

MARKET POLITICS IN AN AGE OF AUTOMATION

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In 1952 a young management consultant, John Diebold, took the stage to address a crowd of personnel managers in Berkeley, California. Having graduated from Harvard Business School only the year before, Diebold—offset by a tiepin, horn-rimmed glasses, and neatly parted receding hair—had already molded himself in the image of an up-and-coming executive with a reading habit and some daring new ideas. Surveying the pace of technological change since the Second World War, he informed his audience that their time was likely to “be looked upon by the next two generations as the second industrial revolution.” Indeed, “every day new articles” were appearing that described recent technological developments in terms of an epochal shift. He underscored the importance of this transformation with a neologism that would serve as the title of his debut book, and that he would later claim as his own invention: far into the future, he predicted, this would be known as the “age of automation.”¹

Diebold was precocious in describing recent technological developments as a “revolution,” and singularly successful in turning their implications into a lucrative career, but he was right to suggest that such dramatic claims were becoming increasingly common. In the years following his speech, comparisons to the Industrial Revolution coursed through popular literature as journalists, theorists, and futurists struggled to account for the perceived implications of automatic controls. Publications including *Business Week*, *Fortune*, and the *New Republic* discussed the onset of a “Second Industrial Revolution.”² The head of the United Auto Workers, Walter Reuther, warned in testimony before Congress that this “second phase of the industrial revolution” was likely to have a “much greater” impact than the first.³ The economist Kenneth Boulding described the implications of emerging technologies in world-historical terms, arguing that they heralded a “second great transition” from civilized to “postcivilized” society.⁴ Scholars engaged in internecine arguments about how many historical disjunctions could be seen as comparable in scale: the Marxist theorist Ernest Mandel reframed the era as the “long wave of the third technological revolution,”

and the heterodox economist Robert Heilbroner termed it the “fourth industrial revolution.”⁵ But in the early 1950s many observers believed that they were witnessing a generational shift at least as important as the arrival of the steam engine or the onset of mass production, and perhaps more far-reaching in its implications.

Rhetoric of technological upheaval had, of course, been widespread since the earliest years of the Industrial Revolution. For over a century, theorists had argued that the pace of innovation was throwing politics into disarray, as past experience became an unreliable guide for future expectations.⁶ But in the wake of the Second World War, many observers agreed that the implications of new technologies differed from previous eras. Whereas earlier waves of mechanization had drawn laborers away from farms and into urban and industrial employment, new capacities would lead to the effacement of manufacturing labor. As Reuther reported to Congress, the crucial distinction was that “the machine now cannot only replace human power, but can replace human judgments.”⁷ Whereas previously, even the most sophisticated production machinery required a cadre of employees to operate, monitor, and tend to it, future factories might conceivably function with nary a person in sight.

Contemporary sociologists noted that the effacement of human labor from production work already seemed to be well underway. The previous half-century had sustained a precipitous decline in agricultural employment, from over 35 percent in 1900 to 12.5 percent in 1950, but when considered in the aggregate, almost none of this displaced labor had been picked up by industry. Despite spectacular productivity gains and a dramatic decline in working hours for employees, manufacturers continued to employ only about one-quarter of the labor force throughout the first half of the twentieth century.⁸ The engine of new employment had become services, rather than industry. As C. Wright Mills wrote the year before Diebold’s speech in his breakthrough work *White Collar*, ever more workers were employed in “servicing, distributing, and co-ordinating” rather than “the extraction and production of things.”⁹ Mills appeared prescient in 1956, when the Bureau of Labor Statistics announced that white-collar workers now outnumbered blue-collar workers for the first time in the history of any industrialized society.¹⁰ From that point forward, the majority of its citizens would no longer be directly employed in the production of either food or goods. In a

seeming defiance of gravity, the material foundations of the economy were beginning to recede to its margins.

Many of the leading theorists of automated technologies raised ominous questions about the long-term implications of this shift. Norbert Wiener, the MIT mathematician and philosopher of cybernetics, warned that while the “first industrial revolution” had devalued “the human arm by the competition of machinery,” this new era would “devalue the human brain, at least in its simpler and more routine decisions.” The scope of environments where humans could generate value appeared to be ever-diminishing.¹¹ And even those who were sanguine about the aggregate implications of this shift, such as Harvard economist Wassily Leontief, frankly acknowledged that many employees were likely to be displaced from their jobs.¹² Like most economists, Leontief remained confident that the dynamics of technological displacement were unlikely to have an adverse effect on total employment figures over the short term. But many leading social scientists—using terms such as “post-maturity” (W. W. Rostow), or “post-capitalist” (Ralf Dahrendorf), or “post-industrial” (Daniel Bell)—argued that new technologies had transformed the social and economic environment in ways that required dramatic new directions in public policy.¹³ From John Kenneth Galbraith’s *The Affluent Society* to the Ad Hoc Committee on the Triple Revolution, commentators emphasized that new production technology had the potential to generate unprecedented levels of both material abundance and distributive inequality. Taking advantage of the former, and mitigating the latter, would require the ever more active hand of the state.¹⁴

But even as some leading commentators drew on the anxieties induced by technological change to advocate an expanded role for the government, others were arriving at a very different set of conclusions. From perches in business schools, or management consultancies, or the shelves of airport bookstores, they inverted the assumptions of their peers: rather than seeing the state as a solution to the problems posed by technology, they saw technology as the solution to problems long confronted by the state. Automating the production process offered an organic way to alleviate the pathologies of industrial labor, pulling employees away from repetitive tasks and into creative and relational work. By following the history of this line of argumentation, we can begin to see how the fraying of the New Deal order in the later decades of the twentieth century was

made possible in part by shifting views of the social implications of technological change. Whereas the effects of industrial labor had generated powerful arguments for regulation and social reform, the shift to knowledge work and service employment enabled executives and technologists to argue that the market was doing more than the administrative apparatus of the midcentury state to resolve the problems of industrial society.

In recent years, historians have increasingly approached the rise of market advocacy, and the corresponding erosion of midcentury political economy, as elements in the emergence of a “neoliberal” world order. This forward-looking approach to the postwar era is a striking departure from the declensionist framework adopted by the authors of this volume’s predecessor—*The Rise and Fall of the New Deal Order*—three decades ago. “The old order is dead,” the editors of that volume announced, and “nothing with the same combination of programmatic coherence, ideological credibility, and mass political appeal has arisen to take its place. We live inside a political parenthesis.”¹⁵ Today, by contrast, 1989 looks more like a watershed than a parenthetical, as revolutions across Eastern Europe seemed to mark a global and transideological embrace of the market-based incentives championed by Thatcher and Reagan. One of the central challenges for this volume, then, is to explain not only the fall of the New Deal order but also the sources of the alternative approach to political economy that emerged in its stead.

Thus far, leading accounts of the rise of neoliberalism have focused first on a crisis of accumulation in the 1970s, provoked by the unraveling of contradictions deeply embedded in the workings of the midcentury economic order, and second on the theoretical, political, and rhetorical activities of elite intellectuals and financial interests, who used sophisticated networking and public relations strategies to persuade those in positions of political influence to implement policies of austerity and deregulation.¹⁶ The political ferment surrounding automation in the 1950s is suggestive of a third story, which played a crucial role in both the structural and the ideological elaboration of neoliberalism. In the decades that followed the Second World War, the growing capacity of machines to perform repetitive tasks would dramatically lower the costs associated with financialization and globalization, transform the power dynamics between capital and labor, and enable the rise of a new conceptual and rhetorical emphasis

on the entrepreneurial self. At the very height of the New Deal order, a broad range of theorists recognized the potential scale and significance of this shift, and began to push both political and management discussions away from present problems and toward future possibilities.

