Local Shocks and Healthcare Elasticities

Sümeyye Yildiz *

University of California, Santa Barbara

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Abstract

Estimating income elasticity of consumption is found to be a challenging task. The causal impact of income changes on expenditure is hard to measure due to endogeneity of the treatment variable income. I use a shift-share instrumental variable design à la Bartik [1991] to mitigate the endogeneity concerns by exploiting variation due to local labor market exposure to aggregate shocks. I estimate income elasticity of consumption that results from the changes in national employment growth in industries weighted with regional employment share of the industry. I find an average elasticity of total household consumption in the ranges between 0.4 to 0.53 depending on the construction of the instrument. Food consumption elasticity ranges between 0.11 to 0.2 though is not significantly estimated. Of particular interest for income elasticity estimates is the household out-of-pocket healthcare expenditure which has an elasticity around 3.14 to 3.59. This finding adds to the discussion of health spending being a luxury good with an elasticity above one which is found in aggregate cross-country or time-series estimates. I find elasticities above one using household level micro consumption and regional employment growth data whereas micro studies usually conclude health expenditure elasticities around zero.

*sumeyyeyildiz@ucsb.edu 3053 North Hall, University of California, Santa Barbara, CA 93106-9210

1 Introduction

Estimating income elasticity of consumption has been a topic of interest for a vast literature. In general, the response of consumption to income changes has been elaborated using a variety of tools and datasets. The tools include estimating elasticities using demand systems, estimating marginal propensity to consume out of income shocks using quasi-experimental research designs, covariance restrictions or structural models. Among the consumption elasticities, healthcare expenditure elasticity stands as a very controversial one due to the inconclusiveness in the estimates, in particular whether it is above one or below one.

Estimating income elasticity of healthcare expenditure is important in many ways. The relevant policy involvements can be made once the relationship between health spending and income is well understood. In this regard the argument goes as: if the health spending is a necessity, then it is desirable to have greater public involvement in healthcare. On the other hand, if it is a luxury good, then it must be left to market forces for optimal allocation [1].

However, there are only a few studies that attempt to estimate income elasticity of health spending in micro level. The reason for this scarcity is that income is endogenous. Most individual and household level studies reveal elasticities that are only simple associations between healthcare expenditures and income. The estimates are downward biased since they do not control for unobservable factors such as health status which is correlated with both health spending and income. This issue can be an explanation for why the micro level elasticities are near zero.

This paper aims at estimating causal effect of income changes on household out-of-pocket healthcare spending. To my knowledge, this is the first paper that estimates the income elasticity of out-of-pocket healthcare expenditures at household level. The closest paper to mine is by Tsai [2015] who estimates income elasticities of out-of-pocket total medical costs, medical service expenses, and prescription drug expenses for the elderly population.

[1] see Culyer [1988] and Di Matteo [2000].

I estimate the income elasticity of out-of-pocket health expenditures for families of working age households.

My strategy in tackling this issue is to exploit cross-regional and time series variation of employment that affected household incomes differentially across regions with varying industry mix of local economy. I use a shift-share instrumental variable design à la Bartik [1991] to mitigate the endogeneity concerns by exploiting variation due to local labor market exposure to aggregate shocks. As is standard in Bartik instruments, my empirical strategy exploits the interaction between changes in national employment growth in industries (a.k.a. *shifters* in "shift-share" design) and the importance of the industry in the region as an instrument for household income. The importance of the industry in a given region is proxied by regional employment share of that industry (a.k.a. *shares* in "shift-share" design). In the baseline specification, I approximate local economies by counties. I use metropolitan statistical area (MSA) level aggregation as an alternative approximation which gives similar results. The identifying assumption is that the interaction between industry employment shares and industry growth rates should have no affect on household out-of-pocket healthcare spending, except its effect through household income. Moreover, I control for health status in a family using health indices that are calculated by summing chronic and acute illnesses for household head and spouse. These indices allow me to eliminate an important part of the endogeneity that exists in most micro studies which creates downward biased estimates.

The controversial results for income elasticity estimation arise partly due to the the level of aggregation. It is well known that as the level of aggregation increase, the estimated elasticities become larger. Healthcare is considered as highly income elastic, a 'luxury' good, due to an income elasticity above unity using aggregate data, i.e. across countries or for a country over time. However, this is inconsistent with micro data where individuals with higher incomes have a lower share of health spending. Newhouse [1977] finds an elasticity around 1.15 and 1.31 in a cross-country study, similarly Leu [1986], Parkin, McGuire and Yule [1987] and Gerdtham et al. [1992] find elasticities as high as 1.39 among OECD countries. In the

intermediate level unit of analysis, Freeman [2003] finds elasticities around 0.817-0.844 among US states for the period 1966-1998. Similarly, Moscone and Tosetti [2010] analyze income elasticity of personal healthcare expenditure at state level and find elasticities less than one for most US states, and above one for only 4 states. Acemoğlu, Finkelstein and Notowidigdo [2013] finds an elasticity around 0.7 in economic subregions (ESRs) comprised of U.S. counties level by exploiting the differential exposure of local areas to the shocks in oil prices. However, they use hospital spending as the healthcare expenditure measure. Similarly, Di Matteo and Di Matteo [1998] also finds a similar estimate of 0.77 in Canadian provinces. [2]

Another reason for controversial results is that the measure of healthcare expenditures vary between studies. Aggregate data, both cross-country or time series, incorporate all healthcare spending in a country. The changes in healthcare incorporate the technological advancements in the health industry over time, or technological and institutional differences across countries. Therefore, these studies are not comparable with micro studies, as the elasticities have different interpretations. Among the few micro studies, Phelps [2016] reports elasticities between 0 and 0.2. On the other hand, Tsai [2015] finds an income elasticity of 0.81 - 1.03 among the elderly population by exploiting the changes in Social Security legislation. These are the highest estimates among micro studies. Getzen [2000] reports summary of many elasticity estimates and shows that estimates are close to zero in studies that use individual or household level data. In micro level, data limitations as well as identification difficulties make the estimation even more inconsistent. Therefore, the income elasticity of health expenditure studies did not reach a consensus for the range of the elasticity. Most studies find an inelastic demand for healthcare in micro studies, and sometimes even report negative elasticities.

I find healthcare expenditure elasticities around 3.14 and 3.59 using household level healthcare expenditure data. These numbers mean that a 10% change in household disposable income leads to around 31 - 36% change in household out-of-pocket healthcare spending. The magnitudes are large and point that healthcare spending is very income elastic. The elasticities

[2] Liu and Chollet [2006] provide a comprehensive review on various estimates of healthcare elasticities.

above one indicate that household out-of-pocket expenditure is a luxury good. These are very large numbers compared to the literature. However, my elasticities are not directly comparable with the elasticities stated in the literature since the estimates in the literature usually refer to total healthcare spending whereas I use out-of-pocket healthcare expenditures including insurance premiums paid by a family. Yet, my question is important on its own because the economic burden of households' need for healthcare can be understood with the amount they are paying. The behavioral response of households to economic conditions for their health care is largely related to its effect on their budget. Moreover, I use healthcare spending by a family controlling the household size. This measure of health spending is more relevant for measuring income elasticities than individual level spending measures since consumption decisions are made at household level. I include households where household head is at working ages. The reason is that Bartik instrument proxies for local labor market conditions which is expected to have direct effects on incomes of working population rather than the retired population.

Using the same strategy for other consumption elasticities, I find an average elasticity of total household consumption in the ranges between 0.4 to 0.53 and food consumption elasticities between 0.11 to 0.2 though the latter is not significantly estimated. Overall, I conclude that the consumption bundle that a typical household has consists of necessities. In this regard, healthcare expenditure is quite different than an average consumption bundle in budget allocation decision of U.S. households.

Further, I look at the heterogeneity in healthcare expenditure elasticities with respect to wealth. I find that low wealth households have a larger elasticities that are around 3.5 - 3.7. On the other hand, high wealth households have elasticities around 2.3 to 2.9. Despite the large difference between wealth groups, the elasticities are above one for all households. Moreover, I divide the sample into US Census regions and estimate elasticities separately for each region. The high income elasticity of healthcare expenditure is observed for all regions, Midwest and West have the highest elasticities.

2 Empirical Strategy

The empirical model I consider is the following linear relationship between consumption growth and income growth:

$$\Delta \ln C_{i,c,t} = \beta_0 + \beta_1 \Delta \ln y_{i,c,t} + X'_{i,c,t}\beta_3 + \lambda_s + \epsilon_{i,c,t} \tag{1}$$

where $\Delta \ln C_{i,c,t}$ is log consumption growth of household i in location c from time t to t+1, $\Delta \ln y_{i,c,t}$ is log income growth of household i in location c from time t to t+1, $X_{i,c,t}$ is household level controls including size of the household, a quadratic in age, education, sex, race and marital status of head of the household, λ_s controls for the state of residence. This equation is the causal relationship between consumption growth and income growth that we are after.

Estimating above equation with OLS is likely to result in biased estimates due to endogeneity of income. If there are factors that are correlated with both consumption and income growth other than the control variables and state fixed effects, then β_1 will be biased. For example, consumption-labor complementarities such as work-related expenditures can create correlation between income and consumption.

For this reason, I use an instrument for income growth which plausibly isolates household level supply shocks to labor supply from demand shocks. I instrument for household income growth with local area employment using industry-level employment data from QCEW. Then, household income growth is estimated as:

$$\Delta \ln y_{i,c,t} = \theta_0 + \theta_1 \hat{E}_{c,t} + X'_{i,c,t}\theta_2 + \eta_s + u_{i,c,t} \tag{2}$$

This second equation is the first stage of 2SLS estimation where $\Delta \hat{E}_{c,t}$ is the Bartik measure of employment growth in location c from time t to t+1.

Bartik instrument is introduced to economic literature by Timothy Bartik [1991] as a measure of projected employment growth in a regional economy. The measure assumes that each industry in a region grows at its national level that is called "national shift", and weighs these growth rates by the industry's share in the regional economy which is called "regional share". This shift-share design plausibly isolates exogenous growth in employment from local endogenous factors.

The second stage in the above specification is given as;

$$\Delta \ln C_{i,c,t} = \alpha_0 + \alpha_1 \Delta \ln \hat{y}_{i,c,t} + X'_{i,c,t}\alpha_2 + \gamma_s + \nu_{i,c,t} \tag{3}$$

Equation 3 is the main specification that will be estimated where $\Delta \ln \hat{y}_{i,c,t}$ is estimated using the first stage in equation 2. I estimate the model with and without state fixed effects. The specification with state fixed effects uses within-state variation to estimate the coefficients.

This specification exploits the variation across households within the same state and same demographic characteristics. Household level controls account for the factors that affect household consumption that are size of the household, a quadratic in age, education, sex, race and marital status of head of the household, acute and chronic health indices that are constructed as the sum of illnesses for head and spouse, and a measure of hospitalization shock for head and spouse. The identifying assumption in 3 is that unobservable household characteristics are orthogonal to the regional employment growth rate conditional on household observables and state.

For an alternative specification, I also include base-year industry characteristics of the regions, namely share of manufacturing in the region in 1998 and share of tradable sectors in the region in 1998. Fixing these shares to the base year prevents a mechanical correlation with the instrument.

$$\Delta \ln C_{i,c,t} = \alpha_0 + \alpha_1 \Delta \ln \hat{y}_{i,c,t} + X'_{i,c,t}\alpha_2 + Q'_{c,1998}\alpha_3 + \gamma_s + u_{i,c,t} \tag{4}$$

where $Q'_{c,1998}$ is the regional industry controls. The variation in this specification comes from differences in households within the same state and same demographic characteristics and in a region with same industry composition. Therefore, the identifying assumption in 4 is that unobservable household characteristics are orthogonal to the regional employment growth rate conditional on household observables, regional industry composition and the state of residence.

I estimate the model to find average income elasticity for various household expenditures. The main coefficient of interest is β_1 in the equation for structural relationship. The dependent variable, $\Delta \ln C_{i,c,t}$, refers to either annual household food consumption, total household consumption or household out-of-pocket healthcare expenditures including insurance premium payments. I approximate local labor markets with counties in my preferred specification. I provide results for MSAs in the appendix.

Further, I estimate the model separately for low net-worth and high net-worth households to investigate the heterogeneity in elasticities with respect to wealth. Recently, Ganong et al. [2020] show that the elasticities and marginal propensity to consume with respect to income varies with wealth and race. They calculate elasticities for all consumption using bank transaction data. I look specifically at healthcare expenditures and its variation across wealth.

3 Instrument Construction

I follow Broxterman and Larson [2020] in constructing alternative shift-share instruments. In particular, I construct three instruments using several industry mixes for employment shares and growth rates.

In all instruments, I use employment in the private sector and I aggregate industries according to 3-digits NAICS classification. I exclude the focal area employment in constructing the national shifter. This practice of excluding own area is called "leave-one-out" procedure and is aimed at reducing endogeneity of the instrument as the highly endogenous sectors to an area's economic activity are also the ones that have high shares in local employment. Hence, this leave-one-out procedure ensures that the instrument does not suffer from endogeneity by local employment supply shocks.

In the first instrument, I use all industries in a region except public administration. The instrument is constructed by exploiting variation in industry-level employment growth rates as follows:

$$Z^{all}_{c,t-1} = \sum_{j=1}^{J} \frac{e_{c,j,t-1}}{e_{c,t-1}} \left(\frac{E_{-c,j,t} - E_{-c,j,t-1}}{E_{-c,j,t-1}} \right) \tag{5}$$

where $e_{c,j,t}$ is employment for location c, in industry j at time t. $E_{-c,j,t}$ is the total national employment in industry j at time t excluding employment in location c. The share, $\frac{e_{c,j,t-1}}{e_{c,t-1}}$, is defined as the ratio of local employment in industry j to all local employment, so shares in each region sum to 1 by construction: $\sum_{j=1}^{J} \frac{e_{c,j,t}}{e_{c,t}} = 1 \quad \forall j, \ \forall t$. I follow many practices in the literature on shift-share instruments by fixing shares to initial year share. Hence, $\frac{e_{c,j,t-1}}{e_{c,t-1}}$ is not updated each year and is fixed to the year 1998 ratio, $\frac{e_{c,j,98}}{e_{c,98}}$, when my data starts.

The second instrument is constructed in a similar way but includes only tradable industries. This instrument considers only export-oriented industry employment. The export-oriented industry definition is based on basic (*economic base*) activity definition of Moretti and Thulin [2013] who consider mining and manufacturing industries as basic activities that are export-oriented and local service activities as *non-basic*. This instrument is constructed as:

$$Z^{trd}_{c,t-1} = \sum_{j=1}^{\tilde{J}} \frac{e_{c,j,t-1}}{e_{c,t-1}} \left(\frac{E_{-c,j,t} - E_{-c,j,t-1}}{E_{-c,j,t-1}} \right) \tag{6}$$

where $\tilde{J}$ is a subset of J that includes only tradable industries. Broxterman and Larson [2020] argue that the instruments constructed omitting employment in non-traded sectors empirically perform better than instruments constructed using all employment. They show that employment in non-traded sectors have low variation across areas and are endogenous. Therefore excluding those industries that produce for mostly local consumption improves instrument relevance and reduces potential endogeneity. However, since non-traded sectors usually have high share in local economy, there is a danger of losing explanatory power by excluding them.

The third instrument separates export-oriented employment based on location quotient employment measures instead of an a priori judgement of export-orienting sectors. This instrument is constructed as follows:

$$Z^{lq}_{c,t-1} = \sum_{j=1}^{\hat{J}} \frac{e^{lq}_{c,j,t-1}}{e^{lq}_{c,j,t}} \left(\frac{E_{-c,j,t} - E_{-c,j,t-1}}{E_{-c,j,t-1}} \right) \tag{7}$$

where $\hat{J}$ is a subset of J that includes only export-oriented industries based on location quotient measures and $e^{lq}_{c,j,t}$ is basic or export employment based on employment location quotient for location c, in industry j at time t.

Bureau of Economic Analysis defines location quotient as: *A location quotient (LQ) is an analytical statistic that measures a region's industrial specialization relative to a larger geographic unit*. So, an employment location quotient is computed as the ratio of an industry's share of regional employment to industry's share of national employment. An LQ value greater 1 indicates that the industry is more concentrated in the region compared to its national average. Following

Broxterman and Larson [2020], I use Brown, Coulson and Engle [1992]'s assumption that excess employment compared to national average produces goods and services for exporting. Consequently, export employment based on location quotient measure is calculated as:

$$e^{lq}_{c,j,t} = \begin{cases} \left(\frac{LQ_{c,j,t}-1}{LQ_{c,j,t}}\right) e_{c,j,t} & \text{if} \quad LQ_{c,j,t} > 1 \\ 0 & \text{otherwise} \end{cases} \tag{8}$$

where $LQ_{c,j,t}$ employment location quotient for location c, in industry j at time t, and calculated as $LQ_{c,j,t} = \dfrac{e_{c,j,t}/e_{c,t}}{E_{j,t}/E_t} \;\; \forall c, \forall j, \forall t.$

4 Data

Data comes from 1999-2015 waves of Panel Study of Income Dynamics (PSID). Starting from 1968, PSID collected data on demographics, employment, asset holdings, expenditures and health factors of 5,000 U.S. households over their life course and their children (SRC sample). Later, more samples added as to represent Latino population and lower income levels (Latino and SEO sample). The survey initially collected food, childcare and housing expenditures, however, after 1999 more comprehensive expenditure categories are added. The empirical analysis in the present paper incorporates all households excluding SEO and Latino samples.

The consumption data uses the aggregated consumption variables imputed by the PSID staff in the main family files. These variables span food, housing, transportation, education, childcare and health-care expenditures and their subcategories. Healthcare expenditure consists of health insurance premiums paid by household and out-of-pocket health-care spending. The wealth variable used in this analysis is all assets net of debt, including home equity. Disposable income is calculated as family unit federal taxable income minus federal, state and social security taxes plus credits. Marginal tax rates and the variables in disposable income

calculations are estimated using NBER's TAXSIM simulator.

I constructed health indices using the categorization employed by Conley and Thompson [2011], however the index construction serves a different purpose in the sense that I construct them as a measure of family health status rather than to identify health shocks. Instead, I use the hospitalization index as a proxy for a health shock. Specifically, acute illnesses consists of stroke, heart attack, and cancer. Chronic illnesses consist of diabetes, lung disease, heart disease, psychological problems, arthritis, asthma, memory loss, and learning disorder. The index is the sum of the existence of each illness for head and spouse combined. Acute and chronic health indices indicate the state of health in the family. Hospitalization index takes values 0, 1 or 2 if either one of head or spouse (1) , both (2) or none (0) of them is hospitalized during previous calendar year.

The sample consists of families where heads are in working ages between 25-65. The health variables are constructed using head and spouse health conditions. Income, consumption and wealth variables are at the household level. I trimmed the data if food consumption grows or shrinks more than 400%. I also dropped observations if a household has a negative checking/saving account or negative stocks, which is possibly due to the imputation of wealth variables. All nominal variables are deflated to 2010 dollars using CPI-U. Food variables are deflated using food CPI and healthcare expenditure variables are deflated using medical CPI.

The PSID data for each year refers to the previous year's household expenditures, income and wealth. Therefore, I construct the geography based instruments for years 1998 to 2014 biannually. The local employment and wages data are constructed using 3-digit NAICS industry level information for both MSAs and counties, and extracted from Quarterly Census of Employment and Wages (QCEW)[3]. There are 92 3-digit NAICS industries, 1168 counties and 547 MSAs in my data. I use counties as regions in aggregating industries in shift-share instrument in the main text. MSA-level estimation results are also provided in the appendix.

[3]NAICS system calls 3-digit industries as "subsector" and 4-digit industries as "industry". Here, I simply call the division as industry without making any distinction between definitions.

Figure 2 provides the spatial distribution of employment growth rates across U.S. counties for 3 time periods. In all time periods, there is substantial variation of employment growth rates across counties. Panel a provides growth rates from 1998 to 2000 and panel c provides the ones for 2012-2014. These two periods have similar magnitudes of growth which are dominantly positive. Panel b provides employment growth rates for 2008-2010 which is the Great Recession period. The growth rates are negative in these years, showing the destruction of the recession on labor markets in the United States.

Figure 1 provides the histograms of Bartik IV constructed using employment in all industries for the same time periods as in Figure 2. The histograms are plots of the inner product of baseline shares and employment growth rates. The magnitudes fall mostly in the range 0 to 0.1 for 1998-2000 and 2012-2014 periods. Again, we see negative and more dispersed magnitudes for the Great Recession period. Histograms also provide evidence that there is a lot of variation of growth rates across space and across time.

The histograms for the Bartik instruments constructed using either tradable sector employment or LQ-based employment are shown in the appendix for the same time periods. The magnitudes and signs are similar to all employment instruments, however those alternative instruments have a more dispersed distribution. This shows that most of the variation comes from export-oriented industries calculated by a priori tradable sector or LQ-based industry definitions.

Table 1 County Level Correlations of alternative instruments

	All sectors	Tradable sectors	LQ sectors
All sectors	1		
Tradable sectors	0.8711	1	
LQ sectors	0.9081	0.8231	1
Observations	28,952	28,952	28,952

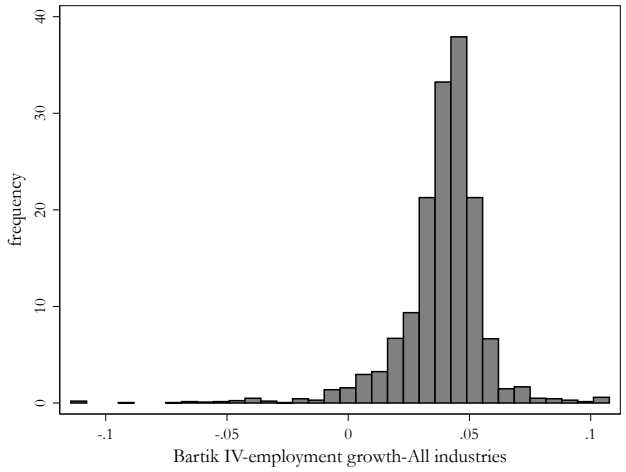
Notes: This table presents correlations between alternative constructions of Bartik instrument at county level. The dataset consists of 1168 counties across the US.

Table 2 MSA Level Correlations of alternative instruments

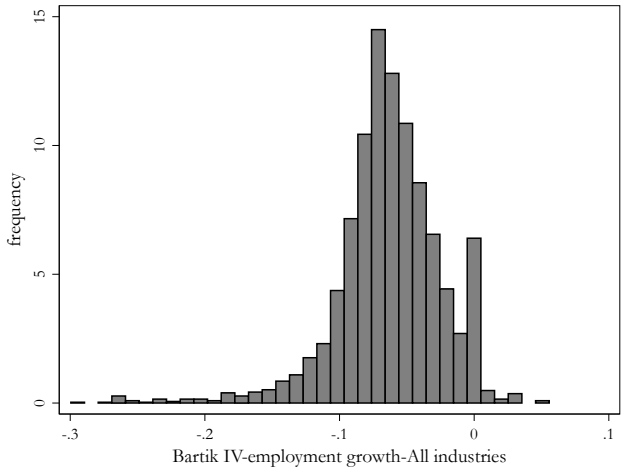
	All sectors	Tradable sectors	LQ sectors
All sectors	1		
Tradable sectors	0.9181	1	
LQ sectors	0.8739	0.8343	1
Observations	3,340	3,340	3,340

Notes: This table presents correlations between alternative constructions of Bartik instrument at MSA level. The dataset consists of 547 MSAs across the US.

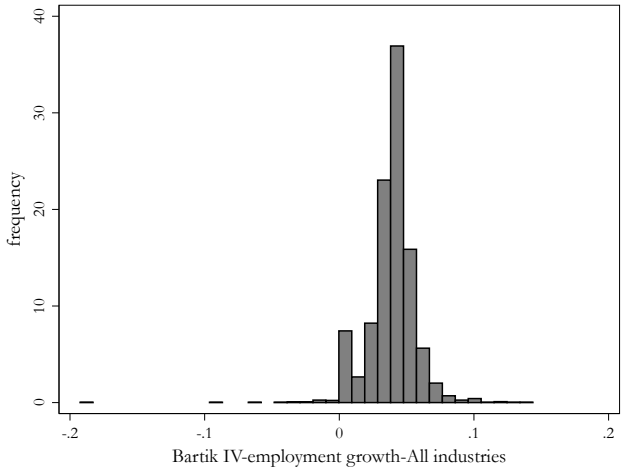
Figure 1 Within-year distribution of Bartik IV for total employment growth rates



[a] County Employment Growth 1998-2000



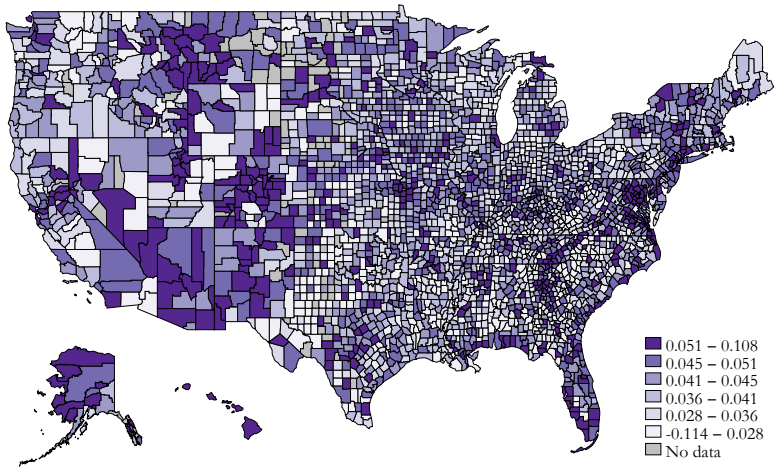
[b] County Employment Growth 2008-2010



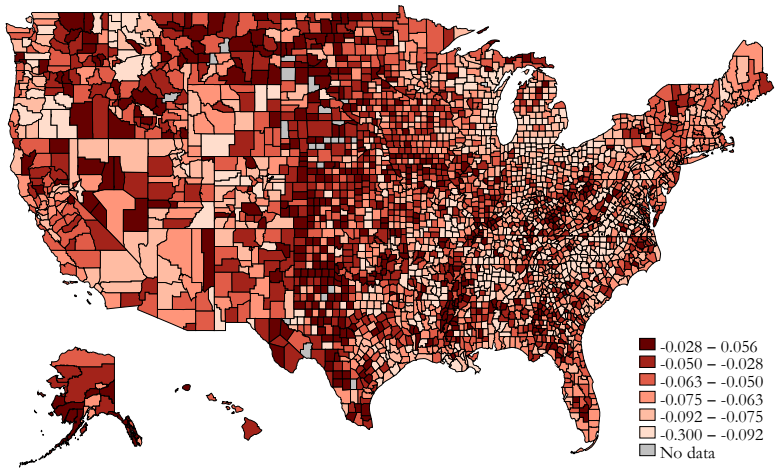
[c] County Employment Growth 2012-2014

Notes: The distribution of Bartik IV employment growth rates within each year. The IV is constructed using employment growth for all industries. The data is taken from Quarterly Census of Employment and Wages (QCEW).

