perfectly negatively correlated [19], Aigner (1973) found the amount of attenuation bias depends on the probability a city's housing supply is indicated as being relatively inelastic when it truly is, and on the probability a city's housing supply is indicated as being relatively inelastic when it actually is not. Further, Card (1996) determined, in the case of a multivariate regression, this attenuation bias is also affected by how correlated the additional regressors are with the elasticity of housing supply; in this case, how correlated the *measures* of the housing supply elasticity are with the Bartik shock. The more correlation there is between the Bartik shock and the housing supply elasticity, the greater the attenuation bias. The sign (and size) of this attenuation bias is unclear without knowledge of the aforementioned probabilities and correlation.

Saks (2008) constructs a composite index from six surveys of housing supply regulations. These surveys covered various jurisdictions from cities to states and date from the mid-1970s to the late-1980s; all but one survey collected data before 1985[20]. However, not all metropolitan areas are surveyed in each source - Saks is able to generate the composite index for only 83 metropolitan areas. As a quick check on the persistence of housing supply regulations, I visually compared the ranking of MSAs using the composite index of Saks (2008) with the ranking of MSAs under the WRLURI. While each index doesn't observe all of the same metro areas, cities that tend to be highly ranked using Saks' index are also highly ranked under the WRLURI; many low ranked cities in Saks' index have similarly low ranks in the WRLURI. While not an ideal test, this suggests there is some degree of persistence in relative housing supply elasticity.

The second threat to identification with my estimation strategy is the assumption of exogeneity. The Bartik instrument must be uncorrelated with the error term and also must satisfy the exclusion restriction. While I estimate reduced form equations based on analytic results from the model, where exogeneity is a structural assumption, the reliability of my reduced form estimates depends on the empirical validity of exogeneity. To address this threat to identification, I employ an instrument for changes in U.S. value added shares in a robustness check.

7.2 An Instrument for the Bartik Shock

To ensure the instrument meets the exclusion restriction, some authors compute the Bartik instrument by leaving out each city's own contribution to national changes. However, this could create new problems when industries are concentrated in one or a few cities. For example, 20% of total

[19] If the dummy is equal to 1, measurement error can only be negative. If it is equal to zero, then measurement error is positive. Hence, mismeasurement is perfectly negatively correlated with the true value of the dummy variable.

[20] I have a plan to estimate the attenuation bias and recover unbiased estimates. Card (1996) implements a method for estimating the attenuation bias; I think I can implement a similar procedure using the MSA data from Saks (2008) together with the WRLURI data in a linear probability model to estimate the two probabilities discussed above. If I then estimate the correlation between the Bartik shock and the measures of housing supply elasticity using OLS, this will let me estimate the attenuation bias, and then to produce an estimate of the unbiased betas.

employment in the "Coke and refined petroleum products" industry was located within the Houston, TX MSA in 2010, up from 10% in 1980. Los Angeles, CA was home to 15% of the "Textiles, wearing apparel, leather, and related products" industry in 2010. Additionally, at least 10% of total employment in multiple industries across all years is concentrated within the New York, NY MSA. Ideally, construction of the instrument should include these MSAs in national trends to maximize the power of the instrument. Including these localities, however, could violate the exclusion restriction as many city-level characteristics are influenced by the composition of local industry. While the data on changes in value added shares in the U.S. does not allow a cities own contribution to be removed, the international scope of EU KLEMS admits an alternate strategy: I can use change sin value added shares from 10 other OECD countries. The trends in value-added shares across skill intensity in these countries closely matches the trends in the United States[21], and yet are unlikely to be correlated with any local characteristics of U.S. cities [22]

I construct an instrument for the Bartik shock using the change in value-added share by industry as measured by the *average* change in value-added shares across 10 OECD countries[23]. In other words, I recalculate the Bartik shock as,

$$Bartik_{c,t}^{OECD} = \sum_{j=1}^{J} \varphi_{c,j,t-10} \times \left(\frac{\overline{v}_{j,t}^{OECD} - \overline{v}_{c,t-10}^{OECD}}{\overline{v}_{c,t-10}^{OECD}}\right), t \in \{1990, 2000, 2010\} \tag{17}$$

where $\varphi_{c,j,t-10}$ is industry j's share of city c employment at time $t-10$ and $\overline{v}_{j,t}^{OECD}$ is industry j's average share of gross value added across 10 OECD countries at time t. I use $Bartik_{c,t}^{OECD}$ - the *OECD Bartik shock* - as an instrument for $Bartik_{c,t}$, and re-estimate equation 15.

The trend in value-added shares across industries are quite similar among all 11 OECD countries, but *changes* in the share of value added by industry in OECD countries should be uncorrelated with any local characteristics of U.S. cities.

7.2.1 First-Stage Results

The instrumental variables approach to estimating equation 15 treats $\triangle Bartik_{ct}$ and $D_c \times \triangle Bartik_{ct}$ as endogenous regressors. Hence, at least two excluded instruments are needed for a just-identified model. I use both $\triangle Bartik_{ct}^{OECD}$ and $D_c \times \triangle Bartik_{ct}^{OECD}$ as instruments for the respective right-

[21] See Buera, Kaboski, and Rogerson (2015) for detailed documentation of these similarities.

[22] This method is similar in application to Ellison, Glaeser, and Kerr (2010) who use input-output measures for UK industries as instruments for U.S. input-output relationships to obtain measures of agglomeration forces (i.e., Marshallian factors) that are orthogonal to endogenous variation in the coagglomeration patterns of U.S. industry. That is, if two industries are coagglomerated in the U.S. because of a geographic accident (e.g., bauxite deposits happen to be located near sugar canes), this is unlikely to be the case in the United Kingdom.

[23] These 10 OECD countries are: Austria, Belgium, Spain, Finland, France, Germany, Italy, Japan, Netherlands, and the United Kingdom.

hand side endogenous variables. Thus, I must estimate two first-stages - one for each excluded instrument.

Table 7 shows the results of each first-stage using the change in the OECD Bartik Shock and its interaction with local housing supply elasticity as instruments for changes in the U.S. Bartik Shock across housing supply elasticity. Columns (1) and (2) show how well the OECD Bartik shock predicts the change in the U.S. Bartik shock without the inclusion of any included exogenous regressors other than decade fixed effects. Columns (3) and (4) add controls for changes in local amenities as included exogenous regressors. Columns (5) and (6) add the local mean wage and rent in 1980 as included exogenous regressors. We see the predictive power is strong in all cases: the coefficients on the instruments are statistically significant and close to one across all columns, though the interacted instrument is not too correlated with the noninteracted Bartik shock, though this isn't surprising. The Kleibergen-Paap rk Wald F statistic[24], a heteroskedastic-robust weak identification test of the excluded instruments, ranges between 115 and 107 when using the WRLURI and between 82 and 80 when using the LUI. These values are relative to a critical value of 7.03 under the most rigorous size reported[25].

