

Minimum Wages and Internal Migration¹

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Abstract: Approximately 40% of individuals who move across US states report that they do so for employment. We study whether minimum wage changes affect state-to-state migration flows in the United States. Using data from the American Community Survey (ACS), we are able to observe the migration patterns of (near-)minimum-wage workers. We apply a variety of identification strategies, including a dynamic difference-in-differences approach leveraging state minimum wage changes, a within-state dynamic triple-differences approach comparing individuals earning the minimum wage to individuals slightly above the minimum wage, and an approach isolating state minimum wage variation induced by federal minimum wage increases. Across identification strategies, we find consistent and statistically-significant evidence of reduced outmigration from states that increase their minimum wages relative to other states. In particular, a minimum wage increase of \$1 is associated with a 0.8 to 1.4 percentage point decrease in outmigration of near-minimum-wage workers (those earning \$1 above the minimum wage or less) in the year after the policy change. There is no evidence of pre-trends, and the full effect appears to be realized in the first year. We find little to no consistent evidence of effects on immigration. The effects gradually diminish in magnitude as we raise the threshold for near-minimum wage workers from \$1 to \$3 to \$5 and incorporate more individuals less likely to be directly affected by the minimum wage in our sample.

1 Introduction

Every year in the United States, approximately 8 million people move across state borders, representing roughly 2.5% of the U.S. population. The most common reason behind their migration decision – cited by 40% of cross-state movers in the CPS – is employment. Furthermore, individuals across the skill distribution are represented amongst cross-state movers. With approximately 40% having a high school education or less, it is not a decision unique to any

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particular subset of the skill distribution. Consequently, many cross-state movers may be affected by minimum wage increases – either directly or indirectly by being only slightly higher in the wage distribution. While mandated higher wages for low-skilled jobs may be an attractive prospect to low-skilled workers, if such a minimum wage increase reduces the demand for low-skilled labor, it may reduce the probability that such workers are able to find a job at all. As such, the appeal to prospective migrants – and any effect on migration – is likely to be ambiguous theoretically and boil down to an empirical question.

We argue that the existence of any such migration effects induced by the minimum wage has important implications. In addition to being of independent policy interest, they provide a revealed-preference approach to determining whether low-skilled workers view minimum wage increases favorably or unfavorably. They also contribute to broad discussions surrounding the phenomenon of “moving to opportunity” – undertaking geographic mobility with the intent of actualizing economic mobility. Furthermore, if the migration effects are strong and rapid enough, they have the potential to invalidate or at least bias existing difference-in-differences designs studying the effects of minimum wage increases on other outcomes such as employment and wages, as some of the population of interest would be flowing between the treatment group and the control group contemporaneous with treatment.

In this paper, we empirically study the effects of minimum wage increases on the cross-state mobility patterns of near-minimum-wage workers. We use data from the American Community Survey (ACS), which contains information on wages and annual migration patterns (each respondents’ state of residence currently and one year ago). The ACS is an ideal data source because it has a cumulative sample size of over 50 million respondents representative of the general US population. Consequently, it is possible to conduct regression analysis targeting even narrowly-defined subsamples; hundreds of thousands of low-skilled cross-state movers are present in the data.

We approach our research question with several different identification strategies. We begin with what has become the standard in the literature on the employment and wage effects of minimum wage changes: a difference-in-differences approach leveraging the staggered timing of

state minimum wage changes. We enrich the approach by estimating a dynamic difference-in-differences regression equation enabling the examination of the time patterns of the effects we find. Still, we observe that this strategy may suffer from endogeneity concerns, as a change in state minimum wage policy may also be correlated with other state policy changes. Consequently, we also utilize other approaches. We estimate a dynamic triple-differences regression equation comparing within-state the effects of minimum wage increases on the mobility of individuals at or very near the minimum wage to those higher up the wage distribution. Furthermore, for both our difference-in-differences and triple-differences approaches, we check robustness to using a narrower subset of state minimum wage variation: federally-induced variation. When the federal government passes minimum wage increases, this induces minimum wage increases in the states at the previous federal minimum (or between the previous federal minimum and the new one) while inducing no policy change whatsoever in states that were already above the new federal minimum wage. Since this decision is compelled by federal action rather than made of the state's own volition, it is plausibly less likely to be correlated with other contemporaneous state-level actions.

The results we find are broadly consistent across our different approaches. We present strongly significant evidence that increases in a state's minimum wage lead to a reduction in outmigration from that state. In particular, a minimum wage increase of \$1 is associated with a 0.4 to 0.6 percentage-point decrease in outmigration of near-minimum-wage workers in the year after the policy change. We argue that this is a sizeable but comprehensible effect, given that a \$1 increase is close to the maximum observed in the data and 2.5% is baseline rate of cross-state migration. Meanwhile, we find no consistent evidence of an effect on immigration. In other words, the main effect of state minimum wage increases on migration is to *curtail* the outmigration decision and keep some individuals in states they might otherwise have left, rather than stimulating any immigration. We show that the result is not sensitive to the specific choice of \$1 above the minimum wage as a threshold. It remains statistically-significant with a \$3 or \$5 threshold, but it decreases in size, as one would expect given that individuals less likely to be strongly affected by minimum wage changes are increasingly being incorporated into the sample. In other words, the

reduction in mobility occurs on the part of the subset of low-skilled individuals best positioned to be affected by the minimum wage increase.