The languages the early theorists of automation adopted, and the issues they brought to the foreground, reveal how the subject of their analysis began affecting political discourse even as its employment implications remained incipient. They focused attention foremost on how automation was beginning to affect the experience of work, as employees were gradually shifted away from highly repetitive tasks and toward positions more suited to the unique capacities of human cognition. They grappled extensively with the resulting problem of displacement and its potential effects on both individual lives and collective bargaining. And they emphasized that the structure of business life was entering the early stages of a dramatic transformation, which would be wrought by technology rather than the state. The political response to the felt problems of the era would therefore depend, to a perhaps unprecedented degree, on forecasts about the trajectory of changes that were only beginning to unfold.

John Diebold—as a prominent evangelist for automation who navigated between engagements with social theory, paid advice to managers, and popular speeches and articles directed to clerical and blue-collar laborers—played a leading role in interpreting the implications of new workplace technologies for an anxious public. In this capacity he found himself striking a delicate balance between stoking enthusiasm about the extraordinary potential of automated controls and calming anxieties induced by the perception of change. He did so by decoupling the concepts of “revolution” and “upheaval”: his central message was that novel technologies would transform social life and the workplace experience, but the effects would be socially beneficial and would require no exceptional regulation or restraint. Yes, the age of automation would be “a world in which fewer and fewer people work in factories”—but that meant “a world in which less human effort will be required for monotonous and tedious work,” “the work week is greatly shortened,” and “the pace of life slows down.” The dynamics of technological change were ushering in a future “in which leisure becomes the center of life, rather than the fringe.”¹⁷ The primary role of government would no longer be to redress the pathological side effects of technology, but rather to prepare people to

best take advantage of the extraordinary opportunities it presented. A social order focused on the maintenance of safety and stability could begin to make way for one focused on the development of human capital and the inducement of further innovations. Diebold accorded himself the role of guide on this cliff walk to utopia, and his instructions provide continued insight into the pathways his audiences took.

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The postwar knowledge economy grew in tandem with the rise of management consulting, as an increasing commodification of information and expertise put a premium on those who could transfer knowledge about business practices across industries and organizations.¹⁸ Harvard Business School—with its genteel traditions and case-centered pedagogy—proved especially adept at training ambitious college graduates for success in this emerging career.¹⁹ In pursuit of his MBA there in 1951, John Diebold led a team of classmates on a year-long project, “Making the Automated Factory a Reality,” which achieved some national press by addressing “what is technologically possible in the way of automatic production.”²⁰ The project made a deep impression on him, and he quickly perceived that the field would present lucrative opportunities to those who cultivated expertise in it. He initially pursued those interests at the consulting firm Griffenhagen & Associates, but quickly grew frustrated with his superiors and left to start his own consultancy.²¹ Within a year he had published the leading book on the subject and become the editor of *Automatic Control*, one of three new magazines in the field.²² Before his twenty-ninth birthday his firm had sixteen employees, he had been called as the lead witness for congressional hearings on “Automation and Technological Change,” and tongue-in-cheek reporters were referring to him as the “elder statesman” of the field.²³ By the end of the decade the “Diebold Group” had grown tenfold again, served a client list that included Boeing, General Electric, and Westinghouse, and counted Griffenhagen & Associates as one of its nineteen subsidiaries.²⁴ Diebold had become one of the leading purveyors of knowledge about how to transition to the knowledge economy: the paradigmatic professional of a postindustrial age.

Diebold's role as a conduit for information and expertise on automated technologies required him to triangulate between a diverse array of constituencies. Business executives employed him to help them decide which areas of their business to automate and which to leave unchanged; politicians repeatedly drew on his expertise in their public debates over whether and how to intervene; public audiences and magazine readers nervously sought his advice on the implications of new control technologies for their intended careers; and theorists cited his work as a point of origin for a burgeoning literature on the social implications of economic change. While Diebold maintained the management consultant's studiously nonpartisan public persona, he was convinced of automation's largesse and eager to present himself as the bearer of good news. His overriding concern was that suspicions of technology would lead labor unions, politicians, and theorists to adopt an oppositional stance that would forestall or dissipate its transformative force. Correspondingly, he developed a set of arguments that presented the inherent dynamics of automation as nonthreatening, enabling, and inevitable. He used his public persona to build public support for the technological transformations that his consulting business served.

Through a process of trial and error, Diebold settled on a set of arguments that he found effective at convincing audiences that their anxieties about this impending "revolution" were misplaced. His first claim was that the transition between industrialism and postindustrialism would be self-modulating. In contrast to the wrenching and cyclical traumas of agrarian decline, the effacement of manufacturing employment would proceed at a predictable and manageable pace, and those who were displaced would have little trouble finding new and perhaps superior positions. Second, Diebold argued that its characteristic forms of employment would be creative. Unlike the deadening and repetitive tasks associated with many forms of industrial labor, the jobs fostered by automation would tend to be relational and dynamic. In this way they would resolve many of the social-psychological problems that earlier versions of capitalism had created. Third, he emphasized that the technological transformations wrought by market forces were inevitable and irreversible. The inherent logic of technological development could not be successfully resisted, and the geopolitical framework of the Cold War made any attempt to alter or delay its progression unwise.

In purveying these views, Diebold helped to pioneer a set of arguments that were widely adopted by technologists and advocates of business interests in the decades that followed. This popularization was attributable in part to other management consultants and theorists, most notably Diebold's friend and colleague Peter Drucker, who legitimated, formalized, and expanded upon some of the ideas Diebold was propounding throughout the 1950s and 1960s.²⁵ Together Diebold, Drucker, and their peers established a genre of futurism that emphasized the pathological nature of industrial labor conditions while appealing to technology, rather than social policy, as the principal source of solutions.²⁶ They looked toward a postindustrial future in which capitalism would overcome the very sense of alienation it had engendered, and in which the long-standing inequities between capital and labor would break down as the nature and meaning of work transformed. This escape from the oppositional politics of the industrial era played a crucial role in the vogue for "entrepreneurship" that began to take hold between the late 1950s and the early 1970s, in the techno-optimism of Silicon Valley, and in the meritocratic ethos of the coastal knowledge workers who reframed Democratic policy making over the final third of the twentieth century.²⁷ In this sense, the well-chronicled rise of market-centered politics from the 1960s to the 1980s was not merely a return to the laissez-faire rhetoric of earlier eras. Rather, it was built on a belief that the nature of labor had transformed: in an age of automation, the experience of work struck some—however paradoxically—as increasingly *human*, thereby rendering many of the workplace concessions and protections associated with the New Deal order obsolete.

Echoes of Diebold's arguments were picked up even by a broad range of centrist and left-leaning critics and political figures who held more jaundiced views of business interests. Many labor leaders met the challenge of automation with a policy of incremental negotiation based on the premise that its onset would be gradual, Marxist theorists acknowledged that postindustrial labor was less alienating than its predecessors, and the most prominent critics of technology conceded that little could be done to stop its relentless advance. Scholars across political lines parroted the notion that automation presented a different set of challenges and opportunities from previous technologies: it would be less traumatic in its reshaping of employment, less exploitative in its labor

relationships, and less susceptible to regulatory control and oversight. Scholars in later decades have continued to debate the accuracy of those predictions. Regardless, it is clear that by the early 1950s the politics of technological transformation—a primary source of energy and inspiration for Marxists and progressives alike—had quietly become a powerful weapon in the arsenal of market advocates.

