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## 1 Abstract

This paper analyzes migration patterns in and out of the industrial Midwest, also known as the Rust Belt. Utilizing data from the American Community Survey and the Current Population Survey, it finds that the region is suffering from a serious brain drain, as the region's stock of educated and wealthy people is being depleted. It hypothesizes that a potential reason for the migration is the stagnation of wage growth, as real wages have remained essentially flat in the area since 2000. Additionally, this paper shows the adverse effects of these migrations on state budgets, and estimates this effect to be on the order of hundreds of millions of dollars a year.

## 2 Introduction

In the 1980s, the phrase "Rust Belt" emerged to describe a region of the Midwest that was formerly home to major manufacturing centers. Proponents of the term believe that the region had been a manufacturing powerhouse in the post-war years, but those machines had now been allowed to rust, so to speak. Some speculate that this "rusting" leads to a loss of human capital, as the region is no longer an attractive place for young, talented workers.

This paper tackles a few main questions— who is leaving the Rust Belt, how many of them are leaving, why are they leaving, and where are they going? I answer these questions with two large datasets. The first is the Census Bureau's American Community Survey from 2016-2018, which provides information about demographics and migration. The second is the Bureau of Labor Statistics' Current Population Survey from 1970-2019, which provides data on historical wages.

This paper shows that there is a significant brain drain out of the Rust Belt. The region brings in 600,000 people a year from the rest of the country, while losing 750,000 people, a net loss of 150,000. Importantly, those leaving are significantly more educated than those arriving, and they also earn around 10% more than them. It also conducts a placebo test, using New England as a control region, to show that these results are unique to the Rust Belt and not due to a nationwide difference between those leaving and arriving.

While this paper makes no attempt to develop a formal framework for casual inference to explain the decision of these migrants, it looks at some processes going on in the Rust Belt contemporaneously with the migration. Notably, it finds that the region has seen a significant stagnation in wage growth compared to the rest of the country. In 1970, those in the Rust Belt earned 7.5% more than those elsewhere, while in 2019 they earned 2.5% less than the rest of the country.

While significant research has been done about the effects of mass migration and brain drain, most of the focus has been on international migration. Docquier and Rapoport

(2012) provide an efficient summary of the research on international brain drain. They describe an initial wave of research that showed detrimental effects of high-skill migration for the countries of origin. These papers highlighted the classic issue associated with brain drain— countries bearing the costs of investment in talented young people without realizing the gains. This was then followed by a somewhat contrasting second wave of research, from authors such as Stark et. al. (1997). Stark argues that there are positive effects of brain drain for countries of origin both in the form of remittances and return migration to the original country.

When applied to the setting of domestic American migration, I am more compelled by the negatives of brain drain than the positives. As discussed later, the people leaving the Rust Belt are unambiguously wealthier and better educated than those arriving. From the perspective of a state budget, it is likely a financial loss when a talented young person grows up in the Rust Belt, and as soon as they begin to develop into a high earner, they leave for greener pastures. As far as the positives of brain drain, return migration can be largely ruled out as it is not observed in the data. Intra-country remittances likely occur on a small scale, but as de Haas (2007) discusses, most remittances are sent from high and medium development countries to very undeveloped countries.

The net migration of talented people out of the Rust Belt is of significant concern to policymakers in the region. A variety of policy solutions have been proposed to try to stem the tide. Many states have proposed systems where recent college graduates who stay in-state could receive preferential tax treatment, although only a small number of states have actually implemented such programs. Other states have instituted merit scholarships for college students, but it is unclear how much this incentivizes students to stay in state after they receive their degrees. Overall, the policy space about domestic brain drain is sparse compared to that of international brain drain.

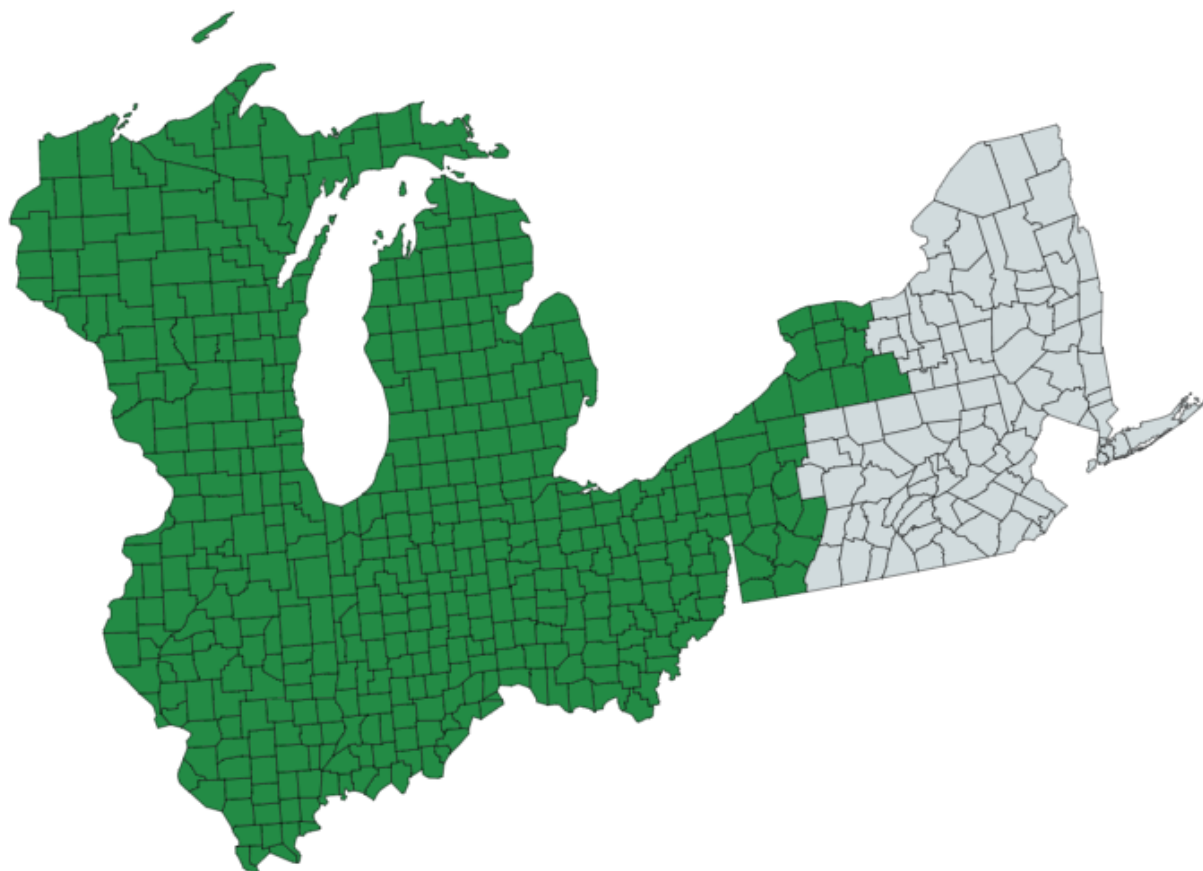
This paper proceeds as follows. Section 3 gives background information on the Rust Belt and its demographics. Section 4 provides details on the two main datasets used. Section 5 breaks down the key findings about the migrants and their effect on the region. Section 6 concludes the paper.

### **3 Background**

There is no consensus on the definition of the Rust Belt. There is a core area that everyone agrees is part of the Rust Belt, and then outlying areas that some definitions include and others exclude. The core area primarily consists of northern Ohio, northern Indiana, southern Michigan, western Pennsylvania and greater Chicago. The principal cities of this region are Chicago, Pittsburgh, Detroit, Cleveland and Toledo. Some definitions extend east through upstate New York, all the way to New Jersey. Some extend south into Kentucky, and some extend west into Minnesota and downstate Illinois.

After consulting many different definitions of the regions, I roughly averaged them

**Figure 1:** *Rust Belt Counties*



The counties in green are considered part of the Rust Belt for my analyses that utilize the ACS data. Due to a lack of county-level data for some years in the CPS data, western New York and western Pennsylvania are not included in the analysis of wages. See the data section for more information.

Figure made with Mapchart.net.