The remainder of this paper is structured as follows. In Section 2, we briefly review some relevant literature on the minimum wage and, in particular, position our work amongst previous work on the effects of minimum wage increases on migration patterns. In Section 3, we discuss in detail our data sources and identification strategy. In Section 4, we present our results. In Section 5, we conclude by discussing the implications of our findings.

2 Literature Review

The minimum wage is one of the most extensively-studied topics in economics. Most of these studies, however, have focused on a relatively narrow range of outcomes: employment and/or wages. This literature is reviewed by Neumark (2017) and Dube (2019). Some papers have branched out beyond these main outcomes, generating small literatures studying the effects of minimum wages on prices (Lemos 2008, Renkin, Montialoux, and Siegenthaler 2020, Leung 2021), skill formation (Agell and Lommerud 1997, Neumark and Wascher 2003), public health (Leigh, Leigh, and Du 2019), crime (Hansen and Machin 2002, Ghosh, Hoover, and Liu 2020), and more.

The effects of the minimum wage on migration patterns is one of these outcomes that has been relatively understudied. Harris and Todaro (1970), in a theoretical paper, were the first to suggest a link between the minimum wage and migration. They posited that job-seekers would migrate with an eye to improved wages, while also accounting for job availability. Therefore, the effects of a government-set minimum wage may have ambiguous effects if it increases the expected wage while decreasing the expected probability of obtaining a job. The first empirical study of this relationship was a case study of Puerto Rico by Castillo-Freeman and Freeman (1992). Between 1974 and 1983, the minimum wage in Puerto Rico was gradually increased until it matched the U.S. federal minimum wage. Castillo-Freeman and Freeman find that this stimulated outmigration of low-skilled workers from Puerto Rico to the mainland United States.

A few more recent papers have studied state-level minimum wages in the United States while focusing on the location decisions of foreign-born immigrants to the US. Orrenius and Zavodny (2008), using a state difference-in-differences approach, find that said immigrants may have been discouraged from settling in states with minimum wages substantially above the federal minimum. Also in a difference-in-differences framework, Cadena (2014) finds similar evidence of low-skilled immigrant populations shifting toward states with relatively low minimum wages. Conversely, Boffy-Ramirez (2013) finds evidence that low-skilled immigrants who have been in the United States for two to four years do the opposite, i.e., that they are attracted to states which raise their minimum wages. Giulietti (2014), also studying low-skilled immigrants, largely concurs with Boffy-Ramirez, albeit using measures of immigrants' expected wages on the right-hand-side of his empirical specifications, as opposed to state minimum wage variation directly.

We contribute to the literature by studying the internal migration patterns of *all* near-minimum-wage workers in US, including both native-born and foreign-born individuals. We investigate whether the state-to-state migration of this broad group of individuals already in the US is influenced by the minimum wage. Furthermore, we apply identification strategies favored in some of the most recent studies of minimum wage effects on employment – adding a triple-differences specification to the standard difference-in-differences approach and studying both all variation in state minimum wages and the subset of state variation induced by the (more plausibly-exogenous) federal reforms. We also make use of the American Community Survey (ACS), which at a sample size of 3.5 million households per year is an order of magnitude larger than the Current Population Survey (CPS) used by previous studies in this literature, allowing for more precise estimates.

3 Empirical Framework

3.1 Data

Our main source of data is the American Community Survey (ACS). Since 2005, the Census Bureau has randomly-selected a sample of 3+ million households annually for a survey inquiring about a variety of social and economic characteristics. The ACS replaced the old long-form

Census, which was an extended survey distributed to one-sixth of respondents to the decennial Census asking detailed questions beyond the basic demographic questions in the short-form Census. Like the old long-form Census, the ACS asks questions on employment, wages, and – crucially – mobility. It asks respondents both their current state of residence and their state of residence one year ago.

Coupled with the individual-level survey weights included in the ACS, this allows us to compile a dataset of state-to-state migration flows. We collapse this dataset to the state level, obtaining measures of outmigration from and immigration into each state annually. Furthermore, the ACS has data on total wage income, hours worked per week, and weeks worked per year. Taken together, this allows computing individuals' hourly wages. Using this information, we are able to focus specifically on migration flows of individuals earning wages near the minimum. For our triple-differences specification, we also compute the migration flows of individuals making \$5 to \$10 above the minimum wage.

It should be noted that the IRS also provides measures of state-to-state migration flows, which it compiles using address data from tax returns. The migration flow data that the IRS makes publicly-available, however, is not disaggregated by any demographic characteristics. Consequently, low-income/low-skill individuals cannot be separated from high-income/high-skill individuals. Because it is implausible that middle- and high-income individuals would respond strongly in their migration patterns to a minimum wage increase in itself – or at least that their response would be identical to that of minimum-wage earners – the IRS data is not useful for the purposes of our study.

We measure the size and timing of minimum wage changes using the database of Vaghul and Zipperer (2016). We extend this data beyond 2016 using publicly-available data from the U.S. Department of Labor (2022).