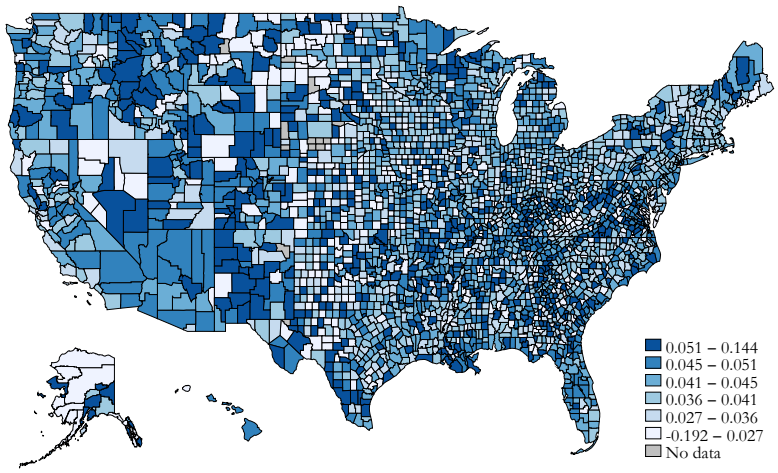
Figure 2 Bartik IV of employment growth rates across time and space



[a] County Employment Growth 1998-2000



[b] County Employment Growth 2008-2010



[c] County Employment Growth 2012-2014

Notes: Bartik IV distributions over U.S. counties. Bartik IV is constructed using employment growth for all industries. The data is taken from Quarterly Census of Employment and Wages (QCEW).

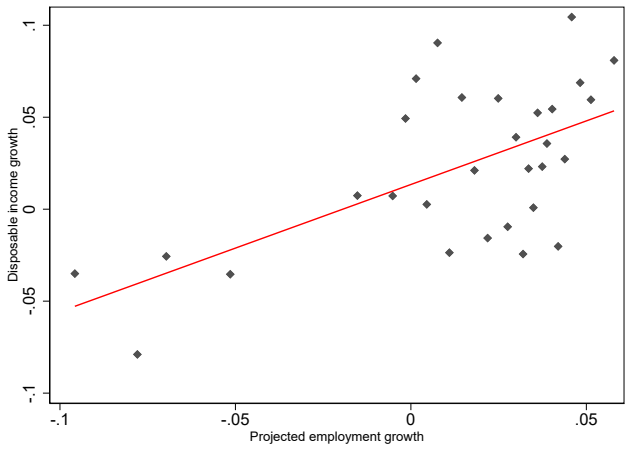
5 Results

5.1 Instrument Relevance

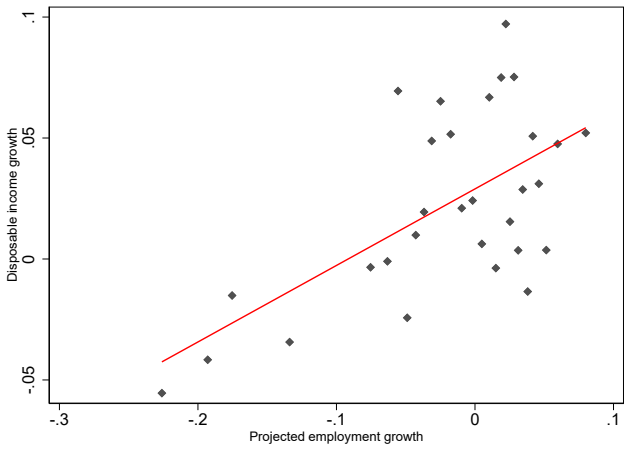
For the relevance of instruments, Figure 3 shows the residualized scatterplots of household disposable income growth and projected employment growth in the county that the households reside. Both variables are residuals after partialling out all the control variables. The figure shows that for all three Bartik instruments, there is positive association between the instrument and the instrumented variable. Figure 4 gives the residuals plotted separately for each wealth group. The positive association is observed for both groups. Overall the instruments are highly relevant for household disposable income growth which is also shown as high first stage F-tests in regression analysis. Similar results are obtained in MSA-level analysis which are shown in the appendix.

Additionally, I investigate another measure for local labor market conditions which is commonly used in constructing shift-share instruments in the literature. Namely, I use average weekly wage growth in a county from QCEW data to construct the shifter of the instrument. This instrument is not relevant and gives poor first stage results in county level. The residualized plots are provided in the appendix. This measure is subject to selection problems ,for instance, when labor markets are staggering, the average weekly wage might be increasing since the lowest wage earners are usually the first ones that lose their jobs. For this reason, I opt out using weekly wage as an instrument and continue with employment growth which is a more robust measure of labor market conditions.

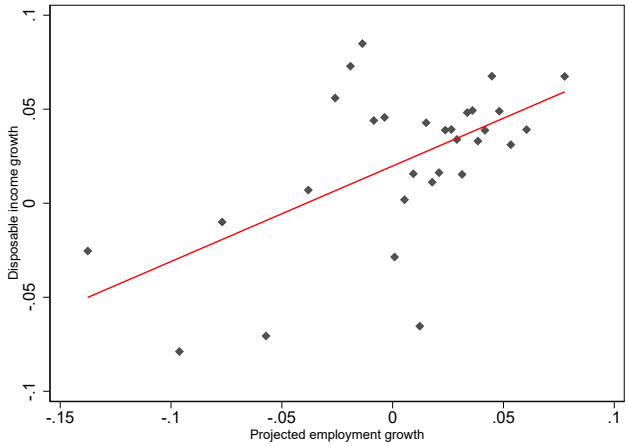
Figure 3 First stage relationship



[a] Residualized income growth and instrument of all industry employment



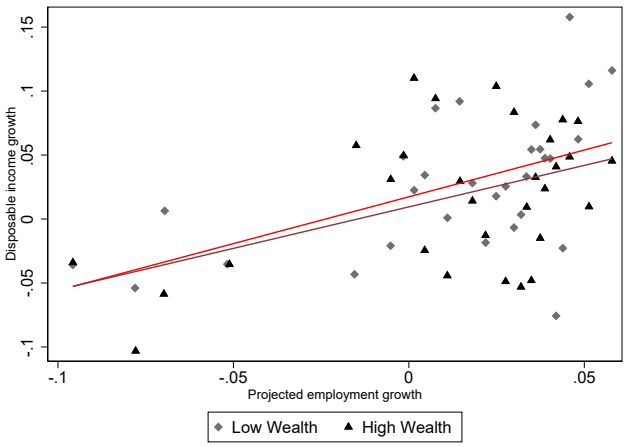
[b] Residualized income growth and instrument of tradable industry employment



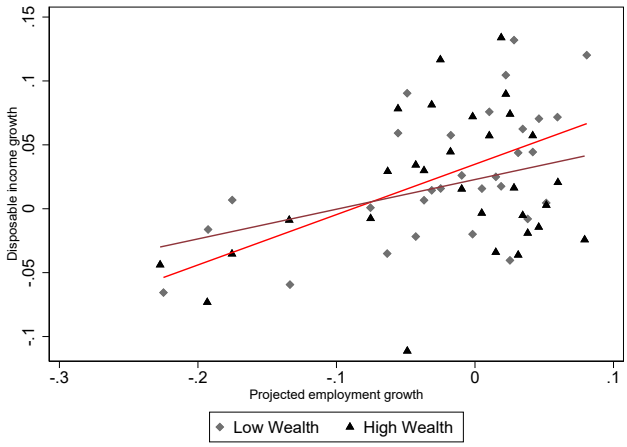
[c] Residualized income growth and instrument of LQ-based industry employment

Notes: Residual plots of projected county employment growth and household disposable income growth. Each dot is an average of 1,137 observations. The covariates in equation 4 are partialled out.

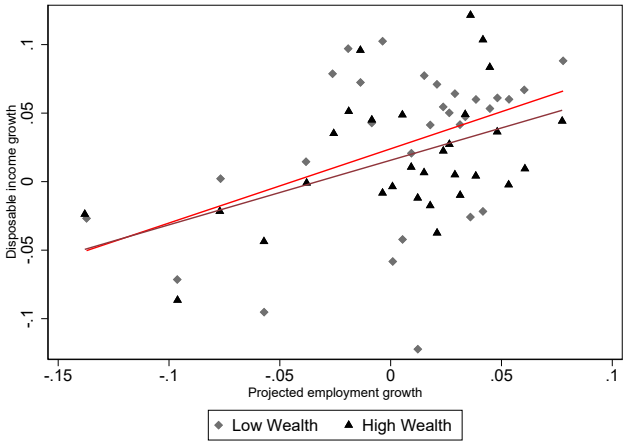
Figure 4 First stage relationship across wealth



[a] Residualized income growth and instrument of all industry employment



[b] Residualized income growth and instrument of tradable industry employment



[c] Residualized income growth and instrument of LQ-based industry employment

Notes: Residual plots of projected county employment growth and household disposable income growth. Each dot is an average of 571 observations for wealth group 1 and 566 observations for wealth group 2. The covariates in equation 4 are partialled out.

5.2 Outcome and Instrument Relation

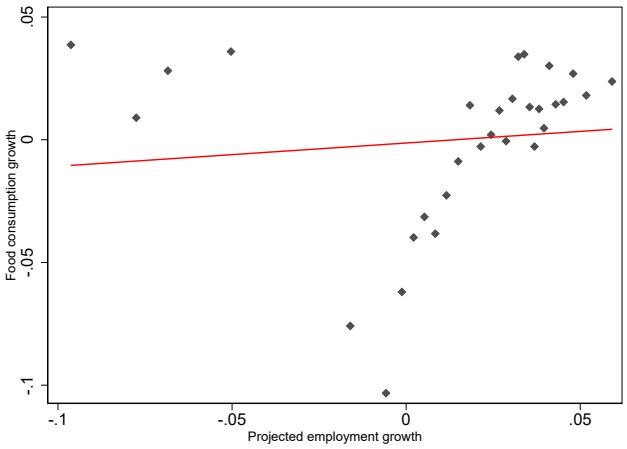
Figure 5, Figure 6 and Figure 7 provide the reduced form relationship between the instruments and food consumption, healthcare expenditure and total consumption, respectively.

Food consumption does not seem to have a strong correlation with the instrument when we consider all ranges of the employment growth. However, for the positive range the correlation is strong and positive.

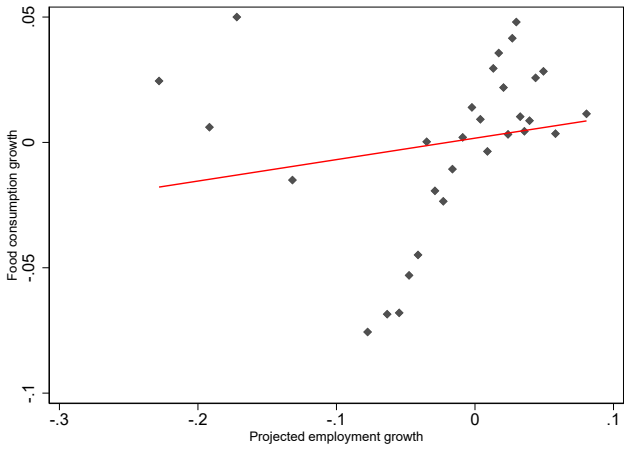
On the other hand, healthcare expenditure has a very strong positive correlation with the instruments as shown in Figure 6. This positive correlation seem to exist even only the positive range for employment growth is considered.

When total household consumption is considered as in Figure 7, the correlation is again positive in the reduced form relation, though not as strong as the healthcare-instrument relation.

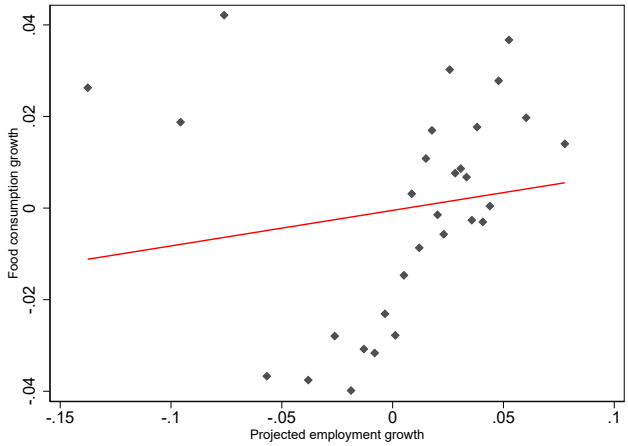
Figure 5 Food consumption and instrument relation



[a] Residualized food consumption growth and instrument of all industry employment



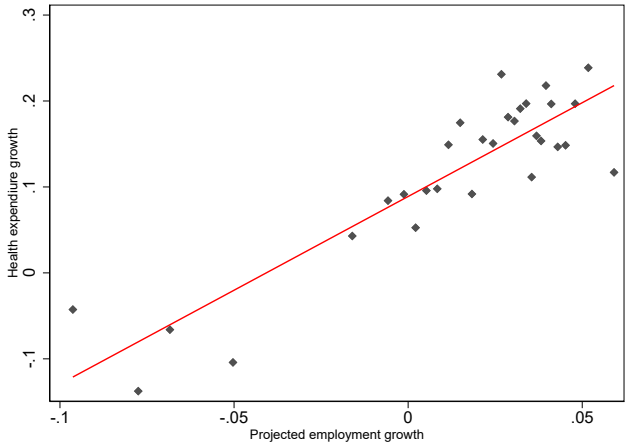
[b] Residualized food consumption growth and instrument of tradable industry employment



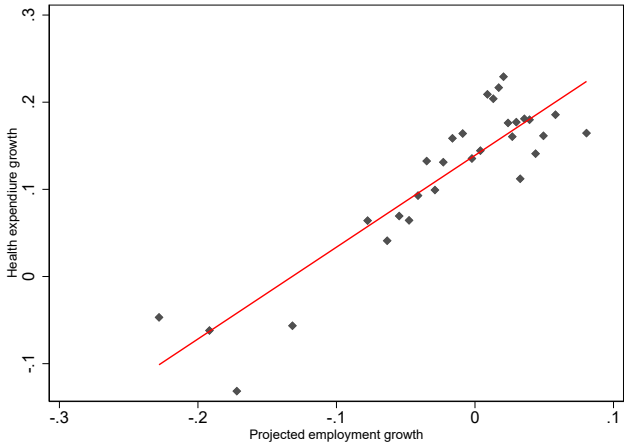
[c] Residualized food consumption growth and instrument of LQ-based industry employment

Notes: Residual plots of projected county employment growth and household food consumption growth. Each dot is an average of 1,117 observations. The covariates in equation 4 are partialled out.

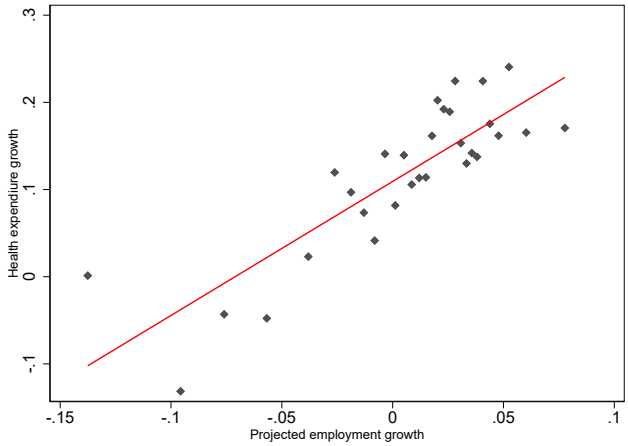
Figure 6 Health spending and instrument relation



[a] Residualized health spending growth and instrument of all industry employment



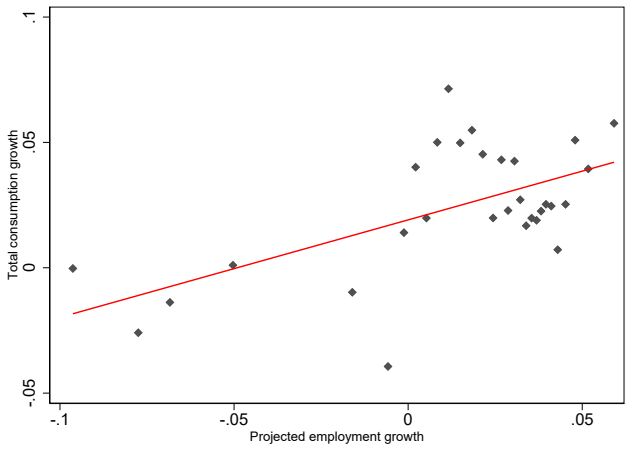
[b] Residualized health spending growth and instrument of tradable industry employment



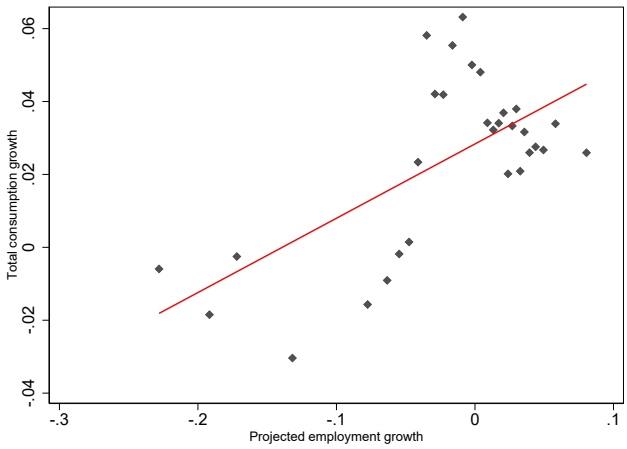
[c] Residualized health spending growth and instrument of LQ-based industry employment

Notes: Residual plots of projected county employment growth and household health spending growth. Each dot is an average of 1,117 observations. The covariates in equation 4 are partialled out.

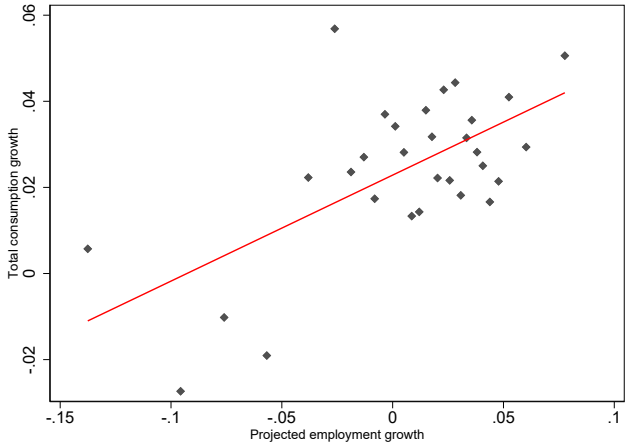
Figure 7 Total expenditures and instrument relation



[a] Residualized total expenditures growth and instrument of all industry employment



[b] Residualized total expenditures growth and instrument of tradable industry employment



[c] Residualized total expenditures growth and instrument of LQ-based industry employment

Notes: Residual plots of projected county employment growth and household total expenditures growth. Each dot is an average of 1,117 observations. The covariates in equation 4 are partialled out.

5.3 Average Income Elasticity of Consumption

I begin with showing OLS results. Table 3 shows correlation of log household income change and log consumption change. The healthcare expenditure has higher correlation to income changes compared to total consumption or food consumption. However, the correlations are much lower than one, 0.1. This is very similar to the income elasticity estimates in micro studies which are close to zero. OLS estimates are likely to be suffering from downward bias due to failing to control for many omitted variables that covary with both income and spending. For example, high income households tend to be healthier which reduces their healthcare expenditures accordingly. Moreover, high income households may have better insurance contracts which lowers their health costs in case of a medical need. Therefore, OLS estimates can at best be some correlations and can be informative qualitatively, such as comparing to other consumption-income correlations. For a quantitative understanding of income-spending relationship, an instrument is needed that can isolate the changes in income which are unrelated to omitted factors that also affect consumption growth.

Table 3 OLS estimates of Income Elasticity of Expenditure

	$\Delta Food$	$\Delta Healthcare$	$\Delta Total$	$\Delta Food$	$\Delta Healthcare$	$\Delta Total$
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta Household\ Income$	0.0510***	0.0958***	0.0448***	0.0502***	0.0946***	0.0446***
	(0.00387)	(0.00862)	(0.00321)	(0.00371)	(0.00895)	(0.00338)
$Manufacturing\ share$ 1998				-0.00425	-0.00996	0.0000661
				(0.00679)	(0.0213)	(0.00513)
$Tradable\ share$ 1998				0.0170	-0.0861	0.00608
				(0.0199)	(0.0551)	(0.0193)
$Constant$	1.089***	0.888***	1.032***	0.0867	0.773	0.462**
	(0.0329)	(0.0674)	(0.0230)	(0.205)	(0.569)	(0.209)
Household controls	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Observations	34324	34324	34324	34001	34001	34001

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents estimates of the change in log income on the change in log expenditure for food, healthcare and total household consumption. Healthcare expenditure includes out-of-pocket health spending and insurance premiums paid by the household. Household level control variables comprise size of the household, a quadratic in age, education, sex, race and marital status of head of the household, acute health index, chronic health index and hospitalization index. State fixed effects are also included. Columns 4-6 adds industry characteristics in the region to the covariates, namely manufacturing industry share and tradable industry share. Region is approximated as U.S. counties. Robust standard errors are clustered at state level.

I continue with elasticity estimations using constructed Bartik instruments. I use all three Bartik instruments constructed using all or subcategory of industries for employment growth. Table 4 gives the results of 2SLS estimates of equations 3 and 4 with the Bartik instrument constructed as in equation 5 (employment in all sectors). Columns 1-3 are the estimates for specification 3 without using base-year industry controls. Columns 4-6 add base year industry composition control variables, manufacturing employment share and tradable sector employment share. Food consumption growth has a low elasticity around 0.1 which is not significantly differentiated from zero. Total household expenditure has an elasticity around 0.4, which means that a 10% change in disposable income leads to a 4% change in average household consumption. These elasticities indicate that an overall consumption bundle is composed of mostly income-inelastic good, i.e. necessities. On the other hand, healthcare expenditures have an elasticity around 3.1 in both specifications and it is very significantly estimated. A 10% change in disposable income leads to 31% change in household healthcare expenditures. The healthcare expenditure in the data consists of household out-of-pocket healthcare spendings plus the insurance premiums paid by the household. Elasticities higher than one indicate that the good is a luxury. In this regard, my PSID sample for 1999-2015 waves composes of households who have a high elasticity to changes in household income driven by the local area labor market conditions and for whom the healthcare spending can be regarded as luxury. Adding industry composition controls do not seem to have a significant impact on the results.

Table 5 and Table 6 show the results for estimations using Bartik instruments in equation 6 (tradable industries) and equation 7 (LQ-based industries). The results are similar in both cases. The income elasticity of health spending is 3.3 using tradable sectors to construct the instrument and the elasticity is 3.1 using location quotients for instrument construction. Overall, the estimated elasticities are very similar across alternative specification and they all point to a very high income sensitivity for out-of-pocket healthcare expenditures. The IV estimates are quite large compared to OLS estimates. The OLS estimates suffer from

downward bias even when I control for health status in the family with the health indices I constructed for household heads and their spouses.

It is useful to give a sense of these elasticities in dollar terms. Average annual household disposable income in my sample is $46,365 and the median absolute deviation of disposable income is $18,778. The size of a median absolute deviation decline in annual disposable income will lead to a decline of $9,032 in annual household consumption. The corresponding decline in healthcare expenditures will be $57,686 which would effectively mean zero health spending since average healthcare expenditures are $5,769.

Table 4 2SLS estimates of Income Elasticity of Expenditure with Bartik IV all employment

	$\Delta Food$	$\Delta Healthcare$	$\Delta Total$	$\Delta Food$	$\Delta Healthcare$	$\Delta Total$
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta Household\ Income$	0.111	3.142***	0.477***	0.114	3.072***	0.481***
	(0.112)	(0.593)	(0.120)	(0.111)	(0.571)	(0.118)
$Manufacturing\ share$ 1998				-0.0176	0.102	0.0419
				(0.0334)	(0.183)	(0.0454)
$Tradable\ share$ 1998				0.0246	-0.223	-0.0299
				(0.0321)	(0.157)	(0.0409)
$Constant$	0.0991	-2.497***	0.0479	0.0888	-2.387***	0.0483
	(0.230)	(0.787)	(0.231)	(0.228)	(0.754)	(0.227)
Household controls	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Observations	34129	34129	34129	34056	34056	34056
First stage F-test	945.01	945.01	945.01	1511.83	1511.83	1511.83
First stage t-test on excluded IV	6.00	6.00	6.00	6.07	6.07	6.07

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents estimates of the change in log income on the change in log expenditure for food, healthcare and total household consumption using projected employment growth in the region as an instrument. Employment growth is constructed using employment in all industries. Region is approximated as U.S. counties. Healthcare expenditure includes out-of-pocket health spending and insurance premiums paid by the household. Household level control variables comprise size of the household, a quadratic in age, education, sex, race and marital status of head of the household, acute health index, chronic health index and hospitalization index. State fixed effects are also included. Columns 4-6 adds industry characteristics in the region to the covariates, namely manufacturing industry share and tradable industry share. Robust standard errors are clustered at state level.

Table 5 2SLS estimates of Income Elasticity of Expenditure with Bartik IV tradable employment

	$\Delta Food$	$\Delta Healthcare$	$\Delta Total$	$\Delta Food$	$\Delta Healthcare$	$\Delta Total$
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta Household\ Income$	0.195	3.293***	0.513***	0.198	3.357***	0.530***
	(0.123)	(0.721)	(0.139)	(0.129)	(0.757)	(0.146)
Manufacturing share 1998				0.000499	0.0485	0.0122
				(0.0115)	(0.0668)	(0.0119)
Tradable share 1998				0.00939	-0.212*	-0.0167
				(0.0219)	(0.122)	(0.0271)
Constant	0.0153	-2.647***	0.0125	0.00992	-2.653***	-0.000585
	(0.229)	(0.876)	(0.240)	(0.230)	(0.899)	(0.242)
Household controls	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Observations	34129	34129	34129	33880	33880	33880
First stage F-test	923.69	923.69	923.69	971.90	971.90	971.90
First stage t-test on excluded IV	5.13	5.13	5.13	5.08	5.08	5.08

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents estimates of the change in log income on the change in log expenditure for food, healthcare and total household consumption using projected employment growth in the region as an instrument. Employment growth is constructed using employment in tradable industries. Region is approximated as U.S. counties. Healthcare expenditure includes out-of-pocket health spending and insurance premiums paid by the household. Household level control variables comprise size of the household, a quadratic in age, education, sex, race and marital status of head of the household, acute health index, chronic health index and hospitalization index. State fixed effects are also included. Columns 4-6 adds industry characteristics in the region to the covariates, namely manufacturing industry share and tradable industry share. Robust standard errors are clustered at state level.

Table 6 2SLS estimates of Income Elasticity of Expenditure with Bartik IV LQ employment

	$\Delta Food$	$\Delta Healthcare$	$\Delta Total$	$\Delta Food$	$\Delta Healthcare$	$\Delta Total$
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta Household\ Income$	0.127	3.084***	0.405***	0.131	3.015***	0.413***
	(0.120)	(0.629)	(0.113)	(0.122)	(0.609)	(0.114)
$Manufacturing\ share$ 1998				-0.00297	0.0361	0.00587
				(0.00770)	(0.0419)	(0.00737)
$Tradable\ share$ 1998				0.0136	-0.210**	-0.00948
				(0.0213)	(0.104)	(0.0244)
$Constant$	0.0825	-2.440***	0.120	0.0751	-2.315***	0.115
	(0.239)	(0.808)	(0.232)	(0.238)	(0.785)	(0.230)
Household controls	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Observations	34129	34129	34129	34001	34001	34001
First stage F-test	891.25	891.25	891.25	101.62	101.62	101.62
First stage t-test on excluded IV	5.63	5.63	5.63	5.67	5.67	5.67

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents estimates of the change in log income on the change in log expenditure for food, healthcare and total household consumption using projected employment growth in the region as an instrument. Employment growth is constructed using employment in LQ-based industries. Region is approximated as U.S. counties. Healthcare expenditure includes out-of-pocket health spending and insurance premiums paid by the household. Household level control variables comprise size of the household, a quadratic in age, education, sex, race and marital status of head of the household, acute health index, chronic health index and hospitalization index. State fixed effects are also included. Columns 4-6 adds industry characteristics in the region to the covariates, namely manufacturing industry share and tradable industry share. Robust standard errors are clustered at state level.