7.2.2 Instrumental Variables Results

Table 8 presents the results of estimating equation 15 when the Bartik Shock is instrumented by the OECD Bartik Shock, estimated using 2-step Generalized Method of Moments (GMM). Columns (1)-(3) report estimates of the effect of the Bartik shock on the mean wage paid to native workers, columns (4)-(6) report estimates of the effect of the Bartik shock on the mean wage paid to foreign-born workers, and columns (7)-(9) report estimates of the effect of the Bartik shock on mean rent. All columns include decade fixed effects, the second column for each dependent variable adds controls for the change in local amenities, and the third column for each dependent variable adds additional controls for the average MSA wage and rent in 1980 as pre-period controls. Panel A reports estimates using the WRLURI measure of housing supply elasticity, while Panel B reports estimates using the LUI measure of housing supply elasticity.

Focusing on Panel A, I find the results across every dependent variable are quite similar to the OLS estimates in section 6.1. Like in Table 5, I find the average wage paid to natives increases as a result of the Bartik shock in both restricted and nonrestricted-housing-supply cities, but the average wage paid to natives increases by a larger amount in restricted-housing-supply cities. That is, a 1% increase in the Bartik shock is associated with an increase in the average wage paid to natives of approximately 0.7% in nonrestricted-housing-supply cities, while the average wage

[24] See Kleibergen-Paap (2006) for a discussion of this statistic.

[25] See Stock and Yogo (2005) for a table of critical values and corresponding test sizes for the Kleibergen-Paap rk Wald F statistic for two endogenous regressors and two exogenous instruments.

paid to natives increased by approximately 1.4% in restricted-housing-supply cities. Similarly, the increase in the average wage paid to foreign-born workers is found to not be significantly different from zero, though the point estimates do suggest a larger increase in wages than the OLS results. The estimates of the change in average rent are quite similar to the OLS results, though the difference between restricted- and nonrestricted-housing-supply MSAs is not statistically different from zero.

Turning our attention to Panel B, the results look mostly quite similar to the IV results in Panel A and the OLS results in Table 5 with the exception of the results for changes in the average wage paid to foreign-born workers: the Bartik shock increases averages wages paid to foreign-born workers much more in restricted-housing-supply cities. This result runs counter to the predictions of the model.

Table 9 is similar in structure to Table 6, reporting the effect of changes in the Bartik shock on changes in the foreign-born ratio, the low-skill-foreign-born ratio, and the high-skill ratio. The IV results are also quite similar to the OLS results. In Panel A, I find a 1% change in the Bartik shock changes the foreign-born ratio in nonrestricted-housing-supply MSAs by -1.5% and by 4.4% in restricted-housing-supply MSAs, changes the low-skill-foreign-born ratio by -1.8% and 5.6%, and has no statistically significant effect on the high-skill ratio. The estimates reported in Panel B are quite similar to the OLS estimates found in Panel B of Table 6, and are similarly less precise than when using the WRLURI measure of housing supply elasticity. Overall, these results are consistent with the predictions of the model, which predicts the foreign-born ratio to decrease in nonrestricted-housing-supply MSAs and increase in restricted-housing-supply MSAs. Worth noting are the estimated coefficients in columns (1)-(6) on the noninteracted Bartik shock - the effect on nonrestricted-housing-supply MSAs.

Unlike the OLS results in Table 6, the IV estimator precisely estimates a negative effect of the shock on the ratios of foreign-born and low-skill-foreign-born in nonrestricted-housing-supply MSAs, while the marginal effect in restricted-housing-supply cities is quite similar to the OLS estimates. These findings are consistent with both the predictions of the model and with the stylized facts in section 3 that were suggestive of a scenario in which low-skilled natives migrate to low housing cost MSAs with higher wages, while foreign-born and high-skill natives migrate toward cities with the highest wages[26].

[26]Recall that the stylized facts of section 3 showed wages are higher in cities with more restricted housing supplies. That is, the highest-wage nonrestricted-housing-supply cities still have lower wages than high wage, restricted-housing-supply cities

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Figures

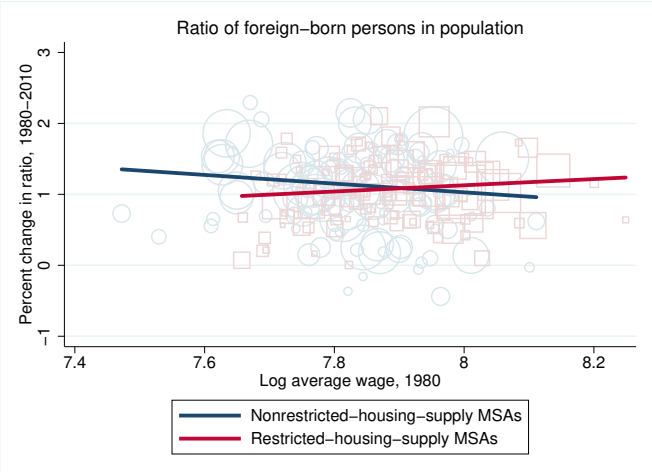
Figure 1: Change in High-skill Population Ratio, 1980-2010

(a) By WRLURI

(b) By LUI

Figure 2: Change in Foreign-born Population Ratio, 1980-2010

(a) By WRLURI



(b) By LUI

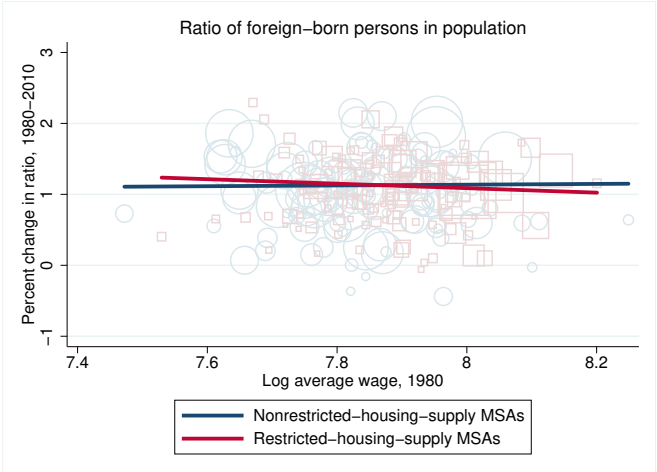
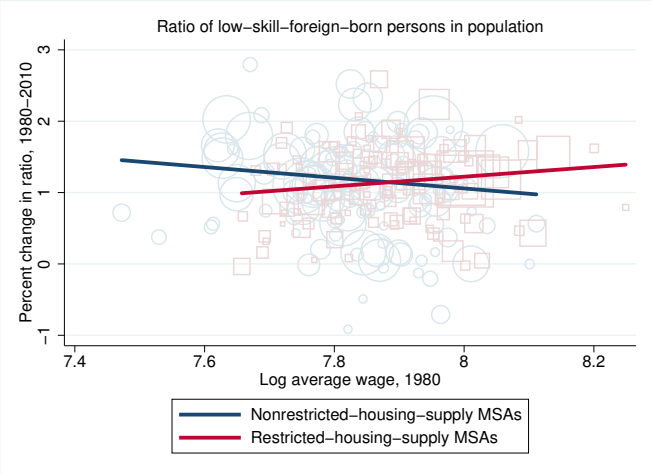