**Figure 2:** *Demographics: Rust Belt vs. rest of USA*

Demographics (2019)		
Category	Rust Belt	Rest of USA
White non-Hispanic	77.36%	57.83%
Black	11.43%	12.37%
Hispanic	8.03%	19.34%
Asian	3.38%	6.19%
Two or more races	2.44%	3.37%
American Indian	0.36%	0.90%
Age	41.9	41.3
Share prime-age adults	35.87%	36.95%
College degree (prime-age)	35.04%	35.66%
HS degree (prime-age)	93.16%	90.69%
Prime-age income	\$53,008	\$54,124

The data used is from the ACS. Prime-age adults are defined as those between the ages of 25 and 54. Figures for educational attainment and prime-age income are for prime-age adults only.

to create the definition in Figure 1. This includes all of Wisconsin, Michigan, Illinois, Indiana and Ohio. It also includes western Pennsylvania in and around Pittsburgh, and western New York in and around Buffalo and Rochester. This region is home to a bit over 50 million people, about fifteen percent of the US population. Maps of some other definitions of the Rust Belt that I consulted can be found in the appendix as figures 14 and 15.

Figure 2 shows basic demographic information about the Rust Belt. The biggest demographic difference between the Rust Belt and the rest of the country is that it is far more homogeneous. White Americans make up nearly 4 in 5 Rust Belt residents, compared to 58% elsewhere. It has a similar share of Black residents, and far fewer Hispanics and Asians than the rest of the US.

Research on domestic brain drain in the United States is more scarce than that on international brain drain. A 2019 report from the congressional Joint Economic Committee takes a deep look at the migration of skilled workers within the United States. They identify two primary regions of brain drain: the Rust Belt and the poorer, more rural states in the south such as Alabama, Mississippi and Louisiana. They highlight the substantial economic effects of this migration, and also note the effect it has on social segregation. One side effect they note of these migrations is that educated Americans are increasingly converging in a few metropolitan areas, potentially increasing political polarization.

Some states have attempted to enact policies to combat brain drain, but fewer have made it into law. In 2017, a bipartisan pair of state legislators in Ohio proposed a bill designed to keep recent graduates in state. The bill would've forgiven some student loan debt for graduates with STEM degrees from public schools in Ohio who stay in state after graduating. However, the bill never passed the state legislature. A similar story played out in Mississippi, where a bill was proposed in 2018 to give a tax credit to recent graduates of a 4-year school who stayed in the state. After passing unanimously in the state House, it never got a vote in the state Senate. One state that did pass a program along these lines is Maine, where the Educational Opportunity Tax Credit provides a tax credit to Mainers who get a degree and stay in state.

One potential solution for stemming skilled emigration at a younger age is merit-based scholarships. Zhang and Ness (2010) present an overview of state merit scholarship programs. Over a dozen states have some sort of merit scholarship program, primarily in the South. The size of the awards vary, but it is thousands of dollars per year in most states. Supporters of these programs claim that it helps keep talented students in state for college, making them more likely to stay in state after receiving their degree. However, there is relatively little research supporting the second part of that claim. Opponents say that these programs largely give financial support to students who already have the means to attend college, and that public education funds would be better spent providing need-based financial aid to expand college access (Zhang and Ness).

## 4 Data

This paper relies on two large publicly available datasets. The first is the Census Bureau's American Community Survey, which I got from IPUMS. The ACS takes roughly a 1% census in each year, and I use observations from 2016, 2017 and 2018. In total, I observe over nine million Americans through these three years of ACS data. The ACS is my source for all migration data.

For each observation in the American Community Survey, I have one column indicating what county the subject lives in this year, and what county the subject lived in last year. From this, I construct 3 important definitions that will be used throughout my paper.

1. A Rust Belt leaver is a prime-age adult who lived in the Rust Belt one year ago, but now lives outside the Rust Belt. For example, someone in the 2016 ACS who resided in Illinois last year and now lives in Arizona would count as a leaver. I observe 24,439 Rust Belt leavers throughout my 3 years of data.
2. A Rust Belt arriver is a prime-age adult who lived outside the Rust Belt one year ago, but now lives in the Rust Belt. For example, someone in the 2017 ACS who resided in New Jersey last year and now lives in Wisconsin would count as an arriver. I observe 17,852 Rust Belt arrivers throughout my 3 years of data.

3. A Rust Belt stayer is a prime-age adult who lived within the Rust Belt last year, and still does this year. The majority of these people did not move during the year, but even those who moved within a Rust Belt state or between Rust Belt states count as Rust Belt stayers. I observe just over one and a half million Rust Belt stayers throughout my 3 years of data.

One important thing to note about these definitions is that they make no consideration of international immigration, only domestic migration. I do have data on those coming into the Rust Belt from other countries, and I observe 6,027 such people in the ACS. They come from a wide variety of countries; India and China are the top senders making up a combined 26% of the migrants. However, I chose not to count these people as Rust Belt arrivers, because I cannot observe their corresponding leavers. That is, there exist some people who lived in the Rust Belt a year ago and now live outside the United States, and since I don't see those international leavers I chose not to include the international arrivers I do have data on.

In addition to data on migration, the ACS contains lots of demographic information I use. The ACS has data on age and race, which is used in some of my analyses. It also contains a detailed breakdown of educational attainment. For example, for each person in the dataset, I can see whether they attended 3 or 4 years of high school, 0, 1, 2, 3 or 4 years of college, and so on. From this, I construct dummy variables for high school degree, college degree and advanced degree attainment.

The second dataset I use is the Current Population Survey from the Bureau of Labor Statistics, which I also got from IPUMS. The CPS surveys a representative sample of American households each month gathering information on work status, income and a variety of other factors. I utilize the CPS' annual March ASEC (Annual Social and Economic Supplement) data from the years 1970, 1980, 1990, 2000, 2010, 2017, 2018 and 2019. The CPS is my source for all data on historical wages.

For many of my analyses, I dropped all individuals from the data who were below the age of 25 or above the age of 54. This leaves only people who the Census Bureau considers "prime-age adults". Since this fundamentally a paper on migration, I wanted to focus on migrations that are economically motivated. For example, many thousands of older Americans move to Florida each year to retire in a sunny climate, but that isn't really the type of migration I'm interested in measuring. Similarly, many children move across state lines each year because their parents do so, but I'm interested in the movement of workers more than the movement of people. Analyses of wages, education status or income consider only prime age adults. Analyses of the total number of people moving across state lines and maps of these movements consider people of all ages.

One important thing to note is that I use both data sources for information on income. Any data on the income of leavers or arrivers comes from the ACS. The ACS is my only data source with migratory information, so I can only identify leavers or arrivers there. The ACS measure of income is total personal income. This includes

wage income, transfer payments, business income etc.

Any data on income over time comes from the CPS. The CPS is my only data source with income information over time. The CPS measure of income is also total personal income, the same as the ACS'. However, estimates of income in the Rust Belt differ slightly between the two datasets for two reasons. First, different samples are taken, so some variation between the datasets is expected. Second, the definition of the Rust Belt used in the CPS data is slightly different than in the ACS data. Recall that my definition of the Rust Belt includes some parts of western New York and western Pennsylvania. These areas are not included in the CPS analyses, because before 2000 the CPS does not reliably record the county of respondents. Therefore, I can't distinguish someone in western New York from New York City, so I do not include them as Rust Belt residents. This should not have a major impact on my results, as the New York and Pennsylvania parts of the Rust Belt make up only 9% of the population and are demographically similar to the rest of the region. This is detailed in Figure 17 in the appendix, which breaks down the population of the Rust Belt by state.