3.2 Regression Approach

We use a number of different identification strategies in order to ascertain that our results are robust to a variety of approaches. We begin with a standard state difference-in-differences that we enrich with lags and leads of the treatment variable in order to measure dynamic effects:

$$\Delta m_{s,t} = \alpha + \sum_{j=-3}^3 \beta_j \Delta \text{MinWage}_{s,t} + \delta_s + \lambda_t + \epsilon_{s,t},$$

where $\Delta m_{s,t}$ represents immigration or outmigration to/from state s during year t , $\Delta \text{MinWage}_{s,t}$ is the change in the minimum wage in state s during year t , δ_s is a state fixed effect, λ_t is a year fixed effect, and $\epsilon_{s,t}$ is the error term. For this specification, we focus exclusively on the migration flows of workers earning \$1 above the minimum wage or less. This identification strategy relies on a comparison between the migration behavior of workers into/out of states increasing their minimum wage (treatment group) and the migration behavior of workers into/out of states not increasing their minimum wage in the contemporaneous period. It assumes parallel trends – that, had the minimum-wage-increasing states *not* increased their minimum wage, migration patterns for those states would have evolved on the same trajectory as migration patterns for the states that *actually* did not increase their minimum wage. It also assumes that the minimum wage changes are not correlated with any other state-level variation that drives changes in migration.

This specification is fairly standard in the literature on the effects of minimum wage increases, but it is subject to some endogeneity concerns. A change in state minimum wage policy may also be correlated with other state policy changes (omitted variable bias). Alternatively, migration flows into or out of a state could potentially affect that state's policy decisions (reverse causality). Running a dynamic difference-in-differences specification with leads and lags, as above, helps partially address these concerns by making it possible to examine pre-trends and the time pattern of post-treatment effects, which can help rule out certain concerns. It is, however, possible to go further and utilize a more stringent regression approach.

To this end, we also estimate a state triple-differences specification, again enriched with lags and leads of treatment in order to measure dynamic effects:

$$\Delta m_{s,g,t} = \alpha + \sum_{j=-3}^3 \beta_j \Delta \text{MinWage}_{s,t} * \mathbf{1}[g = \text{NearMinWage}] + \delta_{s,t} + \lambda_{s,g} + \omega_{g,t} + \epsilon_{s,g,t},$$

where $\Delta m_{s,g,t}$ represents immigration or outmigration to/from state s by group g during year t , $\mathbf{1}[g = \text{NearMinWage}]$ denotes an indicator variable for whether the group g is near-minimum-wage

workers, $\delta_{s,t}$ is a state-by-time fixed-effect, $\lambda_{s,g}$ is a state-by-group fixed effect, $\omega_{g,t}$ is a group-by-time fixed effect, and $\varepsilon_{s,g,t}$ is the error term. In our setting, group g is equal to either “NearMinWage” for individuals earning \$1 or less above the minimum wage or equal to “HigherWage” for individuals earning between \$1 and \$6 above the minimum wage. This identification strategy relies on a within-state comparison of the migration patterns of individuals near the minimum wage against the migration patterns of individuals somewhat higher above the minimum wage. The basic idea is that individuals just above the minimum wage and individuals \$1 to \$6 above the minimum wage are likely to be reasonably similar on average, but the former will be affected by minimum wage changes, whereas the latter will not be substantially affected by them. In this setting, the parallel trends assumption is modified: had the minimum wage not been increased in state s , the migration patterns of near-minimum-wage workers in state s would have evolved in the same manner as the migration patterns of somewhat higher-wage workers in state s *actually* did. It also assumes that the minimum wage changes are not correlated with any other state-by-group variation that drives changes in migration.

In this setting, some of the most worrisome endogeneity concerns of the difference-in-differences approach are alleviated. Suppose minimum wage increases are correlated with other state policy changes. The analysis is now within-state rather than cross-state, reducing the worry that states with a whole package of policy changes are being compared to none and, therefore, minimum wage effects are being conflated with other effects. For example, suppose minimum wage increases are correlated with contemporaneous liberal social policy changes. While there is reason to believe individuals just above the minimum wage will be differently affected by minimum wage changes than individuals \$1 to \$6 above the minimum wage, because these two groups are similar in most other dimensions, there is less reason to believe that they would respond differentially to things such as changes in schooling policy, minority rights, or tax credits.

Having said this, even the triple-differences specification still has imperfections. Certain policies plausibly correlated with minimum wage increases could potentially affect near-minimum-wage workers more sharply than workers slightly higher up the wage distribution. While there wouldn't be a sharp discontinuity around the minimum wage itself for such policies,

a bit of bias may nonetheless be introduced. To this end, we utilize an alternative, narrower source of variation as another robustness check. In addition to minimum wage increases undertaken by a state legislature or referendum, some minimum wage increases are induced by the federal government. When the federal minimum wage is increased, this compels an increase in the state minimum wage in states with minimum wages at the old federal minimum (or between the old federal minimum and the new one). Meanwhile, states with minimum wages that were already above the new federal minimum will be entirely unaffected by the federal minimum wage increase. Because these federally-driven minimum wage increases are out of the hands of state governments, they are less likely to be correlated with a package of related policies in the way state-driven minimum wage increases may be. Reverse causality is also a more implausible conjecture in this context, as it would mean that the federal government chose to undertake a minimum wage increase specifically to alter migration patterns for a subset of states – a very blunt instrument for doing so. As such, we repeat both the difference-in-differences and triple-differences specification using only federally-induced minimum wage increases.