Figure 3: Change in Low-skill-foreign-born Population Ratio, 1980-2010

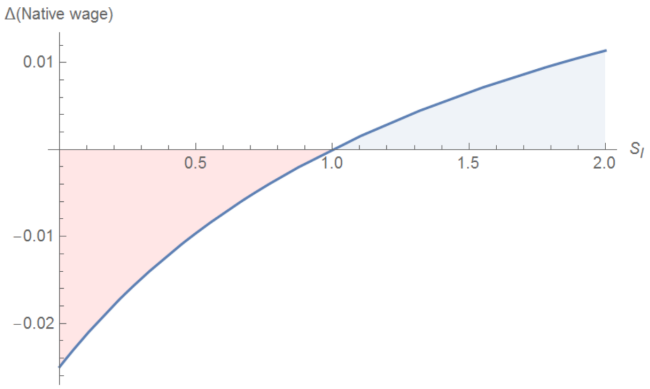
(a) By WRLURI



(b) By LUI

Figure 4: Change in the wages of native workers

(a) City A



(b) City B

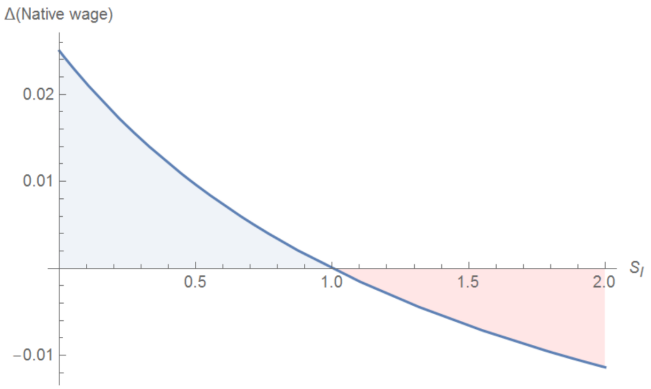
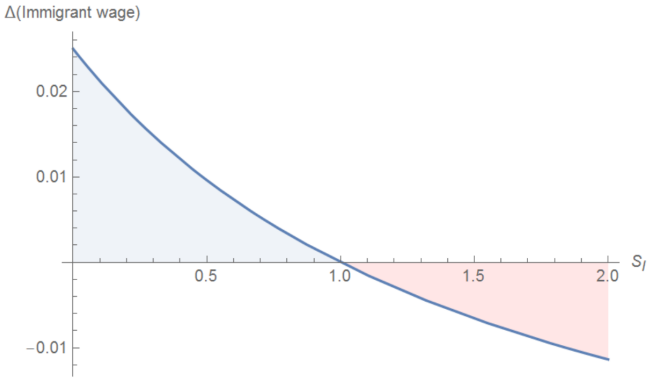


Figure 5: Change in the wages of foreign-born workers

(a) City A



(b) City B

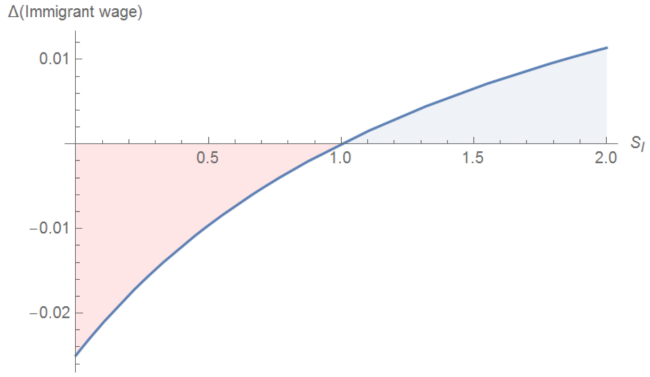
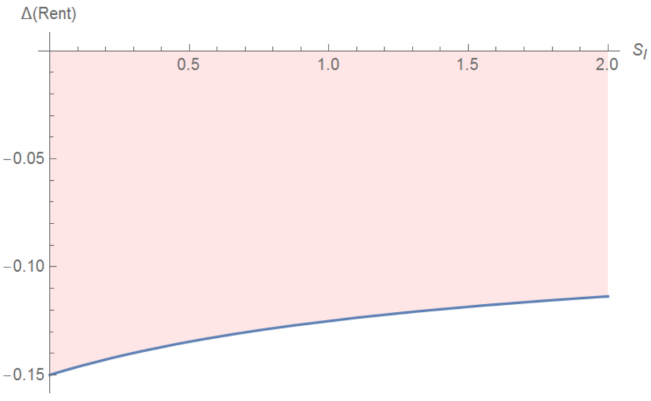


Figure 6: Change in the rental price of housing

(a) City A



(b) City B

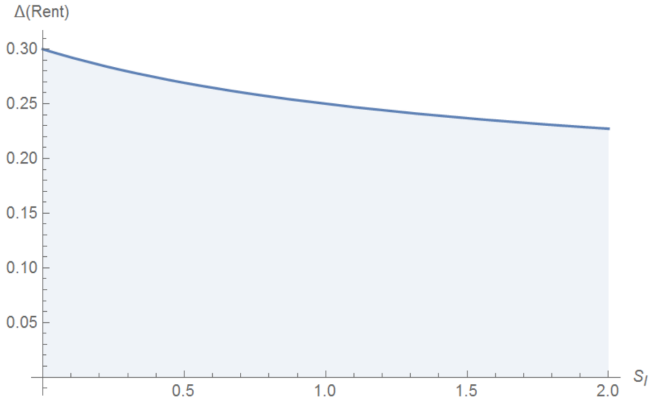


Figure 7: Change in the Immigrant-Native employment ratio

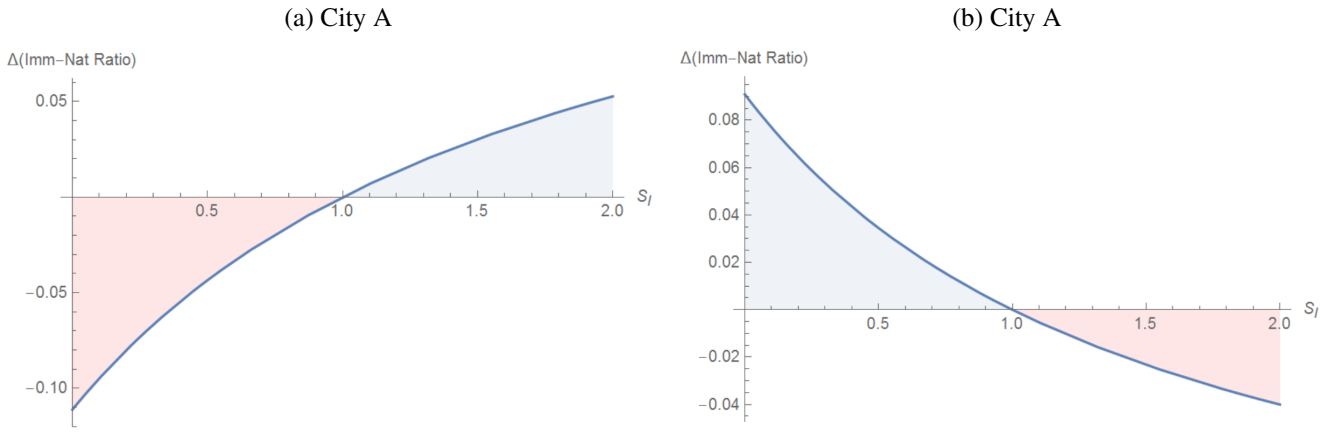


Figure 8: Share of Gross Value-Added by Skill-intensive Sector, United States, 1977-2010