## 5 Results

### 5.1 Who are the Movers?

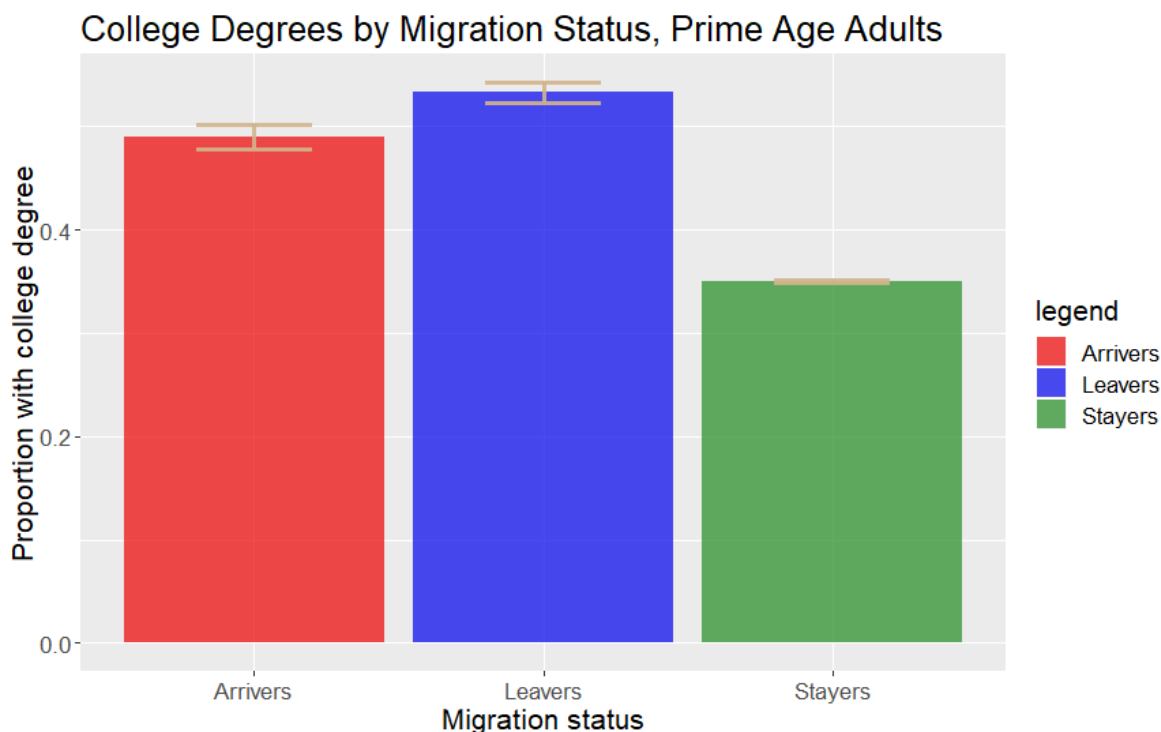
**Table 1:** *Comparison of state movers and stayers*

	Non-movers	State movers	Difference
College degree	0.3519	0.4944	0.1425*** (0.0021)
Some college	0.5932	0.7168	0.1236*** (0.0020)
Advanced degree	0.1278	0.2096	0.0818*** (0.0017)
Age	39.59	35.66	-3.93*** (0.0361)

This table reports summary statistics on educational attainment and age for various groups. Non-movers are defined as people who live in the same state they did the year before, and state movers are defined as people who live in a different state from the year before. 2.27% of people move across state lines each year. As with all further analyses, only prime age adults are considered. Data is from the ACS.

It is relatively unsurprising that leavers are more educated and earn more than stayers. Throughout the US, those who move across state lines are more educated and earn more. Generally, if someone is moving across state lines, they have some economic motivation for doing so such as a new job and are thus disproportionately high earners. Table 1 shows educational attainment by state mover status. About 1 in 3 prime-age non-movers in America have college degrees, compared to 1 in 2 prime-age movers.



**Figure 3:** *College degree attainment by migration status*

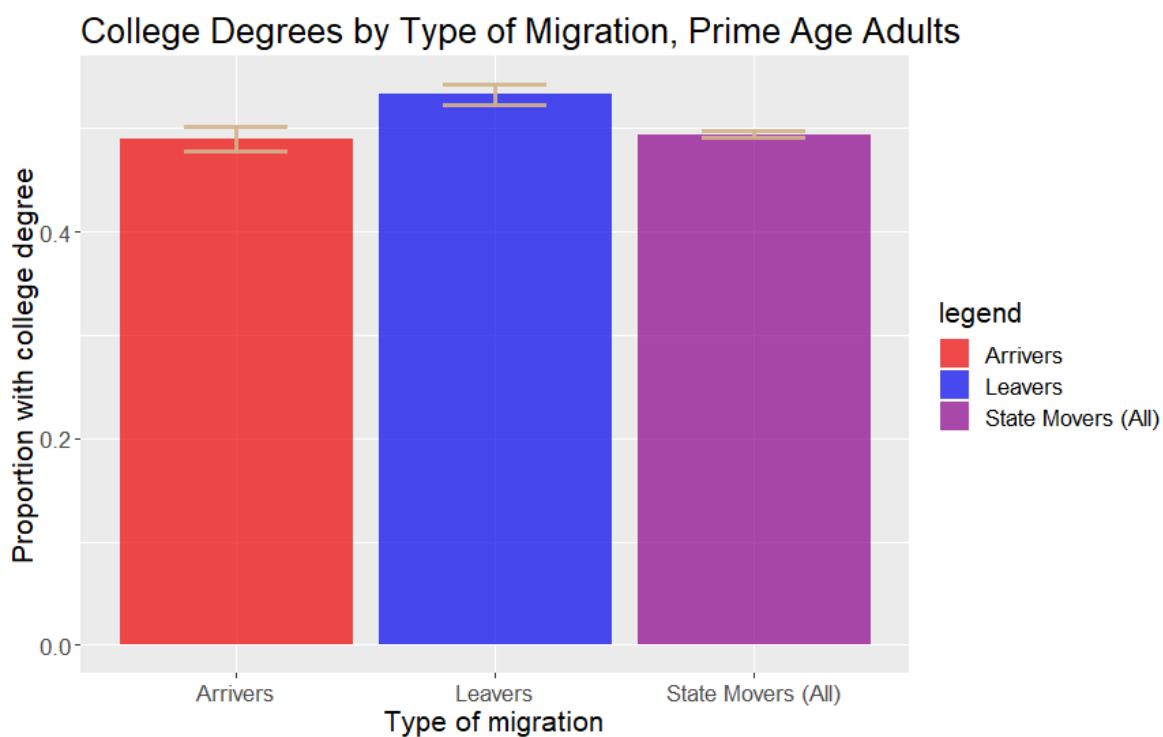
This figure shows the percentage of people in various groups in the Rust Belt with a college degree. Error bars represent 95% confidence intervals. For full definitions of Rust Belt arrivers, leavers or stayers, see the data section. Data from the ACS, only prime-age adults included.

Movers rank higher in all sorts of educational attainment, they are more than one and a half times as likely to hold an advanced degree than non-movers. Movers are also around 4 years younger than non-movers.

Figure 3 shows college degree attainment for Rust Belt leavers, arrivers and stayers. As expected, the stayers lie far below the arrivers and leavers. The more important finding is that Rust Belt leavers are significantly more educated than arrivers. This is a key point of evidence in support of the idea of a brain drain- the Rust Belt is losing a population in which the majority of prime age adults have a college degree and replacing them with a population in which the majority of prime age adults don't. These results hold up when looking at other levels of educational attainment, such as some college attendance or an advanced degree. Table 5 in the appendix shows this information in further detail.

Figure 3 brings up one natural question— is it that the Rust Belt leavers are systematically different from the general population of those moving across state lines, or is it the arrivers who are? Figure 4 helps to answer this question. The purple bar shows all state movers in the US. They have similar levels of educational attainment to the Rust Belt arrivers, it is the leavers who really stand out on this graph. This is further evidence for the idea that this migration is fundamentally a brain drain— those leaving

Figure 4: *College degree attainment by type of migration*



This figure shows the percentage of people in various groups with a college degree. Error bars represent 95% confidence intervals. In contrast with figure 3, the group on the right hand side is all state movers in the US as opposed to Rust Belt stayers. Data from the ACS, only prime-age adults included.

the Rust Belt are uniquely educated compared to the national sample of state movers.

**Table 2:** *Comparison of Rust Belt arrivers, leavers and stayers*

	Leavers vs. Stayers	Leavers vs. Arrivers
Age (no controls)	-3.97*** (0.1112)	0.2201 (0.1678)
Income (no controls)	1447* (756)	4978*** (1084)
Income (with controls)	4706*** (740)	4607*** (1058)

The table reports coefficients  $\beta$  of equation (1). The dependent variable is on the left hand side of the table. For the first two rows, there is no  $Z_i$  term. For the last row, the controls are age, race and sex. Data from the ACS, only prime-age adults included.

A true brain drain requires two things to be true of the leaving population— that they be better educated and wealthier. The education piece is clear, but the income piece is a bit murkier. Table 2 shows coefficients  $\beta$  of a standard OLS regressions of the following form:

$$Y = \alpha + \beta X_i + \delta Z_i \tag{1}$$

Where  $Y$  is the variable on the left hand side of the table,  $X_i$  is a dummy variable that is 1 for the leavers, and  $Z_i$  is a vector of controls including age, race and sex. For the leavers vs. stayers column, the regression is run on all leavers and stayers. For the leavers vs. arrivers column, the regression is run on all leavers and arrivers.

