A Data Notes (Web Appendix)

In this section, I go over how the data was constructed for this article, including the details of the construction of the main dataset for the article, the local area wage series, and various instruments for the local area wage.

A.1 Main Dataset

The main datasets that I use in this article are the 1987 through 2007 Census of Manufactures. From each Census, I remove all Administrative Record plants because these plants do not have data on output or capital. I also eliminate a set of outliers and missing values from the dataset. I first remove all plants born in the given Census year, as well as a small set of plants with missing age data. I then remove plants with zero, missing, or negative data for the equipment capital stock, structures capital stock, labor costs, value added, or materials. I also remove plants above the 99.5th percentile or below the 0.5th percentile of their 2-digit SIC or 3-digit NAICS industry on these variables to remove plants with potential data problems. Finally, I drop plants in Alaska and Hawaii as I do not have amenity instruments for these locations. I have examined how robust my results are to these outlier corrections, and have found similar estimates of the elasticity of substitution when I include the omitted plants in the dataset.

The most important variable in this study is the factor cost ratio, which is the ratio of capital costs to labor costs. I construct both capital costs and labor costs in nominal terms for the given Census year. For labor costs, I use the total salaries and wages paid by the plant.

For capital costs, I multiply capital stock measures by rental rates of capital. Because rental rates are at the industry-year level, and I control for industry fixed effects in cross-section regressions, they primarily affect the share of capital costs coming from structures capital compared to equipment capital.

I use a Census constructed measure of perpetual inventory capital stock for structures and equipment capital separately; in robustness checks, I look solely at book value measures of capital (these are available separately for structures and equipment before 1997, and as a total measure of capital in 1997 and after). The Census constructs perpetual inventory capital based on book value measures of capital as well as investment histories; for plants included in the Censuses but not in the ASMs, this is essentially just based upon the book value of capital. For plants that have been reporting data to the ASM, an investment history is typically available for a perpetual inventory measure of capital. Because the largest plants in the Census are always included in the ASM, these plants will tend to have long investment histories.

I define the rental rate using the external real rate of return specification of Harper et al. (1989). The rental rate for industry n is defined as:

$$R_{i,t} = T_{i,t}(p_{i,t-1}r_{i,t} + \delta_{i,t}p_{i,t})$$

where $r_{i,t}$ is a constant external real rate of return of 3.5 percent, $p_{i,t}$ is the price index for capital in that industry, $\delta_{i,t}$ is the depreciation rate for that industry, and $T_{i,t}$ is the effective rate of capital taxation. I calculate $T_{i,t}$ following Harper et al. (1989) as:

$$T_{i,t} = \frac{1 - u_t z_{i,t} - k_{i,t}}{1 - u_t}$$

where $z_{i,t}$ is the present value of depreciation deductions for tax purposes on a dollar's investment in capital type i over the lifetime of the investment, $k_{i,t}$ is the effective rate of the investment tax credit, and u_{it} is the effective corporate income tax rate. I obtained $z_{i,t}$, u_{it}, and $k_{i,t}$ from Dale Jorgenson at the asset year level; I then used a set of capital flow tables at the asset-industry level to convert these to the industry level.

To calculate depreciation rates $\delta_{i,t}$, I take depreciation rates from NIPA at the asset level and use the capital flow tables to convert them to the industry level. My primary source of prices of capital $p_{i,t}$ is from NIPA, which calculates separate price indices for structures and equipment capital.

The capital flow tables and investment price series depend upon the industry definition; because the US switches from SIC basis to NAICS basis during my sample period, I construct separate rental price series for SIC 2 digit industries and NAICS 3 digit industries.

The Annual Survey of Manufactures tracks about 50,000 plants over five year panel rotations that are more heavily weighted towards large plants. I use the ASM plants for robustness checks. The ASM plant samples also have data on the value of non monetary compensation given to employees, such as health care or retirement benefits, which I use to better measure payments to labor, as well as machinery rents to better measure payments to capital. I have both machinery rents and non-monetary compensation for the full Census in 2002 and 2007; for these years, I include both in factor costs in robustness checks to examine the robustness of my estimates.

A.2 Local Wages

I construct measures of the local wage in order to estimate the elasticity of substitution across plants, using two different datasets to measure the local area wage. I use the 1990 Commuting Zone (Autor and Dorn, 2013) as my definition of local labor market. Commuting zones are clusters of US counties designed to have high commuting ties within cluster and low commuting ties across cluster.

The first dataset that I use is the Census 5% samples of Americans as well as the 2005 to 2009 American Community Surveys (ACS). The Population Censuses and American Community Survey have data on both wages and geographic location for a large sample of workers. Because the Economic Census is conducted in different years from the Population Censuses, I match the 1987 and 1992 Censuses of Manufactures to wages from the 1990 Population Census, the 1997 and 2002 Censuses of Manufactures to wages from the 2000 Population Census, and the 2007 Census of Manufactures to the 2005-2009 American Community Surveys.

To obtain the local wage, I first calculate the individual wage for working age adults (with age between 20 and 65) who are employed in the private sector as workers earning a wage or salary and do not live in group quarters. I calculate the wage as an hourly wage, which I define as total yearly wage and salary income divided by total hours worked. I use the CPI to deflate wage income, which affects the wages matched to the 2007 Census of Manufactures, as these rely on information on workers over 5 different years of the ACS.

I measure total hours worked as weeks worked per year multiplied by hours worked per week. In 2008 and 2009, the total number of weeks worked is not available, but the intervalled number of weeks worked is available. I thus impute the number of weeks worked for individuals in 2008 and 2009 based on averages of the number of weeks worked from 2005 to 2007 from cells of the intervalled weeks worked, an indicator if the worker is female, an indicator if the worker is black, the educational attainment of the worker (as constructed below), and age (as a set of dummy variables for age intervals). I remove all individuals with zero or missing income or zero total hours worked.

Total wage and salary income in the Population Censuses and American Community Surveys are topcoded. The topcode threshold is \$140,000 in 1990, \$175,000 in 2000, and the 99.5% of the state distribution of income for that year in the ACS years. For all cases, I impute the total wage and salary income to 1.5 times the topcode if the wage and salary income is topcoded, in line with Acemoglu and Angrist (2000).

Before calculating local area wages, I adjust measures of local wages for differences in worker characteristics through regressions with the individual log hourly wage as a dependent variable. I include education through a set of dummy variables based upon the worker's maximum educational attainment, which include four categories: college, some college, high school degree, and high school dropouts. I define experience as the individual's age minus an initial age of working that depends upon their education status, and include a quartic in experience in the regression. I also have data on the race of workers and so include three race categories of white, black, and other, as well as an indicator for Hispanic origin and gender. I include six occupational categories: Managerial and Professional; Technical, Sales, and Administrative; Service, Farming, Forestry, and Fishing; Precision Production, Craft, and Repairers; and Operatives and Laborers. Finallly, I include thirteen industrial categories: Agriculture, Forestry, and Fisheries; Mining; Construction; Manufacturing; Transportation, Communications and Other Public Utilities; Wholesale Trade; Retail Trade; Finance, Insurance, and Real Estate; Business and Retail Services; Personal Services; Entertainment and Recreation Services; Professional and Related Services; and Public Administration.