4 Results

We begin with our difference-in-differences regression specification using variation from all state minimum wage increases. Figure 1 displays the dynamic effects of the minimum wage increases on outmigration (left panel) and immigration (right panel). A \$1 increase in the minimum wage is associated with a strongly-significant 0.85 percentage-point decrease in outmigration and a 0.20 percentage-point decrease in immigration in the year after the minimum wage increase. There is no evidence of pre-trends, and in the case of outmigration, the total effect appears to be realized in the year the policy change is implemented. In the case of immigration, there is some weak evidence of effects in periods after the year of the policy change; however, the cumulative effect in the three years after the policy change is small and indistinguishable from zero.

We next turn to our triple-differences specification using variation from all state minimum wage increases. Figure 2 displays the dynamic effects of the minimum wage increases in the context of this identification strategy. A \$1 increase in the minimum wage is associated with a

strongly-significant 0.92 percentage-point decrease in outmigration in the year after the minimum wage increase. No pre-trends are apparent. Again, there is some weak evidence of reduced immigration 3 years after policy implementation, but the cumulative effect in the three years after the policy change is again small and indistinguishable from zero.

We repeat the preceding analysis using the subset of state minimum wage variation induced by the 2007-09 federal minimum wage increases. At the start of 2007, the federal minimum wage was \$5.15 per hour. In May 2007, the recently-elected Democratic majority in Congress passed the Fair Minimum Wage Act of 2007, which increased the federal minimum to \$5.85 per hour effective July 2007, \$6.55 per hour effective July 2008, and \$7.25 per hour effective July 2009. Figure 3 shows the set of 19 states for which this reform was binding.

Running our difference-in-differences specification using this federally-induced variation yields Figure 4. We find evidence of a statistically-significant 0.99 percentage-point decrease in outmigration in the year after the minimum wage increase, with no apparent pre-trends. Using this more plausibly-exogenous source of variation, we find no significant evidence of an effect on outmigration. Finally, running our triple-differences specification using the federally-induced variation yields Figure 5. We find evidence of a statistically-significant 1.43 percentage-point decrease in outmigration in the year after the minimum wage increase. Coefficients in the pre-period are somewhat more variable in this specification, but none are significant, and the variability is perhaps to be expected as a result of the fact that this federally-induced triple-differences specification uses the narrowest slice of variation amongst all our specifications. We also find evidence of a 1.61 percentage-point *increase* in immigration in the year after the minimum wage increase, but it is negated by a coefficient of the opposite sign and similar magnitude in the preceding period such that the cumulative effect is decidedly non-significant.

The above analysis was performed by defining minimum-wage workers as workers making no more than \$1 above the state minimum wage. This allows us to target the workers most likely to be affected directly by the minimum wage; however, the precise choice of \$1 as a cutoff is somewhat arbitrary. Consequently, we reproduce the above four specifications for outmigration using a cutoff of \$3 and \$5 above the minimum wage. These results are plotted in Figure 6, which

reveals similar patterns to the main analysis. Notably, the magnitude of the effects are smaller for the \$3 cutoff than the \$1 cutoff and smallest (though still significant) for the \$5 cutoff. This is as we would expect, given that higher cutoffs increasingly include individuals less likely to be directly affected by minimum wage increases and therefore less likely to have their migration decisions influenced by them.

5 Conclusion

We use data from the American Community Survey on the migration flows of near-minimum-wage individuals to study the effects of minimum wage increases on mobility patterns. We apply a dynamic difference-in-differences identification strategy and a dynamic triple-differences identification strategy. For both of these approaches, we estimate regression equations using all variation in state minimum wages and, separately, only variation induced by federal minimum wage increases. Across specifications, we find consistent evidence of reduced outmigration of near-minimum-wage workers from states that increase their minimum wages. There is no evidence of pre-trends, and the full effect appears to be realized in the first year. Conversely, we find little to no evidence of effects on immigration. We show that the effects are driven by those workers closest to the minimum wage, the group most likely to be affected by a minimum wage change.

These findings have some important implications for the minimum wages more generally. Our results suggest minimum-wage earners view it favorably (at least in the short- and medium-run) when their state increases the minimum wage. The reduction in outmigration indicates that they “vote with their feet” by staying in their state when they might otherwise have moved. On the other hand, the minimum wage increase is perhaps not viewed positively enough to stimulate immigration from minimum-wage earners in other states – likely a higher bar to clear. These findings add to discussions around the phenomenon of “moving to opportunity,” as many minimum-wage earners appear to decide moving is no longer worth it when they are afforded the opportunity of an increased wage. Whether this is good for their lifetime earnings and well-being in the very long run is a separate question and a potential avenue for future research. Finally, and

importantly, we note that the existence of reasonably strong migration effects suggests the existence of some biases in difference-in-differences designs studying the effects of minimum wage increases on employment and wages. Some of the population of interest is leaking between the treatment group and the control group in a timing roughly contemporaneous with treatment, given the rapidity of the effects we identify. Modifying these difference-in-differences designs to account for our findings and deliver revised estimates of effects on employment and wages is another potential avenue for future research.

We note that, as with all studies utilizing variation in U.S. state minimum wages, the variation in our paper is limited to the spectrum of minimum wages that have existed in the United States, which have generally tended to be conservative with regard to their position relative to the broader income distribution. Some recent research (Clemens and Strain 2021) suggests that the effects of particularly large minimum wage increases may be quite different from the effects of modest increases, with the downsides being substantially more potent. Indeed, this is one way of reconciling the findings of Castillo-Freeman and Freeman (1992) with ours. By the mid-1980s, the Puerto Rican minimum wage was over 60% of its *average* wage. Castillo-Freeman and Freeman observe large disemployment effects and increased outmigration from Puerto Rico to the mainland U.S. In other words, we caution against extrapolating our results too far into the realm of very high minimum wages.