The leavers are about four years younger than the stayers, which matches up with the information we have about state movers from table 2. At first blush, it looks like the leavers earn only marginally more than the stayers, but after controlling for the fact that they’re a bit younger, they earn about \$4700 more. The leavers outpace the arrivers in terms of income by a similar amount after controls. \$4700 dollars a year is a significant amount in this context, it represents around 9% of the average income in the group.

Not only are the leavers more educated and wealthier than the arrivers, but there’s also more of the leavers than arrivers. In the period from 2016 to 2018, I estimate that there are 612,797 Rust Belt arrivers a year, and 767,121 Rust Belt leavers, creating a deficit of 154,324 people each year from domestic migration.

One important thing to note is that even though there are more leavers than arrivers in the Rust Belt, the area is not actually losing people. Rather, it is just growing much more slowly than the rest of America. Figure 5 gives some figures on population changes in the region to illustrate this. While the region is losing around 150,000 people a year to domestic migration, it sees almost 200,000 immigrants arrive from foreign

**Figure 5:** *Migration Flows in and out of Rust Belt*

Migration Counting	
Category	Rust Belt
Arrivers	612,798
Births	495,567
Immigrants	193,567
Deaths+Emigrants	-332,111
Leavers	-767,121
Total	202,700

This table estimates annual Rust Belt population change through various means. It is impossible to discern between people who leave the Rust Belt due to death and foreign emigration, so they are group together here. Data is from the ACS, people of all ages are included in the analysis.

countries annually. It also has almost half a million births a year. The remaining population change is attributable mainly to two things unobservable in my data— deaths and emigrants leaving the Rust Belt for other countries. All in all, the region is adding around 200,000 people a year.

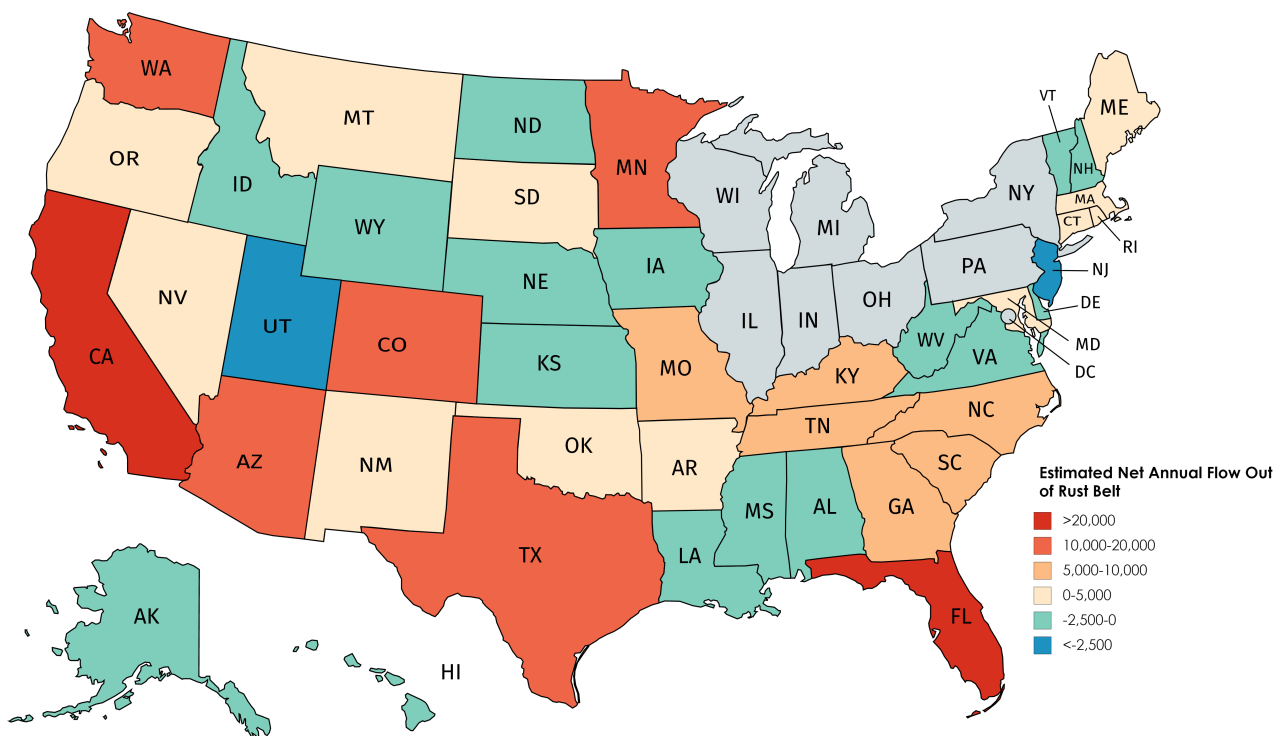
Figure 6 shows the destinations and sources of Rust Belt immigration. The states in shades of red are net receiving people from the Rust Belt, and the states in shades of blue are net sending people to the region. California (26,500 people/year) and Florida (24,000 people/year) top the list, with Texas, Arizona and Washington rounding out the top 5. Unsurprisingly, the top three states on the list are all very large states in the Sun Belt with rapidly growing economies. Note that the states that are losing people to the Rust Belt are doing so in very small numbers, only New Jersey (6,300 people/year) is losing more than a few thousand people to the region each year.

Figure 7 is another version of Figure 6, adjusted for population of the receiving state. The main destinations for leavers are the fast growing states of the South and West. One interesting phenomenon that you can see here is the trend towards migration to neighboring states. Minnesota and Kentucky are not very high growth states, but there is significant migration from Wisconsin across the border into Minnesota, and from Ohio across the border into Kentucky. Overall, the findings are relatively unsurprising though— America’s move to the Sun Belt has been well documented by demographers for decades.

## 5.2 Economics of the Migration

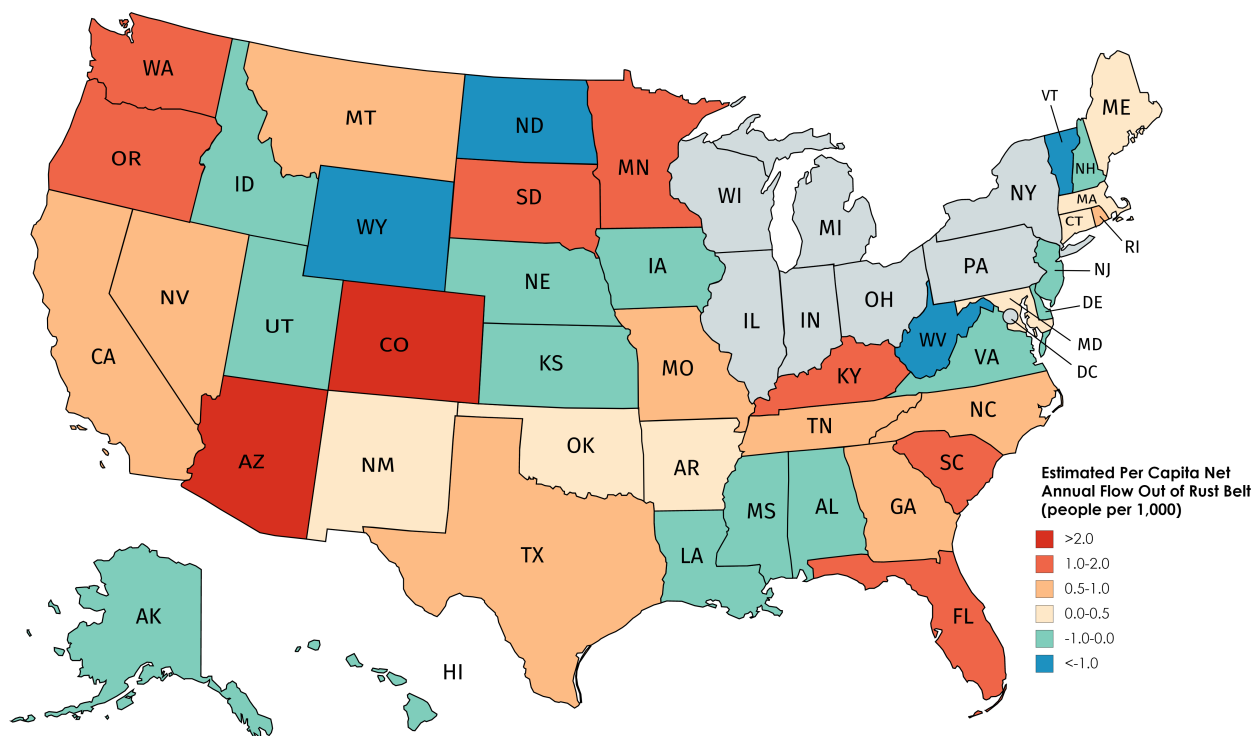
While this paper does not present a rigorous framework for determining the causal effect of this migration, one possible explanation is changes in national wage patterns. Figure