I then estimate a regression that includes all of these characteristics, where I allow all regression coefficients to vary by Census year and weight observations by the Census person weight. For wages matched to the 2007 Census of Manufactures which use multiple ACS years, I include year effects as well to allow the overall wage distribution to vary over time. The attributes included in the regression explain 32.3 percent of the individual wage variation in 1990, 31.5 percent in 2000, and 36.8 percent in the 2005-2009 pooled ACS.

I then aggregate the residuals from this regression to the commuting zone level. The Population Census and ACS data contain information on the Public Use Micro Area (PUMA) of the individual worker. Thus, I use crosswalks from Autor and Dorn (2013) in order to aggregate from the PUMA to the Commuting Zone. Because some PUMAs contain multiple commuting zones, I weight each residual wage by the multiple of the person weight in the Census or ACS and a weight that indicates the fraction of the PUMA in the given Commuting Zone. I then construct average residual wages for each commuting zone.

The second dataset that I use is the Longitudinal Business Database (LBD), which contains data on payroll and employment for all US establishments. I construct the establishment wage as total payroll divided by total employment. I measure the local wage as the mean residual wage at the commuting zone level, after regressing the log establishment wage on indicator variables for 4 digit SIC or 6 digit NAICS industry codes. I match wages from each LBD to the same year of the Economic Census. Because these wages are constructed from establishment data, I cannot make adjustments for differences in workers within or across establishments, except for the industry controls.

The LBD contains the county that each establishment is located in, so I can map all residual wages to unique commuting zones in order to create average establishment wages at the commuting zone level.

A.3 Instruments

I use three different sets of instruments for the local wage.

The first set of instruments are local amenities that could affect labor supply developed by Albouy et al. (2016). They include measures of the slope, elevation, relative humidity, average dew point, average precipitation, and average sunlight for each local area. I also include multiple measures of temperature. The first measures are the number of heating degree days (HDD) and cooling degree days (CDD). HDD measures how cold a location is, and is defined as the sum of the difference between 65F and each day's mean temperature, for all days colder than 65F. CDD is a measure of hot a location is, and is defined as the sum of the difference between 65F and each day's mean temperature, for all days warmer than 65F. In addition, I include a set of temperature day bins which bin the average number of days in a year over 30 years that the average temperature (mean of minimum and maximum temperature) lie within the bin. I include 6 bins of 10 degrees Centigrade each.

The amenities in Albouy et al. (2016) were collected at the PUMA level. I aggregate them to the commuting zone level by taking an average across PUMAs in the same commuting zone, weighting PUMAs by their population in the commuting zone. I do not have amenities for Alaska and Hawaii, and so all specifications exclude these states.

The second instrument, from Bartik (1991), is an instrument for labor market conditions based upon the differential impact of national level shocks to industry employment across locations. Positive national shocks to an industry should increase labor demand, and so wages, more in areas with high concentrations of that industry. Formally, the predicted growth rate in employment for a given location is the sum across industries of the local employment share of this industry multiplied by the 10 year change in national level employment for that industry.

The 10 year instrument is constructed as follows: Let $g_n(t) = \frac{1}{10}\ln(L_n(t)/L_n(t-10))$ be the national growth rate of industry n, and let $\omega_{j,n}(t)$ be the share of local area j's employment working in industry n. Finally, the instrument is the interaction between initial local area employment shares and 10 year national employment growth rates: $Z_j(t) = \sum_{n \in N^S} \omega_{j,n}(t-10) g_n(t)$, where N^S is the set of non-manufacturing four-digit SIC or six-digit NAICS industries.

The implicit assumption here is that changes in industry shares at the national level are independent of local manufacturing plant productivity. To help ensure that this assumption holds, I exclude manufacturing industries from the instrument. I calculate the instrument defining locations by commuting zones.

I also use a second set of instruments for labor market conditions from Beaudry et al. (2012). The first instrument is the interaction of predicted changes in industry employment shares and industry initial wage premia. The second instrument is the interaction of national changes in industry wage premia and predicted future industry employment shares. I also exclude manufacturing industries from these instruments. I call these the BGS instruments.

Formally, let $v_n(t)$ be the national wage premium in industry n in time t, $\omega_{j,n}(t)$ be the share of local area j's employment working in industry n, and $\hat{\omega}_{j,n}(t)$ be the predicted share of local area j's employment working in industry n. The predicted share is predicted based on national employment changes in the same way as the Bartik instrument. The first instrument is then $\sum_{n \in N^S} v_n(t)(\hat{\omega}_{j,n}(t) - \omega_{j,n}(t-10))$ and the second instrument is $\sum_{n \in N^S} \hat{\omega}_{j,n}(t)(v_n(t) - v_n(t-10))$, where N^S is the set of non-manufacturing four-digit SIC or six-digit NAICS industries. National industry wage premia are based on fixed effects from a regression of establishment wages on industry dummy variables.

The main complication with constructing the Bartik and BGS instruments is that industry definitions change over time; in 1987, when industry definitions switch from 1972 SIC industry definitions to 1987 SIC industry definitions, and in 1997, when industry definitions switch from the 1987 SIC definitions to NAICS definitions. Thus, I often cannot construct exact 10 year instruments because industry definitions are not consistent over time. Instead, I use 10 year instruments for 1987, 1997, and 2002, and 5 year instruments and their lag for 1992 and 2007. For 1987, the instrument used is from 1977 to 1986; for 1997, from 1987 to 1997; and for 2002, from 1992 to 2001. For 1992, I use the 1982 to 1986 and 1987 to 1992 instruments. For 2007, I use the 1997 to 2001 and 2002 to 2007 instruments.

B Additional Empirical Results

B.1 Correlation of Factor Cost Ratio with Value Added

In order to further understand the relationship between value added and the capital cost to labor cost ratio, I run regressions of the log factor cost ratio on log value added, after weighting the data around a given value of log value added, examining values of log value added from 4 to 12. I weight using a normal kernel density with a bandwidth of 0.5; in unreported results, I find that my main findings are unaffected by the bandwidth. In Table A1, I report these results. The correlation is negative for small size plants, and more negative using the ASM data that include machinery rents. However, I continue to find substantial positive correlation between the factor cost ratio and log value added for the large plants in the sample, i.e. for a log value added measure between 10 and 12 (value added in the tens of millions to hundreds of millions of dollars, because value added is in the thousands of dollars).

