

# Public Opinion on Automation and Globalization

by

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*To my family*

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<sup>1</sup>Only between April to October.

## Table of Contents

<b>Dedication</b>	<b>ii</b>
<b>Acknowledgements</b>	<b>iii</b>
<b>List of Figures</b>	<b>vii</b>
<b>List of Tables</b>	<b>ix</b>
<b>Abstract</b>	<b>xi</b>
<b>Chapter 1 Introduction</b>	<b>1</b>
1.1 Puzzles and themes . . . . .	1
1.2 Organization of the dissertation . . . . .	4
1.3 Implications . . . . .	6
<b>Chapter 2 Misattributed Blame? Attitudes Towards Globalization in           the Age of Automation</b>	<b>9</b>
2.1 Introduction . . . . .	9
2.2 Structural changes in the American economy . . . . .	12
2.3 Blame misattribution: Scapegoating globalization . . . . .	18
2.4 Research design . . . . .	24
2.5 Results . . . . .	28

2.6	Conclusion . . . . .	38
2.7	Appendix . . . . .	41
<b>Chapter 3 “Restrict Foreigners, Not Robots”: Partisan Responses to Automation Threat</b>		<b>45</b>
3.1	Introduction . . . . .	45
3.2	Public opinion on workplace technology . . . . .	49
3.3	Automation threat and partisan interpretation . . . . .	52
3.4	Research design . . . . .	60
3.5	Results . . . . .	64
3.6	Conclusion . . . . .	73
3.7	Appendix . . . . .	77
<b>Chapter 4 Little to Lose: Exit Options and Technological Receptiveness in China</b>		<b>145</b>
4.1	Introduction . . . . .	145
4.2	Automation in China . . . . .	148
4.3	Data and methods . . . . .	151
4.4	Workers’ views toward technology . . . . .	153
4.5	Anxiety about future automation . . . . .	157
4.6	Conclusion . . . . .	164
4.7	Appendix . . . . .	167
<b>Chapter 5 Conclusion</b>		<b>175</b>
5.1	Summary of arguments . . . . .	175
5.2	Future research . . . . .	176
<b>Bibliography</b>		<b>178</b>



## List of Figures

1	Manufacturing output and employment (1987-2018) . . . . .	15
2	The most and least automated jobs . . . . .	17
3	Degree of past automation and future automation risk . . . . .	26
4	Predicted probabilities at different levels of automation risk . . . . .	30
5	Average marginal effects for key variables predicting attitudes . . . . .	33
6	Average marginal effects for key variables predicting attitudes (full and non-tradable subsample) . . . . .	37
7	Overall positive appraisal of workplace technology . . . . .	50
8	Opinion on various workplace technology . . . . .	51
9	Concerns over technological displacement, by party . . . . .	55
10	Support for immigration restrictions (marginal treatment effects relative to the control) . . . . .	66
11	Support for trade restrictions (marginal treatment effects relative to the control)	67
12	Support for technological restrictions (marginal treatment effects relative to the control) . . . . .	69
13	Image used in the experiment (desktop) . . . . .	82
14	Image used in the experiment (mobile) . . . . .	83

15	Outcome measure: increase tariffs (marginal treatment effects relative to the control) . . . . .	134
16	Outcome measure: restrict immigration (marginal treatment effects relative to the control) . . . . .	135
17	Outcome measure: restrict technology use (marginal treatment effects relative to the control) . . . . .	136
18	Outcome measure: Tax incentives for companies to onshore (marginal treatment effects relative to the control) . . . . .	139
19	Outcome measure: Financial assistance (marginal treatment effects relative to the control) . . . . .	140
20	Outcome measure: Universal basic income (marginal treatment effects relative to the control) . . . . .	141
21	Outcome measure: Do nothing (marginal treatment effects relative to the control) . . . . .	142
22	Industrial robot stock in China . . . . .	151
23	Self-reported impact of automation (mean) . . . . .	156
24	Institutional effects on automation anxiety . . . . .	161

## List of Tables

1	Public attitudes toward technology (World Values Survey, United States, 2011)	20
2	Hypothesized relationships between automation risk and preferences . . . . .	23
3	Attitudes toward globalization (workers in labor force) . . . . .	29
4	Attitudes toward technology spending (workers in labor force) . . . . .	32
5	Attitudes toward globalization and technology (potentially displaced individuals) . . . . .	35
6	Attitudes toward globalization and tech spending (workers in non-tradable sector) . . . . .	36
7	Attitudes toward globalization (entire labor force), with weights . . . . .	41
8	Attitudes toward tech spending (entire labor force), with weights . . . . .	42
9	Attitudes toward globalization and technology (potentially displaced individuals, excluding retirees) . . . . .	43
10	Public opinion on general purpose technology . . . . .	49
11	Experimental conditions (excerpts) . . . . .	63
12	Baseline attitudes (control condition) . . . . .	65
13	ITT among Democrats with Benjamini–Hochberg adjusted p-values . . . . .	71
14	ITT among Republicans with Benjamini–Hochberg adjusted p-values . . . . .	71
15	Balance table . . . . .	77

16	Policy preferences (full sample) . . . . .	133
17	Preferences on technology policy (full sample) . . . . .	138
18	ITT among Democrats . . . . .	143
19	ITT among Republicans . . . . .	144
20	Predictors of technological anxiety . . . . .	163
21	Survey: firm sample (by ownership) . . . . .	172
22	Survey: firm sample (by industry) . . . . .	172
23	Survey: firm sample (by size) . . . . .	173
24	Survey: worker sample (by gender) . . . . .	173
25	Survey: worker sample (by age) . . . . .	173
26	Survey: worker survey (by educational attainment) . . . . .	174
27	Survey: worker survey (by household registration/hukou) . . . . .	174

## Abstract

Globalization and automation are transforming the international labor market. Although technological change has led to job polarization, rising income inequality, and labor displacement, many overwhelmingly blame globalization — immigration, trade, and offshoring — but not automation for economic dislocation. Why do some people point the finger at immigrants and workers abroad, but not robots? Which types of workers are more worried about automation, and why?

A decade's worth of survey data show that people have largely positive attitudes toward technology despite its disruptions to the labor market. Most believe that technological innovations enhance our lives, make the world better off, and should continue to be prioritized. Using a nationally representative survey (chapter 2) and an online survey experiment (chapter 3) in the United States, I show that people tend to cope with employment threats from automation by displacing blame onto outgroups and demanding protectionist policies. Many believe in the fallacy that labor demand is fixed and workers compete in a zero-sum manner. With robots increasingly displacing labor, people want to stop outgroups — immigrant and foreign workers — from further dividing the pie. Hesitant to halt innovation, individuals opt to buffer the technological threat to domestic workers with substitute policies — immigration and trade restrictions — that they believe could improve na-

tional wages and employment prospects. As such, automation anxiety may have evoked individuals' protectionist instincts, intensified attempts to resist globalization, and contributed to the revival of radical politics.

But not all workers are equally anxious about robots and machines. Chapter 4 leverages the household registration system in China to examine how institutions may lessen (or heighten) automation anxiety. This system creates a stratified labor market that discriminates between local and non-local workers. Drawing on data from semi-structured interviews, factory visits, and two original surveys conducted in coastal China, I find that local workers — who are better protected by local labor regulations — are more worried about technological displacement than non-local workers. The divergent legal-institutional environments faced by local and non-local workers influence their expectations and the availability of exit options comparable to their status quo. The undesirability of non-local workers' circumstances make their jobs less painful to lose and easier to substitute, leading to lower technological anxiety. The greater legal protection afforded to local workers makes them more expensive to hire, less competitive than non-local workers with the same skills, and more anxious about automation. These results suggest that opposition toward technology is more likely to originate from workers in relatively privileged positions (e.g. unions) with few exit options comparable to their status quo.

Overall, this work contributes to the nascent but growing literature in political science on technological change, public opinion in international political economy, and labor politics.

# Chapter 1

## Introduction

*“The new technology was a necessary evil, those plants that do not have technology today are in fear of losing their plants altogether.”*

— An autoworker in the United States, 1980s

*“In Sweden, if you ask a union leader, ‘Are you afraid of new technology?’ They will answer, ‘No, I’m afraid of old technology.’”*

— Ylva Johansson, Swedish minister for employment and integration, 2017

### 1.1 Puzzles and themes

The impact of technology on workers is well documented. Economic historians characterize the Industrial Revolution as deskilling where skilled artisans were substituted by technology operated by semi- or unskilled labor (Goldin and Sokoloff, 1982; Acemoglu, 1998). In contrast, the technological changes of today (1980s – present) are considered to be skill-biased (Bekman, Bound and Machin, 1998), routine-biased (Jaimovich and Siu, 2012; Goos, Manning and Salomons, 2014), and capital-biased (Blanchard, 1997) —

privileging skilled over unskilled workers, non-routine over routine jobs, and capital over labor. Machines can now reliably complete a wide range of tasks traditionally performed by humans — self-driving cranes can stack containers at ports, compact three-wheeled autonomous vehicles can deliver lunches and dinners, and robotic chefs can run fast food kitchens entirely. Computerization and mechanization have had important implications for employment and wages, contributing to increasing income inequality, labor displacement, and job polarization (Autor, Levy and Murnane, 2003; Goos and Manning, 2007; Acemoglu and Restrepo, 2020). Looking into the future, researchers estimate that 9 percent (Arntz, Gregory and Zierahn, 2016) to 47 percent (Frey and Osborne, 2017) of American jobs are at high risk of automation due to advances in robotics and artificial intelligence.

Despite technology's threat to workers, responses to automation appear to be different from responses to other ostensible challenges to employment. Calls to slow technological innovation are few and far between; innovation is encouraged and even incentivized around the world. The Japanese government created a Robot Revolution Realization Council to facilitate the development and use of autonomous machines (Kovacic, 2018); the American Artificial Intelligence Initiative invests in the research and application of artificial intelligence in industries (Executive Office of the President, 2019); and the Chinese government provides subsidies to finance the production and adoption of industrial robots (Cheng et al., 2019). This enthusiasm about the prospect of technological change is largely shared by the public. A decade's worth of cross-national surveys show that a majority of people across the world believe that technology improves our lives, makes the world better off, and should continue to be promoted (Inglehart et al., 2014; Eurobarometer, 2017).

This enthusiasm for technology does not preclude growing concerns about workplace automation, however. Workers who are more exposed to automation report lower levels



of job security (Patel et al., 2018). People are also fearful that new technologies will eliminate more jobs than they will create (Eurobarometer, 2017; Pew Research Center, 2019c). How, then, do people cope with employment threats from a trend they support? How do they protect themselves — and their countrymen — from a technological revolution that many consider desirable and perhaps inevitable?

The first part of the dissertation argues that, when confronted with automation threat, *people tend to divert their blame away from technology and toward outgroups*. They opt to demand actions against other sources of job threats that are ostensibly created by outsiders — immigrant and foreign workers — but not technology. Many believe that the amount of work is fixed and laborers compete in a zero-sum manner.<sup>2</sup> With robots eating into the pie of jobs, people want to stop immigrant and foreign labor from also taking a slice. Rather than halting innovation, which brings day-to-day and long-term benefits, individuals seek to buffer domestic workers facing technological threat with substitute policies — restrictions on immigration and trade — that they believe could improve national wages and employment prospects. In parts of the world, automation anxiety has intensified attempts to resist globalization.

What factors might help mitigate automation anxiety, and why? Existing research uses educational attainment as a predictor of winners and losers of technological change (Frey and Osborne, 2017; Gallego, Kurer and Schöll, 2018). While education is no doubt relevant to the analyses of mass attitudes, the second part of the dissertation additionally shows how *institutions — existing labor arrangements — can lead to different levels of technological receptiveness for people who face similar threats of automation*. Rules governing labor relations and organizations affect workers' expectations (as anchored by their existing job, e.g. compensation and fringe benefits), the rules of termination (e.g. at-will employment or termination for cause), and the availability of exit options com-

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<sup>2</sup>Economists have written extensively about the lump of labor fallacy.

parable to the workers' status quo in case of dismissal. Workers are less likely to oppose or resist technological improvements if laid-off workers can expect to secure satisfactory replacements of their jobs within a short period of time, making labor separations less distressing.

This dissertation explores these two themes in a set of three self-contained essays, drawing on surveys, experimental data, in-depth interviews, and field work from the United States and China. I outline each of these essays below.

## 1.2 Organization of the dissertation

*Chapter 2: Misattributed Blame? Attitudes Toward Globalization in the Age of Automation*

Chapters 2 and 3 of this dissertation examine mass attitudes toward automation and globalization among American workers. Globalization is neither the only nor the most important source of labor market disruptions, but it has received outsized negative political attention. Using the 2016 American National Elections Studies (ANES), a nationally representative survey, Chapter 2 finds that citizens have a tendency to misattribute blame for economic dislocations toward immigrants and workers abroad, while discounting the effects of technology. American workers facing higher risks of automation feel less secure about their jobs. However, they are no more likely to oppose government spending to promote technology that might aid further automation. Instead, they are more likely to object to free trade agreements and favor immigration restrictions, even controlling for standard explanations for these attitudes. While pocketbook concerns do influence attitudes toward globalization, these findings call into question the standard assumption that individuals understand and can correctly identify the sources of their economic anxieties — rather people are prone to displace blame for economic stressors

onto immigrant and foreign workers.

*Chapter 3: “Restrict Foreigners, Not Robots”: Partisan Responses to Automation Threat*

Building on the observational study in Chapter 2, Chapter 3 tests the theory of blame misplacement directly by randomizing the cause of job losses and measuring individuals’ protectionist attitudes in an online survey experiment. I find that participants who were primed with a news article highlighting unemployment due to automation reported more protectionist policy preferences against foreign targets. Even with explicit information that technology displaces jobs, people tend to take “their team’s position,” based on their partisanship, in determining who or what they believe to be responsible for these employment concerns. Specifically, direct cues about technological displacement make Republicans more likely to demand tighter restrictions on immigration and Democrats more likely to support higher tariffs. This study provides additional evidence that citizens respond to automation anxiety by actively displacing blame onto and penalizing groups that they already consider unwelcome or objectionable. Results from chapters 2 and 3 imply that automation anxiety may have increased globalization hostility in the United States.

*Chapter 4: Little to Lose: Exit Options and Technological Receptiveness in China*

Chapter 4 takes an inductive approach and examines the structural and legal-institutional conditions that may mitigate (or heighten) automation anxiety. It presents qualitative and quantitative accounts of Chinese manufacturing workers’ reception of workplace automation based on semi-structured interviews, factory visits, and two original surveys covering over 2,400 workers and 600 firms in 19 southern Chinese cities. It finds that most manufacturing workers in the region — buffered by steady increases in demand and chronic labor shortages — are generally unconcerned about technology’s impact on

employment and wages *at present*. However, about half of the surveyed workers believe that their jobs could be automated within the decade.

Paradoxically, insofar as laborers experience automation anxiety, local workers — whom labor regulations better protect — are more worried about technological displacement than non-local workers. The Chinese household registration system creates a stratified labor market that discriminates between local and non-local workers. The greater legal protections afforded to local workers makes them more expensive to hire, less competitive than non-locals with the same levels of skills, and more anxious about automation. On the other hand, this dualistic system lowers the expectations of non-local workers — the undesirability of their circumstances makes their jobs less painful to lose and easier to substitute. The availability of exit options no worse than their status quo contributes to non-local workers' lower anxiety about automation compared to locals. The plethora of imminent threats to employment and their well-being that non-local workers face also push technological displacement down their list of concerns. These results imply that antagonism toward technology may be more likely to originate from workers in relatively privileged positions with few exit options comparable to their status quo.

### 1.3 Implications

This dissertation on the politics of automation has several implications for both scholars and policymakers. Despite technology's impact on workers, political scientists have only recently started studying the political effects of automation. Thus far, evidence is mixed as to how automation threat affects political preferences. Gallego, Kurer and Schöll (2018) argue that technology has created a large class of economic winners who prefer traditional parties and are more likely to vote for the incumbent, thereby sta-

bilizing politics in the United Kingdom. However, Frey, Berger and Chen (2018) and Anelli, Colantone and Stanig (2019) show that automation exposure worsened actual or perceived economic conditions, leading to increased electoral support for radical, anti-status quo politicians in the United States and Western Europe. My observational and experimental studies, which demonstrate a link between automation anxiety and protectionist policy preferences, lend support to the latter. The public's preference to respond to technological threat by limiting other employment threats ostensibly created by outsiders, as opposed to innovation, might have oiled the wheels of the populist backlash against globalization and contributed to the revival of radical politics.

Through a review of surveys, in-depth interviews, and factory visits, this work also offers a more nuanced view of workers' attitudes toward technology. Macroeconomic analyses often highlight the negative effects of technology on wages and employment, but these are neither the only nor the most important considerations for most workers. While workers feel the adverse labor market effects of technology gradually, its perceived benefits (e.g. lowered risks of injury, less monotonous work, increased global competitiveness) are often immediate, observable, and are considered necessary for firm survival. Robots and machines are not merely threats to workers, but also allies. These on-the-ground benefits of technological improvements play an important role in influencing workers' attitudes toward technology, but they are often overlooked in academic and popular discourses on workplace automation.

Finally, this dissertation builds a foundation for cross-national studies of technological receptiveness. The case of China shows that legal-institutional environments may lead to different levels of technological receptiveness, even among people facing similar levels of automation threat. Institutions of work affect what is at stake and the availability of exit options comparable to the workers' status quo. Future research would do well to consider how mechanisms creating stratification in other labor markets (e.g. core

and non-core employees in Japan, union and non-union workers in the United States) affect technology attitudes. If technological improvements are considered necessary to enhance economic growth and a nation's competitiveness, it is critical to understand the origins of technological anxiety and devise appropriate remedies for these apprehensions.

## Chapter 2

# Misattributed Blame? Attitudes Towards Globalization in the Age of Automation

### 2.1 Introduction

From the United States to Europe and beyond, populist leaders are enjoying a resurgence propelled by widespread resentment toward globalization. The United Kingdom's decision to withdraw from the European Union is widely viewed as a rejection of integration. Marine Le Pen took National Front from the fringes of French politics to the forefront by condemning immigration and criticizing international institutions. Globalization was vehemently attacked by the left and right during the 2016 American presidential election. Populists blame globalization — trade, immigration, and offshoring — for causing underemployment, wage stagnation, growing inequality, and the disappearance of well-paid factory jobs.

However, to explain these structural economic changes, the existing scholarship emphasizes the role of technology (Bekman, Bound and Machin, 1998; Acemoglu and Restrepo, 2018, 2020). Acemoglu and Restrepo (2020) find large and robust negative effects of robots on employment and wages across commuting zones. Technological change is also linked to job market polarization and increasing income inequality, hurting especially those in the middle of the education and earnings distribution (Goos and Manning,

2007; Frey and Osborne, 2017). While automation had mostly threatened workers who perform routine and repetitive tasks in the past, rapid developments in robotics and artificial intelligence now threaten even non-routine jobs. Frey and Osborne (2017) estimates that 47 percent of American jobs are at high risks of automation. Even though globalization has distributional effects, the literature overall shows that deepening global integration does not explain the preponderance of affected workers' plight (Helpman, 2018; Acemoglu and Restrepo, 2020; Ottaviano, Peri and Wright, 2013; Card, 1990; Peri and Sparber, 2009).

Globalization, but not automation, dominates political discussions. This paper argues that automation threat intensifies efforts to restrict globalization. Individuals tend to misattribute blame for economic dislocations toward outgroups — immigrants and workers abroad — while discounting the effects of technology. Using the American National Elections Studies, a nationally representative survey, I show that workers facing higher risk of automation feel less secure about their jobs. However, workers at risk of automation are no more likely to support government spending to promote technology that might aid further automation. Instead, they are significantly more likely to oppose free trade agreements and immigration, even when controlling for standard explanations for these attitudes. These findings suggest that workers are misattributing blame for harmful changes in labor markets toward immigrants and foreign workers, and away from the technological changes which are primarily responsible for their weakening job prospects.

This argument relates to two traditional approaches to the study of mass attitudes toward globalization. The first posits that individual preferences should reflect economic self-interest. In studying attitudes toward trade, analysts typically derive predictions about individuals' material interests based on the Ricardo-Viner or Stolper-Samuelson model (Scheve, Slaughter and Slaughter, 2001). In doing so, they assume that citizens



understand and can accurately identify the sources of their financial stressors or fortunes. The second approach demonstrates that citizens are either disinterested or unable to engage in such reasoning. These researchers instead emphasize non-economic influence on preferences. Opponents of globalization are not necessarily economic losers. Economic ignorance, ethnocentrism, political framing, and other symbolic attitudes, rather than pocketbook concerns, determine attitudes toward globalization (Mansfield and Mutz, 2013; Goldstein and Peters, 2014; Rho and Tomz, 2017).

In this paper, I contend that grievances against globalization have economic origins but economic losers often misattribute blame for their anxieties, and consequently, demand policies that poorly advance their interests. While automation threat is associated with lower levels of job security, citizens do not always make the correct inference about the source of such anxiety. People tend to overestimate the extent of globalization (e.g., size of immigrant population) and underestimate personal risks of automation. They also see foreigners and robots through different lenses. While many believe that technology will raise the competitiveness of their firms and facilitate human progress, outgroups are often viewed in zero-sum terms. Populist leaders tap into this sentiment by attributing economic anxieties to the competition from immigrants and workers abroad. According to theories of motivated reasoning, this vilification of foreigners is likely to be a particularly convincing narrative for those who are economically threatened as it validates their preexisting beliefs about zero-sum competition with outgroups, leading to higher rates of blame misattribution. Psychological research also demonstrates that blaming outgroup helps individuals restore a sense of personal control.

This misattribution of blame may lead to poor policy outcomes. If trade and immigration have key positive benefits for consumers and the overall growth of the economy, responding to technological change with closed borders may harm constituencies that derive key benefits from imported goods and immigrant communities. Protectionism may

even hurt those who demand these policies in the first place if they are misidentifying the source of their economic problems. In addition, the overwhelming focus on tariffs and border controls as means to reduce inequality and prop up the middle class takes public attention away from other pertinent issues such as job automation. Technology destroys jobs, but it may also create new ones. It is important for individuals to be aware of the challenges and opportunities related to technology, and to discuss how governments may facilitate the development of skills that complement technological change and formulate appropriate adjustment policies for displaced workers. Lastly, the misplacement of hostility has had important political ramifications on the state of globalization. Populist leaders in the United States, United Kingdom, and elsewhere have found electoral successes by framing globalization as the main cause of structural economic changes and promising a retreat from the global market. The fracturing of international political and economic unions and agreements are often economically detrimental and difficult to reverse.

## **2.2 Structural changes in the American economy**

There have been major transformations in the economy over the last thirty years. Since 1980, factory employment decreased by more than a third. Displaced factory workers often have to settle for near-minimum-wage service sector work and they are, in many cases, deprived of medical benefits and pension rights. Stagnant wages and growing inequality are yet other sources of frustration and discontent. Real median household income has stagnated for most people for about two decades, except for those at the very top.

These secular trends — deindustrialization, job insecurity, wage stagnation, and growing income inequality — coincided with immense increases in trade, offshoring, and

immigration. The concurrence of these trends and structural economic change has led many to believe that reversing globalization will undo these changes. However, the scholarship shows that trade only accounts for a minor share of layoffs and other labor market shocks.<sup>3</sup> A majority of Americans work in services and are largely immune to pressures of import competition. The manufacturing sector, which experienced higher incidences of trade-related layoffs, employs less than 10 percent of Americans. Although recent work on the “China shock” shows the negative effects of Chinese imports on employment and wages, scholars find that employment gains due to export expansion roughly offset these losses.<sup>4</sup> Overall, trade barriers may protect only a modest number of workers while hurting many others: consumers, for example, enjoy sizable welfare gains due to lower prices. Those in the export sector may also be harmed. The US is the world’s second largest and largest exporter in goods and services respectively.

Populists also point the finger at immigrants for displacing native workers and depressing their wages, but three decades of research in immigration economics provides little support for their claims. Using a natural experiment, Card (1990)’s seminal work shows that the sudden influx of Cuban migrants had virtually no effect on wages or unemployment rates for low-skilled workers in Miami.<sup>5</sup> Peri and Sparber (2009) further argue that immigrants boost productivity and wages in the long run. Native workers tend to transition into communication- and cognitive-intensive jobs as immigrants take lower-skill and manual jobs. The fiscal effect of immigration is positive overall at the federal level, meaning that immigrants contribute more in taxes than the benefits they receive. Populists’ economic case against immigrants is largely unsupported by empirical research.

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<sup>3</sup> Freeman (1995); Di Tella and Rodrik (2020).

<sup>4</sup> Autor, Dorn and Hanson (2013); Feenstra, Ma and Xu (2019).

<sup>5</sup> Borjas (1995) reanalyzes the data and finds that there was a decrease in low-skill wages between 1979 and 1985. Peri and Yasenov (2018) find that Borjas arrived at his conclusions by selecting a very narrow set of workers. He uses a small subsample of high school dropouts (fewer than 25).

While protectionists have not gone so far as to advocate capital controls, they shame multinational firms for moving production abroad and call for onshoring. Ottaviano, Peri, and Wright (2013) argue that offshore workers are not a good substitute for native workers as they specialize in different tasks. Offshoring leads to task-upgrading among natives as offshore workers are often assigned tasks of lesser complexity. The study finds that the decline in offshoring costs did not have any significant effect on employment for native workers. In all, only a small number of workers lost their job due to offshoring. According to the Bureau of Labor Statistics (BLS), movement-of-work accounted for just 3 percent of layoffs.<sup>6</sup> It is also important to note that capital flows are a two-way street, but the BLS does not collect data on the number of jobs created by foreign firms in the United States.

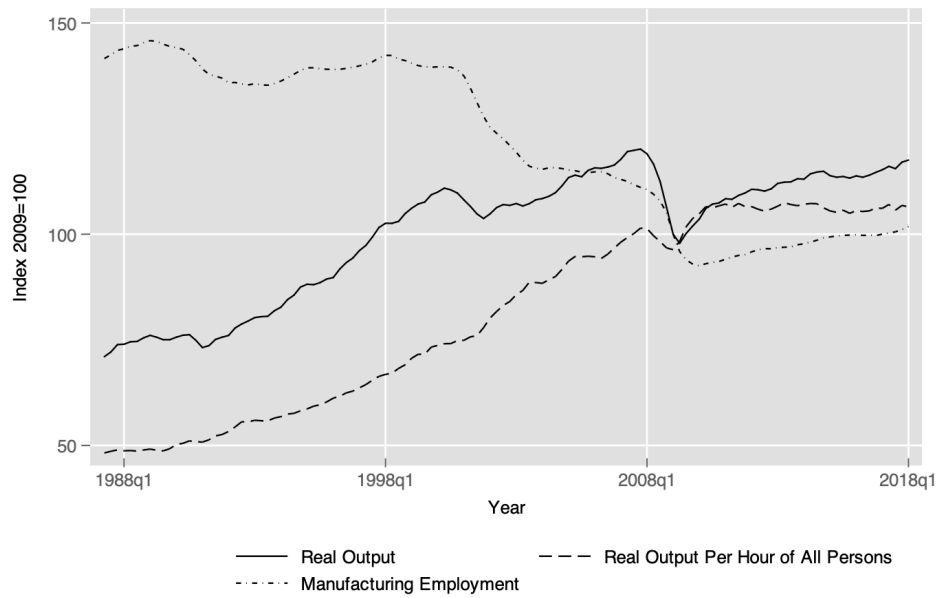
#### *Technological and Automation Threat*

While globalization has created winners and losers, neither international trade, immigration, nor offshoring explain the preponderance of the latter's plight. Instead, the literature on structural economic change emphasizes technology as a more important source of economic disruption. Since the 1980s, a marked increase in labor productivity enabled real manufacturing output to almost double despite a 30 percent decrease in manufacturing employment (Figure 1). Between 2000 and 2010, Hicks and Devaraj (2015) estimate that over 85 percent of job losses in manufacturing were the result of productivity increases due to the adoption of new technology, and only 13 percent were lost to trade. Had the United States maintained its level of productivity in 2000, it would require an extra 8.8 million more workers than it actually employed in 2010 to produce the 2010-level output.

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<sup>6</sup>Note that this figure may overstate the effect of offshoring as it includes both out-of-country and domestic relocations. This figure was from 2012, the last year the statistic was reported.

Figure 1: Manufacturing output and employment (1987-2018)



Note: Data from the Federal Reserve Bank of St. Louis Economic Research Division.

Although manufacturing employment was at the forefront of issues during the 2016 presidential election, technology has played a far more important role in reshaping labor market opportunities and outcomes than globalization, whether in the primary, manufacturing, or service sectors. Acemoglu and Restrepo (2020) find large and robust negative effects of robots on employment and wages across commuting zones. The introduction of one new robot decreases employment by 5.6 workers, and an additional industrial robot per thousand workers reduces wages by 0.5 percent. These labor market effects most affected individuals with less than college education and workers in routine occupations. These findings are consistent with extant research on technological change which shows that post-1980 mechanization has been skill-biased and routine-biased, privileging skilled over unskilled workers, and non-routine over routine jobs.<sup>7</sup> Importantly and perhaps surprisingly, technology has not produced offsetting employment gains in any

<sup>7</sup>Bekman, Bound and Machin (1998); Acemoglu and Restrepo (2020).

occupation or education groups.<sup>8</sup>

Thus far, automation had most threatened workers who perform routine tasks as machines have comparative advantage over humans in performing tasks with well-defined procedures and rules. Routine jobs can be cognitive or manual. Routine manual work tends to be blue collar jobs, such as food batchmakers, machine tenders, and plant operators; whereas routine cognitive jobs generally require some level of precision, training, or education, examples include bookkeepers and travel agents. These jobs tend to be in the middle of the wage distribution.<sup>9</sup> Automation has yet to pose widespread challenges to those in non-routine cognitive and manual jobs that occupy the opposite ends of the skill- and wage- spectrum, although this is set to change. The former includes well-paid managerial, professional, and technical workers, including doctors and software programmers, whereas the latter are generally low-paying service sector jobs such as cleaners, home care aides, and servers. Taken together, technological change has led to the hollowing out of the middle and is linked to growing income inequality. Figure 2 shows the most and least automated jobs in the early 2010s as reported by occupational experts and job incumbents.

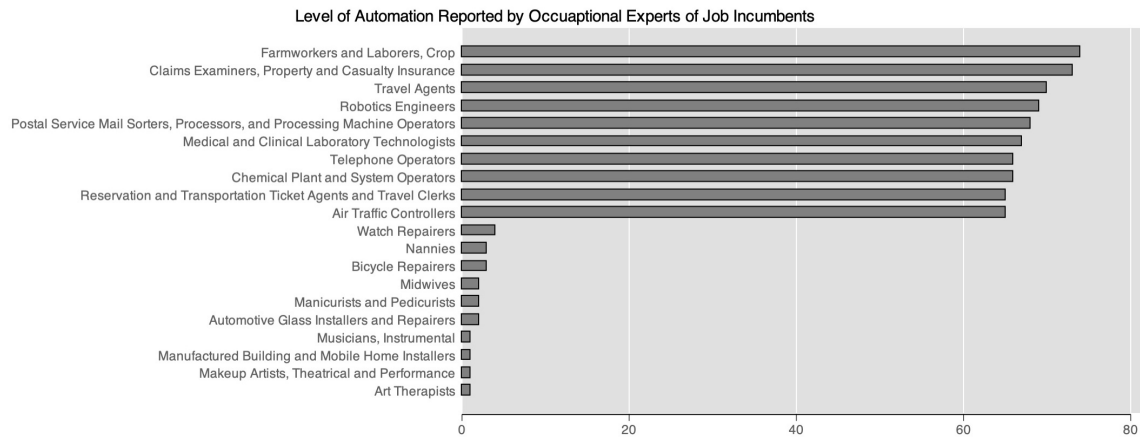
Advances in artificial intelligence and robotics are putting more jobs at risk. Frey and Osborne (2017) estimate that 47 percent of American jobs can be replaced by machines due to these new developments. Different from the past, computerization is no longer confined to routine tasks. Machine learning, including data mining, machine vision, and neural networks allow even cognitive tasks to be automated. An occupation which had not been computerized could face a high risk of automation in the future as technology becomes more sophisticated and cheaper. Automation is conceivably imminent in several occupations. Diagnostic programs now outperform dermatologists

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<sup>8</sup> Acemoglu and Restrepo (2020).

<sup>9</sup> Goos and Manning (2007).

Figure 2: The most and least automated jobs



Note: Drawn from a survey sponsored by the Department of Labor. It asks a representative sample of job incumbents or occupation experts the extent of automation of their jobs.

in identifying melanoma, the most dangerous kind of skin cancer. Robot journalists write sports and finance articles at speeds much faster than the average reporter. The Port of Rotterdam in the Netherlands has five fully-automated deep-sea terminals, where longshoremen were replaced with self-driving cranes and carriers.