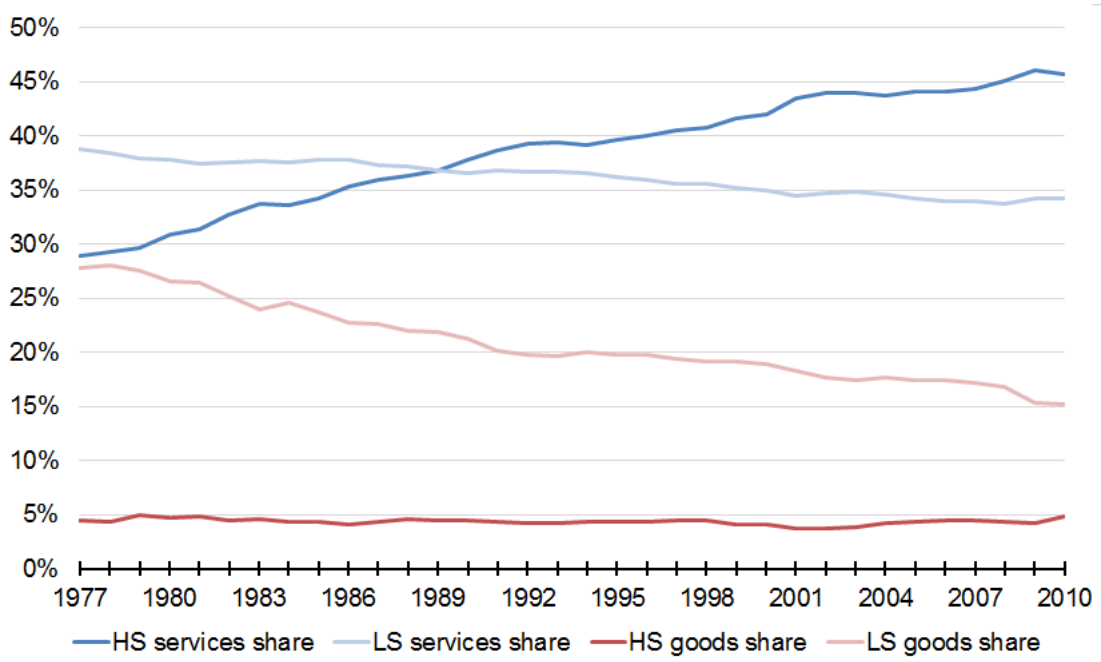


Figure 9: Employment in High-skill-intensive Services in 1980 and MSA Employment Growth, 1980-2010

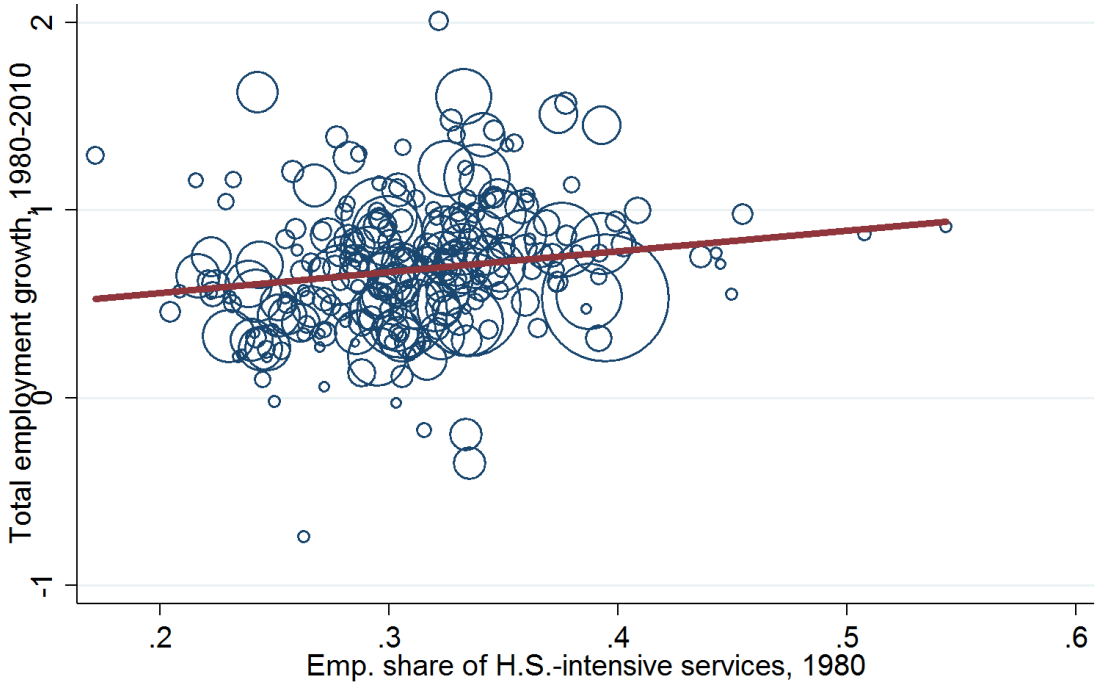
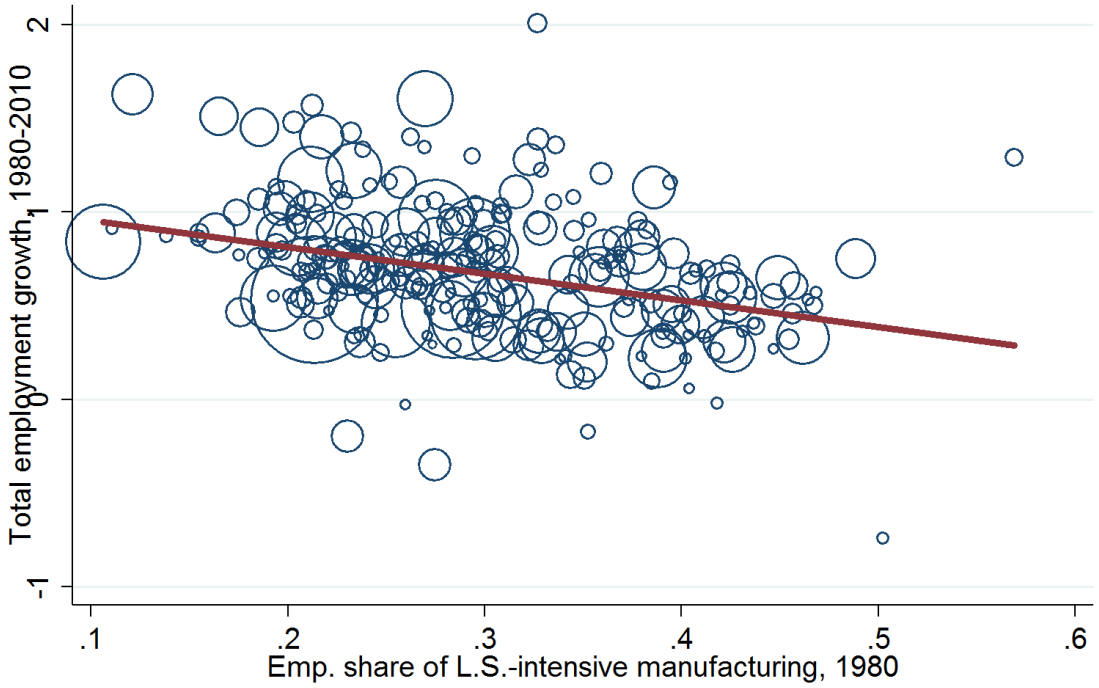