Table A1 Correlations of Factor Cost Ratio with Value Added, Weighted Around a Value of Log Value Added

Log VA	1987	1992	1997	2002	2007
			CMF		
4	-0.081 *(0.0076)*	-0.075 *(0.006)*	-0.22 *(0.0045)*	0.046 *(0.01)*	0.01 *(0.01)*
5	-0.021 *(0.0049)*	-0.06 *(0.0044)*	-0.16 *(0.0042)*	-0.054 *(0.0067)*	-0.017 *(0.0056)*
6	0.018 *(0.0034)*	-0.029 *(0.0034)*	-0.063 *(0.0038)*	-0.025 *(0.0047)*	-0.041 *(0.0036)*
7	0.035 *(0.0029)*	0.0098 *(0.003)*	-0.0021 *(0.0034)*	0.021 *(0.0037)*	-0.079 *(0.0032)*
8	0.031 *(0.0031)*	0.045 *(0.0032)*	0.021 *(0.0035)*	0.025 *(0.0036)*	-0.074 *(0.0033)*
9	0.016 *(0.0039)*	0.056 *(0.0038)*	0.034 *(0.004)*	0.024 *(0.004)*	-0.05 *(0.0039)*
10	0.036 *(0.0052)*	0.067 *(0.0049)*	0.038 *(0.0051)*	0.039 *(0.0052)*	-0.01 *(0.0049)*
11	0.09 *(0.0075)*	0.094 *(0.0068)*	0.067 *(0.0066)*	0.063 *(0.0069)*	0.04 *(0.0066)*
12	0.062 *(0.0096)*	0.081 *(0.0089)*	0.06 *(0.0069)*	0.087 *(0.01)*	0.091 *(0.0098)*
			ASM		
4	-0.21 *(0.059)*	-0.32 *(0.04)*	-0.25 *(0.034)*	-0.25 *(0.051)*	-0.077 *(0.035)*
5	-0.17 *(0.031)*	-0.22 *(0.027)*	-0.22 *(0.024)*	-0.22 *(0.029)*	-0.23 *(0.034)*
6	-0.1 *(0.021)*	-0.14 *(0.018)*	-0.13 *(0.016)*	-0.2 *(0.02)*	-0.18 *(0.021)*
7	-0.01 *(0.012)*	-0.077 *(0.011)*	-0.025 *(0.013)*	-0.086 *(0.014)*	-0.092 *(0.013)*
8	0.014 *(0.0078)*	-0.018 *(0.009)*	0.019 *(0.01)*	-0.027 *(0.011)*	-0.044 *(0.0092)*
9	0.019 *(0.0064)*	0.055 *(0.0077)*	0.076 *(0.0087)*	0.024 *(0.0083)*	0.014 *(0.0078)*
10	0.057 *(0.0063)*	0.1 *(0.0084)*	0.099 *(0.008)*	0.071 *(0.0091)*	0.064 *(0.007)*
11	0.11 *(0.0077)*	0.1 *(0.0084)*	0.12 *(0.0095)*	0.095 *(0.0081)*	0.093 *(0.0077)*
12	0.086 *(0.011)*	0.096 *(0.011)*	0.1 *(0.01)*	0.091 *(0.011)*	0.11 *(0.011)*

Note: Each cell contains the coefficient from a regression with log value added as the independent variable and the factor cost ratio as the dependent variable, and includes controls for dummy variables for age and state, single establishment status and four digit SIC or six digit NAICS industry. Reported standard errors are robust to arbitrary degrees of heteroskedasticity. Each regression is weighted around a particular value of log value added from 4 to 12, using a normal density kernel with a bandwidth of 0.5.

B.2 Estimates Using the Plant-Level Wage

In my baseline empirical strategy, I use the local wage as the wage rate that the plant faces. In this section, I examine the alternative of using the plant level wage. I first show the data generating process required for the local wage or the plant wage to identify the elasticity. I then examine estimates of the correlation between the plant wage and local wage, as well as using the plant level wage for estimation of the capital-labor elasticity, in light of the theoretical results.

All variables listed below are in log form. I first assume that the wage the plant faces for a unit of human capital, w_i^P, both reflects the local wage, w_i^L, and a plant specific compensating differential, S_i. The observed plant level wage, $\hat{w}_i^P$, also includes the amount of human capital per worker, τ_i. Thus, we have that:

$$\begin{aligned} w_i^P &= w_i^L + S_i \\ \hat{w}_i^P &= w_i^P + \tau_i \end{aligned}$$

Because I construct the local wage averaging across workers or establishments in a location, the plant specific compensating differential should be mean zero conditional on the local wage:

$$E\left[S_i | w_i^L\right] = 0$$

This assumption implies that the covariance of the local wage w_i^L and the plant compensating differential S_i should be zero: $Cov\left(w_i^L, S_i\right) = 0$.

The true model for the factor cost ratio is:

$$y_i = \beta w_i^P + \varepsilon_i$$

where y_i is the factor cost ratio and $\beta = \sigma - 1$. For simplicity in demonstrating the differences between the plant level wage and local wage, I assume here that the error term ε_i is i.i.d and independent of right hand side variables and instruments.

The baseline OLS estimates use the local wage. Under this setup, we have that:

$$\frac{Cov\left(y_i, w_i^L\right)}{Var\left(w_i^L\right)} = \beta \frac{Cov\left(w_i^P, w_i^L\right)}{Var\left(w_i^L\right)} = \beta \frac{Cov\left(w_i^L + S_i, w_i^L\right)}{Var\left(w_i^L\right)} = \beta$$

Thus, OLS using the local wage identifies the elasticity of substitution.

Estimating the elasticity using an OLS regression with the plant level wage, we have that:

$$\begin{aligned} \frac{Cov\left(y_i, \hat{w}_i^P\right)}{Var\left(\hat{w}_i^P\right)} &= \beta \frac{Cov\left(w_i^P, \hat{w}_i^P\right)}{Var\left(\hat{w}_i^P\right)} = \beta \frac{Cov\left(\hat{w}_i^P - \tau, \hat{w}_i^P\right)}{Var\left(\hat{w}_i^P\right)} \\ &= \beta \left(1 - \frac{Cov\left(\tau_i, \hat{w}_i^P\right)}{Var\left(\hat{w}_i^P\right)}\right) \end{aligned}$$

So long as measured wages are correlated with skill, so $Cov\left(\tau_i, \hat{w}_i^P\right)$, which is likely, then OLS with the plant level wage will bias estimates of β towards zero, and so estimates of the elasticity σ towards one.