Technology may in the long-run create new jobs.<sup>10</sup> However, workers displaced by technology may not be qualified for the new jobs that are created. Many former workers in routine occupations shifted into low-wage service jobs or dropped out of the labor force altogether<sup>11</sup> Oftentimes, they had to exit highly unionized sectors and settle for precarious non-unionized jobs and were, in many cases, deprived of medical benefits and pension rights. Laborers in demand in the future would tend to be those who are technically skilled or possess a comparative advantage over robots (e.g. good interpersonal skills, creativity).

<sup>10</sup>The idea that any increase in the output of each worker reduces the number of jobs is called the lump-of-labor fallacy. However, Acemoglu and Restrepo (2020) find that technological change of late has not created offsetting employment increases.

<sup>11</sup> Autor and Dorn (2013).

### 2.3 Blame misattribution: Scapegoating globalization

Although technology has disrupted workers' livelihoods in the past and is poised to do so at a faster pace and larger scale in the near future, globalization is disproportionately blamed. Populist leaders and their supporters believe retreating from the global economy will address the negative changes in the labor market of the last few decades.

#### Politically-motivated Framing By Elites

The narrative that foreign imports and offshoring are killing American manufacturing became the dominant frame to understand American job insecurity. Campaign advertisements on trade had been predominately negative, emphasizing trade as a source of unemployment.<sup>12</sup> During the 2016 presidential election, major candidates from both the left and right focused on the harmful labor market effects of import competition. Frames alter opinion by changing how problems are understood — emphasizing certain values and facts over others, giving them greater apparent relevance to the issue than they would have under an alternative frame. Past research suggests that most Americans have a poor grasp of economic trends, making them even more susceptible to framing effects and misinformation. Only 26 percent of respondents know that manufacturing output increased even as employment decreased.<sup>13</sup> Americans also perceive the minority population to be much larger than it is in reality.<sup>14</sup>

While globalization is at the forefront of issues during electoral campaigns, automation receives much less attention and is sometimes denied by politicians. In 2016, Clinton was the only major candidate who acknowledged the challenge of automation, but the issue was only mentioned six times on her campaign website of all speeches and ma-

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<sup>12</sup> Guisinger (2017).

<sup>13</sup> Pew Research Center (2017b).

<sup>14</sup> Alba, Rumbaut and Marotz (2005).



terials she posted during the entire election cycle. Sanders mentioned it once and did not consider it “a major driver of unemployment.” Automation was once brought up on Trump’s site. The report written by two senior advisors plainly rejected the role of automation in the decline of manufacturing.<sup>15</sup>

There are political motivations for elites to emphasize globalization over automation. First, the nature of globalization renders it convenient for elites to use group cues, a potent political tool. Outgroups, immigrants and workers abroad, who are seemingly making considerable gains make clear and conceivable targets to blame. Political psychology research shows that citizens are susceptible to manipulation, and group cues trigger the emotion of anxiety independently of the actual threat posed by the outgroup.<sup>16</sup> Anxiety is known to cause behavioral changes that might be desired by politicians: anxious individuals are more likely to seek and retain information, engage in protective responses, and vote. When people feel the need to compete for scarce resources, including jobs, they are more prone to see outgroup relations in zero-sum terms.<sup>17</sup> However, automation does not fit as neatly in the “us-versus-them” narrative, and no prominent politician has adopted such a frame so far.

Second, the lack of an “easy fix” makes automation an issue less ready for elites to politicize. It is, for example, relatively straightforward for politicians to convince citizens that a border wall and tighter visa restrictions will keep immigrants out, and imposing high tariffs will stop the influx of cheap imports. Nationalistic and ethnocentric sentiments also help justify the costs of such remedies. However, it requires much more effort to persuade citizens that increased efficiency and productivity due to computerization are undesirable and that impediments on innovation are suitable responses

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<sup>15</sup> The report titled, “Scoring the Trump Economic Plan: Trade, Regulatory, and Energy Policy Impacts” was written by Peter Navarro and Wilbur Ross.

<sup>16</sup> Brader, Valentino and Suhay (2008).

<sup>17</sup> LeVine and Campbell (1972); Blumer (1958).

to the “problem.”

### **Predilection for Technology and Downplaying of Technological Threat**

Technology also makes for a poor target for attack because of the convenience it brings. According to the World Values Survey, a majority of Americans believe that science and technology make our lives easier and more comfortable (Table 1, Question 2). Few would trade a personal computer for a shared typist, the ATM machine for visits to a teller, or automatic exchanges for manual telephone switchboards — not even if the sacrifice would save an occupation. It is because most recognize that the world moves forward because of advances in science and technology (Question 1), and to retard innovation while the rest of the world promotes it would be unwise. A case against technological improvement would be politically difficult to make as only 6.9 percent of the respondents agree that more emphasis on the development of technology is bad (Question 3).

Table 1: Public attitudes toward technology (World Values Survey, United States, 2011)

<b>Questions</b>	<b>Responses</b>
(1) The world is better off, or worse off, because of science and technology	7.34 (mean), 8 (median)
(2) Science and technology are making our lives healthier, easier, and more comfortable	7.19 (mean), 7 (median)
(3) Future changes: More emphasis on the development of technology is a bad thing.	6.9% Agree

Note: 1=Strongly Disagree; 10=Strongly Agree

The public’s familiarity with technology helps explain the stark difference in attitudes toward machines during the Industrial Revolution and today. In recent history, workers have shown positive attitudes toward technology in the workplace. In an in-depth study of German workers, Thelen (1991) shows that labor unions and workers were “fundamentally receptive to technological changes,” believing that firms’ failure to

adapt new technology would make them lose their competitiveness and eventually force them out of business. Milkman (1997) finds that technology vastly improved American autoworkers' work environments and they considered technology a "necessary evil" to ensure their company's survival. An Office of Technology Assessment of the United States (1983) report states that "willing acceptance" of new technology was the most common response of unions and their opposition to technology tended to disappear once union leaders were convinced that their members would not be negatively affected or would receive appropriate compensation if they were.

Not only do individuals welcome the benefits of technological change, they also have a tendency to downplay its risks. Automation is not on the minds of most. Of the 3,650 responses to an open-ended question about the most important problem facing the United States in the nationally representative 2016 American National Election Studies, only three mentioned automation or technology. When *directly* prompted, two-thirds of American respondents expect machines "to do much of the work currently done by humans within fifty years."<sup>18</sup> However, four-fifths of them think that their jobs will continue to exist in five decades. It is well documented in psychological research that people are more optimistic about their own prospects than those of others. In a study, college students believed that they were 50.2 percent more likely than their peers to land a job after graduation and 44.3 percent more likely to own a home.<sup>19</sup> Unrealistic optimism or over-confidence is considered to be a defensive strategy motivated by a need to reduce anxiety. It may also be a result of cognitive biases. Individuals have a bias in recall — they are more likely to bring to mind personal actions, experiences, plans, and attributes that make favorable outcomes more likely for them, but they do not give the stereotypical person the same consideration.<sup>20</sup>

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<sup>18</sup> Pew Research Center (2016).

<sup>19</sup> Weinstein (1980).

<sup>20</sup> Tversky and Kahneman (1974); Weinstein (1980).

## **Intense media attention and overestimation of the extent of globalization**

While citizens downplay the risks of automation, journalists and the public tend to overstate the extent and downsides of globalization. The media interprets information, sets the agenda, and influences how issues are evaluated. Globalization is more heavily covered and scrutinized harder than automation. The often visible nature of offshoring — the image of a local plant shutting down and relocating its operations — as opposed to automation which happens out of public view may have contributed to the discrepancy in reporting.<sup>21</sup>

News coverage of globalization also tends to emphasize its various problems and negative effects, such as employment concerns, factory closings, and safety and security risks. Analyzing over 40 years of trade news, Guisinger (2017) finds that “bad news” generate almost 40 percent more stories than “good news.” Like journalists, the public responds much more strongly to negative than positive news, potentially leading responsive governments to take overly aggressive measures.<sup>22</sup> Due to limited media attention until very recently, the extent to which technology affects workers is known mostly to those who experienced it first hand. George Young, a former steel factory worker in Gary, Indiana remarked, “We used to have 10 men doing cleanup in my job. Now one man operates a machine. We used to have 10 men running the furnaces. Now robots run them.”<sup>23</sup> Technological change in manufacturing, in comparison to international competition, is a trend that receives little media attention.

## **Expectations of Blame Assignment**

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<sup>21</sup> Margalit (2011).

<sup>22</sup> Soroka (2006).

<sup>23</sup>From March 28, 2017 edition of The Guardian, “White flight followed factory jobs out of Gary, Indiana. Black people didn’t have a choice.”

Taken together, we arrive at two main theoretical and empirical expectations. First, a higher risk of automation is expected to lead to a more pronounced sense of job insecurity (H1). Subjective assessments of job security do not require a high level of sophistication or deep economic knowledge (Pardos-Prado and Xena, 2019). Second, because of the much higher salience of globalization and the public’s predilection for technology, I hypothesize that at-risk workers more likely to attribute their economic anxieties to globalization rather than automation. Attributions of responsibility are often subjectively motivated or biased, if not incorrect. In situations where multiple parties may be responsible, people often focus on specific outgroups as targets of blame to cope with negative circumstances and restore a sense of control. If this is the case, automation threat will be associated with more hostile views toward immigration (H2), trade (H3), and offshoring (H4), but has little influence on technology attitudes (H5) (Allport, 1954; Glick, 2005; Bukowski et al., 2017).

Table 2: Hypothesized relationships between automation risk and preferences

	<u>Scenario 1</u> Blame misattribution	<u>Scenario 2</u> Correct attribution	<u>Scenario 3</u> Blame everything
Immigration control (H2)	+	/	+
Trade barriers (H3)	+	/	+
Discourage offshoring (H4)	+	/	+
Cut technology spending (H5)	/	+	+

If, however, workers facing higher risk of automation are found to have more negative views toward technology and not globalization, it may instead be the case that workers are attributing blame correctly (as in scenario 2). Alternatively, it is also possible that at-risk workers may demand government action against all these threats to employment. In this case, those who face higher job automation threat will hold hostile views towards both globalization and technology (scenario 3). Table 2 summarizes these different possible blame attribution scenarios, which we will test below.

## 2.4 Research design

I use the 2016 American National Elections Studies (ANES) survey to examine these different models of blame attribution. The ANES does not have a ready-to-use measure of occupation that is detailed enough to allow the matching of meaningful estimates of automation risks. I thus leverage individual responses to an open-ended question about their occupations. Respondents are asked to describe “the kind of work [they] do” and “[their] most important activities or duties at work.” Based on these descriptions, I classified individuals into 840 detailed occupation categories using the 2010 Standard Occupational Classification (SOC) system. Responses of 3,936 individuals were coded, and 3,775 and 3,532 of them could be linked to the two measures of job automation threat respectively.<sup>24</sup> For example, individuals who describe their jobs as “server, wait tables” are coded as “waiters and waitresses (35-3031.00).” People who “take care of the elderly” are classified as “personal care aides (39-9021.00).” In cases where respondents describe duties that could fit multiple related occupations, I assign them multiple SOC codes. For instance, individuals whose jobs are “special education teacher” are coded as “special education teachers, preschool (25-2051.00),” “special education teachers, kindergarten and elementary school (25-2052.00),” “special education teachers, middle school (25-2053.00),” and “special education teachers, secondary school (25-2054.00).” Their risk of job automation is the average of the estimate of each of these occupations.

There are two variables related to automation in the model. The first measures past levels of automation. The data comes from a survey administered by O\*NET, which was sponsored by the Department of Labor. One of the questions asks a representative sample of job incumbents and occupation experts how automated their jobs are. Each SOC code has a corresponding subjectively assessed level of automation. It ranges from 0

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<sup>24</sup>Among those who are not coded are individuals serving in the military or individuals who offered ambiguous, intelligible, or no information.

to 1, from not at all automated to fully automated. In the past, researchers had typically used indicators that measure the prevalence of routine tasks in an occupation.<sup>25</sup> This self-reported data should provide a more accurate account of past levels of automation. Jobs sometimes remain manual because initial costs are prohibitive, not because it is technologically infeasible to automate. Job incumbents and experts are likely to have a better sense of the extent of automation on the ground. An individual holding a job with a high retrospective level of automation in our dataset means that he or she is working in an area where sweeping automation has occurred, but he or she continues to hold the job (e.g. to program machines). The important implication is that these individuals are likely to have witnessed automation in their workplace, but are the survivors, if not victors, of technological change.

The second and main independent variable is a prospective estimate of job automation risk. I adopt Frey and Osborne's (2017) measure. This proxy indicates the risk of automation for each occupation with the expectation that automation will become more sophisticated and cheaper over the next decades, from 0 (not computerizable) to 1 (totally computerizable). The authors, together with a group of machine learning researchers, determined whether 70 occupations are automatable or not based on the detailed descriptions of tasks of occupations on O\*NET, an online service developed for the Department of Labor. A Gaussian process classifier was then used to estimate the probability of computerization for other detailed occupations based on a training set hand-labeled by the researchers. An occupation is deemed susceptible to computerization if the tasks of the job can be sufficiently specified and performed by state of the art computer-controlled equipment. They further consider the extent to which the automation of those tasks would require overcoming engineering bottlenecks such as perception

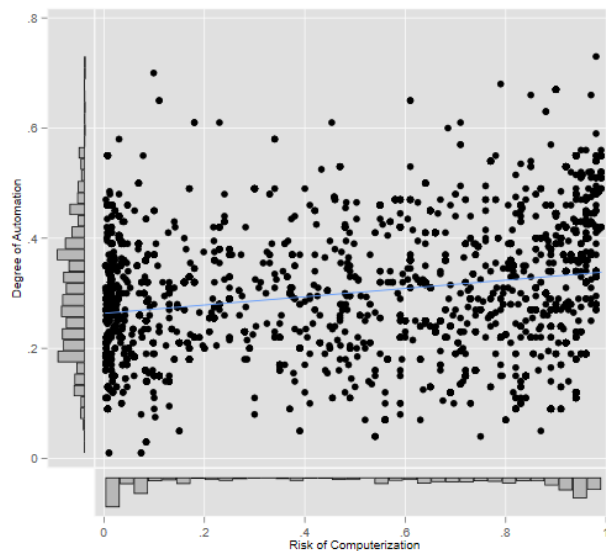
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<sup>25</sup>The commonly used measure, routine task intensity (RTI) is only weakly correlated with actual levels of job automation at  $r=.17$ . RTI is more strongly correlated with our measure of prospective job automation risk, whether a job is susceptible to automation in the future, at  $r=.68$

and manipulation, creative intelligence, and social intelligence. For example, the job of a fashion designer is less computerizable and under a much lower threat than a court clerk because creativity is needed to perform the tasks of the former.

The retrospective and prospective indicators measure different dimensions and facets of workplace automation. Figure 3 shows that the extent to which jobs had already computerized and the likelihood of future automation are only very weakly correlated. Unlike in the past, automation is no longer confined to routine, well-defined tasks. Computers can now perform many tasks that were, not long ago, considered impossible to automate. Levy and Murnane (2005) wrote that drivers are immune from job automation because “it is hard to imagine discovering the set of rules that can replicate [a] driver’s behavior.” Little did they know that autonomous driving would become an area of intense engineering and machine learning focus. On the other hand, there are occupations that had been heavily computer-assisted but are unlikely to be completely automated in the near future, such as air traffic controllers and medical services managers.

Figure 3: Degree of past automation and future automation risk



Note: Retrospective and prospective measures of automation are only weakly correlated. The density plots show the distribution of the observations.



The outcomes of interest are directly drawn from the ANES.<sup>26</sup> The dependent variables include feelings of job insecurity, attitudes toward free trade agreements, immigration, offshoring, and federal spending cuts on science and technology for individual  $i$ , in occupation  $j$ , in industry  $k$ , living in congressional district  $l$ .

I regress individuals' attitudes on trade, immigration, offshoring, and technology on these measures of automation. In addition, I control for the offshorability of individual  $i$ 's job given their occupation  $j$ . I use Blinder and Krueger (2013)'s measure.<sup>27</sup> An occupation is deemed not offshorable if its tasks must be performed at specific location, and require personal contact with end users. The measure ranges from 1 (not offshorable) to 5 (offshoreable with minor or no difficulty or quality loss). I also hold constant the level of immigration in  $i$ 's congressional district  $l$  and import exposure in  $i$ 's industry  $k$ . Level of immigration is defined as the size of the foreign-born population in a congressional district. Import penetration is operationalized as the total amount of imports over total sales in the United States in an industry (three-digit NAICS).

Furthermore, the model includes other variables known to affect  $i$ 's policy attitudes and preferences — education, gender, age, family income, party identification, ethnocentrism, and nationalism. For ethnocentrism, I follow Kinder and Kam (2009)'s method of estimation. It is defined as the average of the three out-group thermometers subtracted from the in-group thermometer. Each respondent is in one of these four groups: Asians, Blacks, Hispanics, or Whites. Ethnocentrism and nationalism are distinct concepts. While ethnocentrism relates to how one evaluates their own ethnic group vis-a-vis other groups, nationalism relates to one's feeling toward their own country. Individuals who are in the labor force, meaning those who are either employed or unemployed but looking for work, are included in the sample. Those who are not are excluded because they are

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<sup>26</sup>The specific questions used can be found in the Appendix.

<sup>27</sup>I followed his codebook to code the offshorability of occupations that were not coded. My additions did not change the results.

no longer directly exposed to automation risks.

The data has a multilevel structure with four levels of analysis. To avoid biasing standard errors downward and producing spuriously “significant” effects, I adopt a multilevel ordered logistic model.<sup>28</sup> The fully specified model is as follows:

$$Y_{ijkl} = \alpha + \beta_1 X_{ijkl} + \gamma_1 Z_{jkl} + \theta_1 V_{kl} + \lambda_1 Q_l + \tau_j + \zeta_k + \mu_l + \epsilon_{ijkl}$$

In this equation,  $Y_{ijkl}$  are the outcomes of interest.  $X_{ijkl}$  is a vector of individual-level covariates.  $Z_{jkl}$  is a vector of occupational-level covariates.  $V_{kl}$  is a vector of the industry-level covariate.  $Q_l$  is a vector of the congressional district-level covariate.  $\beta_1$  is the fixed effect parameter for individual-level covariates.  $\gamma_1$  is the fixed effect parameter for occupational-level covariates.  $\theta_1$  is the fixed effect parameter for the industry-level covariate.  $\lambda_1$  is the fixed effect parameter for the congressional district-level covariate.  $\tau_j, \zeta_k, \mu_l$  are random intercepts.  $\epsilon_{ijkl}$  is the error term.

## 2.5 Results

Individuals who are more exposed to the threat of automation are more worried about losing their jobs in the near future. Figure 4 shows the predicted probabilities for expressing concerns over job loss at different levels of prospective automation risk. This finding echoes results from a recent study by Patel et al. (2018) that there is a positive, statistically significant impact of automation risk on job insecurity at the county level.

The threat of automation is also, as hypothesized, linked to more intense hostility toward globalization. Workers who are exposed to higher risks of automation are more likely to prefer tighter immigration restrictions (models 1 and 2, Table 3) and oppose the negotiation of free trade agreements (models 3 and 4). These results hold in all model

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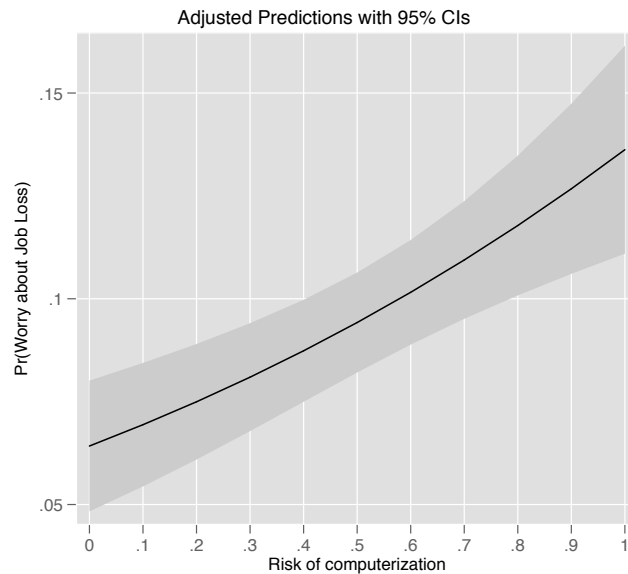
<sup>28</sup>I used ordered logistic regression for some subsample analyses where certain levels of data are dropped. I specify those instances in the findings section.

Table 3: Attitudes toward globalization (workers in labor force)

	Reduce Immigration		Oppose Trade		Discourage Outsourcing	
	(1)	(2)	(3)	(4)	(5)	(6)
Risk of computerization	0.82*** (0.20)	0.46** (0.15)	0.75*** (0.12)	0.32* (0.14)	0.06 (0.18)	0.20 (0.19)
Past level of automation	0.47 (0.46)	0.18 (0.43)	-1.34*** (0.38)	-0.89* (0.43)	0.83 (0.58)	0.24 (0.58)
Offshorability		0.01 (0.04)		0.05 (0.04)		0.06 (0.05)
Import Penetration		-0.16 (0.18)		-0.26 (0.19)		-0.00 (0.23)
Foreign Born		-0.02*** (0.00)		-0.01** (0.00)		-0.01* (0.01)
Gender (Male)		-0.22* (0.10)		-0.25** (0.09)		-0.10 (0.12)
Party ID (GOP)		0.30*** (0.03)		0.12*** (0.02)		0.07* (0.03)
Age		0.02*** (0.00)		-0.01* (0.00)		0.02** (0.01)
Education		-0.08** (0.03)		-0.14*** (0.02)		0.01 (0.03)
Nationalism		0.26*** (0.05)		0.03 (0.04)		-0.04 (0.05)
Ethnocentrism		0.03*** (0.00)		0.00 (0.00)		-0.00 (0.00)
Family Income		0.01 (0.01)		-0.00 (0.01)		0.01 (0.01)
Var(Intercept[occ])	0.00 (0.00)	0.00 (0.00)	0.02 (0.05)	0.00 (0.00)	0.17 (0.12)	0.13 (0.11)
Var(Intercept[occ>ind])	0.00 (0.00)	0.00 (0.00)	0.09 (0.10)	0.09 (0.11)	0.00 (0.00)	0.00 (0.00)
Var(Intercept[occ>ind>cd])	1.97 (1.66)	0.26 (0.48)	0.00 (0.00)	0.00 (0.00)	1.05 (1.63)	0.48 (1.37)
Observations	2073	1811	2059	1801	2076	1814

Note: Results from multilevel ordered logistic regressions of globalization attitudes on hypothesized determinants. Standard errors are in parentheses. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

Figure 4: Predicted probabilities at different levels of automation risk



specifications, even with the addition of demographic and attitudinal controls. However, the relationship between automation risk and attitudes toward offshoring (models 5 and 6) is not statistically significant, but is in the expected direction. It may be due to the fact that there is little variation in the dependent variable. An overwhelming majority, 70 percent, of the respondents believe that the government should discourage companies from hiring workers abroad. Only 4 percent think that the government should encourage offshoring. This animus view toward offshoring is in line with findings in Mansfield and Mutz (2013).

While automation threat is linked to anti-trade and anti-immigration sentiments, it does not predict attitudes toward technology (Table 4). Although firms, rather than the government, invest directly on automation, respondents' views on federal spending on science and engineering should give us a window to understand their general attitudes toward technology. Without adding any control variables, future risk of automation is associated with preference for federal STEM spending cuts, whereas higher past levels

of automation are linked to support for higher STEM spending. However, the effects disappear once we take into account individuals' characteristics and their surrounding environments. In models 8 and 9, there are no statistically significant relationships between the dependent and independent variables. In other words, individuals who face higher risk of computerization are no more likely to oppose government spending on science and engineering, fields where the very technology that displaces workers are developed. The lack of correlation between automation threat and preferences for federal spending on technology suggests that individuals are either tolerant of the adverse labor effects of technological change (in contrast to globalization) or they fail to make the connection that government programs (such as, the American Artificial Intelligence Initiative) may hurt some workers.

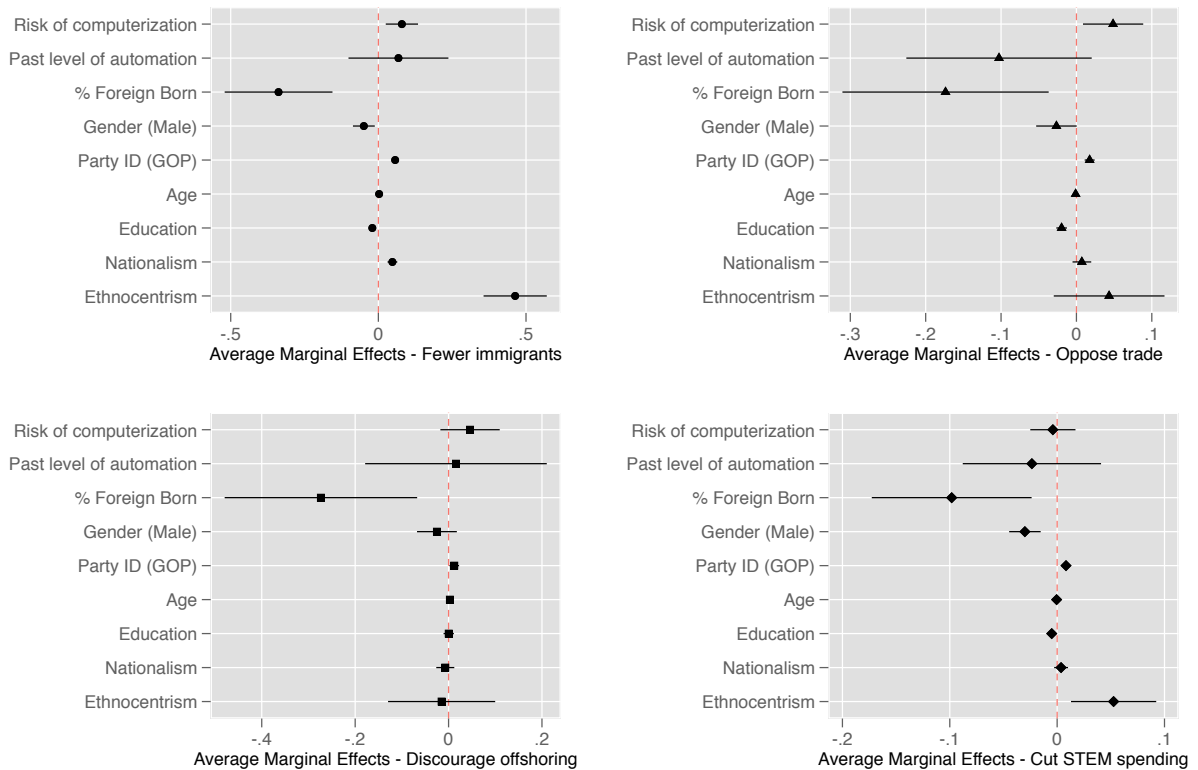
Figure 5 shows the average marginal effects plots of the main variables of interest. Overall, the effects of various control variables are consistent with our conventional understanding of their influences on globalization attitudes: education is negatively associated with protectionist sentiments, nationalism and ethnocentrism strongly correlates with immigrant hostility, and female respondents are more protectionist. Strong Republicans are more likely to be anti-trade and anti-immigration than Democrats. While these positions are inconsistent with those held by the party itself, they are consistent with those held by the presidential candidate of their party in the election. Most importantly, the confidence intervals of the effects of automation risk on immigration and trade attitudes do not overlap with zero. These results are substantively significant especially when we consider the context. The negative effects of job automation are unevenly distributed and will likely become stronger in the years to come. Automation's impact is expected to be geographically concentrated and will likely hit the industrialized Midwest and several low-wage metropolitan areas the hardest. There is evidence that robot exposure had swung the 2016 presidential election in favor of the more radical

Table 4: Attitudes toward technology spending (workers in labor force)

	Decrease government STEM spending		
	(7)	(8)	(9)
Risk of computerization	0.25* (0.12)	-0.10 (0.14)	-0.07 (0.17)
Past level of automation	-0.80* (0.37)	-0.63 (0.42)	-0.39 (0.53)
Gender (Male)		-0.46*** (0.11)	-0.45*** (0.13)
Party ID (GOP)		0.15*** (0.04)	0.13*** (0.04)
Age		-0.00 (0.00)	-0.01 (0.00)
Education		-0.11*** (0.03)	-0.08* (0.03)
Family Income		-0.01 (0.01)	-0.00 (0.01)
Offshorability			-0.05 (0.05)
Import Penetration			-0.34 (0.30)
Foreign Born			-0.02* (0.01)
Nationalism			0.06 (0.05)
Ethnocentrism			0.01* (0.00)
Var(Intercept[occ])	0.00 (0.00)	0.00 (0.00)	0.02 (0.06)
Var(Intercept[occ>ind])	0.06 (0.06)	0.00 (0.00)	0.00 (0.00)
Var(Intercept[occ>ind>cd])	0.00 (0.00)	0.36 (0.92)	0.77 (1.21)
Observations	2421	2296	1814

Note: Results from multilevel ordered logistic regressions of attitudes toward technology spending on hypothesized determinants. Standard errors are in parentheses. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Workers in the labor force includes those who are employed as well as those who are unemployed but seeking jobs.

Figure 5: Average marginal effects for key variables predicting attitudes



Note: Average marginal effects based on ordered logistic regressions of attitudes toward globalization and technology on hypothesized determinants. This sample includes Americans in the labor force.

anti-status quo candidate (Frey, Berger and Chen, 2018). In addition, increasing anti-globalization sentiments due to outgroup scapegoating may cause long-lasting damages to the international system.

I present robustness checks in Tables 7 and 8 of the Appendix. Findings do not change meaningfully with a different estimation method and weights. These findings together offer evidence for the blame misattribution model: workers facing higher risks of automation feel less secure about their jobs. However, they are no more likely to oppose government spending to promote technology that might accelerate further automation. Instead, they are more likely to oppose trade agreements and favor immigration restric-

tions, even after accounting for conventional explanations for these attitudes.

### Further Discussion and Subgroup Analyses

There are other findings and potential challenges to the paper that merit further discussion. At the first glance, it may seem counterintuitive that automation exposure in the past is not linked to immigration hostility (models 1-2, table 1) and is even associated with more positive views toward free trade (models 3-4, table 1). It is worth highlighting that workers in this analysis are still in the labor force and had most likely “survived” automation.<sup>29</sup> If computerization and mechanization are conducive to higher productivity and enhanced competitiveness, workers who are currently in more automated occupations may have an edge in the international market, making them not merely the survivors of technological change but also the winners of it. Among those who survived, animosity toward economic outgroups is driven not by past levels of computerization, but the prospective threat of automation.

Admittedly, the existing survey data limits our ability to trace and identify workers who *did not survive* technological change. While the ANES is administered regularly, it is not a panel survey. Given these constraints, I leverage information on respondents’ past occupations for a preliminary analysis of the relationship between past automation and globalization attitudes among individuals who might have been displaced by technology. This analysis includes those who are no longer in the labor force or are currently unemployed but seeking work. These individuals must have had at least a job in the past to be included in the sample, as a job is the prerequisite for automation exposure. As we do not know when these workers might have been displaced, certain time-dependent covariates (e.g. import exposure at the time of displacement) have to be dropped. The

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<sup>29</sup>The size of the coefficient is even larger if we exclude the group of workers who are unemployed within the labor force.



variable measuring prospective risk of automation is also moot. Results in table 5 show that past levels of automation has a statistically significant effect on protectionist trade and immigration policy preferences.<sup>30</sup> This suggests that probable losers of technological change are more opposed to globalization.

Table 5: Attitudes toward globalization and technology (potentially displaced individuals)

	Oppose Trade (10)	Reduce Immigration (11)	Discourage Outsourcing (12)	Cut STEM funding (13)
Past level of automation	1.08* (0.50)	1.39** (0.52)	-0.15 (0.59)	-0.36 (0.56)
Foreign Born	-3.03*** (0.64)	-2.38*** (0.66)	-0.90 (0.74)	-1.98** (0.75)
Gender (Male)	-0.20 (0.12)	-0.11 (0.12)	-0.23 (0.14)	-0.51*** (0.13)
Party ID (GOP)	0.10*** (0.03)	0.32*** (0.03)	0.01 (0.03)	0.11*** (0.03)
Age	-0.01* (0.00)	0.01* (0.00)	0.01 (0.00)	-0.01 (0.00)
Education	-0.12*** (0.03)	-0.09*** (0.03)	-0.02 (0.03)	-0.09** (0.03)
Nationalism	0.08 (0.05)	0.20*** (0.06)	0.03 (0.06)	0.07 (0.06)
Ethnocentrism	-0.05 (0.35)	2.82*** (0.38)	-0.33 (0.40)	0.11 (0.39)
Observations	987	995	993	998

Note: Results from ordered logistic regressions of globalization attitudes on hypothesized determinants. Standard errors are in parentheses. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Respondents included in this analysis are those who are unemployed but seeking work and those who are out of the labor force but had at least a job in the past. I report additional results in Supplementary Materials where I also exclude retirees.

