Driving Labor Apart: Climate Policy Backlash in the American Auto Corridor*

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Abstract

What are green industrial policy's electoral effects? There has been a global resurgence in industrial policy on the premise that it sidesteps voter opposition. But we argue that industrial policy can cause backlash when it has unequal effects within sectors. Communities that face job threats should vote for politicians who oppose the energy transition. We leverage disaggregated data to identify counties with jobs at risk from vehicle electrification spurred by industrial policy. Using a difference-in-differences design, we find that the EV transition increased Republican presidential vote share by 2.5 percentage points in vulnerable counties compared to the matched control group. Rather than the national union stemming backlash by unifying labor and the left, our interviews show how local unions provided information that reinforced worker fears. Climate reforms with unequal effects undermine industrial policy's political logic and cut new cleavages between left parties and the working class.

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There has been a global resurgence in industrial policy. Governments have rediscovered subsidies, targeted investments, and trade barriers as tools to achieve national goals such as stopping climate change, building semiconductors, and re-shoring manufacturing. So-called "green" industrial policy aims to mitigate emissions that warm the planet (Allan and Nahm 2024). This transformation has a political logic. Create economic winners not losers, so voters do not feel the energy transition's costs (Ross 2024). But this strategic shift is in its early days. There is little evidence yet of its electoral effectiveness.

We know how people who face clear losses from climate policies vote. Absent credible compensation, they turn against the incumbent or support far-right parties (Bolet, Green, and Gonzalez-Eguino 2023; Gazmararian and Tingley 2023). Climate backlash has emerged in coal mining regions (Gazmararian 2024), by workers in polluting industries (Bechtel, Genovese, and Scheve 2019; Heddesheimer, Hilbig, and Voeten 2024), consumers harmed by regulations (Colantone et al. 2024; Voeten 2024), and residents near clean energy construction (Stokes 2016). But these findings do not speak to green industrial policy, which will create, not eliminate, jobs.

We study the electoral effects of policies to electrify cars. Automobile manufacturing employs 1.1 million workers in the United States along a corridor that carves through swing states like Michigan. Democratic presidents have enacted industrial policies that encourage electric vehicles. Republicans oppose the EV transition and climate policy (Egan 2013). Unlike coal, the EV transition does not threaten the auto industry's survival. Manufacturers can shift from gasoline- to battery-powered vehicles. The Democratic Party has also cooperated with unions to design these policies, which should unify labor and the left.

We argue, however, that when industrial policy has distributive effects within an industry, it can provoke electoral backlash. Auto workers vary in their vulnerability to the EV transition. Some produce specific parts for gas-powered vehicles such as internal combustion engines and powertrains. Others build parts used in all vehicles such as fenders and suspensions. Communities with workers in vulnerable production processes face not only threats to their jobs but to their identity as an auto town. Democratic presidential candidates and the national union promise new EV investments, but workers and community members doubt where these jobs will go and whether their skills apply.

As EVs increase in market share, vulnerable communities should anticipate economic disruption and vote for politicians who oppose climate policy. Most voters do not look far into the future. But unions supply information about the EV transition, and this knowledge diffuses through social networks. Presidential candidates have also sent clear messages about where their parties stand. Republicans should gain votes because their presidential candidates promise to roll back Democratic climate policies.

A challenge for our analysis is that as EVs grew in market share, Republican presidential candidates appealed to voters on trade, immigration, and race. These were major issues in the 2016 and 2020 elections, including for auto communities hit hard by globalization, deindustrialization, and automation.

To isolate the EV transition effect, we compare auto union counties. The only difference is their exposure to job loss in the EV transition. Workers in treated counties produce gasoline vehicle parts. Those in control counties manufacture parts any vehicle can use. The counties have the same industry and union, so they have a common political, cultural, and economic background that would predispose them to messages about trade, immigration, and race. We verify that the treatment and control groups have similar trade exposure, socio-economics, and worker skills. We further weight the counties with covariate balancing propensity scores, so they are statistically identical except for their vulnerability.

Before the increase in EV sales, counties with workers making gas vehicle parts and those with people building general auto parts voted for Republicans at similar rates. These parallel trends suggest that the control group serves as an appropriate counterfactual for our difference-in-differences analysis.

We find that the EV transition caused Republican presidential vote share to increase by 2.5 percentage points in vulnerable counties compared to otherwise similar places. This partisan shift occurs despite the EV transition being in its early stages. Voters turned to Republicans in swing states like Ohio and Michigan.

To understand whether job loss concerns influenced voting, we interviewed 29 Michigan autoworkers and union leaders. The participants came from local branches of the United Auto Workers that vary in their EV transition vulnerability. These interviews reveal that uncertainty about vehicle electrification's economic effects drove their support for Republican presidential candidates. These concerns about job loss align with findings from focus groups in this region (Silva, Carley, and Konisky 2023).

Our results challenge prominent theories about how unions influence their members' political behavior. The national UAW supports Democrats and their EV policies, which should create unity behind Democratic presidential candidates, given how unions shape their members' policy preferences (Ahlquist, Clayton, and Levi 2014; Kim and Margalit 2017). But counties with vulnerable union workers broke from the left.

To explain this puzzle, we develop a bottom-up argument about how local unions provide political information. Unions are not monoliths. Many have local branches with varied interests. The national union leadership's ability to organize its local chapters in common cause shapes labor's political influence (Olson 1965, Ch 3.).

We argue that the messages local leaders send vary with how policies affect their members. The presidents, treasurers, and trustees of local unions could lose re-election if they do not act in their members' interests. Thus, locals whose members confront layoffs should pass along more negative information about EVs and Democrats. In contrast, local leaders at facilities less exposed to the transition should spread more positive messages.

Local leaders provide information to their members behind closed doors, which makes this dynamic challenging to study. Our interviews allow us to explore the messages UAW locals sent their members. We compare messages from locals in the same county to hold constant the political and economic context, which could affect information provision.

We find that leadership from UAW Local 160, a local susceptible to job loss, has provided much more negative information about the EV transition and President Biden's policies than UAW Local 2280, which has a firmly situated future in EV production. This exploratory analysis suggests that union information provision varies with how policies affect locals.

Our findings show how climate policy is cutting a new cleavage between the working class and the left (e.g., Mildenberger 2020). Unions once tied the two together. Labor's power, however, has declined for decades and, today, faces new threats. As industries grapple with the clean energy transition, unions struggle to organize the increasingly disparate interests of their members. These internal conflicts challenge the politics of industrial policy.

Reformers hope green industrial policy will avoid electoral backlash by hiding costs and creating economic beneficiaries. Voters in industries that climate policy does not existentially threaten have been ignored in the literature, and perhaps by policy-makers, who assume that because they can survive the transition, their support will automatically follow. It may not, and governments that ignore this do so at their peril.

The American Auto Corridor

We study the electoral effects of industrial policies promoting electric vehicles. These policies affect the American auto industry, which generates three percent of gross domestic product (BEA 2023). Auto manufacturing concentrates in a corridor that extends south from Ontario through Michigan, Ohio, Kentucky, and Alabama, with parts reaching Mexico. This clustering around Detroit results from its proximity to water and railways that provided access to Appalachian coal and steel and Lake Superior's iron and copper.

The United Auto Workers represents much of the industry, and unifies workers and their communities behind the Democratic Party (Dark 1999). Unionization rates vary over time and across the country. In 1970, the UAW had 1.5 million members, which fell to 397,000 in 2020. The UAW has come under pressure as foreign automakers have taken advantage of the South's laxer labor laws to open non-union plants. Even with this decline, Democratic presidential candidates continue to prize the UAW's endorsement.

The auto industry has suffered shocks that sometimes frayed its workers' ties to the Democratic Party. Automakers lost 105,000 jobs between 1979 and 1989 after an oil crisis, record inflation, and Japan's entry into the market (Singleton 1992). In 1994, the North American Free Trade Agreement led to greater industry integration. Cars assembled in Detroit now have parts machined in Chihuahua. Integration made the industry more efficient and displaced some jobs, but overall employment grew (Burfisher, Robinson, and Thierfelder 2001). Still, counties with industries harmed by NAFTA increasingly opposed Democrats (Choi et al. 2021; Flaherty 2023). Then in 2008, the financial crisis bankrupted Chrysler, GM, and nearly Ford. Autoworkers stuck with the Democratic Party through this crisis and industry bailouts. Barack Obama won Macomb County, a Michigan auto manufacturing hub, by nine points in 2008 and five in 2012. But in 2016 and 2020, Macomb and parts of the auto corridor turned to Donald Trump.

Workers have also grappled with automation. Automakers have begun to use robots in tandem with humans to help with repetitive tasks such as welding (Foster et al. 2022). Across the economy, workers in routine tasks have seen demand for their labor decrease (Acemoglu and Restrepo 2020), and the same people have become more supportive of protectionism (Bisbee and Rosendorff 2024; Owen and Johnston 2017; Wu 2022). The losers of technological change often turn to populists parties (Gallego and Kurer 2022), as seen in Europe (Anelli, Colantone, and Stanig 2021; Milner 2021). But there is little evidence that automation has caused electoral backlash among American autoworkers.

Industrial Policy and the EV Transition

The Obama administration implemented industrial policies to grow the electric vehicle market after the 2008 global financial crisis (Lane et al. 2013). The aim was to increase EV supply and demand. Demand-side policies included $7,500 tax credits to reduce upfront costs (Meckling and Nahm 2018). These tax incentives substantially increased EV sales (Li et al. 2017; Sierzchula et al. 2014).

The government expanded EV supply with a requirement that automakers sell fuel efficient cars. The Department of Energy also created a $9 billion loan program to fund clean technology start-ups, which helped then-nascent Tesla grow. The government further invested in charging infrastructure to make it easier for consumers to adopt EVs.

While some commentators point to cheaper batteries as a reason for EV growth, these technological improvements also stemmed from industrial policy (Muratori et al. 2021; Rapson and Muehlegger 2023). The 2009 stimulus package invested $4 billion in battery and electric drive component manufacturing (Lane et al. 2013). Government policy is the main force behind vehicle electrification (Foster et al. 2022; Sykes and Axsen 2017).

Leaders publicized these EV transition policies. In Obama's 2011 State of the Union, he called for one million EVs on the road by 2015. The administration backed off that goal after slower than expected EV growth (Rascoe and Seetharaman 2013), but between 2012 and 2017 electric vehicles begin to increase in market share alongside government and automaker commitments to phase out gasoline vehicles.

EV Transition Accelerates Between 2012-2017

Before 2010, the number of electric vehicles sold was too small for the Bureau of Transportation Statistics to report. EVs as a share of new vehicle sales increased six fold between 2012 and 2016. This is from a small baseline. Electric cars still made up less than one percent of new sales, though the rate of change signals great potential. In 2016, Americans bought over 87,000 EVs. In 2020, that number more than doubled to 239,000 (Appendix A.6).

In response to government policies, automakers set public targets to deploy more EVs. Renault-Nissan in 2013 said it would sell 1.5 million EVs by 2020; Volvo in 2014 said it would phase out internal combustion engine models by 2024; VW promised in 2016 that EVs would make up a quarter of its sales by 2025; GM in 2017 said it would introduce 18 EV models by 2023 (Meckling and Nahm 2019).

The UAW also began to take the EV transition seriously around 2015. “We had a department called Product Intelligence. That department’s sole responsibility was to take a look and peek behind the curtain of the future of manufacturing. Those topics [EVs] were something that we had been on top of in the Ford Department. So, yeah, I can speak intelligently and say 2015-2016,” said Darryl Nolen, who served in UAW leadership.[1]

Partisan Climate Policy Divide

Democrats support industrial policy to deploy EVs. Democratic presidential candidates claim credit for EV growth and promise to expand policy supports for the industry to fight climate change. Hillary Clinton and Joe Biden both pledged in their presidential campaigns to create union jobs in the clean energy transition.

Republican presidential candidates, in contrast, promise to roll back policies encouraging EVs. This reflects a broader partisan divide on climate policy (Egan 2013). Donald Trump “has long claimed electric cars will ‘kill’ America’s auto industry” (Friedman 2024). In 2016, Trump campaigned on rolling back Obama’s fuel economy standards. In 2019, Trump proposed ending the federal EV tax credit. Whether these rollbacks could stop the EV transition is debatable. Regardless, the message is clear: vote for Democrats and accelerate EVs or vote for Republicans who stop the transition.

Distributive Effects Within the Industry

Vehicle electrification will transform how companies make cars. The industry will shift from mechanical production processes, where workers machine and assemble internal combustion engines and powertrains, to electrochemical production processes, where people build batteries and electric motors (Cotterman et al. 2024). Autoworkers perform specific tasks along the supply chain. The same worker does not build engines and assemble the final vehicle.

People who work in internal combustion engine and power train jobs are most at risk in

1. Interview 3.

the transition. Other jobs are less exposed, such as workers who assemble the final vehicle or manufacture general components that EVs also use like interior trim, tires, and fenders.

In addition to what a worker does, where she works also affects her exposure to the transition. Companies are reconfiguring supply chains. Smaller suppliers of gasoline vehicle parts may lack the scale and capital to shift their production processes, unlike larger multinational suppliers. Automakers also plan to develop their own electric vehicle components. This vertical integration makes it harder for suppliers to adapt (Foster et al. 2022).

The EV transition has not yet caused major job loss. Employment data show that gasoline-vehicle manufacturing jobs have grown from 2012 to 2020.[2] The absence of a labor market shock is likely because EVs still comprise a modest share of new cars sold. But if vehicle electrification continues, workers who build parts specific to gasoline vehicles may face employment threats.

But vehicle electrification will also create new jobs. According to industrial policy advocates, these benefits should sustain political support among autoworkers. EVs, for example, will expand demand for workers to build batteries and electric powertrains.

There is, however, debate over whether EVs will result in net job creation. One engineering assessment finds that electrification may increase worker hours per vehicle in the short- to medium-term (Cotterman et al. 2024). Whereas Ford's CEO predicts that EVs will require 40% fewer labor hours to build (Bushey 2022). The UAW internally is worried about the transition even if they publicly support the Democratic Party. "The question is the level of employment within these facilities. It takes fewer people to assemble an electric vehicle; there are fewer parts than in an internal combustion engine. The concern is where the membership is going to go," said Scott Birdsdall, a retired UAW leader.

Even if the transition creates more jobs than it eliminates, this might not reassure vulnerable communities. First, companies may not locate new jobs near gas vehicle manufacturing. Firms may move to states with weaker labor protections. Second, workers worry

2. Appendix A.3. Employment growth could have been faster absent EVs, but there is not net-job loss.

about whether their skills apply in EV production processes, which involve more battery chemistry and less metal machining.[3] Workers may fear the loss of their jobs more than they value potential new opportunities (Kahneman and Tversky 1979).

The government, companies, or unions could offer retraining programs and compensation for lost income. In Spain's coal phase out, "just transition" assistance muted electoral backlash (Bolet, Green, and Gonzalez-Eguino 2023). But the US government has often failed to provide adequate compensation to dislocated workers, which creates uncertainty about a smooth transition (Gazmararian and Tingley 2023). Economic assistance for coal communities, for example, was underfunded and did little to stop voters from leaving the Democratic Party (Gazmararian 2024).

Electoral Effects of Technological Disruption

As the EV transition advances, communities where people build parts specific to gasoline vehicles should become more likely to vote for Republican presidential candidates. Republicans oppose climate policy. Voters may believe that a Republican president would halt and even reverse the energy transition. While there is no off switch for vehicle electrification, this belief is not entirely misguided. Industrial policy has and continues to stimulate electric vehicle supply and demand.