Next, I could instrument for the plant level wage using the local wage. (Similar issues would apply for other instruments.) In that case, we have that:

$$\frac{Cov\left(y_i, w_i^L\right)}{Cov\left(\hat{w}_i^P, w_i^L\right)} = \beta\frac{Cov\left(w_i^P, w_i^L\right)}{Cov\left(\hat{w}_i^P, w_i^L\right)} = \beta\frac{Var\left(w_i^L\right)+Cov\left(S_i, w_i^L\right)}{Var\left(w_i^L\right)+Cov\left(S, w_i^L\right)+Cov\left(\tau_i, w_i^L\right)}$$
$$= \beta\frac{Var\left(w_i^L\right)}{Var\left(w_i^L\right)+Cov\left(\tau_i, w_i^L\right)}$$

In this case, for identification of β, and so the elasticity σ, we require an additional assumption that $Cov\left(\tau_i, w_i^L\right)=0$. That is, we need that the degree of skill at the plant is uncorrelated with the local wage. If areas with higher wages also have workers with higher human capital, this correlation would be positive; otherwise, it would be negative.

I first examine the correlation between the plant wage and local wage, using both the worker based wage and establishment based wage, in Table A2. Each regression regresses the plant level wage, defined as total wage bill divided by total employment, against either the worker based local wage or establishment based local wage. Except for the 1997 local worker wage estimate, at 0.99, all estimates are significantly lower than one. The estimates across years for the worker based local wage range from 0.58 to 0.99, and the establishment based wage estimates range from 0.44 to 0.69. In addition, the establishment based wages, which will include observed skill differences, always have a lower correlation than the worker based wages which are purged of observed skill differences.

Table A2 Estimates of the Correlation between the Plant Level Wage and Local Wage

	Local Wage (Worker)	Local Wage (Establishment)
1987	0.77 *(0.03)*	0.62 *(0.03)*
1992	0.82 *(0.04)*	0.68 *(0.02)*
1997	0.99 *(0.04)*	0.69 *(0.03)*
2002	0.72 *(0.03)*	0.52 *(0.02)*
2007	0.58 *(0.03)*	0.44 *(0.02)*

Note: Standard errors are in parentheses. The table contains estimates of the correlation between the local wage and the plant-level wage, defined as total wage bill divided by total employment. All regressions include 4 digit SIC or 6 digit NAICS industry fixed effects, age fixed effects, and a multiunit status indicator and have standard errors clustered at the commuting zone level.

I then examine several specifications using the plant wage in Table A3. Estimates using OLS regressions with the plant wage are much higher than my baseline estimates, ranging from 0.77 to 0.94, consistent with the expected bias from the correlation of plant level skill with the measured plant level wage. Using either local wages as instruments or my previous instruments, I estimate slightly lower elasticities from 1987 through 1997. These estimates range between 0.25 and 0.35 using local wages, and between 0.14 and 0.4 using all of my three sets of instruments.

However, I obtain much lower estimates for 2002 and 2007 using instruments, with estimates between 0.01 and 0.05 using local wages and 0.13 and 0.14 using all three sets of instruments together. Elasticity estimates are negative for some of the specifications in these years. Overall, compared to the baseline estimates using the local wage, estimates using the plant level wage are highly variable both across specification and year.

Table A3 Estimates of the Capital-Labor Elasticity of Substitution Using Plant-Level Wages and Instruments

	OLS	Local Wage (Worker)	Local Wage (Establishment)	Amenities	Bartik	BGS	All
1987	0.84 *(0.01)*	0.27 *(0.07)*	0.25 *(0.07)*	0.32 *(0.10)*	0.24 *(0.10)*	0.28 *(0.10)*	0.33 *(0.06)*
1992	0.84 *(0.01)*	0.35 *(0.06)*	0.3 *(0.05)*	0.5 *(0.07)*	0.22 *(0.08)*	0.28 *(0.08)*	0.38 *(0.05)*
1997	0.77 *(0.01)*	0.28 *(0.06)*	0.25 *(0.06)*	0.44 *(0.07)*	0.19 *(0.18)*	0.14 *(0.13)*	0.32 *(0.06)*
2002	0.94 *(0.02)*	0.04 *(0.11)*	0.01 *(0.10)*	0.33 *(0.14)*	-0.47 *(0.30)*	-0.11 *(0.14)*	0.14 *(0.09)*
2007	0.81 *(0.02)*	0.05 *(0.10)*	0.05 *(0.09)*	0.17 *(0.13)*	-0.13 *(0.15)*	0.05 *(0.11)*	0.13 *(0.07)*

Note: Standard errors are in parentheses. The table contains estimates of the elasticity of substitution using the plant-level wage, defined as total wage bill divided by total employment. The second column reports OLS results, wheas all other columns use an instrument: either the local wage using worker based wages, the local wage using establishment based wages, the amenity instruments, Bartik instruments, BGS instruments, or the amenity, Bartik, and BGS instruments combined. All regressions include 4 digit SIC or 6 digit NAICS industry fixed effects, age fixed effects, and a multiunit status indicator and have standard errors clustered at the commuting zone level. Instruments are as defined in the text.

B.3 Ex-Post Instrument Specification Tests

Because I have three sets of instruments, I can conduct ex-post specification tests in order to test the plausible exogeneity of the instruments I have used. I conduct these tests in two different ways. First, I conduct heteroskedasticity robust Hausman tests. Second, in order to see the magnitude of discrepancies from instrument exogeneity, I regress the residual from a regression with one set of instruments on another set of excluded instruments.

I estimate heteroskedasticity robust Hausman tests for the amenity instruments, Bartik instrument, and BGS instruments separately.[27] In Table A4, I report the p-values for these tests. In all years, I strongly reject exogeneity for the amenity instruments. At the 5% level, I can reject the null of exogeneity for 2 out of 5 years for the Bartik instrument, and 2 out of 5 years for the BGS instruments.

Next, I run the instrumented regression using one set of instruments, excluding the other two sets of instruments, and regress the residual from this regression on each of the excluded

[27] See Section 6.3.2 of Wooldridge (2010) for the details of these tests.

Table A4 P-Values from Heteroskedasticity Robust Hausman Tests

Instrument Set	1987	1992	1997	2002	2007
Amenities	0	0	0	0	0
Bartik	0.80	0.011	0.96	1.35e-5	0.102
BGS	0.24	0.27	1.36e-8	4.44e-4	0.23

Note: This table reports the p-values from a heteroskedasticity robust Hausman test, conducted as in Section 6.3.2 of Wooldridge (2010), for each year and subset of instruments.

instruments in turn. I normalize these instruments by subtracting the mean and dividing by the standard deviation. Thus, the effects reported denote the percent change for the residual from a one standard deviation change in the instrument. For the amenity instruments, given the large number of instruments, I report the estimates for the number of average precipitation, average sunlight, the number of heating degree days, and the number of cooling degree days.

