "The Productivity Paradox of Information Technology," *Communications of the ACM* 36, no. 12 (1993): 67–77; Erik Brynjolfsson and Lorin M. Hitt, "Beyond the Productivity Paradox: Computers Are the Catalyst for Bigger Changes," *Communications of the ACM* 41, no. 8 (1998): 49–55.

6. For a discussion of first-mover advantages and disadvantages in computing, see William Aspray, "Was Early Entry a Competitive Advantage? US Universities That Entered Computing in the 1940s," *IEEE Annals of the History of Computing* 22, no. 3 (2000): 42–87. Allianz provides a study of how computing practices are "shaped by local circumstances and distinct cultures," in this case postwar Germany, and "yet capture wider and longer-term processes where computing has manifestly shaped the world." Thomas J. Misa, "Understanding 'How Computing Has Changed the World,'" *IEEE Annals of the History of Computing* 29, no. 3 (2007): 52–63, 52.

7. For an analysis of the postwar German economy, see Werner Abelshauser, "Probleme des Wiederaufgaus der westdeutschen Wirtschaft 1945–1953," *Wirtschaft und Gesellschaft* 5 (1979): 208–53; Werner Abelshauser, *Deutsche Wirtschaftsgeschichte: Von 1945 bis zur Gegenwart* (Munich: Beck, 2011; originally published in 2004). Postwar analyses have shown that air raids often missed manufacturing plants, including those in the armaments industry, because they lacked precision, leaving mostly intact the German manufacturing infrastructure located outside urban centers.

8. Alfred Chandler, *The Visible Hand: The Managerial Revolution in American Business* (Cambridge, MA: Harvard University Press, 1977).

9. Martin Campbell-Kelly, "Large-Scale Data Processing in the Prudential, 1850–1930," *Accounting, Business and Financial History* 2, no. 2 (1992): 117–39.

10. For the introduction of punch card machinery in banking in the 1920s, how it shaped bank organization and data processing, and the later introduction of electronic computers, see Lars Heide, *Punched Card Systems and the Early Information Explosion 1880–1945* (Baltimore: Johns Hopkins University Press, 2009); Hubert Bonin, "From Prehistory to the History of Computers in Banking: Mechanization of Data Processing and Accounting Methods in French Banks, circa 1930–1950," in Bernardo Bátiz-Lazo, J. Carles Maixé-Altés, and Paul Thomes, eds., *Technological Innovation in Retail Finance. International Historical Perspectives*, 15–36 (New York: Routledge, 2011).

11. Check processing was the immediate need for which US banks acquired computing technology. See Amy Weaver Fisher and James L. McKenney,

"The Development of the ERMA Banking System: Lessons from History," *IEEE Annals of the History of Computing* 15, no. 1 (1993): 44–57. For the US financial industry more generally, see James W. Cortada, *The Digital Hand*, vol. 2: *How Computers Changed the Work of American Financial, Telecommunications, Media, and Entertainment Industries* (New York: Oxford University Press, 2006); Yates, *Structuring the Information Age*. Check processing was also an urgent need for the British banking sector. See Bernado Bátiz-Lazo and Peter Wardley, "Banking on Change: Information Systems and Technologies in UK High Street Banking, 1919–1969," *Financial History Review* 14, no. 2 (2007): 177–205; Alan Booth, "Technical Change in Branch Banking at the Midland Bank, 1945–75," *Accounting, Business and Financial History* 14, no. 3 (2004): 277–300. More generally, see Alan Booth, *The Management of Technical Change: Automation in the UK and USA since 1950* (New York: Palgrave Macmillan, 2007), 117–64. For the German banking sector generally, see Jürgen Mura, *Entwicklungslinien der deutschen Sparkassengeschichte* (Stuttgart: Deutscher Sparkassenverlag, 1994); Hans Pohl, Bernd Rudolph, and Günther Schulz, *Wirtschafts- und Sozialgeschichte der deutschen Sparkassen im 20. Jahrhundert* (Stuttgart: Deutscher Sparkassenverlag, 2005); Eckard Wandel, *Banken und Versicherungen im 19. und 20. Jahrhundert* (Munich: Oldenbourg, 1998). For data processing in German banks, see Corinna Schlombs, "Productivity Machines: Transatlantic Transfers of Computing Technology and Culture in the Cold War" (PhD diss., University of Pennsylvania, 2010), 196–298; Paul Thomes, "Is There an ICT Path in the German Savings Banking Industry? Circa 1900–1970s," in Bátiz-Lazo, Maixé-Altés, and Thomes, *Technological Innovation*, 119–36.