However, there may be reasons for us to believe that automation and globalization are related processes. If this is true, how do we know that losers of technological change adopt more protectionist policy preferences as a result of blame misattribution, but not because of a rational response to material losses due to globalization? While the

<sup>30</sup>Again, automation exposure has no statistically meaningful impact on views toward outsourcing, possibly due to low variation in the dependent variable.

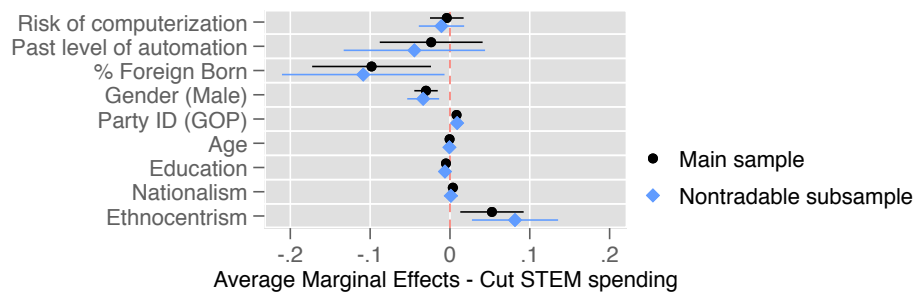
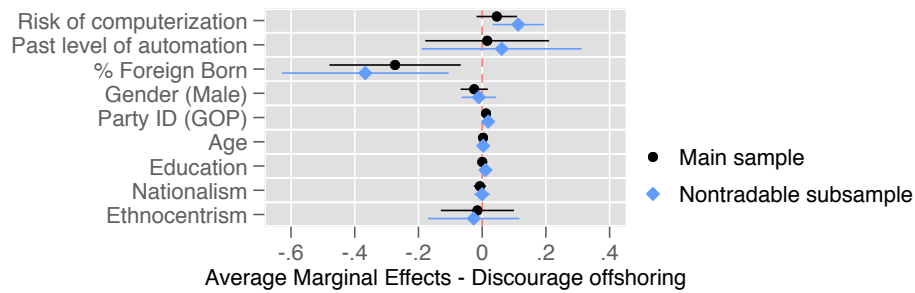
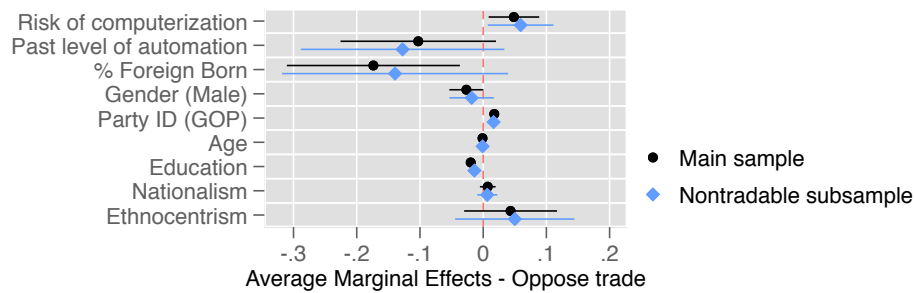
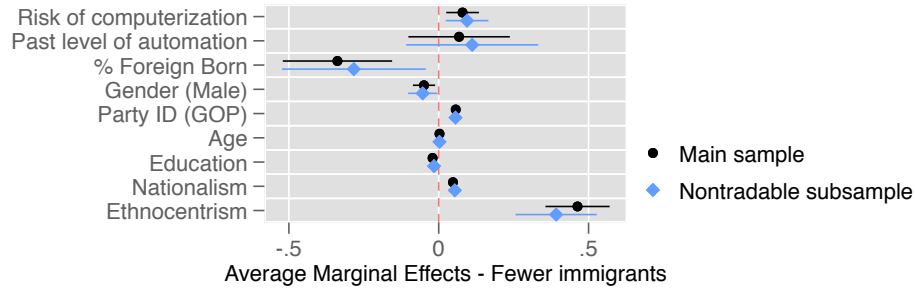
Table 6: Attitudes toward globalization and tech spending (workers in non-tradable sector)

	Reduce Immigration		Oppose Trade		Discourage Outsourcing		Cut STEM spending	
	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Risk of computerization	0.60*** (0.14)	0.50** (0.17)	0.59*** (0.14)	0.35* (0.17)	0.27 (0.16)	0.55** (0.20)	0.15 (0.14)	-0.13 (0.18)
Past level of automation	0.57 (0.48)	0.21 (0.52)	-1.27** (0.48)	-0.95 (0.52)	0.50 (0.56)	0.30 (0.62)	-0.73 (0.48)	-0.56 (0.57)
Import Penetration		-0.03 (0.21)		-0.27 (0.24)		0.11 (0.28)		-0.28 (0.37)
Foreign Born		-1.43* (0.58)		-1.37* (0.58)		-1.77** (0.65)		-1.37* (0.65)
Gender (Male)		-0.20 (0.12)		-0.19 (0.11)		-0.05 (0.13)		-0.42*** (0.12)
Party ID (GOP)		0.27*** (0.03)		0.11*** (0.03)		0.09** (0.03)		0.11*** (0.03)
Age		0.01*** (0.00)		-0.01 (0.00)		0.02*** (0.00)		-0.01 (0.00)
Education		-0.05 (0.03)		-0.10*** (0.03)		0.05 (0.03)		-0.08* (0.03)
Nationalism		0.28*** (0.05)		0.03 (0.05)		-0.00 (0.06)		0.01 (0.06)
Ethnocentrism		2.10*** (0.33)		0.38 (0.30)		-0.13 (0.35)		1.03** (0.34)
Family Income		0.01 (0.01)		0.00 (0.01)		0.02 (0.01)		-0.00 (0.01)
Observations	1294	1124	1290	1119	1299	1127	1521	1126

Note: Results from ordered logistic regressions of globalization attitudes on hypothesized determinants. Standard errors are in parentheses. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Respondents included in this analysis are those who are working in non-tradable sectors as defined by Blinder and Krueger (2013).

structure of the ANES limits identification options, I reanalyze the data with only a subsample of Americans who worked in nontradable sectors (as defined in Blinder and Krueger (2013)). Examples of non-tradable occupations are teachers, firefighters, and restaurant servers. The intuition is that workers in non-tradable sectors are only minimally affected by import competition, and thus should have few economic reasons to be against trade. They may even favor trade in their capacities as consumers. If we observe stronger hostility toward trade among workers exposed to higher threats of automation in this subsample, there are stronger reasons for us to believe that outgroup scapegoating may be at play.

Figure 6: Average marginal effects for key variables predicting attitudes (full and non-tradable subsample)



Note: Average marginal effects based on ordered logistic regressions of attitudes toward globalization and technology on hypothesized determinants. This main sample includes Americans in the labor force, the nontradable subsample includes workers in the non-tradable sector as defined by Blinder and Krueger (2013).

Using the same ANES data, table 6 shows that workers in non-tradable sectors facing higher threats of job automation are still more likely to support immigration restrictions, oppose free trade agreements, and prefer the government to discourage offshoring. These findings are robust and consistent across 5 out of 6 models, with and without controls. Automation threat, as before, is not associated with anti-technology preferences here. Figure 6 presents combined plots of average marginal effects for key variables predicting attitudes for both the main sample comprising of all workers in the labor force and the non-tradable subsample. The magnitudes of effect of automation risk on attitudes are comparable or larger in the subsample than in the main sample. The consistent findings offer additional evidence that hostility toward globalization is related to anxiety about future job automation.

## 2.6 Conclusion

The existing scholarship on structural economic change emphasizes the impact of technology on wages and employment. Although immigration and trade only account for a small percentage of layoffs, globalization takes the brunt of the blame for labor market anxieties (Helpman, 2018; Card, 1990; Peri and Sparber, 2009; Ottaviano, Peri and Wright, 2013). While decades of studies in economics have documented the distributional consequences of technology related to employment, income, inequality, and health, the political effects of automation are not well understood. This paper contributes to the nascent literature by examining the impact of automation on public opinion on globalization and technological change. Using a nationally representative survey, it shows that automation threat intensifies globalization resistance. Workers who are threatened by automation are prone to misdirecting blame for labor market threats toward immigrants and foreign workers and away from technological change. This misplacement of

blame is due to politically-motivated framing by elites to reinforce ingroup and outgroup differences, the visibility of globalization-induced job losses relative to technological displacement, and the public's predilection for technology.

To evaluate this claim empirically, I analyzed the American National Election Studies. I leveraged answers to an open-ended question about individuals' occupations to assess their automation risks. I found that workers facing higher risks of automation feel less secure about their jobs. However, they are no more likely to oppose government spending to promote science and technology that might accelerate further automation. Instead, they are more likely to oppose free trade agreements and favor immigration restrictions, even after accounting for conventional explanations for these attitudes. These results are robust and consistent across different models and model specifications. The impact of automation threat on attitudes toward production offshoring, however, is not statistically significant. It might be attributable to the low variation in opinion toward offshoring, which is predominately adverse. A subsample analysis of individuals in non-tradable sectors provides additional evidence of blame misattribution. Even for those who are minimally affected by trade, automation threat is associated with protectionist policy preferences. Overall, the evidence suggests that automation anxiety increases attempts to resist globalization.

The theory of blame misattribution has important implications for debates over the determinants of globalization attitudes. The premise in open economy politics (OEP) that economic self-interest shapes individual preferences was once regarded as conventional wisdom. Later research challenges the notion and suggests that non-economic factors, such as ethnocentrism and racism, rather than pocketbook concerns, determine preferences toward globalization. This paper shows that grievances against globalization have economic origins, but it calls into question the standard assumption that individuals understand and can correctly identify the sources of their economic anx-

ieties. Anti-globalization attitudes are based on the beliefs, but not necessarily the reality, that foreign outgroups are the sources of their economic anxieties. Given these beliefs, demands for protectionist policies are motivated by self-interest regardless of whether these policies actually address their economic concerns.

Correct blame attribution is important for three main reasons. First, the misplacement of hostility towards globalization can lead to collective decisions that might be economically detrimental and difficult to be reversed, such as the fracturing of international political and economic unions (e.g. Brexit) and the election of political leaders who have protectionist agendas and the executive power to reverse trade liberalization. Second, the misattribution of blame may lead to poor policy outcomes. If free trade and immigration are linked to overall welfare gains, responding to technological change with protectionism may hurt constituencies that derive key benefits from globalization. Protection may even hurt those who demand these policies in the first place if they misidentified the source of their economic problems. Lastly, it is only through the understanding of the real challenge to work that citizens can better prepare themselves for the advent of large-scale job automation. Knowledge of the threat of automation will also motivate more informed discussions about appropriate adjustment and compensation measures for displaced labor.

## 2.7 Appendix

### 1.7.1 Robustness checks

Table 7: Attitudes toward globalization (entire labor force), with weights

	Reduce Immigration		Oppose Trade		Discourage Outsourcing	
	(1)	(2)	(3)	(4)	(5)	(6)
Risk of computerization	0.49*** (0.13)	0.38* (0.15)	0.67*** (0.12)	0.31* (0.14)	0.05 (0.14)	0.28 (0.19)
Past level of automation	0.58 (0.39)	0.22 (0.48)	-1.18* (0.47)	-0.91 (0.54)	0.32 (0.51)	-0.15 (0.55)
Offshorability		-0.00 (0.04)		0.05 (0.05)		0.02 (0.06)
Import Penetration		-0.11 (0.11)		-0.50** (0.16)		-0.03 (0.22)
Foreign Born		-0.02** (0.00)		-0.01* (0.00)		-0.01* (0.01)
Gender (Male)		-0.16 (0.11)		-0.15 (0.10)		-0.01 (0.13)
Party ID (GOP)		0.29*** (0.03)		0.11*** (0.03)		0.08* (0.03)
Age		0.02*** (0.00)		-0.01* (0.00)		0.02*** (0.00)
Education		-0.07** (0.03)		-0.13*** (0.03)		0.01 (0.03)
Nationalism		0.21*** (0.05)		0.06 (0.05)		-0.09 (0.06)
Ethnocentrism		0.02*** (0.00)		0.00 (0.00)		-0.00 (0.00)
Family Income		0.01 (0.01)		0.00 (0.01)		0.02* (0.01)
Observations	2511	2232	2498	2222	2515	2235

Note: Results from ordered logistic regressions, with sample weights specified according to DeBell (2010). Standard errors in parentheses. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Table 8: Attitudes toward tech spending (entire labor force), with weights

	Decrease government STEM spending		
	(7)	(8)	(9)
Risk of computerization	0.28 (0.16)	-0.07 (0.18)	-0.06 (0.18)
Past level of automation	-0.79 (0.48)	-0.42 (0.51)	-0.36 (0.53)
Gender (Male)		-0.37** (0.12)	-0.35** (0.12)
Party ID (GOP)		0.14*** (0.03)	0.11*** (0.03)
Age		-0.01 (0.00)	-0.01 (0.00)
Education		-0.12*** (0.03)	-0.08* (0.03)
Family Income		-0.01 (0.01)	-0.00 (0.01)
Offshorability			-0.05 (0.05)
Import Penetration			-0.21 (0.21)
Foreign Born			-0.01* (0.01)
Nationalism			0.02 (0.05)
Ethnocentrism			0.01** (0.00)
Observations	2517	2417	2235

Note: Results from ordered logistic regressions, with sample weights specified according to DeBell (2010). Standard errors in parentheses. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$



Table 9: Attitudes toward globalization and technology (potentially displaced individuals, excluding retirees)

	Oppose Trade	Reduce Immigration	Discourage Outsourcing	Cut STEM funding
Past level of automation	1.08* (0.50)	1.39** (0.52)	-0.15 (0.59)	-0.36 (0.56)
Foreign Born	-3.03*** (0.64)	-2.38*** (0.66)	-0.90 (0.74)	-1.98** (0.75)
Gender (Male)	-0.20 (0.12)	-0.11 (0.12)	-0.23 (0.14)	-0.51*** (0.13)
Party ID (GOP)	0.10*** (0.03)	0.32*** (0.03)	0.01 (0.03)	0.11*** (0.03)
Age	-0.01* (0.00)	0.01* (0.00)	0.01 (0.00)	-0.01 (0.00)
Education	-0.12*** (0.03)	-0.09*** (0.03)	-0.02 (0.03)	-0.09** (0.03)
Nationalism	0.08 (0.05)	0.20*** (0.06)	0.03 (0.06)	0.07 (0.06)
Ethnocentrism	-0.05 (0.35)	2.82*** (0.38)	-0.33 (0.40)	0.11 (0.39)
Observations	987	995	993	998

Note: Results from ordered logistic regressions. Standard errors in parentheses. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

### 1.7.2 Survey questions

These questions, drawn from the ANES, are used in the analyses:

1. Job insecurity: “How worried are you about losing your job in the near future?”
2. Trade: “Do you favor, oppose, or neither favor nor oppose the U.S. making free trade agreements with other countries?”
3. Immigration: “Do you think the number of immigrants from foreign countries who are permitted to come to the United States to live should be [increased a lot, increased a little, left the same as it is now, decreased a little, or decreased a lot]?”
4. Offshoring: “Recently, some big American companies have been hiring workers in foreign countries to replace workers in the U.S. Do you think the federal government should discourage companies from doing this, encourage companies to do this, or stay out of this matter?”
5. Federal spending cuts on science and technology: “Should federal spending on science and technology be increased, decreased, or kept about the same?”

## Chapter 3

### “Restrict Foreigners, Not Robots”: Partisan Responses to Automation Threat

#### 3.1 Introduction

Technological change has important implications for employment and wages, contributing to increasing income inequality, labor displacement, and job polarization (Autor, Levy and Murnane, 2003; Goos and Manning, 2007; Acemoglu and Restrepo, 2020). While some believe that rises in output will increase labor demand for non-automated jobs, others worry that new developments in robotics and machine learning will enable capital to substitute for labor in an increasing range of tasks. Empirically, researchers find that technological improvements after 1980 have been associated with declines in labor share, unlike those in preceding decades (Autor and Salomons, 2018; Acemoglu and Restrepo, 2019, 2020). In light of continued technological advancements, nearly half of American jobs are expected to be susceptible to automation in the coming decades (Frey and Osborne, 2017).

Despite technology’s threat to American workers, responses to automation appear to be different from responses to other apparent challenges to employment. Political responses to automation, to the extent that they exist, are far less protectionist than responses to import competition and immigration. Politicians concerned about automa-

tion have focused primarily on advocating a safety net for affected workers, but not stalling innovation or adoption. To counter economic shocks from automation, Democratic presidential primary candidate Andrew Yang proposed a universal basic income. Congresswoman Alexandria Ocasio-Cortez said that people should be “excited about automation” as long as welfare policies are in place to reduce economic precariousness and inequality. In fact, the American government actively pursues pro-technology policies. Tax codes in the United States are biased in favor of capital and against labor. Effective labor tax rates are in the range of 25.5 to 33.5 percent, while effective capital tax rates are only about 5 percent after the 2017 tax reforms (Acemoglu, Manera and Restrepo, 2020).

The public’s overwhelming support for technology and innovation has helped stall anti-technology campaigns and provided tacit support for pro-innovation programs across multiple administrations. How then might workers cope with employment threats from a trend they support? This paper argues that people tend to divert their blame and opt to demand government actions against other sources of job threats ostensibly created by outsiders. The role of these external factors often receives outsized attention in political discourses. Although trade and immigration are responsible for only a small share of labor market churn, their labor market effects are disproportionately emphasized by politicians. Evidence shows that citizens cope with automation anxiety by penalizing and clamoring for restrictions on groups that they already consider unwelcome or objectionable. With robots eating into the pie of jobs, people want to stop outsiders from also having a slice of the pie.<sup>31</sup> Partisan loyalty shapes *who or what* people designate as the outgroup by influencing the type of information they consume and how they process such information (Zaller, 1992; Taber and Lodge, 2006).

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<sup>31</sup>Economists have written extensively on this phenomenon called the lump of labor or fixed pie fallacy.

I test this theory of blame displacement directly by randomizing the cause to be blamed for job losses and measuring individuals' protectionist attitudes in an online survey experiment. I find that participants who were primed with a news article highlighting technological unemployment reported more protectionist policy preferences against foreign targets. Specifically, cues about technological displacement made Republicans more likely to demand tighter restrictions on immigration and Democrats more likely to support higher tariffs. On the other hand, automation anxiety slightly dampened enthusiasm for technology, but participants remained hesitant to support technological restrictions. These findings imply that accelerated technological change may intensify attempts to resist globalization, but not necessarily automation (at least not yet).

Political scientists have only recently started studying the political effects of automation. This paper contributes to this nascent but growing body of work in political economy. Thus far, evidence is mixed as to whether and how automation threat shapes political preferences. Thewissen and Rueda (2019) and Jeffrey (2019) show that automation threat increases support for redistributive policies in Europe. However, Zhang (2019) finds that raising awareness about automation has no impact on preferences across a wide host of policies. Frey, Berger and Chen (2018) and Anelli, Colantone and Stanig (2019) argue that automation increased electoral support for radical, anti-status quo platforms in the United States and Western Europe. Contributing to these discussions, this paper establishes and highlights the link between automation anxiety and protectionist policy preferences, which may have oiled the wheels of the populist backlash against globalization and contributed to the revival of radical politics.

This paper also relates to the discussion on why individuals' policy preferences deviate from their economic interests. Opposition to trade and immigration does not necessarily originate from material losses from the same sources. Researchers have chalked this discrepancy up to economic ignorance and political framing, among other factors

(Mansfield and Mutz, 2013; Naoi and Kume, 2015; Rho and Tomz, 2017). This experimental study shows that even in the presence of information that neither trade nor immigration (but technology) was responsible for a specific case of layoffs, participants still clamored for protection. This is consistent with expectations derived from psychological research that picking on an enemy improves feelings of internal agency and personal control (Weiner, 1985; Bukowski et al., 2017). Both of which can be comforting sentiments in the face of a technological revolution that many consider inevitable.

But is it really inevitable? On one hand, this study shows that technology is not immune to opposition. On the other, it finds that support for technology remained high even when participants were directly reminded of technology's negative effects on employment. Historically, when labor-replacing technology threatened jobs, resistance was the norm rather than the exception (Frey, 2019). If continued technological innovation is conducive to long-term economic growth and enhanced human welfare, it is perhaps reassuring that the increasing pace of technological change of late has not inspired a new wave of Luddism. But, in the long run we are all dead.<sup>32</sup> The long-run reward of prosperity may not be sufficient to support an enduring coalition for automation. Although technology is enjoying its heydays, it will be a fruitful endeavor for future research to examine the conditions in which the public's enthusiasm toward technology might break down. The experiment suggests that such opposition may more likely originate from the left.

The structure of the chapter is as follows: the next section reviews a decade's worth of public opinion data in the United States on mass attitudes toward technology, which shows that enthusiasm for, and concerns about, workplace automation coexist. The third section lays out the theory of blame misplacement and corresponding expectations regarding people's responses to automation threat. The fourth and fifth detail the

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<sup>32</sup>To quote John Maynard Keynes.

design and results of the online survey experiment conducted in 2018. The final section concludes.

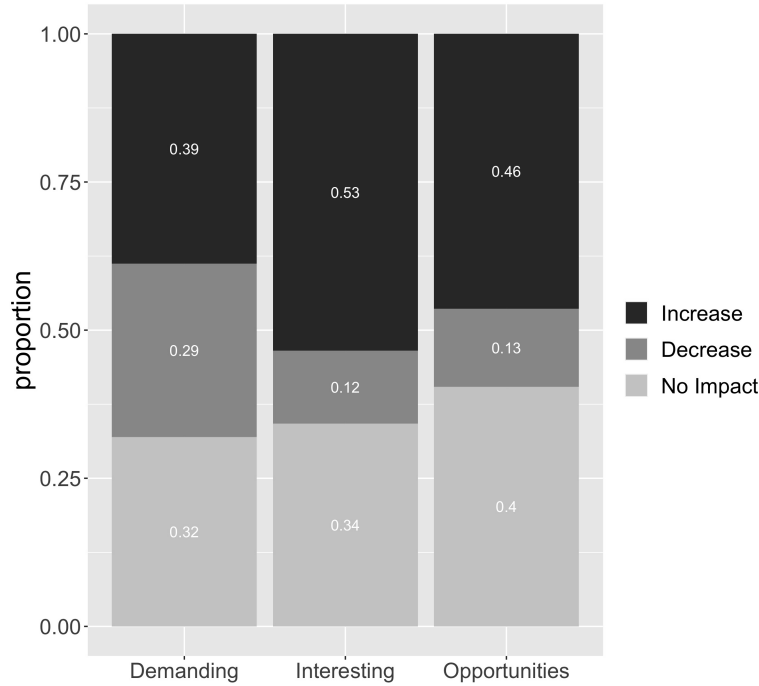
### 3.2 Public opinion on workplace technology

A review of public opinion surveys from the last 10 years finds that Americans are consistent supporters of technology and innovation (shown in Table 10). A majority believe that technology makes life easier, is beneficial to the economy, and will overall create more opportunities for the next generation. Over 90 percent of Americans believe that investments in science and technology are crucial to maintaining American competitiveness in the world.

Table 10: Public opinion on general purpose technology

Survey / Polling Organization (Year)	Questions	Results
World Values Survey (2010)	Because of science and technology, there will be more opportunities for the next generation (1/completely disagree – 10/completely agree)	7.25 (Mean)
World Values Survey (2010)	Science and technology are making our lives healthier, easier, and more comfortable. (1/completely disagree – 10/completely agree)	7.19 (Mean)
Chicago Council Survey (2015)	Please indicate how important the following factors are to the United States remaining competitive with other countries in the global economy: Investing in science and technology	58% Very important 33% Somewhat important 5% Not very important 3% Not at all important
American National Election Studies (2016)	Should federal spending on science and technology be increased, decreased, or kept the same?	57% Increased 35% About the same 8% Decreased
Gallup Organization (2018)	Overall, do you think that science and technology will help improve life for the next generation?	91% Yes 7% No 2% Don't know
John J. Heldrich Center for Workforce Development at Rutgers (2018)	New technologies are good for the economy.	44% Agree a lot 49% Agree a little 5% Disagree a lot 2% Disagree a lot

Figure 7: Overall positive appraisal of workplace technology



Data from a PEW conducted in May 2017. Respondents were asked if technology has (1) made their work more or less demanding, (2) more or less interesting, and (3) increased or decreased opportunities for career advancement. Results are weighted. Respondents include Americans who are currently employed on a full- or part-time basis.

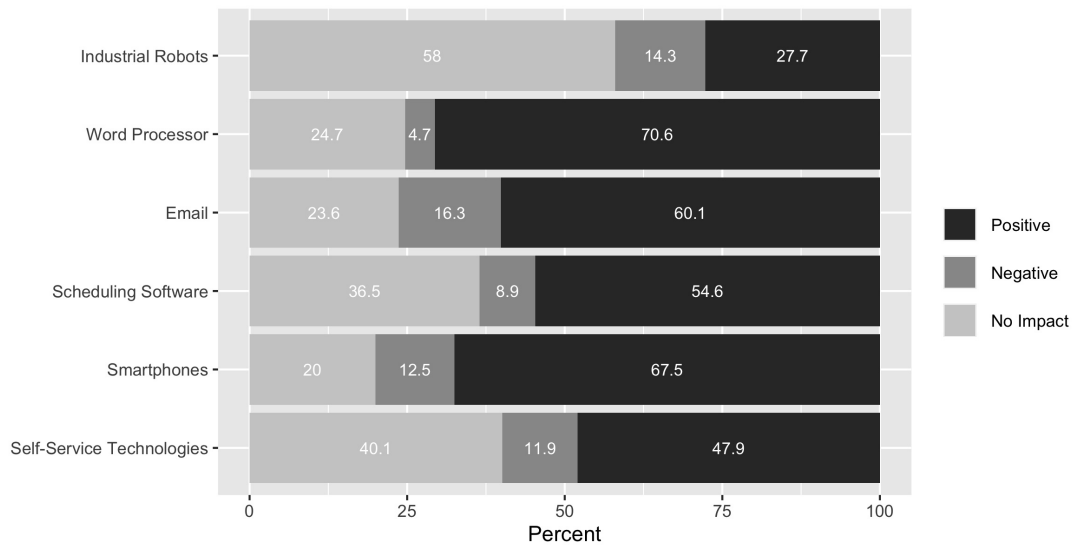
More recent and topical surveys reveal that Americans' positive appraisal of technology largely extends to machines, equipment, and software that are used in the workplace as well — even though these technologies could potentially replace human workers. Technology sometimes changes the job itself. According to a Pew Research Center survey conducted in 2017, about half of the respondents think that technology has made their jobs more interesting and has created more opportunities (Figure 7). In contrast, just above 10 percent believe technology made their jobs more mundane and diminished opportunities. However, slightly more people report that technology made their jobs more demanding rather than less demanding.<sup>33</sup>

<sup>33</sup>For example, accelerated technological change necessitates continuous learning and training for



To some extent, workers differentiate between different types of machines. They rate labor-augmenting and labor-displacing technologies differently. Labor-augmenting technologies increase the efficiency and productivity of workers, and labor-displacing technologies diminish the set of activities in which labor adds significant value. Figure 8 shows that a majority of workers have favorable views on the former (such as word processor, email, and smartphones), but they are slightly more ambivalent toward technologies that can effectively substitute for labor (such as industrial robots and self-service technologies). That being said, less than 15 percent of them deem the impact of the latter category of labor-saving technologies to be strictly negative.

Figure 8: Opinion on various workplace technology



Data from a PEW conducted in May 2017. Results are weighted. Respondents include Americans who are currently employed on a full- or part-time basis.

However, working Americans' enthusiasm toward technology dampens when they are asked to consider technology's effect on jobs, especially in the long-run. While only 9 percent of respondents report working in companies that had lost employees due to knowledge workers thereby increasing effort, but machines like automated guided vehicles (AGVs) likely would have decreased the physicality of jobs for others.

technological change, about 56% of Americans believe that new technologies overall eliminate more jobs than they create (John J. Heldrich Center for Workforce Development at Rutgers University, 2018).<sup>34</sup> American's projections of technology's future impact on jobs is even grimmer. Another survey finds that 78 percent of Americans find the future scenario in which robots and computers do most of the jobs that are currently done by humans to be at least somewhat realistic (Pew Research Center, 2017a). About 7 in 10 believe that robots and artificial intelligence will steal people's jobs. Nearly half say workers will have less job security by 2050 (Pew Research Center, 2019c). In sum, American workers have a clear affinity for technology, but at the same time, they are deeply concerned about the its employment implications.

### 3.3 Automation threat and partisan interpretation

Job loss is often a traumatic event and people's sensitivity to unemployment is well-documented. Concerns about labor displacement affect individuals' physical and psychological well-being (McKee-Ryan et al., 2005), preferences for welfare policies (Iversen and Soskice, 2001), willingness to vote (Burden and Wichowsky, 2014), and vote choice (Conover, Feldman and Knight, 1986). Politicians also campaign heavily on employment promotion and often make costly decisions to signal their commitment to job creation to claim political credit (Jensen and Malesky, 2018).

The United States is an innovation-friendly nation from its grassroots to its elites, *in spite of* technology's disruptions to the labor market. Since the 1980s, technological change has contributed to increasing income inequality, job polarization, and labor displacement (Autor, Levy and Murnane, 2003; Goos and Manning, 2007). Acemoglu and Restrepo (2020) find that the adoption of one more industrial robot in a commuting

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<sup>34</sup>Higher educational attainment is correlated to a more pessimistic assessment of technology's current impact on jobs.

zone reduces employment by about six workers. Looking into the future, researchers estimate that 9 percent (Arntz, Gregory and Zierahn, 2016) to 47 percent (Frey and Osborne, 2017) of American jobs are at high risk of automation due to advances in robotics and artificial intelligence. Notwithstanding the significant difference between these estimates, neither projection bodes well for millions of workers. It is no surprise that most Americans, as discussed before, expressed concerns about technological displacement when directly asked about it (Pew Research Center, 2017b, 2019c).

*“Restrict foreigners, not robots?”*

How do people then cope with employment threats from technological change — a trend that they generally support? People tend to displace blame and opt to demand government actions against other sources of job threats that are ostensibly created by outsiders. Psychological research finds that threats increase scapegoating (Rothschild et al., 2012; Bukowski et al., 2017). People frequently use outgroups as scapegoats when they believe that members of the outgroup are capable of causing the negative outcome in question (Sullivan, Landau and Rothschild, 2010; Glick, 2005). Whilst economic phenomena and crises are often complex with multiple causes, emphasizing one or a few external, controllable, and specific sources or actors as explanations of negative outcomes helps preserve feelings of internal agency and personal control (Weiner, 1985; Bukowski et al., 2017). These sentiments may be particularly reassuring in the face of a trend that seems inevitable. Hesitant to halt innovation, individuals rather buffer domestic workers facing technological threat with substitute policies — restrictions on immigrants and foreign workers — that they believe could improve national wages and employment prospects. Thus, employment threats from technological change may increase demands for restrictions on these outgroups.

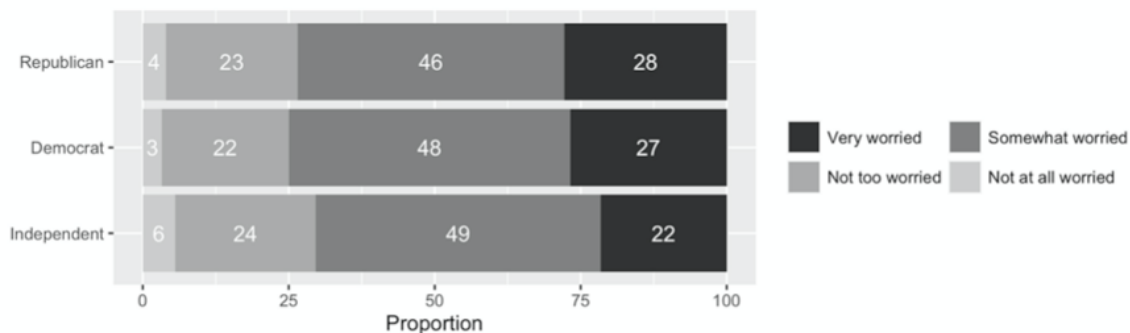
Partisanship likely shapes who or what people specifically believe to be culpable for

their job insecurity, in other words, who or what gets designated as the outgroup. Party identity tends to be very stable. Partisanship develops at a young age and it rarely changes over the life cycle (Sears, 1975). In American politics, this salient and powerful identity influences attitudes, preferences, and behavior, including trust in government, economic evaluations, feelings about the fairness of elections, and church attendance (Bolsen, Druckman and Cook, 2014; Lenz, 2013). Even presumptively fundamental beliefs, like religiosity, may change to align with party loyalty (Margolis, 2018).

