Adapt or Resist?
Unions and the Political Economy of Automation

Adam M. Parker
Columbia University, United States

Abstract: A growing literature argues that automation, freer trade, and more open immigration are economic substitutes for firms seeking lower labor costs. However, I argue that the politics of automation differ from those of trade and immigration and that standard political economy theories cannot explain the divergent responses of different unions to automation. I argue that the diversity of occupations represented by a union determines whether it accommodates automation or opposes it. To test this theory, I compare two cases drawn from the United States between 1950 and 1975 analyzed through deep process tracing. In this neglected episode in economic history, I show that occupationally diverse, industrial unions cautiously embraced automation, while homogeneous craft unions were more militantly opposed. These findings demonstrate that, far from being powerless or reflexively oppositional when faced with new technologies, unions shape the adoption of automation in different ways depending upon their structures and internal dynamics.

On January 7, 2016, the Port of Rotterdam was brought to a standstill for 24 hours when its unionized dockworkers walked off the job in protest against the port operators' automation plans (Barnard 2016a). Rotterdam, the busiest container port outside of Asia, handled more than 13% of all containers brought through EU ports in 2015.[1] After several additional strikes over the following months, the dockworkers accepted an agreement that July allowing the automation plans to proceed in exchange for job guarantees into 2020 (Barnard 2016b).

Two years later, Las Vegas's Culinary Workers Union Local 226—representing the city's bartenders, housekeepers, servers, porters, bellmen, and kitchen staff—also faced automation concerns amid its negotiations with the casinos (CWU 226 2018). But instead of striking, and despite having an authorization to do so, the union accepted contract provisions centered on retraining provisions and advance notification of automation plans rather than bans or job guarantees (CWU 226 2019).

In a recent review, Milner and Solstad note that "scholars of technological change frequently argue that the main barrier to it lies in entrenched domestic interests" (2021, 550).[2] As these stories demonstrate, unions represent an important such interest and play an active role in shaping the adoption of automation. But crucially—and contrary to these expectations—unions do not universally respond with opposition. Some, like Rotterdam's dockworkers, do engage in strikes to prevent or slow automation and protect their jobs. But others, like the Las Vegas resort workers, are more accommodating.

What explains these divergent responses? I argue that the diversity of occupations represented by a union is a key determinant of whether it accommodates or opposes automation. Unions with little occupational diversity tend to resist automation because they internalize most of its negative effects and few of the benefits. In contrast, occupationally diverse unions tend to accommodate automation because they internalize more of its benefits.

Adam M. Parker, PhD Candidate, Dept. of Political Science, Columbia University, adam.parker@columbia.edu.

[1] Author's calculation based on data from UNCTAD and Lloyd's List.
[2] See also Juma (2016) and Mokyr (1998).

These expectations arise from the task- and occupation-based cleavages that automation induces per the task approach to production (Autor 2013). Unlike standard political economy models which emphasize preference cleavages based on industry or class, this paper points to the structure of unions—which does not neatly map to class or industry—as a source of policy outcomes.

To test my theory, I compare two most-similar, least-likely cases, drawn from the United States between 1950 and 1975 and analyzed via deep process tracing. This period corresponds to the first introduction of technologies known by the word "automation" in the United States, when interest in the topic rose to what one observer described as "hysteria" (Terbough 1966). These cases draw on extensive archival and primary-source research to highlight a period of economic history that has been neglected by modern discourse and scholarship about automation.

I show that occupationally diverse industrial unions—specifically the AFL-CIO and members of its Industrial Union Department—cautiously embraced automation and rejected efforts to oppose it despite its displacing effects. This was justified by the positive changes automation was thought to bring to the broader economy and the day-to-day nature of work for those who remained employed. In contrast, the occupationally homogeneous union of typographers in New York City's newspaper industry waged an intense and costly campaign that forestalled the introduction of automation for over a decade. These cases reveal how workers and unions reacted in real time to massively destabilizing developments in technology, a story which remains relevant today.

This paper articulates a political theory of how automation is adopted that is absent from the existing literature. Many studies of automation take automation as given and focus on its effects (Anelli, Colantone, and Stanig 2021; Gallego and Kurer 2022; Gingrich 2019). A broader literature does recognize technological innovation as a politically-driven phenomenon, but here the focus is on whether innovations are adopted and how quickly (Comin and Hobijn 2009; Milner and Solstad 2021). I instead emphasize that automation's adoption results from a political contest, the contours of which vary across cases according to factors like union presence and structure.

The existence of multiple paths to automation's ultimate adoption complicates efforts to understand its political and economic impacts. My findings indicate that the adoption of automation can vary in numerous ways, including the policies that accompany it and the agency and voice that workers have over this process. As a result, automation will not have the same impacts everywhere. This finding is relevant to efforts to study automation in isolation (mentioned above), but also to the growing number of studies situating automation alongside other forces of globalization, such as trade and immigration (*e.g.* Milner 2021; Owen 2021). These latter efforts are further complicated by differences between the politics of automation and those of trade and immigration, both in terms of the relevant cleavages and in the sites of the principal contests.

This theory also provides a novel account of the coalitional implications of task and occupational cleavages. As economic production grows more globalized and fractured, phenomena like task-based outsourcing (Grossman and Rossi-Hansberg 2008) make these cleavages increasingly important. While the existing literature on this issue has investigated the political effects of this outsourcing on individual preferences for trade protection (Blonigen and McGrew 2014; Owen 2017; Owen and Johnston 2017), my theory can extend these analyses into coalition-forming behavior.

Finally, my theory contributes to the political economy literature on unions by highlighting an understudied source of variation that impacts their behavior. A number of studies have incorporated unions into our understanding of phenomena like FDI (Owen 2013, 2015) and international trade (Ahlquist, Clayton, and Levi 2014; Dean 2015, 2016). However, none have identified the occupational structure of unions as an important determinant of their behavior. My theory suggests that this factor is influential in any situation—such as task-based outsourcing—where workers' preferences are expected to differ by occupation.

THEORY: UNION STRUCTURE AND RESPONSES TO AUTOMATION

Separate literatures in political economy examine the effects of automation and the effects of political cleavages on the formation of coalitions. Thus far, they have not been brought together to provide an account of the political coalitions that form around the adoption of automation and that shape automation's politics and political impacts. I briefly review these literatures before deriving a theory relating the occupation-based cleavages induced by automation to the structure of unions. The interaction of these factors, I argue, determines whether or not unions oppose the adoption of automation.

Automation

The existing literature does not provide a particularly clear definition of automation, but the dominant model for understanding its effects on workers is the routine-biased technological change (RBTC) hypothesis proposed by Autor, Levy, and Murnane (2003). Part of the task approach to economic production—which conceptualizes the production process as a series of discrete tasks varying in their attributes—the RBTC hypothesis holds that routine tasks are the most easily automated.[3] Workers performing routine-task-intensive work are thus expected to be harmed by automation while other workers benefit. With occupations being seen essentially as bundles of tasks, preferences over automation are expected to diverge at the occupational level.

While the RBTC hypothesis recognizes that workers can both be harmed by automation and benefit from it, this insight has not been used to study the coalitional politics around its adoption. In fact, the adoption of automation is generally framed as unpreventable and apolitical. Additionally, studies of automation have typically focused on those harmed by automation. The few studies of automation's beneficiaries (Broockman, Ferenstein, and Malhotra 2019; Gallego, Kurer, and Schöll 2022; Schöll and Kurer 2021) focus primarily on voting behavior or on elites rather than regular voters.