Figure 6: Rust Belt Flows, Raw



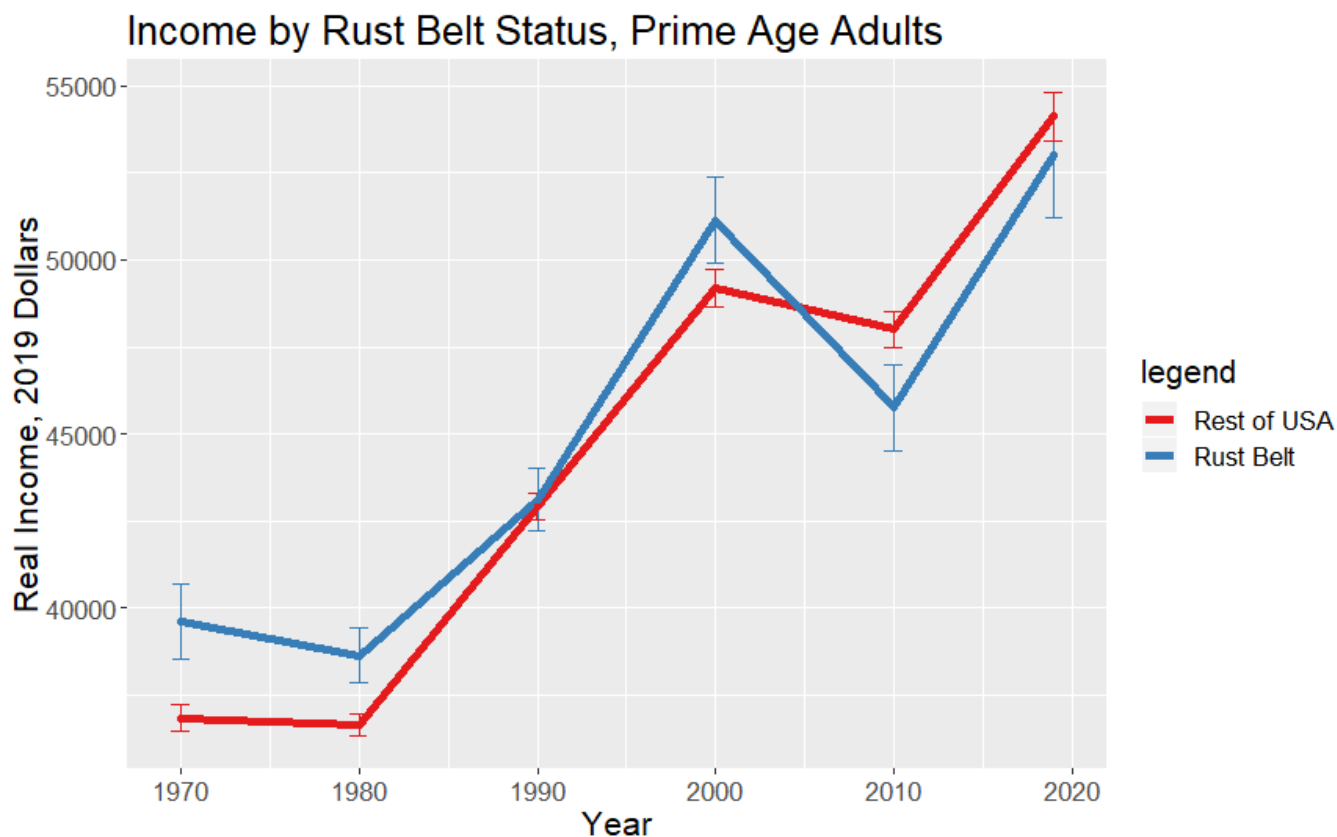
Created with mapchart.net®

This figure shows the flow of people in and out of the Rust Belt. Each state is color coded based on the net number of people it receives from the Rust Belt- the number of people they import from the Rust Belt minus the number of people to export to the Rust Belt. Data from the ACS, figure made with Mapchart.net. People of all ages are included in the analysis.

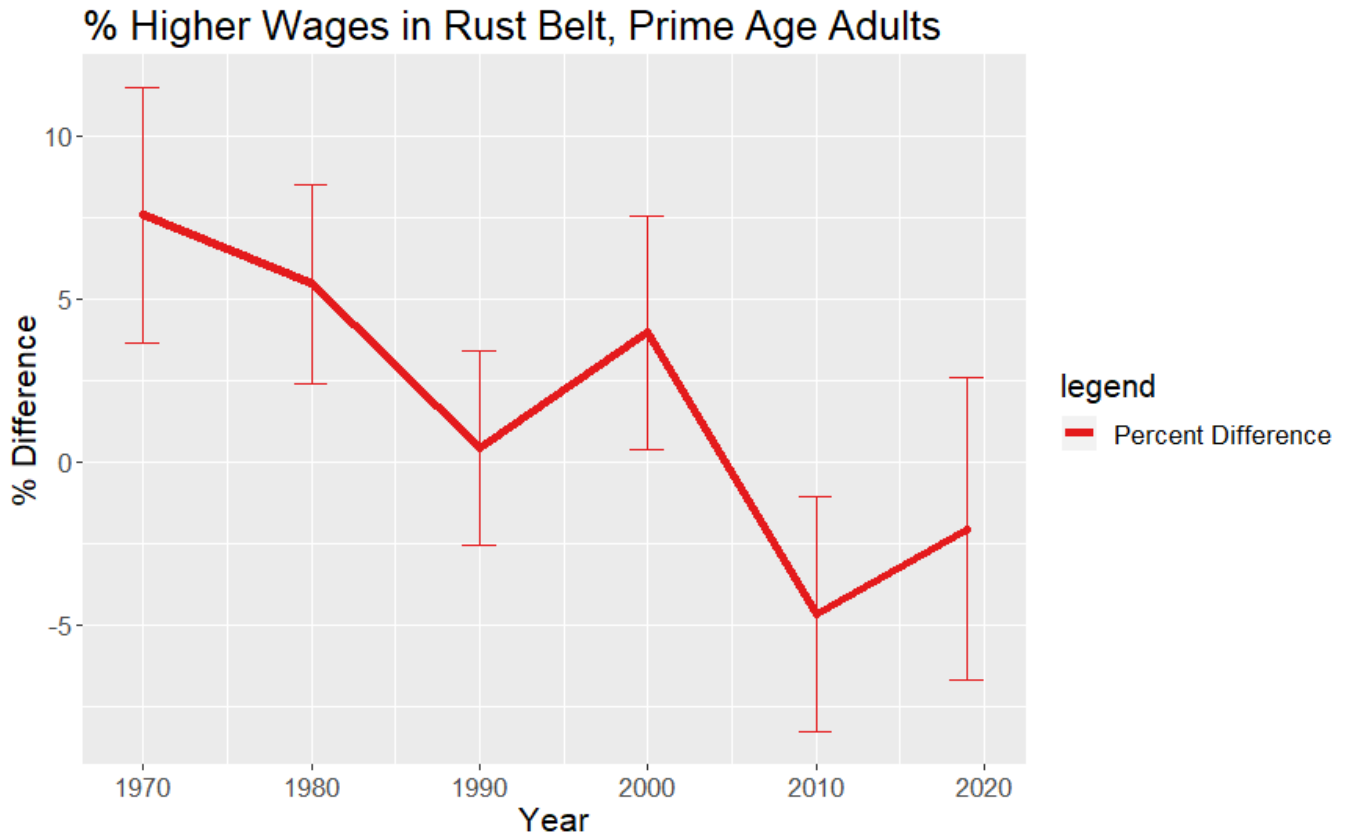
**Figure 7:** *Rust Belt Flows, Adjusted per Capita*

Created with mapchart.net®

This figure shows the flow of people in and out of the Rust Belt. It scales every state from Figure 6 by the population of that state. That is, the darker red a state is, the more of its population is Rust Belt leavers. Data from the ACS, figure made with Mapchart.net. People of all ages are included in the analysis.