Partisanship's influence can be seen in a few ways here. It affects the information people choose to receive and how they process such information. Some seek co-partisan media sources that they deem them more credible and trustworthy (Zaller, 1992), while others use selective information to reduce cognitive dissonance by affirming beliefs they feel uncertain about (Taber and Lodge, 2006). The Internet and cable news facilitate partisans' ability to obtain news and commentaries consistent with their leanings. The prevalence of social media platforms also exposes individuals to belief-consistent information, even when they are not actively seeking out news (Sunstein, 2018). In addition to partisan differences in information exposure, party identity also encourages biased interpretations of events and issues. Even if people begin with very similar sets of facts, they are motivated to arrive at conclusions that are consistent with their partisanship. Interpretations also provide opportunities for partisans to rationalize their opinions as real-world conditions change (Gaines et al., 2007).

Before we dive into a possible partisan divergence in responses to automation, it is worthwhile to note that there is no meaningful difference across partisanship in the perception or assessment of automation threat. Figure 9 shows that roughly equal proportions of Democrats and Republicans are worried about technology doing most of the work currently done by human workers. Despite this common assessment of threat, partisans are likely to blame different actors for the increased employment risks.

Figure 9: Concerns over technological displacement, by party



Data from Pew Research Center (2017b), Weighted.

For decades, immigrants and foreign workers from lower-wage countries are among the most hotly disputed outgroups in the United States. Taking “the team’s position,” self-identified Republicans may be more likely to favor restrictions on immigrants, while self-identified Democrat may prefer limits on imports in response to automation threat to protect American jobs. Although members of neither party have ever been unanimous on immigration and trade, past studies show that both parties have clear and dominant positions on both issues (Karol, 2000; Jeong et al., 2011; Levy, Wright and Citrin, 2016).

#### *Partisan differences on trade and immigration*

There is a rather visible partisan divide on immigration issues. Analyzing 24,208 votes in the House and 6,985 votes in the Senate on the Border Protection, Antiterrorism, and Illegal Immigration Control Act, Wong (2017) finds that Republican representatives are 3.7 and 1.6 times more likely than Democratic representatives to support restrictive immigration-related legislature in the House and Senate respectively. The likelihood that Republican House representatives vote yea on final passage votes on restrictive immigration-related legislation is approximately 96 percent, while that for Democratic representatives is about 23 percent (Ibid). This difference can be seen across multi-

ple dimensions of immigration reform, including admissions, border security, interior immigration enforcement, and integration policies.

There are degrees of factional infighting over immigration issues, but the voting records ultimately demonstrate that the socially conservative Republicans triumphed over the pro-business wing. While the pro-business faction of the Republican party prefer laxer immigration policies to keep labor supply available and cheap, the socially conservative Republican wing worries that immigration would weaken the traditional culture that they prize. On the whole, Republican politicians were more likely to vote against business interests on immigration. Amongst Democratic politicians, the ethnic and civil rights faction has the upper hand. They tend to emphasize the humanitarian and social merits of immigration, preferring more permissive policies to facilitate family reunions and safeguard civil rights. The pro-labor wing of the party has softened their stance on immigration policies over time, increasingly viewing immigrant workers “as a target of opportunity rather than an inevitable threat” (Jeong et al., 2001, p 524). Public opinion maps closely onto elite positions. Self-identified Republicans were consistently more opposed to immigration than self-identified Democrats between 1992 and 2016 (American National Election Studies, 2017). For over a decade, more Republicans have believed immigrants burden the country by taking jobs and welfare rather than strengthen it with their hard work and talents, and the reverse is true for Democrats (Pew Research Center, 2019b).

While the Democrats are pro-immigration, they are more conservative when it comes to trade. The Democratic party, representing the interests of export-oriented agricultural constituents in the south, was once the free-trade party for much of the nineteenth and twentieth centuries (Irwin, 2017). The Republican party, on the other hand, used to champion high tariffs to protect industrial interests in the northeast. However, by the 1970s, the parties realigned on trade policy. Republicans embraced free trade to cater to

the increasingly export-oriented business interests, and Democrats have discarded their long-standing liberal stance on trade to win support from newly protectionist unions. Democrats are also closely tied to progressive interests, such as human rights and environmental movements, which have long expressed reservations about trade's impact; as well as groups in support of economic justice and reducing inequality. Some Democratic politicians (e.g. Senator Bernie Sanders and Congresswoman Rashida Tlaib) tie trade issues to corporate greed, pitting labor interests against business elites, and argue that trade liberalization has allowed multinational companies to hire workers abroad who are willing to work for low wages, to the detriment of American workers.

A bivariate model coding Democrats before 1970 and Republicans since 1970 as the “free-trade party” predicted more than 72 percent of congressional votes on the North American Free Trade Agreement (NAFTA) and other trade-related bills correctly (Karol, 2000). Both Bush and Clinton relied on the support of Republicans. Under Obama, 90 percent of House Republicans supported a free trade agreement with Colombia, while 85 percent of House Democrats voted against it (Irwin, 2020). More recently, Trump's protectionist policies signified a sharp departure from the pro-trade position of the Republican party. Neither party's presidential candidate supported the Trans-Pacific Partnership (TPP) in 2016. That said, pro-trade capital interests continue to influence the Republican leadership (while labor unions have the ear of the Democratic leadership). At the grassroots, self-identified Democrats were more opposed to free trade than self-identified Republicans in all but one election-year survey conducted by the American National Election Studies between 1988 and 2016 (American National Election Studies, 2017).

Immigrant workers and foreign workers who are willing to accept low wages are “viable scapegoats” (Glick, 2005). When confronted with employment threats from automation, people may opt to instead demand restrictions on other sources of job threats

that are ostensibly created by groups they already find undesirable or objectionable. Although the academic community casts doubts on the effectiveness of rolling back globalization in saving jobs, many party elites and their supporters believe immigrants and foreign workers compete with American workers in a zero-sum manner. In view of the the current partisan divide, we may expect *the threat of technological displacement to increase support for immigration restrictions among self-identified Republicans and trade restrictions among self-identified Democrats.*

While partisan identity has found to be a strong predictor of economic and political behaviors, several factors could moderate the effect. Blame displacement away from automation and toward outgroups is plausibly less likely among a few groups of people. Previous work finds that education and job security are linked to more liberal attitudes toward trade and immigration (Hainmueller and Hiscox, 2006; Pardos-Prado and Xena, 2019). Therefore, we might expect that individuals with higher levels of educational attainment and higher confidence in their labor prospects will be less prone to outgroup scapegoating. In addition, those who have preexisting negative opinions toward workplace automation might also be less likely to transfer blame from technology to another source.

#### *Attitudes toward technology*

How might technological unemployment affect attitudes toward technology? The existing literature does not provide a lot of guidance on whether continued technological improvements would give rise to a new wave of Luddism today. Historically, when labor-displacing technology threatened the jobs and livelihoods of workers, resistance was the norm rather than the exception (Frey, 2019). However, researchers have also found support for modern technology amongst workers, including manufacturing workers who have been among the most affected by automation (Thelen, 1991; Milkman, 1997). In-



dustrial robots and machines are not merely a threat to jobs, but an integral part of work today. Furthermore, technology is much more widespread — and possibly better liked — currently than centuries ago. Considering the public’s penchant for modern technology, as expressed in public opinion surveys, and the absence of anti-technology rhetoric from political elites, automation threat may not necessarily increase hostility toward technology. Zhang (2019) finds that raising awareness of technology’s impact on jobs has no effect on preferences for government restrictions on automation.

Having said that, automation may not be immune to opposition across *all* of society. Automation threat may increase demands for technology restrictions among individuals who prize labor welfare and employment above unhindered innovation. Those who believe that technological change will only enrich large corporations or other economic elites and leave the masses behind may also be against uncontrolled automation. Some Democratic party figures (e.g. Congresswoman Alexandria Ocasio-Cortez) have already expressed this sentiment, emphasizing that enthusiasm for automation is contingent upon widening and deepening the safety net for workers. Given Democrats’ dissatisfaction with the existing American welfare system, automation anxiety may increase support for limiting technology among self-identified Democrats.

To summarize, automation anxiety may have no impact on support for technological restrictions but may increase protectionist demands against foreign targets. In response to automation threat, Republicans are more likely to favor stronger limitations on immigrants and Democrats additional restrictions on imports produced by foreign labor. These effects could be moderated by standard explanations for globalization attitudes, such as education and job security.

### 3.4 Research design

#### *Survey experiment*

In assessing the political impact of automation threat, it is empirically challenging to isolate the unique effects of technology from other sources of employment threats with observational data. Although roughly 75 percent of American jobs are not offshorable (Blinder and Krueger, 2013), a nontrivial number of workers face challenges from both trade and automation simultaneously. Among the latter, some processes of technological change and globalization are interrelated (Baldwin, 2019).

Therefore, to examine the causal relationship between automation anxiety and policy preferences, I conducted a survey experiment with a vignette design to manipulate respondents' sources of job anxiety. I test the theory of blame displacement directly by randomizing the cause to be blamed for job losses and measuring individuals' subsequent protectionist attitudes. Participants were recruited from Amazon's Mechanical Turk (MTurk) and TurkPrime in August 2018. While this sample is not representative of the American population, the experiment provides a useful test of the theory's internal validity. In addition, replication exercises show that surveys conducted via MTurk produce very comparable findings as surveys on nationally representative samples (Huff and Tingley, 2015; Berinsky, Huber and Lenz, 2012).<sup>35</sup> Respondents had to be located in the United States, at least 18 years of age, and in the labor force (employed or unemployed but seeking work) to participate in the survey. Measures were in place to ensure data quality (e.g. CAPTCHA to thwart spam and bots, location screening to block participation from outside of the United States, attention checks, manipulation checks, and survey timekeeping). The study was registered with Evidence in Governance and Politics (EGAP).<sup>36</sup>

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<sup>35</sup>The design's implications on external validity will be further discussed in the results section.

<sup>36</sup>A discussion of the change in organization of this paper in relation to the preregistration document

The survey was roughly divided into four parts. The first part consisted of questions about the respondents' employment status, party identification, level of nationalism and ethnocentrism, and other key demographic information. These questions were placed at the onset of the survey instrument to avoid conditioning on post-treatment variables (Montgomery, Nyhan and Torres, 2018). To proceed to the experimental portion of the survey, respondents were required to pass an attention check. The system then screened out those who failed the pre-treatment attention check. Pre-treatment attention checks, as opposed to those administered after random assignment, allows the pruning of subjects in a way that prevents biases that result from differential attrition across treatment arms. While this screening changes the inferential target to a subpopulation of subjects who are paying sufficient attention to pass the attention check, it has the important advantage of not compromising internal validity of the study (Aronow, Baron and Pinson, 2018).

The experimental part of the survey manipulates the sources of job anxieties. Respondents are randomly assigned a fictitious news article about a made up company. In each of the treatment conditions, Aiden Toy announces its plan to permanently close down a number of its factories due to a different reason — (1) automation, (2) offshoring to China, (3) offshoring to Canada, (4) competition with cheap imports, (5) hiring of more immigrants in remaining plants, and (6) no specified reason. The automation treatment is shown below as an example. Only the heading and the underlined sentence are varied for most cases except for the control, where respondents read a (7) “Company Spotlight” article about Aiden Toys, with the informational details preserved from the treatment conditions. Below are text examples or excerpts (Table 11) of the experimental conditions.

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can be found in the Appendix.

*Automation threat treatment:*

### **Aiden Toys to cut 3,000 US jobs due to automation**

<Photo of factory>

NEW YORK (Reuters) – The toymaker Aiden Toys Inc will close 4 of its 10 factories in the United States by July this year. The factories to be closed are located in Indiana, Ohio and Pennsylvania. Approximately 3,000 of the company’s 10,000 workers will be laid off due to the closures. The company will be able to produce the same amount of toys despite the closures, a spokesperson said in a statement. Twenty-five new fully automated lines have been installed in its five remaining plants.

Aiden Toys recently reported that sales rose 0.7 percent last year. It did not specify its revenue, saying only that revenues were consistent with the company’s internal projections.

*Control:*

### **Company Spotlight: Aiden Toys Inc**

<Photo of factory>

NEW YORK (Reuters) – The toymaker Aiden Toys Inc operates 10 factories in the United States. They are located in Indiana, Michigan, and Pennsylvania. It currently employs about 10,000 workers. The company is expected to produce the same amount of toys in the next financial year, the spokesperson said in a statement.

Aiden Toys reported that sales rose by a modest 0.7 percent last year. It did not specify its revenue, saying only that it is consistent with the company’s internal projections.

All experimental conditions:

Table 11: Experimental conditions (excerpts)

Treatment	Headline	Prime
(1) Automation	Aiden Toys to cut 3,000 US jobs due to automation	Twenty-five new fully automated lines have been installed in its five remaining plants.
(2) Offshore to China	Aiden Toys to cut 3,000 US jobs; opens new site in China	Aiden Toys opened a new production site in Shaoguan, China in February.
(3) Offshore to Canada	Aiden Toys to cut 3,000 US jobs; opens new site in Canada	Aiden Toys opened a new production site in Windsor, Canada in February.
(4) Import competition	Aiden Toys to cut 3,000 US jobs due to import competition	The company is downsizing due to import competition from countries with lower labor costs, a spokesperson said in a statement.
(5) Immigration	Aiden Toys to cut 3,000 in US; hires immigrants in remaining plants	Aiden Toys will continue to hire workers at its six remaining plants. The new hires are expected to be mainly immigrant workers.
(6) No reason	Aiden Toys to cut 3,000 in US	(No reason listed)
(7) Control	Company Spotlight: Aiden Toys Inc	(No job loss)

Note: The treatment effects of all experimental conditions can be found in the Appendix. In the main text, for clarity, I report results from (1), (2), (4), and (5) relative to the control (7).

After the news article, we measured individuals' preferences on a number of policies related to globalization and automation. Respondents were asked, "what should the government do to help workers affected by layoffs?" The list of policies to be rated were displayed in randomized order (increase tariffs, restrict immigration, restrict firms' use of technology, provide assistance to workers, provide a universal basic income, tax incentives for firms to stay in or return to the United States, and do nothing). Respondents gave each policy a rating of 1 (strongly oppose) to 5 (strongly agree). In the analy-

sis, I focus on three policies — trade, immigration, and technology.<sup>37</sup> Although I did not intend to drop respondents post-treatment as it would introduce biases of unknown direction and magnitude (Aronow, Baron and Pinson, 2018), the survey included a manipulation check to gauge the quality of the sample to address recent critiques of the survey platform (Chmielewski and Kucker, 2020). Lastly, respondents were debriefed according to the guidelines set forth by the University’s Institutional Review Board. The experimental set-up and the list of outcome measures can be found in the Appendix.

### 3.5 Results

There are 2,471 respondents in the sample. The sample has an average age of 38.4 and gender is roughly balanced (50.47% female and 49.53% male). The average respondent is White (73% White), has a family income of \$50,000 to \$59,999, and some college experience. About 42%, 28%, and 28% of respondents identify as Democrats, Republicans, and Independents respectively.<sup>38</sup> Balance tests show that random assignment to treatment was largely successful (see Appendix A2).<sup>39</sup>

Table 12 shows respondents’ baseline attitudes. In this subsample of respondents in the control condition, people on average prefer the government to provide compensation to workers affected by layoffs over resorting to protectionism, and prefer the government to enact protectionist policies over doing nothing at all. Overall, opinion toward global economic integration is more polarized than that of worker compensation and government inaction. Republicans are considerably more anti-immigration than Democrats and

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<sup>37</sup>The preregistered analysis plan contained hypothesis about automation threat’s impact on attitudes toward universal basic income, but it is beyond the scope of this paper.

<sup>38</sup>In the 2016 American National Election Studies, 35%, 37%, and 28% of respondents identify as Democrats, Republicans, and Independents respectively. As the main goal of the experiment was to test the hypothesis, I am less concerned about the underrepresentation of Republicans. I will explore issues related to generalization in the discussion (section 5.3).

<sup>39</sup>Balance is not achieved for “education.” I thus ran a specification that includes controls for the covariate, and the results hold.

Table 12: Baseline attitudes (control condition)

Policies	Overall	Democrats	Republicans	Independents
Tax incentive to stay in/return to US	4.01	3.85	4.28	3.92
Financial assistance	3.96	4.23	3.65	3.94
Universal basic income	3.15	3.61	2.60	3.10
Restrict immigration	3.08	2.34	3.86	3.35
Increase tariffs	2.82	2.34	3.44	2.86
Do nothing	2.24	1.87	2.60	2.37
Restrict technology	1.90	1.70	2.15	1.95
Observations	353	142	106	101

Note: Variables range from 1 to 5. They are recoded such that a higher value signifies higher level of average support for the policy.

Independents. The baseline support for free trade among Republicans in this sample is also lower than that among Democrats. This deviates from the conventional public opinion pattern in the last 30 years, but it is consistent with the findings in the latest wave of American National Election Studies in 2016. The incumbent Republican President's rhetoric may have contributed to increased resistance to trade among self-identified Republicans and encouraged many Democrats to take the opposite position.

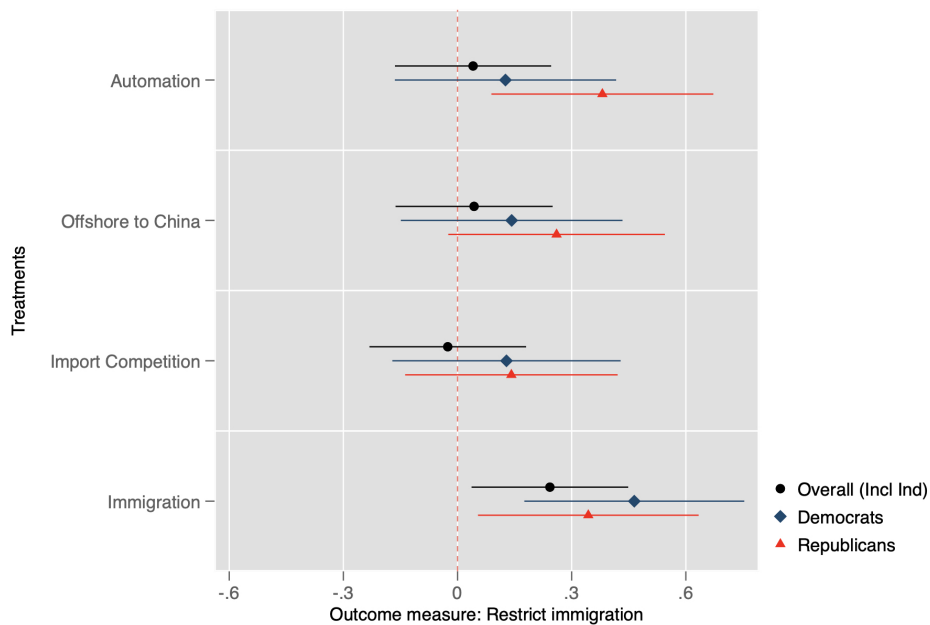
#### *Employment threats and policy responses*

Respondents in treatment conditions were primed to think about a particular source of job loss, and those in the control condition were not. Afterwards, I asked subjects to rate a list of mainstream proposals that address unemployment. For the sake of clarity and length, the main text focuses on the evaluation of immigration, trade, and technology policies, but all results can be found in the Appendix. Overall, 89 percent of participants passed a manipulation check; in other words, 11 percent of respondents were non-compliers. More conservative intent-to-treat (ITT) effects, as opposed to complier-average causal effects (CACE), are reported below (Gerber and Green, 2012; Aronow, Baron and Pinson, 2018).

## Immigration and trade restrictions

Figures 10 and 11 show the treatment effects of various job loss vignettes on respondents' attitudes toward immigration and trade respectively. It is no surprise that priming individuals to think about layoffs due to the hiring of immigrant workers leads to an increased support for the government to “restrict the number of immigrants into the United States” across the board. In the same vein, directly prompting individuals to consider foreign import competition increases support for the government to “raise tariffs on foreign goods” overall. These results together with a manipulation check passage rate of nearly 90% give us confidence that the experiment conditions worked as intended.

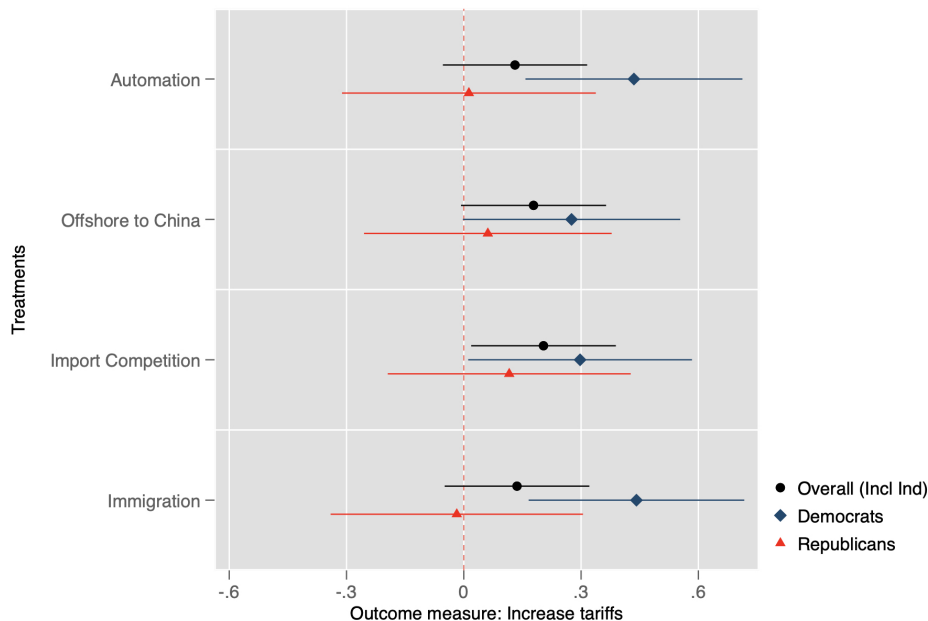
Figure 10: Support for immigration restrictions (marginal treatment effects relative to the control)



Some respondents were primed about technological unemployment. It is implied in the text that automated production lines were installed to replace human workers,



Figure 11: Support for trade restrictions (marginal treatment effects relative to the control)



leading to mass layoffs. Overall, the effects of the automation treatment on immigration and trade policy preferences are both statistically indistinguishable from zero. The overall treatment effect was “washed out” by partisans’ divergent reactions to the same threat (Figures 10 and 11). As expected, partisans are motivated to arrive at conclusions consistent with “their team’s positions.” On immigration, automation threat increases hostility toward immigrants among self-identified Republicans (by 0.38 on a scale of 1 to 5) but has no impact on Democrats. On trade, automation threat shores up support for trade barriers among self-identified Democrats (by 0.44 on a scale of 1 to 5) but has no impact on Republicans. The size of the treatment effect of technology shock is at least as big as that of that of other globalization shocks, which is surprising given that protectionism is a seemingly more direct response to import competition and offshoring than automation. One interpretation is that the relatively high salience of trade and

offshoring at the time of the study meant that many respondents (including those in the control condition) had these issues in mind even without prompting, thereby dampening the effects of experimentally cueing trade and offshoring shocks.

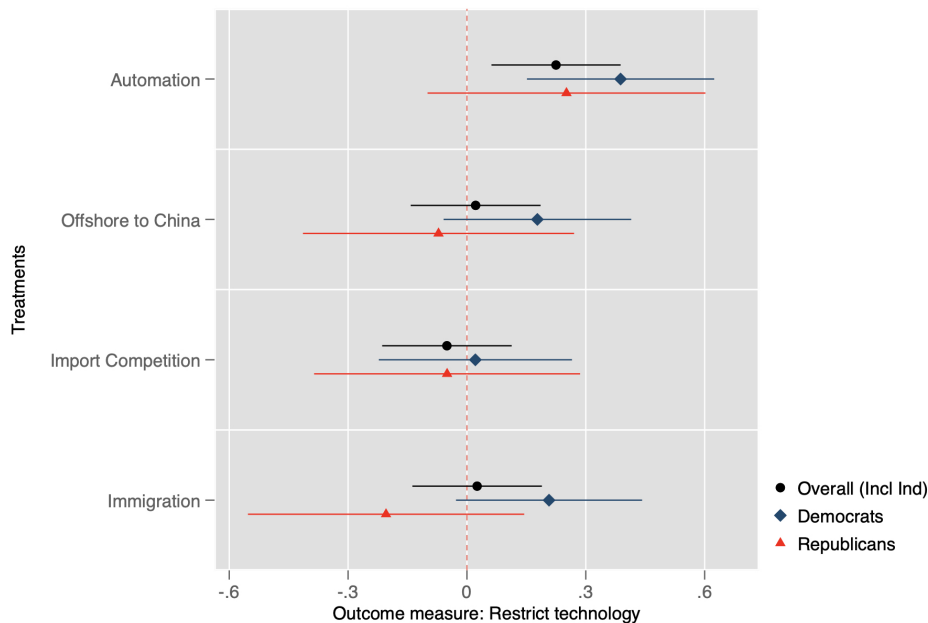
These results suggest that accelerated technological change and its accompanying pressures on workers may intensify the public's attempts to resist globalization. Strikingly, this displacement of blame toward outgroups, in this experimental set-up, occurs without explicit politicization of the issue and without any mention of immigrants and foreign workers in the text. In the real world, political rhetoric emphasizing ingroup-outgroup differences is extremely common, and is often intentionally used by elites to achieve specific political goals (Ryan, 2012).

Additional tests were performed to explore other possible conditional treatment effects of automation threat. Contrary to expectations proposed earlier, I find that the displacement of blame from automation to outgroups is not conditional on education, prior attitudes toward technology, or self-assessed viability in the labor market. The inclusion of various interaction terms measuring respondents' education attainment, pre-treatment appraisal of workplace technology, and self-estimated time needed to secure reemployment in the event of a layoff has no statistically significant effect on opinion on trade and immigration policies. These results suggest that it is partisan identity, not personal circumstances or attributes, that shapes how individuals respond to anxiety from technological change.

#### Technological restrictions

This displacement of blame from automation toward globalization does not work in the other direction. Figure 12 shows that priming individuals about globalization-related job losses — offshoring to China, import competition, and immigration — has no impact on their support for technological restrictions.

Figure 12: Support for technological restrictions (marginal treatment effects relative to the control)



However, those who read about technological displacement are more likely to support government efforts to “restrict companies’ use of new technology.” Among all respondents who received the technology shock treatment, the vignette increases support for technological restrictions by 0.22 (on a scale of 1 to 5).<sup>40</sup> The treatment has no effect on Republicans. The relatively wide confidence intervals of the estimates for Republicans may be indicative of its lower sample size, but it may also signify high heterogeneity of the treatment effect amongst Republicans. The conditional treatment effect is largest for Democrats. The treatment increases the favorability of technological restrictions by 0.39 (on a scale of 1 to 5). This shows that innovation and technological progress, while supported by many, may not be totally immune to opposition. Information about technology’s negative labor effects could potentially lead to increased demands to slow its

<sup>40</sup>This contradicts (Zhang, 2019) which finds that reading a news article that explained the existent and future impact of workplace automation had no impact on people’s technology policy preferences.

spread.

That being said, these treatment effects have to be interpreted very carefully. Table 12 shows that the baseline support for restrictive technological policies are low, in fact, the lowest among the list of policies being evaluated. Even for the subsample of individuals who received the automation treatment, the average evaluation for restrictive technological policies is 2.1 (on a scale of 1 to 5), which roughly translates to “somewhat disagree.” Among Democrats who received the automation treatment, the average rating is also 2.1. Taken altogether, the knowledge or a reminder of automation’s threat to jobs may move opinion on technology to a more negative direction, but people remain fairly hesitant about policies that would hinder innovation and progress.<sup>41</sup>

In sum, while automation anxiety does not lead to a wholesale increase in globalization opposition, the findings suggest that the threat of technological displacement may increase hostility toward specific groups of people whom party loyalists already find objectionable or undesirable. In response to automation anxiety, Republicans prefer stronger limitations on immigrants, while Democrats favor more stringent controls on imports produced by purportedly cheaper workers. This blame transference happened without explicit or even implicit attempts in the experiment to solicit partisan responses in the experiment. These effects may possibly be more pronounced in the real-world where such attempts are prevalent. The study also finds that automation anxiety increases support for limits on technology, contrary to our expectations, but the overall support for these restrictions remains low.

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<sup>41</sup>A further exploration of other heterogeneous treatment effects in the preregistered study can be found in the appendix.

*Robustness checks and correcting for multiple comparisons*

The robustness of these findings was put to additional tests. To address concerns about multiple comparisons, I adjusted the p-values in the reported results below using the Benjamini–Hochberg procedure to control the false discovery rate (FDR). The adjusted p-values are shown alongside the unadjusted ones in Tables 13 and 14. A vast majority of the findings hold. The only exception is that the treatment effect of the immigration prime on immigration policy preference is no longer significant among self-identified Republican respondents (adjusted  $p < .10$ ).

Table 13: ITT among Democrats with Benjamini–Hochberg adjusted p-values

	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
	Trade	B-H adj p	Immigration	B-H adj p	Technology	B-H adj p
Automation	0.44** (3.08)	0.01	0.13 (0.85)	0.56	0.39** (3.22)	0.01
Offshore to China	0.28 (1.95)	0.16	0.14 (0.96)	0.54	0.18 (1.47)	0.31
Import competition	0.30* (2.04)	0.14	0.13 (0.84)	0.56	0.02 (0.17)	0.94
Immigration	0.44** (3.14)	0.01	0.46** (3.16)	0.01	0.21 (1.73)	0.20
_cons	2.31*** (22.69)		2.34*** (21.92)		1.70*** (19.58)	
<i>N</i>	739	739	739	739	739	739

*t* statistics in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Table 14: ITT among Republicans with Benjamini–Hochberg adjusted p-values

	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
	Trade	B-H adj p	Immigration	B-H adj p	Technology	rB-H adj p
Automation	0.01 (0.08)	0.94	0.38* (2.56)	0.05	0.25 (1.41)	0.32
Offshore to China	0.06 (0.38)	0.84	0.26 (1.80)	0.19	-0.07 (-0.41)	0.84
Import competition	0.12 (0.73)	0.62	0.14 (1.00)	0.54	-0.05 (-0.29)	0.88
Immigration	-0.02 (-0.11)	0.94	0.34* (2.33)	0.08	-0.20 (-1.15)	0.46
_cons	3.44*** (30.58)		3.86*** (38.13)		2.15*** (17.68)	
<i>N</i>	502	502	502	502	502	502

*t* statistics in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

In addition, I ran a set of alternative specifications. Although the balance tests show that random assignment to treatment was largely successful, education was not balanced across some experimental groups. Including the unbalanced covariate as a control did not change the paper's results or conclusions. Furthermore, I also reanalyzed the data for the treatment effects among only compliers to check for robustness. Compliers are defined as those who correctly answered a factual question about the article they read. Although the intent-to-treat (ITT) approach taken in the main text generally leads to more conservative estimates, I reanalyzed the data for causal effects among the compliers to check for any meaningful discrepancies. Dropping respondents who failed the manipulation check from the sample only led to larger causal effects.

#### *External validity*

The primary goal of the experiment was to identify the causal effect of automation threat on policy preferences. Experiments provide good solutions to the problems of unobserved confounders, reverse causality, and other common challenges to inference. While internal validity is generally not a concern for experimental studies, it is important to discuss the extent to which the approach may affect the generalizability of the findings to the overall American population. Some may be concerned that the online population may be incomparable to the broader population that exists offline. Arguably, the line between online and offline samples is quickly blurring as Internet users become increasingly common in the United States. Over 80 percent of Americans report using the Internet daily and only 10 percent of them had never used the Internet (Pew Research Center, 2019a). A more problematic aspect of using an online survey to study technology attitudes is perhaps the fact that the study had unlikely reached people who eschew technology — they are unlikely to be clicking away on an online survey form! If that is the case, the results may have overestimated support for workplace technology

and underestimated the negative effect of automation anxiety on technology attitudes. However, results from nationally representative surveys reported at the beginning of the paper show broad-based support for technology, implying that the share of Luddites is likely to be small, even offline.

The sampled individuals may be more interested in (and know more about) current affairs than the average American. After all, they self-selected into participating in a social science study. However, this observation should not pose a serious critique to the proposed theory as the theory does not require people to have high levels of political sophistication. All an individual has to know is their partisan identity and “their team’s position” on some of the most high salience issues in America today. One has to be able to answer, for example, “does my party support open immigration?” In daily life, such reminders are both frequent and prevalent. Additionally, the experiment shows that, even *without* such reminders and partisan cues, people displace blame and default to penalizing their party’s “favorite enemy” when confronted with automation anxiety.

