Is Immigration Good for Health?

The Effect of Immigration on Older Adult Mortality in the United States

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A substantial amount of research has examined the economic implications of immigration, one of the most contentious issues in modern political discourse. Yet, relatively less work has examined the effects of immigration on the health of native individuals, despite the fact that immigrants constitute a sizeable portion of the health and personal care workforce and greater immigration is frequently proposed as a solution to growing caregiver labor shortages. In this paper, we examine the impact of increased immigration on mortality among elderly Americans, a demographic with high demand for health and personal care. Using a shift-share approach, with national immigrant shocks weighted by ethnic groups' propensity to work in the health and personal care sectors, we estimate the effect of immigration on the labor supply of care providers and mortality among Medicare beneficiaries aged 65 and older. We find a strong impact of immigration on the size of the immigrant care workforce—admitting 1000 new immigrants would lead to 142 new foreign healthcare workers, including 88 new aides, nurses, and doctors—without evidence of crowd out of native health care workers. We also find striking effects on mortality: a 10% increase in the national immigrant population would be expected to reduce elderly mortality by nearly 1%, or roughly 24,000 fewer deaths nationally. In ongoing analyses, we are examining the mechanisms underlying these results, including the extent to which immigration increases the use of certain types of health and personal care services and prevents other adverse health events like emergency department visits and unplanned hospitalizations.

Rising immigration has become one of the most contentious issues in modern political discourse both in the U.S. and around the world. This debate touches on a wide variety of issues, many inside the realm of economics. As examples, there are large economic literatures on whether immigrants help or harm native workers, are a net fiscal burden or benefit for local and federal governments, and raise or lower crime.

One area which has received less attention is the implications of increased immigration on health. A large share of immigrants work in health care jobs. These include immigrant doctors and nurses, but also direct caregivers of those in need, from children to the elderly. There are shortages of doctors and nurses in many markets around the US, especially in rural areas, and direct caregiving is typically a low paid job marked by consistent vacancies (National Center for Health Workforce Analysis, 2024). As such, increasing the supply of health care workers through immigration can help mitigate a critical workforce shortage. This is the motivation behind recent proposals to expand immigration specifically for health care workers (Harris & Marshall, 2024). At the same time, health care jobs require specific skills that may or may not be provided by immigrants, particularly given language barriers. If immigrants are at least partially displacing native workers in these sectors, there could be unclear implications for quality of care.

A central question for immigration policy is therefore whether increased immigration is improving the outcomes of those often cared for by immigrants. Prior research has established several positive effects of immigration on health-related outcomes. For example, increased immigration has been found to lead to fewer institutionalized older adults (Butcher, Moran, & Watson, 2022), consistent with stated preferences of older adults to be cared for at home (Guo, Konetzka, Magett, & Dale, 2015). Similarly, increased immigration results in more nursing home staff and better quality of care in that setting (Furtado & Ortega, 2023; Grabowski, Gruber, & McGarry, 2023). Finally, the 2016 Brexit referendum was shown to sharply reduce immigration in

the UK, leading to fewer nurses working in hospitals and higher readmission rates (Castro-Pires, Mello, & Moscelli).

In this paper, we take the most direct possible approach to the question of immigration's effects on health by examining the impact of increased immigration on mortality among elderly Americans. Immigrants are important caregivers for our nation's elderly: 24%, 31%, and 26% of direct care workers in the nursing home, home care, and informal care settings, respectively, are immigrants (Zallman, Finnegan, Himmelstein, Touw, & Woolhandler, 2019), while 18% of all health care workers are immigrants (Migration Policy Institute, 2023). These immigrants are generally non-elderly, so that any effects on elderly mortality come not directly through changing the elderly population but indirectly through changing the composition of the caring workforce.

Although the population of immigrants that we study is distinct from the population whose health outcomes we model, there are concerns about joint determinants of immigrant flows and economic outcomes. That is, immigrants do not flow to particular areas randomly. For example, a booming local economy could attract more immigrants, and past research has shown that tight labor markets can lead to higher mortality (Gerdtham & Ruhm, 2006). To address these potential unobserved correlations, we use an approach pioneered by Card (2001) and used by many others: creating a shift-share instrument for local immigrant worker flows based on national ethnicity-specific flows and the baseline distribution of immigrants by nationality. We adjust this approach to our setting by focusing specifically on the flows and location of immigrants likely to work in health care.

We begin by assessing the impact of immigration on the health care workforce. We find a strong impact of immigration on the size of the immigrant health care workforce: admitting 1000 new immigrants would lead to 142 new foreign healthcare workers, including 88 new aides, nurses

and doctors. Importantly, we find little evidence of a "crowd-out" of domestic health care workers; indeed, we find crowd-in of some higher skill domestic workers, perhaps reflecting the ease of delivering care with more lower-skilled foreign workers available. On net, we estimate that 1000 new immigrants would lead to 173 more healthcare workers of any origin, including 96 new aides, nurses and doctors.

We then turn to the impact on health. We find a striking and statistically meaningful decline in elderly mortality associated with more immigration: 1000 additional immigrants result in 4 fewer deaths among the elderly. This finding emerges clearly in event studies and is robust to a variety of controls.

In ongoing work, we are investigating the mechanisms behind our primary findings. We explore whether the labor supply effects of immigration are concentrated in specific industries, as well as differential effects by setting of care and primary diagnosis/condition. We also examine the extent to which immigration increases the use of certain types of health and personal care services and prevents other adverse health events like emergency department visits and unplanned hospitalizations.

METHODS

Data

Annual measures of immigrant flows and labor supply were obtained from the 2000-2019 American Community Survey (ACS) micro-level dataset. Measures were calculated at the level of the state-MSA, which accounts for the fact that some MSAs span more than one state. We restrict our measure of immigrants to those below age 55 to ensure that immigrants do not directly impact our health outcomes which we measure among those 65 and older.

Information on older adults' mortality was derived from Medicare enrollment data which contains death dates for all individuals enrolled in Medicare, including both Traditional Medicare and Medicare Advantage. We also use Medicare claims data to examine health care utilization outcomes including ED visits, hospitalizations, outpatient office visits, nursing home use, and home health care use.

Outcomes

To assess the effect of immigration on caregiver labor supply, we used ACS data to measure, at the state-MSA level, the total number of individuals working in the health care sector, which include the following care-related sectors that span both the health and personal care systems: hospitals, skilled nursing facilities, (unskilled) residential care facilities, home care, and doctors' offices in the community. Additionally, we examine specific occupations within these industries (derived from the Standard Occupation Codes), including aides, nurses, and physicians and physician extenders. We refer to this bundle of occupations as care providers.