**Figure 8:** *Income in and out of Rust Belt*

This figure compares income in and out of the Rust Belt. As described in the data section, total personal income is the measure of income used. All data has been normalized to 2019 dollars using the Consumer Price Index. Data is from the CPS, only prime-age adults included. Error bars represent 95% confidence intervals.

Figure 9: *Differential Income in and out of Rust Belt*

This figure shows the percent difference between average wages in and out of the Rust Belt over time. Total personal income is the measure of income used. All data has been normalized to 2019 dollars using the Consumer Price Index. Data is from the CPS, only prime-age adults included. Error bars represent 95% confidence intervals.

8 uses the CPS data to plot real wages in 2019 dollars inside and outside of the Rust Belt over the last 50 years. From 1970 until 2000, Rust Belt wages are tracking at or above those in the rest of the country. However, between 2000 and 2010, the region fell far behind the rest of the country, and failed to make up the difference during the 2010s.

Figure 9 shows the same information as Figure 8 in a slightly different form. It plots the percent difference between the two lines in Figure 8. For example, in 1970 the average Rust Belt income was \$39,632 in 2019 dollars, and it was \$36,845 in the rest of the country. This 7.56% difference between the two values is what is shown in Figure 9. That is, in 1970, there was a 7.5% "advantage" to living in the Rust Belt compared to the rest of the country. By 2019, this had flipped to a 2.5% "disadvantage". This result holds even after controlling for education level, age and race. Table 3 shows coefficients  $\beta$  of a standard OLS regression of the following form:

$$Y = \alpha + \beta X_i + \delta Z_i \quad (2)$$



**Table 3:** *Comparison of wages in and out of Rust Belt*

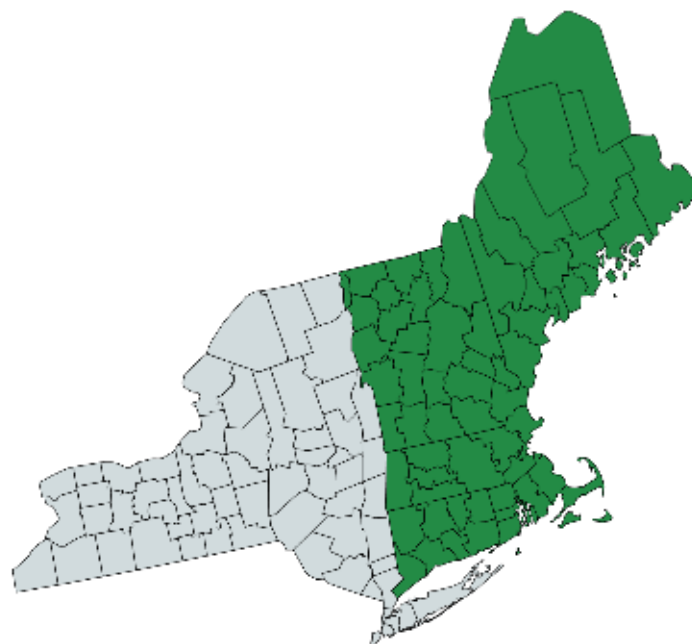
	Rust Belt vs. rest, 1970	Rust Belt vs. rest, 2019
Income	2787*** (549)	-1115 (924)
Income (with controls)	2213*** (404)	-2475*** (859)

This table reports coefficients of  $\beta$  from table 3. The dependent variable in each case is income.  $X$  is a dummy variable that is 1 for those in the Rust Belt and 0 for everyone else. The second row has a control term  $Z_i$  of age, race, education level and sex, the first row does not. Data from the CPS, only prime-age adults included.

Where  $Y$  is income,  $X_i$  is a dummy variable that is 1 only for the Rust Belt, and  $Z_i$  is a vector of controls including age, race, education level and sex. After including the controls, it is clear that 50 years ago, a Rust Belt resident made more money than a comparable person in the rest of the country. Now, they make less.

With hundreds of thousands of working adults leaving the Rust Belt each year, the hit to state budgets is severe. To try to estimate the annual loss in state tax revenue, I made a few assumptions. First, I once again only consider migrants moving within the US, since I have no way of tracking international leavers. Second, I consider only state income taxes, not property or sales tax. My data sources only have good information about income, not property values or commercial activity. Third, I use a state income tax rate of 4%. Some states in the sample have flat state income taxes, such as Illinois at 4.95% and Pennsylvania at 3.07%. Others, such as Ohio and Wisconsin, have progressive income tax structures. Figure 16 in the appendix breaks this down by state, but 4% seems like a reasonable lower bound estimate for the population-weighted average.

I calculate the annual revenue loss by first calculating the revenue brought in by the arrivers, and then subtracting the revenue lost from the leavers. For each group, I break down the population into age buckets. In each five-year age bucket, I calculate that bucket's tax revenue as 4% of the total income earned by the bucket. After adding everything up, I estimate that the 613,000 arrivers pay \$1.051 billion a year in state taxes (\$1,716 per capita), while the 767,000 leavers would've paid \$1.469 billion a year if they had stayed (\$1,916 per capita). This represents a total loss of around \$418 million a year to the state treasury. Note the dual effects here, as the revenue lost is higher than the revenue gained for two reasons. First, there are more leavers than arrivers. Second, on average, each leaver earns more than each arriver. If sales taxes and property taxes were added to the equation, it is conceivable that state governments in the region could be losing over half a billion dollars a year from net migration.

**Figure 10:** *New England Counties*

Counties in green are considered part of New England for the following analyses. Data is from the ACS, only prime-age adults included. Figure made with Mapchart.net.

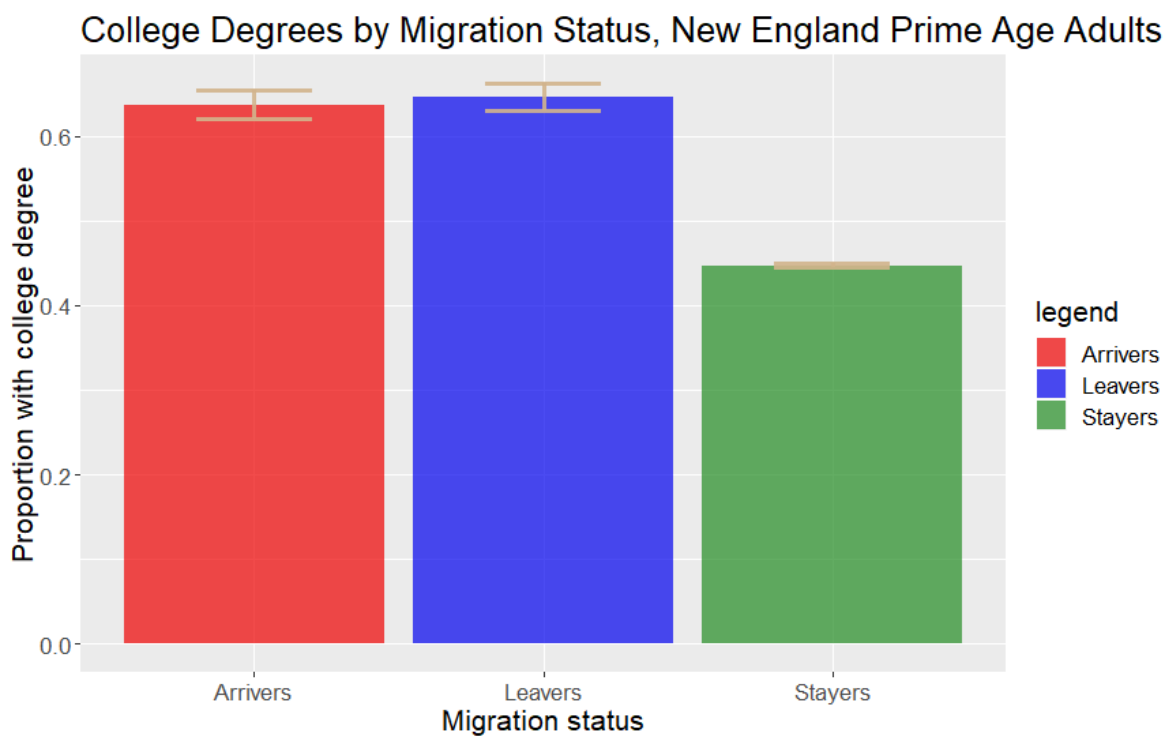
### 5.3 Comparison with New England

One major concern I had was that the difference between leavers and arrivers might be systematic and not specific to the Rust Belt. That is, it could be that leavers are more educated and wealthier than arrivers nationwide, and this is not a phenomena specific to the Rust Belt. To analyze this, I decided to conduct a placebo test by re-running some of my key results in a different part of the country. I decided to use New England for this placebo test, as a priori, there's no reason to think New England is suffering from a significant brain drain.