Figure 10: Employment in Low-skill-intensive manufacturing in 1980 and MSA Employment Growth, 1980-2010



Tables

Table 1: The relationship between housing supply elasticity and city characteristics

	(1)	(2)	(3)	(4)	(5)
Panel A. Wharton Residential Land-Use Regulatory Index (WRLURI)					
	MSA mean wage	MSA mean rent	High-skill Ratio	Foreign-born ratio	Foreign-born ratio, low-skill
WRLURI rank	0.738***	0.872***	0.609***	0.709***	0.702***
	[0.0893]	[0.134]	[0.0676]	[0.205]	[0.208]
Observations	992	992	992	992	992
R-squared	0.353	0.472	0.301	0.23	0.225
Panel B. Land Unavailability Index (LUI)					
	MSA mean wage	MSA mean rent	High-skill Ratio	Foreign-born ratio	Foreign-born ratio, low-skill
LUI rank	0.649***	0.711***	0.471***	0.758***	0.752***
	[0.0906]	[0.148]	[0.0612]	[0.164]	[0.169]
Observations	992	992	992	992	992
R-squared	0.349	0.4	0.23	0.335	0.329

Notes: Rank is based on each MSAs assigned index value for each measure of housing supply elasticity. MSAs are ranked from smallest to largest; that is, the MSA with the smallest index value receives rank 1. Population independent variables are calculated for each MSA using a sample of people aged 18-64 who did not live in group quarters. The wage sample is further restricted to people who worked at least 1 week in the previous year and earned a positive wage. Each regression includes decade fixed effects, and robust standard errors are clustered by state. The coefficients in each column are standardized, or "beta" coefficients.

Table 2: Changes in MSA population by nativity-skill group across housing supply elasticity, 1980-2010

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. Wharton Residential Land-Use Regulatory Index (WRLURI)							
	Total Pop.	Native	Foreign born	High-skill native	High-skill foreign born	Low-skill native	Low-skill foreign born
WRLURI rank	3,737**	-89.30	3,826**	1,710**	1,380**	-1,799**	2,445**
	[1,634]	[351.8]	[1,656]	[720.0]	[605.1]	[786.6]	[1,063]
N	252	252	252	252	252	252	252
R^2	0.111	0.000	0.145	0.147	0.160	0.128	0.135
Panel B. Land Unavailability Index (LUI)							
	Total Pop.	Native	Foreign born	High-skill native	High-skill foreign born	Low-skill native	Low-skill foreign born
LUI rank	3,686**	-463.8	4,150**	1,571**	1,438**	-2,035***	2,712**
	[1,683]	[321.5]	[1,607]	[755.0]	[582.4]	[670.4]	[1,036]
N	252	252	252	252	252	252	252
R^2	0.138	0.016	0.218	0.158	0.221	0.209	0.211

Notes: Rank is based on each MSAs assigned index value for each measure of housing supply elasticity. MSAs are ranked from smallest to largest; that is, the MSA with the smallest index value receives rank 1. The independent variables are calculated for each MSA using a sample of persons aged 18-64 who did not live in group quarters. Coefficients are in units of people and each regression includes decade fixed effects, and robust standard errors are clustered by state.

Table 3: Relationship between lagged migration and population shares, mean wage, and mean rent

	(1)	(2)	(3)	(4)	(5)
Panel A. Wharton Residential Land-Use Regulatory Index (WRLURI)					
	High-skill Share	Foreign-born share	Low-skill foreign-born Share	MSA mean wage	MSA mean rent
In-migration$_{-1}$	-0.0521	0.165***	0.208***	0.00591	0.132**
	[0.103]	[0.0567]	[0.0517]	[0.0831]	[0.0581]
HighLURI $= 1 \times$ In-migration$_{-1}$	0.377***	0.218**	0.148	0.323***	0.258***
	[0.127]	[0.0870]	[0.0943]	[0.109]	[0.0795]
HighLURI $= 1$	0.405***	0.737***	0.714***	0.569***	1.022***
	[0.117]	[0.223]	[0.244]	[0.108]	[0.179]
Decade fixed effects	Yes	Yes	Yes	Yes	Yes
N	756	756	756	756	756
R^2	0.284	0.385	0.333	0.443	0.484
Panel B. Land Unavailability Index (LUI)					
	High-skill Share	Foreign-born share	Low-skill foreign-born Share	MSA mean wage	MSA mean rent
In-migration$_{-1}$	-0.0347	0.158***	0.198***	0.0151	0.186***
	[0.0981]	[0.0495]	[0.0523]	[0.0844]	[0.0590]
HighLUI $= 1 \times$ In-migration$_{-1}$	0.408***	0.344***	0.274***	0.391***	0.303***
	[0.101]	[0.0858]	[0.0912]	[0.0982]	[0.0849]
HighLUI $= 1$	0.143	0.492***	0.497**	0.275**	0.571***
	[0.0981]	[0.178]	[0.199]	[0.109]	[0.171]
Decade fixed effects	Yes	Yes	Yes	Yes	Yes
N	756	756	756	756	756
R^2	0.241	0.326	0.284	0.380	0.328

Notes: Dependent variables are tabulated using a sample of adults aged 18-64 not living in group quarters. The wage sample is further restricted to people who worked at least 1 week in the previous year and earned a positive wage. HighLURI is equal to 1 if a city's WRLURI index value is above the median and 0 otherwise. HighLUI is equal to 1 if a city's LUI index value is above the median and 0 otherwise. Coefficients are standardized and robust standard errors in brackets are clustered by state.