5.4 Heterogeneity in Elasticities

5.4.1 Heterogeneity across wealth

Now, I turn to the heterogeneity in consumption elasticities. There is ample evidence that the elasticities vary with many demographic characteristics such as age, race, income and wealth. I look at the heterogeneity in expenditure elasticities with respect to wealth. I divide the sample into two groups with respect to the net worth of households.

Table 7 gives the OLS estimates separately for wealth groups. Again, the estimates are much lower than one for both groups. The correlations between health spending and income are 0.17 for low wealth and 0.01 for high wealth households. Low wealth households have higher correlation between consumption and disposable income for low wealth households compared to high wealth households.

Table 8 shows the elasticity estimates for expenditure using Bartik instrument constructed as in equation 4 with all industry employment. Table 9 and Table 10 show the estimates using Bartik instruments with tradable industry employment and LQ-based industry employment, respectively.

Total consumption elasticities are similar across wealth, 0.492 for low wealth households and 0.463 for high wealth households. In dollar terms, a decline of an average median deviation of household income of $18,778 will lead to a decline of $9,238 of total consumption for low wealth group, and $8,694 for high wealth group.

The health spending results indicate that low wealth households exhibit a higher elasticity of healthcare expenditure compared to high wealth households. The health spending elasticity estimates for low wealth group varies between 3.5 and 3.7, whereas high wealth group have elasticities around 2.3 and 2.9. On the other hand, total consumption elasticity is in general higher in high wealth group although the estimates are very close for both groups. It is likely that high wealth group has higher share of luxury goods in their consumption bundle. Therefore, the results for total consumption is not really comparable due to possibly different

consumption mixes. The results are similar when baseline industry composition of regions is controlled for.

A related point about income elasticities is that high wealth households seem to have higher total consumption elasticity compared to low wealth households when income is instrumented for. This is again possibly a difference mix of consumption bundle which has higher luxury type spending for wealthier households.

Another observation is that dividing sample creates some precision loss in Table 8 such that the healthcare expenditure elasticity for low wealth group is not precisely estimated. This problem does not arise in Tables 9 and 10 when subcategories of industries are used in instrument construction. This is possibly because of the higher noise in all employment instrument as it is already shown in histograms that most variation across industries come from tradable/LQ-based industries. Again, the baseline industry composition does not seem to matter for consumption patterns of either wealth group.

Table 7 OLS estimates of Income Elasticity of Expenditure

	$\Delta Food\ Consumption$		$\Delta Healthcare\ Expenditures$		$\Delta Total\ Consumption$		$\Delta Food\ Consumption$		$\Delta Healthcare\ Expenditures$		$\Delta Total\ Consumption$	
	Low Wealth (1)	High Wealth (2)	Low Wealth (3)	High Wealth (4)	Low Wealth (5)	High Wealth (6)	Low Wealth (7)	High Wealth (8)	Low Wealth (9)	High Wealth (10)	Low Wealth (11)	High Wealth (12)
$\Delta Household\ Income$	0.0720***	0.0261***	0.167***	0.0131	0.0611***	0.0254***	0.0714***	0.0256***	0.165***	0.0130	0.0614***	0.0248***
	(0.00600)	(0.00520)	(0.0153)	(0.0138)	(0.00420)	(0.00448)	(0.00582)	(0.00526)	(0.0159)	(0.0138)	(0.00443)	(0.00454)
$Manufacturing\ share$ 1998							0.00202	-0.00990	-0.0421	0.0261	0.000856	0.00162
							(0.0148)	(0.00790)	(0.0285)	(0.0218)	(0.00929)	(0.00886)
$Tradable\ share$ 1998							0.0250	-0.00426	-0.0487	-0.152*	0.0195	-0.0271
							(0.0319)	(0.0251)	(0.0769)	(0.0860)	(0.0221)	(0.0330)
$Constant$	1.061***	-0.509***	1.170**	-0.289	1.846***	-0.204	1.121***	0.150**	1.096***	-0.173	1.015***	-0.0139
	(0.0734)	(0.0860)	(0.448)	(0.826)	(0.0444)	(0.213)	(0.0488)	(0.0635)	(0.151)	(0.144)	(0.0406)	(0.0615)
Household controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	17229	17095	17229	17095	17229	17095	17084	16917	17084	16917	17084	16917

Robust standard errors are clustered at state level.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents estimates of the change in log income on the change in log expenditure for food, healthcare and total household consumption separately for low and high wealth households. The wealth variable used in this analysis is all assets net of debt, including home equity. Healthcare expenditure includes out-of-pocket health spending and insurance premiums paid by the household. Household level control variables comprise size of the household, a quadratic in age, education, sex, race and marital status of head of the household, acute health index, chronic health index and hospitalization index. State fixed effects are also included. Columns 7-12 adds industry characteristics in the region to the covariates, namely manufacturing industry share and tradable industry share. Region is approximated as U.S. counties. Robust standard errors are clustered at state level.

Table 8 2SLS estimates of Income Elasticity of Expenditure with Bartik IV all employment

	$\Delta Food\ Consumption$		$\Delta Healthcare\ Expenditures$		$\Delta Total\ Consumption$		$\Delta Food\ Consumption$		$\Delta Healthcare\ Expenditures$		$\Delta Total\ Consumption$	
	Low Wealth (1)	High Wealth (2)	Low Wealth (3)	High Wealth (4)	Low Wealth (5)	High Wealth (6)	Low Wealth (7)	High Wealth (8)	Low Wealth (9)	High Wealth (10)	Low Wealth (11)	High Wealth (12)
$\Delta Household\ Income$	0.0755	0.151	3.758	2.349*	0.489***	0.459***	0.0910	0.139	3.636	2.337*	0.492***	0.463***
	(0.154)	(0.148)	(1.176)	(0.634)	(0.166)	(0.149)	(0.151)	(0.151)	(1.124)	(0.637)	(0.164)	(0.149)
$Manufacturing\ share$ 1998							-0.00565	-0.0198	0.146	0.0768	0.0318	0.0674
							(0.0588)	(0.0466)	(0.356)	(0.282)	(0.0576)	(0.0695)
$Tradable\ share$ 1998							0.0320	0.00341	-0.421	-0.0520	-0.0304	-0.0481
							(0.0498)	(0.0467)	(0.327)	(0.242)	(0.0516)	(0.0592)
$Constant$	0.613***	-0.509***	-3.564**	-1.137	0.263	-0.184	0.582***	-0.503***	-3.317**	-1.139	0.262	-0.174
	(0.219)	(0.105)	(1.619)	(0.765)	(0.258)	(0.206)	(0.214)	(0.110)	(1.512)	(0.780)	(0.248)	(0.209)
Household controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	17146	16983	17146	16983	17146	16983	17108	16948	17108	16948	17108	16948
First stage F-test	77.00	498.21	77.00	498.21	77.00	498.21	144.43	497.68	144.43	497.68	144.43	497.68
First stage t-test on excluded IV	3.66	3.08	3.66	3.08	3.66	3.08	3.79	3.04	3.79	3.04	3.79	3.04

Robust standard errors are clustered at state level.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents estimates of the change in log income on the change in log expenditure for food, healthcare and total household consumption separately for low and high wealth households using projected employment growth in the region as an instrument. Employment growth is constructed using employment in all industries. Region is approximated as U.S. counties. The wealth variable used in this analysis is all assets net of debt, including home equity. Healthcare expenditure includes out-of-pocket health spending and insurance premiums paid by the household. Household level control variables comprise size of the household, a quadratic in age, education, sex, race and marital status of head of the household, acute health index, chronic health index and hospitalization index. State fixed effects are also included. Columns 7-12 adds industry characteristics in the region to the covariates, namely manufacturing industry share and tradable industry share. Robust standard errors are clustered at state level.

Table 9 2SLS estimates of Income Elasticity of Expenditure with Bartik IV tradable employment

	$\Delta Food\ Consumption$		$\Delta Healthcare\ Expenditures$		$\Delta Total\ Consumption$		$\Delta Food\ Consumption$		$\Delta Healthcare\ Expenditures$		$\Delta Total\ Consumption$	
	Low Wealth (1)	High Wealth (2)	Low Wealth (3)	High Wealth (4)	Low Wealth (5)	High Wealth (6)	Low Wealth (7)	High Wealth (8)	Low Wealth (9)	High Wealth (10)	Low Wealth (11)	High Wealth (12)
$\Delta Household\ Income$	0.169	0.228	3.505***	2.955***	0.468***	0.598**	0.171	0.229	3.620***	2.970***	0.483***	0.615**
	(0.147)	(0.193)	(1.119)	(1.122)	(0.157)	(0.256)	(0.156)	(0.190)	(1.221)	(1.083)	(0.170)	(0.251)
Manufacturing share 1998							0.00314	-0.00398	0.103	-0.00833	0.0129	0.00727
							(0.0226)	(0.0118)	(0.122)	(0.104)	(0.0206)	(0.0224)
Tradable share 1998							0.0206	-0.00538	-0.443*	0.0512	-0.0269	0.00174
							(0.0351)	(0.0300)	(0.255)	(0.193)	(0.0401)	(0.0510)
Constant	0.493**	-0.550***	-3.238**	-1.460	0.291	-0.258	0.484**	-0.551***	-3.268**	-1.492	0.274	-0.266
	(0.213)	(0.116)	(1.510)	(0.903)	(0.237)	(0.229)	(0.218)	(0.119)	(1.575)	(0.925)	(0.243)	(0.237)
Household controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	17146	16983	17146	16983	17146	16983	17035	16845	17035	16845	17035	16845
First stage F-test	75.40	475.99	75.40	475.99	75.40	475.99	136.74	4072.07	136.74	4072.07	136.74	4072.07
First stage t-test on excluded IV	3.69	2.14	3.69	2.14	3.69	2.14	3.51	2.25	3.51	2.25	3.51	2.25

Robust standard errors are clustered at state level.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents estimates of the change in log income on the change in log expenditure for food, healthcare and total household consumption separately for low and high wealth households using projected employment growth in the region as an instrument. Employment growth is constructed using employment in tradable industries. Region is approximated as U.S. counties. The wealth variable used in this analysis is all assets net of debt, including home equity. Healthcare expenditure includes out-of-pocket health spending and insurance premiums paid by the household. Household level control variables comprise size of the household, a quadratic in age, education, sex, race and marital status of head of the household, acute health index, chronic health index and hospitalization index. State fixed effects are also included. Columns 7-12 adds industry characteristics in the region to the covariates, namely manufacturing industry share and tradable industry share. Robust standard errors are clustered at state level.

Table 10 2SLS estimates of Income Elasticity of Expenditure with Bartik IV LQ employment

	Δ*Food Consumption*		Δ*Healthcare Expenditures*		Δ*Total Consumption*		Δ*Food Consumption*		Δ*Healthcare Expenditures*		Δ*Total Consumption*	
	Low Wealth (1)	High Wealth (2)	Low Wealth (3)	High Wealth (4)	Low Wealth (5)	High Wealth (6)	Low Wealth (7)	High Wealth (8)	Low Wealth (9)	High Wealth (10)	Low Wealth (11)	High Wealth (12)
Δ*Household Income*	0.109	0.143	3.743***	2.314***	0.432**	0.379**	0.135	0.110	3.641	2.305	0.455	0.364**
	(0.152)	(0.173)	(1.239)	(0.672)	(0.171)	(0.154)	(0.159)	(0.184)	(1.219)	(0.663)	(0.177)	(0.158)
Manufacturing share 1998							0.00439	-0.0107	0.0874	0.00457	0.0155	-0.00157
							(0.0165)	(0.00767)	(0.0819)	(0.0446)	(0.0144)	(0.00971)
Tradable share 1998							0.0180	0.000614	-0.435*	-0.0199	-0.0242	-0.00753
							(0.0334)	(0.0255)	(0.246)	(0.143)	(0.0410)	(0.0406)
Constant	0.570***	-0.504***	-3.545**	-1.119	0.337	-0.142	0.530**	-0.487***	-3.292**	-1.113	0.312	-0.128
	(0.219)	(0.120)	(1.705)	(0.764)	(0.248)	(0.211)	(0.224)	(0.127)	(1.620)	(0.793)	(0.247)	(0.219)
Household controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	17146	16983	17146	16983	17146	16983	17084	16917	17084	16917	17084	16917
First stage F-test	74.30	493.39	74.30	493.39	74.30	493.39	223.55	438.40	223.55	438.40	223.55	438.40
First stage t-test on excluded IV	3.41	2.78	3.41	2.78	3.41	2.78	3.41	2.80	3.41	2.80	3.41	2.80

Robust standard errors are clustered at state level.

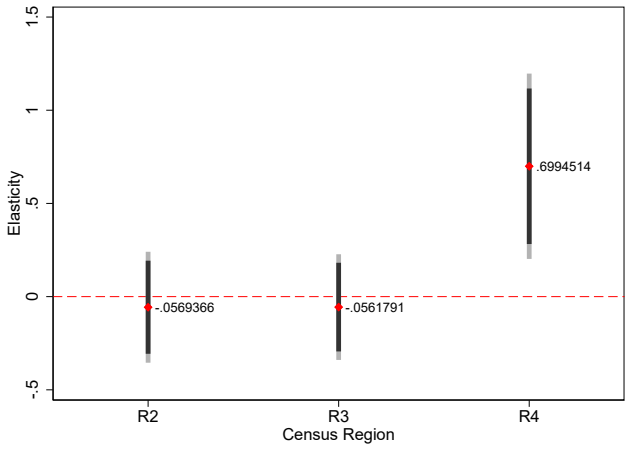
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents estimates of the change in log income on the change in log expenditure for food, healthcare and total household consumption separately for low and high wealth households using projected employment growth in the region as an instrument. Employment growth is constructed using employment in LQ-based industries. Region is approximated as U.S. counties. The wealth variable used in this analysis is all assets net of debt, including home equity. Healthcare expenditure includes out-of-pocket health spending and insurance premiums paid by the household. Household level control variables comprise size of the household, a quadratic in age, education, sex, race and marital status of head of the household, acute health index, chronic health index and hospitalization index. State fixed effects are also included. Columns 7-12 adds industry characteristics in the region to the covariates, namely manufacturing industry share and tradable industry share. Robust standard errors are clustered at state level.

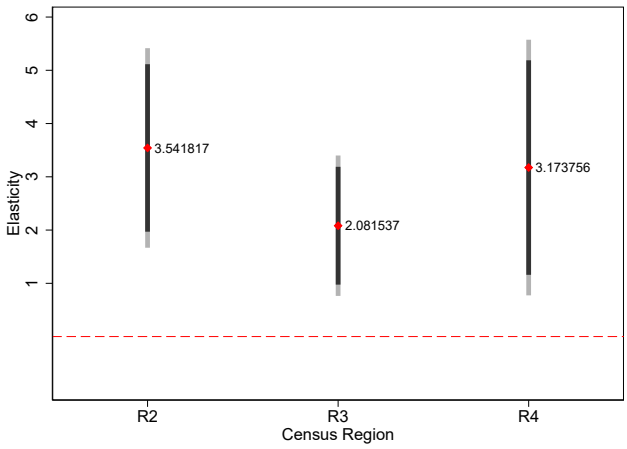
5.4.2 Heterogeneity across space

I estimate elasticities separately for each US Census regions. These regions may exhibit different dynamics since the labor markets and industries across regions vary. Therefore, it is more relevant to compare counties within a region where the industry structure is more similar. Figure 8 shows the coefficient estimates of instrumented disposable income on expenditures with 95% and 90% confidence intervals. Region 1, Northwest, results are omitted since the estimates are very noisy and have huge confidence intervals. The elasticities for remaining three regions indicate that there is significant heterogeneity across Census regions. The income elasticity of household out-of-pocket healthcare expenditure is 2.08 in South, 3.17 in West and 3.54 in Midwest. These numbers correspond to 21%, 32% and 35% change in health spending respectively when income changes by 10%. The elasticities are much greater than one in all regions. Therefore, the income-elastic nature of healthcare expenditure is not specific to a particular region. On the other hand, food consumption and total household consumption bundle seem to be income inelastic. For instance, in West of the US, where all elasticities are estimated very precisely and are larger than other regions, a 10% change in disposable income leads to around 7% change in food consumption and 6% change in total consumption.

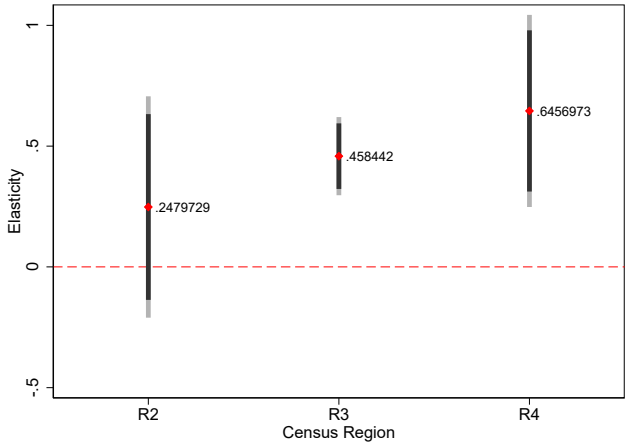
Figure 8 Elasticity of Consumption for Census regions



[a] Elasticity of Food Consumption



[b] Elasticity of Out-of-pocket Health Expenditures



[c] Elasticity of Total Consumption

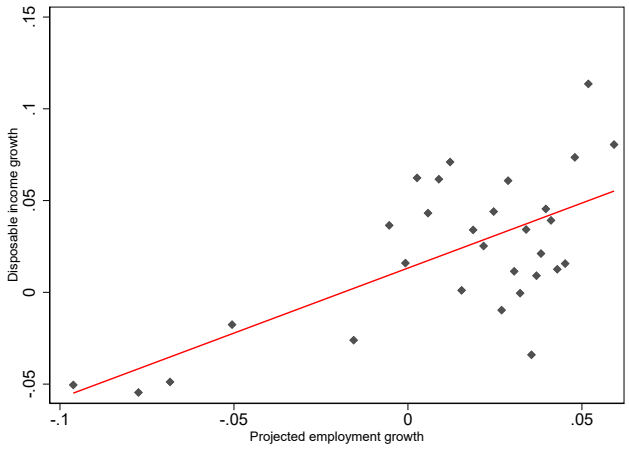
Notes: Second stage coefficients of income elasticity of consumption of 2SLS estimations where Bartik IV for all industries is used. R2:Midwest, R3:South, R4:West. Region1:Northeast is omitted because of high confidence intervals and noisy estimates.

6 Robustness

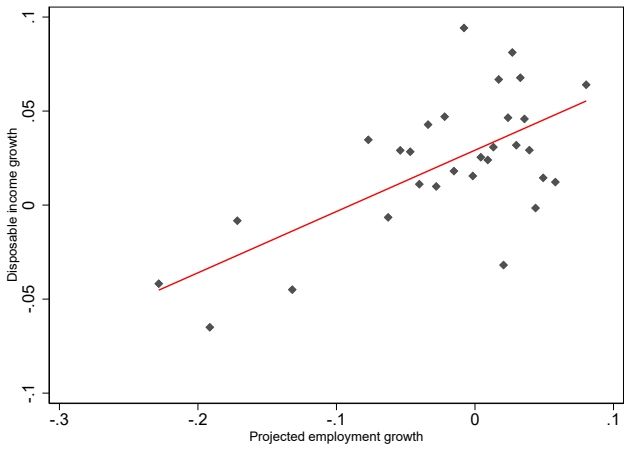
6.1 Insurance Status

Having an insurance affects how much households spend on their healthcare which is also correlated with income. Therefore, I add dummies for insurance status of the head of the household. Insurance dummies are controls for private insurance, public insurance and uninsured. I also add a dummy variable indicating whether insurance status has changed from previous time period. The outcomes are very similar in this specification. In particular, the income elasticity is 3.17 for health expenditures with insurance premium payments and 2.8 for out-of-pocket expenditures without premiums as shown in Table 11. Low wealth households have higher elasticities which are around 3.48 and 3.87 as shown Table 12, and high wealth households have elasticities around 2.06 and 2.36. Overall, the estimated elasticities are robust to the insurance status of the households.

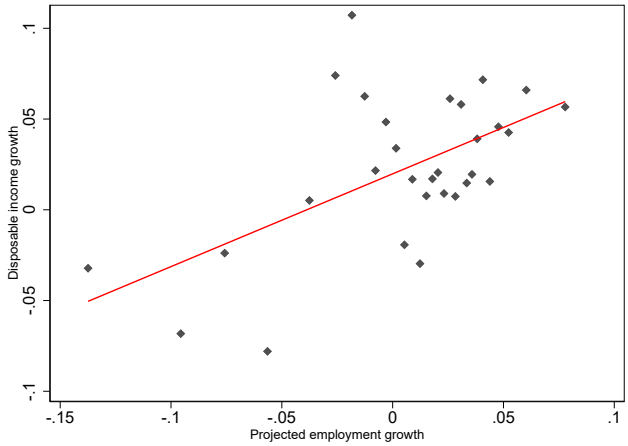
Figure 9 First stage relationship



[a] Residualized income growth and instrument of all industry employment



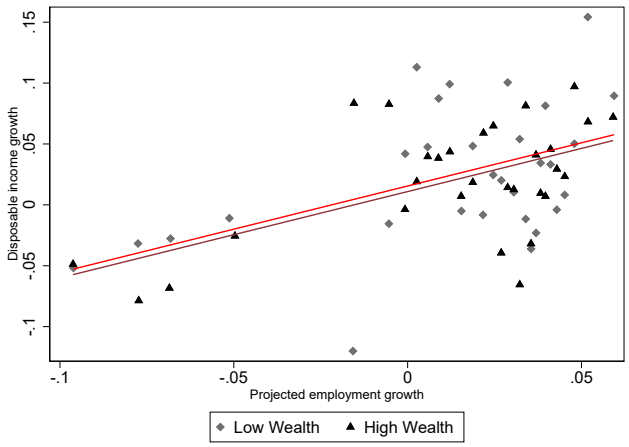
[b] Residualized income growth and instrument of tradable industry employment



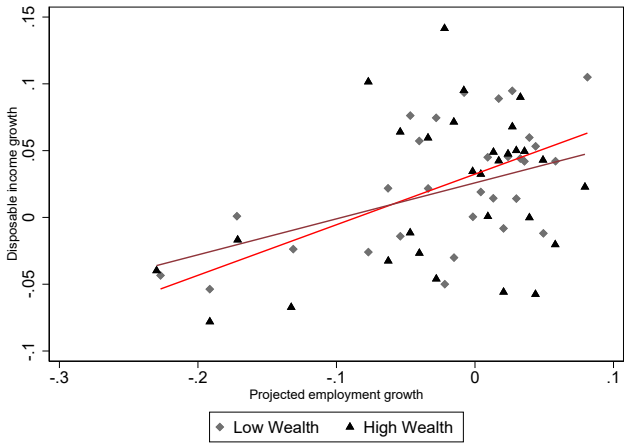
[c] Residualized income growth and instrument of LQ-based industry employment

Notes: Residual plots of projected county employment growth and household disposable income growth. Each dot is an average of 1,137 observations. The covariates in equation 4 and insurance status controls are partialed out.

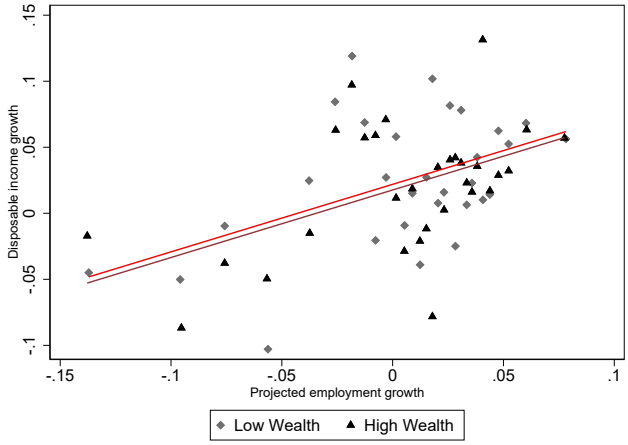
Figure 10 First stage relationship across wealth



[a] Residualized income growth and instrument of all industry employment



[b] Residualized income growth and instrument of tradable industry employment



[c] Residualized income growth and instrument of LQ-based industry employment

Notes: Residual plots of projected county employment growth and household disposable income growth. Each dot is an average of 571 observations for wealth group 1 and 566 observations for wealth group 2. The covariates in equation 4 and insurance status controls are partialled out.

Table 11 2SLS estimates of Income Elasticity of Expenditure with Bartik IV all employment

	$\Delta Food$	$\Delta Oop\ Health$	$\Delta Healthcare$	$\Delta Total$	$\Delta Food$	$\Delta Oop\ Health$	$\Delta Healthcare$	$\Delta Total$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta Household\ Income$	0.124	2.817***	3.173***	0.542***	0.127	2.741***	3.092***	0.544***
	(0.112)	(0.546)	(0.610)	(0.127)	(0.109)	(0.518)	(0.580)	(0.124)
$Insurance\ 1$	0.0114	0.0155	-0.0547	0.0475*	0.0135	0.0156	-0.0538	0.0508**
	(0.0183)	(0.0980)	(0.110)	(0.0245)	(0.0184)	(0.0951)	(0.108)	(0.0252)
$Insurance\ 2$	0.0304*	-0.206*	-0.309**	0.0245	0.0318**	-0.195*	-0.296**	0.0281
	(0.0164)	(0.115)	(0.129)	(0.0246)	(0.0158)	(0.112)	(0.126)	(0.0256)
$\Delta Insurance$	-0.00507	-0.0191	-0.0232	-0.0239***	-0.00454	-0.0180	-0.0218	-0.0234***
	(0.00655)	(0.0391)	(0.0434)	(0.00852)	(0.00662)	(0.0378)	(0.0421)	(0.00851)
$Manuf.\ share\ 1998$					-0.0152	0.0608	0.0768	0.0361
					(0.0328)	(0.159)	(0.181)	(0.0455)
$Tradable\ share\ 1998$					0.0235	-0.192	-0.215	-0.0291
					(0.0317)	(0.139)	(0.155)	(0.0410)
$Constant$	0.0772	-2.213***	-2.356***	0.00209	0.0664	-2.111***	-2.246***	0.00297
	(0.224)	(0.776)	(0.808)	(0.221)	(0.221)	(0.745)	(0.774)	(0.216)
Household controls	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓
Observations	34127	34127	34127	34127	34054	34054	34054	34054
First stage F-test	1338.74	1338.74	1338.74	1338.74	2969.21	2969.21	2969.21	2969.21
First stage t-test on excluded IV	6.08	6.08	6.08	6.08	6.20	6.20	6.20	6.20

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents estimates of the change in log income on the change in log expenditure for food, healthcare and total household consumption using projected employment growth in the region as an instrument. Employment growth is constructed using employment in all industries. Region is approximated as U.S. counties. Healthcare expenditure includes out-of-pocket health spending and insurance premiums paid by the household. Oop Health is out-of-pocket healthcare expenditures excluding insurance premium payments. Insurance 1 is private insurance, Insurance 2 is public insurance. Omitted insurance category is uninsured or unknown. Δ Insurance is a dummy proxying for whether household head has changed insurance status. Household level control variables comprise size of the household, a quadratic in age, education, sex, race and marital status of head of the household, acute health index, chronic health index and hospitalization index. State fixed effects are also included. Columns 5-8 adds industry characteristics in the region to the covariates, namely manufacturing industry share and tradable industry share. Robust standard errors are clustered at state level.