Workers could instead support parties that would protect them by expanding the social safety net (Margalit 2019). Workers who lose their jobs or face layoff threats often demand social protections (Iversen and Soskice 2001; Margalit 2013). But Republicans have blamed the Democrats' EV policies as the cause of future job loss. Voters should prefer preventing the problem rather than insuring against it.

Electoral backlash should appear in presidential elections because of the stark climate policy divide between the parties. Presidents and lawmakers have different constituencies, so they should have distinct stances on the EV transition. The president must defend the

3. There is some evidence of skills transferability (Cotterman et al. 2022).

party platform, which includes green industrial policy, whereas Democratic representatives of auto manufacturing districts can diverge from the party to stay in step with constituents who may oppose the EV transition (e.g., Canes-Wrone, Brady, and Cogan 2002).

Voters in auto communities should respond to the EV transition even if they do not work in the industry for three reasons: identity, unions, and self-interest. First, the auto industry holds cultural significance for community members. Sociologists document how people in auto communities view making cars as a way of life (Dudley 1994). The industry's cultural resonance is common in communities where one company dominates the local economy (Bell and York 2010). Layoffs, therefore, threaten more than workers but a community's identity.

Second, unions share political information with community members and mobilize them to vote (Ahlquist 2017; Verba, Schlozman, and Brady 1995). Union leaders provide members with information at regular meetings, posted bulletins, social media posts, and informal conversations (Macdonald 2021). This information spreads through union members' social networks to their neighbors, family, and friends. These interpersonal ties are a significant way that people learn about politics (Berelson, Lazarsfeld, and McPhee 1954).

Local unions also mobilize community members to vote. They hold phone banks, canvass doors, and set up booths at county fairs to educate people about politics. Unions have the incentives, resources, and experience to organize communities (Lopez 2004). These mobilization efforts are one reason scholars find a connection between union strength and local political participation (Leighley and Nagler 2007; Radcliff and Davis 2000).

Third, it community members' self-interest to vote based on what happens to the auto industry. Job loss harms the entire county. Local manufacturing provides tax revenue that funds public goods such as roads, schools, and firefighters. Layoffs spillover to reduce demand for jobs that support manufacturing such as service workers. People outside the auto industry but inside communities with vulnerable autoworkers may worry about the EV transition's effects on their livelihoods. Community-wide voting appears in response to other economic shocks such as globalization and coal's decline (Gazmararian 2024; Guisinger 2017).

Our argument builds on research about technological disruption's electoral effects. People harmed by technological shocks often lash out against incumbent politicians and support far-right parties (Gallego and Kurer 2022). Voters in places that lost jobs to cheap imports, for example, turned to Republicans who promised protectionism and scapegoated marginalized groups (Autor et al. 2020; Baccini and Weymouth 2021).

But our context differs. We examine voters who anticipate disruption—not those who have already been harmed. People usually do not make such prospective calculations. Political scientists assume people lack the capacity (Achen and Bartels 2016), or incentives to gather information (Downs 1957).

Two factors, however, facilitate forward-looking voting in this case. First, autoworker unions, as described above, spread information about how policies will affect their members. Second, politicians have sent clear messages about where the parties stand on the EV transition. Democratic presidential candidates claim credit and promise to accelerate vehicle electrification. Republicans agree that Democrats are responsible but that the EV transition is harmful and they would reverse it. When policies have clear costs and fall along party lines, voters can more easily vote on single issues (Citrin and Green 1990).

Data and Measurement

EV Transition Vulnerability

A county is vulnerable to the EV transition if workers there build parts used only in gas vehicles. Additional factors, such as outside job options, skill sets, and workforce programs, may attenuate or amplify vulnerability. We focus on the presence of gasoline-vehicle specific employment when measuring vulnerability.

How do workers view vulnerability? "People think, 'what do I do?' Well, if you work in a final assembly plant, we're going to assemble the EVs here, so you're good. If you work in an engine plant, well, a full EV has a much different engine/motor than what we make right

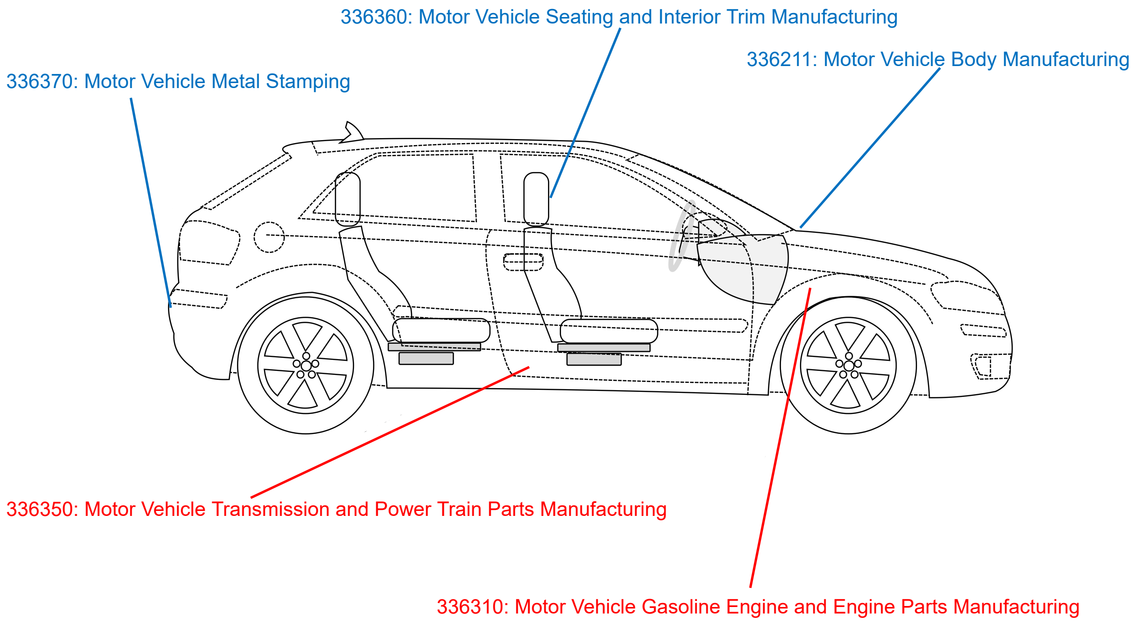

Figure 1: Six-digit NAICS examples

Notes: Red labels indicate parts specific to gasoline-specific vehicles (treatment), and blue labels denote general auto components (control). Appendix A.2 contains an industry code list.

now," said Jim Pedersen, a retired UAW leader who spent his career in the auto industry. This is the logic of our measurement strategy.

To identify vulnerable workers, we use County Business Patterns employment data at the six-digit NAICS level (Eckert et al. 2020). These industry codes classify the production processes at business establishments. The code reflects the primary activity of an establishment, which the Census Bureau determines with production cost and capital investment data. These are the most fine-grained, comprehensive public auto supply chain data.[4]

Each six-digit code contains a brief description and examples. To determine if an industry produces parts for gas vehicles, we cross-referenced studies about car production processes, reviewed the MarkLines auto part catalog, and consulted experts. There is often little ambiguity. NAICS 336310 is "Motor Vehicle Gasoline Engine and Engine Parts Man-

4. We are extending the analysis with proprietary industry data from MarkLines.

ufacturing." A few industries have a mix of production processes, which we categorize as vulnerable because some workers face job risks.

Figure 1 shows how these data differentiate an industry's vulnerability to the EV transition. Vulnerable industries include engine and powertrain manufacturing. Less vulnerable industries include motor vehicle bodies or interior trim. Many vulnerable industries machine parts, whereas less vulnerable ones assemble final vehicles. For example, 734 workers at GM's Marion Metal Center in Indiana stamp aluminum and steel parts, such as doors, roofs, and fenders that form a vehicle's body and structure. Since 1956, workers stamped these parts for gasoline-powered cars. But in 2022, the plant purchased two new press lines and upgraded its equipment to stamp parts for EVs. The general nature of the plant's work made this adjustment easy, according to UAW leaders (GM 2022).

Unionization

The population of interest is counties with unionized auto workers. These communities should have more information about EV policies. They have also historically supported Democrats, so they are cross-pressured on labor and environmental issues.

To locate union counties, we compiled 468,151 financial disclosure reports from the Department of Labor from 2000 to 2021. Federal law compels these disclosures, which contain addresses for local chapters of the UAW. We used ZIP codes to identify a local's county. The sample includes counties with union members as of 2008 to avoid possible post-treatment bias if the EV transition had begun to affect labor's strength.

Presidential Elections

We study presidential elections because there is a national partisan divide on climate policy and the EV transition. In Senate and Congressional races, candidates strategically diverge from the party line to stay in step with constituents. Therefore, the partisan backlash hypothesis does not automatically apply to non-presidential elections without information on candidate platforms (Canes-Wrone, Brady, and Cogan 2002).

The county elections data cover 1976 to 2020 (Leip 2020). This long period provides more leverage to test our research design's parallel trends assumption. We consider electoral change relative to a 2012 baseline to minimize bias from compositional changes. We focus on counties because, as discussed above, our argument predicts community-wide electoral effects. Counties are also the smallest geography that matches the employment data.

Research Design

We use a difference-in-differences design to estimate the EV transition's electoral effects. Our history of American EV policy above shows how vehicle electrification began to accelerate and become visible to union leaders between 2013 and 2016. We reached this conclusion by examining EV sales data, policy timing, automaker plans, and through our interviews with union officials. The timing corresponds most with the 2016 election, which serves as the beginning of the treatment period.[5]

Treatment: Vulnerability

The treatment group consists of counties with vulnerable workers who make gasoline specific parts. The control group includes counties with less vulnerable workers who make general auto parts. Both the treatment and control counties have local unions, whose presence provides information to workers and community members about the EV transition.[6] It is also in places with strong unions where voters are cross-pressured on labor and environmental issues, so the EV transition could shift partisan allegiances. We focus on the level of jobs, not layoffs, because electric vehicles have not yet caused net job loss (Appendix A.3).

The control counties are not necessarily EV investment destinations. Rather, they have workers who build parts or perform tasks that apply to EVs. These workers benefit from car

5. Results hold with a continuous measure that uses the annual market share of EVs (Table B2).
6. Consistent with this argument, the EV transition has no effect in non-union auto counties (Figure C1).

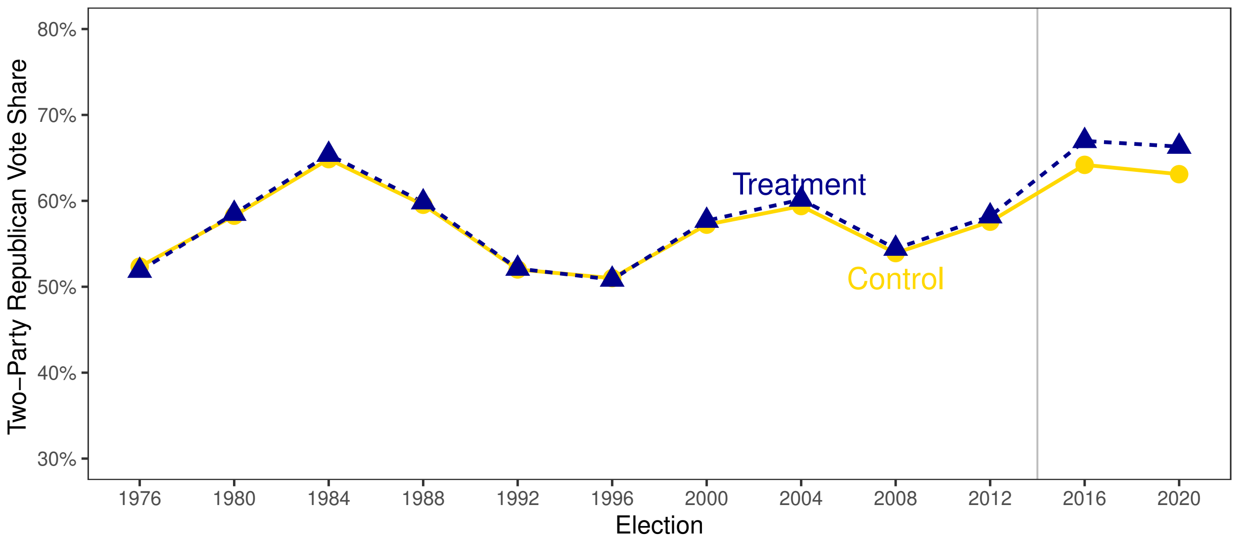

Figure 2: County-level average two-party Republican vote share, 1976–2020

Notes: Treatment counties are those with more than 1% of local union employment in industries manufacturing parts specific to gasoline vehicles, while control counties are those with more than 1% of local union employment in industries manufacturing general auto parts.

sales regardless of whether they are electric. The contrast is between union auto counties that differ in vulnerability.

The difference-in-differences model requires discrete treatment and control groups. We determine these cutoffs with theory and data (Appendix A.5). The EV transition has community-wide effects, so backlash should appear even in counties with few direct auto jobs. The data indicate a meaningful break at one percent of local employment in the auto industry. This threshold positively correlates with manufacturing GDP, a sign of that it captures the industry's economic relevance. Therefore, we defined treated counties as those with more than one percent local vulnerable auto employment after 2008. The control group includes counties with more than one percent local employment in auto jobs not tied to gas vehicles.[7] The post-2008 period captures contemporary employment and avoids under-counting due to cyclical trends. Figure 3 maps the treatment and control counties.

We checked the results' robustness with alternative treatment definitions. One analysis

7. Some counties have gasoline specific and general auto industries, which biases against our hypothesis by increasing their economic resilience.

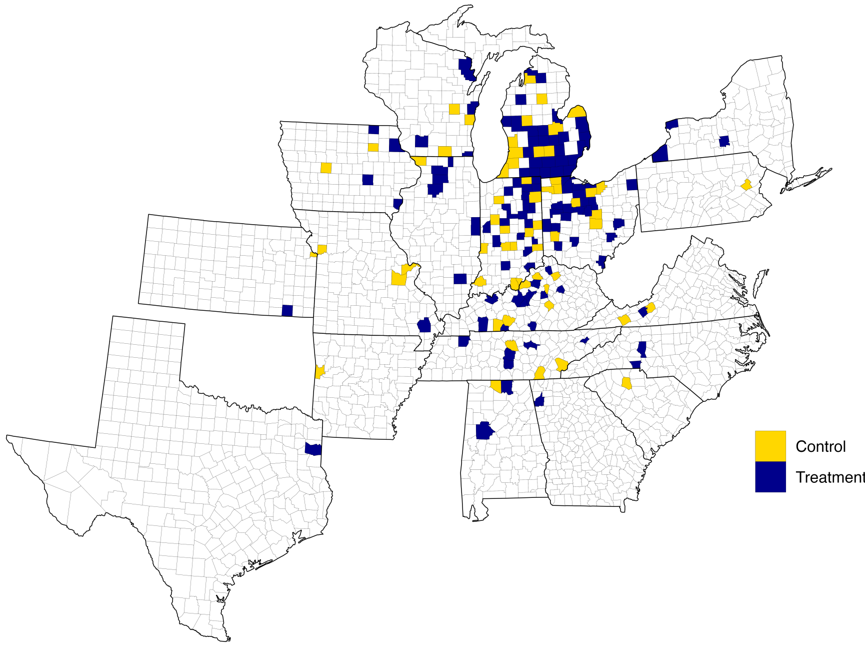

Figure 3: Treatment and Control Counties

uses a continuous measure of gasoline vehicle-related jobs. These models explore both within-county and within-state deviations in local vulnerability to the EV transition. The results hold and strengthen (Appendix A.5).

Treatment and Control Comparability

Figure 2 shows that counties with vulnerable workers followed similar voting trends as less vulnerable counties before the EV transition. The counties diverge in 2016 as EV market share grows. These parallel trends, which we test further below, suggest that the control group serves as a valid counterfactual.