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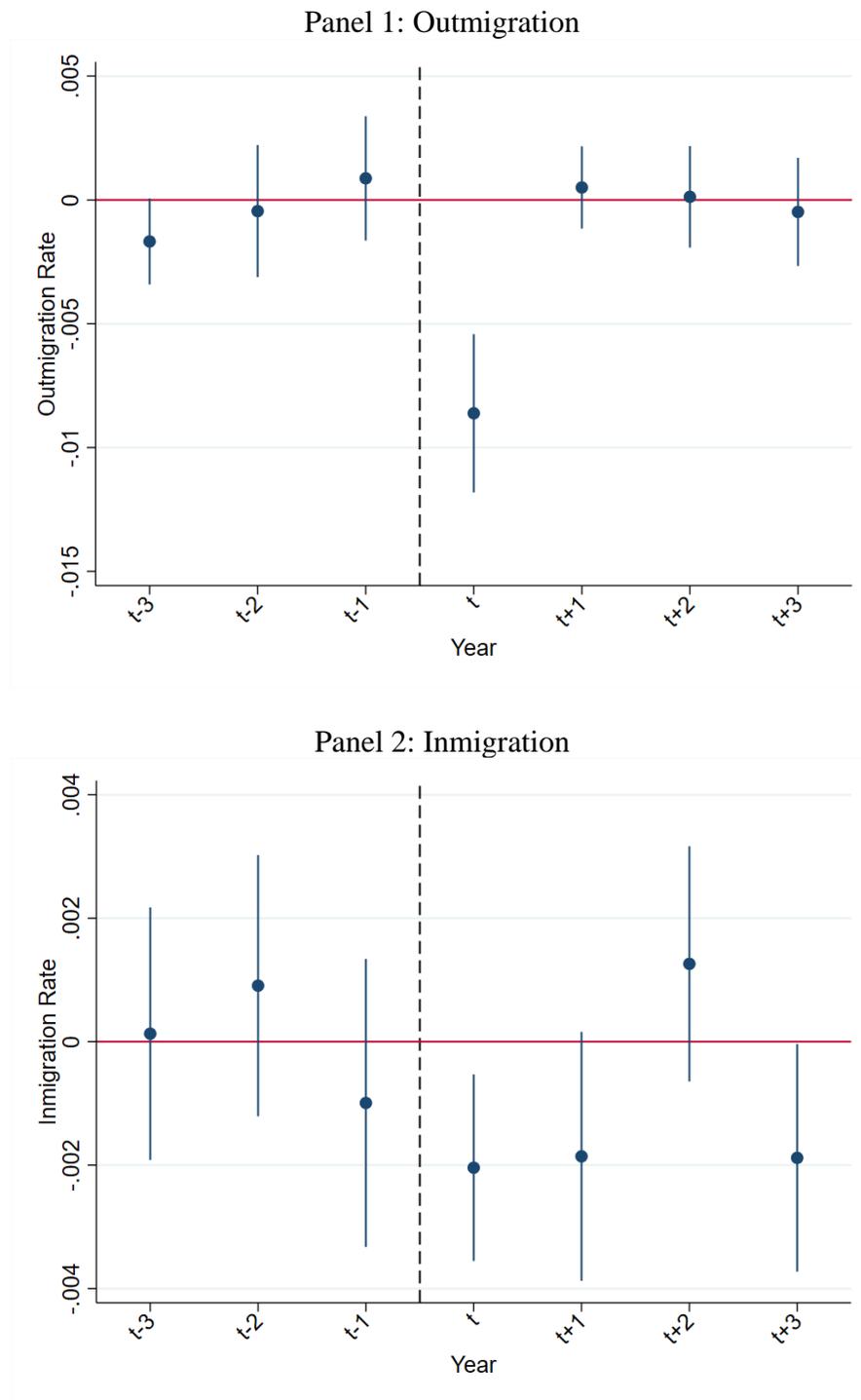
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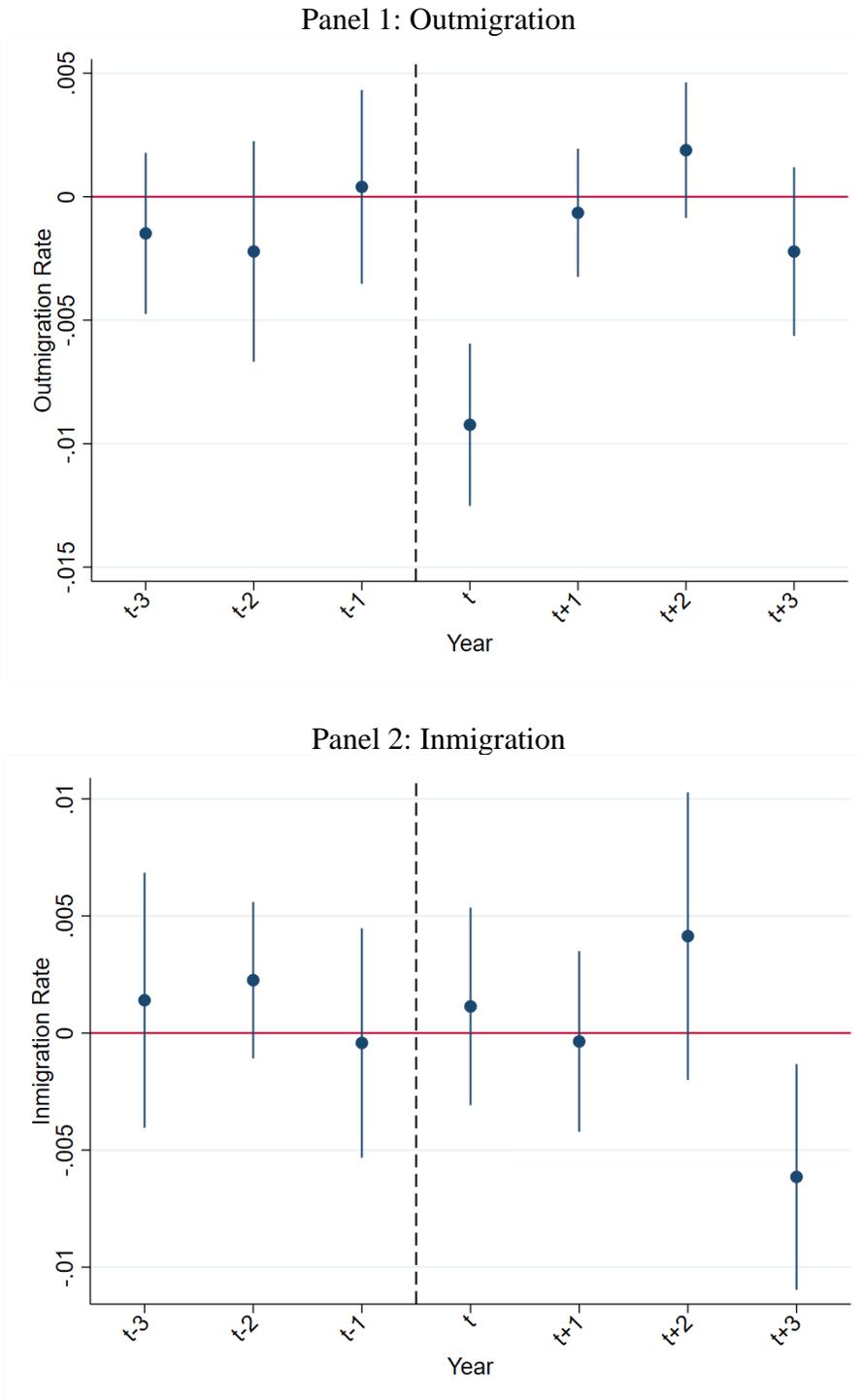
Figures