Table 12 2SLS estimates of Income Elasticity of Expenditure with Bartik IV all employment

	$\Delta Food\ Consumption$		$\Delta Oop\ Health$		$\Delta Healthcare\ Expenditures$		$\Delta Total\ Consumption$		$\Delta Food\ Consumption$		$\Delta Oop\ Health$		$\Delta Healthcare\ Expenditures$		$\Delta Total\ Consumption$	
	Low Wealth (1)	High Wealth (2)	Low Wealth (3)	High Wealth (4)	Low Wealth (5)	High Wealth (6)	Low Wealth (7)	High Wealth (8)	Low Wealth (9)	High Wealth (10)	Low Wealth (11)	High Wealth (12)	Low Wealth (13)	High Wealth (14)	Low Wealth (15)	High Wealth (16)
$\Delta Household\ Income$	0.0893	0.165	3.475***	2.055***	3.868***	2.360***	0.555***	0.524***	0.108	0.152	3.335***	2.040***	3.720***	2.341***	0.554***	0.525***
	(0.162)	(0.139)	(1.167)	(0.512)	(1.298)	(0.576)	(0.189)	(0.148)	(0.157)	(0.141)	(1.094)	(0.508)	(1.219)	(0.573)	(0.184)	(0.146)
Insurance 1	-0.00148	0.0472	0.0981	-0.0258	0.0353	-0.113	0.0531	0.0442	0.00229	0.0483	0.0951	-0.0336	0.0333	-0.122	0.0566	0.0453
	(0.0242)	(0.0321)	(0.176)	(0.0991)	(0.197)	(0.109)	(0.0352)	(0.0330)	(0.0241)	(0.0323)	(0.171)	(0.0999)	(0.191)	(0.110)	(0.0358)	(0.0332)
Insurance 2	0.0338	0.0549*	-0.282	-0.175	-0.390**	-0.288**	0.0104	0.0335	0.0330	0.0577*	-0.248	-0.183	-0.352*	-0.296**	0.0150	0.0349
	(0.0242)	(0.0309)	(0.178)	(0.112)	(0.195)	(0.125)	(0.0285)	(0.0348)	(0.0234)	(0.0304)	(0.170)	(0.112)	(0.187)	(0.124)	(0.0296)	(0.0347)
$\Delta Insurance$	-0.00864	-0.00330	-0.0410	-0.0116	-0.0475	-0.0129	-0.0212**	-0.0261*	-0.00865	-0.00266	-0.0393	-0.0101	-0.0455	-0.0112	-0.0213**	-0.0250*
	(0.00855)	(0.00879)	(0.0658)	(0.0539)	(0.0730)	(0.0595)	(0.0108)	(0.0148)	(0.00861)	(0.00883)	(0.0637)	(0.0532)	(0.0706)	(0.0588)	(0.0108)	(0.0147)
Manufacturing share 1998									0.000559	-0.0233	0.0730	0.0665	0.0988	0.0680	0.0261	0.0581
									(0.0577)	(0.0455)	(0.312)	(0.252)	(0.346)	(0.288)	(0.0589)	(0.0739)
Tradable share 1998									0.0289	0.00616	-0.377	-0.0456	-0.418	-0.0489	-0.0344	-0.0398
									(0.0494)	(0.0463)	(0.296)	(0.213)	(0.327)	(0.247)	(0.0547)	(0.0619)
Constant	0.583***	-0.536***	-3.281**	-1.008	-3.496**	-0.997	0.183	-0.211	0.550**	-0.532***	-3.036**	-1.006	-3.235**	-0.994	0.184	-0.202
	(0.223)	(0.0941)	(1.594)	(0.816)	(1.764)	(0.795)	(0.290)	(0.186)	(0.216)	(0.0999)	(1.473)	(0.827)	(1.634)	(0.810)	(0.278)	(0.189)
Household controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
State FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
Observations	17144	16983	17144	16983	17144	16983	17144	16983	17106	16948	17106	16948	17106	16948	17106	16948
First stage F-test	596.97	1453.78	596.97	1453.78	596.97	1453.78	596.97	1453.78	$9.55 * 10^7$	10239.81	$9.55 * 10^7$	10239.81	$9.55 * 10^7$	10239.81	$9.55 * 10^7$	10239.81

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents estimates of the change in log income on the change in log expenditure for food, healthcare and total household consumption separately for low and high wealth households using projected employment growth in the region as an instrument. Employment growth is constructed using employment in all industries. Region is approximated as U.S. counties. The wealth variable used in this analysis is all assets net of debt, including home equity. Healthcare expenditure includes out-of-pocket health spending and insurance premiums paid by the household. Oop Health is out-of-pocket healthcare expenditures excluding insurance premium payments. Insurance 1 is private insurance, Insurance 2 is public insurance. Omitted insurance category is uninsured or unknown. Δ Insurance is a dummy proxying for whether household head has changed insurance status. Household level control variables comprise size of the household, a quadratic in age, education, sex, race and marital status of head of the household, acute health index, chronic health index and hospitalization index. State fixed effects are also included. Columns 9-16 adds industry characteristics in the region to the covariates, namely manufacturing industry share and tradable industry share. Robust standard errors are clustered at state level.

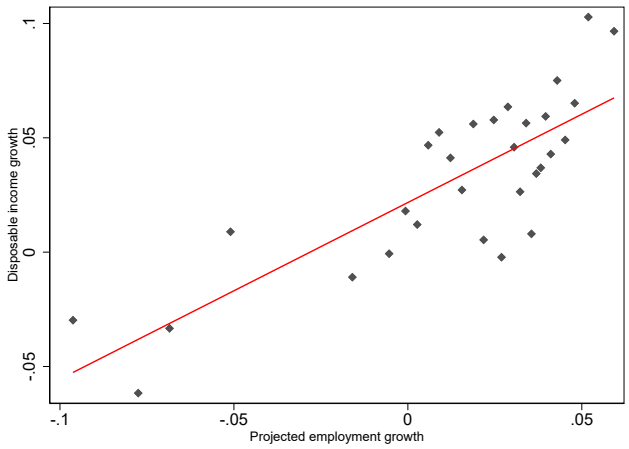
6.2 Extreme Income Changes

The extreme observations might be delivering the high healthcare elasticities estimated in the regressions. High income changes at household are possible but not widespread across households. The households that experience too high changes in income are likely the ones that also adjust their consumption accordingly. To test whether the results are driven by extreme changes in income, I trim sample based on income growth at 300 % , 200% and 100% levels. I continue with the robust analysis by also including insurance status controls in all regressions.

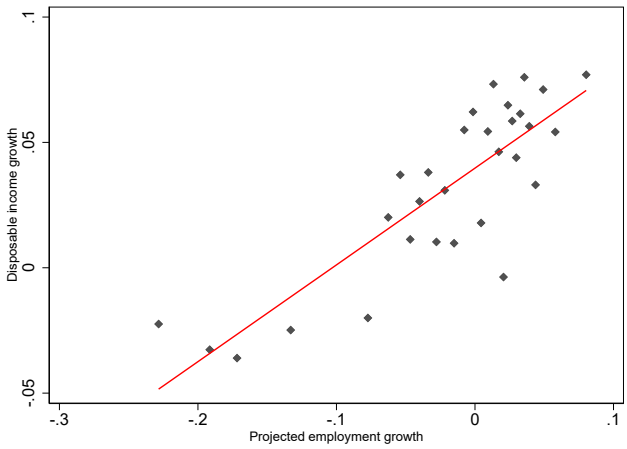
6.2.1 Sample Trim at 300%

First, I trim the sample such that I exclude observations in which the household income grew more than or declined less than 300%. This eliminates 495 and 557 observations respectively. Health elasticities decline in this case, 2.8 for health expenditures with insurance payments and 2.5 for only out-of-pocket expenditures. This result indicates that some extreme income changes also correspond to extreme sensitivity in health spending. It also warns against a possible measurement error in the survey data.

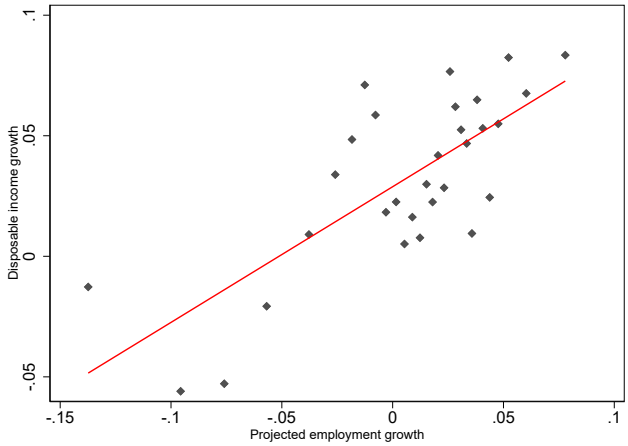
Figure 11 First stage relationship for trimmed sample at 300%



[a] Residualized income growth and instrument of all industry employment



[b] Residualized income growth and instrument of tradable industry employment



[c] Residualized income growth and instrument of LQ-based industry employment

Notes: Residual plots of projected county employment growth and household disposable income growth. Each dot is an average of 1,072 observations. The covariates in equation 4 and insurance status controls are partialed out.

Table 13 2SLS estimates of Income Elasticity of Expenditure with Bartik IV all employment for trimmed sample at 300%

	$\Delta Food$	$\Delta Oop\ Health$	$\Delta Healthcare$	$\Delta Total$	$\Delta Food$	$\Delta Oop\ Health$	$\Delta Healthcare$	$\Delta Total$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta Household\ Income$	0.105	2.523***	2.843***	0.475***	0.108	2.502***	2.824***	0.487***
	(0.0975)	(0.389)	(0.426)	(0.0697)	(0.0970)	(0.384)	(0.423)	(0.0710)
$Insurance\ 1$	0.00495	-0.180***	-0.273***	0.0149	0.00612	-0.183***	-0.276***	0.0161
	(0.0126)	(0.0530)	(0.0579)	(0.0157)	(0.0126)	(0.0523)	(0.0571)	(0.0160)
$Insurance\ 2$	0.0208	-0.249***	-0.353***	0.0169	0.0216	-0.252***	-0.356***	0.0171
	(0.0149)	(0.0590)	(0.0648)	(0.0164)	(0.0146)	(0.0580)	(0.0638)	(0.0169)
$\Delta Insurance$	-0.00404	-0.0540**	-0.0614**	-0.0288***	-0.00369	-0.0536**	-0.0609**	-0.0287***
	(0.00616)	(0.0225)	(0.0247)	(0.00561)	(0.00622)	(0.0224)	(0.0247)	(0.00566)
$Manuf.\ share\ 1998$					-0.0183	0.172	0.202	0.0561
					(0.0326)	(0.140)	(0.159)	(0.0383)
$Tradable\ share\ 1998$					0.0269	-0.206*	-0.228*	-0.0268
					(0.0299)	(0.123)	(0.138)	(0.0340)
$Constant$	0.115	-1.486**	-1.540***	0.137	0.106	-1.428**	-1.478**	0.133
	(0.210)	(0.595)	(0.593)	(0.176)	(0.209)	(0.596)	(0.593)	(0.176)
Household controls	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓
Observations	33088	33088	33088	33088	33020	33020	33020	33020
First stage F-test	2634.87	2634.87	2634.87	2634.87	2969.21	2969.21	2969.21	2969.21

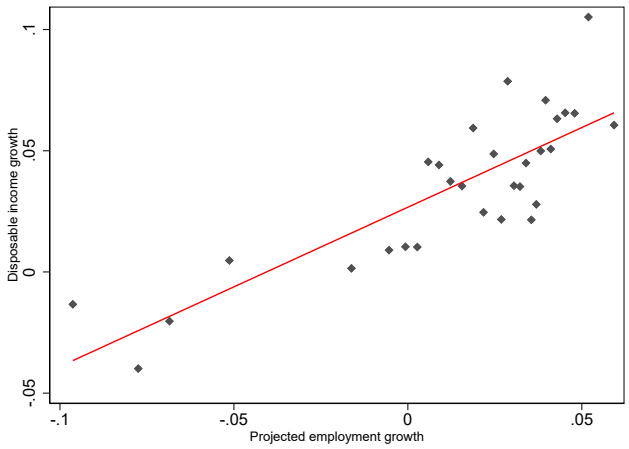
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents estimates of the change in log income on the change in log expenditure for food, healthcare and total household consumption using projected employment growth in the region as an instrument. Employment growth is constructed using employment in all industries. Region is approximated as U.S. counties. Healthcare expenditure includes out-of-pocket health spending and insurance premiums paid by the household. Oop Health is out-of-pocket healthcare expenditures excluding insurance premium payments. Insurance 1 is private insurance, Insurance 2 is public insurance. Omitted insurance category is uninsured or unknown. Δ Insurance is a dummy proxying for whether household head has changed insurance status. Household level control variables comprise size of the household, a quadratic in age, education, sex, race and marital status of head of the household, acute health index, chronic health index and hospitalization index. State fixed effects are also included. Columns 5-8 adds industry characteristics in the region to the covariates, namely manufacturing industry share and tradable industry share. Robust standard errors are clustered at state level.

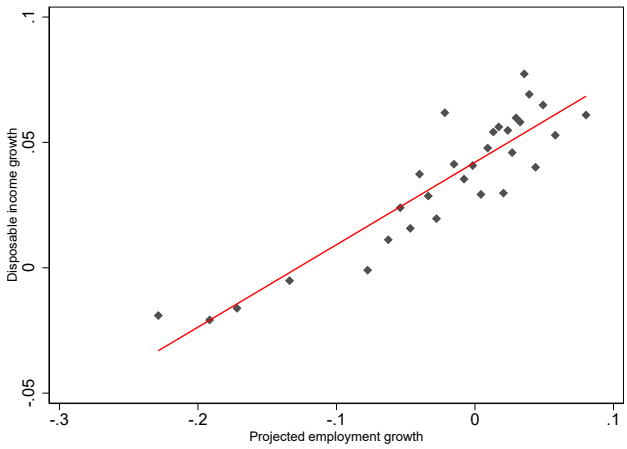
6.2.2 Sample Trim at 200%

I continue trimming the sample such that I exclude observations in which the household income grew more than or declined less than 200%. This eliminates 449 and 484 additional observations from 300% sample respectively. In this case the healthcare spending elasticities increase and become 3.4 for health expenditures with insurance payments and 3 for only out-of-pocket expenditures. The results are interesting in the sense that the extreme observations are actually reducing the elasticities and the high health spending elasticities are driven by relatively modest changes in income.

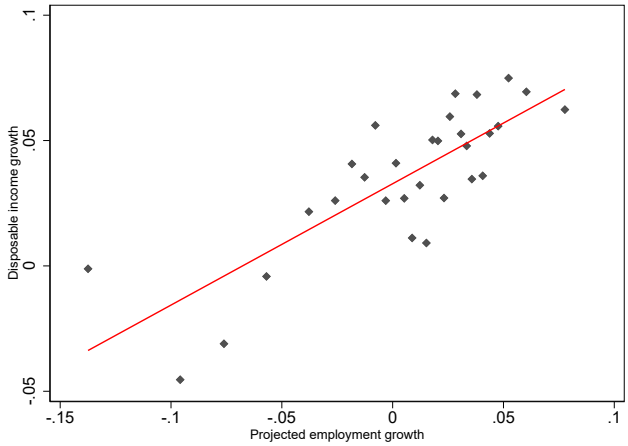
Figure 12 First stage relationship for trimmed sample at 200%



[a] Residualized income growth and instrument of all industry employment



[b] Residualized income growth and instrument of tradable industry employment



[c] Residualized income growth and instrument of LQ-based industry employment

Notes: Residual plots of projected county employment growth and household disposable income growth. Each dot is an average of 1,072 observations. The covariates in equation 4 and insurance status controls are partialed out.

Table 14 2SLS estimates of Income Elasticity of Expenditure with Bartik IV all employment for trimmed sample at 200%

	$\Delta Food$	$\Delta Oop\ Health$	$\Delta Healthcare$	$\Delta Total$	$\Delta Food$	$\Delta Oop\ Health$	$\Delta Healthcare$	$\Delta Total$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta Household\ Income$	0.127	3.029***	3.416***	0.546***	0.135	2.971***	3.356***	0.554***
	(0.128)	(0.417)	(0.451)	(0.0845)	(0.126)	(0.397)	(0.431)	(0.0798)
$Insurance\ 1$	-0.00615	-0.214***	-0.307***	0.00699	-0.00497	-0.217***	-0.311***	0.00796
	(0.0118)	(0.0552)	(0.0601)	(0.0144)	(0.0117)	(0.0541)	(0.0590)	(0.0146)
$Insurance\ 2$	-0.00177	-0.313***	-0.422***	-0.000410	-0.00153	-0.313***	-0.422***	-0.000279
	(0.0149)	(0.0614)	(0.0679)	(0.0157)	(0.0146)	(0.0610)	(0.0677)	(0.0161)
$\Delta Insurance$	-0.00502	-0.0642**	-0.0728**	-0.0290***	-0.00470	-0.0635**	-0.0720**	-0.0290***
	(0.00643)	(0.0263)	(0.0293)	(0.00573)	(0.00648)	(0.0261)	(0.0293)	(0.00579)
$Manuf.\ share\ 1998$					-0.00741	0.0366	0.0459	0.0269
					(0.0327)	(0.133)	(0.150)	(0.0354)
$Tradable\ share\ 1998$					0.0240	-0.135	-0.148	-0.0106
					(0.0290)	(0.119)	(0.134)	(0.0308)
$Constant$	0.0926	-1.842***	-1.940***	0.0734	0.0804	-1.769***	-1.863***	0.0688
	(0.214)	(0.630)	(0.632)	(0.169)	(0.212)	(0.620)	(0.621)	(0.169)
Household controls	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓
Observations	32163	32163	32163	32163	32096	32096	32096	32096
First stage F-test	1710.27	1710.27	1710.27	1710.27	1887.29	1887.29	1887.29	1887.29

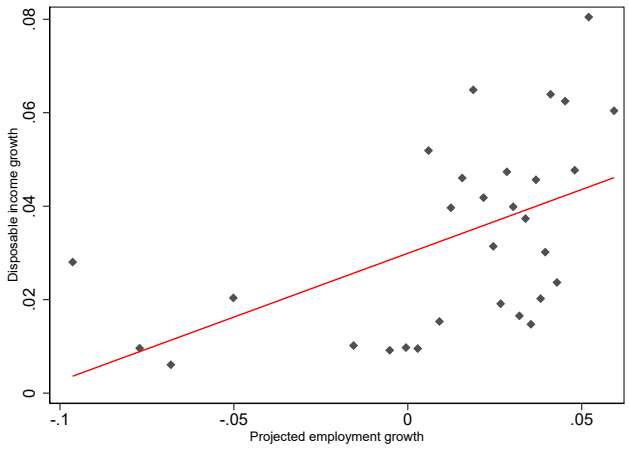
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents estimates of the change in log income on the change in log expenditure for food, healthcare and total household consumption using projected employment growth in the region as an instrument. Employment growth is constructed using employment in all industries. Region is approximated as U.S. counties. Healthcare expenditure includes out-of-pocket health spending and insurance premiums paid by the household. Oop Health is out-of-pocket healthcare expenditures excluding insurance premium payments. Insurance 1 is private insurance, Insurance 2 is public insurance. Omitted insurance category is uninsured or unknown. Δ Insurance is a dummy proxying for whether household head has changed insurance status. Household level control variables comprise size of the household, a quadratic in age, education, sex, race and marital status of head of the household, acute health index, chronic health index and hospitalization index. State fixed effects are also included. Columns 5-8 adds industry characteristics in the region to the covariates, namely manufacturing industry share and tradable industry share. Robust standard errors are clustered at state level.

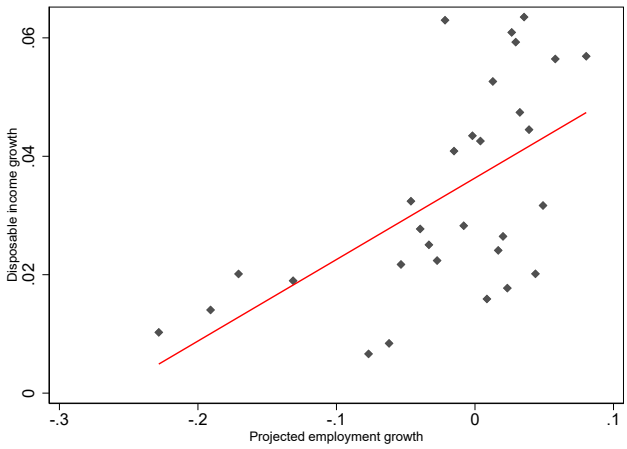
6.2.3 Sample Trim at 100%

Lastly, I trim the sample such that I exclude observations in which the household income grew more than or declined less than 100%. This eliminates 1652 and 1522 additional observations from 200% sample respectively. In this case the healthcare spending elasticities further increase and become as high as 8.3 for health expenditures with insurance payments and 7.3 for only out-of-pocket expenditures. This result provides a clear evidence that high elasticities are a result of high health spending changes to modest income changes. An explanation for this can be that some spending is unavoidable and not related to the magnitude of the change in income.

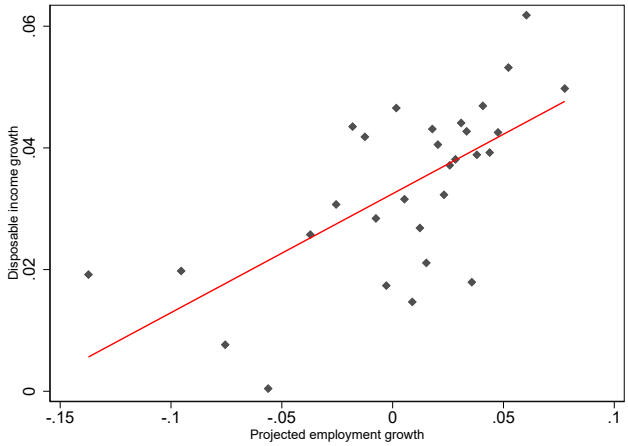
Figure 13 First stage relationship for trimmed sample at 100%



[a] Residualized income growth and instrument of all industry employment



[b] Residualized income growth and instrument of tradable industry employment



[c] Residualized income growth and instrument of LQ-based industry employment

Notes: Residual plots of projected county employment growth and household disposable income growth. Each dot is an average of 967 observations. The covariates in equation 4 and insurance status controls are partialed out.

Table 15 2SLS estimates of Income Elasticity of Expenditure with Bartik IV all employment for trimmed sample at 100%

	$\Delta Food$	$\Delta Oop\ Health$	$\Delta Healthcare$	$\Delta Total$	$\Delta Food$	$\Delta Oop\ Health$	$\Delta Healthcare$	$\Delta Total$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta Household\ Income$	0.139	7.346***	8.370***	1.303***	0.156	7.118***	8.117***	1.304***
	(0.280)	(1.837)	(2.081)	(0.351)	(0.273)	(1.694)	(1.919)	(0.326)
$Insurance\ 1$	-0.00725	-0.334***	-0.442***	-0.0117	-0.00718	-0.341***	-0.449***	-0.0121
	(0.0111)	(0.0772)	(0.0852)	(0.0152)	(0.0111)	(0.0762)	(0.0839)	(0.0151)
$Insurance\ 2$	-0.00652	-0.468***	-0.600***	-0.0213	-0.00719	-0.468***	-0.600***	-0.0218
	(0.0156)	(0.116)	(0.130)	(0.0154)	(0.0154)	(0.115)	(0.128)	(0.0153)
$\Delta Insurance$	-0.00620	-0.0514	-0.0596	-0.0291***	-0.00596	-0.0509	-0.0589	-0.0289***
	(0.00700)	(0.0365)	(0.0417)	(0.00757)	(0.00708)	(0.0364)	(0.0416)	(0.00767)
$Manuf.\ share\ 1998$					0.00894	-0.0260	-0.0358	0.0242
					(0.0335)	(0.320)	(0.366)	(0.0572)
$Tradable\ share\ 1998$					0.00667	-0.144	-0.152	-0.0231
					(0.0320)	(0.235)	(0.266)	(0.0503)
$Constant$	-0.0514	-2.046***	-2.257***	-0.0995	-0.0589	-1.959***	-2.162***	-0.0967
	(0.237)	(0.623)	(0.656)	(0.187)	(0.237)	(0.606)	(0.632)	(0.182)
Household controls	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓
Observations	29007	29007	29007	29007	28946	28946	28946	28946
First stage F-test	1066.23	1066.23	1066.23	1066.23	765.52	765.52	765.52	765.52

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents estimates of the change in log income on the change in log expenditure for food, healthcare and total household consumption using projected employment growth in the region as an instrument. Employment growth is constructed using employment in all industries. Region is approximated as U.S. counties. Healthcare expenditure includes out-of-pocket health spending and insurance premiums paid by the household. Oop Health is out-of-pocket healthcare expenditures excluding insurance premium payments. Insurance 1 is private insurance, Insurance 2 is public insurance. Omitted insurance category is uninsured or unknown. Δ Insurance is a dummy proxying for whether household head has changed insurance status. Household level control variables comprise size of the household, a quadratic in age, education, sex, race and marital status of head of the household, acute health index, chronic health index and hospitalization index. State fixed effects are also included. Columns 5-8 adds industry characteristics in the region to the covariates, namely manufacturing industry share and tradable industry share. Robust standard errors are clustered at state level.

7 Conclusion

The studies that estimate causal effect of income changes on household out-of-pocket healthcare spending is scarce. Most studies that analyze relationship between income and healthcare expenditures are correlational since it is hard to find data for quasi-experimental variation in income.I aim to estimate causal effect of income changes on household out-of-pocket healthcare spending using an instrumental variable design à la Bartik [1991] to mitigate the endogeneity concerns by exploiting variation due to local labor market exposure to aggregate shocks. I exploit cross-regional and time series variation of employment that affected household incomes differentially across regions with varying industry mix of local economy. As is standard in Bartik instruments, my empirical strategy exploits the interaction between changes in national employment growth in industries (a.k.a. *shifters* in "shift-share" design) and the importance of the industry in the region as an instrument for household income. The importance of the industry in a given region is proxied by regional employment share of that industry (a.k.a. *shares* in "shift-share" design). In the baseline specification, I approximate local economies by counties. I use metropolitan statistical area (MSA) level aggregation as an alternative approximation which gives similar results. The identifying assumption is that the interaction between industry employment shares and industry growth rates should have no affect on household out-of-pocket healthcare spending, except its effect through household income.