Studies of those harmed by automation have investigated their preferences over ancillary policies rather than adoption specifically. Vulnerability to automation has been found to decrease support for free trade and immigration (Kaihovaara and Im 2020; Owen 2021; Wu 2021), for example, but other results have not been so consistent. Some find that vulnerability to automation increases support for redistributive policies (Kurer and Häusermann 2022; Thewissen and Rueda 2019), but others find at best a highly contingent link (Jeffrey 2021; Zhang 2019). Similarly divergent findings obtain regarding the effect of automation on support for more active labor market policies and universal basic income.[4]

Finally, while the RBTC model is helpful for understanding the task- and occupation-based cleavages that automating technologies can induce, its narrow focus on computers and task routineness limits its applicability across time periods. This limitation is relevant to both the pre-computer age and, increasingly, the modern age, as advances in areas like artificial intelligence potentially allow the automation of non-routine tasks. Additionally, I argue that the routine-intensiveness of job tasks is not fixed but is rather an outcome of the contests between workers and their employers over automation.

Political Economy Models of Cleavages and Coalitions

There is a robust literature in political economy on the formation of political coalitions, particularly in the areas of immigration and trade. Unfortunately, these theories do not consider cleavages at the task or occupation level. In the immigration literature, dominant theories of economic interests highlight the importance of factor type in shaping workers' preferences (Hainmueller and Hiscox 2010; Scheve

[3]For an overview of the task approach, see Autor (2013).

[4]Im (2020) finds that automation risk increases support for these labor market policies, while Kurer and Häusermann (2022) do not. Sacchi, Guarascio, and Vannutelli (2020) find that automation increases support for UBI, but Dermont and Weisstanner (2020) do not. Busemeyer and Sahm (2021) find no effect on either policy.

and Slaughter 2001a). Under these models, all workers of the same factor type in each firm (and indeed across the economy) are expected to have the same immigration policy preferences.

On the issue of trade, competing theories emphasize factor type, industry of employment, or employing firm in determining workers' interests. Assuming labor factor specificity, all workers within the same firm (per "new" new trade theory (NNTT); Kim 2017) or industry (per the Ricardo-Viner model; Scheve and Slaughter 2001b) are expected to have the same preferences. Assuming labor factor mobility, all workers of the same factor type are expected to have the same trade preferences, both within individual firms and across the economy (per the Heckscher-Ohlin model; Ibid.).

In the trade literature, the task-oriented view of production has been used to develop the "trade-in-tasks" framework (Grossman and Rossi-Hansberg 2008). In this framework, production tasks can be divided not only between labor and machines, but between domestic labor and foreign labor. However, as with studies of automation, efforts to investigate the politics of task-based outsourcing have not discussed how the cleavages that it induces affect the formation of political coalitions on the issue of free trade (Blonigen and McGrew 2014; Owen 2017; Owen and Johnston 2017).

Divergent Occupational Preferences

For this study, I define automation as the technique of making production processes less reliant on human intervention, less subject to discretion, more consistent, and more predictable—that is, more automatic. This definition harmonizes with the broader definition of technology as "artifacts, techniques, institutions, [and] systems that are or were functional" (Dafoe 2015, 1051). Automation thus encompasses production changes that don't involve physical or digital artifacts.

This definition provides less case-independent specificity than the RBTC hypothesis about the workers harmed by automation, but in exchange it allows me to study the politics of automation in more contexts. In place of task-routineness, I divide workers in any given case between the targeted (those performing the tasks being automated) and the non-targeted. I argue that preferences regarding automation can diverge both among targeted workers and between the targeted and the non-targeted.

Workers expected to oppose automation will be primarily targeted workers. They are likely to lose their jobs and, assuming labor market friction, will prefer to avoid this. Targeted workers might also fear that the new technology would degrade their work and prestige, turning over the skills of their craft to machines and/or unskilled workers. As adaptations to automation often spread beyond the targeted steps of the production process, some non-targeted workers might also dislike the changes brought to their own work by automation.

Automation can also have a constituency of workers in its favor within automating plants. Primarily these will be non-targeted workers not threatened with unemployment. Opposing automation is just as costly for these workers as for targeted workers, but it provides them significantly less benefit. On the other hand, automation has potential benefits for them. Automating one part of a production process might require positive changes to the parts they are engaged with. Similarly, targeted workers confident in their continued employment might judge that automation will create a job that is cleaner, safer, less physically taxing, or less tedious, requiring greater skills and commanding higher pay and prestige.

Perhaps more importantly, automation will likely make the firm more competitive and more profitable. Workers left employed after automation could see an increased demand for their skills, particularly if demand for the firm's product(s) increases. A more profitable employer might be more able and willing to increase wages, particularly if its employees are represented by a strong union. And automation should give these workers more job security in the face of competition, such as from imports or substitute industries. Any of these workers would generally be expected to support (or not actively oppose) automation efforts.

Political Contests Over Automation

Decisions about automation are typically made by firms and proceed at the plant level. Most "acts" of automation thus happen outside of government institutions, and the resulting contests are between individual firms and their workers. This is not to say that national institutions do not influence automation. Governments set the broad macroeconomic context in which automation occurs and they can engage in regulation and taxation to influence ongoing automation. Still, intentional government intervention over automation is not guaranteed.

This pattern of contestation makes unions particularly important in the politics of automation. This echoes existing studies (Ahlquist, Clayton, and Levi 2014; Dean 2015, 2016; Owen 2013, 2015) which identify unions as important actors in the politics of trade and FDI. But on the issue of automation, the location of the relevant political contests makes unions the *primary* organizations for generating collective action by workers.

While political parties can mobilize workers and other voters into coalitions over national policies, they are much less relevant within firms. Here it is unions and other collective bargaining groups that do the work of formulating, aggregating, and expressing worker preferences over firms' decisions. Beyond this, unions are also capable of engaging with national-level policy, both through lobbying and by supporting candidates and parties in elections. The influence and capabilities of unions thus span the levels at which political contestation over automation occurs, from the firm to the national polity. Understanding these groups' responses is thus crucial to understanding the politics of automation.

Union Structure and Responses to Automation

Unions are organized in two ideal-typical ways: by craft and by industry. Craft unions "unite those using the same tools or doing the same kind of work" (Savage 1922, 3) and may even cross industry lines. Put in other terms, craft unions are very occupationally homogeneous. In the modern United States the building trades are one example of this type of organization (with separate unions representing electricians, plumbers, bricklayers, etc.), as is the union representing Rotterdam's dockworkers.

In contrast, industrial unions "unite all who are engaged upon a certain product or class of products, regardless … of the service which they render" (Savage 1922, 3). These unions are occupationally heterogeneous, representing workers in a variety of jobs. Prime examples of such unions are the United Steelworkers, which represents workers engaged in all aspects of steel production, and the Las Vegas Culinary Workers Union.

Preference Aggregation in Unions

Before considering how workers' preferences interact with union structure, it is necessary to briefly consider how member preferences are aggregated within a union. The most common model for this process is that of the median voter.[5] Under this model, overall union policy is chosen by office-seeking leaders who will tend toward the preference of the median union member. In its strongest form this theory requires perfect union democracy, though Farber (1986) shows theoretically that this result is approximated even under imperfect democracy as long as the costs of replacing or overthrowing the leader are not too large. I adopt a modified version of this model in which leaders must also consider the impact of their decisions on the subsequent location of the median member.

Few studies have empirically tested this assumption, but those that exist seem to support the prediction that union leaders are broadly responsive to their members' preferences. In a survey of local industrial union leaders, Miller, Zeller, and Miller (1965) find that these leaders overwhelmingly prioritize the economic interests of local members. In their words, union leaders seek to promote "the

[5]For an overview of economic approaches to this issue, see Kaufman (2004).

welfare of their own members in their own place of work" and "do not perceive broad ideological purposes for their organizations" (91). And Knowles (2007), surveying the history of the Australian Workers' Union, concludes that union leaders "are answerable to their members in the same way private sector leaders are to shareholders" (205–206). Finally, to the extent that leaders have non-office-seeking goals of their own, these are logically secondary to holding office.

Industrial Unions

To examine how workers' divergent preferences interact with union structure, I first consider the situation in which the employees in a plant are all represented by an industrial union. Confronted with efforts to automate part of the production process, the members of such an occupationally diverse union will likely have divergent preferences. Many—perhaps all—targeted workers may wish to oppose automation to protect their jobs. But non-targeted workers will prefer acquiescence, as opposition guarantees costs while promising few rewards.