A challenge for our analysis would be if there were unobserved differences between counties with gas-specific and general auto jobs that explained voting for reasons spurious with the EV transition. There are three specific challenges: trade, race, and occupation. First, the treated counties might have suffered worse losses from globalization and, therefore, responded more strongly to Trump's anti-trade message (Autor et al. 2020). Second, the treated counties could have been more white or less educated, making them more susceptible to Trump's racial appeals (Mutz 2018; Sides, Tesler, and Vavreck 2018). Third, if workers in gasoline vehicle-specific jobs had skills more at risk of automation, they might be more economically insecure (Gallego and Kurer 2022).

We take several steps to account for trade, race, and occupation. First, treatment and control counties have unionized autoworkers. The primary difference is whether they build parts used only in gasoline vehicles. The treatment and control groups should, therefore, be similar, unless workers in these supply chain segments had distinct experiences with trade, socio-demographic backgrounds, or occupations. Indeed, when we compare vulnerable and less vulnerable auto counties, there are few differences along these dimensions.

We use weighting to further improve the comparability of the counties.[8] We estimate covariate balancing propensity scores, which we use to calculate the inverse probability of being treated to use as weights in the regressions (Imai and Ratkovic 2014). These weights balance the counties in terms of race, college education, foreign-born population, poverty, population, people under 40 years old, NAFTA exposure, and TAA petitions filed.[9] These factors could affect how susceptible voters are to Trump's messages. Weighting ensures that these factors are evenly distributed in the treatment and control groups, so they should not confound our inferences. Figure 4 shows how the weights improve covariate balance.

Occupations, Pay, Skills, and Tasks

We use data from the Occupational Employment and Wage Statistics report and O*NET to compare the similarity of occupations, pay, skills, and tasks of workers in gasoline-specific and general auto manufacturing jobs (Appendix B.2).

The distribution of occupations is similar across the treatment and control groups. The most common occupation is production. Within production occupations, general auto man-

8. Weighting is preferable to matching as it does not discard units. The results hold without weights (Appendix B.4).

9. Appendix A.4 describes these data sources and their operationalizations.

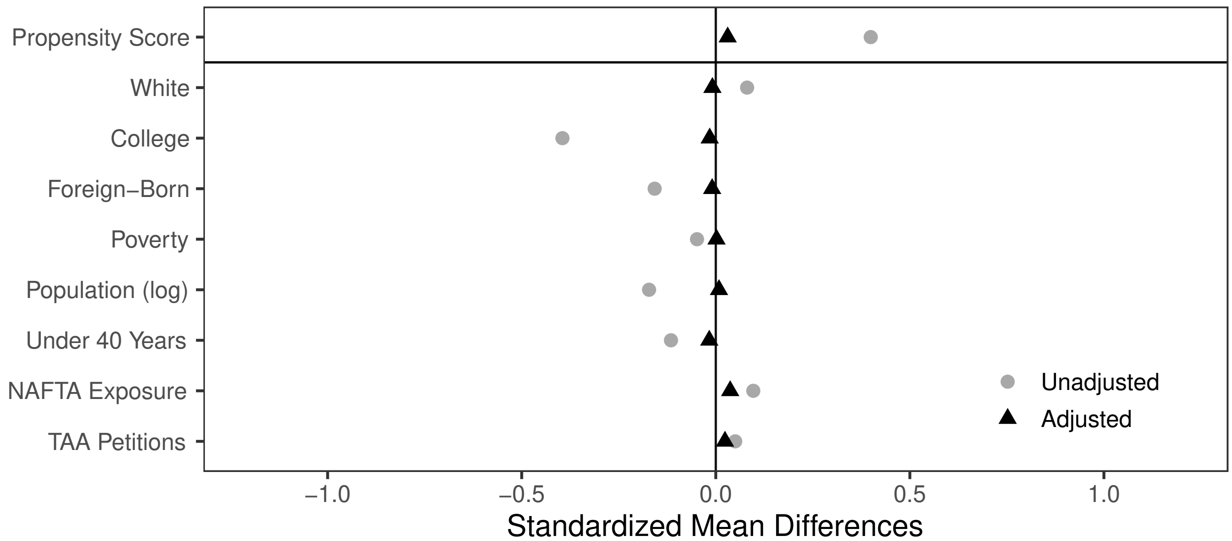

Figure 4: Covariate Balance Improvement After Weighting

ufacturing has more team assemblers, whereas gasoline-specific industries have more machinists. More engineers work in jobs specific to gasoline vehicles, a high skilled occupation that should more easily transition.

There are modest pay differences. Workers in general auto manufacturing jobs make around $3.90 more an hour than those in gasoline-specific industries. This difference is small, so we do not worry about it confounding the results. Mutz (2018) also finds little relationship between household income and Trump support.

Careers across the vulnerable and less vulnerable auto industries don't differ much in the skills they require. Workers largely perform similar tasks. Of 4,406 tasks, 98 percent of them overlap between vulnerable and less vulnerable jobs, even after accounting for their relative importance. The remaining differences include operating machinery and heavy equipment and performing quality checks, which are more common in general auto jobs. It is not apparent that these are less at risk of automation, which could make the control more economically secure for reasons independent of the EV transition. Since the majority of tasks are similar, it is unlikely that task differences explain voting.

Estimation

We aim to estimate the effect of the EV transition on Republican vote share in vulnerable counties. We cannot observe the counterfactual vote share had EVs not grown in market share and these counties not been vulnerable. The research design makes the parallel trends assumption: had treated counties not been vulnerable, they would have had the same average Republican presidential vote share as the less vulnerable control group.

We estimate the following linear regression model.

$$Y_{it} = Post_t + Vuln_i + \delta(Post_t * Vuln_i) + \mathbf{X}_{it}^{\intercal}\beta + \alpha_i + \eta_t + \epsilon_{it} \tag{1}$$

Y_{it} is Republican presidential vote share in a county for an election. $Post$ indicates whether the election is after EV transition begins, which coincides with 2016. $Vuln$ indicates whether a county has vulnerable auto workers. $\mathbf{X}_{it}$ is a matrix of time-varying covariates, including jobs exposed to NAFTA and TAA petitions. α_i is a county fixed effect to remove bias from time-invariant factors such as resource endowments that could affect vulnerability. η_t, an election fixed effect, accounts for national trends, such as oil price changes, candidate characteristics, and national economic conditions. This statistically removes bias unique to an election that has a common effect across counties.

An assumption of our county-level analysis is that compositional shifts, such as migration, do not explain the change in vote share. Since the EV transition has yet to cause major disruption, the treatment is unlikely to have caused population outflow.

EV Transition Effect on Republican Vote Share

Figure 5 plots the EV transition's effect on Republican presidential vote share in vulnerable counties compared to less vulnerable ones. Republican vote share rises by 2.1 percentage points in vulnerable counties in 2016 and increases to 2.5 percentage points in 2020.

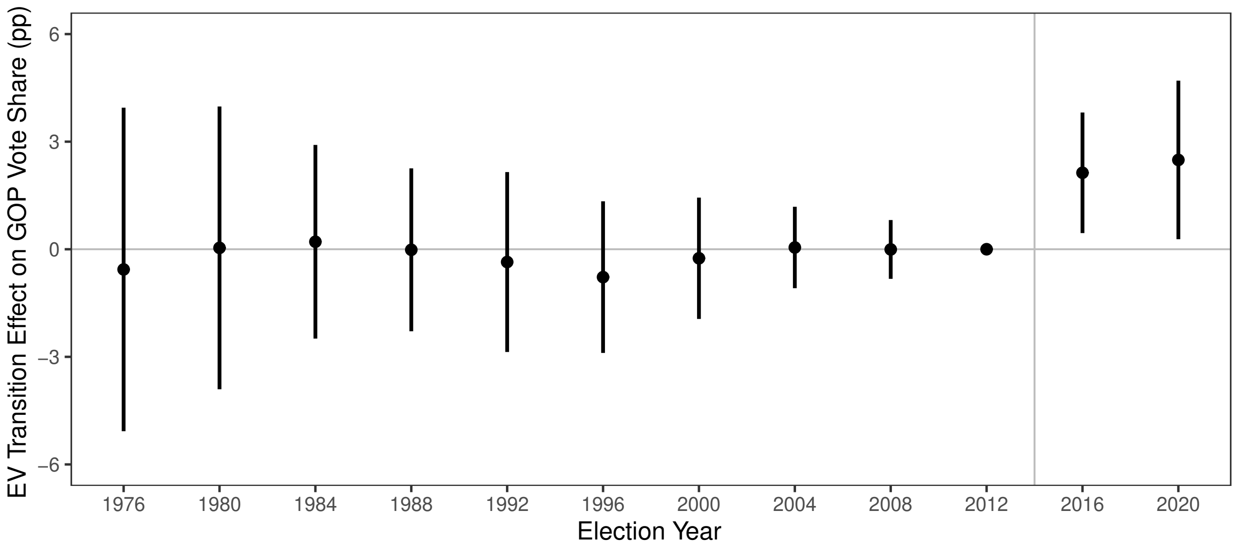

Figure 5: EV Transition Effect on GOP Presidential Vote Share in Vulnerable Counties

Notes: Estimates from a linear regression of the outcome on the treatment interacted with year fixed effects; covariates for NAFTA exposure and TAA petitions; county fixed effects; and balancing weights. Bars denote 95% confidence intervals from heteroskedasticity robust standard errors clustered by county. A one unit shift represents a percentage point increase in Republican vote share. $N = 2{,}028$ (169 counties $\times$ 12 elections).

This effect is modest compared to other studies on climate policy's electoral consequences. Higher utility bills caused a six percentage point increase in radical right vote share in the Netherlands (Voeten 2024). Milan's auto ban caused a 13.5 percentage point increase in populist support (Colantone et al. 2024). Wind construction in Ontario reduced incumbent vote share by seven percentage points (Stokes 2016). In a more comparable study, Gazmararian (2024) finds that coal's decline caused Republican vote share to increase by five points.

When we convert this estimate into votes, it appears electorally relevant. Consider Michigan, which Trump won by 11,612 votes in 2016. Our estimate implies that had the EV transition not happened, all else equal, Trump would have received 48,711 fewer votes from vulnerable Michigan auto counties. We urge caution in extrapolating this simulation. The analysis depends on assumptions about constant turnout and political strategy.

We interpret these results as backlash to the EV transition because the primary difference between the treatment and control groups is their vulnerability to vehicle electrification. Our interviews below provide direct evidence that autoworkers in vulnerable counties worried about the EV transition and it led them to support Trump.

To contradict our interpretation, there would have to be an unobserved, time-varying factor only in counties with workers who produce gasoline vehicle specific parts that increased Republican vote share. The covariate balancing accounts for trade and race, while we also show that the workers have similar skills. Given this careful comparison, the EV transition is the most consistent explanation for the partisan change.

Parallel Trends A visual inspection of the treatment effect in 1976 to 2012 elections indicates no violation of parallel trends (Figure 5). The point estimates hover around zero for elections before 2012. We also conducted an equivalence test of the parallel trends assumption. This flips the null hypothesis of no pretrends violation and begins from the null hypothesis that there is a pretrends violation. Where an imprecisely estimated null effect could survive a standard placebo test, the pretrends estimates must both cover zero and be precisely estimated to pass the equivalence test. The equivalence test p-value is less than 0.001, which indicates high confidence that equivalence holds (Hartman and Hidalgo 2018).

Robustness Appendix B.4 presents results from multiple robustness tests. We considerate alternative estimators, such as the fixed effects and counterfactual and matrix completion estimators that accommodate treatment effect heterogeneity (Liu, Wang, and Xu 2024). We also control for union members in a county to account for labor's decline. Lastly, we employ continuous measures of EV transition vulnerability. The results persist.

EV Market Share Mechanism

Our theory implies that increasing EV transition awareness drives the electoral backlash. To test this mechanism, we construct a time-varying transition measure with data on the national EV market share. The logic is that as automakers build more EVs and people buy them, the transition should increase in salience.

Another approach would be to use data on local EV sales. But political and economic factors influence these decisions. Republican and rural areas may buy fewer EVs because of partisanship and range concerns. We, therefore, used the national market share. Our interviews showed how union leaders tracked national auto trends to inform their political strategies. Nolen described how the UAW at Ford set up a product intelligence unit to stay ahead of industry changes.[10] These market shifts serve as inputs into union beliefs about the EV transition that affect what they tell their members.

We estimate a linear regression of Republican vote share on the interaction of national EV market share and the county share of vulnerable employment.

$$Y_{it} = \beta_1 EVShare_t + \beta_2 Vuln_i + \beta_3 (EVShare_t * Vuln_i) + \mathbf{X}_i^{\intercal}\beta + State_i + \epsilon_{it} \tag{2}$$

$EVShare_t$ is the national percentage of new car sales that are EVs. $Vuln_i$ is the county-level share of vulnerable employment. $\mathbf{X}_i$ is a matrix of county-level demographic covariates. The model also includes state fixed effects to account for time-invariant factors across states such as their history with the auto industry.[11] β_3 should be positive. Increased EV market share leads counties with more vulnerable employment relative to the state average to vote for Republicans.

Table 1 presents the effect of increasing EV sales on Republican presidential vote share in counties with a standard deviation greater share of vulnerable jobs relative to the state average. There is a strong positive effect across models. Vulnerable employment by itself does not have an effect until EVs become salient. These results suggest that expanding EV market share is one mechanism behind increased Republican support in counties with gasoline vehicle-specific jobs.

10. Interview 3

11. County fixed effects would capture within-county *change* in employment, but since there is not drastic change within counties, this would not identify sufficient variation. Election fixed effects would be colinear with EV market share.

Table 1: EV Market Share and Republican Presidential Vote Share, 1976–2020

	(1)	(2)	(3)	(4)
EV Market Share	7.20***	11.96***	8.17***	11.84***
	(0.66)	(1.68)	(0.58)	(1.55)
Vulnerable Employment Share	−0.17	−0.10	−0.07	0.02
	(0.34)	(0.34)	(0.35)	(0.35)
EV Market Share × Vulnerable Employment Share	3.33**	3.65***	3.61***	3.75***
	(1.31)	(1.29)	(1.33)	(1.37)
N	1968	1968	1968	1968
Adjusted R^2	0.38	0.42	0.37	0.41
Covariates	Yes	Yes	Yes	Yes
Covariates × Moderator	No	Yes	No	Yes
State Fixed Effects	Yes	Yes	Yes	Yes
Weights	Yes	Yes	No	No

Notes: Estimates from a linear regression of two-party Republican presidential vote share on county vulnerability to the EV transition with covariates for employment, NAFTA exposure, TAA petitions, population (logged), and the county population share of white, foreign born, college educated, below the poverty line, under 40 years old, and recent movers. Heteroskedasticity robust standard errors clustered by county reported in parentheses. All county-level measures are scaled using the state standard deviation, so a one-unit shift represents a standard deviation increase relative to the state. Table C1 contains covariate estimates. $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

Unions as Ground-Up Information Brokers

Our results conflict with existing theories about unions. The prevailing view is that unions shape what their members believe and how they vote. They do this through the political information they provide and by socializing their members (Ahlquist 2017; Frymer and Grumbach 2021; Macdonald 2021; Schlozman, Verba, and Brady 2012). This implies the national UAW's favorable stance on EVs and Democrats should prevent electoral backlash among its members.

Previous work took a top-down view where the national union provides information that affects all members. Kim and Margalit (2017) show, for example, how the UAW's changed stance on the Korea-US trade deal affected autoworker preferences. Union leaders with strong reputations can even shift members' policy attitudes contrary to their material self-interest (Ahlquist, Clayton, and Levi 2014; Ahlquist and Levi 2013). Under these conditions, information provision appears more influential than workers' material circumstances.