Figure 10 shows the definition of New England I used. I followed the traditional definition of the region, which consists of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut. Massachusetts dominates the region, comprising 47% of the population, followed by Connecticut with 24%. Boston is the region's largest city by far, with Providence and Worcester being the other major cities.

Figure 11 is the analogue of Figure 3 for New England. Recall that in the Rust Belt, leavers were significantly more educated than arrivers, who were both far more educated than stayers. In New England, the absolute levels of education are all higher—New England leavers are more educated than Rust Belt leavers, New England arrivers are more educated than Rust Belt arrivers and New England stayers are more educated

**Figure 11:** *College degree attainment by migration status, New England*



This figure shows the percentage of people in various groups in New England with a college degree. Error bars represent 95% confidence intervals. For full definitions of New England arrivers, leavers or stayers, see the data section. Data is from the ACS, only prime-age adults included.

than Rust Belt stayers. These differences are all around ten to twelve percentage points. Additionally, like in the Rust Belt, stayers are much less educated than arrivers and leavers in New England.

However, the most important aspect of Figure 11 is the lack of difference between arrivers and leavers. While leavers are very marginally more educated than arrivers in New England, it is nowhere near significant. This is a key change from the Rust Belt, where the leavers are far more educated than the arrivers. This is a compelling piece of evidence for the idea that leavers are not systematically different from arrivers nationwide, this is a specifically Rust Belt phenomenon.

**Table 4:** *Comparison of New England arrivers, leavers and stayers*

	Leavers vs. Stayers	Leavers vs. Arrivers
Age (no controls)	-5.13*** (0.1859)	0.1325 (0.2530)
Income (no controls)	-2275 (1811)	-418 (2338)
Income (with controls)	3966** (1756)	-489 (2238)

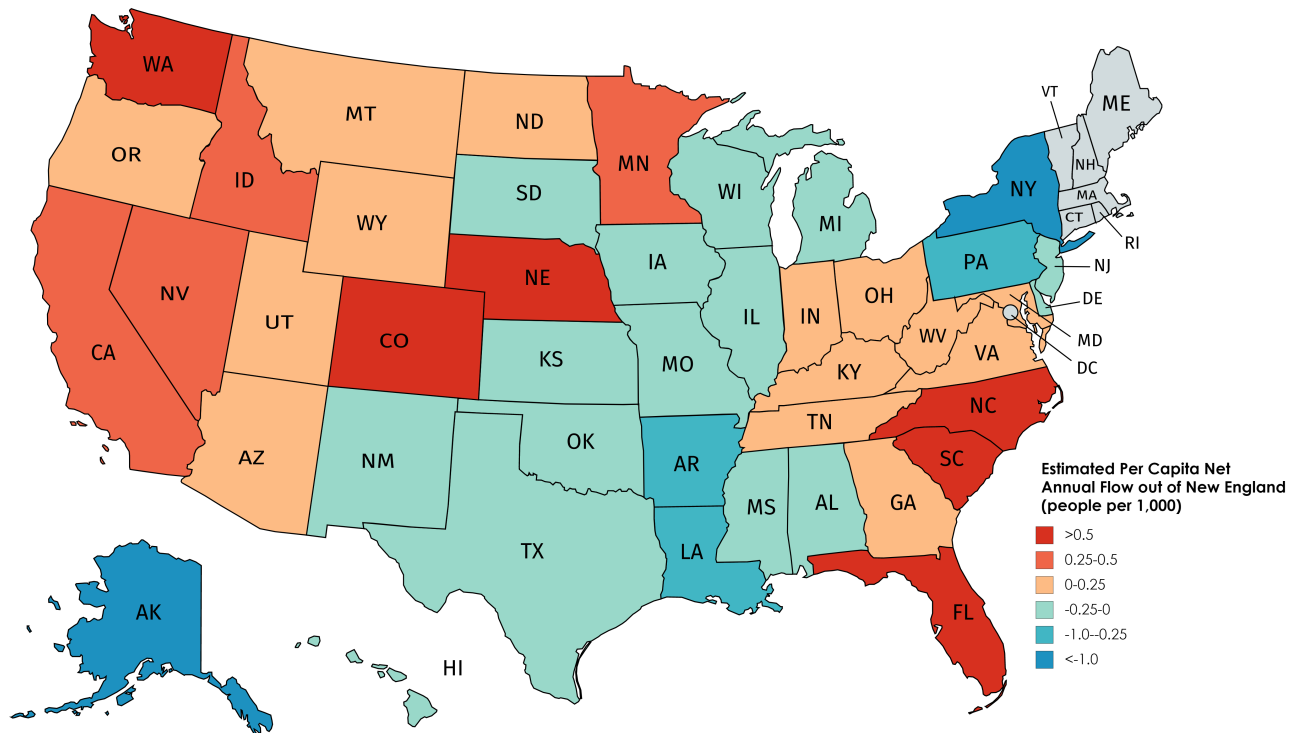
The table reports coefficients  $\beta$  of equation (3). The dependent variable is on the left hand side of the table. For the first two rows, there is no  $Z_i$  term. For the last row, the controls are age, race and sex. Data is from the ACS, only prime age adults included.

Table 4 provides further evidence for this claim. It is the New England analogue of Table 2. Table 4 shows coefficients  $\beta$  of standard OLS regressions of the following form:

$$Y = \alpha + \beta X_i + \delta Z_i \tag{3}$$

Where  $Y$  is the variable on the left hand side of the table,  $X_i$  is a dummy variable that is 1 for the leavers and  $Z_i$  is a vector of controls including age, race and sex. For the leavers vs. stayers column, the regression is run on all leavers and stayers. For the leavers vs. arrivers column, the regression is run on all leavers and arrivers.

Like we saw in the Rust Belt, New England’s leavers are younger than its stayers. They earn marginally less than the stayers, but earn significantly more ( $p = 0.024$ ) after controlling for age, race and sex. Importantly for the purposes of the placebo test, the leavers and arrivers are relatively similar in terms of income. With or without the controls, there is no discernible difference between the income of the leavers and arrivers. This is further evidence that New England’s leavers and arrivers are relatively similar— making it more likely the difference between leavers and arrivers is unique to the Rust Belt.

Figure 12: *New England Flows, Adjusted per Capita*

Created with mapchart.net ©

This figure shows the flow of people in and out of New England. Each state is color coded based on the net number of people it receives from New England- the number of people they import from the New England minus the number of people to export to the New England. Data is from the ACS, figure made with Mapchart.net. People of all ages are included in the analysis.

Figure 12 is the New England analogue of Figure 7. It shows net migration into New England per capita of the sending state. That is, the states in dark blue (New York and Alaska) net send at least 1 person per 1000 to New England a year, while the states in dark red net receive at least 0.5 people per 1000 from New England. Figure 13 shows the states that are sending the most New England arrivers and receiving the most New England leavers. New York and Pennsylvania are by far the biggest senders of people to New England in raw terms, while Florida and California are the biggest receivers. The number of leavers and arrivers are very similar each year. From 2016 to 2018, I estimate that New England has 289,789 arrivers a year and 300,594 leavers for a net loss of 10,805 people a year. This is much smaller than the 154,324 people I estimate the Rust Belt is losing each year.