These divergent preferences, in turn, constrain union leaders. If they lead the union in opposition and fail, the targeted workers who wanted to prevent automation may be displaced, leaving only those who rejected opposition from the start. On the other hand, acceding to automation might shrink the union, but only by preferentially removing those harmed by this acquiescence. Accepting automation thus poses significantly smaller risks for leaders. Put another way, an occupationally heterogeneous union internalizes not only the costs of automation (in the loss of some members' jobs) but also most of its potential benefits (in improved conditions, job security, and compensation for those still employed). Occupational diversity is thus analogous to the profit-sharing mechanisms described by Dean (2015, 2016). Such a union is expected to refrain from opposing automation:

H1: Occupationally heterogeneous unions will not oppose automation.

Craft Unions

Next, consider instead that plant workers are represented by separate unions organized by occupation. Now the costs of automation will be borne entirely by the union representing targeted workers, but its benefits will be diffused across the others representing non-targeted workers; no union fully internalizes the benefits of automation or the costs of opposing it. Unless most of its members expected to remain employed, acceding to automation would cripple the targeted union. Because it represents only one occupation, its members all face the same threat. They will be unified in their preferences, and the risks between leaders and members will be aligned. Such a union is thus expected to oppose automation:

H2: Occupationally homogeneous unions will oppose efforts to automate their work.

Some important points remain. First, craft and industrial unions as presented here are ideal types; few real unions are organized purely along these lines. In practice, "craft" unions might represent workers in multiple related occupations, and "industrial" unions rarely include *all* of the workers in an industry. In fact, industrial and craft unions frequently coexist in the same industry. I will use the terms "craft union" and "industrial union" to refer to unions that tend towards these types as proxies for the real variable of interest: occupational diversity.

Relatedly, the theory is concerned with groups of workers engaged in specific collective actions. These may not always exhibit the same occupational diversity as the relevant union(s). In collective bargaining, bargaining units are the relevant group, and these may be organized along different lines than the parent union. In the case studies that follow, priority is given to identifying the occupational diversity of the relevant group of workers, rather than the union *per se*.

Finally, these hypotheses abstract away other considerations that may influence a union's decision regarding automation. As strategic actors, unions might refrain from opposition that they otherwise

wish to engage in because they feel it is unlikely to succeed or because they see automation as the least bad of a menu of options. Foreign or domestic competition could convince a union that automation is necessary to keep its employer solvent and its members employed, even if in reduced numbers. These factors affect the observable outcomes in a given case but do not contradict the theory's logic.

METHODOLOGY: CASE COMPARISONS AND PROCESS TRACING

This paper combines two case analysis techniques to demonstrate the causal validity of the theory: case comparisons (using the "method of difference" with least-likely cases), and process tracing. The decision to engage in qualitative case analyses is informed in part by the definition of automation discussed above. Case study analyses complement the definition's flexibility in identifying workers affected by automation, allowing the elucidation of workers' real-time perceptions rather than imposing a view of automation's threat upon them.

The case comparisons use the method of difference to allow for a causal interpretation of the findings under the counterfactual framework. The process-tracing methodology, on the other hand, adopts a more mechanistic understanding of causality and investigates the presence of the causal mechanism proposed by the theory in each of the cases. Combining these two methods provides stronger evidence of a causal interpretation of the findings and a stronger validation of the proposed causal mechanism.

Comparative Case Studies: Selection and Sources

In the method of difference, two most-similar cases differing on the independent variable (and, ideally, only that variable) are compared. If found to differ as expected on the dependent variable as well, the comparison supports the existence of a causal relationship between the variables, with the degree of causal leverage depending upon the degree of similarity between the cases.[6]

While efforts were made during case selection to choose most-similar cases, two challenges are noteworthy. First, the independent variable identified by the theory (occupational heterogeneity) is correlated with other union characteristics that might also affect their responses, such as size and skill level. Industrial unions are generally larger than craft unions and represent lower-skill workers. These factors, rather than occupational diversity, may explain any different outcomes. Second, the theory predicts two distinct outcomes (opposition or acceptance) that might have different relationships to any omitted variables. For example, the belief by a union that employers need to automate to stay in business could be sufficient to cause it to accept automation, but the absence of such a belief is not sufficient to cause opposition.

To account for these challenges, each hypothesis was tested using a case that is unlikely (from the perspective of competing theories) to have the outcome predicted by my theory.[7] Two cases were selected for comparison: the AFL-CIO and its industrial unions (1954–1969), and International Typographical Union (ITU) Local No. 6 and the New York City newspaper unions (1948–1974). Insofar as possible given the constraints mentioned above, these are most-similar cases, and both were drawn from the United States between roughly 1950 and 1975.

This general context was chosen for three reasons. First, while efforts to study modern threats of automation are plagued by uncertainty about the future, the long-term outcomes of cases from this period are known or can be established. Second, the U.S. labor movement at this time contained both industrial and craft unions, allowing the selection of one case of each from the same temporal and political context. Third, U.S. unions at this time were relatively strong (as measured by union density)

[6]For a fuller exploration of case comparisons, see Levy (2008).
[7]For more on crucial cases, see Levy (2008) and Eckstein (1975).

and automation was a highly salient issue for the public. These two factors minimize the chance that the actions of union leaders might deviate from the interests of their members or that any given union would be limited by concerns that opposition to automation would fail.

Case 1: The AFL-CIO and its Industrial Union Department, 1954–1969

The unions in this case are highly heterogeneous and expected by my theory not to oppose automation. This was chosen as both a crucial and a least-likely case. The AFL-CIO during this period was the largest confederation of unions in the United States and the closest that the U.S. had to an organization that could speak on behalf of its entire labor movement. Additionally, among the members of the IUD were the most powerful unions in the country. These organizations represented the most important parts of the U.S. labor movement at this time; any theory of union activity must account for their behavior.

This is also a least-likely case of automation acceptance in light of alternative explanations. During the case period, the AFL-CIO was operating at the height of its power, in a time of high public concern over automation, and for much of this period with Democratic allies holding Congress and the presidency. Had it wished to oppose automation directly, it likely would have found success; acceptance thus indicates it did not wish to.

This case is explored through extensive research in the AFL-CIO archives. All documents or collections in this archive related to automation were collected and examined (for details see the supplemental appendix). A key source is the vertical reference file on automation collected by the internal library of the AFL-CIO. It contains 182 individual documents of more than 780,000 combined words, published from 1927–1991 and collected by union employees on an ongoing basis starting no later than 1938. It thus serves as a rolling snapshot of the materials that unions were publishing or finding important regarding automation over more than six decades.[8] Other archival materials consulted include additional AFL-CIO publications, testimony before Congress, public speeches, and other records. These archival sources were supplemented with Congressional records and reports.

Case 2: ITU Local No. 6 and the NYC Newspaper Unions, 1948–1974

This case consists of highly homogeneous unions expected by my theory to resist automation. ITU Local No. 6 (hereafter ITU 6) represented almost exclusively typographers, and the other newspaper unions were also organized on craft lines. This is a least-likely case of automation resistance because important factors in the case militate against opposition to automation. These unions were operating in an industry facing outside competition in the form of television news, which is expected to constrain their opposition to automation out of concern for the ability of firms to offer ongoing employment. Opposition to automation in this case demonstrates the potency of the argument that occupationally homogeneous unions fully internalize neither the costs of opposition to automation nor the benefits of allowing it to proceed. This case is explored principally through contemporary newspaper accounts, supplemented where available with secondary sources. Due to the importance of these unions to newspaper production, this reporting is remarkably thorough.