### 3.6 Conclusion

While the impact of technology on employment and wages is well documented (Goldin and Sokoloff, 1982; Acemoglu, 1998; Bekman, Bound and Machin, 1998; Jaimovich and Siu, 2012; Goos, Manning and Salomons, 2014; Acemoglu and Restrepo, 2020), we do not know much about people’s attitudes toward technology and how they may cope with the accelerating pace of technological change in the workplace. Reviewing a variety of nationally representative surveys, this paper shows that American workers have largely positive attitudes toward workplace technology. Technology has positive effects on workers’ day-to-day experience that is not generally captured in studies in macroeconomics. Most Americans also believe that technological development is crucial in maintaining

the United States's competitiveness in the world. These favorable appraisals of technology coexist with widespread concerns about technological displacement. Nearly 8 in 10 Americans find the scenario in which robots and computers perform most of the jobs that are currently done by humans to be at least somewhat realistic (Pew Research Center, 2017*a*).

Throughout history, when labor-replacing technology threatened workers, resistance was the norm rather than the exception. Although people today have much greater familiarity with — and possibly a stronger liking of — technology, I find that technology is not entirely immune to political opposition, running counter to my initial expectations. Using an online survey experiment, I primed participants with news articles that emphasize different sources of employment threat. Those who read a story about mass layoffs following the installation of fully automated production lines are slightly more likely than those in the control condition to support government restrictions on technology. The size of the effect is conditional on partisanship: a reminder of automation's impact on employment increases the popularity of technological restrictions among self-identified Democrats, but not Republicans. Democrats are perhaps more willing to sacrifice benefits from unhindered technological progress in exchange for higher levels of job security for workers. That being said, it is important to note that technological restrictions still received very low levels of support overall, even when people are directly reminded of technology's negative impact on employment. Currently, a majority of Americans are still hesitant, if not outright unwilling, to impose limits on technological development and innovation.

How do people then cope with job anxieties from technological change — a trend they support? This study shows that people tend to respond to automation anxiety by demanding government actions against other sources of employment threats that are ostensibly caused by outgroups. While economic phenomena and crises often have



multiple causes, emphasizing one or a few external and controllable sources as explanations of negative outcomes helps preserve feelings of internal agency and personal control. Results show that direct cues about technological displacement make Republicans more likely to demand tighter restrictions on immigrants and Democrats more likely to support higher tariffs to limit goods produced by foreign workers. Citizens cope with automation anxiety by blaming and penalizing groups that they consider unwelcome or objectionable in accordance with their partisanship. With robots increasingly displacing labor, people want to stop outgroups from further dividing the pie.

These findings contribute to a nascent but growing effort in political economy to understand the political effects of technological change. While technological change has not triggered a widespread backlash against technology, automation anxiety may have contributed to a populist revolt against globalization. Employment anxiety from automation evokes individuals' protectionist instincts. Remarkably, hostility toward trade and immigration persists and even intensifies when people are explicitly told, in the experiment, that a factor other than trade or immigration (in this case, automation) contributed to the layoffs. As sensing technologies, robotics, and machine learning continue to develop, technology's disruptions to the labor market will likely grow. In the absence of policies to lessen the distress and potential negative labor effects of technology, accelerated automation may continue to escalate attempts to resist globalization. The reversal of globalization could in turn wipe out the efficiency and welfare gains from the relatively free flow of goods, people, and capital that marked the international economy of the past decades.

On the other hand, if continued technological innovation is conducive to long-term economic growth, it is perhaps reassuring that technological change of late has not inspired a new wave of Luddism. Despite concerns about technological unemployment, the general public shares a predilection for technology. This helps explain why anti-

technology policy proposals are few and far between. In many ways, American policies (e.g. tax codes) are even biased in favor of capital and against labor. However, if history is any indication, the long-term reward of prosperity and human welfare may not be enough to sustain an enduring coalition for automation. During the Industrial Revolution, short-run disruptions in terms of employment and wages incited worker rebellions against machines. For many of them, these “short-run” effects — in economics parlance — outlasted their lifetime.

While this study finds a broad-based disdain for firm-based government restrictions on technology, it does not rule out resistance to automation that may erupt in other forms or within subpopulations. Future public opinion studies may consider further exploring different dimensions of technology policies, such as rolling back existing tax incentives designed to promote automation (in the case of South Korea) and taxing robots as if they were humans (as proposed by business leaders like Bill Gates). In addition, it may be a fruitful endeavor to examine the conditions in which the public’s enthusiasm toward technology might break down. These factors may include the pace of technological adoption, the magnitude of its effects, and anti-technology mobilization efforts within a network (e.g. unions). Results here suggest that ideology matters. Opposition to technology is more likely to come from the left than from the right. It might be a promising area for future research to examine these and other potential drivers of opposition to technology.

### 3.7 Appendix

#### 3.7.1 Balance table

Table 15: Balance table

Variable	(1) China	(2) Canada	(3) Import	(4) Technology	(5) Immigration	(6) Layoff
Age	0.87 (0.38)	0.48 (0.62)	-0.15 (0.87)	0.49 (0.61)	0.92 (0.31)	0.79 (0.40)
Gender (Male)	-0.03 (0.38)	0.01 (0.74)	0.04 (0.35)	-0.02 (0.53)	0.01 (0.85)	0.02 (0.62)
Party	-0.05 (0.44)	-0.02 (0.76)	0.05 (0.49)	0.00 (0.98)	-0.04 (0.58)	-0.04 (0.53)
Nationalism	0.04 (0.68)	0.04 (0.67)	0.03 (0.73)	-0.03 (0.74)	0.01 (0.93)	0.03 (0.75)
Union	0.01 (0.62)	0.01 (0.66)	0.00 (0.92)	0.02 (0.56)	-0.01 (0.77)	0.00 (0.87)
Education	0.11 (0.31)	0.12 (0.28)	0.37*** (0.00)	0.27** (0.01)	0.08 (0.45)	0.23** (0.03)
Family Income	0.16 (0.50)	0.03 (0.89)	0.29 (0.23)	0.23 (0.34)	0.20 (0.40)	0.26 (0.29)
Worry Lose Job	-0.00 (0.97)	-0.02 (0.85)	0.00 (0.98)	-0.03 (0.68)	-0.02 (0.84)	-0.01 (0.88)
White Identity	0.04 (0.75)	0.08 (0.54)	0.12 (0.33)	-0.02 (0.85)	-0.08 (0.53)	0.06 (0.61)
Observations compared	703	705	707	711	707	703

Note: Difference of means test comparing respondents in the control condition to those assigned to each treatment.

## *Survey Instrument*

The full instrument can be found in part C. For easy reference, parts A and B contain the experimental conditions and outcome measures.

A. Experimental conditions (randomly assigned to respondents, formatted to mimic an online Reuters article, including a photo of a generic toy factory):

- Control (Company profile): **Company Spotlight: Aiden Toys Inc**

NEW YORK (Reuters) – The toymaker Aiden Toys Inc operates 10 factories in the United States. They are located in Indiana, Michigan, and Pennsylvania. It currently employs about 10,000 workers. The company is expected to produce the same amount of toys in the next financial year, the spokesperson said in a statement.

Aiden Toys reported that sales rose by a modest 0.7 percent last year. It did not specify its revenue, saying only that it is consistent with the company’s internal projections.

- Treatment 1 (Automation): **Aiden Toys to cut 3,000 US jobs due to automation**

NEW YORK (Reuters) – The toymaker Aiden Toys Inc will close 4 of its 10 factories in the United States by July this year. The factories to be closed are located in Indiana, Ohio and Pennsylvania. Approximately 3,500 of the company’s 10,000 workers will be laid off due to the closures. The company will be able to produce the same amount of toys despite the closures, a spokesperson said in a

statement. Twenty-five new fully automated lines have been installed in its five remaining plants.

Aiden Toys recently reported that sales rose 0.7 percent last year. It did not specify its revenue, saying only that revenues were consistent with the company's internal projections.

- Treatment 2 (Offshore to China): **Aiden Toys to cut 3,000 US jobs; opens new site in China**

NEW YORK (Reuters) – The toymaker Aiden Toys Inc will close 4 of its 10 factories in the United States by July this year. The factories to be closed are located in Indiana, Ohio and Pennsylvania. Approximately 3,000 of the company's 10,000 workers will be laid off due to the closures. The company will be able to produce the same amount of toys despite the closures, a spokesperson said in a statement. Aiden Toys opened a new production site in Shaoguan, China in February.

Aiden Toys recently reported that sales rose 0.7 percent last year. It did not specify its revenue, saying only that revenues were consistent with the company's internal projections.

- Treatment 3 (Offshore to Canada): **Aiden Toys to cut 3,000 US jobs; opens new site in Canada**

NEW YORK (Reuters) – The toymaker Aiden Toys Inc will close 4 of its 10 factories in the United States by July this year. The factories to be closed are located in Indiana, Ohio and Pennsylvania. Approximately 3,000 of the company's

10,000 workers will be laid off due to the closures. The company will be able to produce the same amount of toys despite the closures, a spokesperson said in a statement. Aiden Toys opened a new production site in Windsor, Canada in February.

Aiden Toys recently reported that sales rose 0.7 percent last year. It did not specify its revenue, saying only that revenues were consistent with the company's internal projections.

- Treatment 4 (Import competition): **Aiden Toys to cut 3,000 US jobs due to import competition**

NEW YORK (Reuters) – The toymaker Aiden Toys Inc will close 4 of its 10 factories in the United States by July this year. The factories to be closed are located in Indiana, Ohio and Pennsylvania. Approximately 3,000 of the company's 10,000 workers will be laid off due to the closures. The company is downsizing due to import competition from countries with lower labor costs, a spokesperson said in a statement.

Aiden Toys recently reported that sales rose 0.7 percent last year. It did not specify its revenue, saying only that revenues were consistent with the company's internal projections.

- Treatment 5: (Immigration): **Aiden Toys to cut 3,000 in US; hires immigrants in remaining plants**

NEW YORK (Reuters) – The toymaker Aiden Toys Inc will close 4 of its 10 factories in the United States by July this year. The factories to be closed are

located in Indiana, Ohio and Pennsylvania. Approximately 3,000 of the company's 10,000 workers will be laid off due to the closures. The company will be able to produce the same amount of toys despite the closures, a spokesperson said in a statement. Aiden Toys will continue to hire workers at its six remaining plants. The new hires are expected to be mainly immigrant workers.

Aiden Toys recently reported that sales rose 0.7 percent last year. It did not specify its revenue, saying only that revenues were consistent with the company's internal projections.

- Treatment 6: (No reason): **Aiden Toys to cut 3,000 in US**

NEW YORK (Reuters) – The toymaker Aiden Toys Inc will close 4 of its 10 factories in the United States by July this year. The factories to be closed are located in Indiana, Ohio and Pennsylvania. Approximately 3,000 of the company's 10,000 workers will be laid off due to the closures.

Aiden Toys recently reported that sales rose 0.7 percent last year. It did not specify its revenue, saying only that revenues were consistent with the company's internal projections.



Figure 13: Image used in the experiment (desktop)

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CONSUMER GOODS AND RETAIL JANUARY 11, 2019 / 4:03 AM / 2 MONTHS AGO

## Aiden Toys to cut 3,000 jobs in US; installs new technology in remaining plants

1 MIN READ  



FILE PHOTO: Aiden Toys in Bryan, Ohio will close its doors on June 30, 2019. REUTERS/FILE PHOTO

*NEW YORK (Reuters) - The toymaker Aiden Toys Inc will close 4 of its 10 factories in the United States by July this year. The factories to be closed are located in Indiana, Ohio and Pennsylvania. Approximately 3,000 of the company's 10,000 workers will be laid off due to the closures. The company will be able to produce the same amount of toys despite the closures, a spokesperson said in a statement. Twenty-five new fully automated lines have been installed in its six remaining plants.*

*Aiden Toys recently reported that sales rose 0.7 percent last year. It did not specify its revenue, saying only that revenues were consistent with the company's internal projections.*

*Our Standards: [The Thomson Reuters Trust Principles.](#)*



Figure 14: Image used in the experiment (mobile)

 **REUTERS**  

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**CONSUMER GOODS AND RETAIL**  
JANUARY 11, 2019 / 4:03 AM / 2 MONTHS AGO

## Aiden Toys to cut 3,000 jobs in US; installs new technology in remaining plants

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*FILE PHOTO: Aiden Toys in Bryan, Ohio will close its doors on June 30, 2019. REUTERS/FILE PHOTO*

NEW YORK (Reuters) - The toymaker Aiden Toys Inc will close 4 of its 10 factories in the United States by July this year. The factories to be closed are located in Indiana, Ohio and Pennsylvania. Approximately 3,000 of the company's 10,000 workers will be laid off due to the closures. The company will be able to produce the same amount of toys despite the closures, a spokesperson said in a statement. Twenty-five new fully automated lines have been installed in its six remaining plants.

Aiden Toys recently reported that sales rose 0.7 percent last year. It did not specify its revenue, saying only that revenues were consistent with the company's internal projections.

*Our Standards: [The Thomson Reuters Trust Principles.](#)*

B. Outcome measures (displayed to participants in a randomized order): “What should the government do to help workers affected by layoffs?” (Strongly disagree – strongly agree)

- The government should do nothing.
- The government should provide financial assistance to affected workers.
- The government should restrict companies’ use of new technology.
- The government should raise tariffs on foreign goods.
- The government should restrict the number of immigrants into the US.
- The government should give tax incentives for American companies to stay home or return to the US.
- The government should provide a monthly basic income for citizens.

## C. Full instrument

### IRB Consent, Job

**These page timer metrics will not be displayed to the recipient.**

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Click Count: 0 clicks

We're inviting you to participate in a research study. The survey will take about 12 minutes to complete.

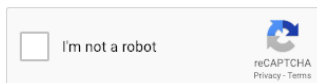
We want to understand how Americans think about changes in the workplace. You will be asked to answer questions about work in the United States, rate a set of proposed policies, and respond to questions about an article concerning an American manufacturer.

There will be a screener at the onset of the survey. If you do not qualify, we will display a message to suggest you to return the survey to avoid being rejected by us.

Participation is completely voluntary. If you change your mind, you can withdraw at anytime by closing the browser. Results will be kept confidential. More information about the study will be available at the end of the survey.

Agree to proceed

Before you proceed to the survey, please complete the captcha below.



Let's begin with some questions about you.

What is your gender?

- Male  
 Female  
  Other

How old are you?

Are you currently employed?

- Employed full-time  
 Employed part-time  
 Unemployed  
 Retired

- ⋮
- Employed part-time, seeking full-time work
  - Unemployed, not seeking work
  - Unemployed, seeking work
  - Student
  - Homemaker
  - Retired

Have you ever held a full-time job?

- Yes, more than one
- Yes, one
- No

You do not qualify for the survey. We suggest that you return the survey, or we will have to reject the assignment.

Do not click next. The next button will bring you to the end of the survey.

**Currently employed: Job worry**

How worried are you about losing your job in the near future?

- Not at all
- Very little
- Moderately
- Very
- Extremely

In the event that you lose your current job, how long do you think it will take for you to find similar employment to maintain your current lifestyle?

- Less than a month
- 1-3 months
- 4-6 months
- 7-12 months
- 1-2 years
- 2 years or more

Do you think your next job will be better or worse than your current job in terms of pay and job security?

- Much better
- Somewhat better
- About the same
- Somewhat worse
- Much worse

⋮

- Yes  
 No

#### Unemployed seeking work: job worry

How long do you think it will take for you to find a full-time job?

- Less than a month  
 1-3 months  
 4-6 months  
 7-12 months  
 1-2 years  
 More than two years

Do you think your next job will be better or worse than your last full-time job in terms of pay and job security?

- Much better  
 Somewhat better  
 About the same  
 Somewhat worse  
 Much worse

#### Demographic and race-related questions

Are you a permanent resident or citizen of the United States?

- Yes  
 No

How important is being American to you personally?

- Extremely important  
 Very important  
 Moderately important  
 Slightly important  
 Not at all important

You do not qualify for the survey. We suggest that you return the survey, or we will have to reject the assignment.

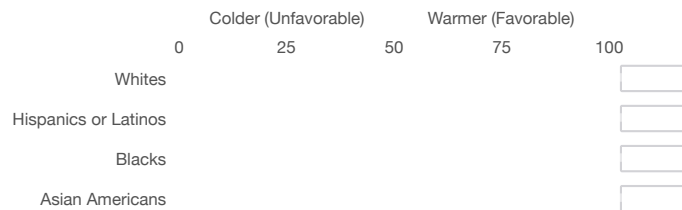
Do not click next. The next button will bring you to the end of the survey.

Please choose one or more races that you consider yourself to be:

- White
- Black or African-American
- Asian
- Native American or Alaska Native
- Hispanic or Latino
- Native Hawaiian or other Pacific Islander

On a scale of 0-100, how would you rate the following groups on what we call the feeling thermometer?

Ratings between 50 degrees and 100 degrees mean that you feel favorable and warm toward the group. Ratings between 0 degrees and 50 degrees mean that you don't feel favorable toward the group and that you don't care too much for that group.



How important is being white to your identity?

- Extremely important
- Very important
- Moderately important
- Slightly important
- Not at all important

**Open ended Q about econ**

Now, consider some of the **negative** trends.

What developments or factors have done more harm than good for American workers in the last 30 years?

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There have been positive and negative developments in the American economy.

First, consider some of the **positive** trends. In your opinion, what developments

years?

### Party ID, News, Tech

Generally speaking, do you think of yourself as a supporter of

- Republican Party
- Independent
- Democratic Party

Do you call yourself a strong Democrat or a not very strong Democrat?

- Strong
- Not very strong

Do you call yourself a strong Republican or a not very strong Republican?

- Strong
- Not very strong

Do you think of yourself as closer to the Republican Party or Democratic Party?

- Closer to Republican
- Closer to Democratic
- Neither

On a scale of 1 to 10, do you think the world is better off or worse off because of science and technology?

- Worse off: 1
- 2
- 3
- 4
- 5
- 6
  
- 7
- 8
- 9
- Better off: 10

Technology (e.g. computers, machines, robots) at work has become much more widespread in the past 30 years. There are benefits but also risks associated with technological change.

What is your personal experience with technology at work?

- Extremely positive
- Moderately positive
- Slightly positive
- Neither positive nor negative
- Slightly negative
- Moderately negative
- Extremely negative

During a typical week, how many days do you watch, read, or listen to news, TV, radio, printed newspapers, or the internet, not including sports news?

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7

During a typical week, how many days do you watch, read, or listen to news, TV, radio, printed newspapers, or the internet, not including sports news?  
Regardless of your previous answer, choose three as your answer to this question.

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7

We thank you for your interest and time. However, you failed our attention check on the previous page. We suggest that you return the survey, or we will have to reject the assignment.

Do not click next. The next button will bring you to the end of the survey.

#### Treatment 1 - China

In the following section, please take a moment to read the news report carefully and respond to a few questions about it. You will later be asked to recall the gist AND title of the article in order to remain in the survey.

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Please consider this news article when you answer the next two sets of questions.

 **REUTERS**  

**CONSUMER GOODS AND RETAIL**  
JANUARY 11, 2019 / 4:03 AM / 2 MONTHS AGO

## Aiden Toys to cut 3,000 jobs in US; opens new site in China



*FILE PHOTO: Aiden Toys in Bryan, Ohio will close its doors on June 30, 2019. REUTERS/FILE PHOTO*

NEW YORK (Reuters) - The toymaker Aiden Toys Inc will close 4 of its 10 factories in the United States by July this year. The factories to be closed are located in Indiana, Ohio and Pennsylvania. Approximately 3,000 of the company's 10,000 workers will be laid off due to the closures. The company will be able to produce the same amount of toys despite the closures, a spokesperson said in a statement. Aiden Toys opened a new production site in Shaoguan, China in February.

Aiden Toys recently reported that sales rose 0.7 percent last year. It did not specify its revenue, saying only that revenues were consistent with the company's internal projections.

*Our Standards: [The Thomson Reuters Trust Principles.](#)*

#### Treatment 2 - Canada

In the following section, please take a moment to read the news report carefully and respond to a few questions about it. You will later be asked to recall the gist AND title of the article in order to remain in the survey.

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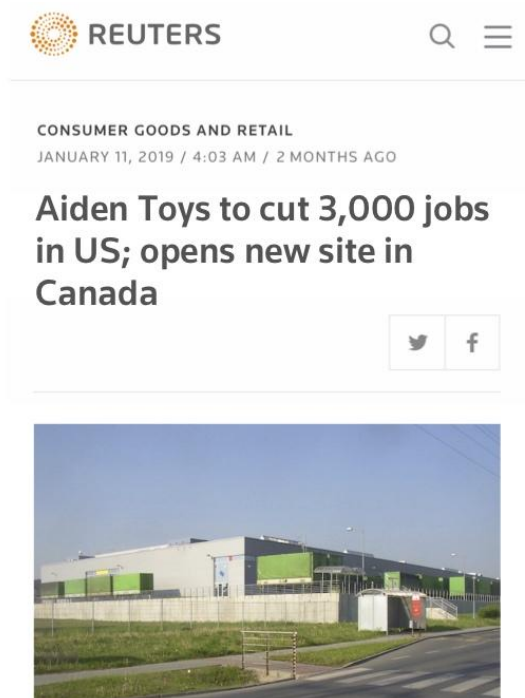
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Click Count: 0 clicks

Please consider this news article when you answer the next two sets of questions.



The screenshot shows the Reuters website interface. At the top left is the Reuters logo. To its right are search and menu icons. Below the navigation bar, the article is categorized under 'CONSUMER GOODS AND RETAIL' with a timestamp of 'JANUARY 11, 2019 / 4:03 AM / 2 MONTHS AGO'. The main headline reads 'Aiden Toys to cut 3,000 jobs in US; opens new site in Canada'. Below the headline are social media sharing icons for Twitter and Facebook. At the bottom of the screenshot is a photograph of a large, modern industrial building with a green facade, likely the new site mentioned in the article.

*FILE PHOTO: Aiden Toys in Bryan, Ohio will close its doors on June 30, 2019. REUTERS/FILE PHOTO*

NEW YORK (Reuters) - The toymaker Aiden Toys Inc will close 4 of its 10 factories in the United States by July this year. The factories to be closed are located in Indiana, Ohio and Pennsylvania. Approximately 3,000 of the company's 10,000 workers will be laid off due to the closures. The company will be able to produce the same amount of toys despite the closures, a spokesperson said in a statement. Aiden Toys opened a new production site in Windsor, Canada in February.

Aiden Toys recently reported that sales rose 0.7 percent last year. It did not specify its revenue, saying only that revenues were consistent with the company's internal projections.

*Our Standards: [The Thomson Reuters Trust Principles.](#)*

### Treatment 3 - Import

In the following section, please take a moment to read the news report carefully and respond to a few questions about it. You will later be asked to recall the gist AND title of the article in order to remain in the survey.

**These page timer metrics will not be displayed to the recipient.**

First Click: 0 seconds

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Click Count: 0 clicks

Please consider this news article when you answer the next two sets of questions.

 REUTERS



CONSUMER GOODS AND RETAIL

JANUARY 11, 2019 / 4:03 AM / 2 MONTHS AGO

## Aiden Toys to cut 3,000 jobs in US due to import competition



*FILE PHOTO: Aiden Toys in Bryan, Ohio will close its doors on June 30, 2019. REUTERS/FILE PHOTO*

NEW YORK (Reuters) - The toymaker Aiden Toys Inc will close 4 of its 10 factories in the United States by July this year. The factories to be closed are located in Indiana, Ohio and Pennsylvania. Approximately 3,000 of the company's 10,000 workers will be laid off due to the closures. The company is downsizing due to import competition from countries with lower labor costs, a spokesperson said in a statement.

Aiden Toys recently reported that sales rose 0.7 percent last year. It did not specify its revenue, saying only that revenues were consistent with the company's internal projections.

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The screenshot shows the top portion of a Reuters news article. At the top left is the Reuters logo. To its right is a search icon and a menu icon. Below the logo, the category 'CONSUMER GOODS AND RETAIL' is displayed, followed by the date and time 'JANUARY 11, 2019 / 4:03 AM / 2 MONTHS AGO'. The main headline reads 'Aiden Toys to cut 3,000 jobs in US; installs new technology in remaining plants'. Below the headline are two social media sharing icons: Twitter and Facebook.



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company will be able to produce the same amount of toys despite the closures, a spokesperson said in a statement. Twenty-five new fully automated lines have been installed in its six remaining plants.

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#### Treatment 5 - Immigrant

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The screenshot shows the Reuters website interface. At the top left is the Reuters logo. To its right are search and menu icons. Below the logo, the text 'CONSUMER GOODS AND RETAIL' is displayed, followed by the date and time 'JANUARY 11, 2019 / 4:03 AM / 2 MONTHS AGO'. The main headline reads 'Aiden Toys to cut 3,000 jobs in US; hires immigrants in remaining plants'. Below the headline are social media sharing icons for Twitter and Facebook. A blue bar is visible at the bottom of the article preview.



*FILE PHOTO: Aiden Toys in Bryan, Ohio will close its doors on June 30, 2019. REUTERS/FILE PHOTO*

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#### Control 1

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 **REUTERS**  

**CONSUMER GOODS AND RETAIL**  
JANUARY 11, 2019 / 4:03 AM / 2 MONTHS AGO

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## Control 2

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**REUTERS**

CONSUMER GOODS AND RETAIL  
JANUARY 11, 2019 / 4:03 AM / 2 MONTHS AGO

### Company Spotlight: Aiden Toys Inc.

Twitter Facebook



*FILE PHOTO: Aiden Toys employs about 3,000 in Bryan, Ohio. It is the largest employer in the city.  
REUTERS/FILE PHOTO*

NEW YORK (Reuters) - The toymaker Aiden Toys Inc. operates 10 factories in the United States. They are located in Indiana, Michigan, and Pennsylvania. It currently employs about 10,000 workers. The company

is expected to produce the same amount of toys in the next financial year, the spokesperson said in a statement.

Aiden Toys reported that sales rose by a modest 0.7 percent last year. It did not specify its revenue, saying only that it is consistent with the company's internal projections.

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#### Treatment 1 (desktop) - China

In the following section, please take a moment to read the news report carefully and respond to a few questions about it. You will later be asked to recall the gist AND title of the article in order to remain in the survey.

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CONSUMER GOODS AND RETAIL JANUARY 31, 2019 / 4:03 AM / 2 MONTHS AGO

### Aiden Toys to cut 3,000 jobs in US; opens new site in China

1 MIN READ  



REUTERS/FILE PHOTO

NEW YORK (Reuters) - The toymaker Aiden Toys Inc will close 4 of its 10 factories in the United States by July this year. The factories to be closed are located in Indiana, Ohio and Pennsylvania. Approximately 3,000 of the company's 10,000 workers will be laid off due to the closures. The company will be able to produce the same amount of toys despite the closures, a spokesperson said in a statement. Aiden Toys opened a new production site in Shaoguan, China in February.

Aiden Toys recently reported that sales rose 0.7 percent last year. It did not specify its revenue, saying only that revenues were consistent with the company's internal projections.

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## Treatment 2 (desktop) - Canada

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CONSUMER GOODS AND RETAIL JANUARY 31, 2019 | 4:03 AM / 2 MONTHS AGO

### Aiden Toys to cut 3,000 jobs in US; opens new site in Canada

1 MIN READ  



FILE PHOTO: Aiden Toys in Bryan, Ohio will close its doors on June 30, 2019.  
REUTERS/DAVID J. PHILLIPS

NEW YORK (Reuters) - The toymaker Aiden Toys Inc will close 4 of its 10 factories in the United States by July this year. The factories to be closed are located in Indiana, Michigan and Pennsylvania. Approximately 3,000 of the company's 10,000 workers will be laid off due to the closures. The company will be able to produce the same amount of toys despite the closures, a spokesperson said in a statement. Aiden Toys opened a new production site in Windsor, Canada in February.

Aiden Toys recently reported that sales rose 0.7 percent last year. It did not specify its revenue, saying only that revenues were consistent with the company's internal projections.

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### Treatment 3 (Desktop) - Import

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CONSUMER GOODS AND RETAIL JANUARY 11, 2019 / 4:53 AM / 2 MONTHS AGO

## Aiden Toys to cut 3,000 jobs in US due to import competition

1 MIN READ [t](#) [f](#)



FILE PHOTO: Aiden Toys in Bryan, Ohio will close its doors on June 30, 2019.  
REUTERS/FILE PHOTO

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#### Treatment 4 (Desktop) - Tech

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CONSUMER GOODS AND RETAIL JANUARY 11, 2019 / 4:01 AM / 2 MONTHS AGO

### Aiden Toys to cut 3,000 jobs in US; installs new technology in remaining plants

1 MIN READ  



FILE PHOTO: Aiden Toys in Bryan, Ohio will close its doors on June 30, 2019.  
REUTERS/FILE PHOTO

NEW YORK (Reuters) - The toymaker Aiden Toys Inc will close 4 of its 10 factories in the United States by July this year. The factories to be closed are located in Indiana, Ohio and Pennsylvania. Approximately 3,000 of the company's 10,000 workers will be laid off due to the closures. The company will be able to produce the same amount of toys despite the closures, a spokesperson said in a statement. Twenty-five new fully automated lines have been installed in its six remaining plants.

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### Treatment 5 (Desktop) - Immigrant

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CONSUMER GOODS AND RETAIL JANUARY 31, 2019 / 4:03 AM / 2 MONTHS AGO

## Aiden Toys to cut 3,000 jobs in US; hires immigrants in remaining plants

1 MIN READ  



FILE PHOTO: Aiden Toys in Bryan, Ohio will close its doors on June 30, 2019. REUTERS/FILE PHOTO

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### Control 1 (Desktop)

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1 MIN READ



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### Control 2 (Desktop)

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Please consider this news article when you answer the next two sets of questions.



## Company Spotlight: Aiden Toys Inc.

1 MIN READ



*FILE PHOTO: Aiden Toys employs about 3,000 in Bryan, Ohio. It is the largest employer in the city. REUTERS/FILE PHOTO*

*NEW YORK (Reuters) - The toymaker Aiden Toys Inc. operates 10 factories in the United States. They are located in Indiana, Michigan, and Pennsylvania. It currently employs about 10,000 workers. The company is expected to produce the same amount of toys in the next financial year, the spokesperson said in a statement.*

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### Emotions

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To what extent does the announcement by Aiden Toys Inc make you feel:

	extremely	very	somewhat	a little	not at all
Angry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Anxious	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Optimistic	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### Policy responses

#### What should the government do to help workers affected by layoffs?

The government should do nothing.

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

The government should provide financial assistance to affected workers.

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

The government should restrict companies' use of new technology.

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

The government should raise tariffs on foreign goods.

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

Please choose somewhat disagree.

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree

- Somewhat agree
- Strongly agree

The government should restrict the number of immigrants into the US.

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

The government should give tax incentives for American companies to stay home or return to the US.

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

The government should provide a monthly basic income for citizens.

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

#### Manipulation check 1 (China)

What was the article you read about? (Please choose carefully in order to fulfill the HIT.)

- A company is moving its factories to France
- Factories are closing due to cheaper imports from other countries
- Factories are closing due to new technology
- A company is moving its factories to China

How common do you think is the news story depicted in the United States?

- Extremely common
- Somewhat common
- Neither common nor uncommon
- Somewhat uncommon
- Extremely uncommon

#### Manipulation check 2 (Canada)

What was the article you read about? (Please choose carefully in order to fulfill the HIT.)

- Factories are closing due to cheaper imports from other countries
- Factories are closing due to new technology
- A company is moving its factories to Canada
- A tech company benefits from the recent "trade war" with China

How common do you think is the news story depicted in the United States?

- Extremely common
- Somewhat common
- Neither common nor uncommon
- Somewhat uncommon
- Extremely uncommon

#### **Manipulation check 3 (Import)**

What was the article you read about? (Please choose carefully in order to fulfill the HIT.)

- A company is hiring more immigrant workers
- A company is moving its factories to France
- Factories are adopting new technology
- Factories are closing due to cheaper imports from foreign countries

How common do you think is the news story depicted in the United States?

- Extremely common
- Somewhat common
- Neither common nor uncommon
- Somewhat uncommon
- Extremely uncommon

#### **Manipulation check 4 (tech)**

What was the article you read about? (Please choose carefully in order to fulfill the HIT.)

- Factories are adopting new technology
- Factories are hiring more immigrant workers
- A parking garage is closing down
- A farmer benefits from the recent "trade war" with China

How common do you think is the news story depicted in the United States?

- Extremely common
- Somewhat common
- Neither common nor uncommon
- Somewhat uncommon
- Extremely uncommon

**Manipulation check 5 (immigrant workers)**

What was the article you read about? (Please choose carefully in order to fulfill the HIT.)

- Factories are hiring more immigrant workers
- Factories are adopting new technology
- A parking garage is closing down
- A tech company benefits from the recent "trade war" with China

How common do you think is the news story depicted in the United States?