Our main health outcome of interest was annual mortality rates among the 65 and older population. Using the Medicare data, we quantify this outcome at the beneficiary level as a binary indicator for death in a given calendar year, conditional on being alive and enrolled in Medicare at least one day in that year.

In ongoing analyses, we are exploring the potential mechanisms through which immigration affects mortality risk by examining several additional outcomes. These include access to and use of various types of care observable in claims data (e.g., outpatient office visits, nursing home stays, and home health episodes), additional adverse health outcomes that may precede, or increase one's risk of, death (e.g., emergency department visits, unplanned hospitalizations), and specific causes of death.

Approach

We use year-to-year variation within state-MSAs in size of the immigration population, normalized by the size of the 65 and older population, to estimate the impact of changes in the immigrant population on older adults' mortality risk. To address the potential endogeneity between the location where immigrants choose to settle and our outcomes of interest, we employ a shift-share instrument approach. Specifically, we instrument for changes in the local immigrant population per 65+ population using national immigration flows and the historic propensity of certain immigrant groups to settle in certain geographic regions. We extend this approach by leveraging the fact that certain immigrant groups tend to work in health care and weight our instrument by each ethnic group's propensity to work as an aide, nurse or doctor. Estimates are obtained using two-stage least squares regressions with year and state-MSA fixed effects, controls, and standard errors clustered at the level of the state-MSA.

To assess the validity of our estimates and check for the presence of existing pre-trends in our outcomes of interest that correlate with local shocks to the immigrant population, we also estimate distributed lag models where we regress our outcomes on leads and lags of our instrument to produce estimates that are analogous to event study estimates. Additional robustness checks include tests for serial correlation in the instrument and using alternative base years to construct our instrument (Jaeger, Ruist, & Stuhler, 2018).

RESULTS

Our analytic sample contains observations on 38,255,121 unique Medicare beneficiaries residing in 306 state-MSAs. The sample reflects 249,087,048 beneficiary years.

We find strong empirical support for our instrument with each one unit increase in the weighted instrument being associated with a 0.9 increase in the local stock of immigrants (F-

stat=21.2; Table 1). Our 2SLS estimates find a sizeable and significant effect of immigration on the number of health care workers. Specifically, an additional 1,000 immigrants (a 1.1% increase in the size of the immigrant population in the average state-MSA) results in an additional 173 health care workers of any origin and 142 additional foreign workers, reflecting 0.4% and 1.6% increases relative to the dependent variable means, respectively (Table 2). We find no significant change in the number of domestic health care workers, suggesting that immigrants do not crowd out native health care workers.

While we do not have discrete events, Schmidheiny & Siegloch illustrate how a shift-share approach can be illustrated in an event-study type framework (2023). This approach, in Figures 1-3, confirms our findings and illustrate that there are no pre-trends. The figures also suggest that the labor supply effects grow larger over time following the immigration shock (Figures 1-3).

When focusing on our primary occupations of interest, we find an additional 1,000 immigrants results in 96 additional aides, nurses, physicians, and physician extenders of any origin and 88 additional foreign care providers. These estimates represent increases of 0.4% and 1.4%, respectively (Table 3, Figures 4-6). When looking at these providers individually, we estimate an additional 1000 immigrants results in 29 aides (0.3%), 50 nurses (0.5%) and 20 doctors (0.5%) of any origin, and 33 aides (1.1%), 33 nurses (1.6%) and 13 doctors (1.2%) of foreign origin (Tables 4-6). We also find evidence that increases in immigration modestly increase the supply of domestic physicians—an additional 1000 immigrants result in 6 domestic physicians (0.2%). This crowd-in effect may reflect health systems' ability to expand capacity in the presence of an increased supply of health care support staff (i.e., nurses and aides).

In terms of the impact of immigration on older adults' health, we find strong evidence that immigration reduces elderly mortality risk. Each additional 1000 immigrants results in 4 fewer

deaths (Table 7). Once again, in Figure 7, we see no pre-trends for this result, and the effect grows over time in parallel to the growing impact on provider supply. Rescaling our 2SLS same-year estimates, a 10% increase in the size of the immigrant population implies a reduction in 65+ mortality by 0.7%.

Although we restrict our immigration measure to younger immigrants to ensure they that cannot age into Medicare during our study window, and directly contribute to Medicare mortality rates, it is possible that elderly immigration patterns are closely correlated with those seen at younger ages. This is not a major concern because new elderly immigrants would not automatically qualify for Medicare benefits—a newly arriving immigrant age 65 or older would typically need to wait 5 years before being eligible to buy-in to Medicare Part A (Kaiser Family Foundation, 2023)—and would therefore not be included in our sample. However, we run additional analyses to rule out this possibility as a driver of our findings. Table 8 presents results of our 2SLS model split by Medicare beneficiaries' race/ethnicity. Mortality effects are concentrated among White, non-Hispanic Medicare beneficiaries, the group most likely to represent native older adults. In contrast, the estimated effect among Hispanic beneficiaries is ¼ the size of that estimated for White, non-Hispanics and is not statistically different from 0. These results suggest our main findings are unlikely to be explained by new, younger immigrants bringing relatively healthy older immigrants with them into treated state-MSAs.

In continued analyses, we examine whether the labor supply effects of immigration are concentrated in specific industries. We also examine whether immigration reduces certain types of deaths (e.g., deaths from injuries and accidents), particularly benefits certain populations (e.g., individuals with dementia or those residing in a nursing home), or increases the use of certain types of health and personal care services. We will also expand health outcomes to include additional adverse outcomes including emergency department visits and unplanned hospitalizations.

DISCUSSION

Increases in the immigration of individuals under age 55 produces meaningful declines in the mortality rates of older adults. A 10% increase in the national immigrant population would be expected to reduce elderly mortality by nearly 1%, or roughly 24,000 fewer deaths nationally (CDC, 2024). These reductions in mortality are associated with sizeable increases the supply of health care workers, particularly aides, nurses, physicians, and physician extenders. As such, targeted immigration reform policies that tie immigration approvals to agreements to work as a care provider could result in even larger mortality reductions. For instance, we estimate that a 10% increase in the immigrant groups with the highest probabilities of working in health care would result in a 2.2% reduction in expected deaths.