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Economists had long argued against fears of technological unemployment by citing historical evidence that new production methods had not, in the aggregate, led to job displacement. The effacement of specific occupations had invariably led to the creation of others.²⁸ In the early 1950s, however, many weren't persuaded by those arguments. Their concern was that technologies that replaced *mental* labor would have different effects from technologies that replaced *physical* labor. In a series of articles in the *New York Review of Books* in the early 1960s, the prominent New School economist Robert Heilbroner worried that workers who were supplanted by machines would have nowhere else to go. Previously, those who were displaced from farms and factories had found refuge in the service sector; now, even these positions were being replaced by machines. "The last sector of the market economy has been, so to speak, preempted by machinery and . . . there is now no expansive market sector left," he wrote. Historical data was useless, as it had never taken such a circumstance into account.²⁹ Wassily Leontief, writing in the same publication, drew an elaborate analogy to substantiate Heilbroner's concern. In 1907 a national "Horse Commission" on technology and automation would have been very sanguine, on the basis of centuries of historical data, about the continued employment of horses; but within a decade, equine functions had been largely replaced, and horses suddenly offered economic advantages only in marginal roles. "What happened to horses conceivably could, but, of course, under no circumstances would be allowed, to happen to human beings who gain their livelihood by selling their labor in a world in which more and more productive tasks can be performed better and more cheaply by machines."³⁰ Leontief's colleague Alvin Hansen speculated in the *New Republic* that the adoption of new technologies in the service sector might force

increasingly elaborate “makework” to be devised.³¹ Such speculations suggested that the confidence derived from historical experience might prove paper-thin: if the current economic transition was truly revolutionary, precedents could no longer be trusted.

The reborn technological utopianism of the early 1950s, therefore, was always yoked to concerns about the marginalization of human contributions to the productive process. “So fantastic are the potentialities of new control devices that it is possible to visualize acres of factory or office space in which no worker is needed,” read one *New York Times* report in 1955. “Automated equipment can process raw materials, assemble them into finished goods, package them and load them into freight cars without direct human help.” Such devices could even “adjust to variable productive conditions, correct their own mistakes, inspect the finished product and even change their own parts when parts break or wear out.” The only humans in such factories spent their time “watching the flashing lights” and “checking the dials.”³² It was then possible to envision these entirely machine-produced goods arriving at stores where very few humans would be directly involved in the sale. According to the University of Massachusetts economist Ben Seligman, items would likely soon be disseminated via “a completely automated retail establishment” in which customers placed orders that would then be delivered, by automatic machines, to the checkout counter. Thus, society would “come closer and closer to a world of work without men.”³³ As the French sociologist Georges Friedmann wrote, “for most men and women presently engaged in physical or manual labor, work in the traditional sense of the term is fated to disappear.”³⁴ In the managerial literature’s droll graphical language, the humans simply vanished (see Figure 8.1). Diebold’s audiences were not alone in worrying about the human implications of a world in which, to adopt his own unsettling phrase, “the buttons push themselves.”³⁵

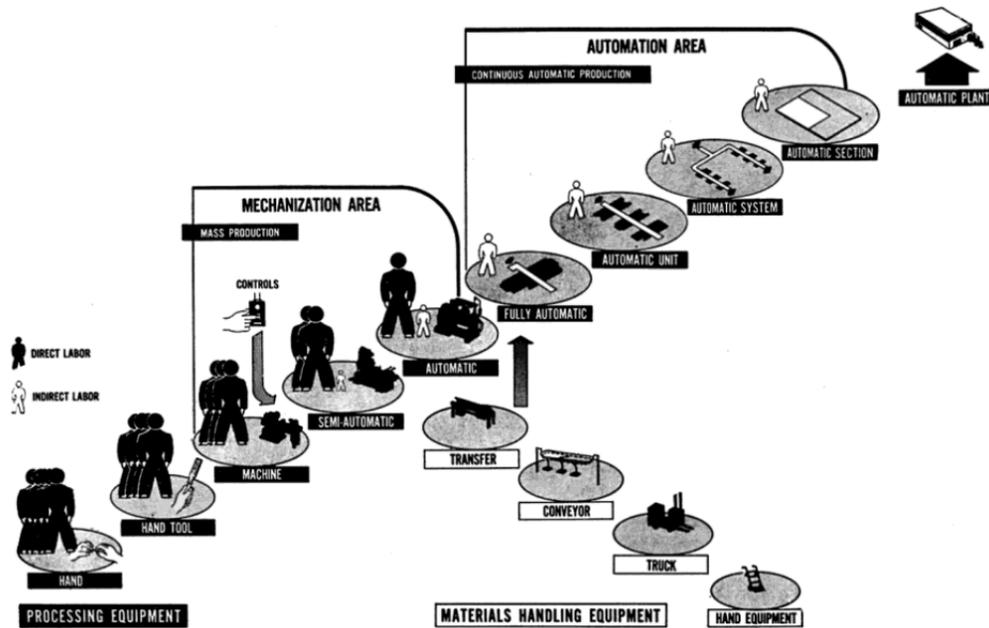


Figure 8.1: Visualization of the displacement of line workers. Source: S.A. June, *The Automatic Factory: A Critical Examination* (Pittsburgh: Instruments Publishing, 1955), 16.

Diebold, who gave talks across the country following the publication of his 1952 book *Automation* and often served as a paid speaker thereafter, frequently engaged in dialogue with audiences that seemed anxious about the potential effects of new workplace technologies. He was struck by their fears: “fear of unemployment, displacement, inability to learn new skills, fear of the human tragedy of individuals exposed and defenseless in a mechanized world.”³⁶ The questions that followed his remarks became a monotonous refrain. “Doesn’t automation mean workerless factories, with robots doing all the jobs? Doesn’t it mean that the plant where I earn my living will fire its 1,000 employees, install some wonder gadgets and then hire a couple of button-pushers to run the whole works? Won’t all factories soon do the same and cause mass unemployment?”³⁷ These discussions made him acutely sensitive to the dangers of the rhetoric of technological transformation: the very changes that inspired wonder and fascination could also generate anxiety and resistance.

Diebold responded to these anxieties by arguing that the shift to automated technologies would be a gradual process, unfolding at a pace “with which we are historically familiar and with which we are able to cope.”³⁸ He saw

concerns about the impending transformation of manufacturing as especially overblown, suggesting in contrast that only a small fraction of industries would experience a marginal employment decline.³⁹ Large sectors of the economy, such as retailing, would be almost entirely unaffected. Critics “greatly exaggerated” its immediate implications. While those who performed especially simple or “repetitive” jobs may have some reason to worry, the vast majority of workers performed tasks that no forthcoming machine could easily replace.⁴⁰ The parade of executives at the 1955 congressional hearings *Automation and Technological Change* were quick to adopt this line of argumentation, often expressing it in stronger language than Diebold adopted. In one Ford executive’s phrasing, automation was “an evolutionary and not a revolutionary process.”⁴¹ Those who were driving the technological transformation proved most reluctant to describe its implications in epochal terms.

Diebold was more willing than many executives to acknowledge that some displacement was bound to occur, but he emphasized that its effects would be heaviest on office workers, who had few institutional mechanisms for organized dissent, rather than on their heavily unionized blue-collar manufacturing counterparts.⁴² In his view, contemporaries tended to overrate the repetitive aspects of industrial line work and to underrate the reproducibility of clerical tasks. “It is in the mechanization of paper work that electronics will have its most immediate and possibly its most widespread effect on business,” he wrote in 1953. “No longer will it be necessary to waste so much human labor in copying routine information on bits of paper, filing the papers, and perhaps referring to them and recopying data at a later date.”⁴³ He described a litany of remarkable new machines that were more efficient and effective than people at performing numerous tasks, including booking flights, researching books, flying planes, analyzing dress sales, and forecasting weather.⁴⁴ The transactions handled by the entire trading floor of the New York Stock Exchange could be better performed by a computer “in a one-room low-rental space in, say, outlying Flushing.”⁴⁵ When *McCall’s* asked “When Will Your Husband Be Obsolete?,” Diebold had a grim warning for the spouses of brokerage clerks, court reporters, and elevator operators, among many others: “the work of every one of these employees is practically certain to be obsolete within the next generation.”⁴⁶