12. Ludwig Arps, *Wechselvolle Zeiten: 75 Jahre Allianz Versicherung 1890–1965* (Munich: Allianz Versicherungs-AG, 1965), 227.

13. Yates, *Structuring the Information Age*, 150, 156, 160.

14. For Allianz's corporate history after World War II, see Arps, *Wechselvolle Zeiten*; Peter Borscheid, *100 Jahre Allianz* (Munich: Allianz Aktiengesellschaft Holding, 1990); Barbara Eggenkämper, Gerd Modert, and Stefan Pretzlik, *Allianz: The Company History 1890–2015* (Munich: C. H. Beck, 2015); Gerald D. Feldman, *Allianz and the German Insurance Business, 1933–1945* (Cambridge: Cambridge University Press, 2001), 444–538.

15. Literally translated, *Betriebswirtschaftliche Abteilung* means "business administration department." BWA, however, devoted itself to organizational rather than general managerial tasks and did not build on the same practice-oriented management education common in business schools in the United States. For BWA's mission, see Heinz-Leo Müller-Lutz, "Ventilgespräch: Referat vor dem Wirtschaftsausschuss der Allianz" [Discussion outlet: presentation to the Allianz economic committee], September 19, 1954, in "Betriebswirtschaftliche Abteilung 1954/55," 82–85, 90, Jahresberichte BWA, Allianz Firmenarchiv; "Zweite Arbeitsbesprechung über Lochkarten-Fragen, München, 29. November bis 2. Dezember 1955" [Second working meeting on punch card questions, Munich, November 29 to December 2, 1955], 6–7, box 2, Entwicklung EDV, Allianz Firmenarchiv, hereafter "Zweite Arbeitsbesprechung Lochkarten-Fragen." On Müller-Lutz's career, see Eggenkämper et al., *Allianz*, 224–29.

16. Barbara Eggenkämper, Gerd Modert, and Stefan Pretzlik, *Bits and Bytes for Business: 50 Jahre EDV bei der Allianz* (Munich: Allianz Deutschland AG, 2006); Eggenkämper et al., *Allianz*, 227–28.

17. Heinz-Leo Müller-Lutz, "Gutachten zur Frage der Automation," undated typescript, 10, box 1, Entwicklung EDV, Allianz Firmenarchiv; Heinz-Leo Müller-Lutz and Otto Ladner, "Bericht über eine Reise nach USA zum Studium der Büroorganisation der amerikanischen Versicherungswirtschaft, unter besondere Berücksichtigung der Verwendung von Lochkarten und anderen modernen Büromaschinen" [Report on a trip to the United States to study office organization in the American insurance industry with special consideration of punch card and other modern office machines], 1954, 11, box 2, Entwicklung EDV, Allianz Firmenarchiv, hereafter "USA Reise 1954."

18. Müller-Lutz and Ladner, "USA Reise 1954," 9–10, Allianz Firmenarchiv.

19. For the organization of insurance companies in the United States, see Heinz-Leo Müller-Lutz and von Denffer, "Reise nach den Vereinigten Staaten von Amerika vom 12. November bis 7. Dezember 1952" [Trip to the United States from November 12 to December 7, 1952], December 1952, 9–23, box 2, Entwicklung EDV, hereafter "USA Reise 1952"; Müller-Lutz and Ladner, "USA Reise 1954," 16–32.