Process-Tracing Method

Both cases are explored through process-tracing as described by Beach (2016), whereby the steps of the causal mechanism proposed by the theory are individually tested.[9] Multiple independent pieces of

[8]Since this collection was curated by union employees, there are possible concerns over omitted views. However, its intended use as an internal reference, its continuous (as opposed to retrospective) construction, and the fact that it was created and maintained by professional librarians, give confidence that any such biases are minimal.
[9]Note that this description differs from the "causal process observations" often associated with this method.

evidence for each step in a given case would provide a strong indication that the causal mechanism is present there, supporting a causal interpretation of the theory *in that case*. The mechanism's presence in *both* cases supports the greater generalizability of the theory. Below, I summarize the causal mechanisms discussed above and describe the evidence that would indicate their presence.

For occupationally heterogeneous unions (Table 1), some members must benefit from automation and support its adoption, while others must be harmed and oppose it. If all members have the same preference, the causal mechanism is absent from the case. Second, union leaders must be aware of these divergent preferences. If they are not, the divergent preferences cannot explain the leaders' behavior and the causal mechanism is absent. Third, these divergent preferences must meaningfully constrain the leaders. If opposition was not considered or thought unlikely to succeed, member preferences are not the constraint. And if leaders don't attempt to address the harms to targeted workers, this indicates that the preferences of these workers are not constraining. In either case, the causal mechanism is absent. However, if evidence indicates that automation's benefits to some workers motivated the lack of opposition, this would support the presence of the mechanism. Finally, the union must refrain (actually and rhetorically) from efforts to oppose automation or make it overly costly to firms. Any such efforts would indicate that the causal mechanism is absent.

TABLE 1. Causal Mechanism for Hypothesis 1

Theory	Proposed Evidence
Step 1: Automation harms some members (who oppose it) and benefits others (who support it)	Analyses, evidence, or statements of actual or potential harms and benefits based on member characteristics
↓	
Step 2: Members' divergent preferences are communicated up to union leaders	Communication between members and leaders; votes by members; acknowledgement by leaders of members' divergent interests
↓	
Step 3: Union leaders are constrained in their responses by these divergent preferences	Indications that opposition was considered; actions to appease those harmed by automation in other ways; statements that support is motivated by the benefits
↓	
Step 4: The union does not actively oppose automation	Statements rejecting opposition or welcoming automation; absence of efforts to constrain automation; proposed adaptations not overly costly to firms
Contextual condition: occupationally heterogeneous union facing attempted automation	

For homogeneous unions (Table 2), most members must be harmed by automation and oppose it. If they support automation, the causal mechanism is absent. Second, union leaders must be aware of these convergent preferences for the reasons described above. Third, these convergent preferences must meaningfully pressure the leaders. Opposition must be a priority for members, and failures to oppose automation must be criticized. Opposition must not be driven by other concerns, such as a desire to protect the union as an organization rather than the members. Otherwise, the mechanism is absent. Finally, the union must (actually, if not rhetorically) engage in efforts to oppose automation or make it overly costly to firms. The absence of such efforts would indicate that the mechanism is absent.

TABLE 2. Causal Mechanism for Hypothesis 2

Theory	Proposed Evidence
Step 1: Automation threatens members' employment, and they oppose it	Analyses, evidence, or statements regarding actual or potential harm based on member characteristics
↓	
Step 2: Members' convergent preferences are communicated up to union leaders	Communication between members and leaders; votes by members; acknowledgement by leaders of members' convergent interests
↓	
Step 3: Union leaders are pressured by these convergent preferences, not by other concerns	Statements or actions indicating that opposition was a member priority; leaders criticized for weak responses; no priority for organizational longevity
↓	
Step 4: The union actively opposes the adoption of automation	Statements opposing automation; strikes or other actions to constrain automation; union demands to make adoption costly to firms

Contextual condition: occupationally homogeneous union facing attempted automation

CASE ANALYSES

This section begins by presenting the historical context of the two cases. In addition to providing general background information, this will establish the high degree of salience that automation held at this time, both in broad social terms and specifically in the political arena. This should, in turn, allay concerns that actions or statements of union leaders might deviate significantly from their members' interests. I then present the evidence from each case as guided by the process-tracing methods described above before discussing the two cases jointly.

Background: "Automation Hysteria" in the Post-War United States

Three key technologies were developed during World War II that would have enormous implications for the post-war U.S. economy: servomotors, computers, and automatic material handling. Servomotors are feedback-controlled actuators that allow machines to precisely position their own components. Electronic computers were developed to perform a host of mathematical calculations in ballistics, rocketry, and aircraft design, and they were also integrated with servomotors to control naval guns. Finally, the creation of nuclear weapons and power required methods for handling dangerous materials without direct contact by human beings. After the war, many of these technologies were adapted to civilian uses. Together, these three technologies would form the basis for a change in industrial production that would come to be known as "automation."

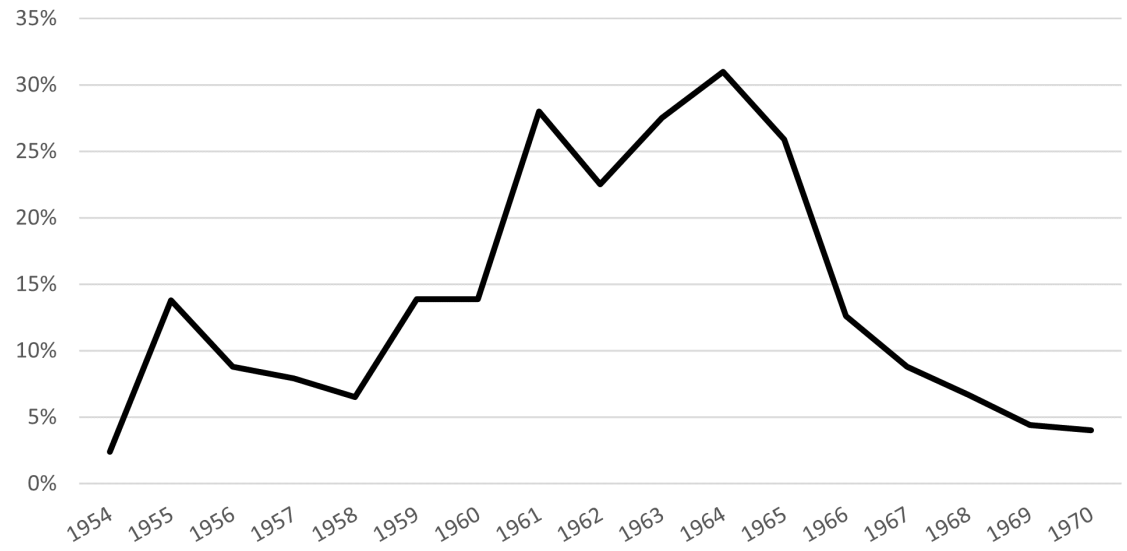
The origins of the term are debated, but in short order the concept of automation took the United States by storm. From 1950 to 1964, per the Google Books American English language corpus, use of the word automation increased over 68-fold, peaking at two in every hundred thousand words published.[10] By at least 1955, automation was showing up on the cover of national magazines and in the pages of major newspapers. On January 22, 1955, *The Saturday Review* ran a special issue

[10]"Automation" (case insensitive) accounted for .030 of every 100,000 words published in 1950 and 2.043 in 1964. For comparison, the word "internet" was .031 of every 100,000 words in 1976 and didn't account for 2 in

on "Atoms and Automation" featuring articles by prominent intellectuals, industrialists, and a union researcher on the twin developments of automation and atomic power.

Over this period, unions also engaged publicly with the issue of automation. Figure 1 shows the share of pages in the weekly union newspaper *The AFL-CIO News* featuring references to automation from 1954 to 1970.[11] By 1964, automation was being discussed multiple times a week, on average almost once every three pages. The national interest in automation rose to what one contemporary termed "automation hysteria" (Terbough 1966).