Whether unions can shape their members political behavior depends on two factors: who workers listen to within the union, and what information they receive. The top-down view assumes that members listen to the national leadership and they receive a consistent message.

But the interests within unions vary, so members must choose from multiple messengers and may receive conflicting information. Most unions in the United States and Great Britain have federal structures. Local chapters represent members across the country with diverse occupations even in the same industry. The particular interests of local unions complicates collective action (Becher, Stegmueller, and Käppner 2018; Olson 1965).

We advance a bottom-up view of unions. When government policies affect locals differently than the entire union, local leaders should provide political information that diverges from what the national leadership says. The national union considers the whole organization's interests when evaluating the policy. Local leaders, in contrast, weigh how a policy affects their constituents.

Union leaders manage a trade-off between promotion and representation. The national expects local chapters to speaks with one voice—the national's voice. Local leaders, however, balance their desire to advance within the union and to be faithful representatives of their members. The incentives to be a faithful representative are strong. The presidents and trustees of local unions live in the communities where their members work and care about their reputations. Few desire national leadership and even fewer get promoted. If a policy has intense local costs, such as threatening workers' jobs, there is little reason to echo the national leadership's message.

Thus, we hypothesize that local unions provide varying information about Democrats and the EV transition depending on how it affects them. UAW locals whose members face job loss should send more negative signals about EVs and Democrats. Silence also sends a message. If local leaders do not assure members that they have a place in the EV future, that leaves Republican attacks unchallenged. In contrast, local leaders with less vulnerable members who could even benefit should provide more optimistic messages about vehicle electrification and the Democrats' policies.

Local leaders may influence their members views more than national messages. The local president received a majority of votes from the chapter, but the same is not always true for the national president. "You always needed the local leadership to get on board and communicate with their members. I can walk in there from the international union and you're the local union president and they voted for you, who are they going to believe?" said Dick Long, a former senior National UAW leader. "If the local leadership isn't behind you, it's hard to do much."

Interview Evidence

Testing our argument about local information provision requires data on what local union leaders tell their members. These conversations, however, happen outside of the public spotlight. They take place inside union halls, the shop floor, and at community events. We first tried to examine the newsletters of UAW locals, but found mixed coverage over time and that not every local makes theirs public.

This led us to conduct semi-structured interviews. We spoke with local leaders, national leaders, and ordinary UAW members, most of whom live in the metro Detroit area. These interviews allow us to explore how the alignment of local and national messages varies with EV transition vulnerability.

Recruitment

To reach people in the UAW, we leveraged initial connections and cold-called UAW locals, which often opened doors to talk to additional people. We conducted 29 interviews between Spring 2022 and Fall 2023. The workers vary in their vulnerability to vehicle electrification. Some have gasoline-specific jobs whereas others work on EVs. Some leaders were active, others retired. The views from former leaders were especially candid.[12]

The interviews lasted from one to three hours and took place over video calls, telephone, and at bars, cafes, and union halls. A semi-structured interview guide facilitated our conversations. The topics ranged but included questions probing views about the EV transition, government policies, and political parties.

Study Sites

The information local unions provide could vary for reasons unrelated to their vulnerability. A UAW chapter, for example, could be in a Republican county with few outside job opportunities, so its leaders are more skeptical of Democrats and worried about the transition.

For this reason, we compare our interviews at two local unions in Macomb County, Michigan. All that separates Local 160 and Local 2280 is an 11-minute drive. These interviews do not, nor do they aim to, systematically control for the factors in our quantitative analysis. But they do hold constant the county's political and economic context. We also show that their members have similar education levels, occupations, and racial backgrounds (Table 2). What differs is their vulnerability to the EV transition.

Local 160 is vulnerable to the EV transition. It has over 1,700 members including the employees at the GM Technical Center in Warren. These workers test and design transmissions, the gear box of a motor, and internal combustion engines, the heart of gasoline-powered cars. Local 2280, in contrast, is not vulnerable and could benefit from vehicle electrification. It represents the employees at the Ford Plant in Sterling Heights. These workers produce electric rotors for the Lightning and Maverick, the company's flagship electric vehicles.

We consider several ways the locals could differ that might affect their political beliefs. First, their members could vary in education, occupation, and tasks. At Local 160, members work in skilled trades positions, a hands-on job that requires a particular skill set. These occupations often require a vocational degree or apprenticeship. At Local 2280, most work

12. Appendix D contains an interview list and characterizes their vulnerability.

Table 2: Local Union Comparison

	Local 160	Local 2280
Vulnerability	High	Low
Location	Macomb County, MI	Macomb County, MI
Company	GM	Ford
Members	$\sim$ 1,700	$\sim$ 1,400
Production	Transmissions, ICE	Electric rotors
Occupations/tasks	Skilled trades, model makers, molders, assembly inspectors, engineers	Skilled trades, technicians, line workers, machinists
Education	Mostly community college, vocational	Mostly high-school degrees
Race	Approx. 30% non-white	Approx. 35-40% non-white

Notes: This comparison is between the locals we study to draw inferences about information provision. For our research we also interviewed people outside of these locals. ICE stands for internal combustion engine.

on the manufacturing line, as technicians, skilled trades workers, or machinists. Unlike 160 whose workers have attended community college, many members of 2280 have only completed a high school degree. People without a college degree were more likely to support Trump, so this educational gap would bias against our hypothesis. Overall, workers at both locals have similar occupations, skills, and tasks.

The workers are also similar in tenure, which could affect their ability to transition to new careers. Local 160 includes a mix of new hands who have worked in the industry for less than 10 years and veterans who have been around for over 30 years. Most members of Local 2280 have worked for less than five years or more than twenty-four years.

There are slight racial differences among the members. Approximately thirty percent of Local 160 is non-white compared to a little over a third of Local 2280. If racial appeals push these members to support Trump, this could account for varying messages of local leaders. This gap, however, is modest. We also listened for coded language that could signal this alternative explanation.

The last difference is the automaker. Members of Local 160 work for GM, whereas those at 2280 work for Ford. We are unaware of management or financial differences between the companies that could make their workers more worried about the EV transition.

High Vulnerability: EV Pessimism

We find that Local 160 leaders provided members with more negative information about EVs and Democrats. “The incumbent [UAW] president apparently wrote an article that said we have to get behind EVs...I’m not going to support a political party when their desire is to exodus manufacturing. That’s what I see and that’s what my members see,” said Earl Fuller Jr., UAW Local 160 chairman. He did not shy away from sharing an opinion that diverged from the national leadership.

When asked about his members’ most pressing concern, Fuller Jr. did not hesitate:

> My membership can’t help but notice that electrification will eventually eliminate 95% of our work... You lose a transmission. No less than 200 machine processes with a transmission. That all goes away [with EVs]. The most sophisticated part of an automobile is the internal combustion engine and that will be replaced by an electric motor. They get to shave their engineering staff probably by half and get to cut their hourly workforce probably by 40%. Because the cars lose their sophistication, they don’t require the same testing and validation, which is what this campus was built for, so it’s taking away my members’ work long-term. The *promise that electrification will bring more work is simply a fantasy*, it’s a complete lie [that] *everybody including the leadership in the union believes*... So, my membership’s outlook is concern and uncertainty for the future.

His reaction acknowledged how the national leadership thinks the EV transition will create more union jobs, but these promised benefits lacked credibility from the local perspective.

Local union leaders connected their EV concerns to the Democratic Party’s policies. “Union leadership works with the Biden administration on EVs. You get tax incentives to buy EVs in this country, and then your plant closes...that’s the disconnect,” said Jessie Kelly, Local 160s head of communications.

Local 160 communicated these concerns to its members through its quasi-regular newsletters. One bulletin in 2020 included a section on “The White Gold Rush,” which criticized the environment costs of lithium mining, a key component in electric vehicle batteries. This independently verifies the messages that we heard from Fuller Jr. and Kelly in interviews.

Low Vulnerability: EV Optimism

"Our facility is electric, we're booming," said Nicole Didia, Local 2280 Vice President, and a third-generation UAW member. Didia was far more positive in the information she provides about what the EV transition would mean for her local. Unlike Fuller Jr. from 160, Didia expresses support for President Biden and Democrats.

We examined Local 2280's web page to see if the messages Didia told us reflect its public political engagement efforts. Indeed, the local publicly called its members to "Take Action" by supporting EV tax credits.[13]

Members of 2280 appear to have received, or at least share, Didia's positive message. "I personally feel optimistic because I'm in an area that I think everyone is going; the electrification field. We make the standard rotor for the electric motors of the Ford Lightning and the Maverick. But we're in the field that everyone seems to be going. In our plant, it seems that *everyone is a bit more optimistic because of what we're doing*," said Steve Lyons, a long-time UAW member who grew up in Southeast Michigan and now works in machine repair at the Sterling Heights Ford Plant. Lyons is an avid Biden supporter.

Interview Summary and Discussion

The vulnerable Local 160 sent more negative messages about EVs and Democrats than the less vulnerable Local 2280. The political and economic context is similar across these locals, as well as their members' socio-economic backgrounds. Local leaders did not appear constrained by promotion incentives. Instead, they sent messages consistent with how they believed industrial policies will affect their members.

Since our subjects are elites and our research design makes close comparison, this limits the sample size and external validity. We talked to the primary leaders of Locals 160 and

13. https://region1.uaw.org/uaw-local-2280/take-action (accessed 8/20/2024).

2280, so there were few additional people we could have interviewed. It is also unlikely they would have provided new information.

A more interesting question, however, is what we would learn if we repeated our study at UAW locals throughout the country. This would require considerable resources, but it would allow us to probe the external validity of our findings. While Detroit has a unique history with the auto industry, in other locations auto manufacturing also plays central role in the local economy. Local union leaders should have similar incentives to provide information that matches how industrial policy would affect their members.

Conclusion

Government policies to stop global warming face steep political obstacles. Scholars, commentators, and reformers hope that green industrial policies that create economic benefits will foster more durable political support for the energy transition (Meckling et al. 2015). Our results, however, indicate that the EV transition is driving vulnerable communities to support presidential candidates who oppose climate policy. This partisan change is large enough to potentially influence the outcome of elections in swing states like Michigan.

Our findings suggest that countries with large auto manufacturing sectors may face similar electoral backlash as they electrify. Auto regions of Germany, for instance, have turned to the far-right AfD (Politico 2023). Our argument could also apply to aviation, shipping, and steel where government policies to green these industries have unequal effects on workers and their communities.

One limitation of our analysis is the dearth of individual-level panel data of unionized autoworkers. This would be helpful to identify the extent to which Republican support comes from voter mobilization or conversion. Our interviews provide anecdotal evidence of conversion, where the vulnerable autoworkers and leaders we spoke to who previously supported Democrats are turning to Republicans.

Our study also took place as EVs began to grow in salience. In future elections, EVs may play a more central role as their salience grows with the expansion of Democratic policies. Vehicle electrification will also affect the massive car dealership and repair network built around gasoline vehicles, which could spark backlash in unexpected places.

Our paper makes three contributions. First, we offer a new explanation for the partisan reversal in working-class areas. Climate policy, above and beyond trade shocks, deindustrialization, and racial backlash, exerts an independent effect on Republican support. This suggests that policy responses to climate change are creating a cleavage between left parties and organized labor (Gazmararian 2024; Mildenberger 2020). This divide may only intensify as the energy transition unfolds.

Second, we depart from the top-down view of unions to advance a ground-up perspective. Local unions provide political information that advances their members' interest, even when it conflicts with the national union. Our theory helps explain the content of union messages, which then influences how their members vote (Ahlquist, Clayton, and Levi 2014; Ahlquist and Levi 2013). Our argument revitalizes Olson's (1965) underappreciated insight that unions contain a diversity of interests that not only challenge collective action as he argued, but affect their members' voting as we show. Future research should further unpack the blackbox of unions by examining how national leaders manage diverse local interests.

Lastly, we provide the first estimates of green industrial policy's electoral effects. We show how job loss fears lead communities tied to industries promised to benefit to act more like voters in coal, oil, gas areas that face clear climate policy costs. These findings underscore the need for credible investments in places with workers disrupted by the energy transition (Gazmararian and Tingley 2023). Political backlash, otherwise, could unwind or block the policies necessary to combat the climate crisis.

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Online Appendix:
Driving Labor Apart

A Data and Measurement

A.1 Summary Statistics

Table A1: Summary statistics for matched sample prior to standardization

	Mean	SD	Min	Max	NA	N
Treatment	0.64	0.48	0.00	1.00	0	2028
Vulnerable share of Employment	0.03	0.04	0.00	0.39	0	2028
Two-Way Republican Vote Share (%)	58.26	10.55	24.81	86.92	0	2028
NAFTA Exposure	1392.78	2270.28	0.00	27 251.94	0	2028
TAA Petitions	0.46	4.33	0.00	172.00	0	2028

Notes: In the analysis, we standardize the measures of NAFTA exposure and TAA petitions by subtracting the county mean and dividing by the county standard deviation, which captures the within-county variation over time.

Table A2: Summary statistics for time-invariant covariates, unmatched sample

	Mean	SD	Min	Max	NA	N
White	0.84	0.16	0.05	1.00	0	3111
Foreign Born	0.03	0.03	0.00	0.57	7	3104
College	0.14	0.06	0.02	0.55	0	3111
Poverty	0.03	0.01	0.00	0.15	7	3104
Population (log)	10.28	1.47	4.76	16.12	0	3111
Under 40	0.49	0.06	0.21	0.83	0	3111

Notes: Data from the 2015 5-Year ACS. In the analysis with state fixed effects, we standardize the measures by subtracting the state mean and dividing by the state standard deviation, which captures within-state variation.