20. Müller-Lutz and Ladner, "USA Reise 1954," 12.

21. Müller-Lutz called for a "sinngemässe Übertragung unter Berücksichtigung der besonderen landsmannschaftlichen Eigenheiten." By the mid-1950s, the term *landsmannschaftlich* had come to designate the welfare and cultural associations for Germans born in the eastern areas of the former Reich. Müller-Lutz, "Bemerkungen zu dem Problem der Büroorganisation in den USA" [Remarks on the challenges/issues of office organization in the United States], in Heinz-Leo Müller-Lutz, "Bericht über USA-Reise 1957," November 13, 1957, 3, box 2, Entwicklung EDV, Allianz Firmenarchiv, hereafter "USA Reise 1957."

22. I am grateful to Matthias Knipping, who brought to my attention the crucial role of Germans and other Europeans who continued to adopt American computer technology once the US administration had retreated from this technology exchange despite their apprehensions about technological unemployment.

23. For the argument that Allianz advanced computerization as part of an overall office rationalization program, see Eggenkämper, Modert, and Pretzlik, *Bits and Bytes for Business*.

24. Müller-Lutz and Ladner, "USA Reise 1954," 58–59.

25. Müller-Lutz, "USA Reise 1957," 43.

26. The task of transferring Allianz's cost savings into contemporary dollar values is complicated because a mere currency conversion does not reflect the different cost structures in the United States and Germany in the 1950s. Between 1956 and 1960, one US dollar equaled, on average, DM 4.20. This means, for example, that the average annual salary of the computing center employees at DM 12,476 would have converted to $2,970, far below the salaries paid to the Metropolitan computing staff in 1956, which began at $3,200 for assistant support positions and went to more than $9,000 for the supervising engineer. Yet there are no indications that Allianz's computing staff was paid below-average wages compared to German salaries at the time. On the flipside, the currency conversion inflated Allianz's machine costs in relation to other costs. In 1959, Allianz's monthly rental for the 650 operations was DM 17,202, or the equivalent of $4071.96. Remington Rand, *Electronic*

Data-Processing: Techniques—Methods—Applications; reprint of US Department of Labor, Bureau of Labor Statistics, *The Introduction of an Electronic Computer in a Large Insurance Company* (Philadelphia: Remington Rand UNIVAC, 1956), box 345, Sperry Corporation, UNIVAC Division, Hagley Museum and Library, Wilmington, Delaware. For currency conversion, see R. L. Bidwell, *Currency Conversion Tables: A Hundred Years of Change* (London: Rex Collings, 1970), 22–24, made available by Harold Marcuse at http://www.history.ucsb.edu/faculty/marcuse/projects/currency.htm#tables.

27. Müller-Lutz, "USA Reise 1957," 42.

28. Yates, *Structuring the Information Age*, 177.

29. Müller-Lutz noted in 1957 that this tendency to acquire computers without systematic cost analysis was aggravated during the US insurance crisis of the mid-1950s, when property insurance companies precipitously acquired electronic computers to monitor claims and sell unprofitable branches. He also reported that two insurance companies similar in size and business structure to Allianz, Liberty Mutual in Boston and Lumbermans in Chicago, decided against electronic computers precisely for the reason that the cost analysis did not show sufficient returns. Müller-Lutz, "USA Reise 1957," 42, 58–59; Heinz-Leo Müller-Lutz and Hans-Willy Schäfer, "Zwischenbericht der Elektronischen Experimentier- und Planungsgruppe (EEP) für die Zeit bis Ende 1958" [Interim report of the electronic experiment and planning group (EEP) for the period to December 1958], March 10, 1959, 11, in Heinz-Leo Müller-Lutz and Hans-Willy Schäfer, "Jahresbericht: Der Magnettrommel-Rechner IBM 650 im Rechenzentrum GD. Einsatz im Jahre 1959 und Planung für 1960" [Annual report: The magnetic drum calculator IBM 650 at the directorate-general computing center; operation in 1959 and planning for 1960], February 27, 1960, Jahresberichte BWA, Allianz Firmenarchiv, hereafter "Zwischenbericht EEP."