**Figure 13:** *New England Destinations*

New England State Mover Data		
Rank	New England Arrivers	New England Leavers
1	New York (27,961)	Florida (13,100)
2	Pennsylvania (7,550)	California (12,298)
3	Michigan (1,844)	Washington (6,619)
4	New Jersey (1,751)	North Carolina (5,347)
5	Louisiana (1,632)	South Carolina (3,383)

This figure estimates the 5 states that are sending the most New England arrivers and receiving the most New England leavers in net. Data is from the ACS, only prime age adults included

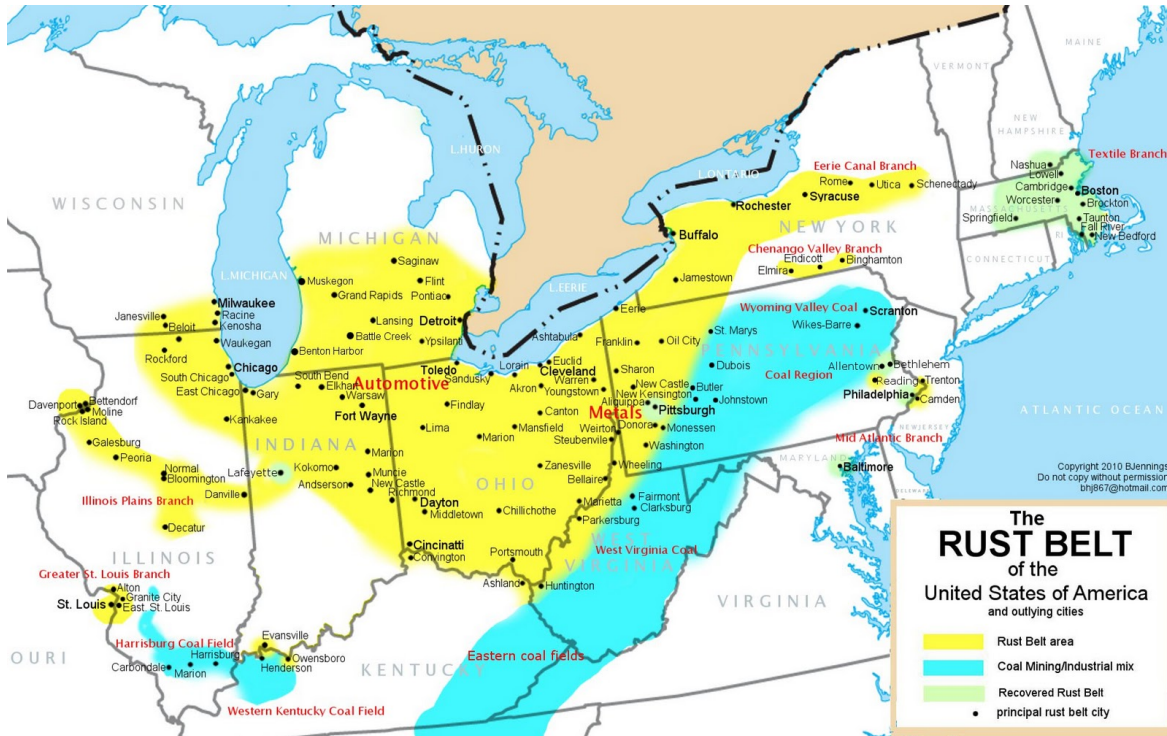
## 6 Conclusion

I investigated the flow of migrants out of the Rust Belt since 2016, and found that the region is net losing 150,000 people a year to the rest of the country. Those emigrating out of the Rust Belt are disproportionately educated, young and wealthy. When they leave the region, they're generally heading to the growing states of the West and South. Existing policies to keep these talented people in the region are fragmented, and the cost of their migration is in the hundreds of millions of dollars a year in state tax revenue. It is possible that this mass migration is motivated by the stagnation of wage growth in the Rust Belt compared to the rest of America. There are no certain options to stop this migration, but if state policymakers do not start exploring them, the long-term effects for the region are likely to be dramatic.

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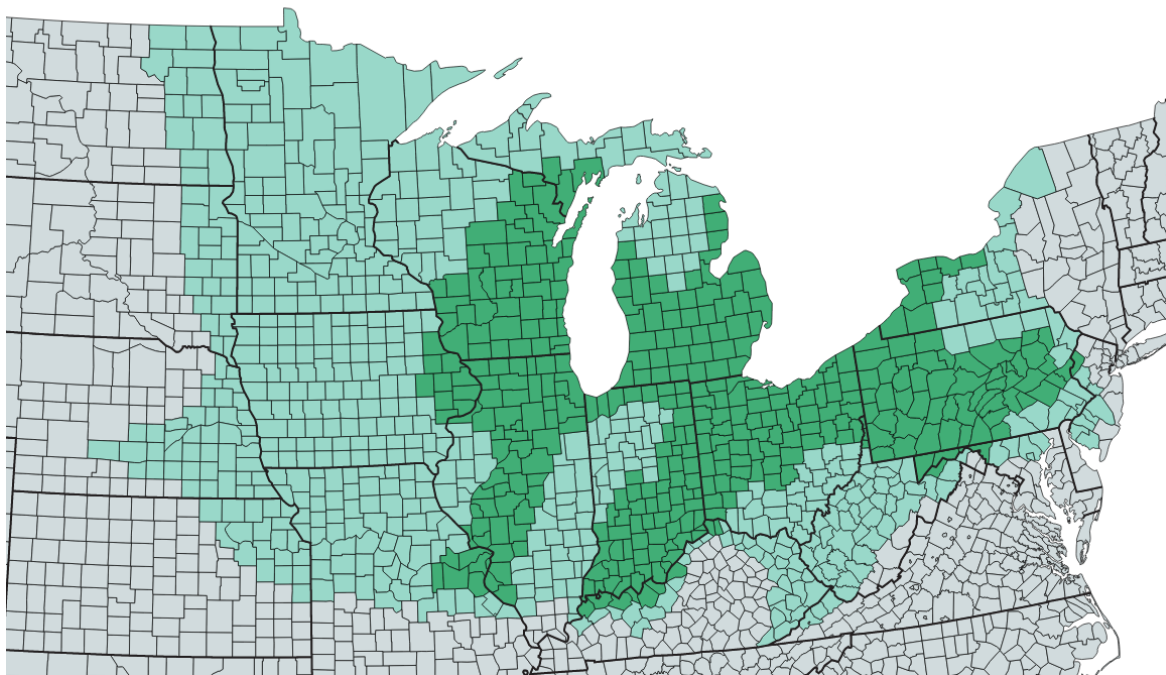
Figure 14: *Alternate Definition of Rust Belt: Belt Mag*



This figure shows Belt Mag’s definition of the Rust Belt that was consulted in making my definition of the region.

## 8 Appendix



**Figure 15:** *Alternate Definition of Rust Belt: Stone*

This figure shows Lyman Stone's definition of the Rust Belt that was consulted in making my definition of the region.

**Figure 16:** *State Tax Rates*

State Tax Rates		
State	Type	Rate
Illinois	Flat	4.95%
Indiana	Flat	3.23%
Michigan	Flat	4.25%
New York	Progressive	4.00-8.82%
Ohio	Progressive	1.98-4.99%
Pennsylvania	Flat	3.07%
Wisconsin	Progressive	4.00-6.75%

This figure shows the type and rate of state taxes in the various Rust Belt states. This information is used to estimate a population-weighted 4% state income tax for the region.

**Table 5:** *Comparison of Rust Belt arrivers, leavers and stayers*

	Rust leavers	Rust arrivers	Rust stayers	Leavers vs. Stayers	Leavers vs. Arrivers
College degree	0.5331	0.4904	0.3469	0.1435*** (0.0065)	0.0428*** (0.0099)
Some college	0.7366	0.7072	0.5997	0.1377*** (0.0058)	0.0294*** (0.0090)
Advanced degree	0.2390	0.2221	0.1248	0.1151*** (0.0055)	0.0169** (0.0081)

This table reports summary statistics on educational attainment and age for various groups. Definitions of Rust Belt leavers, arrivers and stayers can be found in the data section. Data is from the ACS, only prime age adults included.

**Figure 17:** *Population of Rust Belt by State*

Population of Rust Belt by State		
State	Population in Rust Belt (millions)	Percentage
Illinois	12.46	24.63%
Ohio	11.85	23.08%
Michigan	9.90	19.29%
Indiana	6.70	13.05%
Wisconsin	5.92	11.53%
Pennsylvania	2.28	4.44%
New York	2.04	3.98%

This figure shows the number of Rust Belt residents in each state. Note that only part of Pennsylvania and New York are included in the definition of the Rust Belt.