Table 4: The nativity-skill composition of migration to MSAs and housing supply elasticity

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Wharton Residential Land-Use Regulatory Index (WRLURI)						
	Native	Foreign born	High-skill native	Low-skill native	High-skill foreign born	Low-skill foreign born
WRLURI rank	-0.713***	0.714***	0.267**	-0.760***	0.599***	0.597***
	[0.158]	[0.158]	[0.101]	[0.0977]	[0.0907]	[0.161]
N	1,008	1,005	1,008	1,008	986	1,000
R^2	0.350	0.351	0.212	0.488	0.418	0.268
Panel B. Land Unavailability Index (LUI)						
	Native	Foreign born	High-skill native	Low-skill native	High-skill foreign born	Low-skill foreign born
LUI rank	-0.724***	0.725***	0.121	-0.688***	0.597***	0.614***
	[0.120]	[0.120]	[0.0891]	[0.0862]	[0.0841]	[0.112]
N	1,008	1,005	1,008	1,008	986	1,000
R^2	0.435	0.435	0.156	0.503	0.476	0.343

Notes: Rank is based on each MSAs assigned index value for each measure of housing supply elasticity. MSAs are ranked from smallest to largest; that is, the MSA with the smallest index value receives rank 1. All other independent variables are calculated for each MSA using a sample of workers aged 18-64 who worked at least 1 week in the previous year, earned a positive wage, and did not live in group quarters. Each regression includes decade fixed effects, and robust standard errors are clustered by state. The coefficients in each column are standardized, or "beta" coefficients.

Table 5: The effect of the Bartik labor demand shock on mean wages and rent across housing supply elasticity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A. Wharton Residential Land-Use Regulatory Index (WRLURI)									
	△Mean native wage			△Mean foreign-born wage			△Mean rent		
△Bartik	0.869***	0.778***	0.818***	0.738**	0.660*	0.586*	0.423***	0.454***	0.403***
	[0.133]	[0.137]	[0.136]	[0.330]	[0.337]	[0.351]	[0.140]	[0.145]	[0.145]
HighLURI $= 1 \times$ △Bartik	0.617**	0.642**	0.636**	0.0261	0.0555	0.0755	0.637**	0.604**	0.639**
	[0.255]	[0.250]	[0.248]	[0.493]	[0.500]	[0.500]	[0.274]	[0.276]	[0.274]
HighLURI $= 1$	0.0200***	0.0174***	0.0197***	0.0276**	0.0243*	0.0197	0.0168**	0.0169**	0.0130*
	[0.00610]	[0.00609]	[0.00626]	[0.0128]	[0.0132]	[0.0142]	[0.00768]	[0.00801]	[0.00774]
Decade Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Local Amenities	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
1980 MSA Wage and Rent	No	No	Yes	No	No	Yes	No	No	Yes
N	744	744	744	744	744	744	744	744	744
R^2	0.633	0.653	0.654	0.265	0.271	0.272	0.528	0.533	0.569
Panel B. Land Unavailability Index (LUI)									
	△Mean native wage			△Mean foreign-born wage			△Mean rent		
△Bartik	1.010***	0.902***	0.910***	0.784**	0.689**	0.591*	0.468***	0.482***	0.424***
	[0.131]	[0.129]	[0.130]	[0.313]	[0.317]	[0.338]	[0.149]	[0.151]	[0.149]
HighLUI $= 1 \times$ △Bartik	0.540**	0.594**	0.587**	0.0452	0.0914	0.142	0.774***	0.746***	0.742***
	[0.258]	[0.252]	[0.256]	[0.512]	[0.521]	[0.526]	[0.256]	[0.254]	[0.251]
HighLUI $= 1$	0.00816	0.00509	0.00510	0.0219	0.0192	0.0133	0.00512	0.00603	-0.00206
	[0.00637]	[0.00674]	[0.00667]	[0.0133]	[0.0136]	[0.0147]	[0.00741]	[0.00761]	[0.00695]
Decade Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Local Amenities	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
1980 MSA Wage and Rent	No	No	Yes	No	No	Yes	No	No	Yes
N	744	744	744	744	744	744	744	744	744
R^2	0.624	0.644	0.645	0.263	0.270	0.271	0.526	0.531	0.567

Notes: Dependent variables are tabulated using a sample of adults aged 18-64, not living in group quarters, who worked at least 1 week in the previous year, and earned a positive wage. HighLURI is equal to 1 if a city's WRLURI index value is above the median and 0 otherwise. HighLUI is equal to 1 if a city's LUI index value is above the median and 0 otherwise. The Bartik shock is constructed as described in the text, where the MSA employment share is tabulated from a sample of workers aged 18-64 not living in group quarters, who worked at least 1 week in the previous year.

Table 6: The effect of the Bartik labor demand shock on changes in the foreign-born, low-skill-foreign-born, and high-skill ratios across housing supply elasticity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A. Wharton Residential Land-Use Regulatory Index (WRLURI)									
	△Foreign-born Ratio			△Low-skill-foreign-born Ratio			△High-skill Ratio		
△Bartik	-0.208	-0.210	-0.0112	-0.129	-0.134	0.0755	-0.0519	-0.148	-0.230
	[0.660]	[0.657]	[0.615]	[0.795]	[0.791]	[0.743]	[0.215]	[0.219]	[0.218]
HighLURI $= 1 \times$ △Bartik	2.962***	2.974***	2.986***	3.545***	3.558***	3.581***	0.731*	0.751**	0.748**
	[0.903]	[0.907]	[0.905]	[1.085]	[1.091]	[1.088]	[0.374]	[0.359]	[0.346]
HighLURI $= 1$	-0.0764***	-0.0750***	-0.0651**	-0.0840**	-0.0826**	-0.0725**	0.0307***	0.0240**	0.0199*
	[0.0271]	[0.0281]	[0.0308]	[0.0327]	[0.0339]	[0.0368]	[0.0106]	[0.0106]	[0.0114]
Decade Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls for local Amenities	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
1980 MSA Wage and Rent	No	No	Yes	No	No	Yes	No	No	Yes
N	744	744	744	744	744	744	744	744	744
R^2	0.266	0.278	0.305	0.241	0.251	0.279	0.123	0.176	0.209
Panel B. Land Unavailability Index (LUI)									
	△Foreign-born Ratio			△Low-skill-foreign-born Ratio			△High-skill Ratio		
△Bartik	0.0245	0.0459	0.435	0.226	0.244	0.661	0.167	0.0467	-0.0762
	[0.687]	[0.689]	[0.660]	[0.830]	[0.833]	[0.795]	[0.231]	[0.226]	[0.221]
HighLUI $= 1 \times$ △Bartik	2.163**	2.112**	1.807**	2.519**	2.461**	2.120*	0.214	0.261	0.366
	[0.915]	[0.919]	[0.918]	[1.102]	[1.108]	[1.107]	[0.365]	[0.348]	[0.330]
HighLUI $= 1$	-0.0559**	-0.0507*	-0.0420	-0.0652**	-0.0596*	-0.0523	0.0361***	0.0321***	0.0306***
	[0.0274]	[0.0280]	[0.0281]	[0.0331]	[0.0338]	[0.0341]	[0.0105]	[0.0105]	[0.0107]
Decade Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls for local Amenities	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
1980 MSA Wage and Rent	No	No	Yes	No	No	Yes	No	No	Yes
N	744	744	744	744	744	744	744	744	744
R^2	0.252	0.263	0.290	0.228	0.238	0.265	0.120	0.175	0.212

Notes: Dependent variables are tabulated using a sample of adults aged 18-64 who were not living in group quarters. HighLURI is equal to 1 if a city's WRLURI index value is above the median and 0 otherwise. HighLUI is equal to 1 if a city's LUI index value is above the median and 0 otherwise. The Bartik shock is constructed as described in the text, where the MSA employment share is tabulated from a sample of workers aged 18-64 not living in group quarters, who worked at least 1 week in the previous year.