FIGURE 1. Percent of *AFL-CIO News* Pages Referencing "Automation"



Interest in automation, especially in this early period, was driven by the sense that it represented an imminent economic revolution. In 1948, mathematician Norbert Wiener wrote an influential book on the feedback-control techniques that he had helped to develop during the war and their potential impacts on society ([1948] 1965). He described these techniques as ushering in a "second industrial revolution," and many union leaders came to embrace this idea. In March 1953, leaders of the United Auto Workers (UAW) adopted a resolution similarly heralding the revolution's arrival (UAW-CIO Ed. Dept. 1955). And in 1955, CIO President Walter Reuther stated that the impacts of automation "bid fair to prove quite as revolutionary as were those of the First Industrial Revolution" (4). The phrase also appeared in popular media, as on the cover of the aforementioned issue of *The Saturday Review*.

The federal government also showed an interest in automation. In October 1955, a subcommittee of Congress's Joint Committee on the Economic Report (1956; hereafter JCER) held nine days of hearings on the subject. At this time the concept of automation was so new that the subcommittee struggled even to define it. Additional hearings on automation were subsequently held by this and other committees in December 1956, November 1957, September 1959, February 1960 (Joint Economic Committee 1960), and March-April 1961 (House Committee on Education and Labor 1961).

Upon taking office, President Kennedy brought executive branch attention to bear on automation. His fifth executive order, signed four weeks into his term, established the President's Advisory Committee on Labor-Management Policy to investigate "the benefits and problems created by automation and other technological advances" (Kennedy 1961). In April 1961, the Office of Automation and Manpower

every 100,000 until 1994, when it reached 2.426.

[11] Prior to December 1955, the publication was known as *The CIO News*.

was established at the Department of Labor (Klemen 1974). Government attention to automation reached its zenith on August 19, 1964, when President Johnson created the National Commission on Technology, Automation, and Economic Progress, with fourteen members chosen by the President and confirmed by the Senate (Johnson 1964).

Case 1: The AFL-CIO and Industrial Union Department, 1954–1969

The AFL-CIO was formed in December 1955 by the merger of the American Federation of Labor (AFL) and the Congress of Industrial Organizations (CIO). The AFL was founded in 1886 as a federation uniting a number of craft unions that had broken away from the Knights of Labor. Within a few short years it was the dominant union federation in the United States. In 1935, many industrial unions within the AFL formed the Committee for Industrial Organization in an attempt to resist craft union dominance. The craft unions, representing primarily skilled workers, opposed industrial organizing and its focus on unskilled and semiskilled workers. In 1938 the industrial unions broke away entirely and renamed themselves the Congress of Industrial Organizations. The AFL and CIO engaged in intense competition, establishing competing unions and "raiding" members and locals from each other.

Both organizations experienced a leadership change in 1952, when George Meany took over the AFL and Walter Reuther took charge of the CIO. A period of peace followed, and negotiations commenced over a possible merger. Meany was selected to lead the rejoined AFL-CIO, while Reuther became both a vice president and the president of its newly created Industrial Union Department (IUD). Analogous to the earlier Committee for Industrial Organization, the IUD served as a collective voice for industrial unions within the AFL-CIO. Immediately upon its creation, the AFL-CIO became the largest union federation in the United States, representing workers in both craft and industrial unions in almost every occupation in the economy.

TABLE 3. Summary of Evidence in Case 1

Proposition	Evidence
No opposition to automation	The statements made and policies advocated by unions were accommodating rather than oppositional.
Member preferences diverged and leaders were aware	Union leaders spoke of the benefits to automation (reduced drudgery and tedium, higher skills, better pay) and acknowledged its harms to older and lower-skilled workers.
Divergent preferences were a meaningful constraint	Unions attempted to help harmed workers, advocating measures like improved unemployment benefits, early retirement, and retraining programs. Opposition was conceivable; leaders specifically rejected Luddism and had engaged in more direct opposition on other issues in the past.

The AFL-CIO cautiously embraced automation

The leaders of the AFL-CIO and its industrial unions were seemingly unanimous in cautiously embracing automation. In a pamphlet on automation released in 1956, AFL-CIO president George Meany succinctly summarized his organization's view, declaring that "labor welcomes these technological changes" (AFL-CIO 1956, 2).

This was not the first time that this sentiment had been expressed, nor was Meany alone in this view. In 1954, Reuther (then president of both the industrially-organized UAW and the CIO) wrote that "we

in the UAW-CIO are confident that we will not have to fight the new machines and devices" (UAW-CIO Ed. Dept. 1955, 5). And summarizing the findings of their nine days of hearings in October 1955, the JCER wrote: "Not a single witness raised a voice in opposition to automation.... This was true of the representatives of organized labor as well as ... management" (JCER 1956, 5–6).[12] These quotes make it clear that, at least rhetorically, the AFL-CIO and its industrial unions were embracing automation as a conscious choice *not* to engage in opposition. This decision was not altered during the case period.

The AFL-CIO's rejection of opposition was not purely rhetorical. Early responses to automation that it advocated in collective bargaining included advance joint consultation, the use of attrition to reduce the size of the labor force,[13] wage increases, guaranteed wage plans, severance pay provisions, broader seniority protections, wage protections for downgraded workers, early retirement provisions, and retraining (AFL-CIO 1956). These measures, to be sure, would increase the costs to firms of automating and could therefore dissuade them from doing so. But attrition policies in particular represented a significant concession by unions, as they would make attracting new members very difficult and thus damage the unions long-term. Moreover, as time went on, these collective-bargaining measures were deemphasized in favor of national legislative remedies that would lift the burden from individual firms almost entirely (AFL-CIO 1959, 1966).

Member interests diverged—and leaders knew it

The evidence shows that the unions were aware of and constrained by their members' divergent interests regarding automation. They knew some would be hurt by it, and some would benefit. Furthermore, they were sufficiently cognizant of this fact to know which workers fell into these categories. The unions justified their support for automation by pointing to their determination that the automation of the day required increased skill, merited higher wages, and would create more pleasant working conditions.[14] And opposition was explicitly rejected rather than being inconceivable or thought impossible.

The unions knew that automation's effects would not be universally positive. They quickly developed a keen view of not only which workers would be helped by automation, but which workers would be hurt. Older workers were of particular concern to the unions. While they were held to be less valued by employers and potentially harder to retrain, unions emphasized their greater maturity and judgment in a context in which physical strength was less important (J. Stern 1955).

Unions also recognized that in the context of upskilling automation, unskilled or semiskilled workers were likely to bear the brunt of layoffs. In his aforementioned Congressional testimony, Reuther observed that "by its very nature, automation will tend to eliminate unskilled and semiskilled jobs" (1955, 12). These workers were also considered to be harder to retrain, with the high levels of innumeracy and illiteracy among them identified as a particular barrier (IUD 1962; B.W. Stern 1964).

Despite this, the AFL-CIO and its industrial unions were clear that they supported automation because of the benefits that it would have for its members and for society broadly. Reuther wrote in 1954 that, with union guidance, automation could "bring health and happiness, security and leisure, and peace and freedom to mankind everywhere" (UAW-CIO Ed. Dept. 1955, 5). The UAW further felt that because of automation "many of the unpleasant jobs will be eliminated" (23). Reflecting a

[12]The labor witnesses all represented industrial unions, specifically the CWA; the International Union of Electrical Workers; the Office Employees International Union (OEIU); the Brotherhood of Railroad Trainmen; the International Chemical Workers Union; and the CIO.

[13]This refers to the practice of preserving a worker's job until they leave it, but then not replacing them.

[14]Archival evidence does not explicitly show that all members were themselves aware of their divergent interests. It does show both significant popular interest in automation and evidence of attempts by the AFL-CIO to educate members on automation's effects. While I cannot directly show bottom-up pressure on union leaders, I find that they acted *as if* such pressure existed or would exist if these preferences were not accounted for.

common view, Abraham Weiss (1957) of the Brotherhood of Teamsters claimed that "automation removes routine and uninteresting work" and that it "removes human drudgery" (5). Automation was also thought to increase the skill levels required of workers. In testimony before Congress, Reuther noted the "general agreement that one of the results of automation will be a substantial raising of the level of skills required in automated factories and offices" (1955, 17).