Table A5 contains the estimates from these specification tests for 1987, 1997, and 2002, the three years when I can calculate 10 year Bartik and BGS instruments. In general, the magnitude of a one standard deviation change in the instrument is relatively small, with most effects close to zero and the highest effects at about a 2% increase in the residual for a one standard deviation change in the instrument. The Bartik and BGS instruments are never statistically significant at the 5% level in any of the specifications. A few of the amenity instruments are statistically significant, but never for all three years examined. If I regress the residual against all amenity instruments used in the article, the R^2 is extremely small, ranging from between 0.001 and 0.0015. Overall, these instrument specification tests reveal small departures from plausible exogeneity, with most of these departures concentrated in the amenity instruments.

B.4 Industry Level Estimates

This section includes tables of plant capital-labor substitution elasticity estimates across 2 digit and 4 digit industries, using worker based wages, establishment based wages, and instrumenting for the establishment based wage using all three sets of instruments.

Table A5 Instrument Specification Tests

Instrument	1987	1997	2002
	Amenity and BGS Instruments Excluded		
BGS Instrument 1	-0.0052 *(0.0068)*	-0.0036 *(0.0091)*	0.0061 *(0.0071)*
T-Stat	-0.76	-0.40	0.86
BGS Instrument 2	-0.0008 *(0.0047)*	0.012 *(0.0069)*	0.0094 *(0.0089)*
T-Stat	-0.17	1.74	1.06
Heating Degree Days	0.00027 *(0.0065)*	0.013 *(0.0072)*	0.021 *(0.0081)*
T-Stat	0.04	1.81	2.59
Cooling Degree Days	0.01 *(0.0066)*	0.0012 *(0.0028)*	-0.0093 *(0.0042)*
T-Stat	1.52	0.43	-2.21
Average Precipitation	0.0053 *(0.0057)*	0.019 *(0.0066)*	0.017 *(0.0096)*
T-Stat	0.93	2.88	1.77
Average Sunshine	-0.0017 *(0.0048)*	-0.012 *(0.0058)*	-0.019 *(0.0066)*
T-Stat	-0.35	-2.07	-2.88
	Amenity and Bartik Instruments Excluded		
Bartik Instrument	0.0085 *(0.0055)*	0.0017 *(0.0047)*	-0.0056 *(0.011)*
T-Stat	1.55	0.36	-0.51
Heating Degree Days	-0.00082 *(0.0061)*	0.012 *(0.0071)*	0.021 *(0.0081)*
T-Stat	-0.13	1.69	2.59
Cooling Degree Days	0.0095 *(0.0066)*	0.00072 *(0.003)*	-0.0085 *(0.004)*
T-Stat	1.44	0.24	-2.13
Average Precipitation	0.004 *(0.0051)*	0.019 *(0.0064)*	0.017 *(0.0098)*
T-Stat	0.78	2.97	1.73
Average Sunshine	-0.00059 *(0.0042)*	-0.012 *(0.0057)*	-0.019 *(0.0067)*
T-Stat	-0.14	-2.11	-2.84
	Bartik and BGS Instruments Excluded		
BGS Instrument 1	-0.0025 *(0.0071)*	-0.0034 *(0.0092)*	-0.0049 *(0.0067)*
T-Stat	-0.35	-0.37	-0.73
BGS Instrument 2	-0.00051 *(0.0048)*	0.012 *(0.0069)*	0.011 *(0.0084)*
T-Stat	-0.11	1.74	1.31
Bartik Instrument	0.0043 *(0.0055)*	0.000062 *(0.0046)*	-0.011 *(0.011)*
T-Stat	0.78	0.01	-1.00

Note: All regressions have as dependent variable the residual of an instrumented regression of the plant factor cost ratio on the local, establishment based wage. The independent variable is one of the excluded instruments, normalized by subtracting the mean and dividing by the standard deviation.

Table A6 Elasticities of Substitution between Labor and Capital for Two Digit SIC Industries Using Worker Based Wages

Industry	1987	1992	1997	N (1987)
20: Food Products	0.60 *(0.06)*	0.69 *(0.08)*	0.63 *(0.09)*	≈ 11,200
22: Textiles	0.58 *(0.16)*	0.64 *(0.18)*	0.39 *(0.19)*	≈ 3,580
23: Apparel	0.94 *(0.10)*	0.73 *(0.05)*	0.36 *(0.09)*	≈ 12,800
24: Lumber and Wood	0.19 *(0.08)*	0.47 *(0.08)*	0.09 *(0.10)*	≈ 15,500
25: Furniture	0.19 *(0.10)*	0.43 *(0.10)*	-0.17 *(0.20)*	≈ 5,720
26: Paper	0.22 *(0.10)*	0.35 *(0.09)*	0.46 *(0.10)*	≈ 4,280
27: Printing and Publishing	0.45 *(0.04)*	0.34 *(0.05)*	0.26 *(0.07)*	≈ 27,800
28: Chemicals	0.31 *(0.12)*	0.26 *(0.12)*	0.09 *(0.13)*	≈ 7,040
29: Petroleum Refining	0.45 *(0.18)*	1.15 *(0.18)*	0.47 *(0.23)*	≈ 1,670
30: Rubber	0.45 *(0.12)*	0.44 *(0.11)*	0.23 *(0.10)*	≈ 8,630
31: Leather	0.70 *(0.22)*	0.54 *(0.19)*	0.45 *(0.29)*	≈ 1,000
32: Stone, Clay, Glass, Concrete	0.20 *(0.11)*	0.58 *(0.11)*	0.26 *(0.13)*	≈ 9,360
33: Primary Metal	0.40 *(0.12)*	0.32 *(0.10)*	0.21 *(0.17)*	≈ 4,380
34: Fabricated Metal	0.24 *(0.07)*	0.38 *(0.07)*	0.14 *(0.09)*	≈ 21,000
35: Machinery	0.47 *(0.05)*	0.47 *(0.06)*	0.38 *(0.08)*	≈ 26,100
36: Electrical Machinery	0.42 *(0.10)*	0.47 *(0.11)*	0.52 *(0.11)*	≈ 8,300
37: Transportation Equip	0.59 *(0.13)*	0.70 *(0.14)*	0.47 *(0.12)*	≈ 5,130
38: Instruments	0.61 *(0.11)*	0.39 *(0.10)*	0.41 *(0.11)*	≈ 4,680
39: Misc	0.33 *(0.10)*	0.25 *(0.11)*	-0.00 *(0.11)*	≈ 6,900

Note: All regressions include 4 digit SIC industry fixed effects, age fixed effects, and a multiunit status indicator and have standard errors clustered at the commuting zone level. Wages are based upon worker data and as defined in the text.