A.2 EV Transition Vulnerability Measurement

Table A3: Classification of NAICS

NAICS	Description	Examples	Type
336310 Motor Vehicle Gasoline Engine and Engine Parts Manufacturing	This industry comprises establishments primarily engaged in (1) manufacturing and/or rebuilding motor vehicle gasoline engines and engine parts and/or (2) manufacturing and/or rebuilding carburetors, pistons, piston rings, and engine valves, whether or not for vehicular use.	Carburetors, all types, manufacturing	ICE
		Crankshaft assemblies, automotive and truck gasoline engine, manufacturing	ICE
		Cylinder heads, automotive and truck gasoline engine, manufacturing	ICE
		Fuel injection systems and parts, automotive and truck gasoline engine, manufacturing	ICE
		Gasoline engines for hybrid automotive vehicles manufacturing	ICE
		Pistons and piston rings manufacturing	ICE
		Manifolds (i.e., intake and exhaust), automotive and truck gasoline engine, manufacturing	ICE
		Timing gears and chains, automotive and truck gasoline engine, manufacturing	ICE
		Pumps (e.g., fuel, oil, water), mechanical, automotive and truck gasoline engine (except power steering), manufacturing	ICE
		Valves, engine, intake and exhaust, manufacturing	ICE
336320 Motor Vehicle Electrical and Electronic Equipment Manufacturing	This industry comprises establishments primarily engaged in manufacturing and/or rebuilding electrical and electronic equipment for motor vehicles and internal combustion engines. The products made can be used for all types of transportation equipment (i.e., aircraft, automobiles, trucks, trains, ships) or stationary internal combustion engine applications.	Alternators and generators for internal combustion engines manufacturing	ICE
		Automotive lighting fixtures manufacturing	ICE
		Coils, ignition, internal combustion engines, manufacturing	ICE
		Distributors for internal combustion engines manufacturing	ICE
		Electrical control chips (modules), motor vehicle, manufacturing	ICE
		Electrical ignition cable sets for internal combustion engines manufacturing	ICE
		Generators for internal combustion engines manufacturing	ICE
		Ignition wiring harness for internal combustion engines manufacturing	ICE
		Spark plugs for internal combustion engines manufacturing	ICE
		Instrument control panels (i.e., assembling purchased gauges), automotive, truck, and bus, manufacturing	Non-ICE
		Windshield washer pumps, automotive, truck, and bus, manufacturing	Non-ICE
336350 Motor Vehicle Transmission and Power Train Parts Manufacturing	This industry comprises establishments primarily engaged in manufacturing and/or rebuilding motor vehicle transmissions and power train parts.	Automatic transmissions, automotive, truck, and bus, manufacturing	ICE

NAICS	Description	Examples	Type
		Axle bearings, automotive, truck, and bus, manufacturing	ICE
		Constant velocity joints, automotive, truck, and bus, manufacturing	ICE
		Differential and rear axle assemblies, automotive, truck, and bus, manufacturing	ICE
		Torque converters, automotive, truck, and bus, manufacturing	ICE
		Universal joints, automotive, truck, and bus, manufacturing	ICE
336390 Other Motor Vehicle Parts Manufacturing	This industry comprises establishments primarily engaged in manufacturing and/or rebuilding motor vehicle parts and accessories (except motor vehicle gasoline engines and engine parts, motor vehicle electrical and electronic equipment, motor vehicle steering and suspension components, motor vehicle brake systems, motor vehicle transmissions and power train parts, motor vehicle seating and interior trim, and motor vehicle stampings).	Air bag assemblies manufacturing	Non-ICE
		Air-conditioners, motor vehicle, manufacturing	Non-ICE
		Air filters, automotive, truck, and bus, manufacturing	Non-ICE
		Catalytic converters, engine exhaust, automotive, truck, and bus, manufacturing	ICE
		Compressors, motor vehicle air-conditioning, manufacturing	Non-ICE
		Mufflers and resonators, motor vehicle, manufacturing	ICE
		Radiators and cores manufacturing	Non-ICE
		Wheels (i.e., rims), automotive, truck, and bus, manufacturing	Non-ICE
335312 Motor and Generator Manufacturing	This U.S. industry comprises establishments primarily engaged in manufacturing electric motors (except internal combustion engine starting motors), power generators (except battery charging alternators for internal combustion engines), and motor generator sets (except turbine generator set units). This industry includes establishments rewinding armatures on a factory basis. (Manufacturing electric motors for electric vehicles–are classified in U.S. Industry 335312, Motor and Generator Manufacturing)	NA	Non-ICE
336330 Motor Vehicle Steering and Suspension Components (except Spring) Manufacturing	This industry comprises establishments primarily engaged in manufacturing and/or rebuilding motor vehicle steering mechanisms and suspension components (except springs).	Power steering pumps manufacturing	Non-ICE
		Rack and pinion steering assemblies manufacturing	Non-ICE
		Shock absorbers, automotive, truck, and bus, manufacturing	Non-ICE
		Steering columns, automotive, truck, and bus, manufacturing	Non-ICE
		Steering wheels, automotive, truck, and bus, manufacturing	Non-ICE
		Struts, automotive, truck, and bus, manufacturing	Non-ICE

NAICS	Description	Examples	Type
336340 Motor Vehicle Brake System Manufacturing	This industry comprises establishments primarily engaged in manufacturing and/or rebuilding motor vehicle brake systems and related components.	Brake cylinders, master and wheel, automotive, truck, and bus, manufacturing	Non-ICE
		Brake drums, automotive, truck, and bus, manufacturing	Non-ICE
		Brake hose assemblies manufacturing	Non-ICE
		Brake pads and shoes, automotive, truck, and bus, manufacturing	Non-ICE
		Calipers, brake, automotive, truck, and bus, manufacturing	Non-ICE
336360 Motor Vehicle Seating and Interior Trim Manufacturing	This industry comprises establishments primarily engaged in manufacturing motor vehicle seating, seats, seat frames, seat belts, and interior trimmings.	NA	Non-ICE
336370 Motor Vehicle Metal Stamping	This industry comprises establishments primarily engaged in manufacturing motor vehicle stampings, such as fenders, tops, body parts, trim, and molding.	NA	Non-ICE
336111 Automobile Manufacturing	This U.S. industry comprises establishments primarily engaged in (1) manufacturing complete automobiles (i.e., body and chassis or unibody) or (2) manufacturing automobile chassis only.	NA	Non-ICE
336112 Light Truck and Utility Vehicle Manufacturing	This U.S. industry comprises establishments primarily engaged in (1) manufacturing complete light trucks and utility vehicles (i.e., body and chassis) or (2) manufacturing light truck and utility vehicle chassis only. Vehicles made include light duty vans, pickup trucks, minivans, and sport utility vehicles.	NA	Non-ICE
336211 Motor Vehicle Body Manufacturing	This U.S. industry comprises establishments primarily engaged in manufacturing truck and bus bodies and cabs and automobile bodies. The products made may be sold separately or may be assembled on purchased chassis and sold as complete vehicles.	NA	Non-ICE

We determined our coding of NAICS data into vulnerable (ICE) and non-vulnerable (non-ICE) manufacturing based on our review of the literature, auto parts supply chain data, and interviews.

Less Vulnerable The interior and body of ICE and non-ICE vehicles are largely the same: seats, air-conditioners, doors, and windows (etc.). The major difference is the powertrain (Hawkins et al. 2013). The UAW's research finds that EVs and ICE vehicles have similar cabins but the difference is under the hood and floorboards (UAW 2019). We, therefore, code parts and processes involving car interiors and vehicle body manufacturing as less vulnerable.

Vulnerable EVs differ from gasoline-powered cars in their propulsion. Consistent with academic research, industry analyses, and independent vehicle teardowns, we code parts and processes involved in the production of gas engines and transmission systems as vulnerable (Alexy et al. 2021; Eydgahi and Long 2011; Girardi, Gargiulo, and Brambilla 2015; Hawkins et al. 2013; Hummel et al. 2017; Veloso 2001). ICE and non-ICE vehicles are similar in their "exterior, interior, and chassis systems...The most significant differences between the two vehicle categories are concentrated in the powertrain, in which the mechanical components of an ICEV's engine, drive-unit, and exhaust systems are substituted out in favor of an electric motor and various power electronics powered by a battery pack" (Cotterman et al. 2024, 8–9). These mechanical components include "the engine block, crankshaft, camshaft, cylinder head, transmission, exhaust system, drive-unit, and fuel injection systems" (pp. 10-11). The Cotterman et al. study is the most comprehensive recent analysis.

A.3 Auto Industry Employment Trends

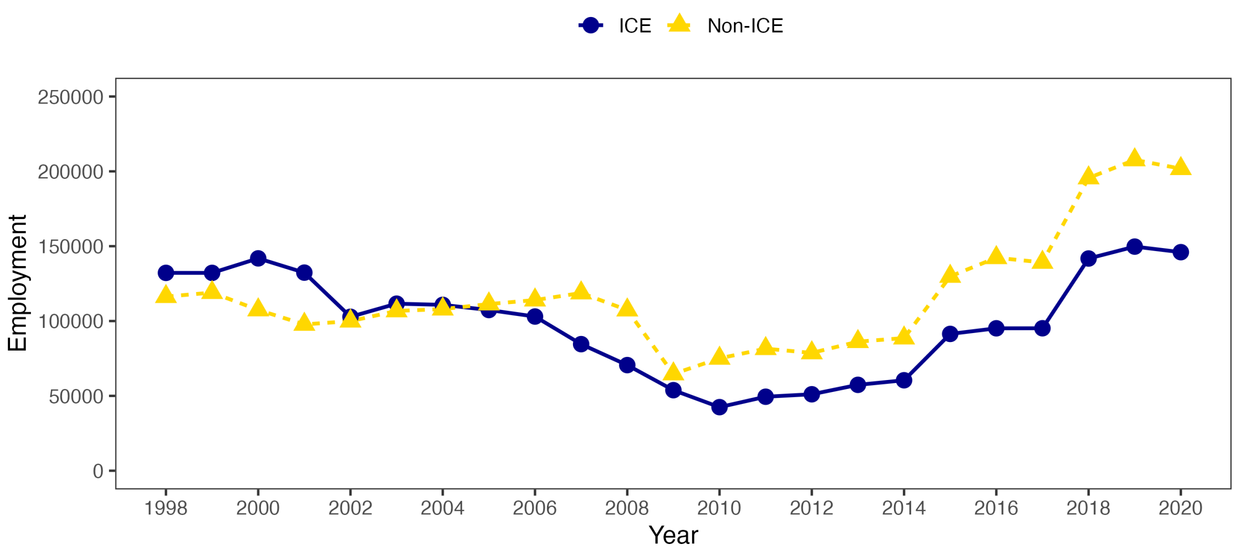

Figure A1: Vulnerable and Non-Vulnerable Employment, 1998–2020

Notes: Data from the CBP, with the time series beginning in 1998 to correspond with the switch from SIC to NAICS.

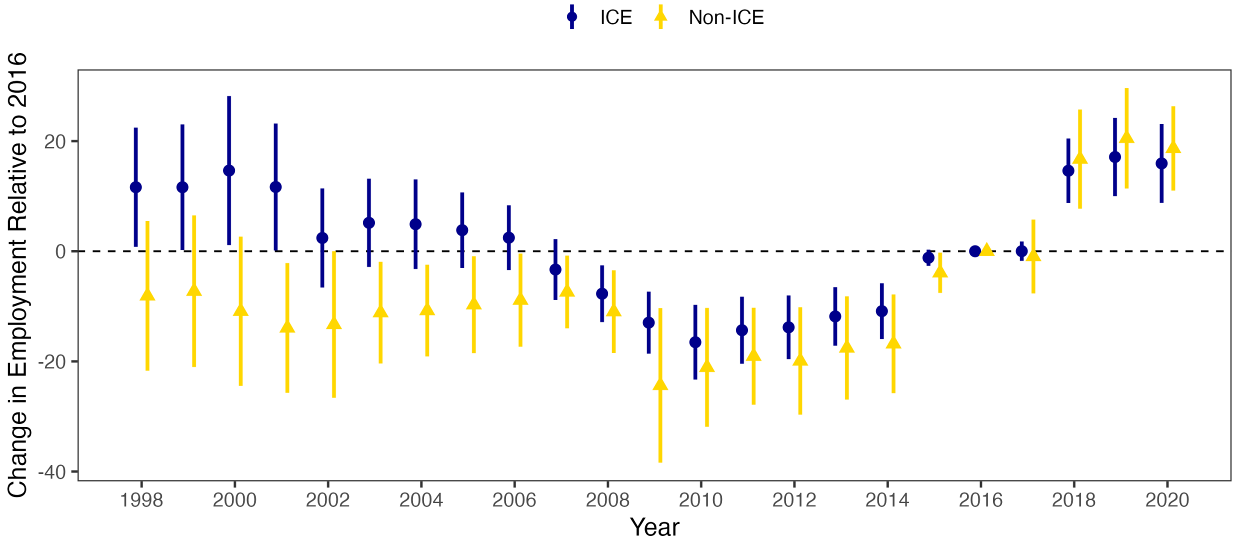

Figure A2: Within-County Change in Vulnerable and Non-Vulnerable Employment, 1998–2020

Notes: Estimates come from a linear regression model of industry employment on year and county fixed effects with heteroskedasticity robust standard errors clustered by county. Bars denote 95% confidence intervals. The reference year is 2016, so the effect should be interpreted as the within-county change in vulnerable (ICE) or less vulnerable (non-ICE) employment relative to the county's level of employment in 2016. $N = 73,347$ (3201 counties)

A.4 Trade Exposure

We collected time-varying data on county exposure to economic disruption from trade and NAFTA. Our first measure is the annual count of Trade Adjustment Assistance (TAA) petitions filed in a county. Groups of workers dislocated by trade file these petitions, so they represent a direct measure of perceived economic distress due to globalization (Kim and Pelc 2021). We retrieved data from the Department of Labor on the universe of TAA petitions from 1975–2022 (N = 86,306), from which we identified petitions filed by workers in the auto industry using the 6-digit NAICS codes and SIC equivalents.

Our next measure captures labor exposure to NAFTA. We used comprehensive data from Hakobyan and McLaren (2016) on the change in Mexican tariffs after NAFTA for 12,056 products listed on the Harmonized Tariff Schedule (HTS) Chapter 8 code. We mapped these products to NAICS and paired them with employment data to construct a variable for the annual level of county jobs in an industry exposed to NAFTA. We used this measure in two ways. First, we included the 1994 share of jobs exposed to NAFTA as a covariate when matching. Second, we included a time-varying measure of county jobs in NAFTA-exposed industries in our regression models.

A.5 Treatment Definition

The canonical DiD model is a powerful approach to causal inference that requires a binary treatment.[14] We use theory and data to guide the choice of treatment and control groups. Our theory suggests that the local importance of the industry through economic and social ties matters more than direct employment, so even in counties with relatively low levels of vulnerable employment there should be an electoral effect in response to growing EV salience.

Yet, this theoretical intuition cannot determine the precise threshold that we should use to distinguish treatment and control counties. We approach this challenge by examining the data to determine where a meaningful break in the distribution of employment occurs. The aim is to find a point that filters out the counties with employment marginal enough that the auto industry is not relevant economically or socially. Figure A3 plots the distribution of the county-level share of vulnerable and less vulnerable employment. Less vulnerable employment counties will serve as our control group, so there too, we must pick a threshold. At about 1% employment, there is a noticeable break in the distribution that separates counties with close to 0 percent employment in the two industries from those with more appreciable shares of auto employment. For this reason, we employ the 1% threshold.

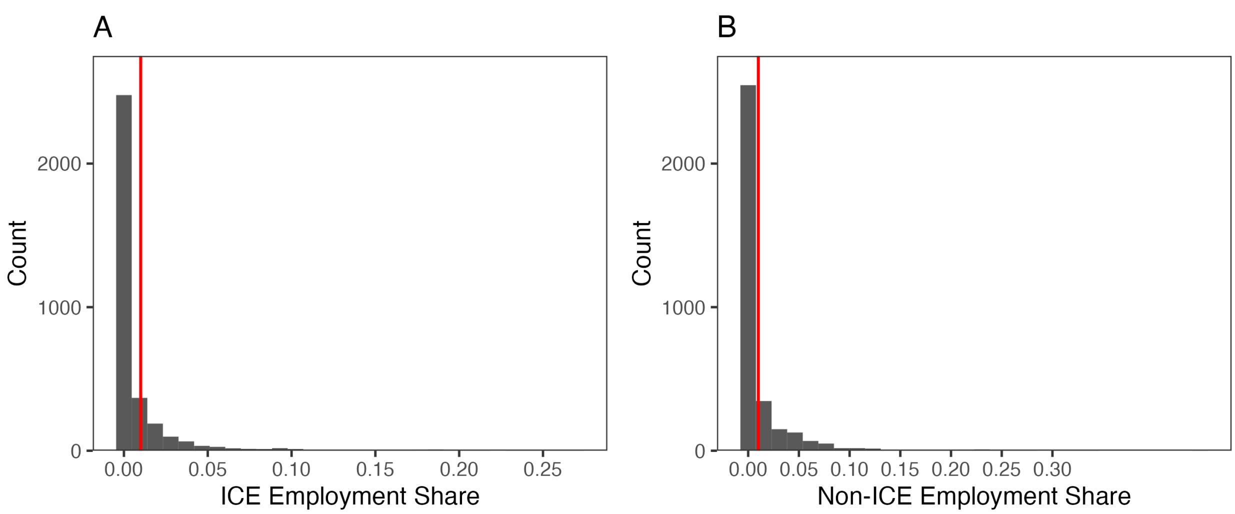

Figure A3: Histogram of vulnerable and less vulnerable employment with the 1% treatment definition cutoff depicted in red. Employment data include only counties with UAW presence and in the post-2008 period.