I find healthcare expenditure elasticities around 3.14 and 3.59 using household level healthcare expenditure data. The elasticities above one indicate that household out-of-pocket expenditure is a luxury good. These are very large numbers compared to the literature. My elasticities are not directly comparable with the elasticities stated in the literature since the estimates in the literature usually refer to total healthcare spending. However, my question is important on its own because the economic burden of households' need for healthcare can be understood with the amount they are paying. Moreover, the behavioral response of households to economic conditions for their health care is more related to its effect on their

budget.

On the other hand, I find an average elasticity of total household consumption in the ranges between 0.4 to 0.53 and food consumption elasticities between 0.11 to 0.2 though the latter is not significantly estimated. Overall, the consumption bundle that a typical household has consists of necessities. In this regard, healthcare expenditure is quite different than average consumption bundle in budget allocation decision of U.S. households.

Moreover , I show that there is some heterogeneity in healthcare expenditure elasticities with respect to wealth which is not observed in other consumption items or average consumption bundle of households. I find that low wealth households have a larger elasticity around 3.5- 3.7. On the other hand, high wealth households have elasticities around 2.3 to 2.9. Despite the large difference between wealth groups, the elasticities are above one for all households.

These high elasticities are interpreted in the literature as health spending being a luxury good. I give a caution to this interpretation since it should be evaluated taking into account the dynamic structure of health accumulation. I believe this issue arises because of the stock-flow nature of health spending and health capital rather than health expenditures being a luxury good in utility function. The stock-flow adjustment creates large swings in healthcare expenditures as is shown in Yıldız [2019]. Therefore, the high elasticity results should be viewed in this lense.

8 References

Acemoğlu, Daron, Amy Finkelstein, and Matthew J Notowidigdo. 2013. "Income and health spending: Evidence from oil price shocks." *Review of Economics and Statistics*, 95(4): 1079–1095.

Acemoğlu, Daron, and Pascual Restrepo. 2020. "Robots and jobs: Evidence from US labor markets." *Journal of Political Economy*, 128(6): 000–000.

Aizer, Anna. 2010. "The gender wage gap and domestic violence." *American Economic Review*, 100(4): 1847–59.

Bana, Sarah H. 2019. "Identifying Vulnerable Displaced Workers: The Role of State-Level Occupation Conditions." working paper.

Bartik, Timothy. 1991. "Who Benefits from State and Local Economic Development Policies?" WE Upjohn Institute for Employment Research.

Berger, David, Veronica Guerrieri, Guido Lorenzoni, and Joseph Vavra. 2018. "House prices and consumer spending." *The Review of Economic Studies*, 85(3): 1502–1542.

Brown, Scott J, N Edward Coulson, and Robert F Engle. 1992. "On the determination of regional base and regional base multipliers." *Regional Science and Urban Economics*, 22(4): 619–635.

Broxterman, Daniel A, and William D Larson. 2020. "An empirical examination of shift-share instruments." *Journal of Regional Science*.

Conley, Dalton, and Jason Alan Thompson. 2011. "Health shocks, insurance status and net worth: Intra-and inter-generational effects." National Bureau of Economic Research.

Culyer, Anthony J. 1988. *Health care expenditures in Canada: myth and reality, past and future.* Canadian Tax Foundation.

Di Matteo, Livio. 2000. "The determinants of the public–private mix in Canadian health care expenditures: 1975–1996." *Health policy*, 52(2): 87–112.

Di Matteo, Livio, and Rosanna Di Matteo. 1998. "Evidence on the determinants of Canadian provincial government health expenditures: 1965–1991." *Journal of health economics*, 17(2): 211–228.

Freeman, Donald G. 2003. "Is health care a necessity or a luxury? Pooled estimates of income elasticity from US state-level data." *Applied Economics*, 35(5): 495–502.

Ganong, Peter, Damon Jones, Pascal Noel, Diana Farrell, Fiona Greig, and Chris Wheat. 2020. "Wealth, Race, and Consumption Smoothing of Typical Income Shocks." *University of Chicago, Becker Friedman Institute for Economics Working Paper*, , (2020-49).

Gerdtham, Ulf-G, Jes Søgaard, Fredrik Andersson, and Bengt Jönsson. 1992. "An econometric analysis of health care expenditure: a cross-section study of the OECD countries." *Journal of health economics*, 11(1): 63–84.

Getzen, Thomas E. 2000. "Health care is an individual necessity and a national luxury: applying multilevel decision models to the analysis of health care expenditures." *Journal of health economics*, 19(2): 259–270.

Goldsmith-Pinkham, Paul, Isaac Sorkin, and Henry Swift. 2018. "Bartik instruments: What, when, why, and how." National Bureau of Economic Research.

Leu, Robert. 1986. "The public-private mix and international health care costs." *The Public and Private Health Services*, 41–63.

Liu, Su, and Deborah Chollet. 2006. "Price and income elasticity of the demand for health insurance and health care services: a critical review of the literature." Mathematica Policy Research.

Mian, Atif, Kamalesh Rao, and Amir Sufi. 2013. "Household balance sheets, consumption, and the economic slump." *The Quarterly Journal of Economics*, 128(4): 1687–1726.

Moretti, Enrico, and Per Thulin. 2013. "Local multipliers and human capital in the United States and Sweden." *Industrial and Corporate Change*, 22(1): 339–362.

Moscone, Francesco, and Elisa Tosetti. 2010. "Health expenditure and income in the United States." *Health economics*, 19(12): 1385–1403.

Newhouse, Joseph P. 1977. "Medical-care expenditure: a cross-national survey." *The Journal of Human Resources*, 12(1): 115–125.

Notowidigdo, Matthew. 2011. "The Incidence of Local Labor Demand Shocks." *NBER Working Paper*, , (w17167).

Parkin, David, Alistair McGuire, and Brian Yule. 1987. "Aggregate health care expenditures and national income: is health care a luxury good?" *Journal of health economics*, 6(2): 109–127.

Phelps, Charles E. 2016. *Health economics.* Routledge.

Tsai, Yuping. 2015. "Is Health Care an Individual Necessity? Evidence from Social Security Notch." *Evidence from Social Security Notch (May 5, 2015)*.

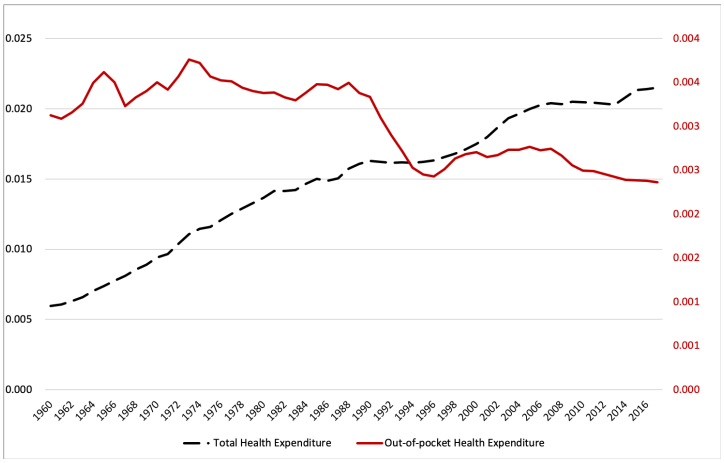
Yıldız, Sümeyye. 2019. "Liquidity Constraints and Healthcare Expenditure." *Available at SSRN 3550882*.

9 Appendices

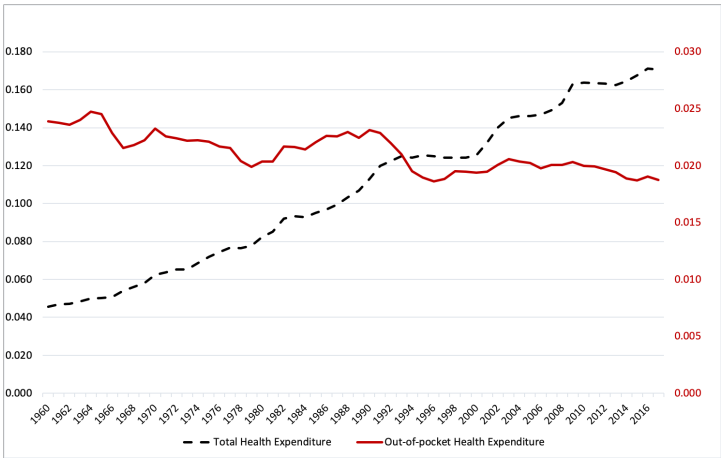
A Additional Figures

A.1 Healthcare expenditure over time

Figure 14 U.S. total and out-of-pocket health expenditures 1960-2017



[a] U.S. total (left) and out-of-pocket (right) health expenditure per capita



[b] GDP share of U.S. total (left) and out-of-pocket (right) health expenditure

Notes: The figure shows time series of U.S. total and out-of-pocket healthcare expenditure per capita (in billion dollars) and its GDP share between 1960-2017. The expenditures are deflated to 2010 dollars using CPI for medical expenditures (CPIMEDSL). The health data is from National Health Expenditure data of Center for Medicare and Medicaid Services. GDP and price data are extracted from FRED database of Federal Reserve Bank of St. Louis.

A.2 Data Summary

Table 16 Descriptive Statistics

	Wealth Groups		
	Low Wealth	High Wealth	Total
Logs:			
Net Wealth	15.2	695.7	355.5
Disposable Income	29.6	63.1	46.4
Total Consumption	38.4	56.0	47.2
Food Consumption	7.3	9.6	8.4
Health Expenditure	4.2	7.3	5.8
Growths:			
Δ Disposable Income	0.09	-0.04	0.02
Δ Total Consumption	0.05	0.02	0.03
Δ Food Consumption	0.03	-0.02	0.005
Δ Health Expenditure	0.18	0.07	0.12
Demographics:			
Age	38.9	52.6	45.8
Education	13.2	14.2	13.7
Household Size	2.7	2.7	2.7
Observations	17,771	17,770	35,541

Notes: This table presents mean of corresponding variables for low wealth and high households and all sample. Wealth, income and consumption are in thousand dollars. The wealth variable used in this analysis is all assets net of debt, including home equity.

Table 17 Median Absolute Deviation

	Wealth Groups		
	Low Wealth	High Wealth	Total
Net Wealth	18.9	177.1	90.5
Disposable Income	13	23.7	18.8
Total Consumption	11.8	17.5	14.8
Food Consumption	2.4	2.9	2.7
Health Expenditure	2.1	3.4	2.8
Observations	17,771	17,770	35,541

Notes: This table presents median absolute deviations of each variable are in thousand dollars for low wealth and high households and all sample. The wealth variable used in this analysis is all assets net of debt, including home equity.

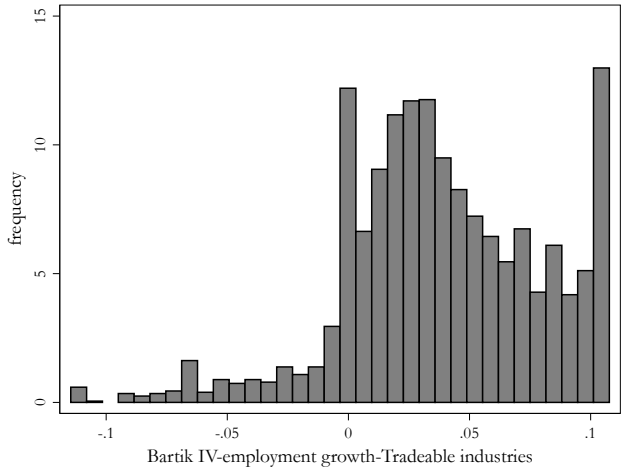
Table 18 Health Index Statistics

	Wealth Groups		
	Low Wealth	High Wealth	Total
Acute illness index	0.109	0.234	0.172
Chronic illness index	0.796	0.851	0.823
Hospitalization shock	0.127	0.120	0.123
Observations	17,771	17,770	35,541

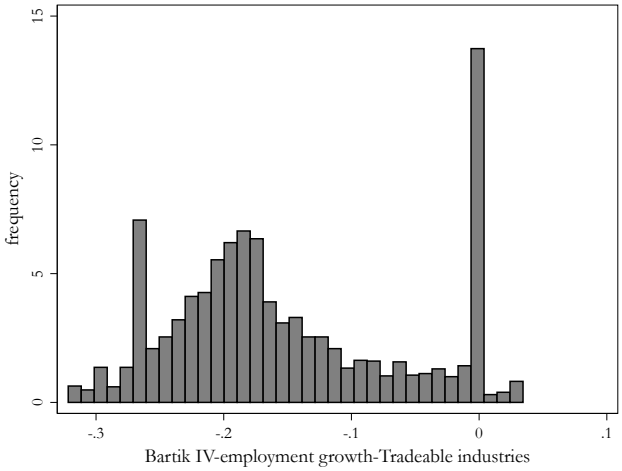
Notes: This table presents mean health index for low wealth and high households and all sample. Higher index corresponds to more illnesses. The wealth variable used in this analysis is all assets net of debt, including home equity.

A.3 Histograms for Bartik IV - LQ-based-sector employment

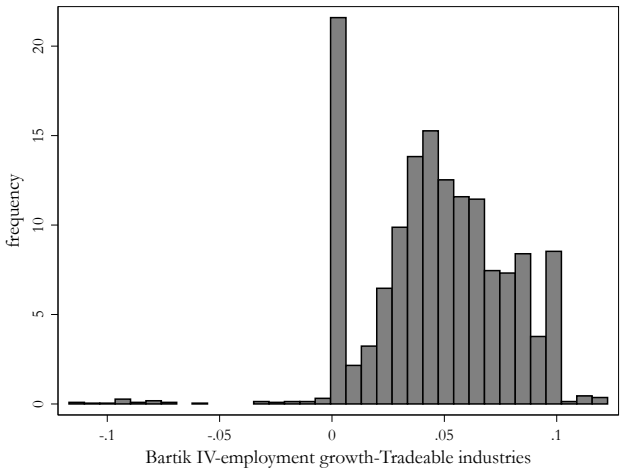
Figure 15 Within-year distribution of Bartik IV tradable-employment growth rates



[a] County Employment Growth 1998-2000



[b] County Employment Growth 2008-2010

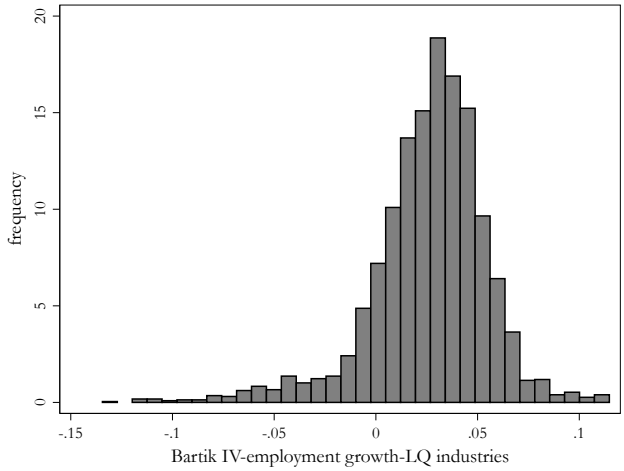


[c] County Employment Growth 2012-2014

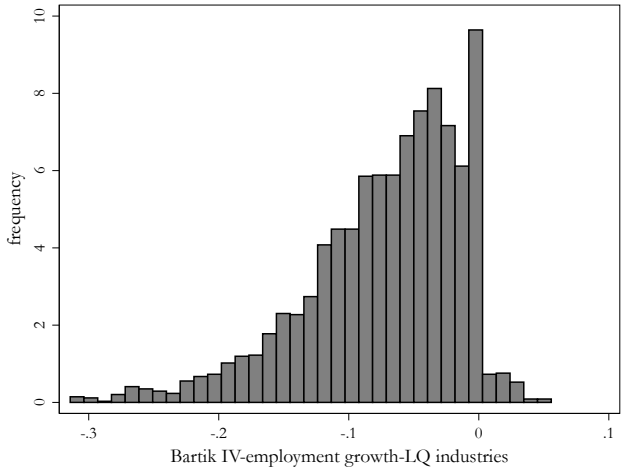
Notes: The distribution of Bartik IV employment growth rates within each year. The IV is constructed using employment growth for tradable industries. The data is taken from Quarterly Census of Employment and Wages (QCEW).

A.4 Histograms for Bartik IV - tradable-sector employment

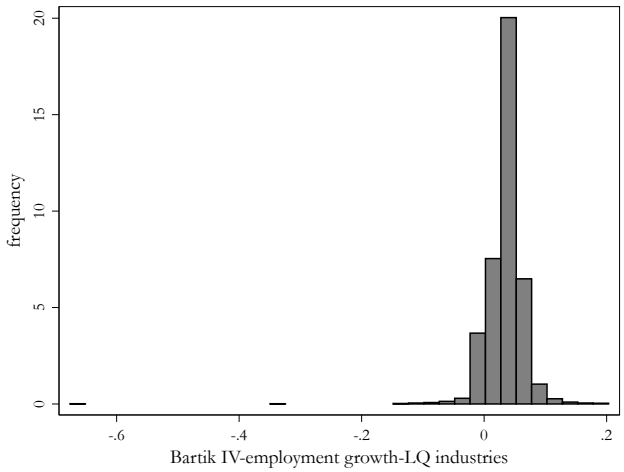
Figure 16 Within-year distribution of Bartik IV LQ-employment growth rates



[a] County Employment Growth 1998-2000



[b] County Employment Growth 2008-2010

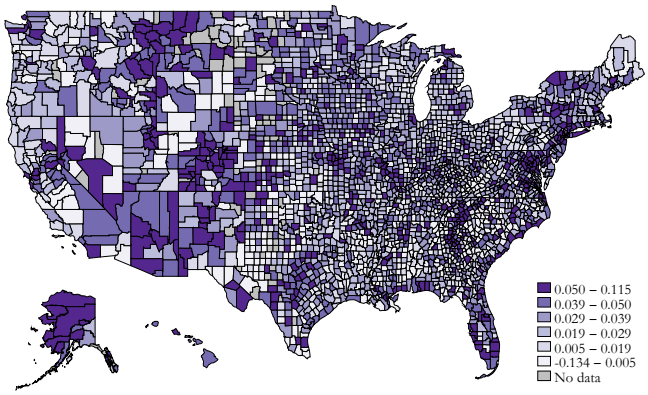


[c] County Employment Growth 2012-2014

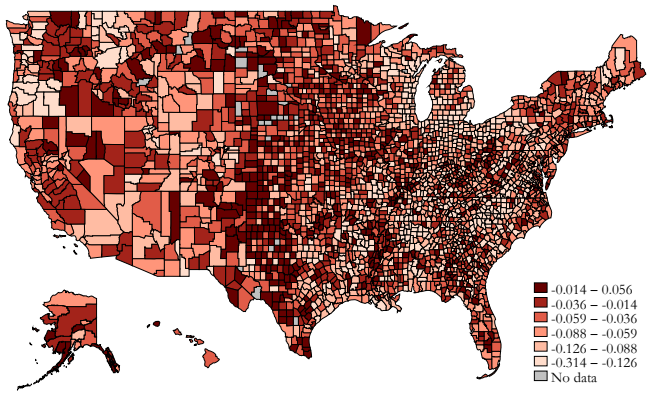
Notes: The distribution of Bartik IV employment growth rates within each year. The IV is constructed using employment growth for LQ industries. The data is taken from Quarterly Census of Employment and Wages (QCEW).

A.5 Distribution of Employment Growth across counties - LQ-based-sector employment

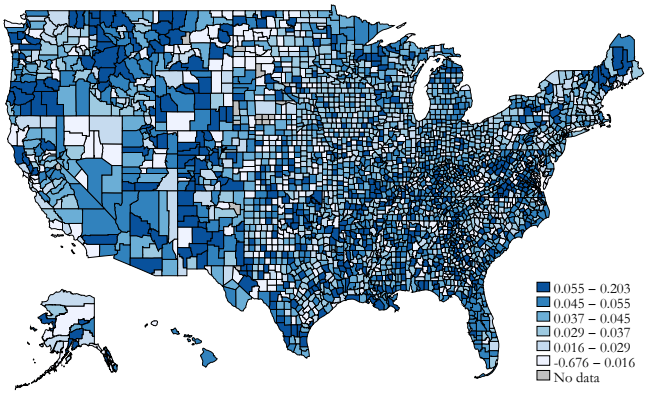
Figure 17 Bartik IV of employment growth rates across space



[a] County Employment Growth 1998-2000



[b] County Employment Growth 2008-2010

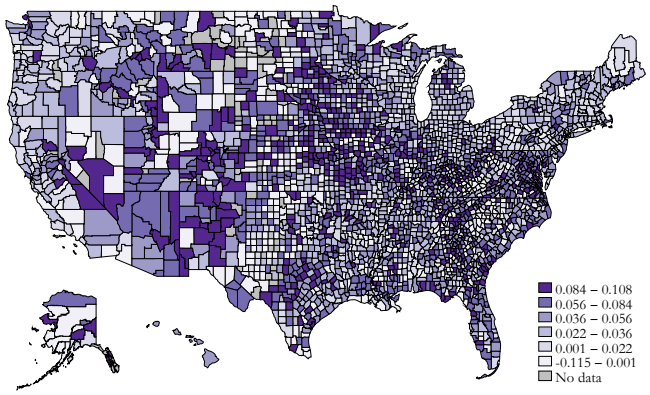


[c] County Employment Growth 2012-2014

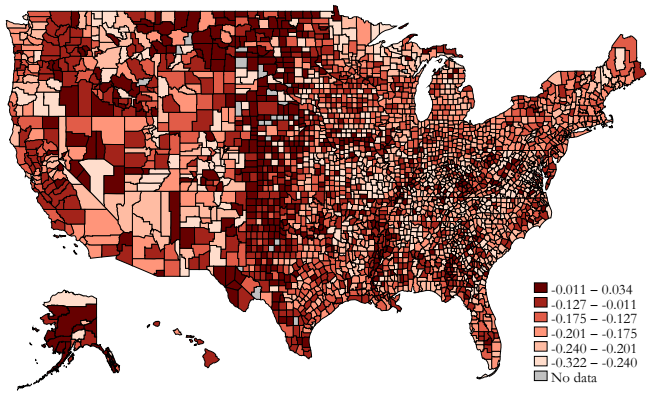
Notes: Bartik IV distributions over U.S. counties. Bartik IV is constructed using employment growth for all industries. The data is taken from Quarterly Census of Employment and Wages (QCEW).

A.6 Distribution of Employment Growth across counties - tradable-sector employment

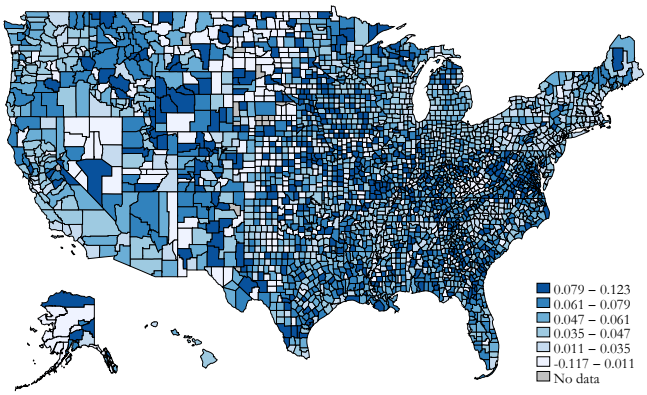
Figure 18 Bartik IV of employment growth rates across space



[a] County Employment Growth 1998-2000



[b] County Employment Growth 2008-2010

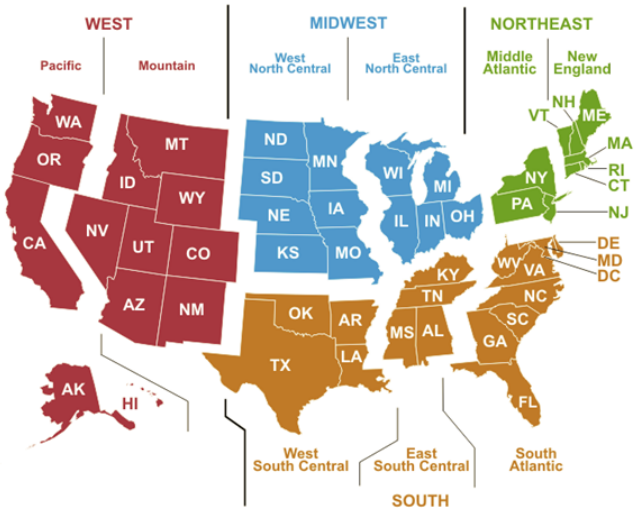


[c] County Employment Growth 2012-2014

Notes: Bartik IV distributions over U.S. counties. Bartik IV is constructed using employment growth for all industries. The data is taken from Quarterly Census of Employment and Wages (QCEW).