30. There are indications that Allianz's general director, Hans Goudefroy, personally took an interest in electronic computer technology in 1953. But it remains an open question whether and how far Goudefroy pushed for Allianz to acquire a computer at the time. "1.3.1965: 10 Jahre Rechenzentrum" [March 1, 1965: 10 years computing center], *Unser Adler* 3 (1965): 3; Hans-Willy Schäfer, "Bericht: 10 Jahre Rechenzentrum—Der Einsatz unserer elektronischen Datenverarbeitungsanlagen von 1955 bis 1965" [Report on 10 years computing center: Operation of our electronic data processing equipment from 1955 to 1965], in "Jahresbericht 1965 (XI)," 1, Jahresberichte BWA, Allianz Firmenarchiv, hereafter "Bericht 10 Jahre Rechenzentrum."

31. German companies, of course, had developed office machinery including desktop calculating machines such as the Brunsviga, and the German IBM licensing company Dehomag and Siemens & Halske offered punch card machines. Independently, Konrad Zuse had developed electromechanical computing machines during World War II and, after the war, turned to electronic technology. Likewise, Heinz Nixdorf began developing electronic computers after the war, and the technical universities of Darmstadt and Munich constructed one-of-a-kind scientific machines. While Zuse and Nixdorf's start-up companies did not provide office machine experience or support, the Deutsche Forschungsgemeinschaft—the German equivalent of the National Science Foundation in the United States—only began systematically funding electronic computer development in 1956 with a program aimed at encouraging large

technical companies such as IBM, Siemens & Halske, SEL, and Telefunken to develop large- and medium-sized electronic computers primarily for academic use. Hartmut Petzold, *Rechnende Maschinen: Eine historische Untersuchung ihrer Herstellung und Anwendung vom Kaiserreich bis zur Bundesrepublik* (Düsseldorf: VDI, 1985); Rolf Zellmer, "Die Entstehung der deutschen Computerindustrie: Von den Pionierleistungen Konrad Zuses und Gerhard Dirks' bis zu den ersten Serienprodukten der 50er und 60er Jahre" (PhD diss., Cologne University, 1990).

32. Müller-Lutz and Ladner also visited Scriptomatic, Addressograph, and Burroughs, which announced a high-speed printer while Müller-Lutz and Ladner were in the United States. Three years later, Müller-Lutz visited ten on his list of twenty electronic computer companies. This long list included companies that are rarely mentioned in the history of computing, such as Stewart-Warner in Chicago; Marchand, Potter in Great Neck, New York; General Dynamics in Rochester; and Shepard and Annelex in Boston. This list indicates how widely open the emerging computing field was in the mid-1950s. Müller-Lutz and Ladner, "USA Reise 1954," 63; Müller-Lutz, "USA Reise 1957" 9. In the United States, office machine companies such as IBM, NCR, Burroughs, and Remington Rand actively pursued the market for electronic computers through marketing, education, and service to recruit customers. They proved to be more successful in doing so than competitors in the electronics industry and start-up companies. James W. Cortada, *IBM, NCR, Burroughs, and Remington Rand and the Industry They Created, 1865–1956* (Princeton, NJ: Princeton University Press, 1993); Martin Campbell-Kelly, William Aspray, Nathan Ensmenger, and Jeffrey R. Yost, *Computer: A History of the Information Machine*, 3rd ed. (Boulder, CO: Westview, 2013).

33. Müller-Lutz and Ladner, "USA Reise 1954," 61–63.

34. The Allianz Frankfurt branch office closely cooperated with the Frankfurter insurance company, which Allianz bought in the late 1920s. The insurance company had already formed a punch card department in 1926 and worked with equipment manufactured by the Powers Tabulating Machine Company. Powers technology formed the basis of Remington Rand's punch card operations when the two companies merged in the late 1920s, and Allianz's Frankfurt departments bought a new Remington Rand tabulating machine in 1948, possibly through Marshall funding. Eggenkämper, Modert, and Pretzlik, *Bits and Bytes for Business*, 40–46.

35. Along this line, JoAnne Yates states that many IBM punch card customers in the insurance industry installed an IBM 650 because of additional features; for example, they could continue to use punch cards as a recording medium and work with the same input and output peripherals. Yates, *Structuring the Information Age*, 73, 112, 175.