As a test of the validity of this threshold, we examine the correlation of the treatment indicator with a measure of the share of county GDP from the manufacturing industry. The expectation is that there should be a strong, positive correlation between the treatment and local GDP from manufacturing. GDP data come from the Bureau of Economic Analysis in the Department of Commerce. Unfortunately, there is not a GDP measure at the auto industry level, so this measurement error should make this a more conservative test. We averaged the GDP data to match the same years as the employment data.

14. Some work has begun to consider DiD with a continuous treatment, but this requires much stronger assumptions (Callaway, Goodman-Bacon, and Sant'Anna 2021; D'Haultfœuille, Hoderlein, and Sasaki 2023).

Table A4 presents the results from regressing the share of county GDP from manufacturing on indicator variables with progressively stricter employment thresholds used for dichotomization. Model 1 shows that having more than 1% local employment in the auto industry has a positive correlation with county GDP from manufacturing. There is about a 9% increase in county GDP from manufacturing associated with the binary indicator at the threshold our treatment uses. Model 2 shows that even increasing our threshold by tenfold does not do much to improve the magnitude of the correlation between the indicator and local GDP from manufacturing—13% increase versus 9%. Model 3 shows that using the continuous share of auto employment (standardized for interpretation) does not have as large of a correlation with county GDP compared to the threshold used for our treatment in Model 1. In all, this analysis indicates the 1% threshold for treatment assignment captures our concept of interest: the local economic importance of the auto industry.

Table A4: Linear regression of county GDP from manufacturing on the indicator for 1% automotive employment and alternative employment thresholds

	(1)	(2)	(3)
Intercept	0.05***	0.06***	0.06***
	(0.00)	(0.00)	(0.00)
Above 1% Auto Employment (=1)	0.09***		
	(0.01)		
Above 10% Auto Employment (=1)		0.13***	
		(0.02)	
Auto Employment			0.03***
			(0.00)
N	3059	3058	3058
Adjusted R^2	0.100	0.063	0.201

Notes: HC2 standard errors clustered by county. $^{*}p < 0.1,^{**} p < 0.05,^{***} p < 0.01$

Lastly, we also estimated a model that uses a continuous measure of vulnerable employment. One might expect the effects of increasing EV salience to be greater in counties where its importance to the local industry is higher. Indeed, our results are also consistent when using this continuous treatment measure in a shift-share design (Table 1) and a DiD setup (Table B2).

A.6 EV Transition Timing

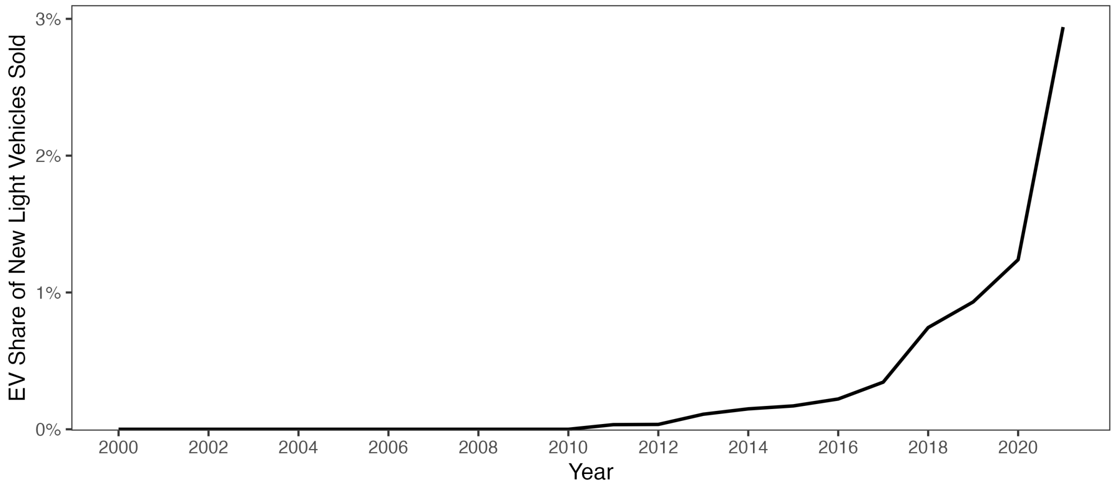

Figure A4: EV market share for new light vehicles sold in the United States, 2000–2021. Data from the National Transportation Statistics report. Between 2000 and 2010, the number of EVs sold in the US was "too small to report," so we code those years as 0.

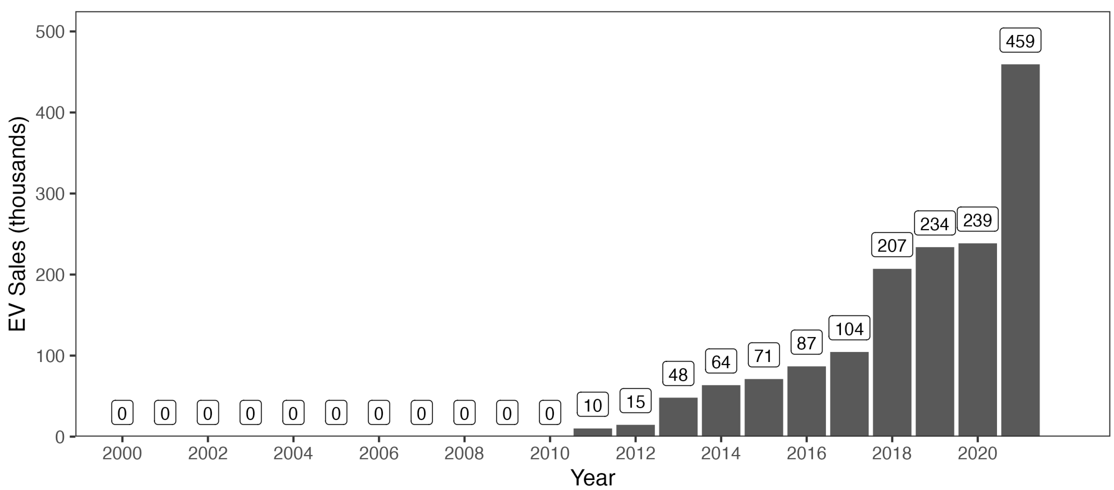

Figure A5: New EV sold in the United States, 2000–2021. Data from the National Transportation Statistics report. Between 2000 and 2010, the number of EVs sold in the US was "too small to report," so we code those years as 0.

B Identification of Main Results

B.1 Matching Diagnostics

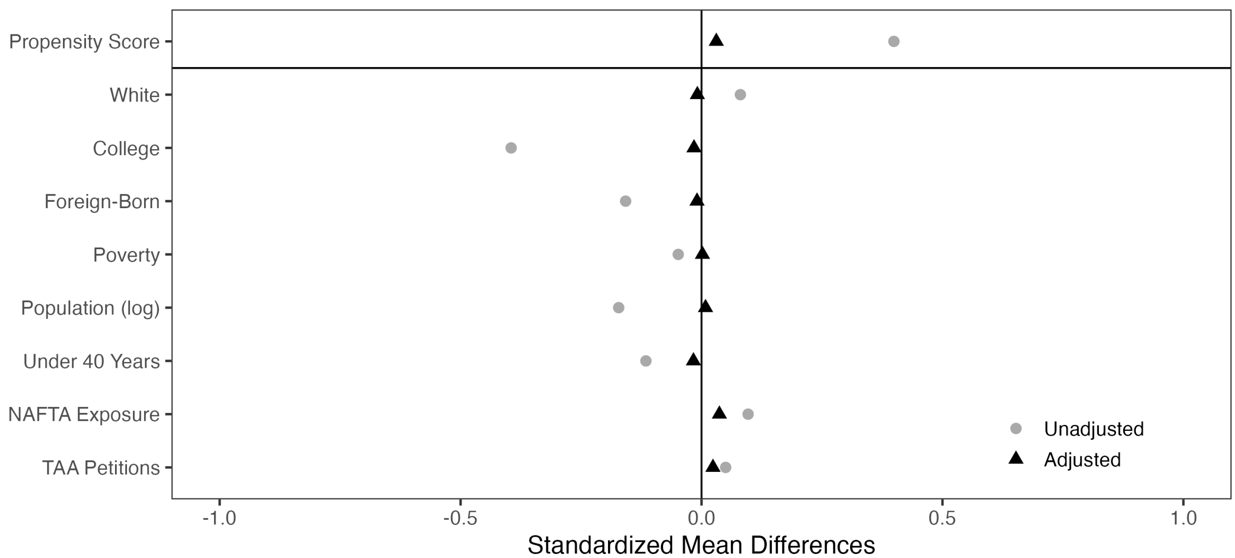

Figure B1: Covariate balance before and after matching. Treated counties are those with union employment in manufacturing for parts related to gasoline vehicles, whereas control counties are those with union employment in manufacturing for general parts. Nearest neighbor matching with replacement employed (Ho et al. 2007). Covariate data from the 2015 5-Year ACS. The plot shows low imbalance before matching, with less than a standard deviation of imbalance across all covariates. After matching, balance improves to within less than about a 0.25 standardized mean difference, with there being no overall imbalance represented by *distance*.

B.2 Skills Comparability

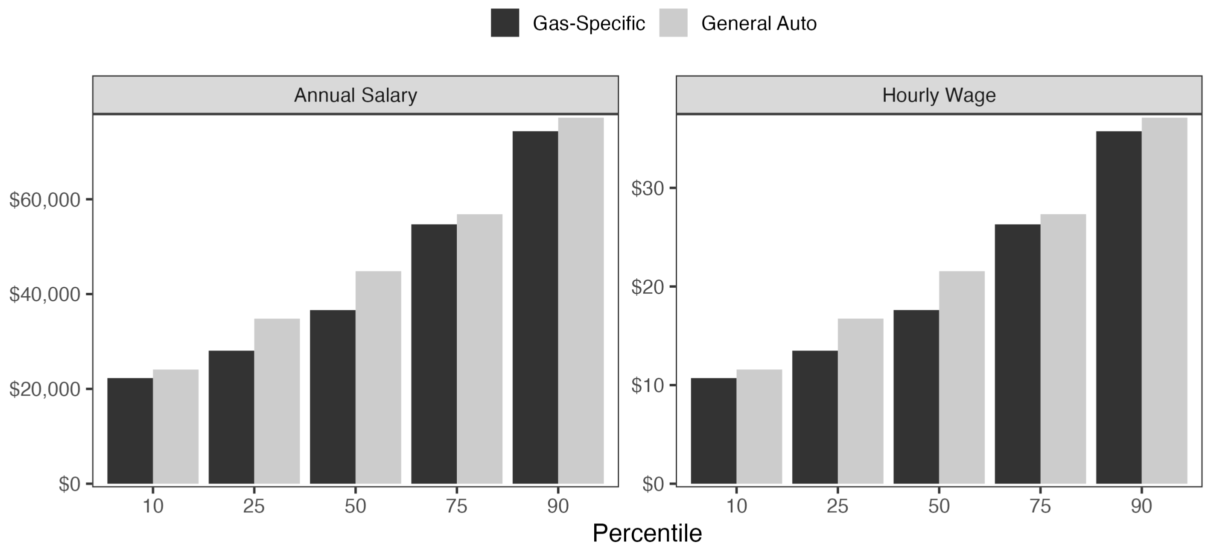

Figure B2: Annual salary and hourly wage comparison in ICE and non-ICE occupations.

Notes: ICE defined using NAICS 336300, and non-ICE defined using NAICS 336100 and 336200.

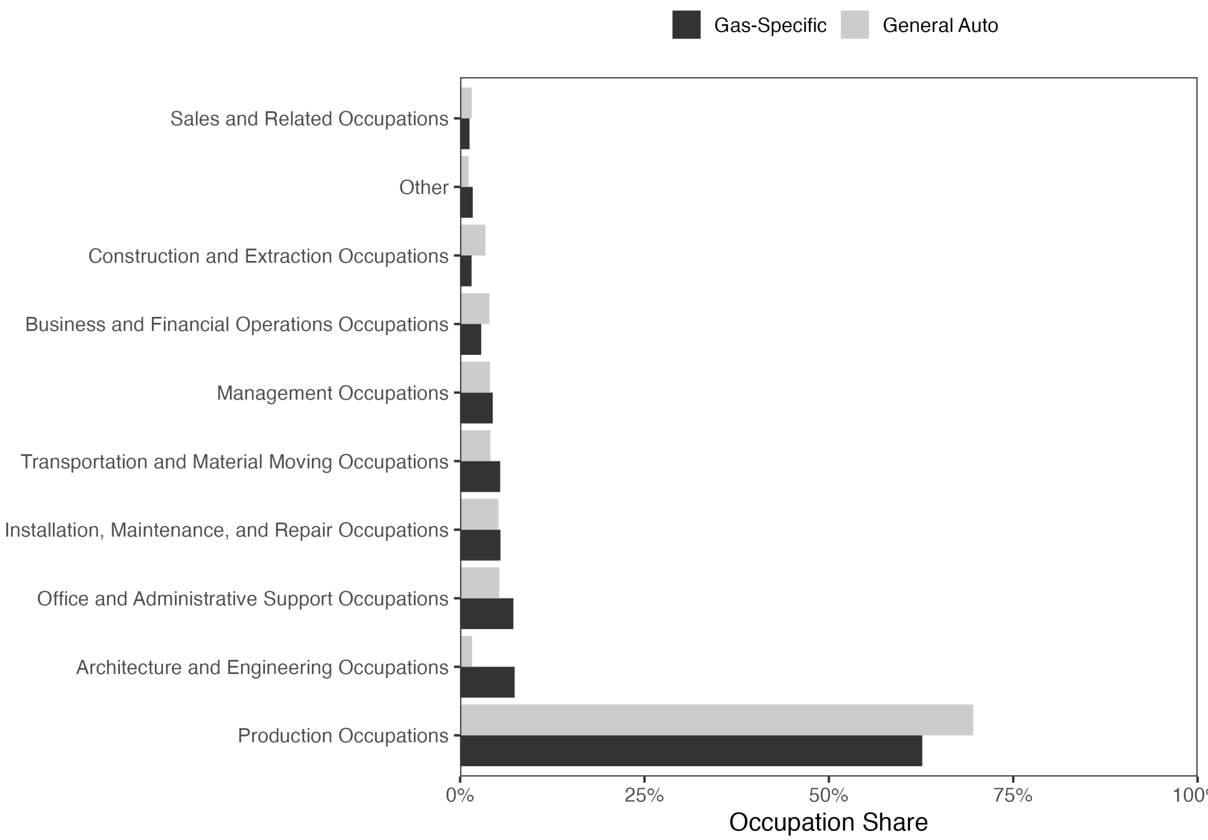

Figure B3: Occupations in ICE and non-ICE industries.

Notes: ICE defined using NAICS 336300, and non-ICE defined using NAICS 336100 and 336200.