Table 7: First-stage relationship between the Bartik shock and the OECD Bartik Shock

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Wharton Residential Land-Use Regulatory Index (WRLURI)						
	△Bartik	HighLURI = 1 × △Bartik	△Bartik	HighLURI = 1 × △Bartik	△Bartik	HighLURI = 1 × △Bartik
△Bartik^{OECD}	1.015***	0.0568***	1.018***	0.0610***	1.037***	0.0673***
	[0.0342]	[0.0146]	[0.0339]	[0.0158]	[0.0381]	[0.0235]
HighLURI = 1 × △Bartik^{OECD}	-0.0276	0.929***	-0.0332	0.926***	-0.0419	0.923***
	[0.0857]	[0.0731]	[0.0859]	[0.0740]	[0.0860]	[0.0738]
HighLURI = 1	0.000731	-0.00319*	0.000987	-0.00292	0.00179	-0.00266
	[0.00195]	[0.00185]	[0.00195]	[0.00186]	[0.00197]	[0.00174]
Decade Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Amenities Controls	No	No	Yes	Yes	Yes	Yes
1980 MSA Wage and Rent	No	No	No	No	Yes	Yes
N	744	744	744	744	744	744
KP rk Wald F Statistic	114.1	114.1	113.2	113.2	107.7	107.7
Panel B. Land Unavailability Index (LUI)						
	△Bartik	HighLUI = 1 × △Bartik	△Bartik	HighLUI = 1 × △Bartik	△Bartik	HighLUI = 1 × △Bartik
△Bartik^{OECD}	1.055***	0.0541***	1.057***	0.0557***	1.083***	0.0600**
	[0.0323]	[0.0152]	[0.0328]	[0.0166]	[0.0391]	[0.0259]
HighLUI = 1 × △Bartik^{OECD}	-0.0864	0.910***	-0.0927	0.907***	-0.126	0.895***
	[0.0897]	[0.0792]	[0.0901]	[0.0799]	[0.0914]	[0.0796]
HighLUI = 1	-0.000550	-0.00337	-0.000311	-0.00321	0.000594	-0.00306
	[0.00214]	[0.00214]	[0.00216]	[0.00216]	[0.00213]	[0.00200]
Decade Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Amenities Controls	No	No	Yes	Yes	Yes	Yes
1980 MSA Wage and Rent	No	No	No	No	Yes	Yes
N	744	744	744	744	744	744
KP rk Wald F Statistic	81.18	81.18	80.99	80.99	80.53	80.53

Table 8: IV results of the effect of the Bartik labor demand shock on mean wages and rent across housing supply elasticity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A. Wharton Residential Land-Use Regulatory Index (WRLURI)									
	△Mean native wage			△Mean foreign-born wage			△Mean rent		
△Bartik	0.734***	0.661***	0.736***	0.475	0.406	0.527	0.549***	0.590***	0.482***
	[0.176]	[0.181]	[0.180]	[0.317]	[0.326]	[0.328]	[0.171]	[0.177]	[0.175]
HighLURI $= 1 \times$ △Bartik	0.724**	0.709**	0.667*	0.675	0.683	0.626	0.529	0.471	0.412
	[0.360]	[0.360]	[0.355]	[0.518]	[0.526]	[0.522]	[0.382]	[0.382]	[0.354]
HighLURI $= 1$	0.0187**	0.0173**	0.0203**	0.000778	0.000546	0.00534	0.0155	0.0152	0.0106
	[0.00864]	[0.00851]	[0.00817]	[0.0130]	[0.0132]	[0.0134]	[0.00961]	[0.00994]	[0.00907]
Decade Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls for local Amenities	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
1980 MSA Wage and Rent	No	No	Yes	No	No	Yes	No	No	Yes
N	744	744	744	744	744	744	744	744	744
Centered R^2	0.53	0.545	0.557	0.273	0.281	0.29	0.42	0.427	0.502
Panel B. Land Unavailability Index (LUI)									
	△Mean native wage			△Mean foreign-born wage			△Mean rent		
△Bartik	0.895***	0.786***	0.847***	0.419	0.320	0.434	0.611***	0.613***	0.517***
	[0.176]	[0.172]	[0.178]	[0.301]	[0.307]	[0.313]	[0.169]	[0.172]	[0.172]
HighLUI $= 1 \times$ △Bartik	0.714**	0.776**	0.652*	1.276**	1.335**	1.165**	0.862***	0.836**	0.612*
	[0.339]	[0.345]	[0.346]	[0.533]	[0.548]	[0.548]	[0.329]	[0.328]	[0.319]
HighLUI $= 1$	0.00369	0.00125	0.00288	-0.0195	-0.0211	-0.0176	-0.00510	-0.00480	-0.00971
	[0.00950]	[0.00982]	[0.00928]	[0.0140]	[0.0142]	[0.0140]	[0.00923]	[0.00951]	[0.00873]
Decade Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls for local Amenities	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
1980 MSA Wage and Rent	No	No	Yes	No	No	Yes	No	No	Yes
N	744	744	744	744	744	744	744	744	744
Centered R^2	0.525	0.541	0.55	0.27	0.278	0.286	0.416	0.424	0.5