But Diebold always tempered his frankness about the prospect of displacement in discrete fields with messages of reassurance. He emphasized that automation would create as many jobs as it supplanted, and that the process of adapting to the demands of these new positions would not require arduous retraining. Drawing on an array of studies published in the *Harvard Business Review* by James Bright, he argued that even unskilled workers would have little trouble finding new positions in a world of self-regulating machines.⁴⁷ In automated businesses, Bright had insisted, “the machine had assumed most of the skill requirements of the job,” and “the production systems were easier to run and required less skilled labor than before. There literally was nothing for the worker to do but ‘push a button’ or ‘monitor’ the machinery.”⁴⁸ Bright acknowledged that the most primitive stages of mechanization required an increase in operational skill, but as machinery became more sophisticated, the level of employee input rapidly decreased. Diebold did not share Bright’s confidence in an inverse relationship between mechanization and skill, but he agreed (and emphasized) that most of the jobs in an automated economy would not require foreboding levels of technical training. A facility with human interactions, complex manual skills, or capacities for oversight would all be valued and rewarded. He even objected to the very supposition that employment would grow scarce: observing that the relationship of workers to children and the elderly had entered into a precipitous decline, he predicted that jobs would remain plentiful for the indefinite future.⁴⁹ Peter Drucker went so far as to warn, in *Harper’s*, about a coming “labor shortage,” the catastrophic effects of which automation could forestall.⁵⁰ Concerns that automation would cause an onset of technological unemployment or the effacement of unskilled labor were rooted, according to this line of argument, in a misreading of its aggregate effects and a misinterpretation of economic trends.⁵¹

Political debates always draw heavily on extrapolations from recent trends into a projected future. However, the widespread recognition that automated controls were novel and politically important made the postwar decades a crucial inflection point, a moment when a heightened sense of technological uncertainty forced people in positions of influence to stake out positions based on limited experience and an unusual degree of conjecture. Was the arrival of automation a wrenching shift that required extraordinary investment—new controls over

capital-labor relations, dramatic investments in education, and a growing safety net to aid those caught in its crosshairs? Or was it an incremental adjustment best met by incremental negotiations along established lines? Given Diebold's position and proclivities, it is predictable that he advocated for the latter interpretation, citing deep concern that the former would lead to regulations that would stifle the pace of technological change and limit its potential largesse.

Surprisingly, however, many labor leaders in the 1950s and early 1960s echoed his views. Over the course of the 1950s a wide range of unions accepted Diebold's claims for the potential benefits of automation as well as his argument that its advance would be slow: it was as much an opportunity to be exploited as a looming threat. A conference of union leaders on the progress of automation in April 1955, for instance, elicited repeated statements of validation. "All of us at this table welcome automation," the CIO's associate director of research asserted; "we rejoice at the tremendous advances in output, in national strength, in leisure, in working and living conditions that the new technology makes possible."⁵² According to the president of the Communication Workers of America, there was "no doubt that automation can usher in a new and great era, if we begin to act now."⁵³ The congressional hearings later that year were marked by still more insistent endorsements. "We fully realize that the potential benefits of automation are great, if properly handled," Walter Reuther emphasized to the assembled congressmen. "If only a fraction of what technologists promise for the future is true, within a very few years automation can and should make possible a four-day workweek, longer vacation periods, opportunities for earlier retirement, as well as a vast increase in our material standards of living."⁵⁴ Viewing such statements, the *New York Times* reported that labor leaders appeared to have learned "two things": "that it is impossible to stop technological advances" and "that it is contrary to the best interests of the workers themselves even to try."⁵⁵ In response many of them adopted an approach of strategic accommodation, acknowledging the potential benefits of automation in order to urge specific restrictions and regulations as it began to unfold.⁵⁶

Such an approach presented some risks. White-collar employees had proven notoriously difficult to unionize, and a continued decline of factory labor had the potential to erode membership rolls. The prospect of replacing workers with machines also gave companies negotiating leverage, which they could use to

minimize and suppress labor demands. But Reuther and many of his colleagues were impressed by the potential of these new technologies to continue the long-term trend toward shorter workweeks, greater material abundance, and heightened economic security. In their view, the challenge would be to develop a policy regime that ensured these new capacities were broadly distributed rather than hoarded by the purchasers and possessors of capital. One survey found that three-quarters of firm presidents believed they were entitled to “all” of the savings resulting from new machinery, suggesting precisely the perspective that union leaders were eager to subvert.⁵⁷ Reuther centered his program on the idea of a “guaranteed annual wage,” which would slow the advance of new technologies and soften the dislocations they caused.⁵⁸ Others defied the ambivalence of their constituents to prioritize a four-day workweek, in order to forestall unemployment and ensure new productivity was partially distributed in the form of leisure.⁵⁹ The longshoremen’s union successfully advocated for employment guarantees and the creation of a compensation fund that would redirect a portion of the profits from labor-saving machinery to them.⁶⁰ Still others emphasized the heightened necessity of social insurance and the importance of regulations that would force companies to give current employees the training and relocation funds that adaptation to new machinery often required.⁶¹

The dystopic anxieties that Diebold encountered in his public tours were not reproduced in the rhetoric and demands of most union leaders. Thus a senator, at the conclusion of many days of debate among interested parties and experts about the implications of automation, could remark with wonder that not “one witness” had “resisted” its advance.⁶² Such consensus became possible because many of the leading figures in organized labor adopted an approach to automation that accepted the premises, if not always the conclusions, of Diebold’s analysis. If technological change would unfold in pliable and predictable ways, unions could aim to minimize displacement of current employees while skimming dividends in both money and time. In an awkward, anomalous, and surprisingly durable union, the prospect of an economic revolution was married to the politics of stasis.

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Even as he emphasized that automation would unfold at a modulated piece, Diebold allowed himself to marvel at the transformed world it would eventually yield. His success as a consultant and speaker hinged largely on his potent futurist imagination: he glimpsed a world of five-day weekends, instant electronic publishing, videophones, talking computers, and neurally integrated prosthetic limbs.⁶³

Diebold's prose turned suddenly vibrant when he envisioned the radical ways in which mundane servo-mechanisms might reform conventional practices and professions. As employees were pulled out of factory and clerical work and into new jobs, they would find themselves engaging with their duties and coworkers in new and different ways. Their positions would be less repetitive, less isolating, and less restrictive of their human capacity for judgment and interaction. Even the time structure of working lives would transform, as the rhythmic disciplines of industrialism gave way to an era of increased flexibility and independence. He frequently gestured toward the liberatory potential of automated technologies: after historical cycles of subservience to the land and machines, humans would finally be released to find meaning in other, less material pursuits.

In discussing the capacity of technology to transform the workplace, Diebold sought to exploit a crucial difference between the rise of automation and previous periods of economic transition. In contrast to the rhetoric that accompanied the extended conversion from agricultural to industrial labor, few romanticized the labor regime that postindustrialism was bound to supplant. Nineteenth-century debates about industrialization had fixated on the many degradations of factory life, including its grinding hours, strict adherence to a time discipline, monotonous routines, and rigid organizational hierarchies. Such concerns had only been heightened by the early twentieth-century advent of Taylorism, with its attentiveness to the minutest details of each employee's motions and output, and the introduction of the assembly line, with its breakdown of production into the repetitive performance of ever more minute and specialized tasks. The management vogues of the 1930s and 1940s, beginning with Elton Mayo's *The Human Problems of an Industrial Civilization*, had been defined in large part by their expressions of dissatisfaction with the industrial order and their attempts to create alternative approaches to the workplace that

softened its hours, subverted its hierarchies, and diminished its reliance on routinized tasks.⁶⁴ Diebold saw resistance to new factory and business technologies as a misguided holdover from these previous eras of technological change. Instead, he argued, automation should be seen as an epochal subversion. New control technologies would eliminate the need for humans to perform the most degrading aspects of industrial labor and free them to perform the more creative, holistic, and integrative functions that theorists such as Mayo had long sought. Automation was a harbinger of liberation from, rather than further subservience to, the machine.