Figure 1: Difference-in-Differences Specification, All Variation



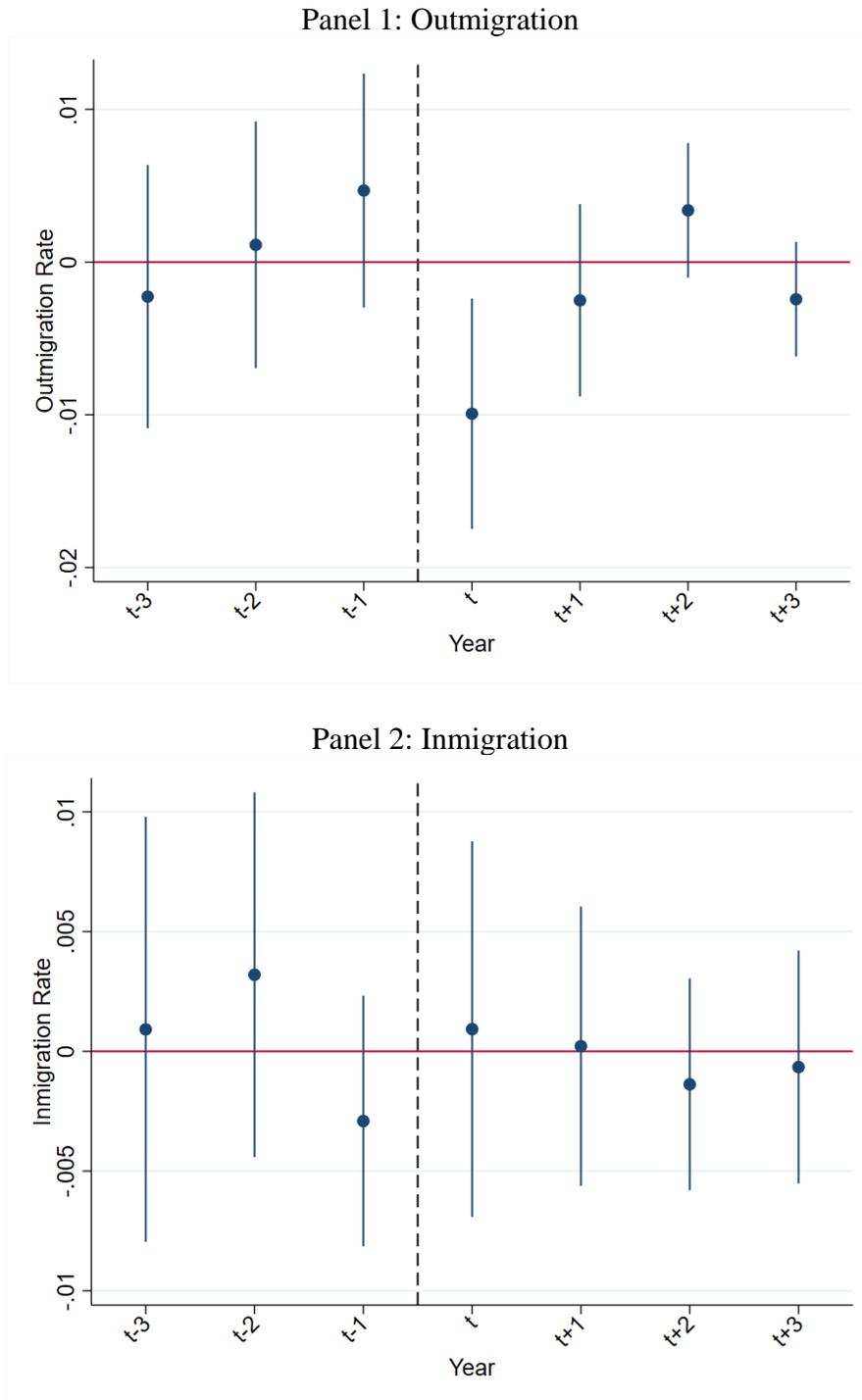
Note: This figure displays the dynamic effects of a minimum wage increase on outmigration and immigration of near-minimum-wage earners (those earning no more than \$1 above the minimum wage), as per the differences-in-differences specification utilizing state and federal minimum wage increases.