Table 9: IV results of the effect of the Bartik labor demand shock on changes in the foreign-born, low-skill-foreign-born, and high-skill ratios by housing supply elasticity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A. Wharton Residential Land-Use Regulatory Index (WRLURI)									
	△Foreign-born Ratio			△Low-skill-foreign-born Ratio			△High-skill Ratio		
△Bartik	-1.644**	-1.657**	-1.490*	-1.905**	-1.920*	-1.784*	0.380	0.279	0.181
	[0.829]	[0.836]	[0.799]	[0.971]	[0.980]	[0.935]	[0.276]	[0.276]	[0.266]
HighLURI = 1 × △Bartik	4.518***	4.529***	4.434***	5.652***	5.670***	5.565***	0.473	0.425	0.502
	[1.097]	[1.081]	[1.076]	[1.288]	[1.276]	[1.271]	[0.429]	[0.415]	[0.410]
HighLURI = 1	-0.0603**	-0.0596**	-0.0530*	-0.0654**	-0.0643**	-0.0590*	0.0331***	0.0271***	0.0233**
	[0.0271]	[0.0276]	[0.0303]	[0.0321]	[0.0328]	[0.0355]	[0.0107]	[0.0105]	[0.0114]
Decade Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls for local Amenities	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
1980 MSA Wage and Rent	No	No	Yes	No	No	Yes	No	No	Yes
N	744	744	744	744	744	744	744	744	744
Centered R^2	0.178	0.19	0.202	0.161	0.17	0.181	0.089	0.151	0.2
Panel B. Land Unavailability Index (LUI)									
	△Foreign-born Ratio			△Low-skill-foreign-born Ratio			△High-skill Ratio		
△Bartik	-0.783	-0.771	-0.473	-0.779	-0.764	-0.504	0.545*	0.386	0.191
	[0.858]	[0.875]	[0.854]	[1.033]	[1.057]	[1.032]	[0.284]	[0.278]	[0.263]
HighLUI = 1 × △Bartik	2.342**	2.315**	1.948*	2.981**	2.961**	2.560*	0.0645	0.102	0.423
	[1.156]	[1.150]	[1.142]	[1.370]	[1.368]	[1.359]	[0.416]	[0.399]	[0.393]
HighLUI = 1	-0.0417	-0.0383	-0.0289	-0.0495	-0.0461	-0.0383	0.0354***	0.0319***	0.0262**
	[0.0292]	[0.0297]	[0.0295]	[0.0349]	[0.0353]	[0.0350]	[0.0108]	[0.0106]	[0.0106]
Decade Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls for local Amenities	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
1980 MSA Wage and Rent	No	No	Yes	No	No	Yes	No	No	Yes
N	744	744	744	744	744	744	744	744	744
Centered R^2	0.174	0.185	0.196	0.16	0.168	0.178	0.083	0.15	0.201

Table 10: The effect of the employment-based Bartik shock on changes in mean wages and rent across housing supply elasticity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A. Wharton Residential Land-Use Regulatory Index (WRLURI)									
	△Mean native wage			△Mean foreign-born wage			△Mean rent		
△Bartik^{Emp}	0.458***	0.392***	0.318**	0.415	0.372	0.137	0.0657	0.0602	0.0222
	[0.145]	[0.140]	[0.151]	[0.317]	[0.329]	[0.329]	[0.225]	[0.223]	[0.273]
HighLURI $= 1 \times$ △Bartik^{Emp}	0.952***	0.955***	0.906***	-0.654	-0.661	-0.625	1.593**	1.541**	1.478**
	[0.334]	[0.327]	[0.339]	[0.469]	[0.474]	[0.470]	[0.704]	[0.690]	[0.723]
HighLURI $= 1$	0.0240***	0.0191***	0.00484	0.0499***	0.0440***	0.0216	0.0428***	0.0384**	0.0264
	[0.00720]	[0.00704]	[0.00707]	[0.0123]	[0.0126]	[0.0143]	[0.0164]	[0.0164]	[0.0167]
Decade Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls for local Amenities	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
1980 MSA Wage and Rent	No	No	Yes	No	No	Yes	No	No	Yes
N	744	744	744	744	744	744	744	744	744
R^2	0.628	0.652	0.669	0.133	0.150	0.162	0.165	0.188	0.196
Panel B. Land Unavailability Index (LUI)									
	△Mean native wage			△Mean foreign-born wage			△Mean rent		
△Bartik	0.680***	0.600***	0.450***	0.312	0.247	-0.0579	0.438	0.394	0.221
	[0.150]	[0.140]	[0.154]	[0.324]	[0.334]	[0.334]	[0.278]	[0.267]	[0.306]
HighLUI $= 1 \times$ △Bartik	0.723**	0.738**	0.683*	-0.258	-0.249	-0.187	1.259*	1.244*	1.182
	[0.339]	[0.338]	[0.362]	[0.480]	[0.490]	[0.492]	[0.720]	[0.714]	[0.765]
HighLUI $= 1$	0.0101	0.00514	-0.00722	0.0418***	0.0367***	0.0166	0.0165	0.0130	-0.00122
	[0.00736]	[0.00781]	[0.00663]	[0.0123]	[0.0124]	[0.0135]	[0.0176]	[0.0183]	[0.0158]
Decade Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls for local Amenities	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
1980 MSA Wage and Rent	No	No	Yes	No	No	Yes	No	No	Yes
N	744	744	744	744	744	744	744	744	744
R^2	0.611	0.638	0.663	0.124	0.142	0.158	0.141	0.167	0.183

Table 11: The effect of the employment-based Bartik shock on changes in the foreign-born, low-skill-foreign-born, and high-skill ratios across housing supply elasticity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A. Wharton Residential Land-Use Regulatory Index (WRLURI)									
	△Foreign-born Ratio			△Low-skill-foreign-born Ratio			△High-skill Ratio		
△Bartik	-0.923	-0.926	-0.887	-1.036	-1.032	-1.078	-0.00508	-0.0609	-0.222
	[0.768]	[0.758]	[0.732]	[0.889]	[0.879]	[0.852]	[0.248]	[0.240]	[0.250]
HighLURI $= 1 \times$ △Bartik	4.320***	4.303***	4.106***	5.249***	5.230***	5.022***	0.476	0.481	0.596
	[0.967]	[0.963]	[0.914]	[1.118]	[1.116]	[1.067]	[0.423]	[0.405]	[0.407]
HighLURI $= 1$	-0.0660**	-0.0647**	-0.0843***	-0.0695**	-0.0675**	-0.0979***	0.0437***	0.0339***	0.0294**
	[0.0261]	[0.0269]	[0.0309]	[0.0307]	[0.0319]	[0.0372]	[0.0107]	[0.0105]	[0.0128]
Decade Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Contorls for local Amenities	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
1980 MSA Wage and Rent	No	No	Yes	No	No	Yes	No	No	Yes
N	744	744	744	744	744	744	744	744	744
R^2	0.220	0.230	0.245	0.209	0.216	0.232	0.078	0.150	0.166
Panel B. Land Unavailability Index (LUI)									
	△Foreign-born Ratio			△Low-skill-foreign-born Ratio			△High-skill Ratio		
△Bartik	-0.711	-0.699	-0.592	-0.657	-0.637	-0.635	0.124	0.0463	-0.134
	[0.823]	[0.816]	[0.824]	[0.954]	[0.947]	[0.950]	[0.277]	[0.263]	[0.266]
HighLUI $= 1 \times$ △Bartik	3.720***	3.678***	3.392***	4.335***	4.295***	4.001***	0.244	0.249	0.413
	[1.000]	[0.999]	[0.990]	[1.162]	[1.161]	[1.150]	[0.416]	[0.403]	[0.406]
HighLUI $= 1$	-0.0590**	-0.0548*	-0.0554**	-0.0653**	-0.0606*	-0.0690**	0.0433***	0.0366***	0.0284**
	[0.0276]	[0.0282]	[0.0271]	[0.0325]	[0.0332]	[0.0329]	[0.0105]	[0.0104]	[0.0114]
Decade Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Contorls for local Amenities	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
1980 MSA Wage and Rent	No	No	Yes	No	No	Yes	No	No	Yes
N	744	744	744	744	744	744	744	744	744
R^2	0.205	0.215	0.225	0.192	0.200	0.210	0.075	0.152	0.164