Divergent preferences were a meaningful constraint

That these divergent preferences constrained unions is indicated by two facts. First, union activities indicate that workers harmed by automation were not simply discarded by the unions. As discussed above, unions were keenly aware of the unemployment threat posed by automation and the workers that were most vulnerable to it. The collective bargaining measures they advocated are almost all focused on assisting those workers who were thought to be hurt by automation. Attrition policies were specifically intended to prevent any layoffs, and severance pay and retraining programs were meant to help workers transition into new employment. Many measures were aimed specifically at the older workers thought to be particularly vulnerable, such as early retirement and broadened seniority protections.

Proposals for national legislation had a similar aim, and included retraining programs, enhanced unemployment insurance, public service employment programs, and free tuition at community colleges (AFL-CIO 1956, 1959, 1966). All of these proposals, and the accompanying lobbying intended to bring them into effect, demonstrate the significant influence that the potential losers to automation exerted on the activities of industrial unions. While the unions did not directly oppose automation on their behalf, they still advocated for vulnerable workers.

Second, direct opposition to automation was entirely plausible to the unions. Luddism, for instance, was a consistently invoked example of what the unions were rejecting.[15] Additionally, the union leaders of this time had themselves engaged in significant direct actions. In the Flint sit-down strike of 1936–37, for instance, Reuther and members of the UAW seized several General Motors plants and violently held them against police raids and court orders, in part to prevent GM from removing important manufacturing dies from the facilities (Fine 1965). While there is no evidence in the examined materials that such approaches were specifically considered regarding automation, they were certainly conceivable had direct opposition been the goal. The divergent interests of their members, however, dictated that it would not be.

Case 2: ITU Local No. 6 and the NYC Newspaper Unions, 1948–1974

The International Typographical Union was founded in 1852 as an industrial union representing workers in the printing trades. Between 1892 and 1904, a series of splits saw the creation of separate unions representing lithographers, pressmen, stereotypers, electrotypers, and photoengravers. In 1943 the mailers also formed a separate union. As a result, the ITU came to represent primarily compositors.[16]

The ITU local in New York City was number 6, known widely as "Big Six" due to its influence. After the departure of the mailers from the ITU, ten separate unions were active in the NYC newspaper industry during the case period; there were no further splits or mergers. Nine were craft unions, representing the typographers, mailers, delivery drivers, photoengravers, stereotypers, pressmen, electricians, paper handlers, and machinists, respectively. The tenth was the Newspaper Guild. While called an industrial union, it did not represent even most of the workers in the industry. Instead, it represented only non-craft office employees, including reporters and commercial staff. In the view of

[15]Howard Coughlin, OEIU President: "there are no longer any Luddites among us" (1963, 6). See also Huhndorff (1955); UAW-CIO Ed. Dept. (1955).

[16]These workers are also called printers, typographers, or (referring to machine operators) linotypists.

the theory, it is thus closer to a craft union than an industrial union. The newspapers during this period tended to negotiate as a group under the umbrella of the NYC Publishers' Association.

Since the 1890s, the work done by the ITU's compositors had been accomplished primarily using linecasting machines (*Time* 1936), and to a lesser degree by traditional hand methods. But in the decade following the end of WWII, two new techniques of typesetting were introduced: teletypesetting (TTS) and photocomposing (Kelber and Schlesinger (hereafter K&S) 1967). In TTS, punched tape was fed into automatic linecasting machines that then produced the specified metal printing slugs from hot lead. These tapes could be produced in-house for a paper's own stories, or they could be purchased from outside sources. In-house tape provided a modest productivity boost, but the use of outside tape could eliminate in-house compositors altogether. By 1951, wire services such as the Associated Press were selling stories in TTS format (*Time* 1953).

In photocomposing or phototypesetting, the production of metal type was eliminated altogether in what was known as a cold-type process. Later advances in electronic computers enabled further automation, with the greatest advantage found in combining computers with phototypesetting. In the case period, ITU 6 was thus facing a rapidly evolving threat from automating technologies as a craft-style union within a highly fragmented labor environment.

TABLE 4. Summary of Evidence in Case 2

Proposition	Evidence
Direct opposition to automation	ITU 6 engaged in strikes and slowdowns to gain jurisdiction over automated equipment and restrict its use.
Members preferences converged and leaders were aware	Members' preferences were expressed in observable votes and meetings, and members overwhelmingly voted for actions that restricted automation.
Member preferences (not other factors) pressured leaders	Members opposed even modest expansions of automation. Opposition was to protect members, not the union; automation was allowed once job guarantees were obtained, but the union was fatally hobbled by the agreement.

Strikes and slowdowns to oppose automation

Opposition to automation by ITU 6 occurred primarily in two steps that were repeated over the case period for different technologies. First, the union would seek to prevent a new technology from being adopted unless the union's jurisdiction over the workers using it was recognized. Second, upon obtaining this recognition, the union would demand expensive work rules for the operation of these machines, making them uneconomical for the papers.

This pattern was first established in 1948. In negotiations that year, the union sought jurisdiction over phototypesetting machines as well as Varitypers (a cold-type machine). Unable to achieve this, ITU 6 approved a compromise in August that prohibited the papers from using any "substitute processes" unless they went on strike (K&S 1967, 30–64). The same language was approved again in both 1950 and 1953. Until these contracts expired, "not a single Teletypesetter perforating or receiving unit would be in operation in New York daily newspaper composing rooms," even though roughly 3,000 TTS units were in use elsewhere in the country (50). This lasted until March 1955, when a new contract was signed recognizing ITU 6's jurisdiction over photocomposition and TTS work (58–62).

With jurisdiction settled, ITU 6 moved to impose rules concerning how the new equipment could be operated. By 1955, only the Wall Street Journal (WSJ) had an approved operation to produce tape in-house. Their agreement required all tape to be created—and each automatic linecasting machine to be individually attended—by ITU members, significantly limiting the tape's labor-saving potential (K&S 1967, 55–58). The WSJ could manage this because it used tape produced in NYC to print editions in Chicago, San Francisco, and Dallas. The New York Times (NYT) similarly began TTS operations in 1960 while seeking to simultaneously publish an NYC and an International edition (80–82). Union demands also limited the use of outside tape. At this time only the Herald Tribune and the WSJ had ITU approval to use outside tape, and only the WSJ was actually doing so (61).

The greater savings from phototypesetting made it somewhat more attractive in the face of union demands, but still there were only limited attempts to introduce such equipment. The Daily News, the NYT, and the World Telegram & Sun each introduced a limited number of these machines between 1956 and 1960. All such installations were primarily experimental, and none were particularly consequential to ITU employment at the papers (73–83).

In 1961, ITU 6 reached an agreement with the Publishers' Association that finally set the rules for TTS operations across the city. Papers wishing to use such equipment would have to train twice as many operators as they needed in a course that would last 70 weeks, pay full union wages, and cost $2,000 per student (K&S 1967, 83–87). ITU journeymen were required to monitor the automatic linecasting machines and could monitor no more than three at a time (compared to the 1:1 ratio required at the WSJ). All ITU journeymen working in TTS operations would receive the same wages as those using hand- and machine-compositing methods, and no outside tape could be used unless agreed to separately with the union. The publishers agreed to these rules under pressure from the NYT, which wanted to produce a new West Coast edition. By 1962, only papers printing editions outside NYC had found TTS economically viable (99).

This pattern continued for the rest of the case period. In 1962, negotiations regarding automation centered on outside tape from the wire services, which the newspapers wanted to use to set stock market and other financial tables. Led by new president Bertram Powers and inspired in part by these automation concerns, ITU 6 went on strike in December and caused the suspension of all daily newspaper operations in NYC for 114 days. The contract that emerged allowed the papers to set by tape only two-thirds of the material that they had hoped to. Additionally, the papers agreed to contribute, in principle though not in specifics, to a union-operated automation fund (Raskin 1963).