Figure 2: Triple-Differences Specification, All Variation



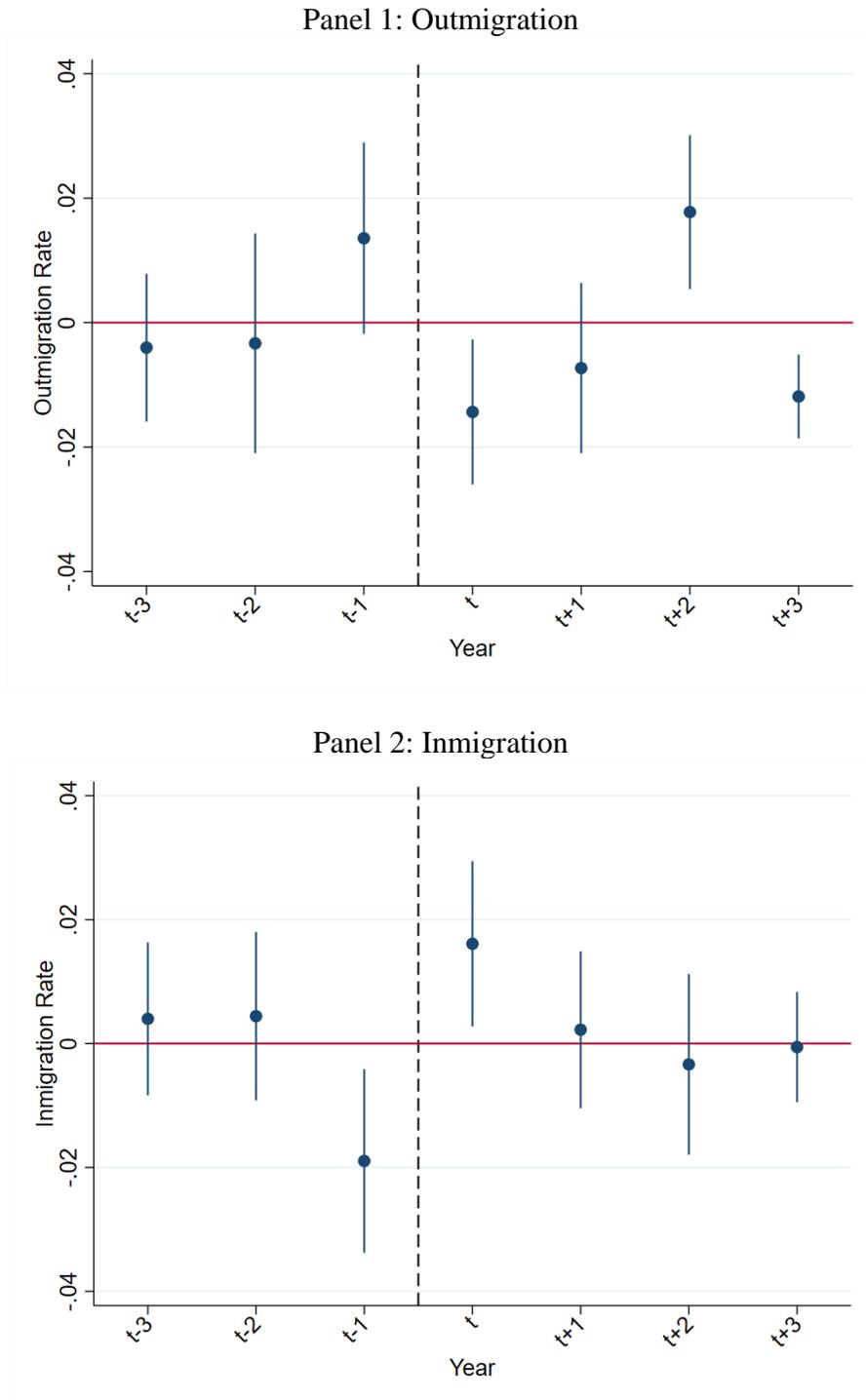
Note: This figure displays the dynamic effects of a minimum wage increase on outmigration and immigration of near-minimum-wage earners (those earning no more than \$1 above the minimum wage), as per the triple-differences specification utilizing state and federal minimum wage increases and comparing near-minimum-wage earners to those somewhat higher in the wage distribution (those earning between \$1 and \$6 above the minimum wage).