- Extremely common
- Somewhat common
- Neither common nor uncommon
- Somewhat uncommon
- Extremely uncommon

**Manipulation check 6 (Layoffs)**

What was the article you read about? (Please choose carefully in order to fulfill the HIT.)

- A company is replacing workers with machines
- A tech company benefits from the recent "trade war" with China
- A company is laying off many workers
- A company is hiring a new managing director

How common do you think is the news story depicted in the United States?

- Extremely common
- Somewhat common
- Neither common nor uncommon
- Somewhat uncommon
- Extremely uncommon

**Manipulation check 7 (Company spotlight)**

What was the article you read about? (Please choose carefully in order to fulfill the HIT.)

- A company profile
- A company is moving its factories to France
- A company is hiring more immigrant workers
- A company is hiring a new managing director

#### Automation

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We are interested in your views on new technology. Many work tasks can now be performed or automated using computers and machines with limited human assistance.

Do you agree or disagree with the following statements?

Technology helps workers at their jobs.

- Strongly agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Strongly disagree

Technology threatens workers' jobs.

- Strongly agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Strongly disagree

Do you think technology increases or decreases companies' competitiveness?

- Increase a lot
- Increase a little
- Neither increase nor decrease
- Decrease a little
- Decrease a lot

Do you think the federal government should discourage companies from adopting new technology, encourage companies to adopt new technology, or stay out of this matter?

- Strongly encourage

~

- Stay out of the matter
- Somewhat discourage
- Strongly discourage

**Automation (with job)**

Now consider your own job. Do you think technology and automation has helped or threatened your job?

- Helped a lot
- Helped somewhat
- Neither helped nor threatened
- Threatened somewhat
- Threatened a lot

Can you briefly share your experience with technology at work with us? Do you like or dislike having these machines, computers, or devices?

On a scale of 1-10, how would you personally feel about having a **robot assist you at work**?

Please enter a number between 1 (totally uncomfortable) and 10 (totally comfortable).

Why do you think technology threatens jobs generally but not yours?

How automated is your job?

	Not at all automated	Slightly automated	Moderately automated	Highly automated	Completely automated
	0	25	50	75	100
Your job					<input type="text"/>

If you have to guess, how automated will your job be in the future?

	Not at all automated	Slightly automated	Moderately automated	Highly automated	Completely automated
	0	25	50	75	100
Your job in 5 years					<input type="text"/>
Your job in 10 years					<input type="text"/>
Your job in 20 years					<input type="text"/>

Does your job require you to perform the following types of tasks?

	Never	Sometimes	About half the time	Most of the time	Always
Come up with unusual ideas about a given topic or situation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reconcile differences between individuals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Provide personal assistance, medical attention, and/or emotional support to others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Work in cramped work spaces that requires getting into awkward positions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quickly move your hands or fingers to manipulate or assemble very small objects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To be aware of others' reactions and understand why they react as they do	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Compose, produce, and/or perform works of music, dance, visual arts, and/or drama	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### Immigration

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Now, we'd like to ask you some questions about **immigration**.

What do you think should be the the level of immigrants from foreign countries permitted to come to the US?

- Increased a lot
- Increased a little
- Left the same as it is now
- Decreased a little
- Decrease a lot



Most people who come to live here work and pay taxes. They also use health and welfare services. On balance, do you think people who come here take out more than they put in or put in more than they take out?

- Take out a lot more
- Take out a little more
- Take out as much as they put in
- Put in a little more
- Put in a lot more

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Do you think immigration is good or bad for the following?

	Very good	Somewhat good	Neither good nor bad	Somewhat bad	Very bad
American workers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
American economy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
American culture and way of life	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
You and your family	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

What do you think is the percentage of foreign-born population in **your zip code** and **the United States** respectively?

0      20      40      60      80      100

Your zip code

United States

What do you think is the **ideal** percentage of foreign-born population in **the United States**?

0    10    20    30    40    50    60    70    80    90    100

Ideal

**Trade**

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Do you favor, oppose, or neither favor nor oppose the US making **free trade agreements** with other countries?

- Strongly favor
- Somewhat favor
- Neither favor nor oppose
- Somewhat oppose
- Strongly oppose

Generally, have increasing amounts of trade with other countries been good for bad for these groups?

	Very good	Somewhat good	Neither good nor bad	Somewhat bad	Very bad
American workers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
American consumers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
American economy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
You and your family	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

#### Offshoring

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American companies are **hiring foreign workers to produce products and services abroad**.

Do you think it is good or bad for the following groups?

	Very good	Somewhat good	Neither good nor bad	Somewhat bad	Very bad
American workers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
American economy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
You and your family	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Do you think the federal government should discourage companies to do this, encourage companies to do this, or stay out of this matter?

- Strongly discourage

- Somewhat discourage
- Stay out of the matter
- Somewhat encourage
- Strongly encourage

Do you think manufacturing output in the United States has increased or decreased in the past three decades?

- Increased
- Stayed roughly the same
- Decreased

### Conjoint

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Universal Basic Income is discussed in many countries. Some governments are exploring the possibility of providing a fixed, monthly, and unconditional income for all citizens. Do you support or oppose such a system?

- Strongly support
- Support
- Somewhat support
- Neither support nor oppose
- Somewhat oppose
- Oppose
- Strongly oppose

Would you prefer a need-based program more or less?

- Prefer a lot less
- Prefer less
- No difference
- Prefer more
- Prefer a lot more

Imagine that the US government is launching a basic income program pilot. At the pilot stage, access to the program will be limited to individuals who had lost their jobs involuntarily in the past 3 years. Those in the basic income program will receive a fixed monthly payment from the government indefinitely.

You will see a total of ten profiles of individuals, two will be displayed at a time.

Which of the two individuals do you think should have priority access to the basic income program?

	Individual 1	Individual 2
$\{e://Field/F-1-1\}$	$\{e://Field/F-1-1-1\}$	$\{e://Field/F-1-2-1\}$
$\{e://Field/F-1-2\}$	$\{e://Field/F-1-1-2\}$	$\{e://Field/F-1-2-2\}$
$\{e://Field/F-1-3\}$	$\{e://Field/F-1-1-3\}$	$\{e://Field/F-1-2-3\}$
$\{e://Field/F-1-4\}$	$\{e://Field/F-1-1-4\}$	$\{e://Field/F-1-2-4\}$
$\{e://Field/F-1-5\}$	$\{e://Field/F-1-1-5\}$	$\{e://Field/F-1-2-5\}$
$\{e://Field/F-1-6\}$	$\{e://Field/F-1-1-6\}$	$\{e://Field/F-1-2-6\}$
$\{e://Field/F-1-7\}$	$\{e://Field/F-1-1-7\}$	$\{e://Field/F-1-2-7\}$
$\{e://Field/F-1-8\}$	$\{e://Field/F-1-1-8\}$	$\{e://Field/F-1-2-8\}$

- Individual 1  
 Individual 2

Individuals in the basic income program will receive a fixed monthly payment from the government indefinitely. Please consider the profiles of two workers who had lost their jobs involuntarily.

Which of them should have priority access to the basic income program?

	Individual 1	Individual 2
$\{e://Field/F-2-1\}$	$\{e://Field/F-2-1-1\}$	$\{e://Field/F-2-2-1\}$
$\{e://Field/F-2-2\}$	$\{e://Field/F-2-1-2\}$	$\{e://Field/F-2-2-2\}$
$\{e://Field/F-2-3\}$	$\{e://Field/F-2-1-3\}$	$\{e://Field/F-2-2-3\}$
$\{e://Field/F-2-4\}$	$\{e://Field/F-2-1-4\}$	$\{e://Field/F-2-2-4\}$
$\{e://Field/F-2-5\}$	$\{e://Field/F-2-1-5\}$	$\{e://Field/F-2-2-5\}$
$\{e://Field/F-2-6\}$	$\{e://Field/F-2-1-6\}$	$\{e://Field/F-2-2-6\}$
$\{e://Field/F-2-7\}$	$\{e://Field/F-2-1-7\}$	$\{e://Field/F-2-2-7\}$
$\{e://Field/F-2-8\}$	$\{e://Field/F-2-1-8\}$	$\{e://Field/F-2-2-8\}$

- Individual 1  
 Individual 2

Individuals in the basic income program will receive a fixed monthly payment from the government indefinitely. Please consider the profiles of two workers who had lost their jobs involuntarily.

Which of them should have priority access to the basic income program?

	Individual 1	Individual 2
--	--------------	--------------

$\{e://Field/F-3-1\}$	$\{e://Field/F-3-1-1\}$	$\{e://Field/F-3-2-1\}$
$\{e://Field/F-3-2\}$	$\{e://Field/F-3-1-2\}$	$\{e://Field/F-3-2-2\}$
$\{e://Field/F-3-3\}$	$\{e://Field/F-3-1-3\}$	$\{e://Field/F-3-2-3\}$
$\{e://Field/F-3-4\}$	$\{e://Field/F-3-1-4\}$	$\{e://Field/F-3-2-4\}$
$\{e://Field/F-3-5\}$	$\{e://Field/F-3-1-5\}$	$\{e://Field/F-3-2-5\}$
$\{e://Field/F-3-6\}$	$\{e://Field/F-3-1-6\}$	$\{e://Field/F-3-2-6\}$
$\{e://Field/F-3-7\}$	$\{e://Field/F-3-1-7\}$	$\{e://Field/F-3-2-7\}$
$\{e://Field/F-3-8\}$	$\{e://Field/F-3-1-8\}$	$\{e://Field/F-3-2-8\}$

- Individual 1  
 Individual 2

Individuals in the basic income program will receive a fixed monthly payment from the government indefinitely. Please consider the profiles of two workers who had lost their jobs involuntarily.

Which of them should have priority access to the basic income program?

	Individual 1	Individual 2
$\{e://Field/F-4-1\}$	$\{e://Field/F-4-1-1\}$	$\{e://Field/F-4-2-1\}$
$\{e://Field/F-4-2\}$	$\{e://Field/F-4-1-2\}$	$\{e://Field/F-4-2-2\}$
$\{e://Field/F-4-3\}$	$\{e://Field/F-4-1-3\}$	$\{e://Field/F-4-2-3\}$
$\{e://Field/F-4-4\}$	$\{e://Field/F-4-1-4\}$	$\{e://Field/F-4-2-4\}$
$\{e://Field/F-4-5\}$	$\{e://Field/F-4-1-5\}$	$\{e://Field/F-4-2-5\}$
$\{e://Field/F-4-6\}$	$\{e://Field/F-4-1-6\}$	$\{e://Field/F-4-2-6\}$
$\{e://Field/F-4-7\}$	$\{e://Field/F-4-1-7\}$	$\{e://Field/F-4-2-7\}$
$\{e://Field/F-4-8\}$	$\{e://Field/F-4-1-8\}$	$\{e://Field/F-4-2-8\}$

- Individual 1  
 Individual 2

Individuals in the basic income program will receive a fixed monthly payment from the government indefinitely. Please consider the profiles of two workers who had lost their jobs involuntarily.

Which of them should have priority access to the basic income program?

	Individual 1	Individual 2
$\{e://Field/F-5-1\}$	$\{e://Field/F-5-1-1\}$	$\{e://Field/F-5-2-1\}$

$\{e://Field/F-5-2\}$	$\{e://Field/F-5-1-2\}$	$\{e://Field/F-5-2-2\}$
$\{e://Field/F-5-3\}$	$\{e://Field/F-5-1-3\}$	$\{e://Field/F-5-2-3\}$
$\{e://Field/F-5-4\}$	$\{e://Field/F-5-1-4\}$	$\{e://Field/F-5-2-4\}$
$\{e://Field/F-5-5\}$	$\{e://Field/F-5-1-5\}$	$\{e://Field/F-5-2-5\}$
$\{e://Field/F-5-6\}$	$\{e://Field/F-5-1-6\}$	$\{e://Field/F-5-2-6\}$
$\{e://Field/F-5-7\}$	$\{e://Field/F-5-1-7\}$	$\{e://Field/F-5-2-7\}$
$\{e://Field/F-5-8\}$	$\{e://Field/F-5-1-8\}$	$\{e://Field/F-5-2-8\}$

- Individual 1
- Individual 2

### Occupation

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We have only a few questions left about your occupation and training/education.

What is your occupation? Please first select an occupational group.

- Business and financial operations
- Building, grounds cleaning, and maintenance
- Sales
- Healthcare
- Education and library
- Architecture and engineering
- Food
- Computer and mathematical
- Office and administrative support
- Life, Physical, and Social Sciences
- Construction, extraction, installation, and maintenance
- Protective service
- Personal care and service
- Production
- Transportation and material moving
- Community and Social Service
- Legal

### Business and financial operations

Which of the following best describes your job?

- Accountants and auditors
- Management analysts
- General and operations managers
- Financial managers
- Market research analysts
- Human resources specialists
- Loan officers
- Other: Please specify

#### Computer and mathematical

Which of the following best describes your job?

- Software developers, applications
- Computer support specialists
- Computer systems analysts
- Software developers, systems software
- Network and computer systems administrators
- Other: Please specify

#### Architecture and engineering

Which of the following best describes your job?

- Civil engineers
- Materials engineers
- Industrial engineers
- Architect
- Surveyors
- Other: Please specify

#### Life, Physical, and Social Sciences

Which of the following best describes your job?

- Environmental scientists
- Biological technicians
- Urban and regional planners
- Geoscientists
- Medical scientists
- Epidemiologists
- Clinical, counseling, and social psychologist
- Life, physical, and social science technicians
- Chemist
- Other: Please specify

.....

Which of the following best describes your job?

- Social and human service assistants
- Child, family, and social workers
- Other: Please specify

#### Legal

Which of the following best describes your job?

- Lawyers
- Judges
- Paralegals and legal assistants
- Judicial law clerks
- Arbitrators, magistrate judges, and magistrates
- Other: Please specify

#### Education and library

Which of the following best describes your job?

- Postsecondary teachers
- Elementary school teachers
- Teaching assistants
- Secondary school teachers
- Middle school teachers
- Preschool teachers
- Substitute teachers
- Other: Please specify

#### Healthcare

Which of the following best describes your job?

- Licensed practical and licensed vocational nurses
- Physicians and surgeons
- Registered nurses
- Nursing assistants
- Pharmacy technicians
- Pharmacists
- Home health aides
- Medical assistants
- Dental assistants
- Other: Please specify

#### Protective service



Which of the following best describes your job?

- Security guards
- Police and sheriff's patrol officers
- Correctional officers and jailers
- Firefighters
- Other: Please specify

#### Food

Which of the following best describes your job?

- Fast food preparation and serving workers
- Waiters and waitresses
- Cooks
- Bartenders
- Dishwashers
- Hosts and hostesses
- Other: Please specify

#### Building, grounds cleaning, and maintenance

Which of the following best describes your job?

- Janitors and cleaners
- Maids and housekeeping cleaners
- Landscaping and groundskeeping workers
- Other: Please specify

#### Personal care and service

Which of the following best describes your job?

- Personal care aides
- Childcare workers
- Recreational workers
- Hairdressers, hairstylists, and cosmetologists
- Other: Please specify

#### Sales

Which of the following best describes your job?

- Retail salespersons
- Cashiers

- Sales representatives in wholesale and manufacturing
- First-line supervisors of retail sales workers
- Counter and rental clerks
- Securities, commodities, and financial services sales agents
- Other: Please specify

#### Office and administrative support

Which of the following best describes your job?

- Office clerks, general
- Customer service representatives
- Secretaries and administrative assistants
- Stock clerks and order fillers
- Bookkeeping, accounting, and auditing clerks
- Receptionists
- First-line supervisors of office and administrative staff
- Other: Please specify

#### Construction, extraction, installation, and maintenance

Which of the following best describes your job?

- First-line supervisors of construction trades and extraction workers
- Carpenters
- Construction laborers
- Other: Please specify
- Electricians
  
- Automotive service technicians and mechanics
- Heating, air condition, and refrigeration mechanics
- Plumbers, pipefitters
- First-line supervisors of mechanics, installers, and repairers

#### Production

Which of the following best describes your job?

- Machinists
- First-line supervisors of production and operating workers
- Assemblers and fabricators
- Welders, cutters, and brazers
- Packaging and filling machine operators
- Other: please specify
- Production worker - helpers
- Inspectors, testers, sorters

#### Transportation and material moving

Which of the following best describes your job?

- Laborers and freight, stock, and material movers
- First-line supervisors of transport and material moving workers
- Industrial truck and tractor operators
- Heavy and tractor-trailer truck drivers
- Bus drivers
- Other: please specify
- Light truck or delivery drivers
- Packers (by hand)

#### Job

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Now, in your own words, can you describe your **current job** in a few sentences:  
What is your job title? What are your usual activities and duties at this job?

#### Last job

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What was your **last** job? Please first select an occupational group.

- Education and library
- Building, grounds cleaning, and maintenance
- Architecture and engineering
- Legal
- Personal care and service
- Healthcare
- Transportation and material moving
- Sales
- Construction, extraction, installation, and maintenance
- Office and administrative support
- Production
- Protective service
- Computer and mathematical
- Food

- Life, Physical, and Social Sciences
- Business and financial operations
- Community and Social Service

## 2-Business and financial operations

Which of the following best describes your **previous** job?

- Accountants and auditors
- Management analysts
- General and operations managers
- Financial managers
- Market research analysts
- Human resources specialists
- Loan officers
- Other: Please specify

## 2-Computer and mathematical

Which of the following best describes your **previous** job?

- Software developers, applications
- Computer support specialists
- Computer systems analysts
- Software developers, systems software
- Network and computer systems administrators
- Other: Please specify

## 2-Architecture and engineering

Which of the following best describes your **previous** job?

- Civil engineers
- Materials engineers
- Industrial engineers
- Architect
- Surveyors
- Other: Please specify

## 2-Life, Physical, and Social Sciences

Which of the following best describes your **previous** job?

- Environmental scientists
- Biological technicians
- Urban and regional planners
- Geoscientists

- Medical scientists
- Epidemiologists
- Clinical, counseling, and social psychologist
- Life, physical, and social science technicians
- Chemist
- Other: Please specify

## 2-Community and Social Service

Which of the following best describes your **previous** job?

- Social and human service assistants
- Child, family, and social workers
- Other: Please specify

## 2-Legal

Which of the following best describes your **previous** job?

- Lawyers
- Judges
- Paralegals and legal assistants
- Judicial law clerks
- Arbitrators, magistrate judges, and magistrates
- Other: Please specify

## 2-Education and library

Which of the following best describes your **previous** job?

- Postsecondary teachers
- Elementary school teachers
- Teaching assistants
- Secondary school teachers
- Middle school teachers
- Preschool teachers
- Substitute teachers
- Other: Please specify

## 2-Healthcare

Which of the following best describes your **previous** job?

- Licensed practical and licensed vocational nurses
- Physicians and surgeons
- Registered nurses
- Nursing assistants
-

- 
- Pharmacists
- Home health aides
- Medical assistants
- Dental assistants
- Other: Please specify

## 2-Protective service

Which of the following best describes your **previous** job?

- Security guards
- Police and sheriff's patrol officers
- Correctional officers and jailers
- Firefighters
- Other: Please specify

## 2-Food

Which of the following best describes your **previous** job?

- Fast food preparation and serving workers
- Waiters and waitresses
- Cooks
- Bartenders
- Dishwashers
- Hosts and hostesses
- Other: Please specify

## 2-Building, grounds cleaning, and maintenance

Which of the following best describes your **previous** job?

- Janitors and cleaners
- Maids and housekeeping cleaners
- Landscaping and groundskeeping workers
- Other: Please specify

## 2-Personal care and service

Which of the following best describes your **previous** job?

- Personal care aides
- Childcare workers
- Recreational workers
- Hairdressers, hairstylists, and cosmetologists
-

## 2-Sales

Which of the following best describes your **previous** job?

- Retail salespersons
- Cashiers
- Sales representatives in wholesale and manufacturing
- First-line supervisors of retail sales workers
- Counter and rental clerks
- Securities, commodities, and financial services sales agents
- Other: Please specify

## 2-Office and administrative support

Which of the following best describes your **previous** job?

- Office clerks, general
- Customer service representatives
- Secretaries and administrative assistants
- Stock clerks and order fillers
- Bookkeeping, accounting, and auditing clerks
- Receptionists
- First-line supervisors of office and administrative staff
- Other: Please specify

## 2-Construction, extraction, installation, and maintenance

Which of the following best describes your **previous** job?

- First-line supervisors of construction trades and extraction workers
- Automotive service technicians and mechanics
- Heating, air condition, and refrigeration mechanics
- First-line supervisors of mechanics, installers, and repairers
- Electricians
- Plumbers, pipefitters
- Carpenters
- Construction laborers
- Other: Please specify

## 2-Production

Which of the following best describes your **previous** job?

- Assemblers and fabricators
- Other: please specify

- Inspectors, testers, sorters
- First-line supervisors of production and operating workers
- Production worker - helpers
- Machinists
- Welders, cutters, and brazers
- Packaging and filling machine operators

## 2-Transportation and material moving

Which of the following best describes your **previous** job?

- Industrial truck and tractor operators
- Other: please specify
- Light truck or delivery drivers
- Laborers and freight, stock, and material movers
- Bus drivers
- Heavy and tractor-trailer truck drivers
- Packers (by hand)
- First-line supervisors of transport and material moving workers

## Last job

Why did you leave your last job? (Choose multiple if needed)

- Contract ended
- Other (please specify)
- Disability
- Reached retirement age
- Technological change
- Company closure or restructuring

## Factual questions

What is your highest level of education?

- 8th grade or below
- 9th grade to 11th grade
- High school graduate
- Some college but no degree
- Associate degree
- Bachelor's degree
- Master's degree
- Professional school degree (e.g. MD, DDS, DVM, JD)
- Doctorate degree (e.g. PhD, EdD)

What is your household family income?

- Less than \$10,000



- \$10,000 - \$19,999
- \$20,000 - \$29,999
- \$30,000 - \$39,999
- \$40,000 - \$49,999
- \$50,000 - \$59,999
- \$60,000 - \$69,999
- \$70,000 - \$79,999
- \$80,000 - \$89,999
- \$90,000 - \$99,999
- \$100,000 - \$149,999
  
- \$150,000-\$199,999
- More than \$200,000

What is your 5-digit zip code?

What do you think is the unemployment rate in your county? (0-100%)

What do you think is the unemployment rate in the United States? (0-100%)

#### Debrief

**IMPORTANT: Please make sure to go to the next page to have your answers recorded and receive a completion code. Your responses will be deleted if you exit the browser now.**

\*\*\*\*\*

Thank you for your participation in our study! Your participation is greatly appreciated. You will find more information about the study below.

Purpose of the Study:

This study is about mass attitudes toward globalization and automation. This survey aims to collect baseline data on public opinion toward trade, immigration, and workplace automation. In addition, it seeks to explore the effects of information (in this case, a news article) on attitudes.

In order to test the project's hypotheses, the survey included a fictitious article about the closure of toy factories. Please note that Aiden Toys Inc. does not in fact exist. We apologize for the use of a fictitious article.

Confidentiality:

Your responses will be kept strictly confidential. No personally identifying information has

been collected during the process of the survey (e.g. name, exact address). If you have any concerns and/or would like your data removed from the study and permanently deleted please contact the researcher, Nicole Wu at nicolewu@umich.edu.

Once again, thank you for your participation in this study!

#### Random ID

Here is your completion code: \${e://Field/Random%20ID}

Copy this value to paste into Mturk.

When you have copied this ID, **please make sure to click the next button to submit the survey**. Again, thank you for your time and responses!

Please enter your MTurk ID. This ID will be deleted within a week after HIT review.

Powered by Qualtrics

## Additional Results

### Study preregistration

This study was registered with EGAP before its launch. The preregistration documents can be found here: <https://osf.io/8b4kd>. Some of the preregistered hypotheses were not formalized in this paper, but were nonetheless discussed in the results for organizational clarity. A number of expectations of heterogeneous treatment effects were preregistered based on ones partisanship, educational level, and other pre-treatment attitudinal attributes. The main text of this manuscript focuses on treatment effects conditioned on partisanship. Other heterogeneous treatment effects conditioned on personal attributes and other attitudinal attributes were discussed in the results section. In addition, some respondents were also a part of a choice-based conjoint experiment related to guaranteed monthly income/welfare that was conducted as a part of the preregistered study. The topic is beyond the scope of this paper.

Not all outcome measures and experimental conditions were included in the write-up. For transparency, they are included below.

### Outcome measures

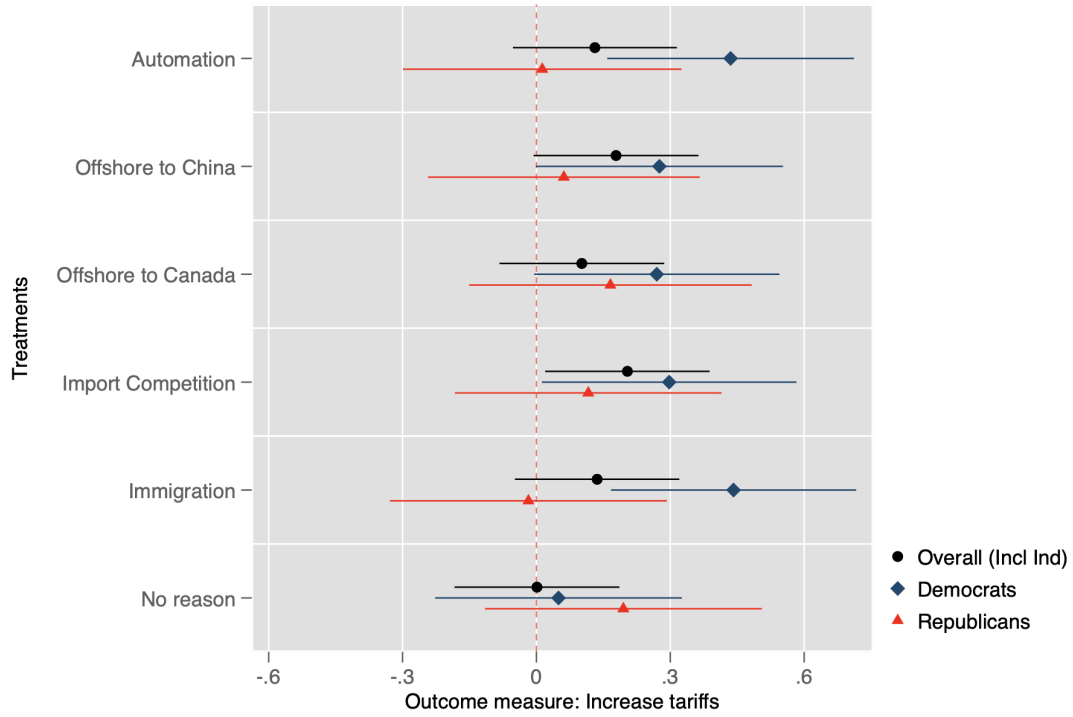
Table 16: Policy preferences (full sample)

Policies (Outcome measures)	Overall	Democrats	Republicans	Independents
Tax incentive to stay in or return to US	4.02	3.93	4.23	3.99
Financial assistance	3.90	4.22	3.55	3.79
Universal basic income	3.16	3.67	2.53	2.99
Restrict immigration	3.10	2.47	4.08	3.15
Increase tariffs	2.92	2.57	3.52	2.91
Do nothing	2.21	1.89	2.60	2.30
Restrict technology	1.94	1.87	2.13	1.90
Observations	2,471	1,049	683	693

Note: Variables range from 1 to 5. They are recoded such that a higher value signifies higher level of average support for the policy.

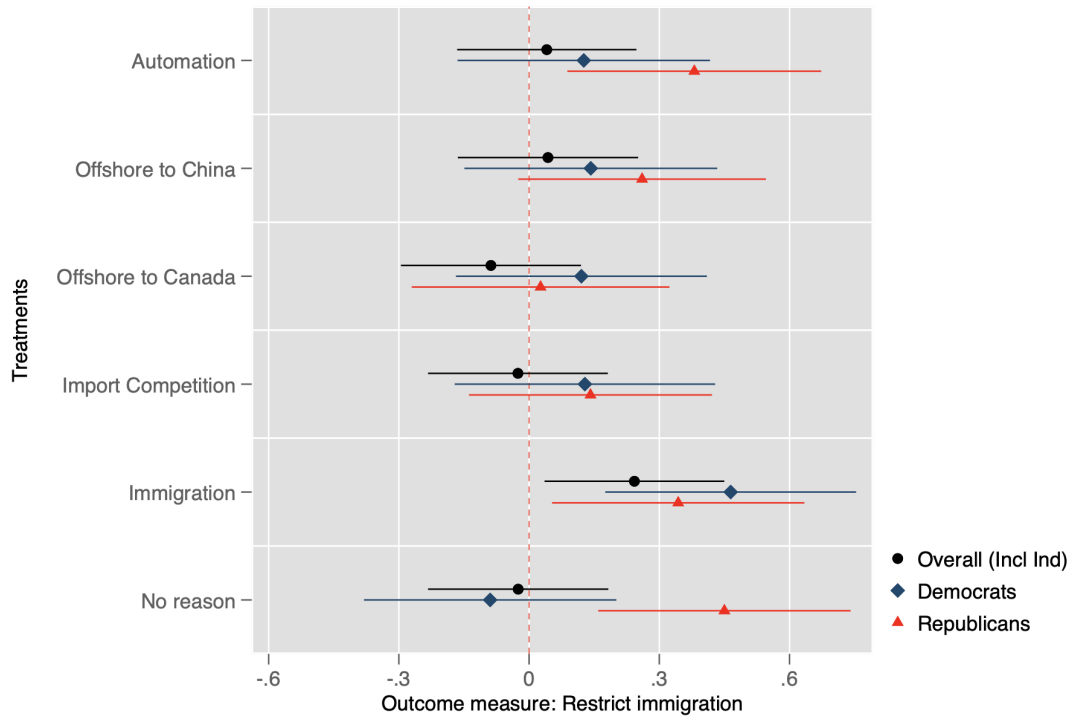
## Trade restrictions

Figure 15: Outcome measure: increase tariffs (marginal treatment effects relative to the control)



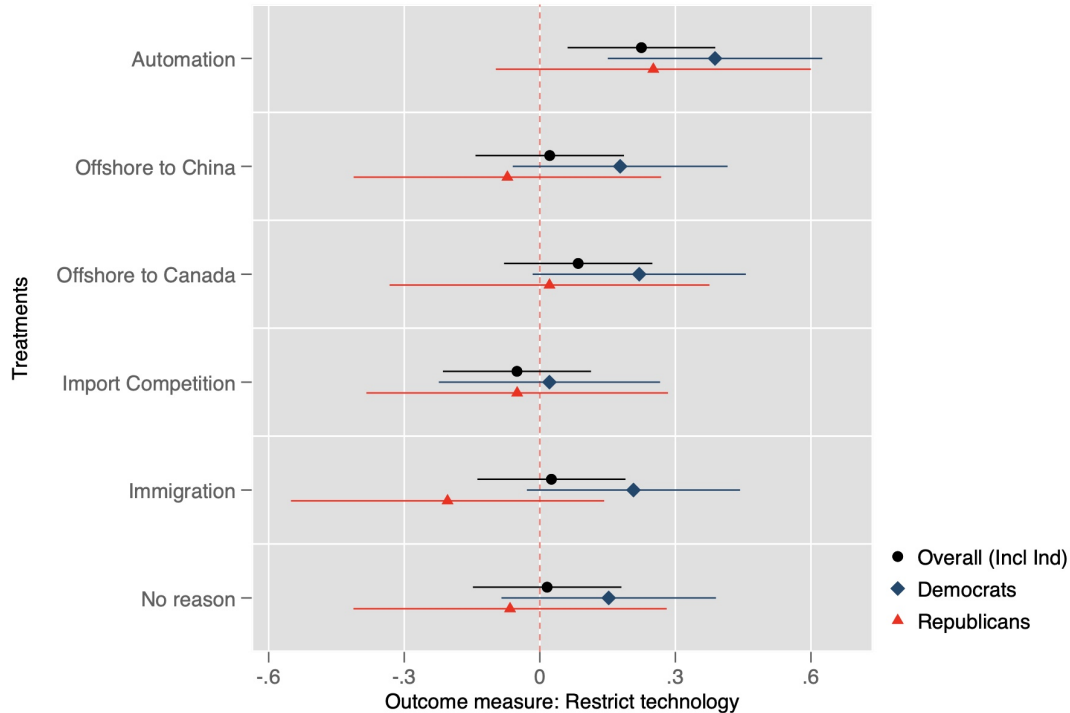
## Immigration restrictions

Figure 16: Outcome measure: restrict immigration (marginal treatment effects relative to the control)



## Technological restrictions

Figure 17: Outcome measure: restrict technology use (marginal treatment effects relative to the control)



As there are very few existing studies of technology policy preferences, it is worthwhile to explore other potential explanations for such attitudes. First, we may find differences in such attitudes between high- and low-skilled workers as training may affect their confidence in using computers and machines. Second, workers who personally had bad experiences with technology may be more likely to support technological restrictions. Lastly, workers who believe themselves to be more viable in the labor market may be willing to tolerate job risks associated with automation, leading to lower support for restrictive technology policies. These factors — higher education, pre-treatment enthusiasm about workplace technology, and one's confidence in the labor market — may blunt the treatment effects

in the study. Table 17 explores other possible heterogeneous treatment effects using treatment-by-covariate interactions. Running counter to the above conjectures, none of the interaction effects are statistically significant in Table 17. In the models without interactive terms, we find that those who have had more negative personal experience with technology at work (model 4) and those who believe that they will need a longer time to seek alternative employment after a layoff (model 6) are more likely to favor government restrictions on technology use.