Additional work we are undertaking now is needed to understand the specific mechanisms underlying these health improvements, but current results are consistent with immigrants reducing persistent labor shortages in the care economy. Such increases in labor supply may allow older adults to access needed health and personal care services at both the intensive and extensive margins, thereby preventing adverse events and improving longevity. Consistent with prior research, immigrants may also allow individuals to safely avoid entering a nursing home by making it easier to receive care at home (Butcher et al., 2022). Avoiding this type of congregate living environment may confer particular health benefits if it lowers the risk of acquiring an infectious diseases like flu or RSV, which are both important causes of death among the elderly.

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TABLES AND FIGURES

Table 1: 2SLS First Stage

	(1) Immigrants per 65+ (weighted; base 2005)
Weighted Shift-Share Instrument	0.907***
	(0.197)
Obs.	4020
Sample Average	1.114
F-stat	21.17

Table presents the first stage of our 2SLS regression where the endogenous variable is the annual number of immigrants age 54 or younger per 65 and older population in a state-MSA (fixed in 2005), and the instrument is the shift-share predicted number of immigrants age 54 or younger per 65 and older population in a state-MSA (fixed in 2005) weighted by immigrant ethnic groups' propensity to work in health care. Models contain state-MSA and year fixed effects, as well as controls for the state-MSA unemployment rate. Observations are weighted by the 65 and older population in a state-MSA in 2005.

Table 2: Effect of Immigration on Total Health Care Workers

	(1) Health Care	(2) Foreign Health Care	(3) Domestic Health Care
Immigrants per 65+ (weighted; base 2005)	0.173***	0.142***	0.0438
	(0.0421)	(0.0208)	(0.0486)
Obs.	4020	4020	4020
Sample Average	0.467	0.0959	0.370
Staff per 1000 immigrants	173.3	141.7	43.80
Percent Change (per 1000 immigrants)	0.401	1.599	0.128

Table presents results of a 2SLS regression where the key independent variable is the annual number of immigrants age 54 or younger per 65 and older population in a state-MSA (fixed in 2005), instrumented with a shift-share instrument that is weighted by immigrant ethnic groups' propensity to work in health care. The primary outcome is the total number of individuals working in health care per 65 and older population (fixed in 2005). Models contain state-MSA and year fixed effects, as well as controls for the state-MSA unemployment rate. Standard errors are clustered at the state-MSA level. Observations are weighted by the 65 and older population in a state-MSA in 2005. The staff per 1000 immigrants statistic is the implied expected change in staff (in levels) from 1000 new immigrants arriving in the average state-MSA. The percent change per 1000 immigrants statistic is the expected change in the staff rate from 1000 new immigrants arriving in the average state-MSA as a percent of the mean staff rate.

Table 3: Aides, Nurses and Doctors

	(1) Aides, Nurses and Doctors	(2) Foreign Aides, Nurses and Doctors	(3) Domestic Aides, Nurses and Doctors
Immigrants per 65+ (weighted; base 2005)	0.0963***	0.0885***	0.0132
	(0.0270)	(0.0137)	(0.0284)
Obs.	4020	4020	4020
Sample Average	0.268	0.0662	0.202
Staff per 1000 immigrants	96.32	88.46	13.21
Percent Change (per 1000 immigrants)	0.388	1.446	0.0710

Table presents results of a 2SLS regression where the key independent variable is the annual number of immigrants age 54 or younger per 65 and older population in a state-MSA (fixed in 2005), instrumented with a shift-share instrument that is weighted by immigrant ethnic groups' propensity to work in health care. The primary outcome is the total number of individuals working as aides, nurses, physicians and physician extenders per 65 and older population (fixed in 2005). Models contain state-MSA and year fixed effects, as well as controls for the state-MSA unemployment rate. Standard errors are clustered at the state-MSA level. Observations are weighted by the 65 and older population in a state-MSA in 2005. The staff per 1000 immigrants statistic is the implied expected change in staff (in levels) from 1000 new immigrants arriving in the average state-MSA. The percent change per 1000 immigrants statistic is the expected change in the staff rate from 1000 new immigrants arriving in the average state-MSA as a percent of the mean staff rate.

Table 4: Aides

	(1) Aides	(2) Foreign Aides	(3) Domestic Aides
Immigrants per 65+ (weighted; base 2005)	0.0293**	0.0333***	-0.00478
	(0.0134)	(0.00866)	(0.0104)
Obs.	4020	4020	4020
Sample Average	0.107	0.0320	0.0747
Staff per 1000 immigrants	29.31	33.26	-4.780
Percent Change (per 1000 immigrants)	0.297	1.125	-0.0690

Table presents results of a 2SLS regression where the key independent variable is the annual number of immigrants age 54 or younger per 65 and older population in a state-MSA (fixed in 2005), instrumented with a shift-share instrument that is weighted by immigrant ethnic groups' propensity to work in health care. The primary outcome is the total number of individuals working as aides per 65 and older population (fixed in 2005). Models contain state-MSA and year fixed effects, as well as controls for the state-MSA unemployment rate. Standard errors are clustered at the state-MSA level. Observations are weighted by the 65 and older population in a state-MSA in 2005. The staff per 1000 immigrants statistic is the implied expected change in staff (in levels) from 1000 new immigrants arriving in the average state-MSA. The percent change per 1000 immigrants statistic is the expected change in the staff rate from 1000 new immigrants arriving in the average state-MSA as a percent of the mean staff rate.

Table 5: Nurses

	(1) Nurses	(2) Foreign Nurses	(3) Domestic Nurses
Immigrants per 65+ (weighted; base 2005)	0.0500***	0.0327***	0.0142
	(0.0158)	(0.00700)	(0.0167)
Obs.	4020	4020	4020
Sample Average	0.118	0.0221	0.0957
Staff per 1000 immigrants	49.95	32.71	14.24
Percent Change (per 1000 immigrants)	0.458	1.600	0.161

Table presents results of a 2SLS regression where the key independent variable is the annual number of immigrants age 54 or younger per 65 and older population in a state-MSA (fixed in 2005), instrumented with a shift-share instrument that is weighted by immigrant ethnic groups' propensity to work in health care. The primary outcome is the total number of individuals working as nurses per 65 and older population (fixed in 2005). Models contain state-MSA and year fixed effects, as well as controls for the state-MSA unemployment rate. Standard errors are clustered at the state-MSA level. Observations are weighted by the 65 and older population in a state-MSA in 2005. The staff per 1000 immigrants statistic is the implied expected change in staff (in levels) from 1000 new immigrants arriving in the average state-MSA. The percent change per 1000 immigrants statistic is the expected change in the staff rate from 1000 new immigrants arriving in the average state-MSA as a percent of the mean staff rate.