36. IBM rejected Müller-Lutz's request for developments tailored toward Allianz's needs, pointing to the company's need to focus on mass market production. By contrast, in the late 1940s, Prudential's Edmund C. Berkeley had still been able to shape the development of what would eventually become Remington Rand's UNIVAC computer. Joanne Yates, "Early Interactions between the Life Insurance and Computer Industries: The Prudential's Edmund C. Berkeley," *IEEE Annals of the History of Computing* 19, no. 3 (1997): 60–73.

37. The special service agreement, which was to be kept confidential, ended in 1959 when IBM again placed Allianz under its German subsidiary. In

1956, Allianz had received one of the first serially produced IBM 650s, before the German subsidiary began producing the machine in Sindelfingen. But by 1959, the German subsidiary was able to offer IBM's full machine range and to adapt the machines to German conditions, for instance, by converting electronic computers from 60 to 50 hertz. Müller-Lutz and Ladner, "USA Reise 1954," 64, 102; Hans-Willy Schäfer, "Bericht: Amerika-Reise vom 14.10. bis 18.12.1959" [Report: Trip to America from October 14 to December 18, 1959], February 3, 1960, 50–51, box 2, Entwicklung EDV, Allianz Firmenarchiv, hereafter "USA Reise 1959."

38. "Betriebswirtschaftliche Abteilung 1954/55," 103. By 1954, the retired General MacArthur was the head of Remington Rand. MacArthur may have helped Remington Rand obtain military funding and compete in military markets. It is doubtful, however, that he would have been able to foster a warm relationship with Müller-Lutz at a time when Germany was still under Allied control.

39. Müller-Lutz and Ladner, "USA Reise 1954," 58, 63.

40. Yates, *Structuring the Information Age*, 147–92, 237–51. A few medium-size insurance companies, such as the Equitable Life Assurance and Aetna Life Insurance, began with several IBM 650s and gradually migrated to larger IBM computers as their computing needs grew.

41. The additional difference—Remington Rand's UNIVAC operated with magnetic tape rather than punch cards—seems to have played a minor role in BWA's decision. Many US insurance companies were reluctant to directly migrate to magnetic tape because of legal requirements for recordkeeping. Müller-Lutz, however, initially even felt the IBM computers were slower than the UNIVAC because they operated with punch cards. In his view, IBM remained tied to the slower punch card operations because magnetic tape would have rendered existing IBM punch card machines superfluous and would have eliminated IBM's income from the sale of punch cards. Yates, *Structuring the Information Age*, 112, 175; Müller-Lutz and Ladner, "USA Reise 1954," 61–63.

42. Heinz-Leo Müller-Lutz and Hans-Willy Schäfer, "Jahresbericht: Der Magnettrommel-Rechner IBM 650 im Rechenzentrum GD, Einsatz im Jahre 1958 und Planung für 1959" [Annual report: The magnetic drum calculator IBM 650 at the directorate-general computing center; operation in 1958 and planning for 1959], February 27, 1959, 17–21, Jahresberichte BWA, Allianz Firmenarchiv, hereafter "Jahresbericht IBM 650 Einsatz 1958." A more critical question would have been how many clerk work hours the IBM 650 could accomplish in one of its average operating hours—information that BWA neglected to provide.

43. "Betriebswirtschaftliche Abteilung 1954/55," 23–24.

44. The total savings of DM 19,254 in 1959 were roughly equal to the monthly rental for the IBM 650 at DM 17,102 in 1959 and amounted to about half of the annual personnel expenses of the computing center at DM 43,668 in 1959. Müller-Lutz and Schäfer, "Jahresbericht IBM 650 Einsatz 1958," 17–21.