Thus, Diebold was quick to shift conversation away from the prospect of technological unemployment, with all the anxieties it provoked, and toward changes in the *kinds* of work people would be required to do. “What a waste of human resources it is at present to have a human being, capable of all a human can do and feel and express, standing in an assembly line tightening nuts!,” he wrote in 1952.⁶⁵ In an automated world, “the jobs in which the worker is tied to and paced by the machine will be taken over by other machines,” and the “worker will be released for work permitting development of his inherent human capacities.”⁶⁶ These new technologies promised “freedom from many of the routine, machine-paced tasks of industry, the very types of jobs which have given rise to the criticism that industrialization has enslaved men and made the machine his master.”⁶⁷

According to Diebold, the incessant debate about technological unemployment signified a failure to comprehend the true significance of the decline of unskilled labor. The future would be marked not by the disappearance of jobs but rather by their transfiguration: an automated society would allow people to fulfill their fully human qualities without being forced to mimic the repetitive capacities of a machine. It would yield an influx of new positions oriented toward the creation, maintenance, and operation of control devices, as demand rapidly expanded for “technicians, programmers, specialized people to work on the machines.” Perhaps more importantly, the massive gains in productivity would create new positions for “creative workers of all kinds—scientists, professionals, managers, service workers, communicators, artists, and craftsmen.”⁶⁸ Governments should therefore focus not on generating new sources of employment, but rather on fostering the capacities that these new roles would

require. Employment in an automated society would require “ability to think, increased imagination and judgment, and increased understanding of mathematical and logical methods—in brief, increased education.”⁶⁹ If earlier stages of industrial society had required people to suppress their capacities in order to fixate on the efficient performance of repetitive tasks, this new age would once again enable the cultivation of the self.

Business advocates and their favored economists adopted variations of this message, arguing that automation would enable industrial workers to overcome the problems that previous technological advances had caused. By directing employment away from machine-tool operations and toward maintenance and engineering, the University of Chicago economist Yale Brozen argued in 1956, automation made work “less routine, more creative,” more demanding of “skill and judgment,” and more worthy of “interest.”⁷⁰ Marshall Munce, vice president of the York Corporation and a director of the National Association of Manufacturers, spun such ideas into an idealistic vision in his testimony before the congressional subcommittee on automation in 1955. With monotonous jobs replaced by “unfeeling machines,” he predicted, “man will be the master of the machine rather than the servant. Life in America will be richer, better, more rewarding.”⁷¹ The American worker, *Time* argued in 1961, may well be able to “have his cake and eat it too: the material rewards of mass-produced abundance and the satisfaction that comes from performing an intricate and responsible job.” Such workers would preserve the benefits of “Henry Ford’s assembly lines” without the “dirty and drudge work” they had previously required.⁷²

By the late 1950s, some management theorists had begun to emphasize that the age of automation would be characterized by the special social and economic value accorded to “knowledge.” Peter Drucker became the preeminent spokesman for this emerging view. An Austrian émigré who arrived in the United States during World War II, Drucker rose to prominence in the late 1940s as the author of a study of management practices at General Motors, *The Concept of the Corporation*. Building on the work of Elton Mayo, he argued that corporations would increase their employees’ productivity (and maintain more amicable labor relations) if they fostered a greater sense of autonomy.⁷³ At first, Drucker represented worker engagement in the enterprise as a managerial problem, and he became widely known as an expert in organizational structure. During the 1950s,

however, he became convinced that new technologies were rendering the problems of monotony and alienation increasingly obsolete. The stultifying repetition of assembly-line labor would no longer be an issue “on the production floor of tomorrow’s push button factory,” he told readers of *Harper’s* in 1955. Like Diebold, he foresaw extraordinary new demand for “highly skilled” employees to install, control, and repair the machines, for “highly educated men” to design and engineer the machinery, and for “managers” who would be able “to think, to analyze, to make decisions, and to assume risks” amid increasingly rapid change.⁷⁴ Automation would largely eliminate the most deadening forms of industrial labor, replacing them with positions that required skill, judgment, and a capacity for adaptation.

According to Drucker, the great challenge for contemporary societies would be the development of an educational infrastructure capable of training employees for this very different business environment. In previous eras, he argued, the primary source of competitive advantage for both businesses and individuals lay in manual labor. Beyond a very low threshold, education was unproductive, and its highest levels were conspicuously oriented toward activities considered “nonwork.” But in recent years the rapid pace of technological change had sharply devalued experience, repeatedly rendering it useless with the arrival of new products and production techniques. Those who worked with their hands suddenly found themselves “unproductive” when compared with machines that performed work more quickly and at lower cost. Productivity had shifted instead to those who developed an understanding of these novel technologies, or the capacity to anticipate changes with more speed and insight than their competitors. Drucker described their occupations as “knowledge work,” and boldly proclaimed that they were in possession of “the only real capital today.”⁷⁵ Due to the technological advances of automation, the United States was transitioning from a society that trafficked primarily in goods to one that trafficked primarily in ideas.

Drucker’s writings in the late 1950s and 1960s helped to generate many of the tropes of the subsequent literature on the “knowledge,” “creative,” or “information” society. In doing so, their political implications transformed. In his earlier work, Drucker saw his line of inquiry as closely aligned with Elton Mayo’s: he hoped to help foster new practices and organizational structures that would help managers overcome the stifling effects of industrial labor and the corporate

form.⁷⁶ His primary goal was to transform businesses to better meet the social and political needs of their employees. In shifting his emphasis to the rise of the “knowledge” economy, Drucker suggested that such preoccupations were no longer necessary. By virtue of the different jobs that automation fostered, capitalism was beginning to resolve its longtime contradictions. Markets were overcoming the problems of industrial labor without requiring intervention from the private sector or the state. Executives could therefore redirect their attention away from the thorny problems of labor relations and focus instead on the crucial subject of “innovation,” which would become the crucible of business success. After having risen to prominence by arguing that business and policy makers needed to restructure their organizations to address the problem of alienation, he now suggested that this challenge could be effaced by the progress of technology. In the parlance of contemporary Austrian economists, Drucker saw markets as tending toward a spontaneous order in certain circumstances but not others. The institutional circumstances of the industrial economy generated pathologies that required aggressive measures to resolve; while the knowledge economy tended toward catallaxy, and therefore required less active intervention and oversight.

As Drucker’s evolution suggests, writings on the rise of a knowledge society often served as a propaedeutic to a conservative worldview. A shift in employment away from manual and repetitive tasks and toward more “creative” endeavors disarmed some critics of the alienation induced by capitalism, and created a potent challenge for those who sought to resist the encroachments of automation. With no recourse to romantic conceptions of the industrial past, many such critics conceded that the labor requirements of a postindustrial society might prove more fulfilling than those they supplanted. Georges Friedmann, a French sociologist who valorized craft skill and maintained deep reservations about Drucker’s “technician’s Utopia,” readily acknowledged that automation would reveal the subdivision of jobs under industrialism to have been “a transitory form of labor, and often a pathological one.”⁷⁷ The Frankfurt School theorist Friedrich Pollock, in the midst of a book critiquing the cultural and employment implications of automation, allowed that it “spares workers from much soul-destroying drudgery.”⁷⁸ And Walter Reuther tempered his proposals for measures that would protect against the dangers of automation with a frank recognition of its potential benefits. “Automation can bring freedom from the monotonous

drudgery of many jobs in which the worker today is no more than a servant of the machine,” he told Congress in 1955. “It can free workers from routine, repetitive tasks which the new machines can be taught to do, and can give to the workers who toil on these tasks the opportunity of developing higher skills.”⁷⁹ Critics of automation were temporally unmoored—skeptical of the technological future, dissatisfied with the present, and unwilling to find solace in the recent past. Even those who sought to contest the transformative social vision propounded by advocates such as Diebold and Drucker found themselves conceding many of its terms.