Table 6: Doctors

	(1) Doctors	(2) Foreign Doctors	(3) Domestic Doctors
Immigrants per 65+ (weighted; base 2005)	0.0196***	0.0134***	0.00643**
	(0.00387)	(0.00203)	(0.00296)
Obs.	4020	4020	4020
Sample Average	0.0435	0.0124	0.0312
Staff per 1000 immigrants	19.59	13.44	6.429
Percent Change (per 1000 immigrants)	0.487	1.173	0.223

Table presents results of a 2SLS regression where the key independent variable is the annual number of immigrants age 54 or younger per 65 and older population in a state-MSA (fixed in 2005), instrumented with a shift-share instrument that is weighted by immigrant ethnic groups' propensity to work in health care. The primary outcome is the total number of individuals working as physicians and physician extenders per 65 and older population (fixed in 2005). Models contain state-MSA and year fixed effects, as well as controls for the state-MSA unemployment rate. Standard errors are clustered at the state-MSA level. Observations are weighted by the 65 and older population in a state-MSA in 2005. The staff per 1000 immigrants statistic is the implied expected change in staff (in levels) from 1000 new immigrants arriving in the average state-MSA. The percent change per 1000 immigrants statistic is the expected change in the staff rate from 1000 new immigrants arriving in the average state-MSA as a percent of the mean staff rate.

Table 7: Medicare Beneficiary Mortality

	(1) Probability of Death
Immigrants per 65+ (weighted; base 2005)	-0.00286***
	(0.000881)
Obs.	249087048
Sample Average	0.0420
Deaths from 1000 immigrants	-3.689
Percent Change (per 1000 immigrants)	-0.0740

Table presents results of a 2SLS regression where the key independent variable is the annual number of immigrants age 54 or younger per 65 and older population in a state-MSA (fixed in 2005), instrumented with a shift-share instrument that is weighted by immigrant ethnic groups' propensity to work in health care. The primary outcome is a binary variable indicating if a given Medicare beneficiary age 65 or older died in that year. Models contain state-MSA and year fixed effects, as well as controls for the beneficiary's age and sex, and state-MSA unemployment rate. Standard errors are clustered at the state-MSA level. The deaths per 1000 immigrants statistic is the expected change in probability of death from 1000 new immigrants arriving in the average state-MSA times the average number of individuals aged 65 or older. The percent change per 1000 immigrants statistic is the expected change in the probability of death from 1000 new immigrants arriving in the average state-MSA as a percent of the mean probability of death.

Table 8: Medicare Beneficiary Mortality by Race/Ethnicity

	(1) Probability of Death (White, non-Hispanic)	(2) Probability of Death (Black, non-Hispanic)	(3) Probability of Death (Hispanic)	(4) Probability of Death (Other)
Immigrants per 65+ (weighted; base 2005)	-0.00247***	-0.00153	-0.000615	0.000161
	(0.000894)	(0.00128)	(0.000853)	(0.00176)
Obs.	201332464	20110517	16867204	10776863
Sample Average	0.0435	0.0441	0.0327	0.0252
Deaths from 1000 immigrants	-2.579	-0.158	-0.0560	0.00800
Percent Change (per 1000 immigrants)	-0.0610	-0.0370	-0.0200	0.00700

Table presents results of a 2SLS regression examining mortality effects within special racial and ethnic groups, where the key independent variable is the annual number of immigrants age 54 or younger per 65 and older population in a state-MSA (fixed in 2005), instrumented with a shift-share instrument that is weighted by immigrant ethnic groups' propensity to work in health care. Racial and ethnic categories are obtained from Medicare enrollment data and are mutually exclusive. The primary outcome is a binary variable indicating if a given Medicare beneficiary age 65 or older died in that year. Sample is split by race/ethnicity. Models contain state-MSA and year fixed effects, as well as controls for the beneficiary's age and sex, and state-MSA unemployment rate. Standard errors are clustered at the state-MSA level. The deaths per 1000 immigrants statistic is the expected change in probability of death (of individuals from a given race/ethnicity) from 1000 new immigrants arriving in the average state-MSA times the average number of individuals of aged 65, adjusting for the population share of the given race/ethnicity. The percent change per 1000 immigrants statistic is the expected change in the probability of death (of individuals from a given race/ethnicity) from 1000 new immigrants arriving in the average state-MSA as a percent of the mean probability of death for that race/ethnicity.