45. Schäfer, "Bericht 10 Jahre Rechenzentrum," 3.

46. For the performance of US life insurance companies, see Yates, *Structuring the Information Age*.

47. Müller-Lutz, "USA Reise 1957," 53.

48. For the development of Allianz's IBM 650 computing staff, see Heinz-Leo Müller-Lutz and Hans-Willy Schäfer, "Jahresbericht: Der

Magnettrommel-Rechner IBM 650 im Rechenzentrum GD, Einsatz im Jahre 1957 und Planung für 1958" [Annual report: The magnetic drum calculator IBM 650 at the directorate-general computing center; operation in 1957 and planning for 1958], February 25, 1958, 22, Jahresberichte, Allianz Firmenarchiv, hereafter "Jahresbericht IBM 650 Einsatz 1957"; Müller-Lutz and Schäfer, "Jahresbericht IBM 650 Einsatz 1958"; "Protokoll EEP 29 der Elektronischen Experimentier- und Planungsgruppe: Besprechung am 26.5.61 in München" [Protocol EEP 29 of electronic experiment and planning group: Meeting on May 26, 1961, in Munich], June 12, 1961, 6, in "VIII Jahresbericht (1.3.61–28.2.61)," Jahresberichte BWA, Allianz Firmenarchiv; "1.3.1965: 10 Jahre Rechenzentrum," *Unser Adler* 3 (1965): 3.

49. Yates, *Structuring the Information Age*, 182.

50. Diebold's observation that European companies generally operated their computers "with a minimum number of people" supports this argument. Lacking aggregate data, individual examples may provide comparative insight into the staffing of US computing centers. The Franklin Life Insurance Company, for example, a relatively small company with only 600,000 insurance policies, employed a staff of 64 for its UNIVAC installation, including 10 programmers, 9 engineering and technical staff, 30 clerical coders, 13 unitypists, and 2 administrative staff. Metropolitan Life Insurance Company similarly employed 20 operating staff for its UNIVAC installation, plus 14 programmers initially and 9 later. John Diebold, Associates, Inc., *A Study of the European Market for Computers: Prepared for Remington Rand, Division of Sperry Rand Corporation*, 8, box 3, folder 2, CBI 178, The Diebold Group, Inc., Client Reports 1957–1990, Charles Babbage Institute, Minneapolis, MN; John Diebold & Associates, Inc. "UNIVAC Applications in Two Insurance Companies," Methods Report June 29, 195614, box 65, folder 3, CBI 32 National Bureau of Standards Computer Literature Collection, Charles Babbage Institute; US Department of Labor, Bureau of Labor Statistics, "Studies of Automatic Technology No. 2: The Introduction of an Electronic Computer in a Large Insurance Company," October 1955, 7–8, box 40, entry 1058 SRE Special Representative in Europe, Deputy for Economic Affairs; Productivity and Technical Assistance Division, Subject Files, 1950–56, RG 469 Records of US Foreign Assistance Agencies, 1948–1961, National Archives II, College Park, Maryland.

51. While the issue of control has been studied for industrial automation in the United States, the related issues of centralization and control in office automation remain remarkably understudied. Even Yates does not directly address this issue in her study of control and office mechanization. JoAnne Yates, *Control through Communication: The Rise of System in American Management* (Baltimore: Johns Hopkins University Press, 1989). For centralization in industrial automation in the United States, see David F. Noble, *Forces of Production: A Social History of Industrial Automation* (New York: Knopf, 1984).

52. For a list of special tasks, see "Zweite Arbeitsbesprechung Lochkarten-Fragen," 14–16.

53. "Bericht der Betriebwirtschaftlichen Abteilung," 1956–57, 27.

54. "Betriebswirtschaftliche Abteilung 1954/55," 82; "Zweite Arbeitsbesprechung Lochkarten-Fragen," 6, Allianz Firmenarchiv; "Bericht der Betriebwirtschaftlichen Abteilung," 1955–56, 50, Jahresberichte BWA, Allianz Firmenarchiv.

55. "Zweite Arbeitsbesprechung Lochkarten-Fragen," 30–31; "Niederschrift über die am 19. und 28. Dezember 1956 abgehaltene Monatsbesprechung der Betriebswirtschaftlichen Abteilung" [Minutes of the monthly meeting of the Betriebswirtschaftliche Abteilung on December 19 and 28, 1956], 3, in "Bericht der Betriebwirtschaftlichen Abteilung," 1956–57.