A.7 Census Region Heterogeneity of Elasticities for alternative instruments

Figure 19 U.S. Census Bureau statistical regions



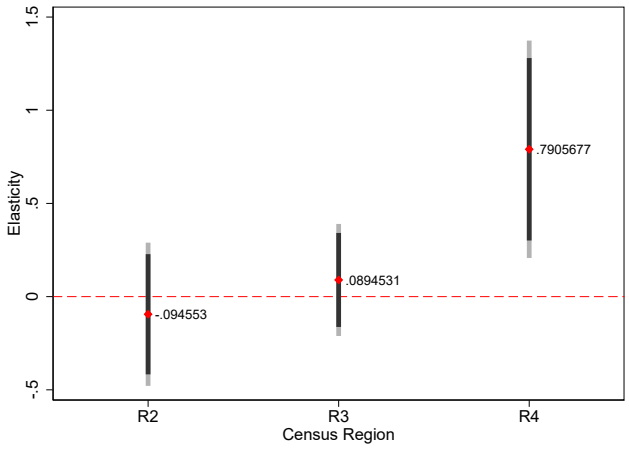
Notes: The map shows the division of Census regions and included states across the United States. (Region 1: Northeast | Region 2: Midwest | Region 3: South | Region 4: West)
Source: https://www.eia.gov/consumption/commercial/maps.php

Figure 20 States in each Census Bureau statistical region

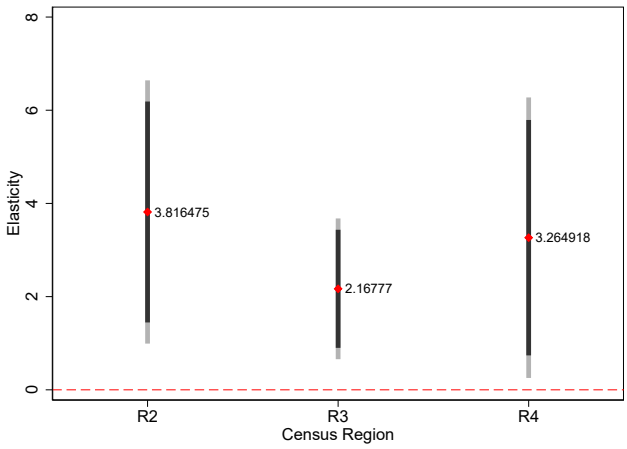
Region 1 Northeast		Region 2 Midwest		Region 3 South		Region 4 West	
FIPS code	*State*	*FIPS code*	*State*	*FIPS code*	*State*	*FIPS code*	*State*
9	Connecticut	17	Illinois	1	Alabama	2	Alaska
23	Maine	18	Indiana	5	Arkansas	4	Arizona
25	Massachusetts	19	Iowa	10	Delaware	6	California
33	New Hampshire	20	Kansas	11	District of Columbia	8	Colorado
34	New Jersey	26	Michigan	12	Florida	15	Hawaii
36	New York	27	Minnesota	13	Georgia	16	Idaho
42	Pennsylvania	29	Missouri	21	Kentucky	30	Montana
44	Rhode Island	31	Nebraska	22	Louisiana	32	Nevada
50	Vermont	38	North Dakota	24	Maryland	35	New Mexico
		39	Ohio	28	Mississippi	41	Oregon
		46	South Dakota	37	North Carolina	49	Utah
		55	Wisconsin	40	Oklahoma	53	Washington
				45	South Carolina	56	Wyoming
				47	Tennessee		
				48	Texas		
				51	Virginia		
				54	West Virginia		

Notes: The table shows states in each Census region.
(Region 1: Northeast | Region 2: Midwest | Region 3: South | Region 4: West)

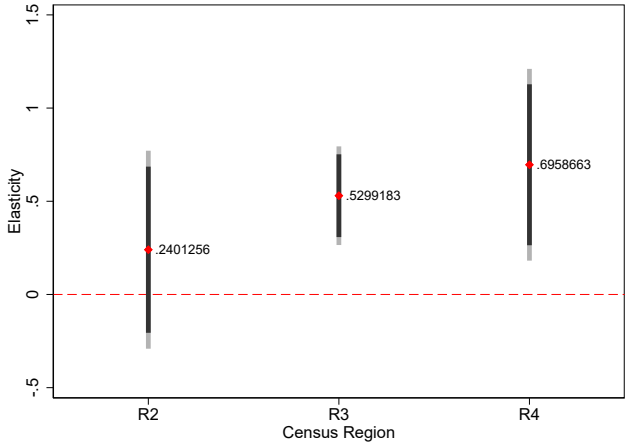
Figure 21 Elasticity of Consumption for Census regions - Tradable Industries



[a] Elasticity of Food Consumption



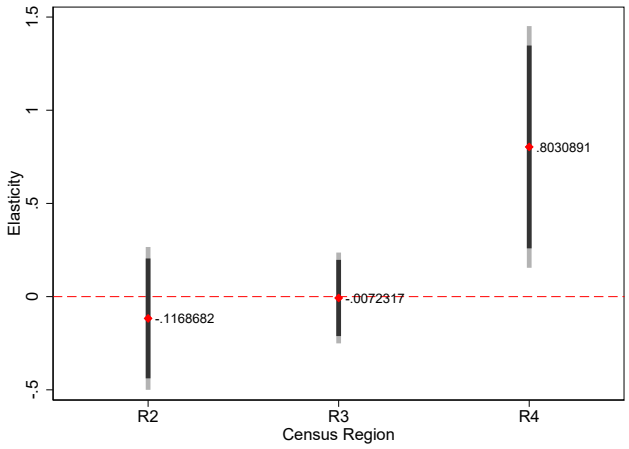
[b] Elasticity of Out-of-pocket Health Expenditures



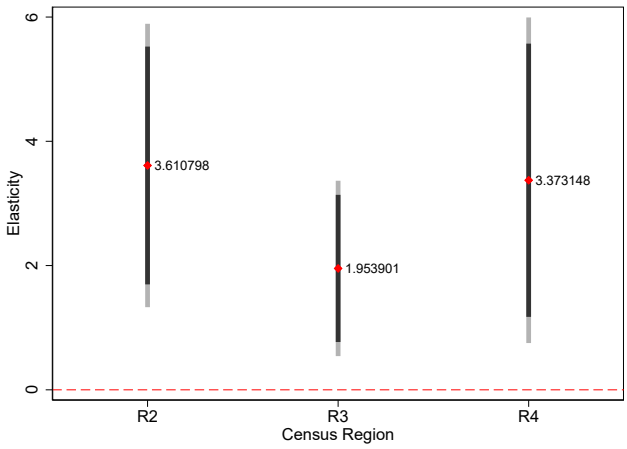
[c] Elasticity of Total Consumption

Notes: Second stage coefficients of income elasticity of consumption of 2SLS estimations where Bartik IV for tradable industries is used. R2:Midwest, R3:South, R4:West. Region1:Northeast is omitted because of high confidence intervals and noisy estimates.

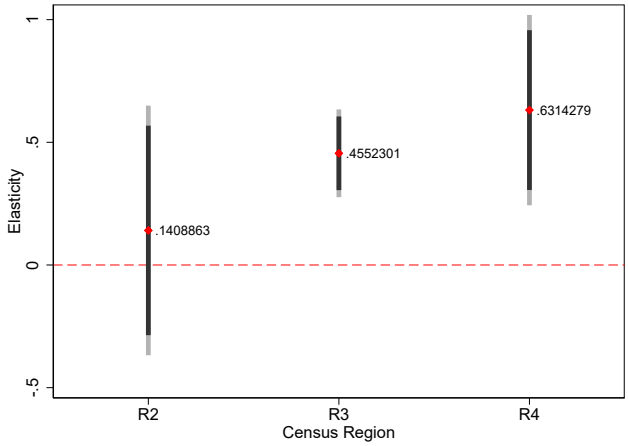
Figure 22 Elasticity of Consumption for Census regions - LQ-based Industries



[a] Elasticity of Food Consumption



[b] Elasticity of Out-of-pocket Health Expenditures



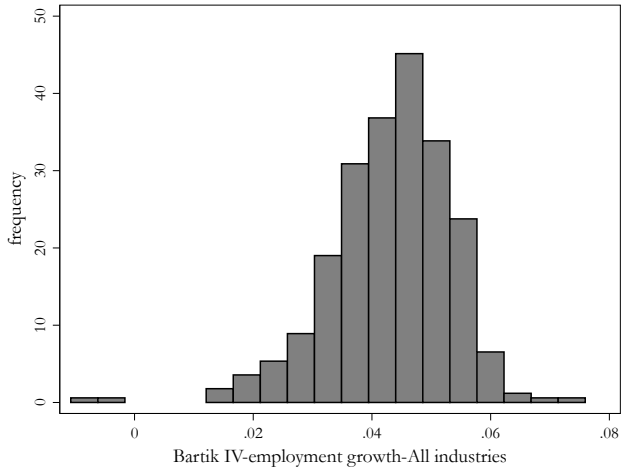
[c] Elasticity of Total Consumption

Notes: Second stage coefficients of income elasticity of consumption of 2SLS estimations where Bartik IV for LQ-based industries is used. R2:Midwest, R3:South, R4:West. Region1:Northeast is omitted because of high confidence intervals and noisy estimates.

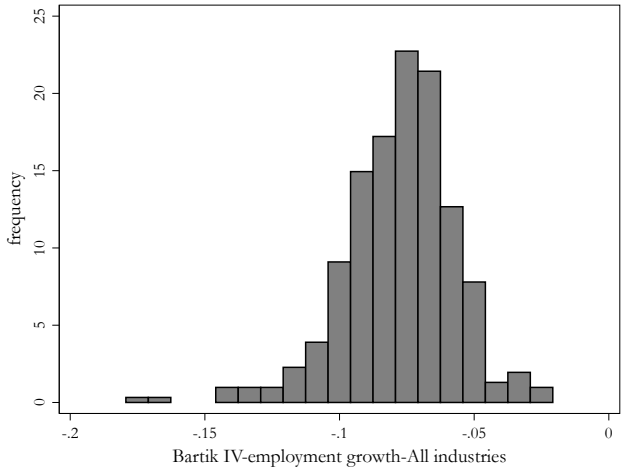
B MSA Results

B.1 Histograms for Bartik IV - all sectors employment for MSAs

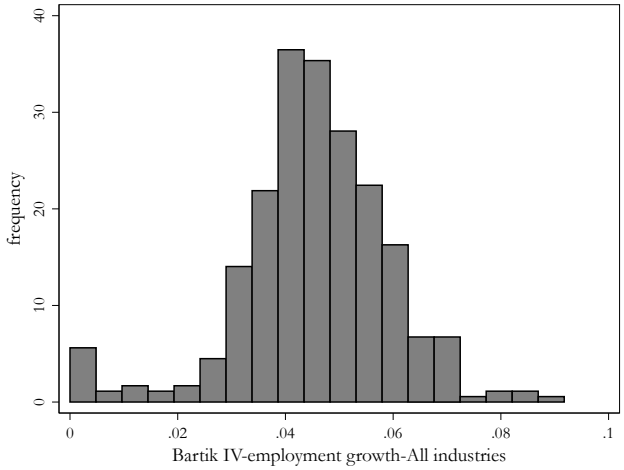
Figure 23 Within-year distribution of Bartik IV for total employment growth rates



[a] County Employment Growth 1998-2000



[b] County Employment Growth 2008-2010

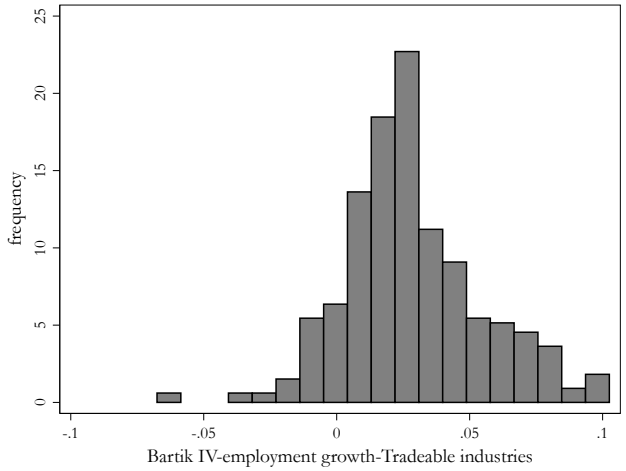


[c] County Employment Growth 2012-2014

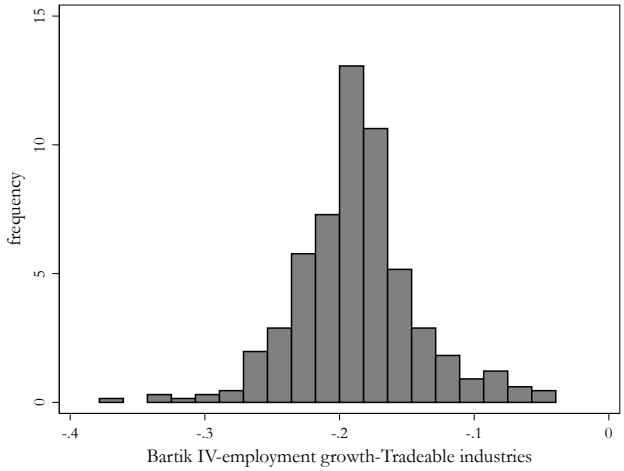
Notes: The distribution of Bartik IV employment growth rates within each year. The IV is constructed using employment growth for all industries. The data is taken from Quarterly Census of Employment and Wages (QCEW).

B.2 Histograms for Bartik IV - LQ-based-sector employment for MSAs

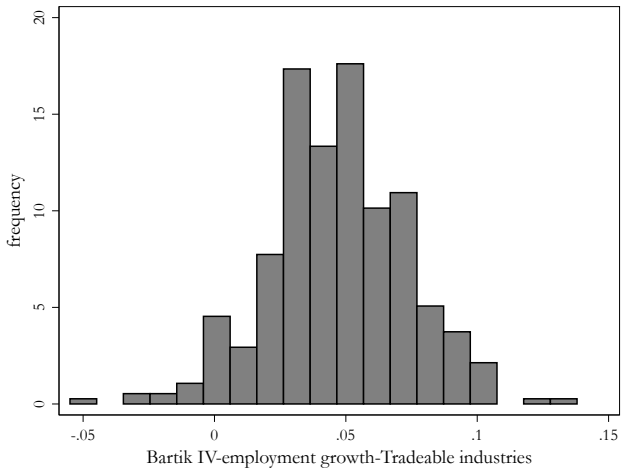
Figure 24 Within-year distribution of Bartik IV tradable-employment growth rates



[a] County Employment Growth 1998-2000



[b] County Employment Growth 2008-2010

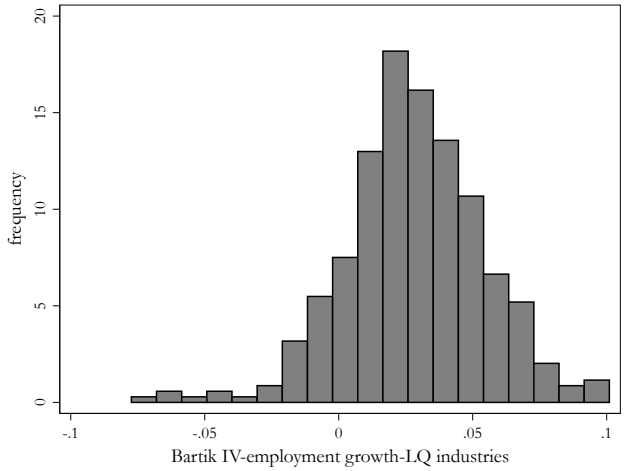


[c] County Employment Growth 2012-2014

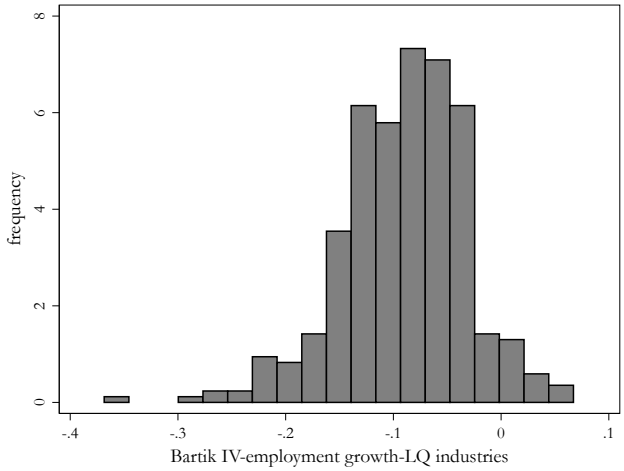
Notes: The distribution of Bartik IV employment growth rates within each year. The IV is constructed using employment growth for tradable industries. The data is taken from Quarterly Census of Employment and Wages (QCEW).

B.3 Histograms for Bartik IV - tradable-sector employment for MSAs

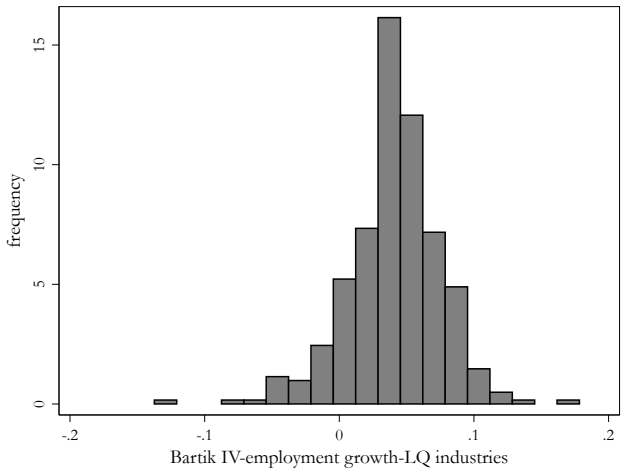
Figure 25 Within-year distribution of Bartik IV LQ-employment growth rates



[a] County Employment Growth 1998-2000



[b] County Employment Growth 2008-2010

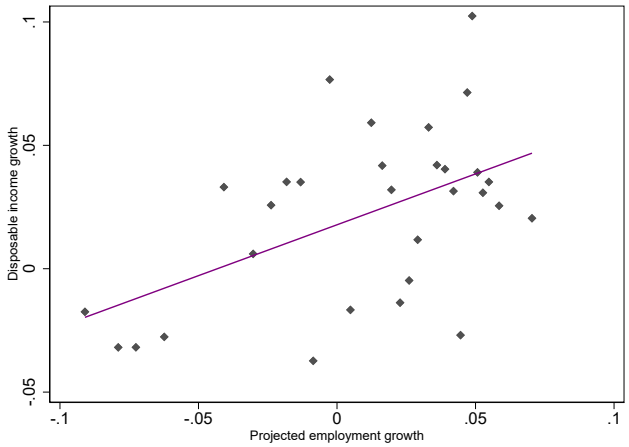


[c] County Employment Growth 2012-2014

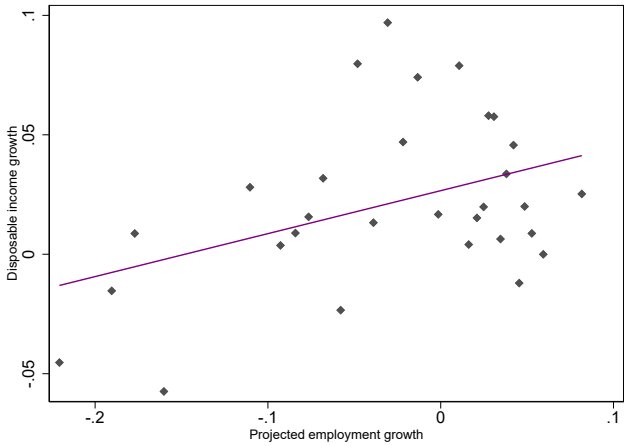
Notes: The distribution of Bartik IV employment growth rates within each year. The IV is constructed using employment growth for LQ industries. The data is taken from Quarterly Census of Employment and Wages (QCEW).

B.4 Strength of Instrument for MSA Estimations

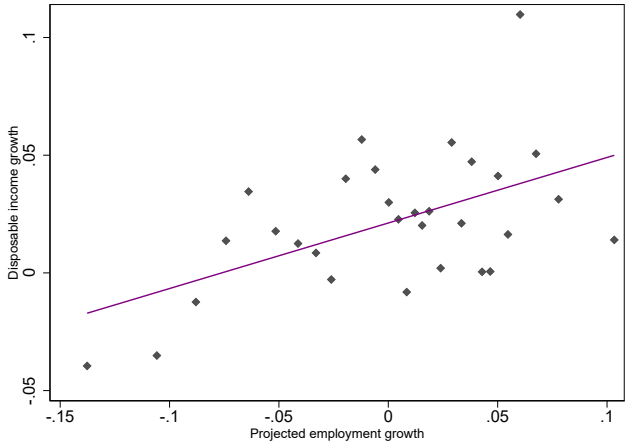
Figure 26 First stage relationship



[a] Residualized IV and income growth for all industries



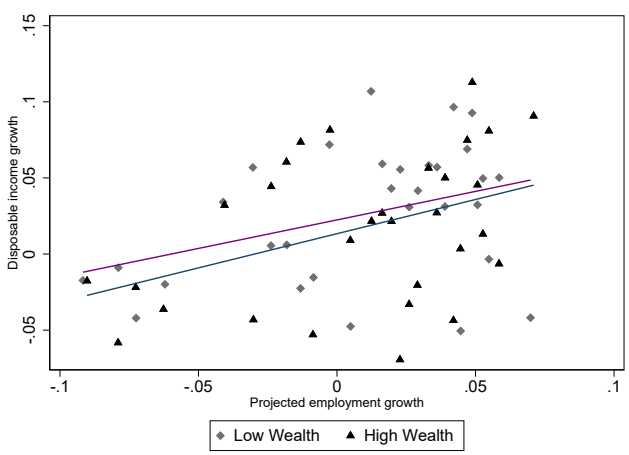
[b] Residualized IV and income growth for tradable industries



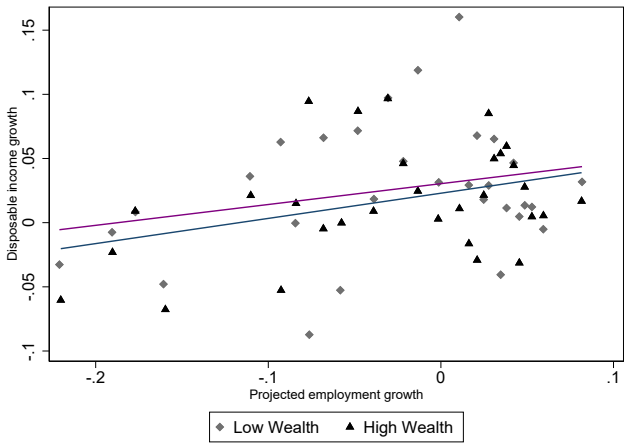
[c] Residualized IV and income growth for LQ-based industries

Notes: Residual plots of projected county employment growth and household disposable income growth. Each dot is an average of 885 observations. The covariates in equation 4 are partialed out.

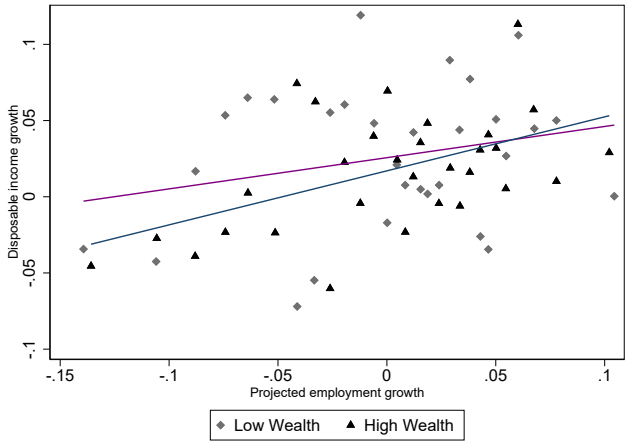
Figure 27 First stage relationship across wealth



[a] Residualized IV and income growth for all industries



[b] Residualized IV and income growth for tradable industries



[c] Residualized IV and income growth for LQ-based industries

Notes: Residual plots of projected county employment growth and household disposable income growth. Each dot is an average of 437 observations for wealth group 1 and 447 observations for wealth group 2. The covariates in equation 4 are partialed out.

B.5 Elasticities for MSA Estimations

Table 19 OLS estimates of Income Elasticity of Expenditure with MSA industry controls

	$\Delta Food$	$\Delta Healthcare$	$\Delta Total$	$\Delta Food$	$\Delta Healthcare$	$\Delta Total$
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta Household\ Income$	0.0546***	0.0904***	0.0462***	0.0546***	0.0904***	0.0462***
	(0.00452)	(0.0113)	(0.00452)	(0.00451)	(0.0114)	(0.00452)
$Manufacturing\ share$ 1998				-0.0319	-0.0835	-0.00269
				(0.0507)	(0.0856)	(0.0313)
$Tradable\ share$ 1998				0.0273	-0.119*	-0.0352
				(0.0398)	(0.0593)	(0.0276)
$Constant$	0.249***	0.703***	0.366***	0.243***	0.754***	0.378***
	(0.0453)	(0.128)	(0.0333)	(0.0405)	(0.129)	(0.0336)
Household controls	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Observations	26550	26550	26550	26550	26550	26550
Adjusted R^2	0.0206	0.0139	0.0294	0.0205	0.0138	0.0294

Robust standard errors are clustered at state level.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents estimates of the change in log income on the change in log expenditure for food, healthcare and total household consumption. Healthcare expenditure includes out-of-pocket health spending and insurance premiums paid by the household. Household level control variables comprise size of the household, a quadratic in age, education, sex, race and marital status of head of the household, acute health index, chronic health index and hospitalization index. State fixed effects are also included. Columns 4-6 adds industry characteristics in the region to the covariates, namely manufacturing industry share and tradable industry share. Region is approximated as MSAs. Robust standard errors are clustered at state level.

Table 20 2SLS estimates of Income Elasticity of Expenditure with Bartik IV all employment

	$\Delta Food$	$\Delta Healthcare$	$\Delta Total$	$\Delta Food$	$\Delta Healthcare$	$\Delta Total$
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta Household\ Income$	0.535**	4.446***	1.000***	0.544**	4.519***	1.018***
	(0.249)	(1.408)	(0.331)	(0.260)	(1.493)	(0.349)
Manufacturing share 1998				0.0716	0.853	0.203
				(0.0819)	(0.560)	(0.135)
Tradable share 1998				-0.0542	-0.855***	-0.197***
				(0.0585)	(0.330)	(0.0685)
Constant	-0.295	-3.503**	-0.396	-0.297	-3.442**	-0.384
	(0.308)	(1.440)	(0.371)	(0.310)	(1.485)	(0.377)
Household controls	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Observations	26550	26550	26550	26550	26550	26550
First stage F-test	909.62	909.62	909.62	893.53	893.53	893.53

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents estimates of the change in log income on the change in log expenditure for food, healthcare and total household consumption using projected employment growth in the region as an instrument. Employment growth is constructed using employment in all industries. Region is approximated as MSAs. Healthcare expenditure includes out-of-pocket health spending and insurance premiums paid by the household. Household level control variables comprise size of the household, a quadratic in age, education, sex, race and marital status of head of the household, acute health index, chronic health index and hospitalization index. State fixed effects are also included. Columns 4-6 adds industry characteristics in the region to the covariates, namely manufacturing industry share and tradable industry share. Robust standard errors are clustered at state level.

Table 21 2SLS estimates of Income Elasticity of Expenditure with Bartik IV tradable employment

	$\Delta Food$	$\Delta Healthcare$	$\Delta Total$	$\Delta Food$	$\Delta Healthcare$	$\Delta Total$
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta Household\ Income$	0.597*	5.435**	0.910**	0.624*	5.801**	0.973**
	(0.313)	(2.241)	(0.410)	(0.344)	(2.547)	(0.465)
Manufacturing share 1998				0.0885	1.124	0.193
				(0.0991)	(0.789)	(0.145)
Tradable share 1998				-0.0675	-1.069**	-0.189**
				(0.0728)	(0.481)	(0.0827)
Constant	-0.354	-4.435**	-0.312	-0.370	-4.619*	-0.343
	(0.355)	(2.144)	(0.433)	(0.372)	(2.378)	(0.469)
Household controls	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Observations	26550	26550	26550	26550	26550	26550
First stage F-test	905.90	905.90	905.90	864.62	864.62	864.62

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents estimates of the change in log income on the change in log expenditure for food, healthcare and total household consumption using projected employment growth in the region as an instrument. Employment growth is constructed using employment in tradable industries. Region is approximated as MSAs. Healthcare expenditure includes out-of-pocket health spending and insurance premiums paid by the household. Household level control variables comprise size of the household, a quadratic in age, education, sex, race and marital status of head of the household, acute health index, chronic health index and hospitalization index. State fixed effects are also included. Columns 4-6 adds industry characteristics in the region to the covariates, namely manufacturing industry share and tradable industry share. Robust standard errors are clustered at state level.

Table 22 2SLS estimates of Income Elasticity of Expenditure with Bartik IV LQ employment

	$\Delta Food$	$\Delta Healthcare$	$\Delta Total$	$\Delta Food$	$\Delta Healthcare$	$\Delta Total$
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta Household\ Income$	0.405	4.163**	0.760**	0.422	4.370**	0.799**
	(0.296)	(1.623)	(0.346)	(0.325)	(1.880)	(0.385)
Manufacturing share 1998				0.0458	0.821	0.156
				(0.0887)	(0.621)	(0.125)
Tradable share 1998				-0.0339	-0.831**	-0.160**
				(0.0666)	(0.354)	(0.0663)
Constant	-0.173	-3.236*	-0.171	-0.184	-3.305*	-0.183
	(0.358)	(1.752)	(0.388)	(0.375)	(1.960)	(0.414)
Household controls	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Observations	26550	26550	26550	26550	26550	26550
First stage F-test	867.59	867.59	867.59	821.50	821.50	821.50

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents estimates of the change in log income on the change in log expenditure for food, healthcare and total household consumption using projected employment growth in the region as an instrument. Employment growth is constructed using employment in LQ-based industries. Region is approximated as MSAs. Healthcare expenditure includes out-of-pocket health spending and insurance premiums paid by the household. Household level control variables comprise size of the household, a quadratic in age, education, sex, race and marital status of head of the household, acute health index, chronic health index and hospitalization index. State fixed effects are also included. Columns 4-6 adds industry characteristics in the region to the covariates, namely manufacturing industry share and tradable industry share. Robust standard errors are clustered at state level.