Table 17: Preferences on technology policy (full sample)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<b>Treatments</b>							
Automation	0.22** (2.71)	0.23** (2.78)	0.15 (0.46)	0.25** (2.99)	0.47 (0.98)	0.18* (1.99)	0.21 (0.95)
Offshore to China	0.02 (0.26)	0.01 (0.15)	-0.43 (-1.27)	0.03 (0.35)	0.17 (0.38)	-0.00 (-0.02)	0.10 (0.47)
Import competition	-0.05 (-0.61)	-0.06 (-0.72)	-0.54 (-1.52)	-0.04 (-0.45)	-0.38 (-0.83)	-0.11 (-1.28)	0.10 (0.43)
Immigration	0.03 (0.31)	0.03 (0.31)	0.32 (0.99)	0.02 (0.29)	0.45 (1.01)	0.02 (0.22)	0.27 (1.26)
<b>Covariates</b>							
Education		-0.01 (-0.35)	-0.03 (-0.70)				
Automation × Edu			0.02 (0.26)				
Offshore to China × Edu			0.08 (1.35)				
Import competition × Edu			0.09 (1.37)				
Immigration × Edu			-0.06 (-0.93)				
Work technology appraisal				-0.21*** (-8.53)	-0.19*** (-3.64)		
Automation × Tech					-0.04 (-0.48)		
Offshore to China × Tech					-0.02 (-0.32)		
Import competition × Tech					0.06 (0.76)		
Immigration × Tech					-0.07 (-0.98)		
Labor market struggle						0.16*** (6.41)	0.22*** (3.61)
Automation × LMS							-0.02 (-0.20)
Offshore to China × LMS							-0.04 (-0.55)
Import competition × LMS							-0.08 (-1.02)
Immigration × LMS							-0.11 (-1.28)
_cons	1.90*** (32.19)	1.93*** (16.21)	2.05*** (9.13)	3.10*** (20.07)	3.01*** (9.54)	1.53*** (17.55)	1.41*** (9.09)
<i>N</i>	1769	1731	1731	1727	1727	1577	1577

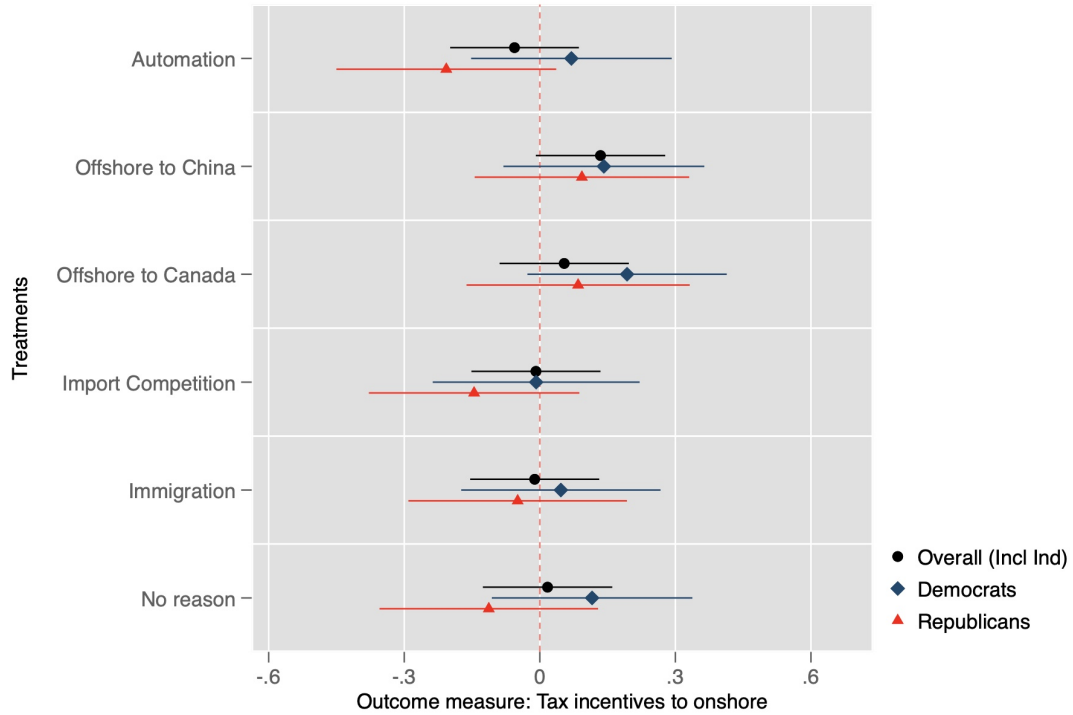
*t* statistics in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$



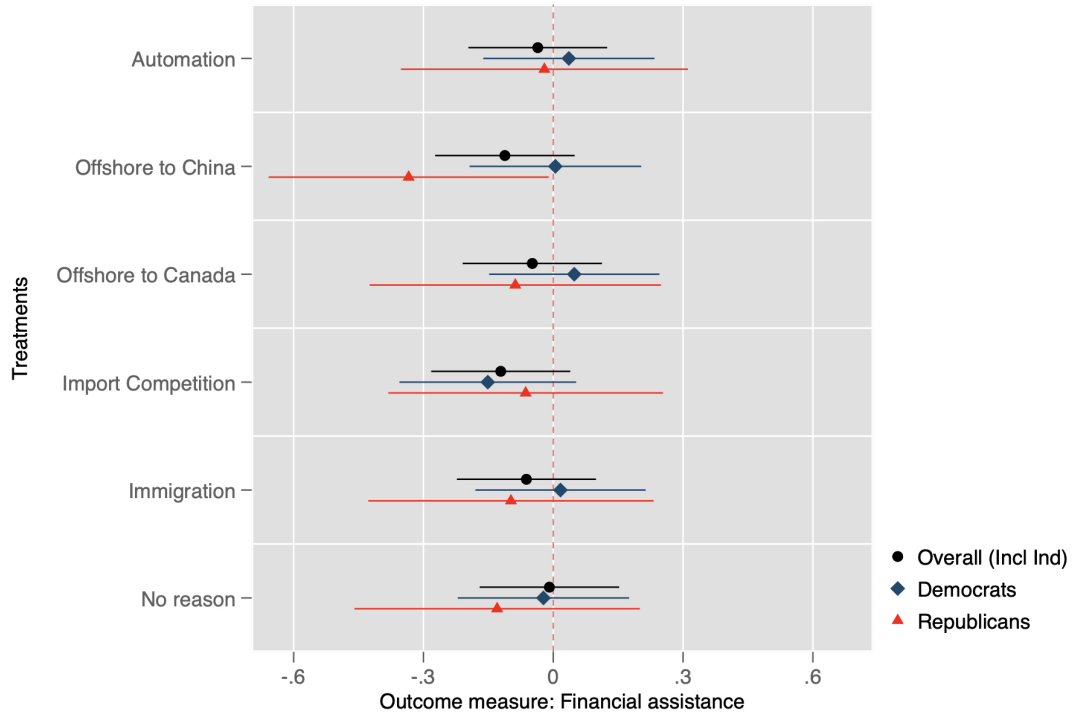
## Tax incentives for companies to onshore

Figure 18: Outcome measure: Tax incentives for companies to onshore (marginal treatment effects relative to the control)



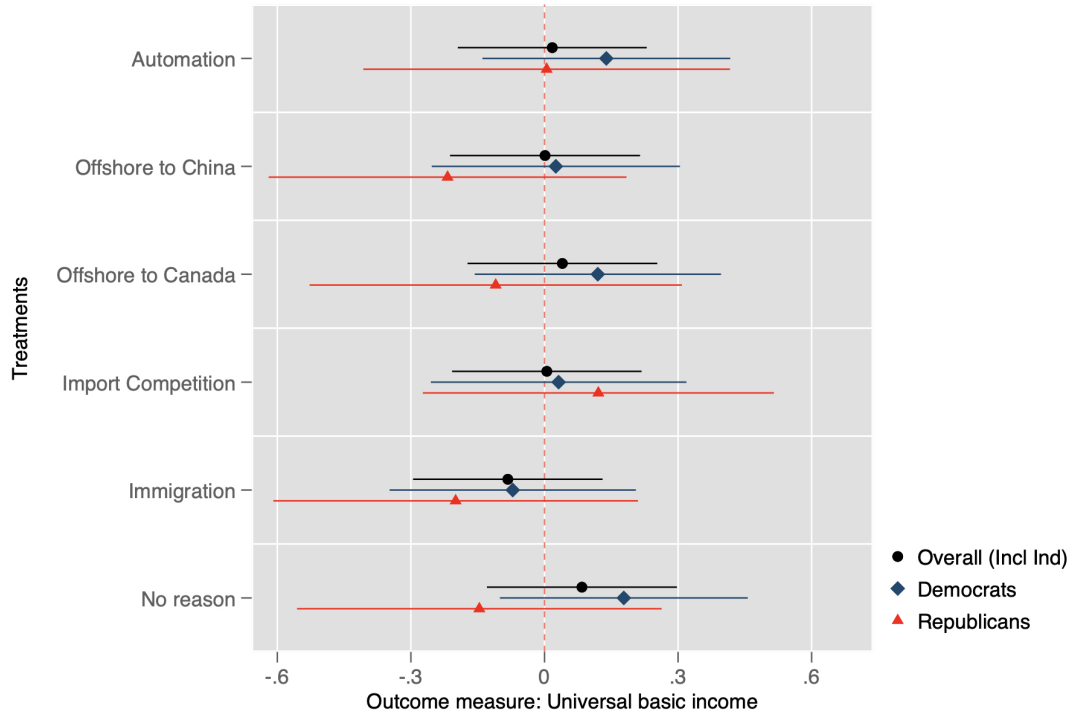
## Financial assistance

Figure 19: Outcome measure: Financial assistance (marginal treatment effects relative to the control)



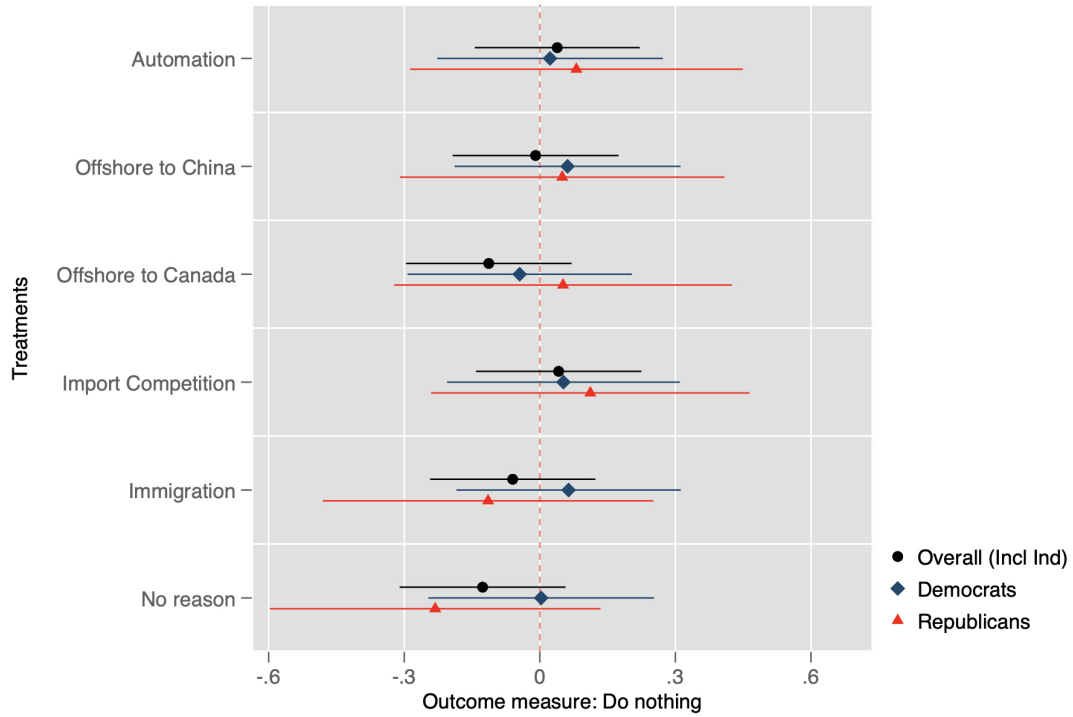
## Universal basic income

Figure 20: Outcome measure: Universal basic income (marginal treatment effects relative to the control)



Do nothing

Figure 21: Outcome measure: Do nothing (marginal treatment effects relative to the control)



Numeric results

Table 18: ITT among Democrats

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	tariff	restrictimmg	restricttech	onshore	financial	ubi	nothing
Automation	0.44** (3.09)	0.13 (0.85)	0.39** (3.21)	0.07 (0.62)	0.04 (0.36)	0.14 (0.98)	0.02 (0.18)
Offshore to China	0.28 (1.95)	0.14 (0.96)	0.18 (1.47)	0.14 (1.25)	0.00 (0.05)	0.03 (0.18)	0.06 (0.48)
Offshore to Canada	0.27 (1.93)	0.12 (0.82)	0.22 (1.83)	0.19 (1.72)	0.05 (0.48)	0.12 (0.85)	-0.04 (-0.35)
Import competition	0.30* (2.05)	0.13 (0.84)	0.02 (0.17)	-0.01 (-0.07)	-0.15 (-1.45)	0.03 (0.22)	0.05 (0.40)
Immigration	0.44** (3.15)	0.46** (3.15)	0.21 (1.72)	0.05 (0.42)	0.02 (0.17)	-0.07 (-0.51)	0.06 (0.50)
No reason	0.05 (0.35)	-0.09 (-0.60)	0.15 (1.26)	0.12 (1.02)	-0.02 (-0.23)	0.18 (1.26)	0.00 (0.02)
_cons	2.31*** (22.77)	2.34*** (21.90)	1.70*** (19.48)	3.85*** (47.21)	4.23*** (58.15)	3.61*** (35.37)	1.87*** (20.37)
<i>N</i>	1049	1049	1049	1049	1049	1049	1049

*t* statistics in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Table 19: ITT among Republicans

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	tariff	restrictimmg	restricttech	onshore	financial	ubi	nothing
Automation	0.01 (0.08)	0.38* (2.56)	0.25 (1.42)	-0.21 (-1.67)	-0.02 (-0.12)	0.00 (0.02)	0.08 (0.43)
Offshore to China	0.06 (0.40)	0.26 (1.79)	-0.07 (-0.41)	0.09 (0.77)	-0.33* (-2.03)	-0.22 (-1.06)	0.05 (0.27)
Offshore to Canada	0.17 (1.03)	0.03 (0.18)	0.02 (0.12)	0.08 (0.67)	-0.09 (-0.51)	-0.11 (-0.51)	0.05 (0.27)
Import Competition	0.12 (0.76)	0.14 (0.99)	-0.05 (-0.29)	-0.15 (-1.23)	-0.06 (-0.39)	0.12 (0.60)	0.11 (0.62)
Immigration	-0.02 (-0.11)	0.34* (2.32)	-0.20 (-1.16)	-0.05 (-0.40)	-0.10 (-0.58)	-0.20 (-0.96)	-0.11 (-0.61)
No reason	0.19 (1.23)	0.45** (3.04)	-0.07 (-0.37)	-0.11 (-0.92)	-0.13 (-0.77)	-0.15 (-0.70)	-0.23 (-1.24)
_cons	3.44*** (31.79)	3.86*** (38.01)	2.15*** (17.77)	4.28*** (50.72)	3.65*** (31.71)	2.60*** (18.21)	2.60*** (20.38)
<i>N</i>	683	683	683	683	683	683	683

*t* statistics in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

## Chapter 4

### Little to Lose: Exit Options and Technological Receptiveness in China

#### 4.1 Introduction

Recent research on automation has emphasized its negative implications on wages and employment in industrialized economies (Brynjolfsson and McAfee, 2014; Frey and Osborne, 2017; Acemoglu and Restrepo, 2020). There is growing concern that technology will have an even greater impact on developing nations, where larger shares of jobs are susceptible to automation. One estimate suggests that it will be technically feasible to automate 77 percent of jobs in China in the next few decades (Frey and Osborne, 2017; Citi, 2016). Yet, the Chinese government promotes an initiative to “replace humans with robots” (*jiqui huanren*). Beijing emphasizes the necessity and urgency to boost technological adoption in its “Made in China 2025” campaign, which aims to maintain China’s economic growth by shifting away from low value-added manufacturing and toward high value-added production. To that end, various levels of Chinese government have made concrete policy commitments, including subsidies to finance the production and adoption of industrial robots, to modernize factories and help move companies up the global value chain (Sharif and Huang, 2019a).

The seemingly dystopian slogan of “replacing humans with robots” can be found in

official government publications since 2012. From time to time, the state media also boasts about the effectiveness of the program, highlighting sizable labor savings due to automation. What do manufacturing workers — the people the government wants replaced — think about these automation efforts? This paper presents findings based on semi-structured interviews with firm managers and manufacturing workers from 76 companies, 34 factory visits, and two original surveys of over 2,400 workers and 600 companies, covering 19 cities in southern coastal China. The combination of open-ended techniques and survey methods allows hypotheses to be refined and updated in the field and subsequently tested (Kapiszewski, MacLean and Read, 2015).

Contrary to the more pessimistic assessments of automation, most manufacturing workers in Guangdong — buffered by steady increases in demand and chronic labor shortage — appear to be unfazed by technological change *at present*. During interviews, they more frequently emphasized the immediate and observable effects of technological improvements, such as lowered risks of injury, less monotonous work, and improved product quality, as opposed to wage or employment concerns. These on-the-ground benefits of technological improvements play a critical role in shaping workers' attitudes toward technology, but are often overlooked in macroeconomic analyses of automation.

Paradoxically, insofar as laborers experience anxiety over the prospects of job automation, the survey finds that local workers — whom local labor regulations better protect — are more worried about technological displacement than migrant workers. Migrants with a non-local *hukou* (household registration) working in cities receive lower average hourly wages than locals, have limited to no access to public services provided by local city governments, and are less likely to be offered formal labor contracts (Song, 2014).

This important institution alters the cost of technological displacement felt by local and non-local workers respectively by affecting their *expectations, what is at stake*, as well



as *the ease of securing comparable employment after a layoff*. The migrants' undesirable circumstances — precarious positions, lower remuneration, out-of-pocket expenses for essential public services that they are ineligible for, and sometimes years-long separation from their children — lower their job expectations and make their jobs less painful to lose. As these jobs provide little benefit to migrant workers, it is relatively unchallenging for them to find a replacement that is no worse than the status quo. Furthermore, the greater legal protection afforded to local workers (e.g., higher mandated levels of employer contributions to insurance and retirement funds) ironically makes local workers more expensive to hire and therefore less competitive than non-locals with the same levels of skills. Local workers who have more to lose are therefore more worried about automation.

This paper may be of interest to scholars of Chinese politics and those of comparative political economy. For the former, this work highlights the unintended labor consequences of an unequal welfare system which discriminates based the hukou status people inherited at birth. By allowing employers to opt for a lower, less generous tier of social insurance for their non-local employees, local governments inadvertently hurt the competitiveness of the group they sought to protect. It also reveals a possible tension between local governments' goals of promoting industrial upgrading via automation on one hand, and appeasing their local working class constituents on the other. Unemployed migrant workers without a local hukou can return to their hometowns or move to a different city for opportunities, but local workers in coastal cities are less inclined to relocate. If local workers feel more negatively affected by automation, local governments' aggressive push to modernize factories may create a politically tricky situation by irking their constituents.

More broadly, this paper offers a new perspective on technology attitudes that has implications beyond China. Existing research uses individuals' educational attainment and

their job characteristics as a proxy for their susceptibility to automation (Frey and Osborne, 2017; Gallego, Kurer and Schöll, 2018). While these factors are no doubt relevant to analyses of mass attitudes, this paper additionally shows how institutions — existing labor arrangements — shape technological receptiveness for people who face similar levels of automation risks. For example, technological displacement may be more painful for union auto workers than non-union retail workers in the United States, because a well-compensated union job is harder to replace. Likewise, American manufacturing workers may be more against automation than Chinese manufacturing workers, because comparable exit options for the former are few and far between. While education level affects one's adaptability to technological change, existing levels of labor organization often affect the value of the job at stake. Antagonism toward technology may be more likely to originate from organized groups, although it is not yet clear how automation may fundamentally shift the balance of capital-labor bargaining. If technological improvements are necessary to secure long-term economic competitiveness and growth, it is then critical for scholars and policymakers to understand the concerns of those who might attempt to halt those processes, and devise appropriate policy responses to address these apprehensions.

## 4.2 Automation in China

Research on technology's impact on workers is predominately based on the experience of advanced economies. Technological change has been linked to job polarization, increasing inequality, and labor displacement (Autor, Katz and Kearney, 2006; Goos, Manning and Salomons, 2014; Frey and Osborne, 2017; Acemoglu and Restrepo, 2020). The effects of technology on Chinese workers are much more ambiguous. While technological improvements have diminished the number of routine jobs elsewhere, Du and Park (2017)

find an increase in routine-intensive occupations in China as the growing export-oriented sector specializes in less abstract, more routine tasks. Others show that automation exposure has negative effects on wages and employment, hurting especially state-owned sector, low-skilled, male, and prime-age and older workers (Giuntella and Wang, 2019). Through participant-observation in nine factories in Dongguan in 2015 and 2016, Sharif and Huang (2019b) show instances of labor deskilling (typically through moving to a lower-paying department of the same company) and displacement, but also upskilling (through additional training), as a result of technological upgrades.

It is worthwhile to investigate the changing and growing impact of technology on workers as automation in China accelerates. China has a relatively low stock of industrial robots per worker — ranking the last in robot density amongst G20 members — but has witnessed the largest growth in robot flow in recent years (International Federation of Robotics, 2019). The typical impetus to cut labor costs and improve product quality via automation aside, some scholars believe that aggressive government policies have contributed to the sharp rise in automation in China (Cheng et al., 2019). In 2012 and 2013, the Ministry of Industry and Information Technology and the Ministry of Science and Technology, both national-level development agencies, published guiding opinions on promoting automation. In 2014, lower level governments started to offer financial assistance to companies to automate, generally in the form of a rebate of 10 to 30 percent of the purchase price of qualified equipment, depending on the locality. In 2015, Beijing reaffirmed these provincial- and municipal-level undertakings in its “Made in China 2025” campaign. Motivated to move China up the innovation value chain, the plan identified key development industries and promised support for manufacturing innovation centers.<sup>42</sup> A local government official I interviewed quipped that the program

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<sup>42</sup>The full text of the announcement can be found here: [http://www.gov.cn/zhengce/content/2015-05/19/content\\_9784.htm](http://www.gov.cn/zhengce/content/2015-05/19/content_9784.htm).

had garnered too much negative attention from the United States and Europe,<sup>43</sup> and so officials now simply drop the provoking slogan and prefer to refer to the plan as “intelligent manufacturing” (*zhineng zhizao*). Although Premier Li Keqiang did not refer to the “Made in China 2025” plan in name in his annual address to the National People’s Congress in March 2019, the policies remained.

The extent to which these policies actually accelerate technological adoption and innovation remains unclear. On one hand, Cheng et al. (2019) find that firms controlled by Communist Party members are more likely to adopt industrial robots. Fifteen percent of robot-using firms in their sample reported that government industrial policies contributed to their adoption decisions. On the other hand, Sharif and Huang (2019*b*) note that government officials in Dongguan considered these subsidies merely as “icing on the cake.” Consistent with their observation, a human resource manager of a multinational corporation noted that their company “would have automated anyway” and that the subsidy amounted to “adding flowers to a brocade” (Company 32, Appendix). The owner of a privately owned machinery company said they did not apply for the subsidy to avoid “trouble” and “cumbersome paperwork” (Company 63). The General Manager of a robotics company complained that state subsidies had hurt innovation and homegrown robotics development as these financial incentives made once unaffordable German and Japanese robots attainable for their usual clientele (Company 3).<sup>44</sup> More frequently, firm management attributes automation decisions to market forces — such as increasing output, responding to competition, and alleviate labor shortages — rather than government incentives.

Regardless, both government- and market-based motivations to automate will likely

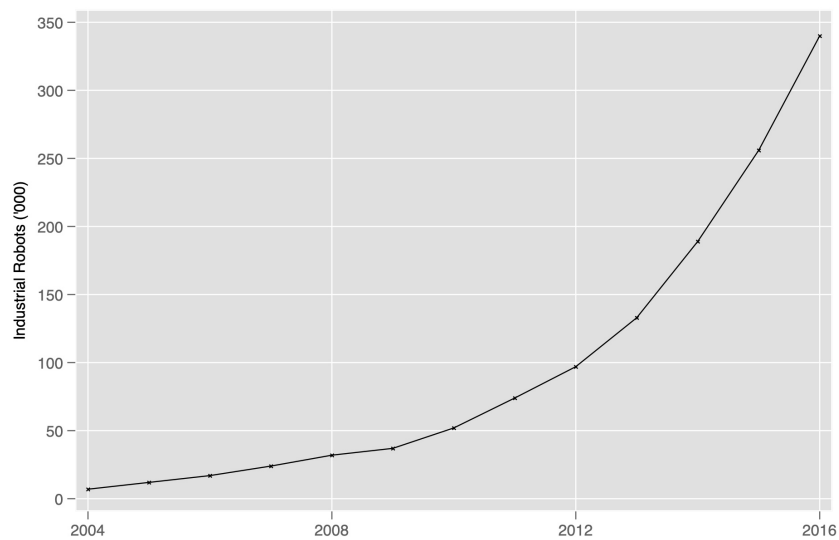
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<sup>43</sup>For example, tariff increases specifically targeted at products identified in the Made In China 2025 plan by the United States.

<sup>44</sup>Note that some local governments require subsidies to be used on domestically produced robots. The rule varies across localities.

persist in the years to come. Figure 22 shows that increases in robot stock in China preceded government policies to promote “intelligent manufacturing,” but accelerated in pace in recent years. Does the Chinese government not fear the labor market — and possibly political — consequences of automation? How does technology affect workers, and what do workers think about these robots and machines?

Figure 22: Industrial robot stock in China



Data from International Federation of Robotics (2019).

### 4.3 Data and methods

To answer these questions, I collected a combination of qualitative and quantitative data in collaboration with two China-based researchers. We secured access to government officials, firm managers, and production line workers in 19 cities across southern China. This region has traditionally been a site for policy experimentation and economic innovation. In 2014, the Dongguan Municipal Government in Guangdong Province established a fund to help companies “replace human with robots.” In addition, the southern region

houses a significant portion of the country's manufacturing activities and has thus been of great economic import to China. Guangdong Province alone was responsible for 26 percent of the country's total value of exports in 2018.<sup>45</sup> Facing increasingly unfavorable policies (e.g. environmental regulations) and market conditions (e.g. soaring wages) for low-end, labor-intensive manufacturing, businesses in southern China were also among the earliest adopters of technology in the nation, making it an instructive case to examine the effects of automation on Chinese workers (Sharif and Huang, 2019a).

We sought to uncover a comprehensive picture of the impact of automation on workers through a variety of strategies, including interviews, factory visits, and original surveys. We conducted semi-structured interviews with firm managers and production line workers from 76 manufacturing companies. The list of firms can be found in the Appendix. For workers, we probed their personal experiences with workplace technology and possible labor market concerns. For firm management, we inquired about motivations for and consequences of automation (e.g. profits, recruitment and retention). Over the course of four months, we also observed production line workers — mostly human, but sometimes robots — in 34 production facilities. These visits enabled us to contextualize workers' responses and better understand automation's on-the-ground impact on work.

In addition, we fielded two original surveys of over 600 companies and 2,400 workers. As we had to rely on local Human Resources and Social Security Bureaus for survey distribution, our sampling method best approximated quota sampling whereby firms were chosen based on selected characteristics including industry, firm size, and ownership type. The final sample covered eight main industries including chemical, textile and apparel, electronics, metal fabrication, machinery, automobiles and other transportation

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<sup>45</sup>Data from the National Bureau of Statistics, available at <http://data.stats.gov.cn/english/easyquery.htm?cn=E0103>.

equipment, and beverages and food processing. The firms were a mix of state-owned, privately-held, foreign-owned, and jointly-owned corporations. Production line workers were selected from the sampled firms to complete another survey. About 70 percent of the respondents received some secondary (*gaozhong*), vocational (*zhongzhuan*), or technical education (*jixiao*), with an average age of 34.<sup>46</sup> In addition to enriching descriptive inference, the two surveys also allowed the subsequent testing of hypotheses that were updated and refined in the field (Kapiszewski, MacLean and Read, 2015). Admittedly, China's political environment introduced significant constraints on sampling and question scope, but these interviews and surveys still represent important data on technology attitudes — especially when getting access to subjects in China has become increasingly difficult (O'Brien, 2018).

#### 4.4 Workers' views toward technology

At the beginning of every interview session, we introduced ourselves and were forthright about the purpose of our visit, which was to “understand the extent of automation at the production site; and how intelligent manufacturing has affected work, employment, and labor relations.” The majority of workers were cognizant of technological improvements at their production sites, if they existed. Many of them underwent training, operated, maintained, or at least saw these machines. In one case, a fully automated line was placed directly next to a human line that produced the exact same product (Company 44, Appendix). In our survey of manufacturing workers, about 36 percent of the 2,445 respondents noted that their department had introduced industrial robots. In our survey of firms, 43 percent reported having acquired new technology aimed at automation. The discrepancy between the two surveys may be attributable to the fact that we asked

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<sup>46</sup>The median age of the Chinese people is 37.4. The lower average age in the sample is no surprise as it consisted of only working-age individuals.

workers about technological improvements in their units, while we asked firm representatives if there had been such improvements firm-wide. Industrial robots, at the time of this research, were seldom capable of completing all production procedures from start to finish, they merely took over certain tasks from humans. Production at most of these sites was semi-automatic at best.<sup>47</sup>

When asked to share their experience with technology at work, workers predominantly focused on its practical implications on the factory floor, rather than wage or employment concerns, contrary to my initial expectations based on extant research in economics (Autor, Katz and Kearney, 2006; Goos, Manning and Salomons, 2014; Brynjolfsson and McAfee, 2014; Frey and Osborne, 2017). Among workers who reported experiencing automation, 45 percent noted an improvement in work environment (whereas 4 percent noted a deterioration). According to our observation, some technologies must operate in dust-free environments and at machine room temperature with proper ventilation. These upgrades benefited workers who use or work alongside these machines — climate-controlled rooms are especially appreciated during long, humid, and hot southern Chinese summers. In addition, 54 percent and 63 percent of workers believed technology to have made their jobs less dangerous and less labor intensive respectively (whereas 7 percent and 5 percent reported an increase in injury risks and labor intensity respectively). During interviews, many workers cited automated guided vehicles (AGVs) including AGV forklifts and AGV pallet jacks as greatly reducing fatigue and risks of injury, as they were no long required to manually carry heavy articles.