In 1965, ITU 6 threatened a strike and engaged in slowdowns at three separate papers. During these slowdowns, "chapel meetings" were held in the papers' composing rooms, effectively bringing work to a halt for the meeting's duration.[17] In the resultant contract, the papers committed to not introduce automated equipment without specific approval from both ITU 6 and its international. Effectively, the union had secured a veto over future automation. The papers also agreed to contribute 100% of their direct savings from outside punch-tape use to the union's automation fund (Stetson 1965b).

The Guild *did* strike the NYT that year, in part over concerns about automation. The NYT ultimately agreed to provide employment protection against automation for Guild employees. The paper also agreed that no automated equipment affecting the Guild's jurisdiction would be introduced without its approval, but refused to give them the same blanket veto won by ITU 6. The mailers, too, won job guarantees against automation during this strike after threatening to stay out (Stetson 1965a).

During the 1967 negotiations, ITU 6 expanded its use of chapel meeting slowdowns starting on March 30 at the Daily News. By late April these meetings were occupying 15 hours of each workday. A tentative agreement ending the slowdowns was finally reached on April 28 (Stetson 1967a), and

[17] In the ITU, the organization of workers within the same plant or shop was known as a chapel.

agreements with most of the other papers followed in May and June (*NYT* 1967; Stetson 1967b). All of ITU 6's 1967 agreements maintained its veto over automated equipment through 1970. The final negotiations (with the Long Island Star-Journal) stretched into 1968. The paper argued that it would go out of business if not allowed to cut costs by automating (Raymont 1967). ITU 6 refused this demand and eventually struck the paper on March 16; it closed permanently as a result (*NYT* 1968).

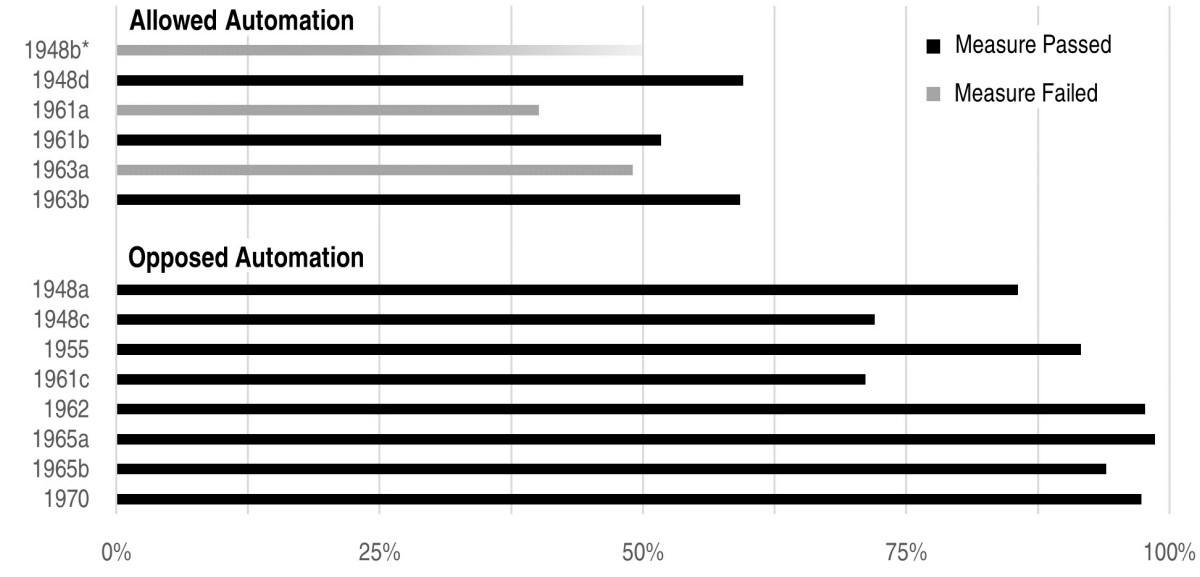
In the 1970 negotiations ITU 6 once again approved a strike authorization and employed slowdowns, this time to stifle operations at the NYT (Perlmutter 1970). By early May, the union was effectively occupying the NYT composing rooms for 17 hours each day (Stetson 1970a). Ultimately, new three-year contracts were agreed to that maintained ITU 6's veto over automation (Stetson 1970b).

In 1973, the papers sought to eliminate this veto in order to introduce new automated equipment (Stetson 1973). In the fall, when ITU 6 tried to restart the slowdowns, the NYT obtained an injunction from the state supreme court preventing union inference in newspaper operations; the Daily News followed suit that winter (Stetson 1974). ITU 6 and Powers were later fine for violating the injunctions.

In spring 1974, ITU 6 was able to approve a strike authorization, dissolve the injunctions against it, and renew its slow-down campaign at the Daily News. By this time, however, the News had managed to bring some phototypesetting machines online with non-ITU employees. After 19 days of slowdowns, they started to use these machines to set the paper. This resulted in a physical confrontation during which Powers destroyed a magnesium plate produced with the machines. Powers was arrested on charges of criminal trespass, and ITU 6 responded with a wildcat strike. Their picket was not respected by the other unions, though, and the News was able to continue publishing using the new equipment. Their diminished leverage thus exposed, ITU 6 settled after just 16 days (Ibid.).

In exchange for granting the publishers free rein to automate their composing rooms, the contract provided improved pensions, early retirement bonuses of up to $15,000, and lifetime employment guarantees for any regular employee or substitute who stayed. The jobs were guaranteed in perpetuity, even if no further contract was signed (Raskin 1979). Contracts with the NYT and the Daily News were approved in late July, and a nearly identical agreement with the Post was concluded a month later (Montgomery 1974; *NYT* 1974). With these agreements, Big Six's resistance to automation was ended.

FIGURE 2. Positive Votes (% Share) for Measures That ...



Note: *Exact margin unknown.

Convergent preferences pressured leaders to oppose automation

The unity of members' preferences regarding automation is conveyed in membership votes, particularly on contracts and strike authorizations. An examination of these votes reveals a clear pattern: contracts which allowed additional automation (even with the significant restrictions noted above) faced a much tougher ratification fight, while contracts and strike authorizations that prevented additional automation entirely were overwhelmingly approved. This indicates the significant preference of members for strong opposition to automation and the pressure on leaders to deliver, as even mild expansions of automation were resisted. The results of these votes are described below and summarized in Figure 2.

Votes on measures opposing automation took place from 1948 to 1970. In preparation for possible strikes in upcoming contests regarding its jurisdiction over new technologies, ITU 6 in 1948 (measure *a*) voted 5,902–993 (85.6% in favor) to approve increased assessments for the international's defense fund, raising total contributions to 10% of gross earnings (K&S 1967, 40). Also in 1948(*c*), members voted 4,151–1,576 (72% in support) to reelect the president of the international who was taking a hard line on jurisdiction issues, including by recommending that ITU 6 members reject a contract deemed too weak on this matter. In 1955, members voted 657–60 (91.6% in favor) to approve a contract which won jurisdiction over TTS and photocomposition but did not approve any installations (59).

In 1961(*c*), a vote to significantly bolster the local's strike fund was approved 5,526–2,248 (71.1% in favor) just seven weeks after the members narrowly passed a contract which set terms for some new TTS and photocomposition installations (K&S 1967, 116). During the 1962 negotiations, the local approved a strike authorization by a vote of 2,003–47 (97.7% in favor), and subsequently held together over a 114-day strike (Ibid.). A strike authorization in 1965(*a*) was approved by a vote of 1,978–28, and the subsequent contract granting ITU 6 a veto over automation (*b*) was approved 442–28 (219–226). The 1970 contract that maintained ITU 6's veto was approved 293–8 (*NYT* 1970).