* * *

For those who remained unwilling to acknowledge the benefits of automation, Diebold resorted to a final line of argumentation. Debating its ultimate merits was bound to be a pointless enterprise, he suggested, because – regardless of one’s opinions – it was certain to progress. It is “as inevitable as union dues and taxes,” he told an audience at the Case Institute of Technology in 1955.⁸⁰ Any technological advance that led to such obvious efficiency gains would necessarily overcome all sources of resistance. “Automation cannot be stopped,” he wrote in *Challenge* magazine in 1959; “like the steam engine and the automatic loom, it must be lived with and managed as well as possible.”⁸¹ Further, it had developed an autonomous logic that led to its continuous encroachment into new venues of influence. As he explained to students at Rollins College, “technological advance has become self-generating.”⁸² The adoption of automated technologies in certain areas of human life was facilitating its expansion to others, in a progression that appeared to demand little human planning or control. Viewed from this perspective, the entire debate over the merits and desirability of automation seemed a misguided distraction; public discussion should focus on how to accomplish, not whether to resist, its adoption.

Even discussions about how to manage the progress of automation, according to Diebold, could proceed only under terms that were overdetermined by the economic pressures of the Cold War. In the 1952 book *Automation* he warned that “it is only by increasing output per manhour worked that we will be able to build effective defense against the aggressive powers of communism.”⁸³

Thereafter, he closely monitored Russian advances in control technologies and warned his audiences that delays in their adoption were bound to yield an advantage to the Communists. Thus the Soviet creation of a “Ministry of Automation” in 1956 signified a superior policy commitment to automated technologies, and Krushev’s comment that automation would enable his people to “beat you capitalists” provided an unflattering contrast with the “fear and defensiveness” at home.⁸⁴ In Diebold’s view, the progress of automation could be slowed but not halted, and delays in its adoption would produce disadvantages in a global ideological war. So while he may have shared concerns about its social and cultural implications, he emphasized that American society was impotent to act upon them. The independent logic of technological advancement and the pressures of economic competition suggested that, regardless of their merits, all philosophical debates about the human dimensions of technological change would prove futile.

Critics of the social implications of technological change were troubled by such an emphasis on inevitability, as it suggested that human societies were suffering a worrisome loss of control over their own social and institutional development.⁸⁵ But despite these reservations, they struggled to develop alternative theories of technological development that established a clear and coherent space for political intervention. The result was a literature that reiterated Diebold’s sense of inevitability with a melancholy rather than a triumphalist tone. In one such text, *The Technological Society*, the sociologist and theologian Jacques Ellul interpreted the rise of control technology as both a manifestation and cause of the contemporary proliferation of “technique.” The meaning of “technique” had long been slippery and contested, but Ellul framed it in broad terms, defining it as “nothing more than *means* and the *ensemble of means*.”⁸⁶ Over centuries, he argued, societies had become ever more fixated on the refinement of means and less concerned with the ends they were intended to achieve. Industrial machines were only a recent manifestation of technique, but their proliferation represented a culminating moment, as the very origin of their being lay in their identity as a means to a preconceived end. In his terms, machines were “solely, exclusively, technique,” and their embodiment of its ethos was “pure.”⁸⁷ With the rise of automation and the growing entwining of science and technology, technique had now “arrived at such a point in its evolution that it is being transformed and is

progressing almost without decisive intervention by man.”⁸⁸ In other terms, it had become “autonomous,” rapidly digesting traditional values and ways of life without allowing humans to intercede. Ellul shared Diebold’s sense that these developments were ineluctable; in his view, even resistance movements were inexorably assimilated into the technological society they opposed. But whereas Diebold urged the necessity of reconciliation, Ellul framed this narrative in tragic terms. “Enclosed within his artificial creation,” he wrote, “man finds that there is ‘no exit’; he cannot pierce the shell of technology to find again the ancient milieu to which he was adapted for hundreds of thousands of years.”⁸⁹

Other critics of the direction of technological change searched for ways to exert more control over its development. In a 1964 speech, Lewis Mumford agreed with Ellul’s argument that automated machines embodied a pathological fixation on thinly defined means. An automatic system “is so fixed and rigid that it seems little more than a neat, mechanical model of a compulsion neurosis,” Mumford wrote.⁹⁰ By allowing such machines to proliferate, societies were “wiping out, with no sense of the colossal loss, all natural richness and diversity, all ecological complexity, all independent human selectivity and purposefulness.”⁹¹ And like Ellul, Mumford worried that this process was increasingly unfolding with an autonomous logic, admitting “no ‘feedback’ and therefore no method of evaluating its deleterious results or correcting its mistaken postulates.”⁹² We were now confronted, in his pithy terms, by the “automation of automation,” or the “organized impotence” of human societies.⁹³ But in contrast to Ellul, Mumford expressed continued faith in the human capacity to reverse this trajectory, which he expressed in vague but urgent terms. “Our task, I shall urge,” he wrote, “is rather to restore to man, as the central agent and creator, the wide span of capabilities and potentialities he voluntarily surrendered or suppressed when he took it upon himself to develop the machine and consigned to automatons the absolute powers once exercised by divine kings.”⁹⁴ *The Myth of the Machine* aimed to create a critical energy that would reverse the trajectory of technological development, without clarifying the specific political form such a resistance might take.

Diebold argued that any such resistance was misguided, due to its reliance on a binary understanding of humans and machines that was rapidly becoming outmoded. Ellul and Mumford centered their critiques on a series of dichotomies:

the flexibility, organicism, intelligence, and rich diversity of human society was contrasted with the rigidity, artificiality, dumbness, and unidirectionality of machine tools. To Diebold, such an analysis missed the crucial distinction between automated machines and their predecessors. Automation, via the feedback principle, was defined precisely by its flexibility, its capacity to mimic the sensory responses of organic creatures, its ability to reproduce (and even exceed) substantial dimensions of human intelligence, and its adaptiveness to an extraordinary range of productive tasks. The advent of automation therefore represented not an extension of the logic of industrial machines, but rather its sublimation. The boundaries between machines and human societies were becoming blurred, but this was attributable to the humanization of machinery rather than the mechanization of humankind.

Other advocates of automation adopted similar logic to arrive at still bolder claims about the novel organicism of automated machines. As Peter Drucker wrote in his first article about the concept of automation, it could be called “an ‘organic’ philosophy—if only to distinguish it from the strictly mechanistic approach on which Henry Ford’s concept of mass production was based.”⁹⁵ Its foundation in “self-regulating control” enabled it to respond to economic activity as a dynamic “process” based on “*pattern, order, or form*” rather than as a static event. To reduce automation to “gadgeteering” or “engineering” was therefore to miss its fundamental insight and contribution: “it is a concept of the structure and order of economic life, the design of its basic patterns integrated into a harmonious, balanced, and organic whole.”⁹⁶ Control technologies enabled machines to become reactive, dynamic, and newly capable of integrating themselves into complex systems; the arrival of automation signified the decline of the rigidities of industrial “technique” and the arrival of the organic machine. As another theorist who emphasized the organic capacities of automated machines, Marshall McLuhan, later wrote: “automation retains only as much of the mechanical character as the motorcar kept of the forms of the horse and the carriage.”⁹⁷ Any lingering similarities of form obscured a radically different motivating principle.

By emphasizing the organic character of automation, theorists such as Diebold, Drucker, and McLuhan sought to bypass debates about the inevitability of technological change. In their view, the advent of automatic controls should

not have provoked concern over the expanding remit accorded to machines. Rather, its significance lay in a shift in the kinds of machines that interacted with human societies. New technologies mimicked the activities of animals and nervous systems, providing a supple and reactive connective tissue that responded to complex stimuli in sophisticated ways. Their inexorable advance was a cause for celebration rather than reconciliation or resistance. As the industrial era neared its end, society could overcome an excess of mechanization by accelerating, rather than forestalling, its progress.