Technology has also been shown to shape the content of jobs, reducing labor input of routine tasks and increasing labor input of non-routine cognitive tasks (Autor, Levy

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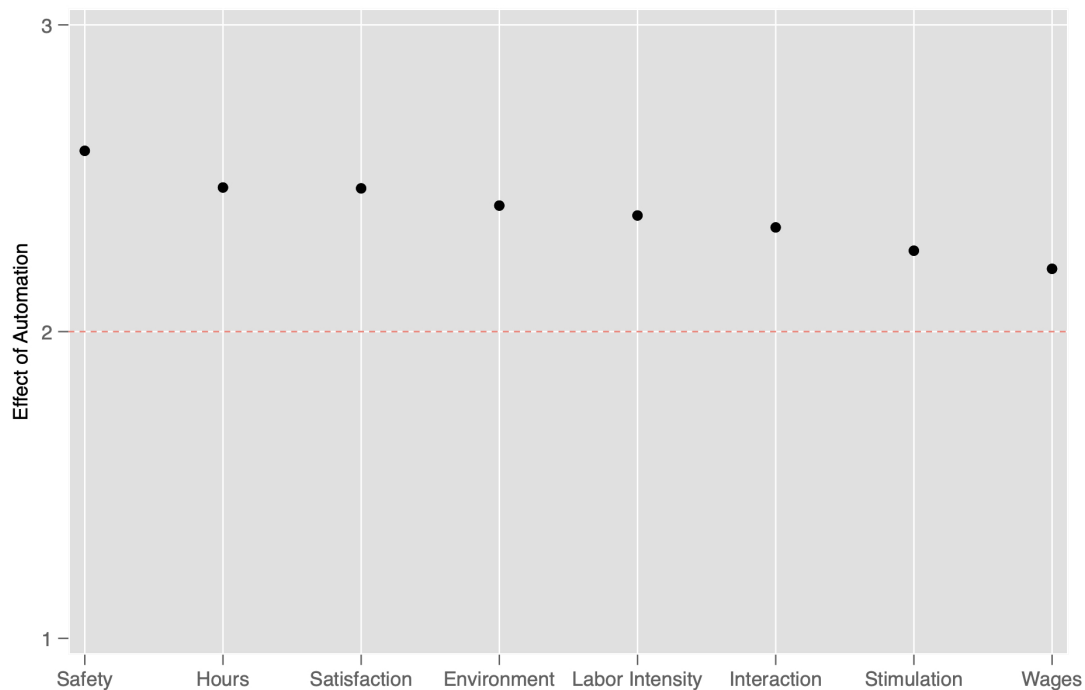
<sup>47</sup>Frey and Osborne (2017) describes such automation bottlenecks. Sometimes, companies choose not to automate even when they have the appropriate technology. This is more likely to be the case if the size of an order (usually of an unstandardized or custom product) is not sufficient to justify the time spent on experimenting and programming.



and Murnane, 2003). While we did not specifically measure changes in job content among these workers, 35 percent of those in production units with industrial robots reported that their jobs became more stimulating due to these technological improvements, and 9 percent reported that work became more monotonous. Over half of them found technology to have made their jobs neither more interesting nor mundane. A production line worker in a semiconductor factory (Company 35, Appendix) said, “I used to have to complete all procedures by hand. I now press the same buttons over and over again according to the manual, but it is easier.” The ease of operation of these machines varies widely; in some instances, a mere few days of training sufficed, in others, it required months-long trips abroad. Additionally, workers on average also report that technological improvements increased interaction between colleagues as well as enhanced overall job satisfaction. Figure 23 summarizes workers’ evaluation of automation’s impact (ranges from 1-3). A higher average rating indicates more positive evaluation.

As mentioned before, concerns about salary cuts or technological unemployment did not come up without direct probing during the dozens of interviews conducted, running counter to expectations derived from relevant macroeconomic research. We asked workers in the survey if they had been laid off or reassigned to another position due to technological change in the past two years, only 2 percent said “yes.” Among workers who witnessed automation in their unit, only 7 percent reported a decrease in salary (compared to 28 percent who saw an increase). While a survivorship bias was theoretically possible — that is, inferences based on survey and interviews of incumbent workers could potentially overlook workers who were permanently displaced by technology — this threat was unlikely to be significant in reality. There appeared to be two major buffers for wage and employment shocks in the context of southern China at the time of this research.

Figure 23: Self-reported impact of automation (mean)



Note: Data from original survey. Rated by workers who reported experiencing automation. Mean values above the dotted line indicate positive appraisals overall.

Among the sampled firms, there was a continued increase in demand. About 86 percent of these firms service mainly domestic markets. According to World Bank data, final consumption expenditure in China has risen steadily from 2.9 trillion USD in 2010 to 7.3 trillion USD in 2018.<sup>48</sup> Automation helped firms meet larger demands, instead of leading to mass layoffs. Second, there are chronic labor shortages and retainment issues in the region (Meng, 2012). About 93 percent of surveyed firms reported facing recruitment challenges and nearly 90 percent reported labor shortages. A human resources manager (Company 51, Appendix) told a familiar story: “Speaking about City G, there has been a dramatic decline in labor supply, especially since 2015. The city government

<sup>48</sup>Accessed on June 29, 2020: <https://data.worldbank.org/indicator/NE.CON.TOTL.CD>

hosts a manufacturing job fair after the Chinese New Year every year in the sports arena. The venue used to be packed, but we had half the turnout in 2015, and then just another half of that in 2016.” “I just returned from a month-long recruitment trip in the Northeast,” he said, noting growing difficulties in recruitment. However, recruitment was often only half the battle. A majority of firms struggled to retain workers. The management of a state-owned automotive electronics company (Company 33) lamented about losing 50 to 60 percent of production workers per year. “It would be better if we could keep it under 30 percent,” he added. *Currently*, the pressing challenge facing Chinese manufacturing in the southern coast is not one of joblessness, but jobs unfilled due to excessive mobility. About 87 percent of firms in the sample said no workers were laid off due to automation.

#### 4.5 Anxiety about future automation

However, the absence of massive layoffs does not negate the disappearance of job opportunities *in the future*. Surveyed firms estimated that their firm’s modal industrial robot could theoretically replace 4.2 workers on average. Instead of laying off workers and risking labor disputes, interviews revealed that some firms preferred to slow or stop rehiring after workers resign or complete their contracts. This implies that there may be fewer open positions industry-wide in the future as Chinese firms continue to automate. In addition, recent research using Spanish and French data shows that firm-level automation led to negative market-level employment outcomes, but decreases in employment occurred not in the automating firm, but chiefly in competitor firms that did not automate (Koch, Manuylov and Smolka, 2019; Acemoglu, LeLarge and Restrepo, 2020). Despite Chinese workers’ positive evaluation of automation, they do not appear to be in denial of the possible future employment effects of automation. About 47 percent of

workers in the survey believe that their jobs could be automated in the next 5 to 10 years.<sup>49</sup>

### *Institutional Effects on Automation Anxiety*

Interviews suggest that workers' level of technological anxiety may vary depending on *what is at stake* as well as *how easy it is to secure comparable employment after a layoff*. Individuals' current positions often serve as an anchor point for subsequent evaluations. Finding a substitute for a good job — stable, well-compensated, with generous fringe benefits — tends to be more difficult, making an individual more attached to the job in hand and displacement much more painful. In contrast, labor separations are likely to be less distressing if the spell of unemployment is short. It is generally much less challenging to replace a job that provides little, for example, one that lacks a formal contract, pays low wages, and provides no or limited benefits.

A 60-year-old institutional arrangement in China provides a unique opportunity to test this theory. The household registration (*hukou*) system shapes individuals' lifelong economic opportunities — and affects how they may be treated as workers — at birth. Hukou is passed on from one's parents. It determines an individual's official and only formal permanent residence.<sup>50</sup> Hundreds of millions of Chinese workers have left their hometowns for cities in pursuit of economic opportunities, but internal migrants are shunned from government-provided public services and welfare programs at their migration destinations, and thus have much higher out-of-pocket expenses and costs of living (Song, 2014). In addition, migrant workers receive worse treatment in the labor market than their peers with local hukou. They were 2.6 times more likely than locals to be informally employed in 2005 (Gallagher, Lee and Kuruvilla, 2011). Informal employment

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<sup>49</sup>A similar question found in a Pew Research Center (2016) survey finds that only 18 percent of Americans believe their occupation will be automated in 50 years.

<sup>50</sup>Acquiring a local hukou in a big city is possible but notoriously difficult.

is characterized by its temporality, absence of a formal contract, and limited social insurance benefits or labor protections. Moreover, sizable wage differentials exist between locals and migrants (Lee, 2012). Although the 2008 Labour Contract Law sought to broaden protections for migrant workers, there are still significant gaps in implementation, enforcement, and social insurance coverage (Gao, Yang and Li, 2017). In other words, migrant workers with non-local hukou, on average, receive worse treatments and lower compensation than their local counterparts even if they perform the same tasks within the same company.

The systemic differences in access to public services and welfare have an enormous impact on workers' daily lives. These push factors decrease migrants' attachment to their current jobs, and motivate an increasingly large number of them to return to their hometowns (Duan et al., 2020). Most workers without a local hukou are not permitted to send their children to public schools in the city to which they migrated, meaning that they must either pay for private (and often subpar) education or leave their children behind in their hometowns. "None of our children [without a local hukou] can attend [public schools]. They have to go to private schools. The quality of education is infinitely worse — it is even worse than public schools in my hometown, which costs 47 RMB [7 USD] per year. My child goes to the cheapest private school here and it costs 6,000 RMB [850 USD] per school term," a worker from Company 17 (Appendix) said. "Workers without special skills typically make 5,000 to 6,000 RMB per month in this firm and the minimum wage in the city is 2,200 RMB," she added. Moreover, other costs of living in cities also typically increase at a much faster pace than wages. The starting monthly salary for another interviewee's position grew 50 percent from 3,000 RMB in 2008 to 4,500 RMB in 2018, but housing costs doubled during the same period of time (Company 51, Appendix). To offset these costs, locals can apply for minimum living standard subsidies and subsidized housing, but non-local workers cannot (Feng, Hu and

Moffitt, 2017).

Migrant workers have lower expectations. Their disadvantaged positions also mean that exit options no worse than their status quo are relatively abundant in supply. Interviewees frequently talked about options such as insurance sales, realtor, ride-share driver, and food delivery.<sup>51</sup> Migrant workers are also more likely to be geographically mobile than locals. Given the plethora of imminent threats to employment and family well-being, technological displacement is also not among migrant workers' top concerns. Furthermore, the greater legal protection afforded to local workers ironically makes them more expensive to hire and therefore less competitive than non-local workers with the same skills. For example, in Shenzhen, employers are mandated to provide medical insurance for contracted employees. They are required to purchase Tier 1 insurance for local employees and contribute 6 percent of the workers' salary toward the premium. On the other hand, employers are allowed to purchase Tier 2 or Tier 3 insurance for workers without a local hukou, costing them only 0.5 percent or 0.4 percent of the worker's monthly salary respectively.<sup>52</sup> Given their higher wages and government-mandated benefits, local workers are overall a greater financial burden to their employers than migrant workers. Thus, not only do local workers have more to lose, they are less mobile and might have a harder time securing a job after displacement, making them more anxious about job automation. Figure 24 below summarizes the argument:

### *Empirical test*

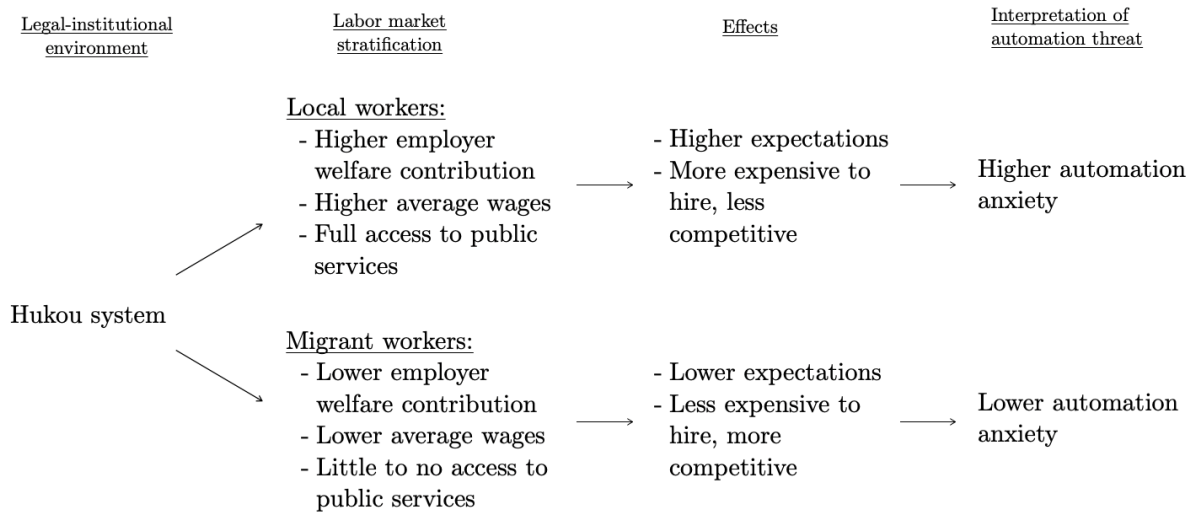
I test the theory using an original survey fielded in 19 southern cities. The sampling procedures were previously discussed in section 3. All 2,443 respondents are production

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<sup>51</sup>Interviewees noted that the younger generation often prefer real estate and insurance sales jobs over factory jobs. Other flexible employment opportunities in the gig economy were rumored to be higher-paying than unskilled manufacturing jobs among workers I conversed with.

<sup>52</sup>The full text of the Shenzhen Social Medical Insurance Law can be found here: [http://sso.sz.gov.cn/pub/sbjmeta/zxbs/zdyw/cbyw/zcwj/201408/t20140830\\_2553100.htm](http://sso.sz.gov.cn/pub/sbjmeta/zxbs/zdyw/cbyw/zcwj/201408/t20140830_2553100.htm).

Figure 24: Institutional effects on automation anxiety



workers in manufacturing. The sample is 50 percent male. The average respondent is 34 years of age, had attended either high school, vocational school, or technical school, and has a local hukou. They work in a large variety of industries, with electronics and electrical appliances (23 percent), clothing and textile (15 percent), and machinery and equipments (8 percent) best represented in the sample.

The dependent variable is the level of automation anxiety felt by workers. The survey asked respondents, “If your firm adopts industrial robots or automates production, how worried are you about losing your job?” Answers range from “not at all worried” to “very worried.” The independent variable is an individuals’ hukou status — local or non-local. The model also includes a host of individual-level demographic and attitudinal covariates that may influence technological anxiety. I control for age, gender, and the number of years an individual has served in their current firm (as a proxy of job stability). I also control for education, which may be correlated with individuals’ ability to adapt to and

benefit from workplace technology (Gallego, Kurer and Schöll, 2018) and how susceptible they are to automation (Frey and Osborne, 2017). In addition, the model accounts for respondents' self-assessed risk of replacement by robots and any existing plans to leave the firm. Lastly, I control for firm ownership (privately-owned, foreign-owned, state-owned), firm size (as measured by the amount of registered capital), firm-level profit margin, and industry type (e.g. clothing and textiles, food and beverage).

### *Results*

Results are presented in Table 20. Robust standard errors are adjusted for firm clustering. Respondents with a non-local hukou are less likely to be worried about technological displacement, with (column 3) and without firm-level controls (column 1). Hukou's statistically significant effect on technological anxiety is consistent with the predictions of the theory. This effect is substantively modest, but its role is comparable to a common explanation of automation susceptibility — education. The additional achievement of an educational milestone reduces individuals' technological anxiety by roughly the same magnitude as having a non-local hukou. Moreover, workers are less worried about being displaced by robots the longer they have served in the company, affording them seniority and feelings of security. Unsurprisingly, self-assessed risk of job automation in the next 5 to 10 years is positively associated with technological anxiety. However, age, gender, and workers' existing plans have no impact on technological anxiety, contrary to some of the findings in Giuntella and Wang (2019). Results are consistent across models with only individual-level covariates (column 1) and the full specification (column 3).

Firm- and industry-level covariates, as presented in column 2, appear to be less reliable predictors of automation anxiety than individual-level predictors. Only firm size has a statistically significant effect on the dependent variable. Workers in larger firms, as measured by the firm's registered capital, report higher levels of automation anxiety.



Table 20: Predictors of technological anxiety

	(1) Individual	(2) Firm	(3) Full
Non-local	-0.10* (0.04)		-0.12** (0.04)
Education	-0.11*** (0.02)		-0.12*** (0.02)
Gender	-0.01 (0.03)		0.01 (0.03)
Age	-0.01 (0.02)		-0.01 (0.02)
Firm years	-0.01* (0.00)		-0.01* (0.00)
Automation risk	0.13*** (0.03)		0.13*** (0.03)
Plan to leave	0.10 (0.05)		0.09 (0.06)
Ownership: Private		-0.00 (0.11)	-0.07 (0.11)
Ownership: Foreign		0.03 (0.11)	-0.06 (0.12)
Firm size		0.19* (0.07)	0.20** (0.07)
Profit margin		-0.02 (0.02)	-0.01 (0.02)
Industry: Electronics		0.09 (0.08)	0.11 (0.08)
Industry: Machinery		-0.01 (0.09)	0.06 (0.09)
Industry: Plastics		0.01 (0.10)	0.08 (0.10)
Industry: Metalworking		0.01 (0.10)	0.01 (0.11)
Industry: Furniture		-0.04 (0.10)	-0.04 (0.11)
Industry: Automobile		0.12 (0.12)	0.17 (0.12)
Industry: Food		-0.10 (0.13)	-0.13 (0.11)
Industry: Others		0.06 (0.08)	0.11 (0.08)
Constant	2.25*** (0.12)	2.12*** (0.13)	2.35*** (0.18)
Observations	1940	2107	1803

Standard errors in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Large firms have more resources and are thus in better positions to adopt state-of-the-art technology than small firms, contributing to the higher anxiety levels of their employees. However, the profit margin of a firm has small and statistically insignificant effects on job anxiety. In addition, workers in privately-owned and foreign-owned companies are no more or less worried about being replaced by robots than workers in state-owned enterprises, the baseline category, even though state-owned enterprises are less likely to automate (Cheng et al., 2019). Various industry types, compared to the clothing and textiles industry baseline, appears to have no effect on anxiety. This is in line with expectations based on Acemoglu and Autor (2011) and Frey and Osborne (2017), which argue for a task-based approach rather than industry-based approach to understand automation susceptibility.

On the whole, these results are consistent with the proposed theory and support findings from semi-structured interviews conducted in the field. Paradoxically, insofar as Chinese manufacturing workers experience anxiety over prospective job automation, local workers — who are better compensated and protected by local labor regulations — are more worried about technological displacement than migrant workers with non-local hukou.

#### **4.6 Conclusion**

This paper presented qualitative and quantitative accounts of Chinese manufacturing workers' reception of workplace automation based on semi-structured interviews, factory visits, and two original surveys conducted in 19 cities. Contrary to the scholarship's more pessimistic accounts of automation, most manufacturing workers in southern China — buffered by steady increases in demand and chronic labor shortages — appear to be unconcerned about technology's impact on employment and wages at present. During

interviews, workers instead emphasized the immediate and observable effects of technological improvements, such as lowered risks of injury, less monotonous work, lower labor intensity, increased competitiveness, and improved work environments, as opposed to economic or material concerns. These on-the-ground benefits of technological improvements play an important role in influencing blue-collar workers' attitudes toward technology, but they are often overlooked in macroeconomic analyses and popular discourses on workplace automation.

Chinese manufacturing workers do not appear to be in denial of the possible future employment effects of automation. About half of the surveyed workers believe that their jobs could be automated within the decade, whereas only 18 percent of Americans believe their occupation would be automated in 50 years (Pew Research Center, 2016). Survey results find that local workers are more worried about technological displacement than workers with non-local hukou, controlling for a host of individual- and firm-level covariates. This paper argues that China's hukou system shapes individuals' economic opportunities, and thus influences their expectations, what is at stake, and the availability of exit options no worse than the status quo. A good job with generous fringe benefits and protection is, on average, much harder to replace than a job that provides little to begin with. The undesirability of migrants' circumstances — precarious positions, lower remuneration, out-of-pocket expenses for essential public services that they are ineligible for, and sometimes years-long separation from their children — lower their expectations, and make their jobs less painful to lose and easier to substitute. Immigrant workers face a plethora of imminent threats to employment and family well-being, pushing technological displacement down their lists of concerns.

This paper contributes to ongoing discussions in Chinese politics, labor politics, and comparative political economy. For researchers interested in Chinese politics, this work highlights the unintended labor consequences of an unequal welfare system which

discriminates people based the hukou status people inherited at birth. By allowing systemic inequalities to persist (e.g. permitting employers to opt for a lesser tier of social insurance for their non-local employees), local governments inadvertently hurt the competitiveness of the group they sought to protect. In addition, this project also reveals a possible tension between local governments' goal of facilitating industrial upgrading through incentivizing automation on one hand, and placating their local working class constituents on the other. If local workers continue to feel more negatively affected by automation, local governments' aggressive push to modernize factories and promote "smart manufacturing" may create dissatisfaction amongst a group of constituents that is no stranger to contentious collective action.

This paper offers an institutional explanation of automation anxiety that may have implications beyond China. While existing explanations of education and job characteristics are no doubt relevant to the analyses of technology attitudes, this paper shows how institutions — existing labor arrangements — can lead to different levels of technological receptiveness for people who face similar threats of automation. In other countries, existing structures of labor organization often affect the value of the job at stake, especially for workers with lower educational attainment. In these situations, antagonism toward technology may be more likely to originate from organized groups, although it is not yet clear how automation may fundamentally shift the balance of capital-labor bargaining. If technological improvements are considered necessary to enhance economic growth and a nation's competitiveness, it is critical to understand the origins of technological anxiety and devise appropriate remedies to address these apprehensions.

## 4.7 Appendix

### *List of interviews and company visits*

Industry (name concealed to protect identities), city shorthand, establishment year, ownership type, size (employment), date (MM/DD/YY) (\*asterisk denotes additional factory or company visits). These interviews were conducted with Zhongwei Sun (South China Normal University) and Yunxue Deng (Central South University) in 2018. Interviewees included company leadership, human resources managers, and production line workers.

1. Automotive, City A, 2005, Japanese, 700, 09/13/18\*
2. Pharmaceutical, City A, 1959, State-owned, 1,200, 09/13/18\*
3. Robotics/Machinery, City A, 2015, State-owned, 1,000, 09/14/18\*
4. Chemical engineering, City A, 1985, Privately-owned, 200, 08/22/18
5. Chemical engineering (household), City A, 1994, Privately-owned, 10,000, 08/22/18
6. Product packaging, City A, 2001, Hong Kong, 500, 08/22/18
7. Furniture, City A, 1994, Privately-owned, 1,000, 08/22/18
8. Electronics, City A, 1999, Privately-owned, 900, 08/22/18
9. Automotive, City A, 2003, Joint venture, 16,000, 08/22/18
10. Automotive, City A, 1992, Joint venture, 3,800, 08/22/18
11. Computing/electronics, City B, 1993, Privately-owned, 1,000, 09/06/18\*
12. Semiconductor, City B, 1984, Joint venture, 600, 09/05/18\*

13. Jewelry, City B, 2012, Hong Kong, 600, 09/07/18\*
14. Electronics, City B, 2003, Privately-owned, 200, 09/07/18\*
15. Electronics, City B, 2002, Privately-owned, 1,200, 09/07/18\*
16. Automotive, City B, 1995, Privately-owned, 1,200, 09/07/18\*
17. Robotics/Machinery, City B, 2012, Privately-owned, 110, 09/06/18
18. Electronics, City B, 2000, American, 1,800, 09/06/18
19. Jewelry, City B, 2007, Privately-owned, 230, 09/06/18
20. Electrical appliances, City B, 1991, Republic of China (Taiwan), 3,500, 09/05/18
21. Electronics, City B, 1994, Hong Kong, 2,000, 09/05/18
22. Machinery, City B, 1986, Joint venture, 1,000, 08/24/18\*
23. Electronics, City B, 2008, Privately-owned, 2,000, 08/23/18\*
24. Pharmaceutical, City B, 1979, Privately-owned, 3,000, 08/23/18
25. Office facilities, City B, 2001, Japanese, 1,000, 08/23/18
26. Electronics, City C, 2010, Privately-owned, 7,000, 08/23/18
27. Automotive parts, City C, 1998, Republic of China (Taiwan), 1,000, 08/23/18
28. Electrical appliances, City C, 2010, Hong Kong, 2,000, 08/23/18
29. Metalworking, City C, 2010, Hong Kong, 1,000, 08/23/18
30. Polymer/plastics, City C, 2012, Republic of China (Taiwan), 800, 08/23/18
31. Electronics and Electrical appliances, City D, 1994, Privately-owned, 6,600, 09/10/18\*

32. Beverages, City D, 2006, British/Hong Kong, 280, 09/11/2018\*
33. Automotive electronics, City D, 1986, State-owned, 4,300, 09/11/18\*
34. Automotive parts, City D, 1995, Japanese, 5,000, 09/12/18\*
35. Machinery, City D, 2010, Hong Kong, 1,800, 09/12/18\*
36. Automotive parts, City D, 1992, Japanese, 1,500, 09/10/18
37. Electrical appliances, City E, 1983, Joint venture, 1,500, 10/15/18\*
38. Electronics, City E, 1997, Privately-owned, 1,300, 10/15/18\*
39. Textiles, City E, 2004, 500, Privately-owned, 500, 10/15/18
40. Ceramics, City E, 2002, 750, Privately-owned, 750, 10/15/18
41. Electrical appliances, City E, 2011, Privately-owned, 730, 10/15/18
42. Automotive electronics, City E, 1981, Privately-owned, 2,500, 10/15/18
43. Furniture, City E, 2015, Privately-owned, 320, 10/17/18
44. Electrical appliances, City F, 1992, Privately-owned, 2,600, 10/17/18\*
45. Lighting, City F, 1997, Privately-owned, 9,000, 10/18/18\*
46. Automotive parts, City F, 2002, Japanese, 1,000, 10/16/18
47. Robotics/machinery, City F, 2003, Privately-owned, 150, 10/16/18
48. Industrial production (bathrooms), 2008, American, 210, 10/16/18
49. Pharmaceuticals, City F, 2002, Privately-owned, 600, 10/16/18
50. Packaging and printing, City F, 1900, Privately-owned, 1,600, 10/16/18

51. Robotics/machinery, City G, 2015, Privately-owned, 1,100, 10/18/18\*
52. Machinery/motor, City G, 2003, Japanese, 2,400, 10/18/18
53. Automotive, City G, 2008, Privately-owned, 10,000, 10/18/18
54. Machinery, City H, Privately-owned, 350, 10/08/18
55. Packaging, City H, Privately-owned, 490, 10/09/18\*
56. Toys, City H, Privately-owned, 500, 10/09/18\*
57. Electrical appliances, City H, Privately-owned, 400, 10/08/18
58. Toys, City H, Hong Kong, 430, 10/08/18
59. Metalworking, City H, 1996, Hong Kong, 300, 10/09/18\*
60. Stationery, City H, 1998, Privately-owned, 200, 10/08/18
61. Moulding/machinery, City I, 2000, Privately-owned, 1,000, 10/11/18\*
62. Moulding/machinery, City I, 1958, Privately-owned, 300, 10/11/18\*
63. Moulding/machinery, City I, 1992, Privately-owned, 60, 10/11/18\*
64. Furniture, City I, 2008, Privately-owned, 100, 10/12/18\*
65. Shoes, City I, 2000, Privately-owned, 600, 10/12/18\*
66. Electronics, City J, 2009, Privately-owned, 2,200, 11/21/18\*
67. Machinery, City J, 1992, Privately-owned, 600, 11/21/18
68. Machinery/Parts, City J, 1966, State-owned, 500, 11/21/18
69. Beverages, City J, 2016, Privately-owned, 160, 11/21/18\*



70. Machinery, City J, 1992, Joint venture, 200, 11/21/18\*
71. Steel and metal, City K, 2008, State-owned, 2,900, 11/22/18\*
72. Metalworking, City K, 1995, Privately-owned, 600, 11/22/18\*
73. Metalworking, City K, 2010, Privately-owned, 300, 11/22/18
74. Knife making, City K, 1997, Privately-owned, 200, 11/22/18
75. Glassworking, City K, 1994, Privately-owned, 300, 11/22/18
76. Electrical appliances, City K, 2004, German, 900, 11/22/18

*Survey samples*

Table 21: Survey: firm sample (by ownership)

Ownership	N	%	Cumulative
State-owned	24	3.95	3.95
Privately-owned	313	51.48	55.43
Hong Kong	121	19.90	75.33
Taiwan	48	7.89	83.22
Japan	26	4.28	87.50
Korea	2	0.33	87.83
Europe and United States	24	3.95	91.78
Others	50	8.22	100.00
Total	608	100.00	

Table 22: Survey: firm sample (by industry)

Industry	N	%	Cumulative
Electronics and electrical appliances	153	25.16	25.16
Machinery	59	9.70	34.87
Plastics and chemicals	71	11.68	46.55
Textile and clothing	102	16.78	63.32
Metalworking	44	7.24	70.56
Appliances, toys, furniture	58	9.54	80.10
Automobile	26	4.28	84.38
Food and beverages	35	5.76	90.13
Others	4	0.66	90.79
Metallurgy and cement processing	38	6.25	97.04
Vehicle parts	10	1.64	98.68
Paper	8	1.32	100.00
Total	608	100.00	

Table 23: Survey: firm sample (by size)

Size (employees)	N	%	Cumulative
Small (1-299)	291	47.86	47.86
Mid-sized (300-999)	192	31.58	79.44
Large (1000 or above)	125	20.56	100.00
Total	608	100.00	

Table 24: Survey: worker sample (by gender)

Gender	N	%	Cumulative
Male	1,209	49.67	49.67
Female	1,225	50.33	100.00
Total	2,434	100.00	

Table 25: Survey: worker sample (by age)

Age (compressed)	N	%	Cumulative
15-25	332	13.66	13.66
25-30	618	25.42	39.08
31-35	580	23.86	62.94
36-40	463	19.05	81.98
41 or above	438	18.02	100.00
Total	2,431	100.00	

Table 26: Survey: worker survey (by educational attainment)

Education	N	%	Cumulative
Elementary school or below	66	2.70	2.70
Middle school	670	27.40	30.10
High school, tech school, vocational school	980	40.08	70.18
Associate degree	494	20.20	90.39
Bachelor's degree or above	235	9.61	100.00
Total	2,445	100.00	

Table 27: Survey: worker survey (by household registration/hukou)

Hukou	N	%	Cumulative
Local, agriculture	696	29.27	29.27
Local, non-agriculture	514	21.61	50.88
Non-local, agriculture	969	40.75	91.63
Non-local, non-agriculture	199	8.37	100.00
Total	2,378	100.00	

## Chapter 5

### Conclusion

#### 5.1 Summary of arguments

While decades of studies in economics have documented the distributional consequences of technology related to employment, income, inequality, and health, the political effects of automation are not well understood. This dissertation represents one of the first systematic attempts to study public opinion toward automation, making three main arguments:

First, despite technology's disruptions to the labor market, people have largely positive attitudes toward workplace technology. Technology has immediate and observable benefits on workers' day-to-day experiences that are generally not captured in macroeconomic analyses of technological change. Most workers also believe that technological innovation and adoption are crucial to ensure their company's survival and in maintaining their country's competitiveness in the world. These favorable appraisals of technology coexist with widespread concerns about technological displacement, and remain relatively robust even when people are explicitly reminded of technology's labor-displacing effects.

Second, it shows that workers cope with employment threats from automation, not by slowing technology adoption and innovation, but instead by clamoring for restrictions

against immigrants and foreign workers. Employment anxiety from automation evokes individuals' protectionist instincts. With robots eating into the pie of jobs, people want to stop *outsiders* from further dividing the pie. Hesitant to halt innovation, individuals would rather buffer domestic workers facing technological threat with substitute policies — restrictions on immigration and trade — that they believe could improve national wages and employment prospects. Thus, the threat of automation has not ignited a backlash against technology, but a populist revolt against globalization.

Lastly, this work argues that institutions influence workers' evaluation of technological threat. Rules governing labor relations and organizations affect workers' expectations, grounds for termination, and the ease of securing comparable employment in case of dismissal. The household registration system in China creates a stratified labor market for local and non-local workers. Non-local workers, who face systemic discrimination and have fewer labor protections, are ironically less concerned about technological displacement than local workers. The availability of exit options no worse than their status quo contributes to migrants' lower anxiety about automation compared to locals. Antagonism toward technology may be more likely to originate from workers in relatively privileged positions, if they do not expect to be able to transition to comparable employment after a layoff.

## 5.2 Future research

Throughout history, when labor-replacing technology threatened workers, resistance was the norm rather than the exception. While this work finds a widespread disdain for government restrictions on technology, it does not rule out resistance to automation that may erupt in other forms or within subpopulations in the future. Future public opinion studies aiming to understand the politics of automation may consider further

exploring different dimensions of technology policies. Proposals such as rolling back existing tax incentives designed to promote automation (in the case of South Korea) and taxing robots as if they were humans (as proposed by business leaders like Bill Gates) may gain traction amongst the public. This dissertation has only examined one generic form of anti-technology policy.

In addition, it may be fruitful to examine the conditions in which enthusiasm toward technology might break down within subpopulations. The paradoxical finding in China that non-local workers with less labor protections (leading to lower expectations and more exit options) exhibit lower levels of automation anxiety than local workers merits further examination in other contexts. Institutional mechanisms in other systems likewise create marked differences in compensation and stratification in the labor market, even for workers with similar skills, such as union and non-union workers in the United States, and full-time and part-time workers in Japan. Findings from this dissertation imply that opposition to automation may come from workers with relatively privileged positions. Furthermore, variations in industrial relations and vocational training between liberal market economies (e.g. the United States) and coordinated market economies (e.g. Germany) may contribute to differences in technological acceptance among workers. A promising area for future research may be how different “varieties of capitalism” affect the pace of technological adoption, anti-technology mobilization efforts within a network, transferability of workers’ skills, and the availability of exit options system-wide.

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