Votes on measures that allowed some automation occurred in 1948, 1961, and 1963. As described above, all of these measures placed significant restrictions on automation. In each case, the proposed measure was first rejected before being narrowly passed, sometimes after modifications had been made. In 1948(*b*), the local voted down a contract after the international declared that its jurisdiction provisions were insufficient. Later that year, a compromise contract which allowed the papers to use substitute processes only during a strike (*d*) was approved 609–414 (59.5% in favor; K&S 1967, 45–46).

In 1961(*a*), a contract which set the terms for installing certain automating technologies was initially voted down 474–317 (only 40% in favor). A new bargaining committee was then elected, which said:

> We are of the opinion that this contract should be rejected primarily because it does not grant sufficient economic gains … to compensate us sufficiently for the now pending introduction of Teletypesetter and other automation (87).

The new committee was unable to win additional concessions, and the contract (*b*) was ultimately narrowly approved 3,798–3,548 (51.7% in favor; Ibid.).

The contract that followed the 1963 strike allowed limited additional automation via outside tape and provided no specifics on newspaper contributions to the automation fund. In a first vote (*a*), the contract was rejected by a vote of 1,621–1,557 (49% in favor). In a second vote (*b*), and facing the loss of support from both the international and the other NYC unions, the contract was approved 2,562–1,763 (59.2% in favor; 132).ITU 6 approved no further expansions of automation until 1974.

Finally, the evidence is clear that concerns over members' unemployment, rather than a concern for the union as an organization, drove opposition to automation. The bargaining committee that unsuccessfully sought an improved contract in 1961 justified their opposition by saying: "We feel that acceptance of this offer would result in loss of job opportunities and serious unemployment for our

members" (K&S 1967, 87). ITU 6's jurisdiction over the new technologies meant that members did not have to fear decreased wages, as the union consistently defended a common rate for journeymen.

The primacy of members' concerns over unemployment is also confirmed by the way that ITU 6's opposition to automation was finally overcome. In the lone exception to the pattern of membership votes discussed above, the final contract allowing automation in 1974 was approved by 96.1% of voting members (Raskin 1979). This was also the only contract which paired an expansion of automation with a guarantee protecting the jobs of all affected members in perpetuity. The contract would also slowly kill the local. The lack of new employment opportunities meant that there would be no new members to replace any who left, causing membership to decline. The ITU international disbanded in 1986, and its remaining locals were folded into the Communications Workers of America.

Mutually Reinforcing Findings from the Cases

The cases provide robust support for the theory, both in the overall correlation between the independent and dependent variables and in the logic that animates these hypotheses. The cases also provide insight into each other in a way that mutually reinforces the findings of each case study.

First, the case of ITU 6 supplements the argument that direct forms of resistance to automation were conceivable to the leaders and members of the AFL-CIO and its industrial unions. The strike of 1962-63, for example, was a national story; it shuttered newspapers in the country's largest media market and even drew a public rebuke of Powers by President Kennedy (K&S 1967, 119). In fact, ITU 6's resistance to automation was widely reported throughout the case period. It is scarcely possible that these alternative responses to automation were unknown to the AFL-CIO and its industrial unions.

This case also demonstrates the potent capacity of automation to induce low-level cleavages as expected by the theory. Kelber and Schlesinger (1967) document concerns within the ITU (both national and local) that other unions would undermine its position by obtaining jurisdiction over the new techniques. The lithographers, photoengravers, telegraphers, and the Newspaper Guild all represented or attempted to represent workers using these new technologies. The telegraphers union, for example, represented the workers creating TTS tapes for the wire services and sought to incorporate those making in-house tape. The photoengravers also "were not averse to promoting a new process which might mean considerably more work for their craft and might enhance their strategic importance in relation to other crafts in the printing industry" (35). It is thus likely that a union incorporating all these workers might have responded quite differently. In fact, as these unions were all members of the AFL-CIO, that case supports this supposition.

Preferences also nearly diverged even within ITU 6, though this was prevented. This is clearest in the efforts to introduce TTS and photocomposition equipment from 1955–1961. At the Daily News, the chapel became concerned that only Linotype operators were being trained on the new equipment and sought to "prevent the possibility of serious friction between machine operators and handmen regarding preferential training" (K&S 1967, 75). They also wanted to avoid "a cleavage between journeymen working on conventional equipment and those who would be trained in Linofilm composition" (75).

The union recognized the benefits to members using the new equipment, particularly regarding unemployment, and so moved to short-circuit the emergence of divergent preferences among its members. This was accomplished by opening training broadly to its members, ensuring equal wages for all types of compositing work, and disallowing preferential layoffs by compositing method (K&S 1967, 73–91). These concerns and responses demonstrate in specific detail that automation can cause divergent preferences even among workers in the same occupation and plant, while also illustrating some mechanisms by which more homogenous unions can overcome this tendency. An industrial union, representing many workers not targeted by automation, would not have these opportunities.

CONCLUSION

American workers in the 30 years following WWII were divided in their interests regarding automation. While some would benefit from the new technologies, others faced economic insecurity and possible unemployment. In contrast to prevailing theories of workers' preferences over other phenomena in political economy (such as trade and immigration), the preferences of these workers diverged even within the same plant and occupation. And while some frame technological change as an unalterable, external phenomenon, these workers did not merely resign themselves to fate. Through political action, they influenced the course of these changes to secure a better future for themselves.

For many, their union was the principal focus of these efforts. Contrary to prevailing narratives, these unions were neither helpless nor reflexively anti-technology. Their responses were instead shaped by the occupational diversity they represented at the bargaining table. More occupationally diverse unions, such as the AFL-CIO and its industrial unions, sought not to prevent automation but merely to soften its effects. On the other hand, occupationally homogeneous craft-style unions like the ITU were more militant in response to technologies that threatened their jobs. These findings demonstrate that polities have real agency in responding to automation, a fact which should be remembered.

While this paper focuses on automation in a historical perspective, its findings are applicable today. Automation is an increasingly salient political concern, and unions remain important to its politics. As U.S. truckers face the threat of self-driving vehicles, their craft-style union organization points to the possibility of opposition. This resistance might take a more local or less strike-centered form given the comparative weakness of modern U.S. unions, but this theory suggests that some unions will nevertheless want to engage in opposition. Also, with efforts to unionize firms like Amazon and Apple gaining momentum, the way these unions organize across warehouse, retail, and office workers will play a large role in determining their responses to automation. A more inclusive bargaining structure, such as the CWU has, might restrain these new unions' resistance.

This theory is also not restricted to America; unions around the world vary in their occupational diversity and are expected to exhibit the dynamics described in this paper. Recent decades have seen a trend towards greater decentralization of wage bargaining in many European countries. This theory suggests that we should expect greater opposition to automation in these countries if such decentralization narrows the scope of occupations covered by the resulting bargaining groups.

This paper suggests several avenues for future research. First, while workers do have agency in responding to automation, it is likely curtailed by non-responsive or repressive political institutions. As automation increasingly spreads beyond the world's advanced industrial democracies, future research should investigate workers' responses in these contexts. Second, this theory has implications for how automation spreads. If certain types of unions are more receptive to automation than others, polities where these types of unions predominate will see more rapid adoption of automating technologies. Prevailing union structures are, in turn, shaped by politics and legislation; the Taft-Hartley amendment, for example, arguably contributed to narrower union organizing in the U.S. (Lichtenstein 1998). Future research could investigate the effects of unions and political institutions on the spread of technology.

Finally, unions may play an underappreciated role in addressing the negative political impacts of automation. Studies have linked automation to populist-right voting behavior (Anelli, Colantone, and Stanig 2021; Caselli, Fracasso, and Traverso 2021) and political abstention (Boix 2019; Kurer 2020), but little is known about what mediates these connections. Compensatory policies seem insufficient to dampen the tendency of automation to spark support for populism (Gingrich 2019; Milner 2021). But Haapanala, Marx, and Parolin (2022) have found that unions reduce technological unemployment, and unions may also enhance members' feelings of agency over the economic changes they face. Future scholarship on the political impacts of automation would benefit from greater attention to unions.

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