Table A7 Elasticities of Substitution between Labor and Capital for Two Digit SIC Industries Using Establishment Based Wages

Industry	1987	1992	1997	N (1987)
20: Food Products	0.68 *(0.05)*	0.74 *(0.07)*	0.74 *(0.07)*	≈ 11,200
22: Textiles	0.68 *(0.12)*	0.67 *(0.15)*	0.52 *(0.13)*	≈ 3,580
23: Apparel	0.99 *(0.07)*	0.78 *(0.05)*	0.52 *(0.07)*	≈ 12,800
24: Lumber and Wood	0.37 *(0.06)*	0.47 *(0.06)*	0.34 *(0.07)*	≈ 15,500
25: Furniture	0.30 *(0.08)*	0.42 *(0.09)*	0.17 *(0.13)*	≈ 5,720
26: Paper	0.36 *(0.08)*	0.43 *(0.09)*	0.17 *(0.13)*	≈ 4,280
27: Printing and Publishing	0.51 *(0.03)*	0.39 *(0.04)*	0.44 *(0.05)*	≈ 27,800
28: Chemicals	0.44 *(0.12)*	0.29 *(0.12)*	0.25 *(0.11)*	≈ 7,040
29: Petroleum Refining	0.50 *(0.15)*	1.04 *(0.17)*	0.57 *(0.18)*	≈ 1,670
30: Rubber	0.53 *(0.10)*	0.50 *(0.08)*	0.45 *(0.08)*	≈ 8,630
31: Leather	0.80 *(0.18)*	0.59 *(0.16)*	0.53 *(0.19)*	≈ 1,000
32: Stone, Clay, Glass, Concrete	0.39 *(0.09)*	0.68 *(0.09)*	0.44 *(0.09)*	≈ 9,360
33: Primary Metal	0.58 *(0.09)*	0.39 *(0.08)*	0.44 *(0.11)*	≈ 4,380
34: Fabricated Metal	0.40 *(0.06)*	0.43 *(0.06)*	0.38 *(0.06)*	≈ 21,000
35: Machinery	0.59 *(0.04)*	0.57 *(0.06)*	0.58 *(0.06)*	≈ 26,100
36: Electrical Machinery	0.54 *(0.09)*	0.59 *(0.09)*	0.61 *(0.07)*	≈ 8,300
37: Transportation Equip	0.64 *(0.10)*	0.69 *(0.12)*	0.65 *(0.09)*	≈ 5,130
38: Instruments	0.60 *(0.09)*	0.39 *(0.10)*	0.54 *(0.09)*	≈ 4,680
39: Misc	0.40 *(0.08)*	0.29 *(0.09)*	0.24 *(0.09)*	≈ 6,900

Note: All regressions include 4 digit SIC industry fixed effects, age fixed effects, and a multiunit status indicator and have standard errors clustered at the commuting zone level. Wages are based upon establishment data and as defined in the text.

Table A8 Elasticities of Substitution between Labor and Capital for Two Digit SIC Industries Using All Instruments

Industry	1987	1992	1997	N (1987)
20: Food Products	0.65 *(0.06)*	0.62 *(0.09)*	0.67 *(0.09)*	≈ 11,200
22: Textiles	0.64 *(0.12)*	0.78 *(0.16)*	0.47 *(0.16)*	≈ 3,580
23: Apparel	0.93 *(0.09)*	0.77 *(0.05)*	0.39 *(0.07)*	≈ 12,800
24: Lumber and Wood	0.34 *(0.10)*	0.53 *(0.09)*	0.28 *(0.10)*	≈ 15,500
25: Furniture	0.23 *(0.08)*	0.35 *(0.11)*	0.02 *(0.20)*	≈ 5,720
26: Paper	0.28 *(0.10)*	0.41 *(0.08)*	0.40 *(0.10)*	≈ 4,280
27: Printing and Publishing	0.52 *(0.04)*	0.34 *(0.04)*	0.37 *(0.06)*	≈ 27,800
28: Chemicals	0.31 *(0.12)*	0.18 *(0.13)*	0.15 *(0.13)*	≈ 7,040
29: Petroleum Refining	0.49 *(0.19)*	1.13 *(0.22)*	0.51 *(0.23)*	≈ 1,670
30: Rubber	0.50 *(0.14)*	0.45 *(0.11)*	0.39 *(0.10)*	≈ 8,630
31: Leather	0.68 *(0.20)*	0.55 *(0.17)*	0.66 *(0.21)*	≈ 1,000
32: Stone, Clay, Glass, Concrete	0.23 *(0.12)*	0.64 *(0.13)*	0.29 *(0.13)*	≈ 9,360
33: Primary Metal	0.49 *(0.11)*	0.48 *(0.10)*	0.29 *(0.16)*	≈ 4,380
34: Fabricated Metal	0.38 *(0.07)*	0.41 *(0.07)*	0.31 *(0.09)*	≈ 21,000
35: Machinery	0.57 *(0.05)*	0.54 *(0.06)*	0.52 *(0.07)*	≈ 26,100
36: Electrical Machinery	0.48 *(0.11)*	0.59 *(0.10)*	0.63 *(0.09)*	≈ 8,300
37: Transportation Equip	0.76 *(0.14)*	0.60 *(0.13)*	0.62 *(0.12)*	≈ 5,130
38: Instruments	0.63 *(0.11)*	0.51 *(0.13)*	0.47 *(0.10)*	≈ 4,680
39: Misc	0.33 *(0.09)*	0.21 *(0.10)*	0.17 *(0.11)*	≈ 6,900

Note: All regressions include 4 digit SIC industry fixed effects, age fixed effects, and a multiunit status indicator and have standard errors clustered at the commuting zone level. Wages are based upon establishment data and as defined in the text. Instruments include amenity, Bartik, and BGS instruments together and are as defined in the text.

Table A9 Elasticities of Substitution between Labor and Capital for Three Digit NAICS Industries Using Worker Based Wages