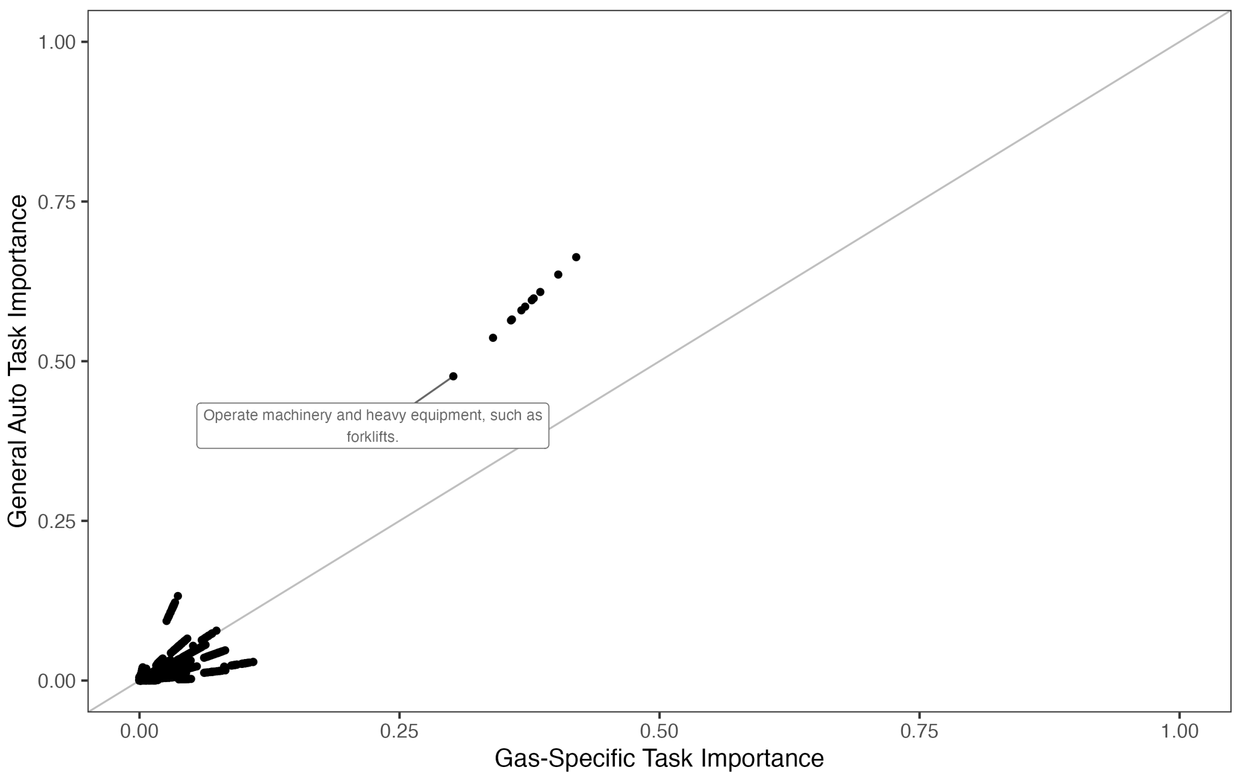

Figure B4: Employment-weighted task importance in ICE and non-ICE occupations.

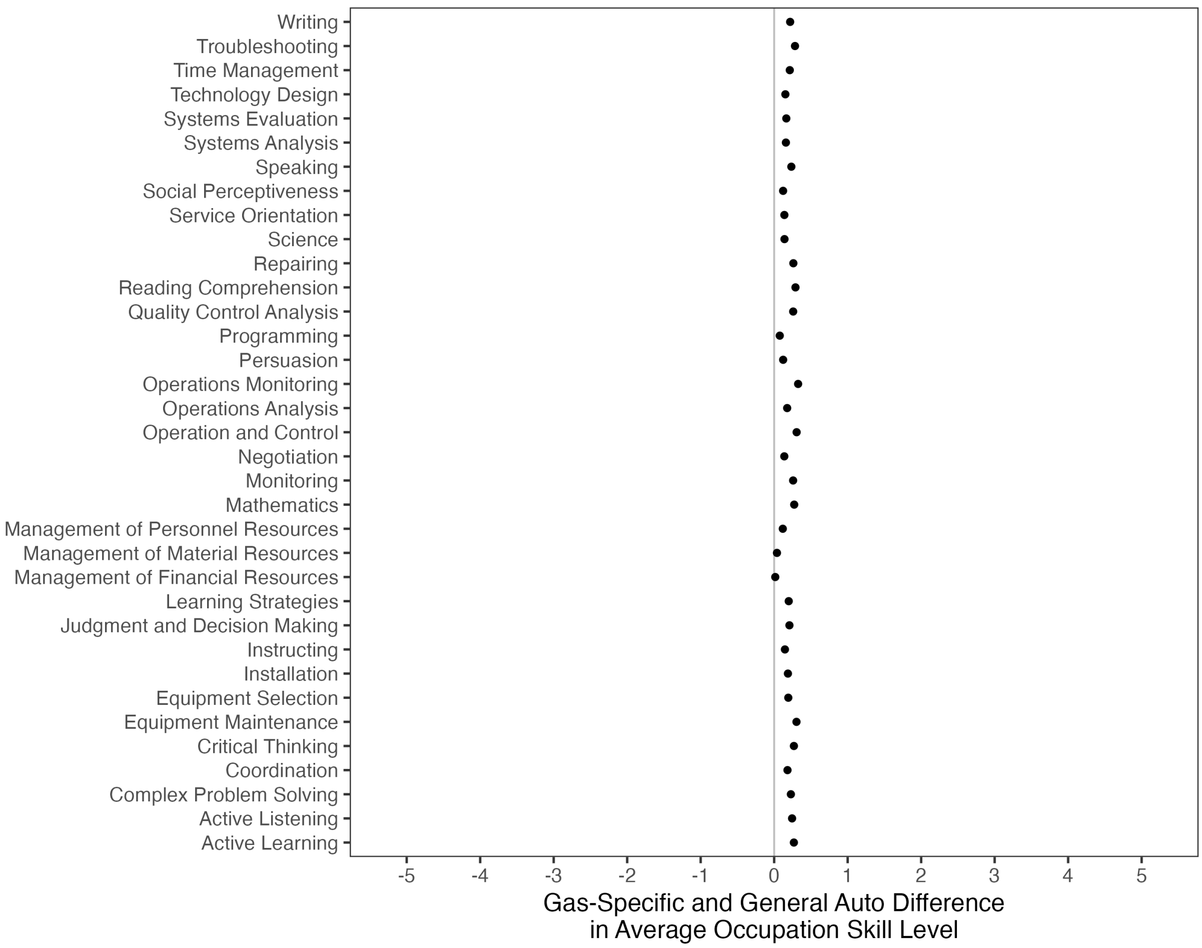

Figure B5: Employment-weighted skill differences in ICE and non-ICE occupations.

B.3 Regression Estimates

Table B1: EV Transition Effect on GOP Presidential Vote Share in Vulnerable Counties

	Outcome: GOP Presidential Vote Share (pp)											
	1976-2020						2000-2020		2004-2020		2008-2020	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Vulnerable x Post	2.71**	2.62**	2.57**	2.67*	2.59*	2.44*	2.39**	2.41**	2.32**	2.36**	2.34***	2.37**
	(1.31)	(1.30)	(1.30)	(1.47)	(1.46)	(1.46)	(0.93)	(1.09)	(0.89)	(1.03)	(0.88)	(1.01)
NAFTA Exposure		0.73***	0.75***		0.70***	0.76***	0.24	0.31	0.58*	0.64*	0.77**	0.84**
		(0.25)	(0.25)		(0.25)	(0.25)	(0.29)	(0.34)	(0.31)	(0.33)	(0.36)	(0.41)
TAA Petitions		0.59***	0.59***		0.62***	0.63***	0.12	0.12	0.01	−0.03	0.10	0.04
		(0.22)	(0.22)		(0.23)	(0.23)	(0.18)	(0.19)	(0.20)	(0.21)	(0.21)	(0.22)
Employment			−0.15			−0.45						
			(0.34)			(0.38)						
N	2028	2028	2028	2028	2028	2028	1014	1014	845	845	676	676
Adjusted R^2	0.72	0.72	0.72	0.71	0.72	0.72	0.88	0.88	0.90	0.90	0.92	0.91
Election Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Matched	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes	No	Yes

Notes: Estimate from a linear regression of the outcome on interaction of the treatment and post-2016 indicators. Heteroskedasticity robust standard errors clustered by county are in parentheses. Covariates are scaled by the county standard deviation so a one-unit shift represents a standard deviation within-county increase in the covariate. $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

B.4 Robustness

B.4.1 FEct

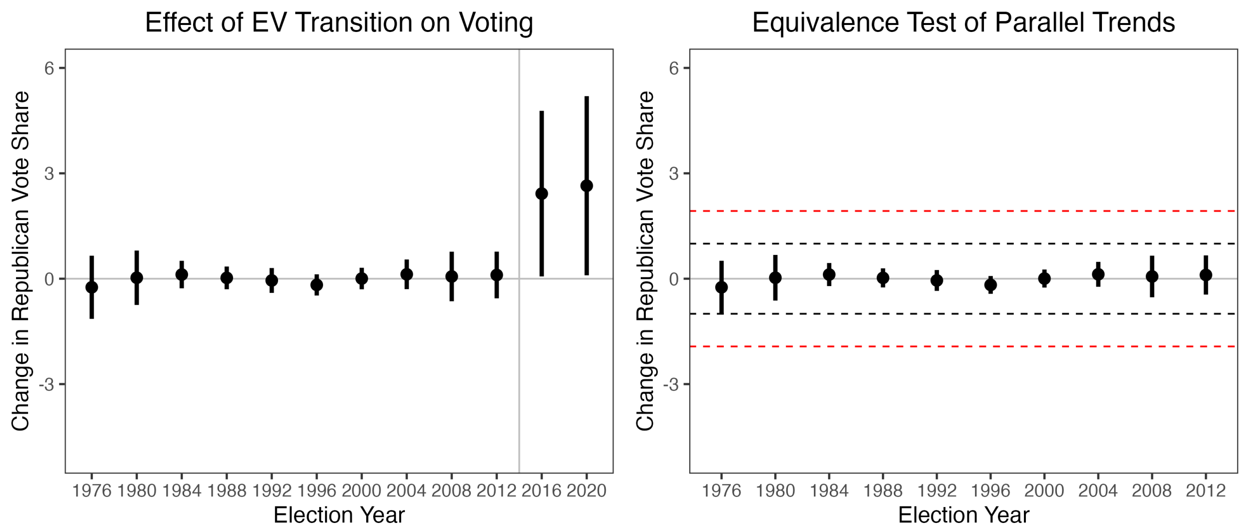

Figure B6: FEct estimator of EV transition effect on Republican presidential vote share in unionized auto manufacturing counties vulnerable to EVs versus those less vulnerable, 1976–2020. The left plot shows the dynamic treatment effects estimates for elections before and after the 2016 election. Bars denote 95% confidence intervals from 5,000 block bootstrap replications clustered by county. The right plot shows the pre-treatment average prediction errors and their 90% confidence intervals. The red dashed lines denote the equivalence range and the black dashed lines mark the minimum range. $N = 2{,}028$

B.4.2 Matrix Completion Estimator

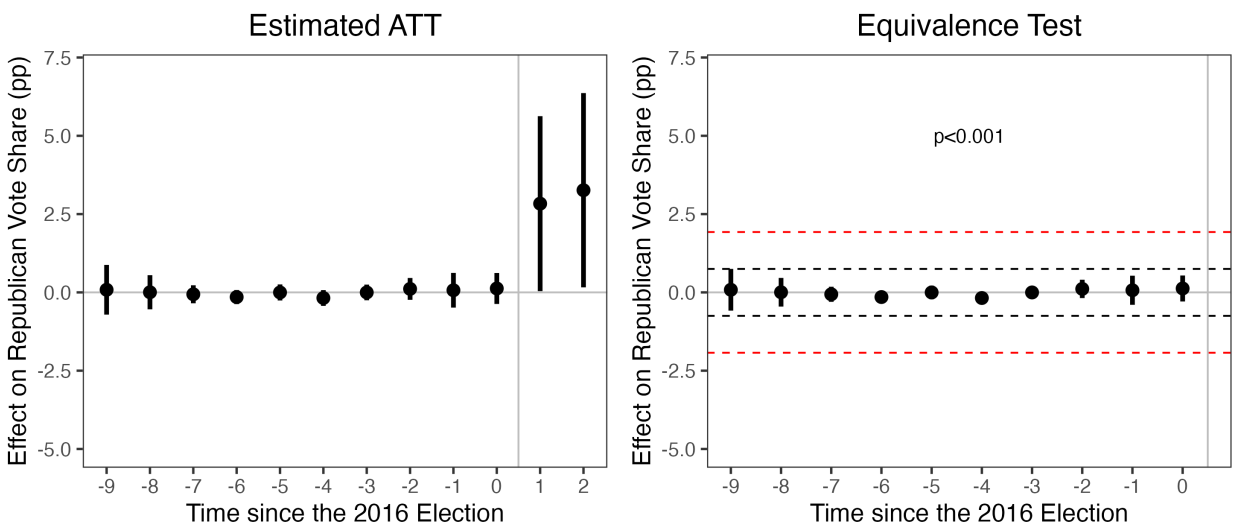

Figure B7: Matrix completion estimator for EV transition effect on Republican presidential vote share in matched unionized auto manufacturing counties vulnerable to EVs versus those less vulnerable, 1976–2020. The left plot shows the dynamic treatment effects estimates for elections before and after the 2016 election. Bars denote 95% confidence intervals from 5,000 block bootstrap replications clustered by county. The right plot shows the pre-treatment average prediction errors and their 90% confidence intervals. The red dashed lines denote the equivalence range and the black dashed lines mark the minimum range. $N = 2{,}028$

B.4.3 Continuous Treatment

We estimate models that use a continuous measure of the county share of vulnerable employment. Two reasons motivate this analysis. First, it tests the robustness of our findings when using a treatment different from our 1% threshold. Second, these models allow for the effect of increased EV salience to vary with the local reliance of a county on vulnerable employment, which helps to test one causal mechanism behind the electoral backlash.

We estimate two sets of models that capture different dimensions of vulnerable employment. The first set of models examines the effect of within-county variation in vulnerable employment by employing election and county fixed effects. We examine these models for robustness despite them not being an ideal match for our theory; our theory is about the *presence* of vulnerable employment, whereas these models capture the *change* in vulnerable employment, which may be positively correlated with Republican presidential vote share but could also represent a distinct underlying process.

The second set of models examines within-state variation in vulnerable employment by employing election and state fixed effects. This better matches our theorized process, which implies that the level of vulnerable employment is what matters, while still also taking advantage of the state fixed effects for differencing time-invariant characteristics like a state's history with the auto industry that might bias the results.

In both of these model specifications, we employ the same set of covariates as before. For the analysis with county and state fixed effects, respectively, we standardize these covariates at the county and state levels to match the variation used in estimation. Heterogeneity-robust standard errors are clustered at the county level in all analyses.

Table B2 presents the results when using a continuous measure of vulnerable employment as the treatment interacted with an indicator for post-2016 elections. Models 1 and 2 examine the effect of within-county changes in vulnerable employment in the post-2016 period. In Model 1, which uses the matched sample, there is a positive effect of an increase in county vulnerable employment on two-party Republican presidential vote share in the post-2016 period. The effect is also similar in Model 2, which uses the unmatched sample, suggesting that the result generalizes to other auto manufacturing counties. Substantively, we interpret these results as saying that as counties increase their exposure to the EV transition over time, their political behavior shifts to voting for candidates opposed to climate policy. We caution, however, against reading too much into these results because the primary variation in EV exposure is *across* counties as opposed to changes over time within them.[15] Still, it is encouraging that we detect the effect given the variation that does exist.

Models 3 and 4 in Table B2 examine the effect of within-state variation in vulnerable employment in the post-2016 period on Republican presidential vote share. We find that there is a positive effect of increasing vulnerable employment, relative to employment shares in the rest of the state, on Republican presidential vote share after increased EV salience beginning around 2016. Overall, the results are consistent when using a dichotomous treatment and a continuous treatment across a variety of specifications.