* * *

The Rise and Fall of the New Deal Order was a prescient and wide-ranging volume that did much to establish the parameters of historical research on midcentury political economy in an era when such questions had fallen out of fashion. In retrospect, however, its contributions said remarkably little about the role technology played in the narrative arc of American political history between Roosevelt and Reagan. This lacuna is surely attributable, in part, to the surreptitious presentism that marks each generation of historical research. If Diebold's "age of automation" was marked by a sense of deep excitement and uncertainty about the political implications of emerging technologies, the period between the 1970s and 1990s was characterized by a diminished faith in their transformative potential. Trends that had appeared clear, urgent, and radical in the context of the early 1950s began to seem hazy, sluggish, and doubtful with the passage of time. The contraction of manufacturing employment, however inexorable, proved slow: absolute numbers held steady even as its relative position continued a steady decline.⁹⁸ The dramatic contraction of the workweek over the first half of the twentieth century did not continue into the second, and the predicted age of leisure never fully matured.⁹⁹ Concerns about technological unemployment continued to shadow government job reports but were gradually eclipsed by anxieties about an energy shortage, inflation, and the rise of outsourcing in a newly globalized economy.¹⁰⁰ The economic troubles of the early 1970s left few speaking of the structural problems of "abundance," as the economics of scarcity returned again to the center of national debates.¹⁰¹ And the most exorbitant predictions of the futurists of the 1950s seemed to grow more

distant with the passage of time: the space factories, flying cars, rocket mailmen, and universal vending machines that populated the comics of the era gave way to a new tenor of disappointment in the limits of technology's largesse.¹⁰²

As the specific nature of this "revolution" dispersed into ambiguities and conflicting terminologies, the disciplines that had charted it drifted into other lines of inquiry. In the 1970s sociologists became less engaged in questions of public policy, and political economy became ever more marginal to their internal debates.¹⁰³ The last vestiges of institutionalism disappeared from the economics profession, leaving Robert Heilbroner and John Kenneth Galbraith among the few outliers who continued to write about the social dynamics created by structural change.¹⁰⁴ The diminished American community of Marxists became increasingly engaged with literary and cultural concerns, devoting limited attention to the logic of capital in a postindustrial age.¹⁰⁵ And many of those who continued to ask such questions deplored the parochialism of earlier eras, arguing that the pattern of "abundance" some had observed in the 1950s was the product of a "world system" that continued to rely on the dynamics of scarcity.¹⁰⁶ Even "futurism," which had inspired an extraordinary burst of organizational energy in postwar decades, became relegated to an increasingly discredited fringe.

With a characteristic fealty to its cognate disciplines, the historical profession, too, devoted dwindling resources to the kinds of structural questions that the early writers on automation had posed. In the 1960s and 1970s an emerging generation of historians revolted against the grand narratives that had characterized many of the most prominent works of an earlier era, privileging the localized empiricism of social history and the textually bounded exegeses associated with the cultural turn. Political historians became marginalized, intellectual historians retrenched, and economic history increasingly migrated to economics departments. Many of those scholars who remained interested in political economy directed their work toward the more focused problematics of business and labor history.¹⁰⁷ As a result of these shifting methodological inclinations, issues that preoccupied the early theorists of automation—the movement from manufacturing to services, the psychological effects of temporary employment, the emergence of a "knowledge" economy, the transforming character of leisure, and the cultural implications of technological change—fell to the margins of disciplinary inquiry. The dramatic political, intellectual, and

cultural reconfigurations of the postwar decades were often relayed with only glancing reference to these underlying transformations in the conditions of economic life.

Recent years, however, have witnessed a revival of interest in the problems that preoccupied theorists amid the onset of debates about cybernetics and postindustrialism. In our own era of smartphones and autonomous cars, renewable energy and digital libraries, genetic testing and private spacecraft, the palpability of technological change has fostered glimmers of utopianism, futurist consultancies, and a new generation of popular seers. Scholars are once again writing that we have entered a “second machine age,” in which our experience of work and leisure will be upended by the development of spectacular machines.¹⁰⁸ Economists are speculating about the shape and implications of the emerging information economy, in which the revaluation of skills may continue increasing inequalities and punishing those who possess “average” capacities.¹⁰⁹ Sociologists and geographers have returned their attention to the dynamics of economic systems and the cultural effects of the diminishing fixity and necessity of work.¹¹⁰ The chastened technological imagination of the final quarter of the twentieth century now seems an interregnum between periods of broad confidence in the capacity of technology to transform the patterns of everyday life.

Surveying the similarities between these successive waves of techno-optimism, some might be inclined to feel cynical about the thinness of the boundary between forecast and fantasy. Recurrent promises of revolution can seem a mere distraction from an underlying stasis in the technological development of the United States since midcentury. Where, as David Graeber recently asked in the *Baffler*, are our flying cars?¹¹¹ But protracted delays in the arrival of some predicted technologies should not obscure the depth and breadth of transformations that have percolated through workplaces since the 1950s. Diebold’s writings anticipated many aspects of the information-rich, financialized, skill-differentiated, and service-centered structures of economic life in the contemporary United States. The crucial question for contemporary readers, then, is whether he was right to express such broad optimism about their social and political implications. Has the shifting composition of the employment market helped to resolve the problems of estranged labor, or have workers’ feelings of alienation merely transferred from one job to another? Have novel production

capacities produced widespread dividends in both leisure and material goods, or has the resulting displacement of labor generated new political instabilities? Have intelligent machines become an extension of human needs and desires, or a growing threat to psychological well-being? Has the difficulty of exerting political control over emerging technologies given business leaders the freedom to foster dynamism and growth, or generated widespread feelings of political disillusionment and democratic deficit? Despite frequent claims of a current technological disjunction, Diebold's writings remind us that such problems have unfolded since the Second World War, accompanying (and in some cases precipitating) the unraveling of the New Deal order. The temporal depth of this transformation should be cause for relief: debates about present-day problems invariably rely on projections about the future, which can only be cobbled together out of extrapolations from the past. History is never more relevant than in the midst of a futurist age.

* I am grateful for comments and suggestions on prior drafts of this paper from the American Studies Workshop at Princeton, the History of Capitalism Workshop at Stanford University, the Economic History Workshop of the Institute for New Economic Thinking, the History Workshop at the University of Delaware, and the Economic History Forum at the University of Pennsylvania, as well as participants at the “Beyond the New Deal Order” conference at the University of California, Santa Barbara, and the editors and anonymous reviewers for this volume. I also benefitted from research assistance from Paige Glotzer, and research support from the Kauffman Foundation, provided through the “History of American Capitalism” program at Johns Hopkins University.

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⁵⁶ On the response of labor unions to the challenge of automation, see Nelson Lichtenstein, *State of the Union: A Century of American Labor* (Princeton, NJ: Princeton University Press, 2002), 133–35.

⁵⁷ William Glazier, “Automation and the Longshoremen,” *Atlantic*, December 1960, 58.

⁵⁸ For a brief explanation of the relationship between automation and the call for the “guaranteed annual wage,” see Walter Reuther, in Congress of Industrial Organizations, *Challenge of Automation*, 54.

⁵⁹ For advocacy of the four-day week, see Daniel Seligman, “The Four-Day Week—How Soon?,” *Fortune*, July 1954, 81; “The Challenge of Automation,” *Nation*, December 10, 1955; William Glazier, “Automation and Joblessness,” *Atlantic*, August 1962, 47. Diebold himself wrote in 1954 that it was “entirely reasonable to expect a three day weekend within the next decade.” John Diebold, “Today’s Industrial Revolution,” *Automatic Control*, July 1954, 13.