Industry	1997	2002	2007	N (1997)
311: Food Products	0.51 *(0.07)*	0.69 *(0.09)*	0.70 *(0.08)*	≈ 15,000
312: Beverage	1.10 *(0.36)*	1.07 *(0.22)*	1.09 *(0.27)*	≈ 1,380
313: Textiles	0.35 *(0.25)*	0.04 *(0.19)*	-0.14 *(0.25)*	≈ 2,650
314: Textile Products	0.23 *(0.13)*	-0.02 *(0.20)*	0.70 *(0.14)*	≈ 4,130
315: Apparel	0.34 *(0.10)*	0.23 *(0.17)*	0.42 *(0.16)*	≈ 10,200
316: Leather	0.44 *(0.28)*	0.63 *(0.31)*	0.78 *(0.44)*	≈ 914
321: Wood Products	0.09 *(0.10)*	-0.38 *(0.15)*	-0.04 *(0.08)*	≈ 11,000
322: Paper	0.38 *(0.11)*	0.37 *(0.12)*	0.52 *(0.15)*	≈ 4,420
323: Printing	0.26 *(0.07)*	0.50 *(0.08)*	0.61 *(0.06)*	≈ 23,900
324: Petroleum Refining	0.47 *(0.23)*	0.33 *(0.24)*	0.42 *(0.21)*	≈ 1,620
325: Chemicals	0.12 *(0.13)*	0.08 *(0.14)*	0.06 *(0.14)*	≈ 8,370
326: Rubber	0.26 *(0.10)*	0.39 *(0.11)*	0.19 *(0.10)*	≈ 11,300
327: Stone, Clay, Glass, Concrete	0.25 *(0.13)*	0.00 *(0.13)*	0.39 *(0.11)*	≈ 10,600
331: Primary Metal	0.31 *(0.16)*	0.19 *(0.17)*	0.44 *(0.22)*	≈ 3,560
332: Fabricated Metal	0.33 *(0.07)*	0.45 *(0.10)*	0.45 *(0.06)*	≈ 37,700
333: Machinery	0.16 *(0.11)*	0.15 *(0.09)*	0.43 *(0.08)*	≈ 18,500
334: Computers	0.50 *(0.10)*	0.50 *(0.14)*	0.44 *(0.12)*	≈ 9,230
335: Electrical Equip	0.28 *(0.18)*	0.25 *(0.19)*	0.57 *(0.18)*	≈ 4,080
336: Transportation Equip	0.45 *(0.11)*	0.44 *(0.17)*	0.21 *(0.15)*	≈ 7,030
337: Furniture	-0.02 *(0.15)*	0.11 *(0.15)*	0.49 *(0.11)*	≈ 10,300
339: Misc	0.15 *(0.09)*	0.21 *(0.10)*	0.62 *(0.06)*	≈ 12,500

Note: All regressions include 6 digit NAICS industry fixed effects, age fixed effects, and a multiunit status indicator and have standard errors clustered at the commuting zone level. Wages are based upon worker data and as defined in the text.

Table A10 Elasticities of Substitution between Labor and Capital for Three Digit NAICS Industries Using Establishment Based Wages

Industry	1997	2002	2007	N (1997)
311: Food Products	0.64 *(0.05)*	0.75 *(0.06)*	0.76 *(0.06)*	≈ 15,000
312: Beverage	1.14 *(0.25)*	1.07 *(0.17)*	1.11 *(0.22)*	≈ 1,380
313: Textiles	0.52 *(0.18)*	0.23 *(0.14)*	0.12 *(0.20)*	≈ 2,650
314: Textile Products	0.38 *(0.10)*	0.24 *(0.15)*	0.76 *(0.12)*	≈ 4,130
315: Apparel	0.55 *(0.09)*	0.44 *(0.13)*	0.59 *(0.13)*	≈ 10,200
316: Leather	0.52 *(0.19)*	0.70 *(0.24)*	0.90 *(0.32)*	≈ 914
321: Wood Products	0.38 *(0.08)*	0.06 *(0.10)*	0.28 *(0.07)*	≈ 11,000
322: Paper	0.58 *(0.08)*	0.55 *(0.09)*	0.64 *(0.11)*	≈ 4,420
323: Printing	0.43 *(0.05)*	0.60 *(0.06)*	0.67 *(0.04)*	≈ 23,900
324: Petroleum Refining	0.57 *(0.18)*	0.37 *(0.18)*	0.69 *(0.16)*	≈ 1,620
325: Chemicals	0.29 *(0.10)*	0.23 *(0.10)*	0.24 *(0.12)*	≈ 8,370
326: Rubber	0.47 *(0.08)*	0.54 *(0.08)*	0.40 *(0.07)*	≈ 11,300
327: Stone, Clay, Glass, Concrete	0.44 *(0.09)*	0.31 *(0.09)*	0.60 *(0.08)*	≈ 10,600
331: Primary Metal	0.48 *(0.11)*	0.36 *(0.11)*	0.49 *(0.15)*	≈ 3,560
332: Fabricated Metal	0.50 *(0.05)*	0.59 *(0.07)*	0.57 *(0.05)*	≈ 37,700
333: Machinery	0.49 *(0.08)*	0.41 *(0.06)*	0.59 *(0.06)*	≈ 18,500
334: Computers	0.57 *(0.08)*	0.60 *(0.11)*	0.56 *(0.10)*	≈ 9,230
335: Electrical Equip	0.51 *(0.12)*	0.43 *(0.14)*	0.66 *(0.15)*	≈ 4,080
336: Transportation Equip	0.63 *(0.08)*	0.59 *(0.11)*	0.44 *(0.10)*	≈ 7,030
337: Furniture	0.25 *(0.09)*	0.30 *(0.11)*	0.55 *(0.09)*	≈ 10,300
339: Misc	0.35 *(0.07)*	0.44 *(0.09)*	0.68 *(0.05)*	≈ 12,500

Note: All regressions include 6 digit NAICS industry fixed effects, age fixed effects, and a multiunit status indicator and have standard errors clustered at the commuting zone level. Wages are based upon establishment data and as defined in the text.

Table A11 Elasticities of Substitution between Labor and Capital for Three Digit NAICS Industries Using All Instruments

Industry	1997	2002	2007	N (1997)
311: Food Products	0.59 *(0.07)*	0.74 *(0.09)*	0.71 *(0.07)*	≈ 15,000
312: Beverage	0.87 *(0.35)*	0.86 *(0.23)*	1.2 *(0.25)*	≈ 1,380
313: Textiles	0.35 *(0.20)*	0.15 *(0.17)*	0.06 *(0.23)*	≈ 2,650
314: Textile Products	0.18 *(0.12)*	0.20 *(0.17)*	0.66 *(0.14)*	≈ 4,130
315: Apparel	0.44 *(0.09)*	0.40 *(0.16)*	0.52 *(0.16)*	≈ 10,200
316: Leather	0.60 *(0.20)*	0.51 *(0.29)*	0.84 *(0.38)*	≈ 914
321: Wood Products	0.36 *(0.12)*	-0.09 *(0.15)*	0.24 *(0.08)*	≈ 11,000
322: Paper	0.36 *(0.11)*	0.53 *(0.12)*	0.63 *(0.14)*	≈ 4,420
323: Printing	0.37 *(0.06)*	0.60 *(0.07)*	0.69 *(0.05)*	≈ 23,900
324: Petroleum Refining	0.50 *(0.23)*	0.21 *(0.27)*	0.75 *(0.22)*	≈ 1,620
325: Chemicals	0.21 *(0.12)*	0.13 *(0.13)*	0.28 *(0.14)*	≈ 8,370
326: Rubber	0.40 *(0.11)*	0.41 *(0.10)*	0.29 *(0.09)*	≈ 11,300
327: Stone, Clay, Glass, Concrete	0.29 *(0.13)*	0.32 *(0.13)*	0.58 *(0.11)*	≈ 10,600
331: Primary Metal	0.32 *(0.15)*	0.13 *(0.13)*	0.58 *(0.11)*	≈ 3,560
332: Fabricated Metal	0.46 *(0.06)*	0.57 *(0.09)*	0.52 *(0.05)*	≈ 37,700
333: Machinery	0.40 *(0.10)*	0.31 *(0.08)*	0.54 *(0.07)*	≈ 18,500
334: Computers	0.54 *(0.10)*	0.63 *(0.12)*	0.55 *(0.11)*	≈ 9,230
335: Electrical Equip	0.57 *(0.14)*	0.26 *(0.17)*	0.60 *(0.19)*	≈ 4,080
336: Transportation Equip	0.61 *(0.12)*	0.44 *(0.14)*	0.33 *(0.12)*	≈ 7,030
337: Furniture	0.11 *(0.14)*	0.16 *(0.14)*	0.52 *(0.10)*	≈ 10,300
339: Misc	0.27 *(0.09)*	0.39 *(0.11)*	0.62 *(0.06)*	≈ 12,500