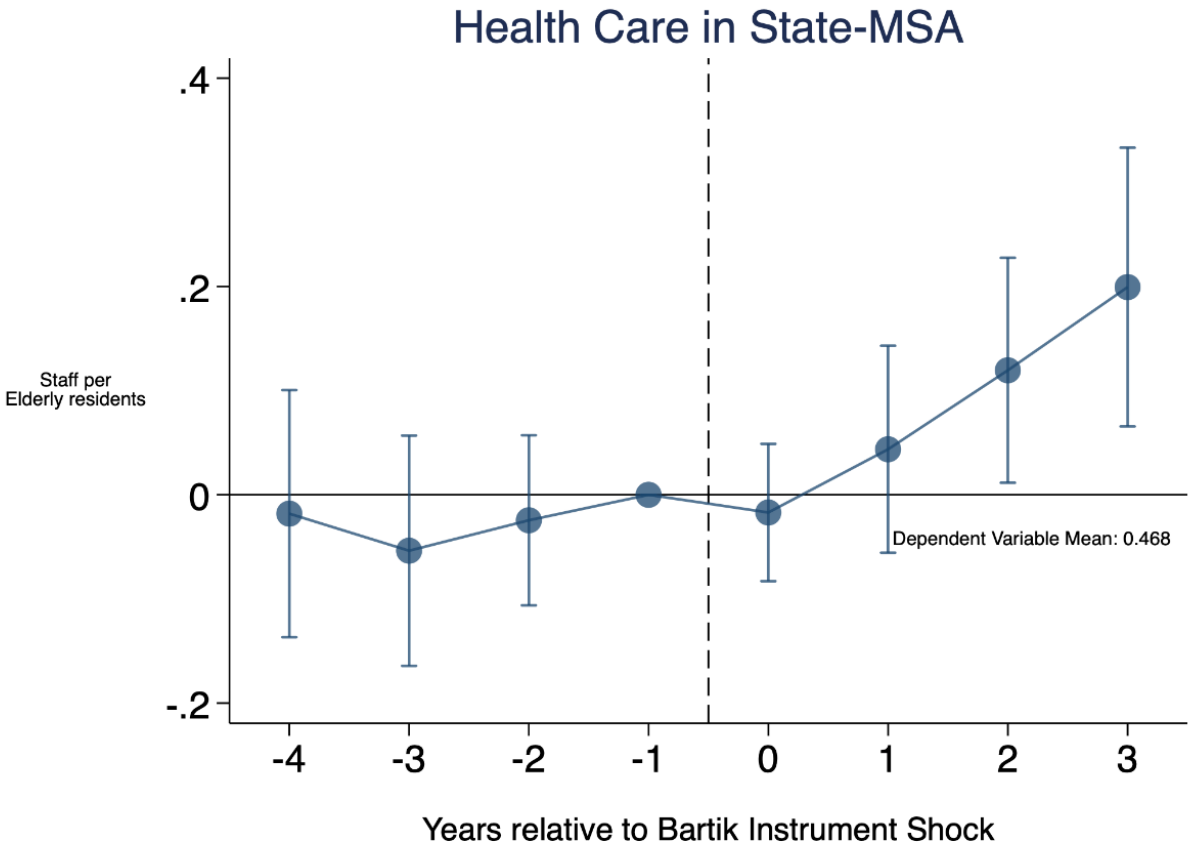


Figure 1: Health care staffing. Figure presents results of a reduced-form regression where the key independent variables are leads and lags of the shift-share (Bartik) instrument for the annual number of immigrants age 54 or younger per 65 and older population in a state-MSA (fixed in 2005) weighted by immigrant ethnic groups' propensity to work in health care. The outcome is the total number of individuals working in health care per 65 and older population (fixed in 2005). Models contain state-MSA and year fixed effects, as well as controls for the state-MSA unemployment rate. Standard errors are clustered at the state-MSA level. Observations are weighted by the 65 and older population in a state-MSA in 2005. Coefficients are the cumulative effects of a 1 unit increase in the instrument normalized by coefficient for event-time -1.

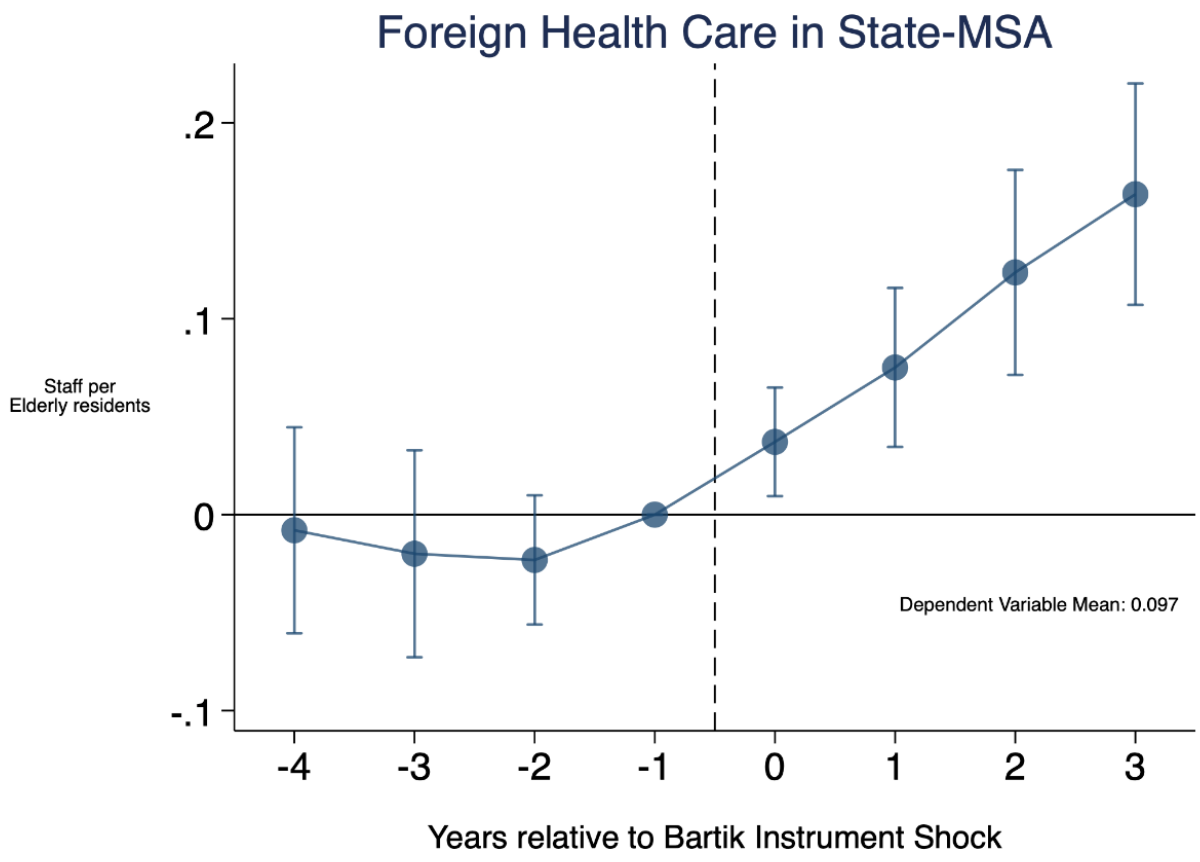


Figure 2: Foreign health care staffing. Figure presents results of a reduced-form regression where the key independent variables are leads and lags of the shift-share (Bartik) instrument for the annual number of immigrants age 54 or younger per 65 and older population in a state-MSA (fixed in 2005) weighted by immigrant ethnic groups' propensity to work in health care. The outcome is the total number of foreign-born individuals working in health care per 65 and older population (fixed in 2005). Models contain state-MSA and year fixed effects, as well as controls for the state-MSA unemployment rate. Standard errors are clustered at the state-MSA level. Observations are weighted by the 65 and older population in a state-MSA in 2005. Coefficients are the cumulative effects of a 1 unit increase in the instrument normalized by coefficient for event-time -1.