Table 23 OLS estimates of Income Elasticity of Expenditure for MSAs

	$\Delta Food\ Consumption$		$\Delta Healthcare\ Expenditures$		$\Delta Total\ Consumption$		$\Delta Food\ Consumption$		$\Delta Healthcare\ Expenditures$		$\Delta Total\ Consumption$	
	Low Wealth (1)	High Wealth (2)	Low Wealth (3)	High Wealth (4)	Low Wealth (5)	High Wealth (6)	Low Wealth (7)	High Wealth (8)	Low Wealth (9)	High Wealth (10)	Low Wealth (11)	High Wealth (12)
$\Delta Household\ Income$	0.0720***	0.0261***	0.167***	0.0131	0.0611***	0.0254***	0.0761***	0.0306***	0.168***	0.00402	0.0634***	0.0267***
	(0.00600)	(0.00520)	(0.0153)	(0.0138)	(0.00420)	(0.00448)	(0.00606)	(0.00661)	(0.0174)	(0.0152)	(0.00643)	(0.00544)
$Manufacturing\ share$ 1998							-0.0949	0.0723	-0.342**	0.238	-0.0462	0.0738
							(0.116)	(0.0542)	(0.150)	(0.151)	(0.0585)	(0.0481)
$Tradable\ share$ 1998							0.0675	-0.0515	0.0330	-0.350**	0.0234	-0.131***
							(0.101)	(0.0434)	(0.0921)	(0.149)	(0.0441)	(0.0314)
Constant	1.061***	-0.509***	1.170**	-0.289	1.846***	-0.204	0.551***	-0.620***	1.530***	0.00574	0.896***	0.0631
	(0.0734)	(0.0860)	(0.448)	(0.826)	(0.0444)	(0.213)	(0.0713)	(0.107)	(0.419)	(0.817)	(0.0553)	(0.212)
Household controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	17229	17095	17229	17095	17229	17095	13121	13429	13121	13429	13121	13429

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents estimates of the change in log income on the change in log expenditure for food, healthcare and total household consumption separately for low and high wealth households. The wealth variable used in this analysis is all assets net of debt, including home equity. Healthcare expenditure includes out-of-pocket health spending and insurance premiums paid by the household. Household level control variables comprise size of the household, a quadratic in age, education, sex, race and marital status of head of the household, acute health index, chronic health index and hospitalization index. State fixed effects are also included. Columns 7-12 adds industry characteristics in the region to the covariates, namely manufacturing industry share and tradable industry share. Region is approximated as MSAs. Robust standard errors are clustered at state level.

Table 24 2SLS estimates of Income Elasticity of Expenditure with Bartik IV all employment for MSAs

	$\Delta Food\ Consumption$		$\Delta Healthcare\ Expenditures$		$\Delta Total\ Consumption$		$\Delta Food\ Consumption$		$\Delta Healthcare\ Expenditures$		$\Delta Total\ Consumption$	
	Low Wealth (1)	High Wealth (2)	Low Wealth (3)	High Wealth (4)	Low Wealth (5)	High Wealth (6)	Low Wealth (7)	High Wealth (8)	Low Wealth (9)	High Wealth (10)	Low Wealth (11)	High Wealth (12)
$\Delta Household\ Income$	0.563	0.476**	5.823*	3.108**	1.080*	0.905**	0.568	0.490**	5.973*	3.135**	1.116*	0.908**
	(0.385)	(0.223)	(3.134)	(1.305)	(0.580)	(0.383)	(0.401)	(0.235)	(3.332)	(1.334)	(0.613)	(0.393)
Manufacturing share 1998							0.0769	0.0785	1.684	0.280	0.321	0.0855
							(0.174)	(0.0728)	(1.230)	(0.464)	(0.226)	(0.147)
Tradable share 1998							-0.0864	-0.0342	-1.782	-0.232	-0.306	-0.0973
							(0.160)	(0.0679)	(1.105)	(0.293)	(0.199)	(0.0828)
Constant	0.0427	-0.774***	-5.813	-1.169	-0.401	-0.301	0.0470	-0.775***	-5.760	-1.145	-0.405	-0.287
	(0.501)	(0.123)	(3.927)	(0.898)	(0.740)	(0.259)	(0.503)	(0.132)	(4.045)	(0.901)	(0.758)	(0.261)
Household controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	13121	13429	13121	13429	13121	13429	13121	13429	13121	13429	13121	13429
First stage F-test	607.66	6346.6	607.66	6346.6	607.66	6346.6	607.4	9693.07	607.4	9693.07	607.4	9693.07

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents estimates of the change in log income on the change in log expenditure for food, healthcare and total household consumption separately for low and high wealth households using projected employment growth in the region as an instrument. Employment growth is constructed using employment in all industries. Region is approximated as MSAs. The wealth variable used in this analysis is all assets net of debt, including home equity. Healthcare expenditure includes out-of-pocket health spending and insurance premiums paid by the household. Household level control variables comprise size of the household, a quadratic in age, education, sex, race and marital status of head of the household, acute health index, chronic health index and hospitalization index. State fixed effects are also included. Columns 7-12 adds industry characteristics in the region to the covariates, namely manufacturing industry share and tradable industry share. Robust standard errors are clustered at state level.

Table 25 2SLS estimates of Income Elasticity of Expenditure with Bartik IV tradable employment for MSAs

	$\Delta Food\ Consumption$		$\Delta Healthcare\ Expenditures$		$\Delta Total\ Consumption$		$\Delta Food\ Consumption$		$\Delta Healthcare\ Expenditures$		$\Delta Total\ Consumption$	
	Low Wealth (1)	High Wealth (2)	Low Wealth (3)	High Wealth (4)	Low Wealth (5)	High Wealth (6)	Low Wealth (7)	High Wealth (8)	Low Wealth (9)	High Wealth (10)	Low Wealth (11)	High Wealth (12)
$\Delta Household\ Income$	0.624	0.518*	7.573	3.416*	1.004	0.804*	0.665	0.538*	8.527	3.491*	1.122	0.827*
	(0.485)	(0.293)	(5.000)	(1.912)	(0.648)	(0.462)	(0.567)	(0.303)	(6.377)	(1.954)	(0.809)	(0.477)
Manufacturing share 1998							0.111	0.0791	2.576	0.285	0.323	0.0844
							(0.214)	(0.0777)	(2.291)	(0.511)	(0.286)	(0.137)
Tradable share 1998							-0.117	-0.0324	-2.581	-0.219	-0.308	-0.100
							(0.203)	(0.0718)	(2.044)	(0.328)	(0.252)	(0.0756)
Constant	-0.0329	-0.791***	-7.976	-1.291	-0.307	-0.261	-0.0686	-0.794***	-8.811	-1.287	-0.412	-0.254
	(0.612)	(0.144)	(6.025)	(1.086)	(0.794)	(0.278)	(0.686)	(0.151)	(7.447)	(1.106)	(0.955)	(0.285)
Household controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	13121	13429	13121	13429	13121	13429	13121	13429	13121	13429	13121	13429
First stage F-test	610.4	6706.76	610.4	6706.76	610.4	6706.76	611.27	10061.07	611.27	10061.07	611.27	10061.07

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents estimates of the change in log income on the change in log expenditure for food, healthcare and total household consumption separately for low and high wealth households using projected employment growth in the region as an instrument. Employment growth is constructed using employment in tradable industries. Region is approximated as MSAs. The wealth variable used in this analysis is all assets net of debt, including home equity. Healthcare expenditure includes out-of-pocket health spending and insurance premiums paid by the household. Household level control variables comprise size of the household, a quadratic in age, education, sex, race and marital status of head of the household, acute health index, chronic health index and hospitalization index. State fixed effects are also included. Columns 7-12 adds industry characteristics in the region to the covariates, namely manufacturing industry share and tradable industry share. Robust standard errors are clustered at state level.

Table 26 2SLS estimates of Income Elasticity of Expenditure with Bartik IV LQ employment for MSAs

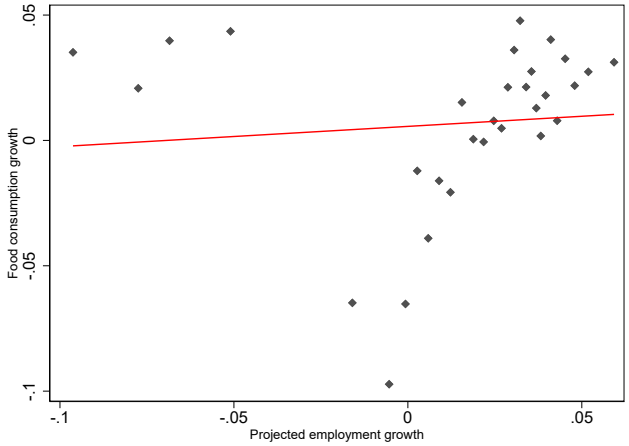
	$\Delta Food\ Consumption$		$\Delta Healthcare\ Expenditures$		$\Delta Total\ Consumption$		$\Delta Food\ Consumption$		$\Delta Healthcare\ Expenditures$		$\Delta Total\ Consumption$	
	Low Wealth (1)	High Wealth (2)	Low Wealth (3)	High Wealth (4)	Low Wealth (5)	High Wealth (6)	Low Wealth (7)	High Wealth (8)	Low Wealth (9)	High Wealth (10)	Low Wealth (11)	High Wealth (12)
$\Delta Household\ Income$	0.675	0.214	7.151	2.251**	1.144	0.502**	0.717	0.240	7.956	2.303**	1.287	0.505**
	(0.676)	(0.210)	(4.818)	(1.026)	(0.850)	(0.238)	(0.796)	(0.219)	(6.168)	(1.070)	(1.056)	(0.249)
Manufacturing share 1998							0.129	0.0751	2.377	0.269	0.381	0.0801
							(0.298)	(0.0551)	(2.236)	(0.362)	(0.387)	(0.0967)
Tradable share 1998							-0.133	-0.0436	-2.402	-0.263	-0.359	-0.113**
							(0.273)	(0.0513)	(1.908)	(0.221)	(0.335)	(0.0457)
Constant	-0.0957	-0.671***	-7.454	-0.830	-0.480	-0.142	-0.130	-0.675***	-8.129	-0.810	-0.609	-0.125
	(0.887)	(0.121)	(6.322)	(0.796)	(1.106)	(0.215)	(1.005)	(0.126)	(7.803)	(0.802)	(1.328)	(0.216)
Household controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	13121	13429	13121	13429	13121	13429	13121	13429	13121	13429	13121	13429
First stage F-test	599.43	5930.92	599.43	5930.92	599.43	5930.92	609.26	9631.49	609.26	9631.49	609.26	9631.49

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

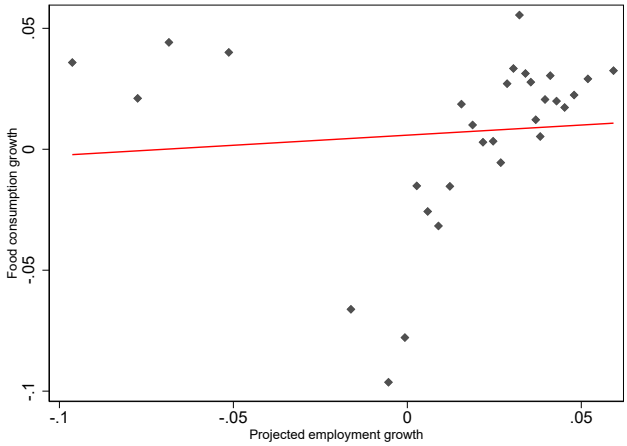
Notes: This table presents estimates of the change in log income on the change in log expenditure for food, healthcare and total household consumption separately for low and high wealth households using projected employment growth in the region as an instrument. Employment growth is constructed using employment in LQ-based industries. Region is approximated as MSAs. The wealth variable used in this analysis is all assets net of debt, including home equity. Healthcare expenditure includes out-of-pocket health spending and insurance premiums paid by the household. Household level control variables comprise size of the household, a quadratic in age, education, sex, race and marital status of head of the household, acute health index, chronic health index and hospitalization index. State fixed effects are also included. Columns 7-12 adds industry characteristics in the region to the covariates, namely manufacturing industry share and tradable industry share. Robust standard errors are clustered at state level.

B.6 Outcome and Instrument Relation in trimmed samples

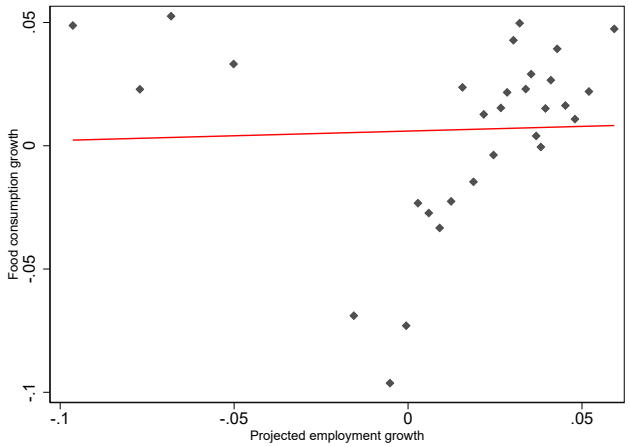
Figure 28 Food consumption and instrument relation



[a] Scatterplot of residualized IV and food consumption growth for 300% trimmed sample



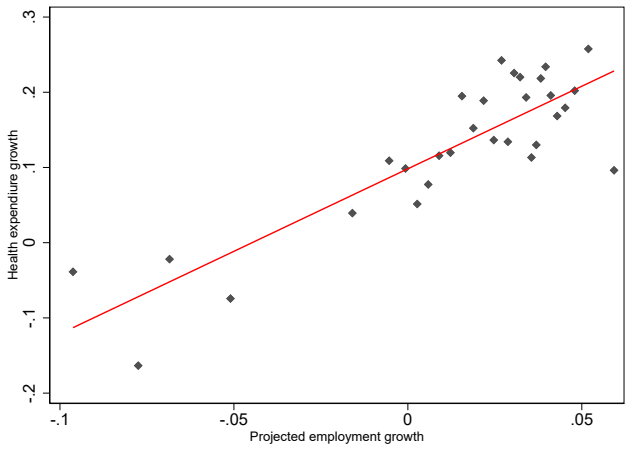
[b] Scatterplot of residualized IV and food consumption growth for 200% trimmed sample



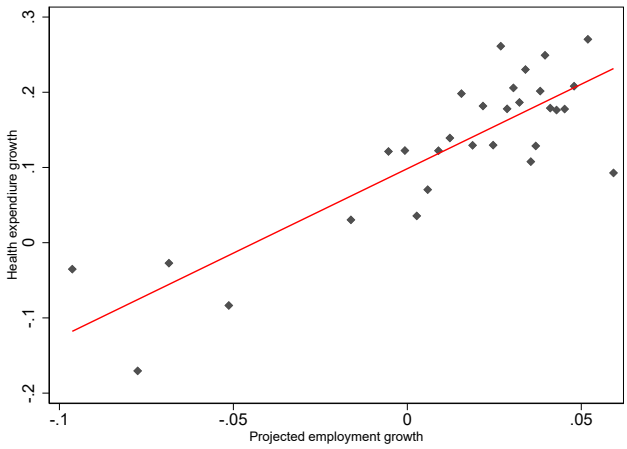
[c] Scatterplot of residualized IV and food consumption growth for 100% trimmed sample

Notes: Residual plots of projected county employment growth and household food consumption growth

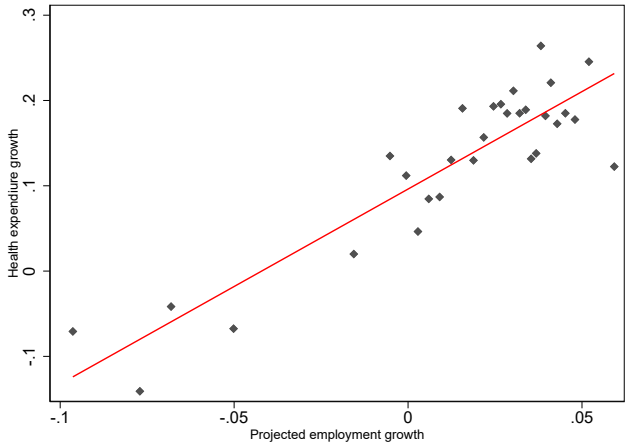
Figure 29 Health spending and instrument relation



[a] Scatterplot of residualized IV and health spending growth for 300% trimmed sample



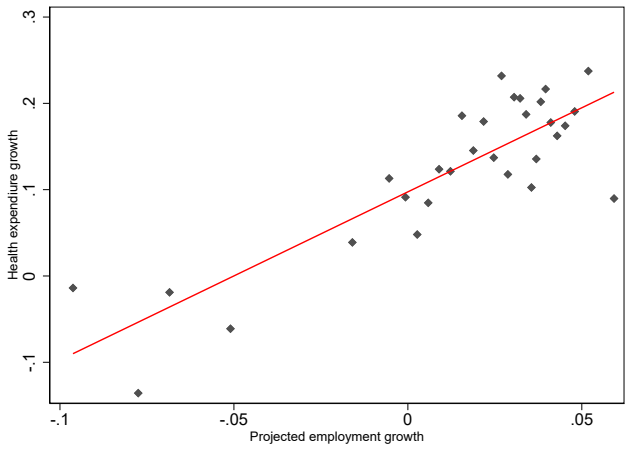
[b] Scatterplot of residualized IV and health spending growth for 200% trimmed sample



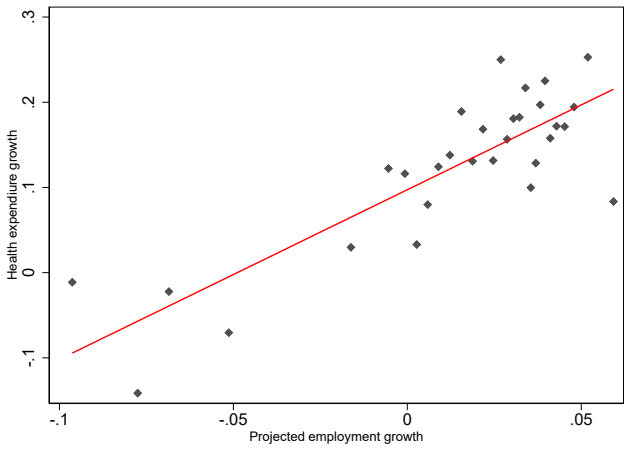
[c] Scatterplot of residualized IV and health spending growth for 100% trimmed sample

Notes: Residual plots of projected county employment growth and household health spending growth

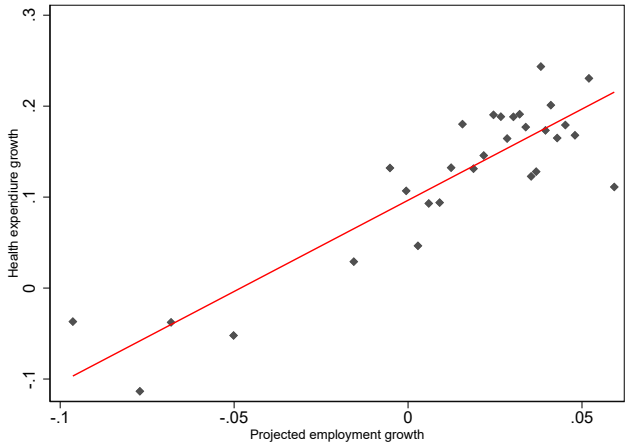
Figure 30 Health spending excluding insurance premiums and instrument relation



[a] Scatterplot of residualized IV and health spending growth for 300% trimmed sample



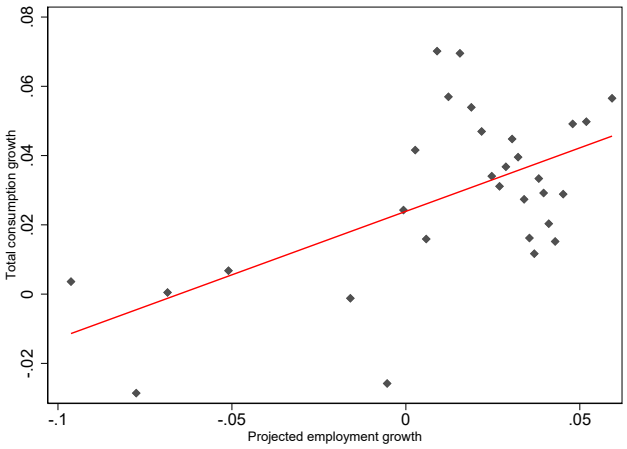
[b] Scatterplot of residualized IV and health spending growth for 200% trimmed sample



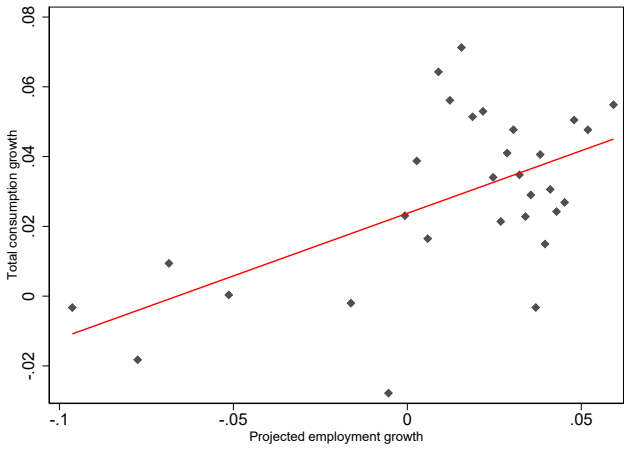
[c] Scatterplot of residualized IV and health spending growth for 100% trimmed sample

Notes: Residual plots of projected county employment growth and household health spending growth

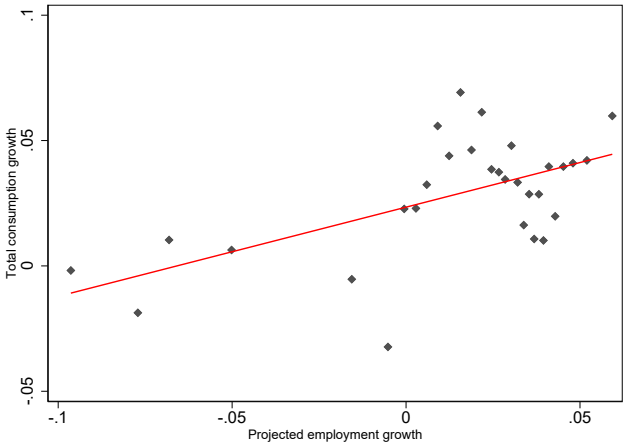
Figure 31 Total expenditures and instrument relation



[a] Scatterplot of residualized IV and total expenditures growth for 300% trimmed sample



[b] Scatterplot of residualized IV and total expenditures growth for 200% trimmed sample

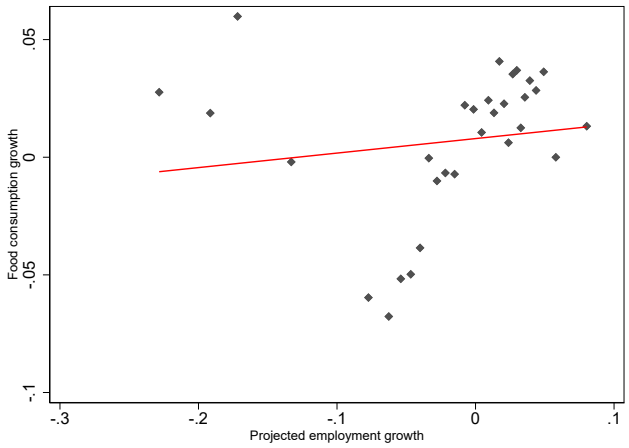


[c] Scatterplot of residualized IV and total expenditures growth for 100% trimmed sample

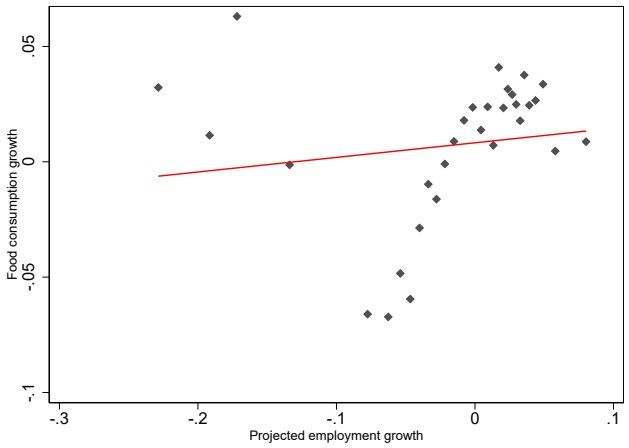
Notes: Residual plots of projected county employment growth and household total expenditures growth

B.7 Tradable industry IV in trimmed samples

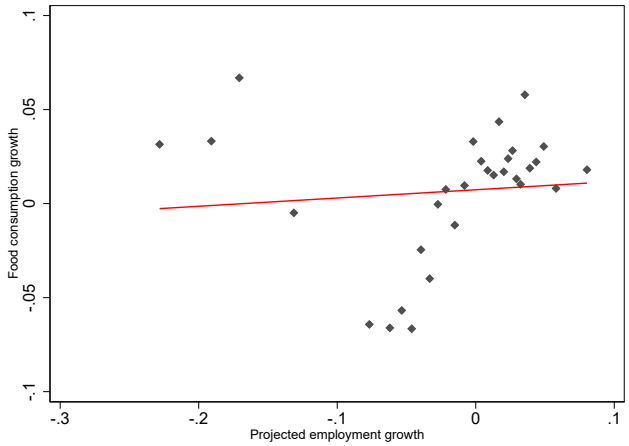
Figure 32 Food consumption and instrument relation



[a] Scatterplot of residualized IV and food consumption growth for 300% trimmed sample



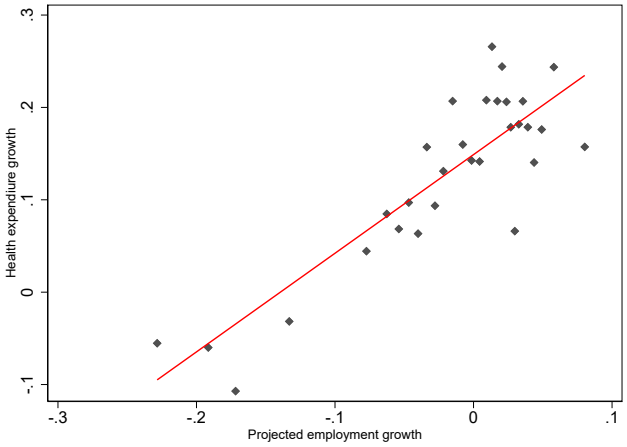
[b] Scatterplot of residualized IV and food consumption growth for 200% trimmed sample