⁶⁰ Glazier, “Automation and the Longshoremen.”

⁶¹ On relocation and retraining, see Georges Friedmann, *The Anatomy of Work* (New York: Free Press of Glencoe, 1961), 119; Joseph Beirne, in Congress of Industrial Organizations, *Challenge of Automation*, 70; *Automation and Technological Change* (statement of Walter Reuther), 105. On social insurance, see R. Bendiner, “The Age of the Thinking Robot and What It Means to Us,” *The Reporter*, April 7, 1955, 17; “Challenge of Automation.” Both these policies were included among the recommendations in the report by the National Commission on Technology, Automation, and Economic Progress, *Technology and the American Economy*, vol. 1 (Washington, DC: Author, February 1966), 38, 60.

⁶² Paul Douglas, in *Automation and Technological Change*, 270.

⁶³ “A New Breed of People,” interview with John Diebold, *This Week*, March 20, 1966.

⁶⁴ Elton Mayo, *The Human Problems of an Industrial Civilization* (New York: Macmillan, 1933).

⁶⁵ Diebold, *Automation*, 156.

⁶⁶ *Ibid.*, 162.

⁶⁷ John Diebold, “The Employee and Automation,” NAM Open Management Conference, Chicago, June 15, 1955, Diebold Papers.

⁶⁸ “Automation: How Will It Change Your World?,” *Glamour*, June 1964.

⁶⁹ “What Automation Will Mean to You,” *Compact*, February 1957, 90.

⁷⁰ Yale Brozen, “Automation: Creator or Destroyer of Jobs?,” *Iowa Business Digest*, February 1956, 7.

⁷¹ *Automation and Technological Change* (statement of Marshall G. Munce, vice president, York Corp.), 404.

⁷² “Automation Speeds Recovery, Boosts Productivity, Pares Jobs,” *Time*, December 29, 1961.

⁷³ Peter Drucker, *Concept of the Corporation* (1946; repr., New Brunswick, NJ: Transaction, 2005). On Drucker’s work in this period, see Nils Gilman, “The Prophet of Post-Fordism: Peter Drucker and the Legitimation of the Corporation,” *American Capitalism: Social Thought and Political Economy in the Twentieth Century*, ed. Nelson Lichtenstein (Philadelphia: University of

Pennsylvania Press, 2006), 109–31; Daniel Immerwahr, “Polanyi in the United States: Peter Drucker, Karl Polanyi, and the Midcentury Critique of Economic Society,” *Journal of the History of Ideas* 70, no. 3 (2009): 445–66.

⁷⁴ Drucker, “The Promise of Automation,” in *America’s Next Twenty Years*, 26–27.

⁷⁵ Peter Drucker, *Landmarks of Tomorrow* (New York: Harper, 1959), 116–22. The expansion of the market for “knowledge” was closely aligned with the ascendance of the consulting industry (from which both Diebold and Drucker profited); see Christopher McKenna, “How Have Consultants Mattered?,” in *The World’s Newest Profession: Management Consulting in the Twentieth Century* (New York: Cambridge University Press, 2006), 51–79.

⁷⁶ Drucker expressed his admiration for Mayo in a warm correspondence; see Elton Mayo Papers, box 1b, Baker Library, Harvard Business School.

⁷⁷ Friedmann, *Anatomy of Work*, 120. This was an elaboration on his views in *Industrial Society: The Emergence of the Human Problems of Automation* (Glencoe, IL: Free Press, 1955).

⁷⁸ Pollock, *Economic and Social Consequences*, 212.

⁷⁹ *Automation and Technological Change* (statement of Walter Reuther), 101.

⁸⁰ John Diebold, “Speaking of Automation,” 1955, 2, Diebold Papers.

⁸¹ John Diebold, “Automation Needs a Human Policy,” *Challenge*, May 1959.

⁸² John Diebold, “Science, Technology and Man’s Relation to the Universe,” Rollins College, Winter Park, FL, Diebold Papers.

⁸³ Diebold, *Automation*, 170.

⁸⁴ John Diebold, “The Effects of Automation on New Products,” New Products Seminar (New York, NY), April 13, 1956, Diebold Papers; John Diebold, “Automation—The Need for a Positive Program,” Commonwealth of Massachusetts Conference on Automation, June 2, 1960, 19, Diebold Papers.

⁸⁵ For an extended intellectual history of these critiques, see Langdon Winner, *Autonomous Technology: Technics-Out-of-Control as a Theme in Political Thought* (Cambridge, MA: MIT Press, 1977). Matthew Wisnioski explores their development within the engineering profession in *Engineers for Change: Competing Visions of Technology in 1960s America* (Cambridge, MA: MIT Press, 2012). Also see Fred Turner, “The Shifting Politics of the Computational Metaphor,” in *From Counterculture to Cyberculture: Stewart Brand, the Whole Earth Network, and the Rise of Digital Utopianism* (Chicago: University of Chicago Press, 2006), 11–40.

⁸⁶ Jacques Ellul, *The Technological Society*, trans. John Wilkinson (New York: Knopf, 1964), 19 (emphasis Ellul’s).

⁸⁷ *Ibid.*, 4.

⁸⁸ *Ibid.*, 85.

⁸⁹ *Ibid.*, 428.

⁹⁰ Lewis Mumford, “The Automation of Knowledge,” *AV Communication Review* 12, no. 3 (1964), 265. This speech was an early introduction to some of the themes informing *The Myth of the Machine: Technics and Human Development* (New York: Harcourt, Brace and World, 1967) and *The Myth of the Machine: The Pentagon of Power* (New York: Harcourt Brace Jovanovich, 1970).

⁹¹ Mumford, “Automation of Knowledge,” 264.

⁹² *Ibid.*, 268.

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- ⁹³ Ibid., 269, 274.
- ⁹⁴ Ibid., 266.
- ⁹⁵ Drucker, “Promise of Automation,” 25.
- ⁹⁶ Ibid., 24, 34 (emphasis Drucker’s).
- ⁹⁷ Marshall McLuhan, *Understanding Media: The Extensions of Man* (New York: McGraw-Hill, 1964), 349.
- ⁹⁸ The number of workers in manufacturing and mining in 1950 was 15,966,337 (28%); in 1990 it was 21,066,975 (18%); in 2010 it was 14,812,000 (10%). Matthew Sobek, Table Ba652–669, in *Historical Statistics of the United States*, ed. Susan B. Carter, Scott Sigmunt Gartner, Michael R. Haines et al. (New York: Cambridge University Press, 2006); U.S. Census Bureau, table 120 (“Employment by Industry: 2000 to 2010”), *Statistical Abstract of the United States*.
- ⁹⁹ See William A. Sundstrom, Table Ba4575, in *Historical Statistics of the United States*.
- ¹⁰⁰ Judith Stein, *Pivotal Decade: How the United States Traded Factories for Finance in the Seventies* (New Haven, CT: Yale University Press, 2010).
- ¹⁰¹ Robert M. Collins, “The Retreat from Growth in the 1970s,” in *More: The Politics of Economic Growth in Modern America* (New York: Oxford University Press, 2000), 132–65.
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- ¹⁰⁹ Tyler Cowen, *Average Is Over: Powering America Beyond the Age of the Great Stagnation* (New York: Dutton, 2013).
- ¹¹⁰ Ulrich Beck, *The Brave New World of Work*, trans. Patrick Camiller (Malden, MA: Blackwell, 2000).
- ¹¹¹ David Graeber, “Of Flying Cars and the Declining Rate of Profit,” *The Baffler* 19 (2012): 64–84. Robert Gordon emphasizes the slowing pace of transformative innovations since the early 1970s in *The Rise and Fall of American Growth* (Princeton, NJ: Princeton University Press, 2016).