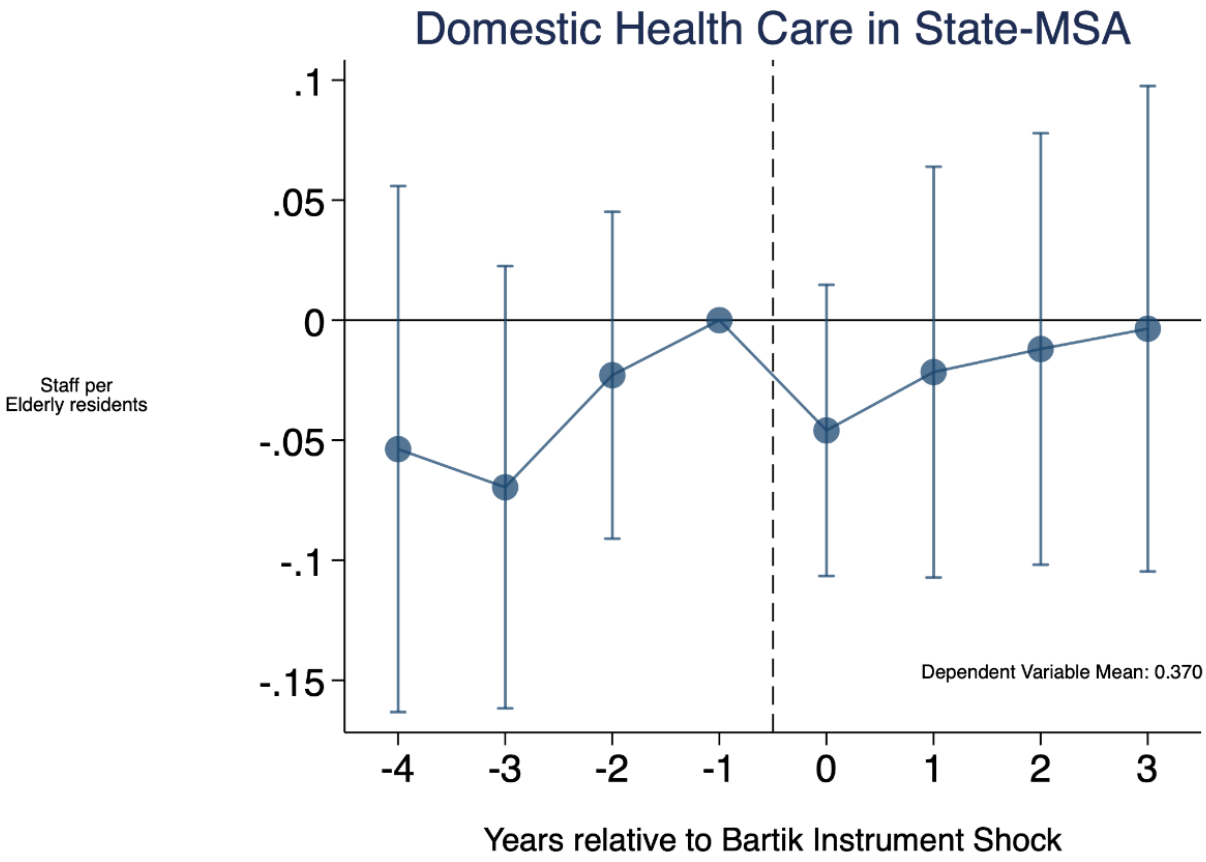


Figure 3: Domestic health care staffing. Figure presents results of a reduced-form regression where the key independent variables are leads and lags of the shift-share (Bartik) instrument for the annual number of immigrants age 54 or younger per 65 and older population in a state-MSA (fixed in 2005) weighted by immigrant ethnic groups' propensity to work in health care. The outcome is the total number of US-born individuals working in health care per 65 and older population (fixed in 2005). Models contain state-MSA and year fixed effects, as well as controls for the state-MSA unemployment rate. Standard errors are clustered at the state-MSA level. Observations are weighted by the 65 and older population in a state-MSA in 2005. Coefficients are the cumulative effects of a 1 unit increase in the instrument normalized by coefficient for event-time -1.