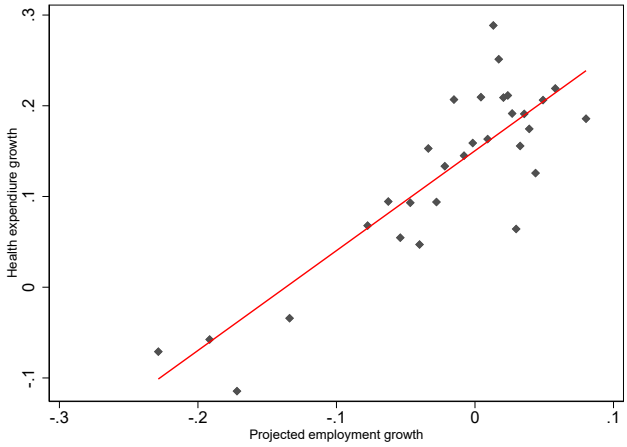
[c] Scatterplot of residualized IV and food consumption growth for 100% trimmed sample

Notes: Residual plots of projected county employment growth and household food consumption growth

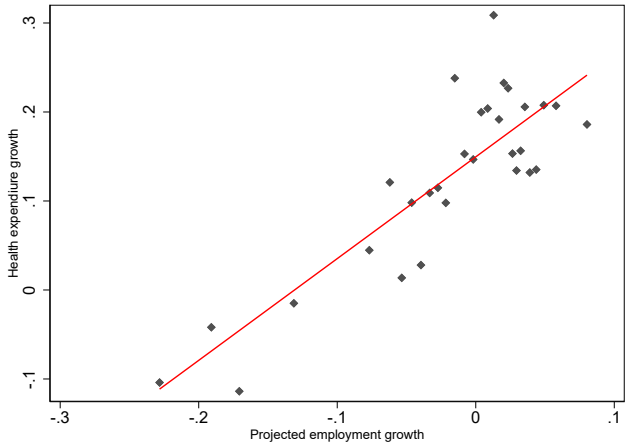
Figure 33 Health spending and instrument relation



[a] Scatterplot of residualized IV and health spending growth for 300% trimmed sample



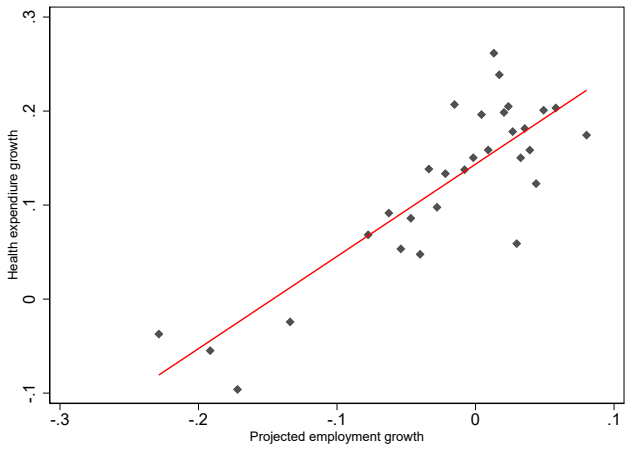
[b] Scatterplot of residualized IV and health spending growth for 200% trimmed sample



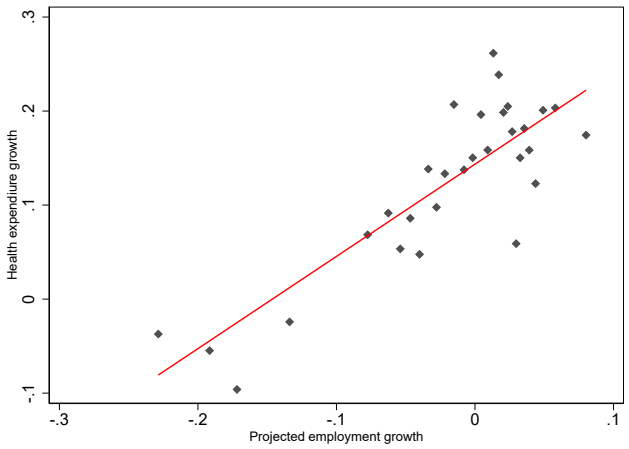
[c] Scatterplot of residualized IV and health spending growth for 100% trimmed sample

Notes: Residual plots of projected county employment growth and household health spending growth

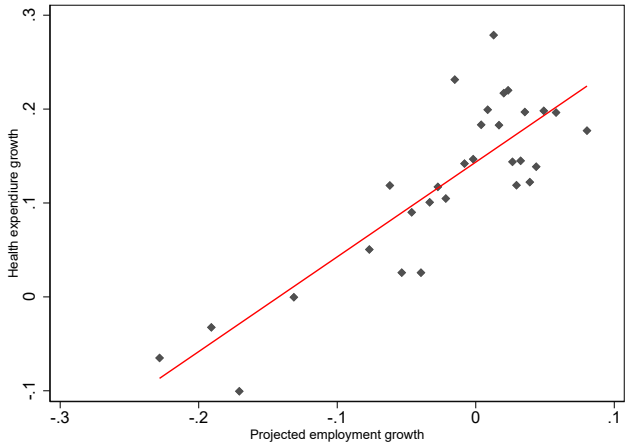
Figure 34 Health spending excluding insurance premiums and instrument relation



[a] Scatterplot of residualized IV and health spending growth for 300% trimmed sample



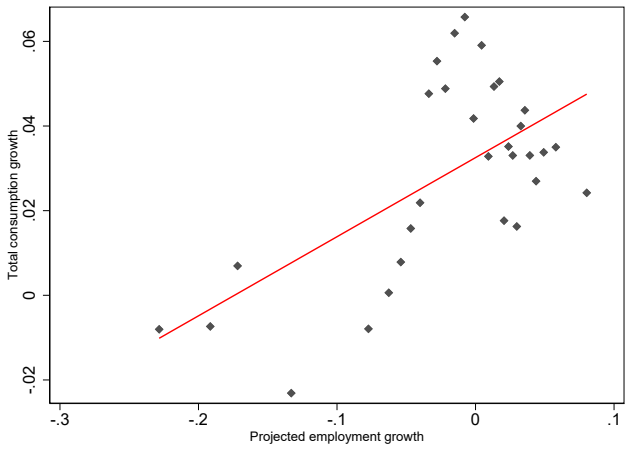
[b] Scatterplot of residualized IV and health spending growth for 200% trimmed sample



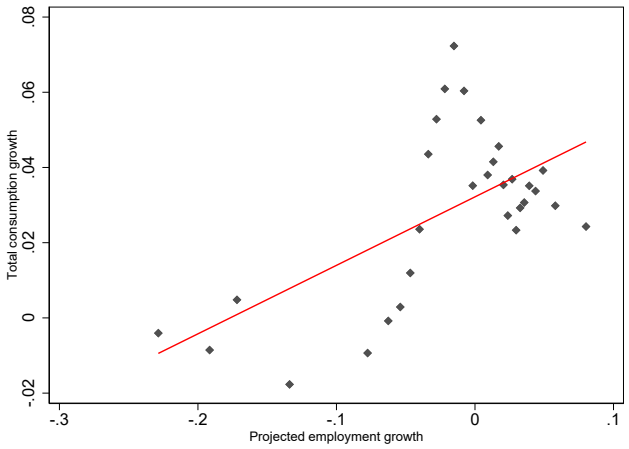
[c] Scatterplot of residualized IV and health spending growth for 100% trimmed sample

Notes: Residual plots of projected county employment growth and household health spending growth

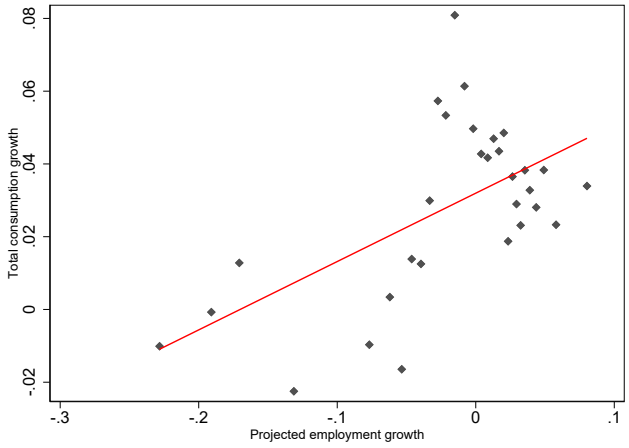
Figure 35 Total expenditures and instrument relation



[a] Scatterplot of residualized IV and total expenditures growth for 300% trimmed sample



[b] Scatterplot of residualized IV and total expenditures growth for 200% trimmed sample

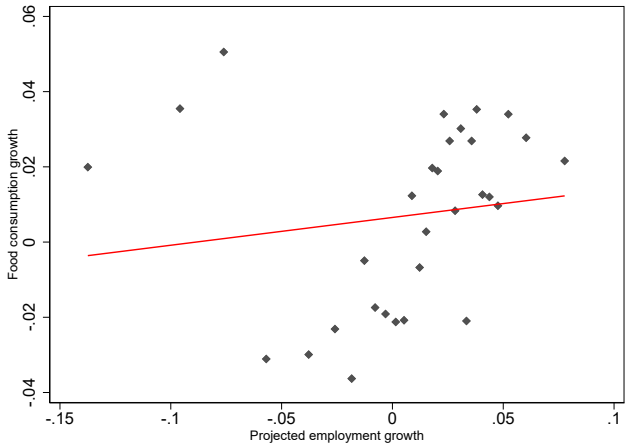


[c] Scatterplot of residualized IV and total expenditures growth for 100% trimmed sample

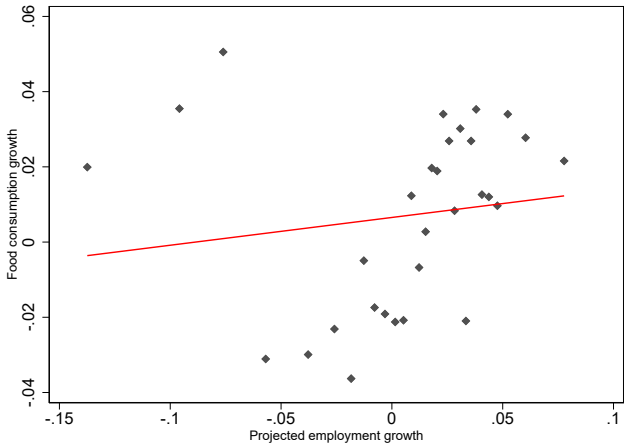
Notes: Residual plots of projected county employment growth and household total expenditures growth

B.8 LQ-based industry IV in trimmed samples

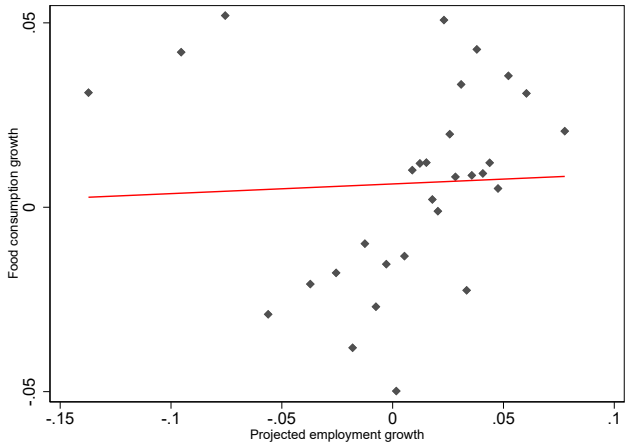
Figure 36 Food consumption and instrument relation



[a] Scatterplot of residualized IV and food consumption growth for 300% trimmed sample



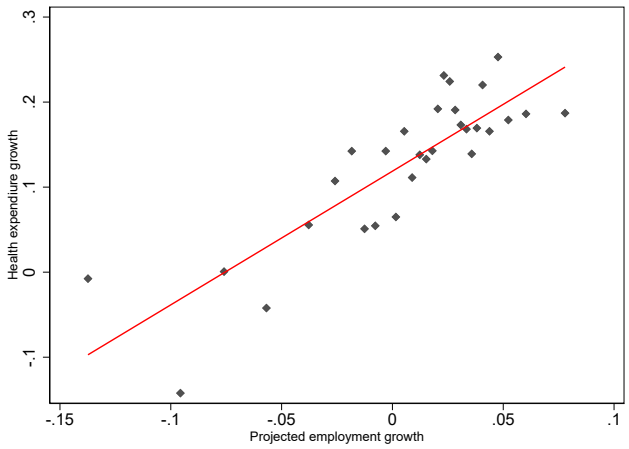
[b] Scatterplot of residualized IV and food consumption growth for 200% trimmed sample



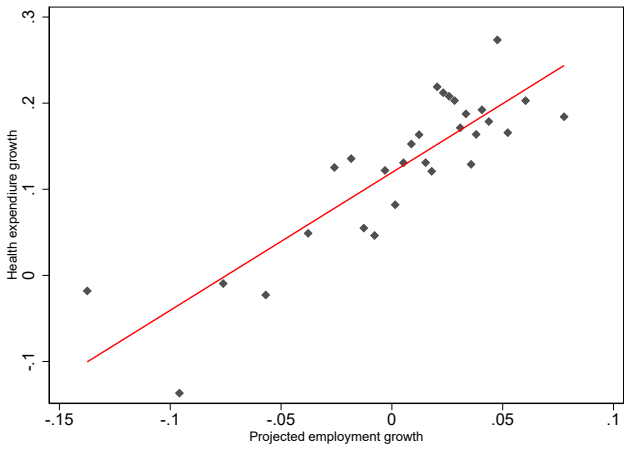
[c] Scatterplot of residualized IV and food consumption growth for 100% trimmed sample

Notes: Residual plots of projected county employment growth and household food consumption growth

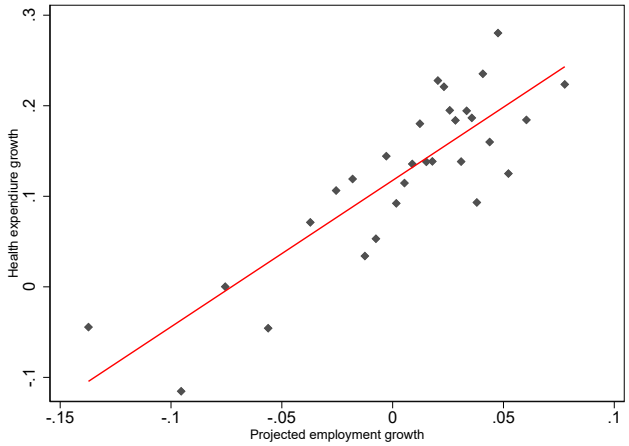
Figure 37 Health spending and instrument relation



[a] Scatterplot of residualized IV and health spending growth for 300% trimmed sample



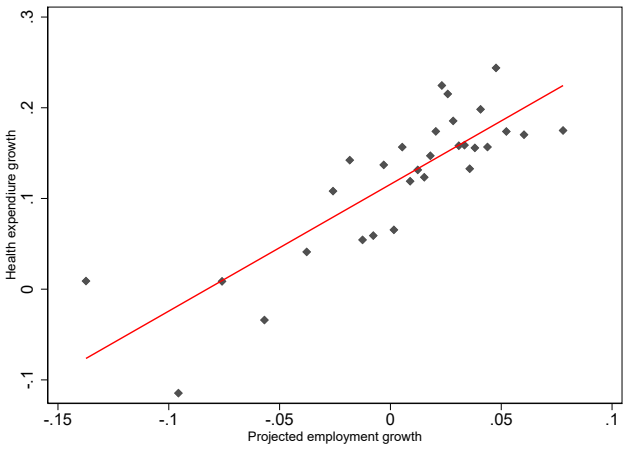
[b] Scatterplot of residualized IV and health spending growth for 200% trimmed sample



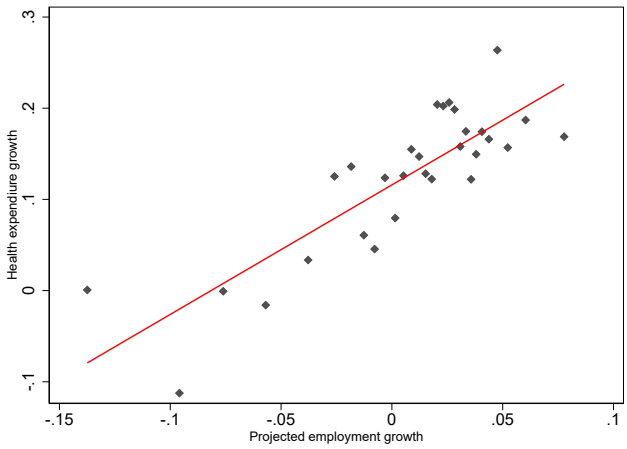
[c] Scatterplot of residualized IV and health spending growth for 100% trimmed sample

Notes: Residual plots of projected county employment growth and household health spending growth

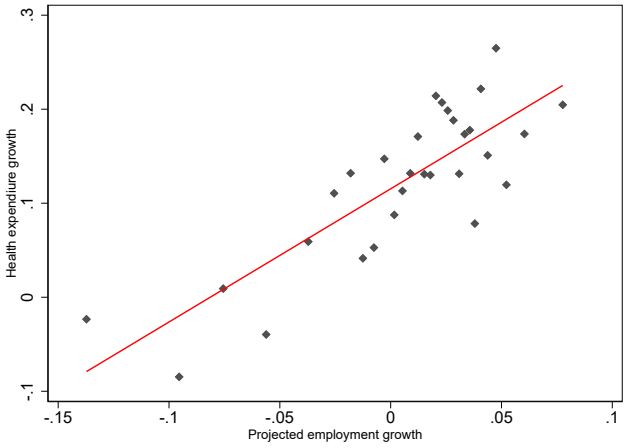
Figure 38 Health spending excluding insurance premiums and instrument relation



[a] Scatterplot of residualized IV and health spending growth for 300% trimmed sample



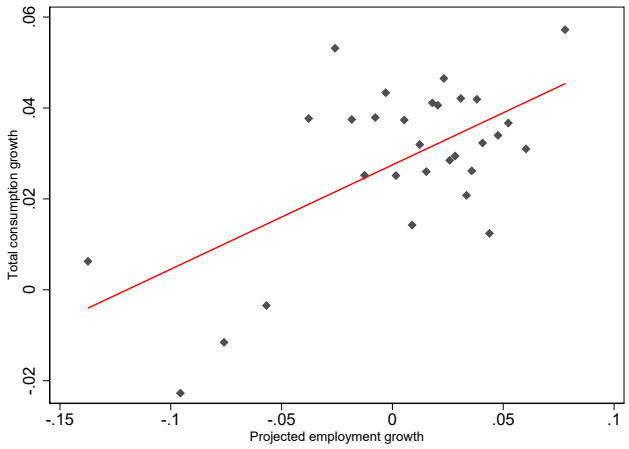
[b] Scatterplot of residualized IV and health spending growth for 200% trimmed sample



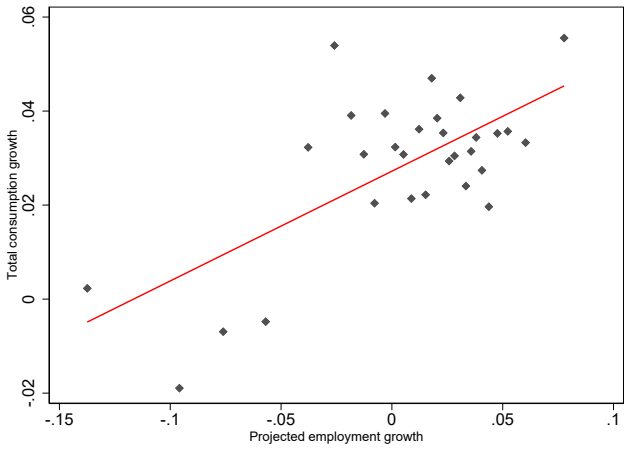
[c] Scatterplot of residualized IV and health spending growth for 100% trimmed sample

Notes: Residual plots of projected county employment growth and household health spending growth

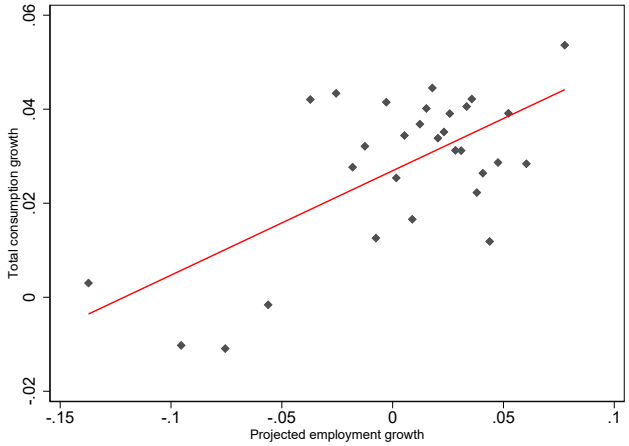
Figure 39 Total expenditures and instrument relation



[a] Scatterplot of residualized IV and total expenditures growth for 300% trimmed sample



[b] Scatterplot of residualized IV and total expenditures growth for 200% trimmed sample

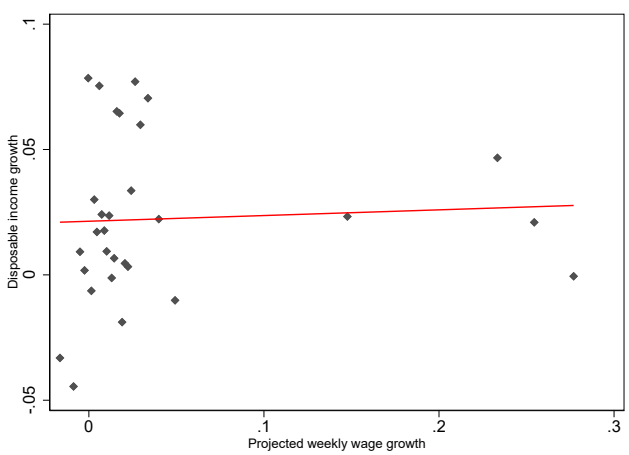


[c] Scatterplot of residualized IV and total expenditures growth for 100% trimmed sample

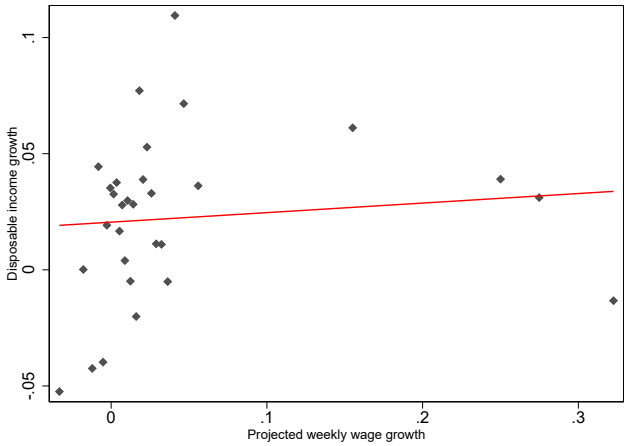
Notes: Residual plots of projected county employment growth and household total expenditures growth

B.9 Ir-relevance of Alternative Instrument at County Level

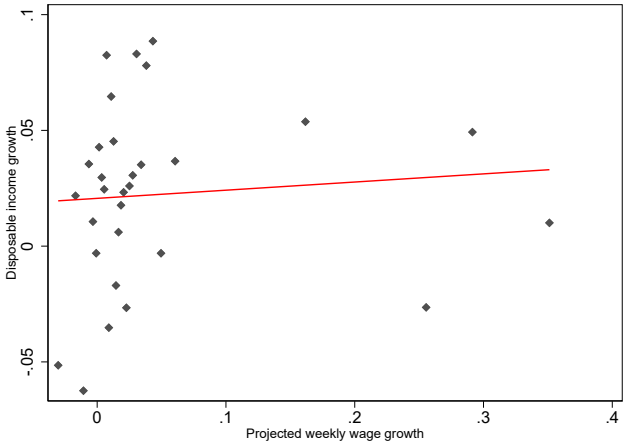
Figure 40 Relationship between household disposable income growth and county average weekly wage growth



[a] Residualized IV and income growth for all industries



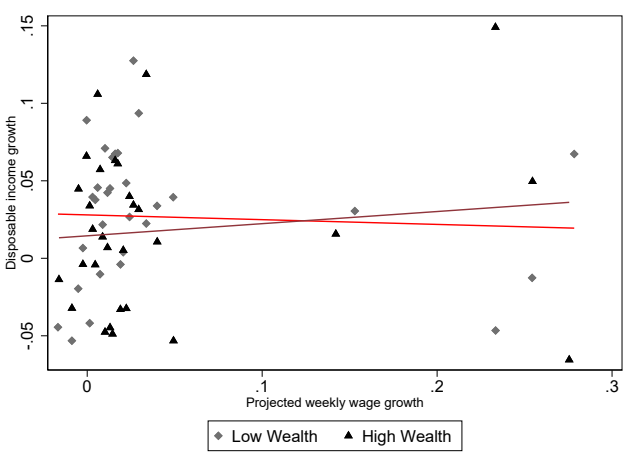
[b] Residualized IV and income growth for tradable industries



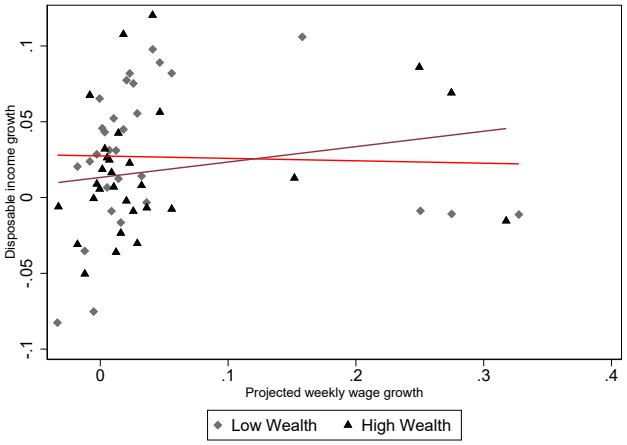
[c] Residualized IV and income growth for LQ-based industries

Notes: Residual plots of projected county average weekly wage growth and household disposable income growth. Each dot is an average of 1,117 observations. The covariates in equation 4 are partialed out.

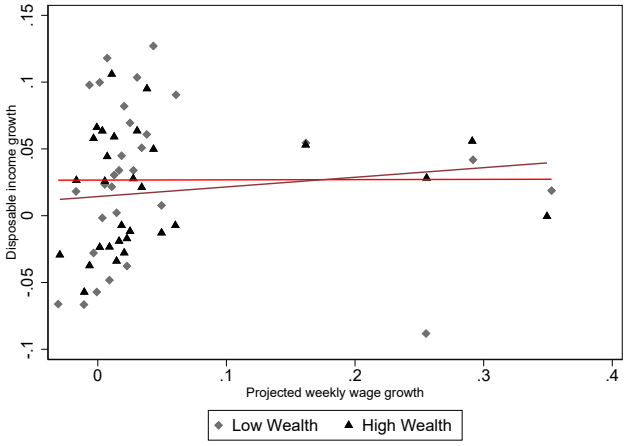
Figure 41 Relationship between household disposable income growth and county average weekly wage growth across wealth



[a] Residualized IV and income growth for all industries



[b] Residualized IV and income growth for tradable industries



[c] Residualized IV and income growth for LQ-based industries

Notes: Residual plots of projected county average weekly wage growth and household disposable income growth. Each dot is an average of 571 observations for wealth group 1 and 566 observations for wealth group 2. The covariates in equation 4 are partialed out.