56. "Niederschrift über die am 22. August 1955 abgehaltene (13.) Arbeitsbesprechung der Betriebswirtschaftlichen Abteilung" [Minutes of the (13th) working meeting of the Betriebswirtschaftliche Abteilung on August 22, 1955], September 1, 1955, 1–2, in "Bericht der Betriebwirtschaftlichen Abteilung," 1955–56.

57. Müller-Lutz, "USA Reise 1957," 12–13.

58. A technological lock-in effect thus seems to have worked at Allianz after the first computer installation, not before. Müller-Lutz, "USA Reise 1957," 15–16.

59. Schäfer, "USA Reise 1959," 73, 75.

60. Müller-Lutz and Schäfer, "Schlussbericht der Elektronischen Experiementier- und Planungsgruppe (EEP) über den Einsatz von electronischen Rechengeräten in der Allianz. 15.2.1960" [Final report of the electronic experiment and planning group (EEP) about the operation of electronic calculators at Allianz, February 15, 1960], 11, in "Bericht der Betriebswirtschaftlichen Abteilung" 1959–60.

61. Otto Tix and Hans-Willy Schäfer, "Jahresbericht: Die elektronischen Datenverarbeitungsanlagen IBM 7070 und IBM 1401 im Rechenzentrum GD: Einsatz im Jahre 1962 und Planung für 1963" [Annual Report: The electronic data processing equipment IBM 7070 and IBM 1401 at the directorate-general computing center; operation in 1962 and planning for 1963], April 10, 1963, 3–4, 11, "Jahresbericht 1962 (IX)," Jahresberichte BWA, Allianz Firmenarchiv.

62. Ibid., 11–12.

63. In the 1950s and 1960s, Germans commonly distinguished between addressing a woman as Fräulein (Miss) or Frau (Mrs.). Allianz reports also distinguish the two forms of address, allowing identification of the marital status of Allianz's female employees. While it is likely that the majority of Allianz's unmarried female staff were young, a small number among them may have been older women who had not married. Ibid., 11–12. For a 1963 personnel roster of the Allianz computing center, see "Protokoll EEP 45 der Elektronischen Experimentier- und Planungsgruppe: Besprechung am 3.7.1963 in München" [Protocol EEP 45 of the electronic experiment and planning group: Meeting on July 3, 1963, in Munich], August 7, 1963, 21], in "Jahresbericht 1964 (X)," Jahresberichte BWA, Allianz Firmenarchiv, hereafter "Protokoll EEP 45."

64. US Department of Labor, Bureau of Labor Statistics, "Studies of Automatic Technology No. 2: The Introduction of an Electronic Computer in a Large Insurance Company," October 1955, 8, box 40, entry 1058, RG 469, National Archives II.

65. In addition, Tube Investments Ltd. trained men to operate computers on night shifts. Hans-Willy Schäfer, "Aktennote: Fifth European Guide Conference in Kopenhagen vom 19. bis 22. Mai 1964," June 9, 1964, 8–9, in "Jahresbericht 1964 (X)," Jahresberichte BWA, Allianz Firmenarchiv.

66. "Protokoll EEP 45," 10–11. For the cost structure of the IBM 650 operations, see Müller-Lutz and Schäfer, "Jahresbericht: IBM 650 Einsatz 1957," 22;

Müller-Lutz and Schäfer, "Jahresbericht IBM 650 Einsatz 1958," 18. Of course, the currency exchange rate affected these ratios, inflating Allianz's machine costs over its labor costs, as discussed in note 26.

67. "1.3.1965: 10 Jahre Rechenzentrum," *Unser Adler* 3 (1965): 3.