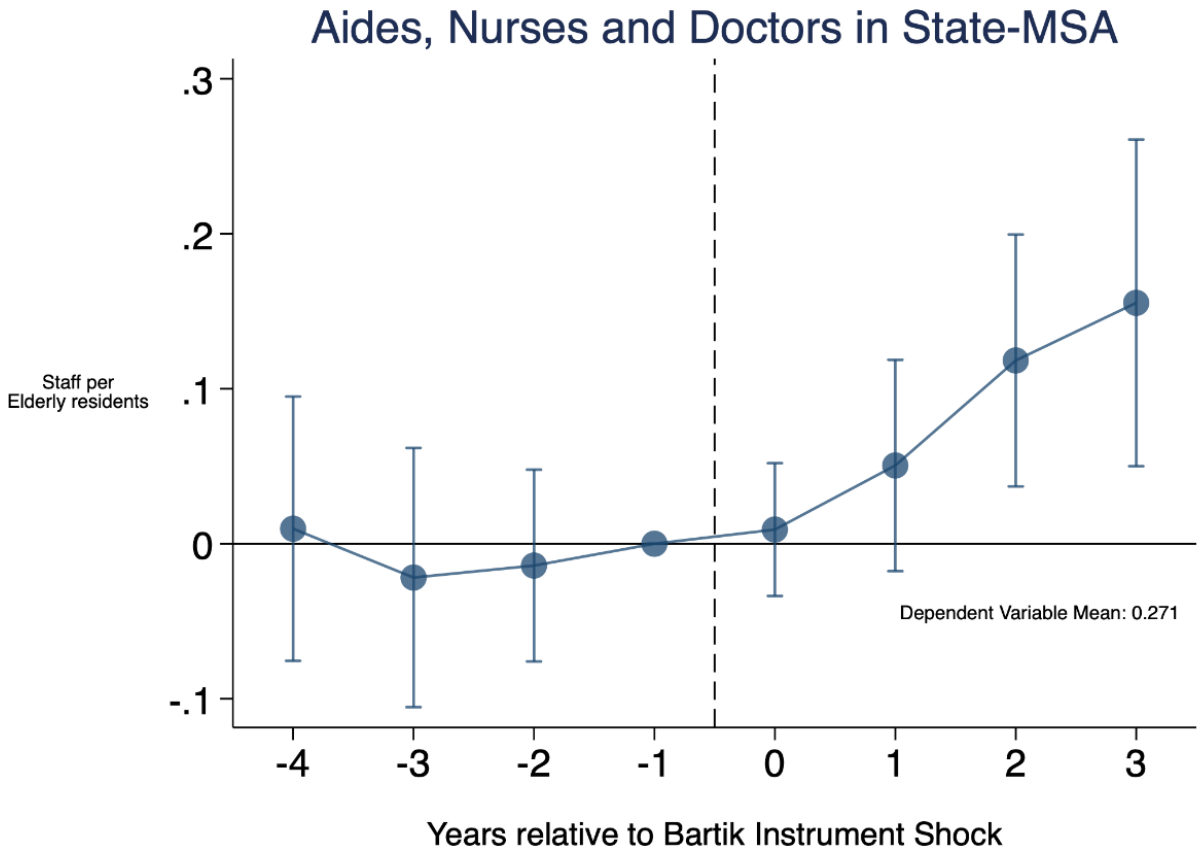


Figure 4: Aides, nurses and doctors staffing. Figure presents results of a reduced-form regression where the key independent variables are leads and lags of the shift-share (Bartik) instrument for the annual number of immigrants age 54 or younger per 65 and older population in a state-MSA (fixed in 2005) weighted by immigrant ethnic groups' propensity to work in health care. The outcome is the total number of individuals working as aides, nurses, physicians and physician-extenders per 65 and older population (fixed in 2005). Models contain state-MSA and year fixed effects, as well as controls for the state-MSA unemployment rate. Standard errors are clustered at the state-MSA level. Observations are weighted by the 65 and older population in a state-MSA in 2005. Coefficients are the cumulative effects of a 1 unit increase in the instrument normalized by coefficient for event-time -1.

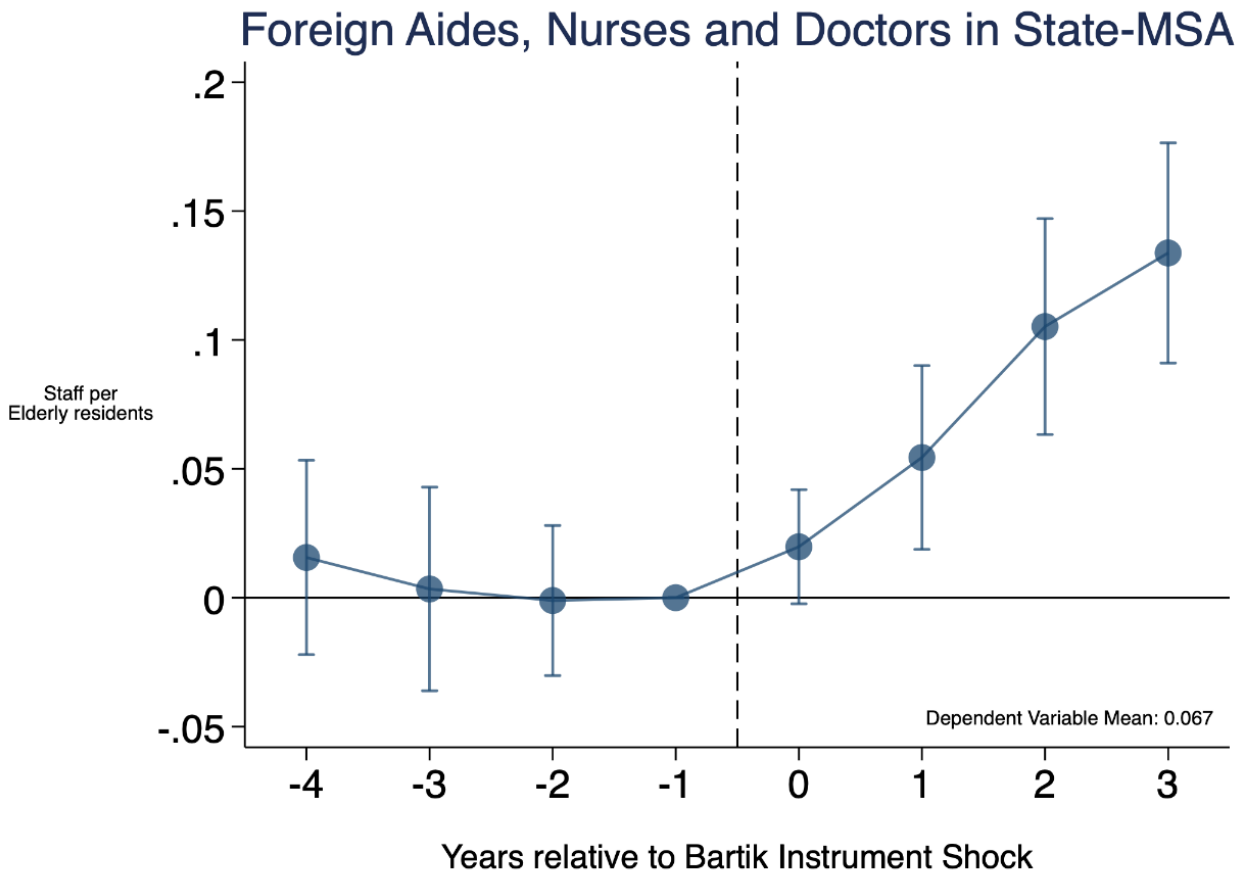


Figure 5: Foreign aides, nurses and doctors staffing. Figure presents results of a reduced-form regression where the key independent variables are leads and lags of the shift-share (Bartik) instrument for the annual number of immigrants age 54 or younger per 65 and older population in a state-MSA (fixed in 2005) weighted by immigrant ethnic groups' propensity to work in health care. The outcome is the total number of foreign-born individuals working as aides, nurses, physicians and physician-extenders per 65 and older population (fixed in 2005). Models contain state-MSA and year fixed effects, as well as controls for the state-MSA unemployment rate. Standard errors are clustered at the state-MSA level. Observations are weighted by the 65 and older population in a state-MSA in 2005. Coefficients are the cumulative effects of a 1 unit increase in the instrument normalized by coefficient for event-time -1.