15. Indeed, when residualizing the variation in the share of vulnerable employment using the county and election fixed effects, the probability mass of the residuals concentrates over 0, but there is still some variation evidenced by the standard deviation of 1.3.

Table B2: Linear regression of two-party Republican presidential vote share on the county-level vulnerable employment share, 1976–2020

	(1)	(2)	(3)	(4)
Vulnerable Employment × Post	0.50*	0.48*	1.19**	1.15***
	(0.30)	(0.27)	(0.50)	(0.41)
Vulnerable Employment	0.20	0.13	0.12	0.17
	(0.27)	(0.21)	(0.28)	(0.27)
NAFTA Exposure	0.75***	0.80***	3.98***	4.26***
	(0.11)	(0.11)	(0.58)	(0.59)
TAA Petitions			0.00	−0.01
			(0.04)	(0.03)
White Share			8.37***	8.01***
			(1.52)	(1.48)
Foreign-Born Share			1.32	1.90
			(1.51)	(1.50)
College Share			−0.22	−0.15
			(0.69)	(0.67)
Poverty Share			−1.93***	−1.82***
			(0.64)	(0.64)
Population (log)			0.14	−0.45
			(1.21)	(1.24)
Under 40 Share			1.24	1.19
			(0.77)	(0.75)
Mobile Share			−0.01	−0.26
			(0.61)	(0.58)
N	2028	2028	2028	2028
Adjusted R^2	0.72	0.73	0.55	0.56
County Fixed Effects	Yes	Yes	No	No
Election Fixed Effects	Yes	Yes	Yes	Yes
State Fixed Effects	No	No	Yes	Yes
Matched	Yes	Yes	Yes	No

Notes: Heterogeneity robust standard errors clustered by county. Analyzed counties include those with a union presence. Covariates in the models with county and state fixed effects, respectively, standardized to capture within county and state variances. $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

B.4.4 Time-Varying Union Control

Since the union data begin in 2000, in the main models, we only use the information to identify unionized and non-unionized counties at the time of increased EV salience. Yet, one might also want to control for the level of unionization to account for the alternative explanation that increased Republican vote share stems from the decline of organized labor's strength as opposed to exposure to EVs. To do so, we subset the data to the post-2000 period when there is temporal coverage for the unionization data.

Re-estimating the models shows that the positive treatment effect remains when controlling for the number of UAW union members in a county each year (Figure B8).

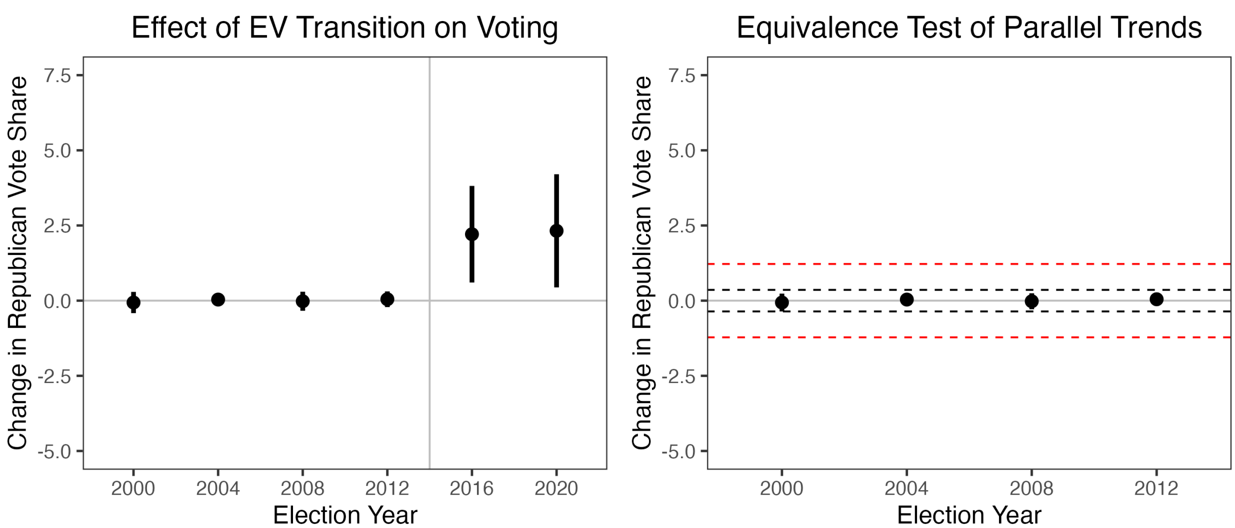

Figure B8: Effect of increased EV salience on Republican presidential vote share in the unionized auto manufacturing counties vulnerable to EVs compared to all less vulnerable union auto manufacturing counties when controlling for unionization, 2000–2020. The left plot shows the dynamic treatment effects estimates for elections before and after 2016. Bars denote 95% confidence intervals from 5,000 block bootstrap replications clustered by county. The right plot shows the pre-treatment average prediction errors and their 90% confidence intervals. The red dashed lines denote the equivalence range and the black dashed lines mark the minimum range. $N = 1{,}086$.

C Empirical Extensions

C.1 EV Market Share

Table C1: Linear regression of two-party Republican presidential vote share on county-level exposure to the EV transition interacted with the annual EV market share, 1976–2020

	(1)	(2)	(3)	(4)
EV Market Share	7.20***	11.96***	8.17***	11.84***
	(0.66)	(1.68)	(0.58)	(1.55)
Vulnerable Employment Share	−0.17	−0.10	−0.07	0.02
	(0.34)	(0.34)	(0.35)	(0.35)
EV Market Share × Vulnerable Employment Share	3.33**	3.65***	3.61***	3.75***
	(1.31)	(1.29)	(1.33)	(1.37)
Employment	−1.27*	−1.09	−1.27*	−1.18
	(0.76)	(0.83)	(0.76)	(0.82)
NAFTA Exposure	1.97***	1.61***	2.07***	1.74***
	(0.41)	(0.46)	(0.41)	(0.45)
TAA Petitions	−0.09	−0.04	−0.08	−0.03
	(0.15)	(0.15)	(0.15)	(0.14)
White Share	3.71***	3.72***	3.47***	3.45***
	(0.78)	(0.78)	(0.78)	(0.79)
Foreign-Born Share	−0.08	0.06	0.09	0.23
	(0.70)	(0.70)	(0.67)	(0.67)
College Share	0.12	0.54	0.27	0.68
	(0.64)	(0.64)	(0.64)	(0.65)
Poverty Share	−1.61***	−1.66***	−1.46***	−1.52***
	(0.44)	(0.44)	(0.44)	(0.43)
Population (log)	−0.52	−0.54	−1.07	−1.09
	(0.99)	(0.98)	(1.00)	(1.00)
Under 40 Share	1.02*	1.00*	1.00*	0.98*
	(0.61)	(0.61)	(0.59)	(0.59)
Mobile Share	−0.56	−0.59	−0.78	−0.82*
	(0.56)	(0.56)	(0.50)	(0.50)
EV Market Share × Employment		0.16		0.17
		(0.59)		(0.56)
EV Market Share × NAFTA Exposure		17.75***		20.51***
		(4.03)		(4.08)
EV Market Share × TAA Petitions		−0.20		−0.16
		(0.59)		(0.55)
EV Market Share × White Share		0.51***		0.50***
		(0.07)		(0.07)
EV Market Share × Foreign-Born Share		−0.97*		−1.07*
		(0.56)		(0.57)
EV Market Share × College Share		−3.37***		−3.35***
		(0.42)		(0.44)
EV Market Share × Poverty Share		0.31		0.40
		(0.34)		(0.33)
EV Market Share × Population (log)		−0.27*		−0.24*
		(0.16)		(0.13)
EV Market Share × Under 40 Share		0.01		0.00
		(0.03)		(0.03)
EV Market Share × Mobile Share		0.10***		0.10***
		(0.01)		(0.01)
N	1968	1968	1968	1968
Adjusted R^2	0.38	0.42	0.37	0.41
State Fixed Effects	Yes	Yes	Yes	Yes
Weights	Yes	Yes	No	No

Notes: Heterogeneity robust standard errors clustered by county. Analyzed counties include those with a union presence. Covariates standardized to capture within-state variance. $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

C.2 Effect in Non-Union Counties

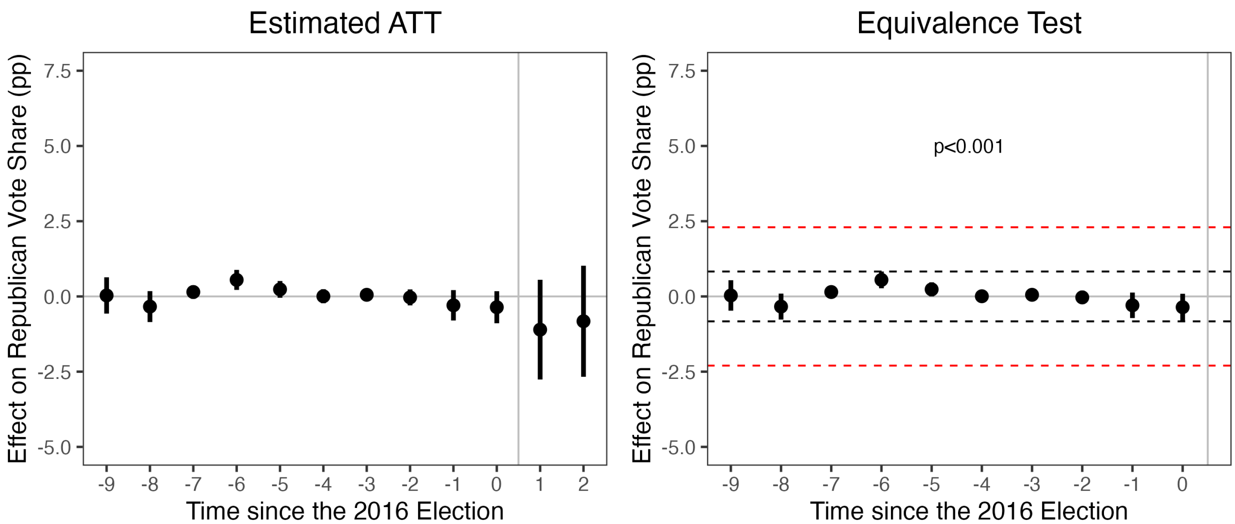

Figure C1: Effect of increased EV salience on Republican presidential vote share in non-union auto manufacturing counties vulnerable to EVs compared to matched counties that are less vulnerable, 1976–2020. The left plot shows the dynamic treatment effects estimates for elections before and after 2016. Bars denote 95% confidence intervals from 5,000 block bootstrap replications clustered by county. The right plot shows the pre-treatment average prediction errors and their 90% confidence intervals. The red dashed lines denote the equivalence range and the black dashed lines mark the minimum range. $N = 5{,}436$.

D Interviews

D.1 Research Ethics

The study conforms to the APSA Principles and Guidance for Human Subjects Research.

Power We conducted human subjects research exclusively with labor leaders and union members. We did not engage with vulnerable populations (e.g., children, prisoners). The questions were not sensitive; the semi-structured interview focused on the subject's views of the auto industry, which is a daily topic of conversation for this population.

Consent We obtained voluntary informed consent from all subjects orally before commencing with the interview. We transparently communicated our names and affiliations, the general purpose of the research, an explanation of what participation entailed, the potential risks and benefits to participants, how identities and data would be protected, and any other information relevant to the study.

Compensation There was no compensation paid to participants.

Deception No deception was used.

Harm and trauma No harm or trauma was anticipated or identified.

Confidentiality We provided all participants with the option of confidentiality. For those who consented to their names being referenced, we made clear that they would be included in potential published research. As mentioned above, we did not anticipate any harm or trauma from this identification. For those who chose not to be identified, we ensured confidentiality by de-identifying responses so that there is no traceable record of who they are.

Impact No impact on political processes was anticipated or identified.

Laws, regulations, and prospective review The study complied with all relevant laws and regulations. Prospective review by IRB at [[redacted institution]] was obtained.

D.2 Semi-Structured Interview Questions

Selected interview questions, altered for specific position of the interviewee:

- How would you say the average UAW member evaluates the state of the auto industry? Are they optimistic or pessimistic about it going forward?
- What political issues/concerns do members care about the most right now?
- When would you say the transition to electric vehicles first emerged? When did UAW members start seeing this as an issue?

- How do you think opinions among the membership towards the EV transition has evolved over time?
- What do you think the general reaction of UAW membership is to Biden's pro-EV policies?
- Do you think that the perception of UAW membership towards the EV transition is shaped by what type of work they do
- Do you think membership is getting the same direction about EV's from their local union leadership as their national leadership?

D.3 Interview List

1. Jim Pedersen, Retired UAW Leader, Zoom, October 4, 2023
2. Darryl Nolen, Retired UAW Leader, Zoom, October 4, 2023
3. Darryl Nolen, Retired UAW Leader, Zoom, June 28, 2023
4. Paul Massaron, Retired UAW Leader, Phone, June 25, 2023
5. Rick Isaacson, Retired UAW Leader, Zoom, June 19, 2023
6. Nicole Didia, VP of UAW Local 2280, Phone, May 17, 2023 (Local union clearly benefitting from EV transition)
7. Scott Birdsall, Retired UAW Leader, Phone, May 12, 2023
8. Steve Lyons, Member UAW Local 2280, Phone, May 11, 2023 (Local union clearly benefitting from EV transition)
9. Dottie Lenard, UAW Local 900 Member, Zoom, April 27, 2023 (Local union less vulnerable to EV transition)
10. Anonymous UAW Member, Phone, April 24, 2023
11. Dick Long, Retired UAW Leader, Personal Address, April 24, 2023
12. Samuel Cohen, Member Michigan Carpenters Union, Zoom, April 23, 2023
13. Jim Pedersen, Retired UAW Leader, Zoom, April 21, 2023
14. Dan Nixon, President Plumber's Local 98, Nemo's bar in Detroit, April 20, 2023
15. Rick Nelson, Retired Michigan union member, Nemo's bar in Detroit, April 20, 2023
16. Bob Morris, Son of UAW Leader, Fishbones in Detroit, April 19, 2023
17. Brian Pannebecker, Retired UAW Member, EOS Café in Macomb County, April 17, 2023

18. Rick Nelson, Retired Michigan union member, Kurley's Bar, Windsor ON, April 15, 2023

19. Sean Crawford, Member UAW Local 160, Local 160 Hall, April 13, 2023 (Local union more vulnerable to EV transition)

20. Jessie Kelly, Member UAW Local 160, Local 160 Hall, April 13, 2023 (Local union more vulnerable to EV transition)

21. Jaren Garza, Member UAW Local 160, Local 160 Hall, April 13, 2023 (Local union more vulnerable to EV transition)

22. Earl Fuller Jr., Chairman UAW Local 160, Local 160 Hall, April 13, 2023 (Local union more vulnerable to EV transition)

23. D. Robinson, VP UAW Local 140, Local 140 Hall, April 12, 2023 (Local union more vulnerable to EV transition)

24. Lisa Canada, Michigan Carpenters' Union, Zoom, July 21, 2022

25. Mark Gaffney, Former President of Michigan AFL-CIO, Zoom, July 7, 2022

26. Jamiel Martin, Former political director of the Metro Detroit AFL-CIO, The Congregation Bar/Restaurant in Detroit, June 9, 2022

27. Ron Bieber, President of Michigan AFL-CIO, Head Office Michigan AFL-CIO, June 7, 2022

28. Pat Devlin, President of the Michigan Building Trades Association, Nemo's Bar, June 6, 2022

29. Rick Nelson, Retired Michigan union member, Nemo's Bar, June 6, 2022