68. *BWA Kurznachrichten* 16 (1966), Jahresberichte BWA, Allianz Firmenarchiv. The ratio of keypunch to tabulating machine operators seems to have persisted into the 1970s. Heinz-Leo Müller-Lutz, "EDV-Situationsbericht," 1972, 9, box 2, Entwicklung EDV, Allianz Firmenarchiv. This increase in mostly female keypunch operators upended the predictions of many contemporary computer proponents, who either expected computing equipment to replace manual clerical work or hoped computers would help control female clerical staff who often opted with their feet against low-paid, routine work that promised little professional advancement. Bátiz-Lazo and Wardley, "Banking on Change," 200; Booth, *Management of Technical Change*, 117–26. The need for keypunch operations has also been commonly ignored in the historiography of computing.

69. Schäfer, "USA Reise 1959," 70–71; "Protokoll EEP 45," 10; Müller-Lutz and Schäfer, "Zwischenbericht EEP," 25.

70. Rudolf Wilhelm Eversmann to Heinz-Leo Müller-Lutz, March 3, 1956, box 1, Entwicklung EDV, Allianz Firmenarchiv; Heinz-Leo Müller-Lutz to Alfred Haase, November 6, 1967, box 1, Entwicklung EDV, Allianz Firmenarchiv.

71. Müller-Lutz and Schäfer, "Schlussbericht EEP," 13; Müller-Lutz and Schäfer, "Zwischenbericht EEP," 29–30; "Protokoll EEP 31 der Elektronischen Experimentier- und Planungsgruppe: Besprechung am 1.9.61 in München" [Protocol EEP 31 of the electronic experiment and planning group: Meeting on September 1, 1961, in Munich], September 18, 1961, 3–4, "VIII. Jahresbericht (1.3.61–28.2.62)," Jahresberichte BWA, Allianz Firmenarchiv; "Protokoll EEP 44 der Elektronischen Experimentier- und Planungsgruppe: Besprechung am 4.4.1963 in München" [Protocol EEP 44 of the electronic experiment and planning group: Meeting on April 4, 1963, in Munich], June 20, 1963, 2, 10, in "Jahresbericht 1964 (X)," Jahresberichte BWA, Allianz Firmenarchiv; Loy, "Niederschrift über die 15. Arbeitsbesprechung der Lochkartenabteilungsleiter in München vom 13.–14.4.1964" [Minutes of the 15th working meeting of the punch card department heads in Munich on April 13–14, 1964], April 21, 1964, 14, Jahresberichte BWA, Allianz Firmenarchiv; "Jahresbericht 1967 (XIV)," 1, Jahresberichte BWA, Allianz Firmenarchiv.

72. "Protokoll EEP 45," 17.

73. "Anhang 1: Bericht über den Aufenthalt in den USA vom 14.–24.10.1965" [Appendix 1: Report about the trip to the United States October 14–24, 1965], 1, 3, in "Protokoll AGID 11 der Arbeitsgruppe für integrierte Datenverarbeitung: Besprechung am 11.11.1965 in München" [Protocol AGID 11 of the working group for integrated data processing: Meeting on November 11, 1965, in Munich], January 3, 1966, Jahresberichte BWA, Allianz Firmenarchiv.

74. "Anhang 1—Aktennotiz: Besuch des Herrn Direktor Dr. Wahl, stellvertretender Generaldirektor der IBM, in München am Freitag dem 21.5.65" [Appendix 1. Memo: Visit of director Dr. Wahl, vice president of IBM, in Munich on Friday, May 21, 1965], May 28, 1965, 2–3, in "Protokoll AGID 9 der Arbeitsgruppe für integrierte Datenverarbeitung: Besprechung am 2.8.65 in München" [Protocol AGID 9 of the working group for integrated

data processing: Meeting on August 2, 1965, in Munich], August 4, 1965, Jahresberichte BWA, Allianz Firmenarchiv.

75. Ibid.

76. Porter, *Trust in Numbers*, 85.

77. Wolfgang Schieren to Heinz-Leo Müller-Lutz, April 11, 1973, box 1, Entwicklung EDV, Allianz Firmenarchiv.

78. Allianz became an early adopter of computer technology although technological leadership was not part of Allianz's business strategy. The example of Allianz's computerization complicates attempts at categorizing companies as "early" or "late" adopters according to their technological policies.