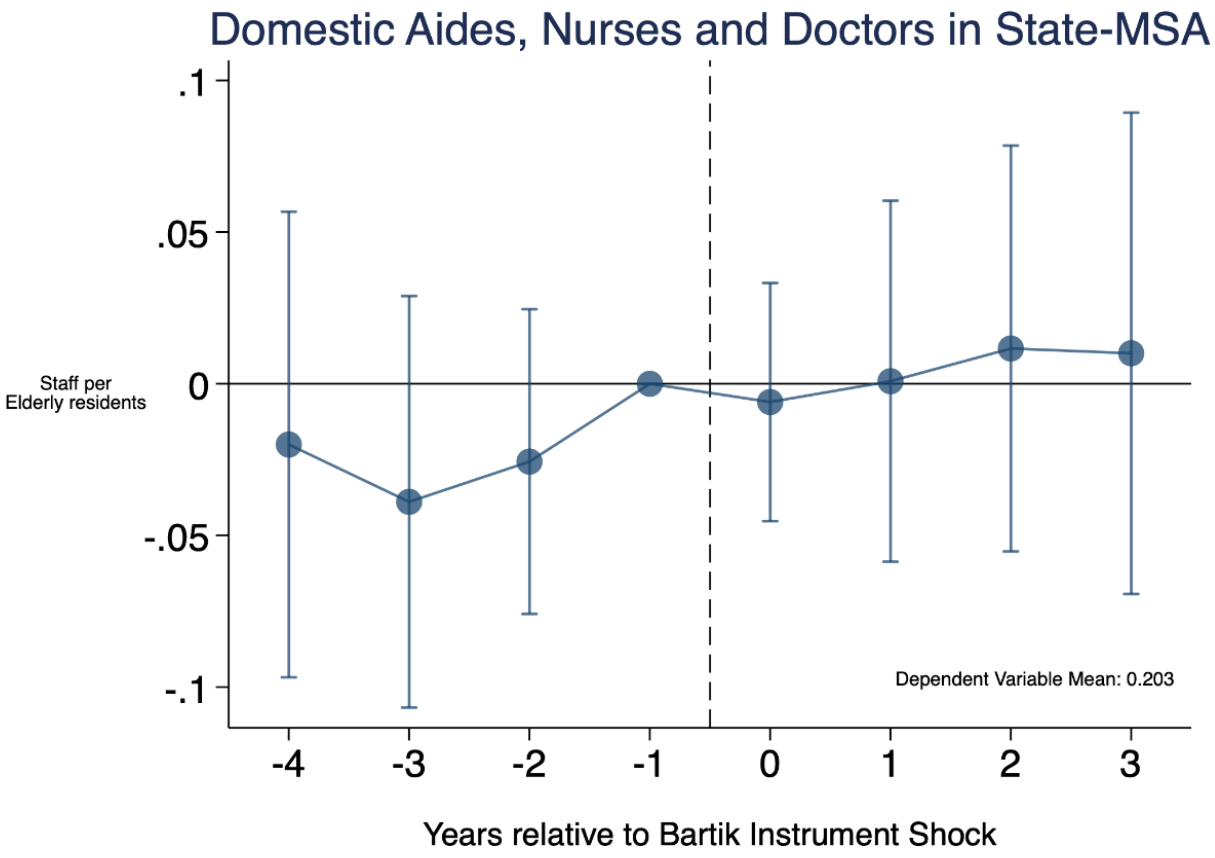


Figure 6: Domestic aides, nurses and doctors staffing. Figure presents results of a reduced-form regression where the key independent variables are leads and lags of the shift-share (Bartik) instrument for the annual number of immigrants age 54 or younger per 65 and older population in a state-MSA (fixed in 2005) weighted by immigrant ethnic groups' propensity to work in health care. The outcome is the total number of US-born individuals working as aides, nurses, physicians and physician-extenders per 65 and older population (fixed in 2005). Models contain state-MSA and year fixed effects, as well as controls for the state-MSA unemployment rate. Standard errors are clustered at the state-MSA level. Observations are weighted by the 65 and older population in a state-MSA in 2005. Coefficients are the cumulative effects of a 1 unit increase in the instrument normalized by coefficient for event-time -1.

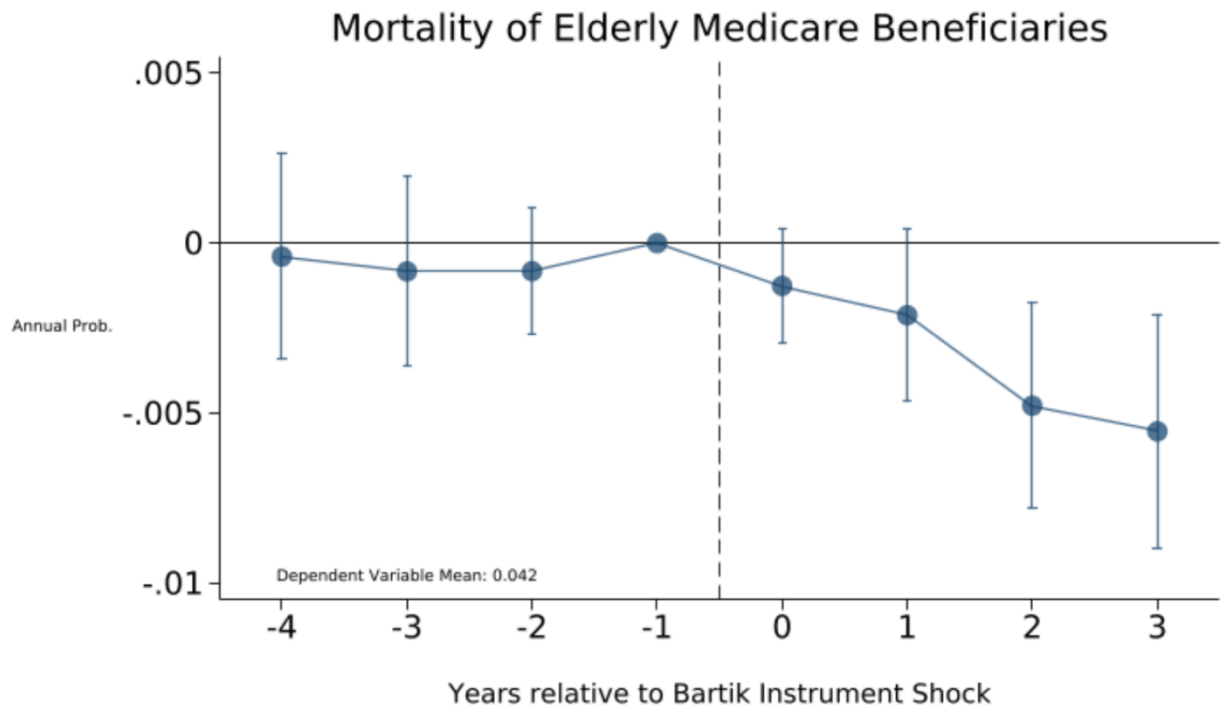


Figure 7: Medicare Beneficiary Mortality. Figure presents results of a reduced-form regression where the key independent variables are leads and lags of the shift-share (Bartik) instrument for the annual number of immigrants age 54 or younger per 65 and older population in a state-MSA (fixed in 2005) weighted by immigrant ethnic groups' propensity to work in health care. The outcome is a binary variable indicating if a given Medicare beneficiary age 65 or older died in that year. Models contain state-MSA and year fixed effects, as well as controls for the beneficiary's age and sex, and state-MSA unemployment rate. Standard errors are clustered at the state-MSA level. Coefficients are the cumulative effects of a 1 unit increase in the instrument normalized by coefficient for event-time -1.