Figure 4: Difference-in-Differences Specification, Federally-Induced Variation



Note: This figure displays the dynamic effects of a minimum wage increase on outmigration and immigration of near-minimum-wage earners (those earning no more than \$1 above the minimum wage), as per the differences-in-differences specification utilizing only federal minimum wage increases.

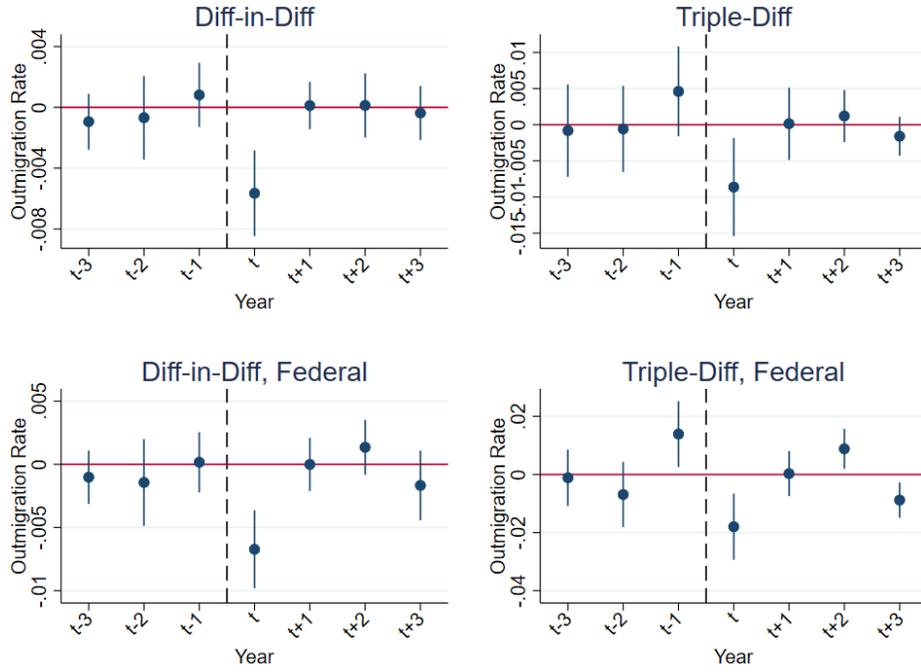
Figure 5: Triple-Differences Specification, Federally-Induced Variation



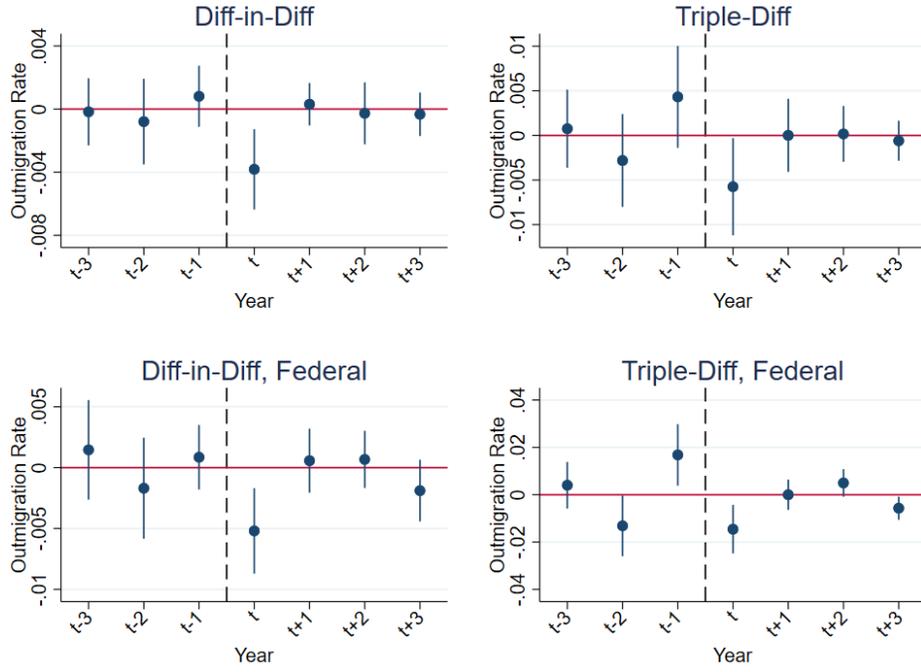
Note: This figure displays the dynamic effects of a minimum wage increase on outmigration and immigration of near-minimum-wage earners (those earning no more than \$1 above the minimum wage), as per the triple-differences specification utilizing only federal minimum wage increases and comparing near-minimum-wage earners to those somewhat higher in the wage distribution (those earning between \$1 and \$6 above the minimum wage).

Figure 6: Varying Thresholds for Near-Minimum-Wage Workers

Panel 1: Threshold – \$3 Above Minimum Wage or Less



Panel 2: Threshold – \$5 Above Minimum Wage or Less



Note: This repeats the main outmigration specifications using different thresholds to define a near-minimum-wage worker – specifically, \$3 and \$5 above the minimum wage, as opposed to \$1 above the minimum wage in the baseline.