Note: All regressions include 6 digit NAICS industry fixed effects, age fixed effects, and a multiunit status indicator and have standard errors clustered at the commuting zone level. Wages are based upon establishment data and as defined in the text. Instruments include amenity, Bartik, and BGS instruments together and are as defined in the text.

Table A12 Elasticities of Substitution between Labor and Capital for Large Four Digit Industries Using Worker Based Wages

Industry	1987	1992	1997	N (1987)
2711: Newspaper Publishing	0.20 *(0.11)*	0.05 *(0.09)*		≈ 3,840
2752: Commercial Printing, Lithographic	0.63 *(0.06)*	0.48 *(0.10)*	0.28 *(0.08)*	≈ 11,900
3272: Concrete Products, Except Block and Brick	0.25 *(0.15)*	0.88 *(0.18)*	0.15 *(0.23)*	≈ 1,850
3273: Ready Mixed Concrete	0.17 *(0.18)*	0.66 *(0.16)*	0.11 *(0.18)*	≈ 3,510
3441: Fabricated Structural Metal	0.04 *(0.14)*	0.51 *(0.19)*	0.50 *(0.22)*	≈ 1,490
3444: Sheet Metal Work	0.31 *(0.16)*	0.74 *(0.13)*	0.24 *(0.20)*	≈ 2,760
2051: Bread and other Bakery Products	0.84 *(0.19)*	1.14 *(0.20)*	0.89 *(0.21)*	≈ 986
2421: Sawmills and Planing Mills	0.61 *(0.18)*	0.79 *(0.17)*	0.55 *(0.16)*	≈ 3,120
2431: Millwork	-0.18 *(0.15)*	0.36 *(0.17)*	0.01 *(0.19)*	≈ 1,490
2434: Wood Kitchen Cabinets	-0.02 *(0.17)*	0.74 *(0.16)*	0.34 *(0.22)*	≈ 1,730

Note: All regressions include age fixed effects, and a multiunit status indicator and have standard errors clustered at the commuting zone level. Wages are based upon worker data and as defined in the text.

Table A13 Elasticities of Substitution between Labor and Capital for Large Four Digit Industries Using Establishment Based Wages

Industry	1987	1992	1997	N (1987)
2711: Newspaper Publishing	0.36 *(0.09)*	0.25 *(0.07)*		≈ 3,840
2752: Commercial Printing, Lithographic	0.65 *(0.05)*	0.50 *(0.08)*	0.42 *(0.05)*	≈ 11,900
3272: Concrete Products, Except Block and Brick	0.38 *(0.13)*	0.85 *(0.14)*	0.25 *(0.16)*	≈ 1,850
3273: Ready Mixed Concrete	0.36 *(0.14)*	0.82 *(0.13)*	0.34 *(0.13)*	≈ 3,510
3441: Fabricated Structural Metal	0.26 *(0.13)*	0.47 *(0.15)*	0.67 *(0.15)*	≈ 1,490
3444: Sheet Metal Work	0.41 *(0.14)*	0.70 *(0.12)*	0.42 *(0.14)*	≈ 2,760
2051: Bread and other Bakery Products	0.84 *(0.17)*	1.08 *(0.14)*	0.64 *(0.12)*	≈ 986
2421: Sawmills and Planing Mills	0.67 *(0.13)*	0.81 *(0.14)*	0.64 *(0.12)*	≈ 3,120
2431: Millwork	0.05 *(0.13)*	0.31 *(0.14)*	0.32 *(0.13)*	≈ 1,490
2434: Wood Kitchen Cabinets	0.19 *(0.15)*	0.59 *(0.13)*	0.42 *(0.15)*	≈ 1,730

Note: All regressions include age fixed effects, and a multiunit status indicator and have standard errors clustered at the commuting zone level. Wages are based upon establishment data and as defined in the text.

Table A14 Elasticities of Substitution between Labor and Capital for Large Four Digit Industries Using All Instruments

Industry	1987	1992	1997	N (1987)
2711: Newspaper Publishing	0.37 *(0.13)*	0.19 *(0.09)*		$\approx$ 3,840
2752: Commercial Printing, Lithographic	0.69 *(0.06)*	0.48 *(0.09)*	0.40 *(0.06)*	$\approx$ 11,900
3272: Concrete Products, Except Block and Brick	0.37 *(0.17)*	0.81 *(0.19)*	0.06 *(0.20)*	$\approx$ 1,850
3273: Ready Mixed Concrete	0.12 *(0.20)*	0.82 *(0.18)*	0.21 *(0.16)*	$\approx$ 3,510
3441: Fabricated Structural Metal	0.20 *(0.15)*	0.50 *(0.19)*	0.61 *(0.20)*	$\approx$ 1,490
3444: Sheet Metal Work	0.55 *(0.19)*	0.74 *(0.15)*	0.37 *(0.19)*	$\approx$ 2,760
2051: Bread and other Bakery Products	0.86 *(0.20)*	1.02 *(0.20)*	1.21 *(0.23)*	$\approx$ 986
2421: Sawmills and Planing Mills	0.64 *(0.23)*	0.84 *(0.22)*	0.65 *(0.19)*	$\approx$ 3,120
2431: Millwork	-0.02 *(0.14)*	0.25 *(0.15)*	0.20 *(0.16)*	$\approx$ 1,490
2434: Wood Kitchen Cabinets	0.14 *(0.19)*	0.63 *(0.17)*	0.27 *(0.19)*	$\approx$ 1,730

Note: All regressions include age fixed effects, and a multiunit status indicator and have standard errors clustered at the commuting zone level. Wages are based upon establishment data and as defined in the text. Instruments include amenity, Bartik, and BGS instruments together and are as defined in the text.