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The Exports of U.S. Cities: Measurement and Economic Impact

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Abstract

This research note examines data on the value of U.S. exports that are attributed to specific metropolitan areas. We discuss how metropolitan area exports are measured and summarize patterns in the data. Then we turn to the question of economic impact, specifically whether the amount that a city exports has a positive impact on wages in the local labor market. We estimate an econometric model of the average weekly earnings of individual U.S. workers using data from the Current Population Survey in 2014. The model indicates that workers in relatively export-intensive metropolitan areas have significantly higher earnings, even after controlling for the human capital and demographic characteristics of the individual workers. The estimated magnitude of the impact on wages varies across the metropolitan areas and depends on the measure of metropolitan area exports in the econometric model.

Keywords Metropolitan Areas, Exports, Wages, Econometric Analysis

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1. Introduction

The International Trade Administration (ITA) in the U.S. Department of Commerce releases annual data on the total value of merchandise exports from metropolitan areas within the United States.² Press accounts often present this information as a ranking of the metropolitan areas that had the largest value of exports and the largest growth in exports. According to the ITA data, the Houston-The Woodlands-Sugar Land, TX metropolitan area recorded the largest merchandise exports in 2014 (\$119.0 billion), followed by New York-Newark-Jersey City, NY-NJ-PA (\$105.3 billion) and then Los Angeles-Long Beach-Anaheim, CA (\$75.5 billion). Charleston, SC recorded the largest export growth between 2013 and 2014 (a 69.5 percent increase in exports).³ Local newspapers, such as *the Tribune-Democrat (Johnstown, Pennsylvania), Kokomo Tribune (Indiana), Denver Post (Colorado), New Orleans CityBusiness (New Orleans, LA), Pittsburgh Tribune Review (Pennsylvania), El Paso Times (Texas), The Salt Lake Tribune (Utah), San Jose Mercury News (California – Brookings data), and Las Cruces Sun-News (New Mexico)*, have reported the export performance of their respective cities.

Why do these export statistics matter? There are many economic studies that document the benefits of exporting for the U.S. economy.⁴ They find that exporting firms and export-intensive industries generally pay higher wages. Likewise, the press accounts of metropolitan area exports often claim that there are benefits to exporting, including additional job creation and economic development.⁵ The metropolitan area export statistics indicate the areas that gain the most from policy initiatives that expand U.S. exports, like international trade agreements.

² Throughout this research note, we use the term *exports* to refer to U.S. exports that are shipped from a U.S. metropolitan area to a foreign country. (It does not refer to shipments from one metropolitan area to another area within the United States).

³ These estimates are reported in Hall (2015).

⁴ Examples of studies that use firm-level data include Bernard and Jensen (1999), Bernard, Jensen, Redding, and Schott (2007). Examples of studies that use worker-level data include Riker (2010), Riker and Thurner (2011), Riker (2015), and CEA (2015).

⁵ Examples include Niraj Chokshi's September 18, 2013 article in the *Washington Post* titled "In the National's 100 Largest Metropolitan Areas, More than Half the Recovery Has Come from Exports;" Alexander Hess, Michael Sauter, and Thomas Frohlich's February 1, 2014 article in *USA Today* titled "America's 10 Fastest-Growing Economies;" Tiffany Hsu's September 3, 2014 article in the *Los Angeles Times* titled "California Trails Texas in Exports and Related Jobs, Report Finds;" the AP's July 27, 2015 article in the *Chicago Tribune* titled "Metro Toledo Export Industry Grows by Record \$1.4 Billion."

Before evaluating the economic impact of metropolitan area exports, it is important to first understand how these values are estimated, since the specific location of the manufacturing of the exports is not directly measured in official U.S. trade statistics. What information is used to assign or attribute the exports to specific metropolitan areas? In Section 2, we discuss two widely cited datasets on U.S. metropolitan area exports, the data published by the ITA and an alternative dataset published by the Brookings Institute. These two sources use different approaches to attribute U.S. exports to specific metropolitan areas. The ITA approach uses information about the origin of movement from official export declarations. The Brookings approach allocates industry-level nationally aggregated U.S. export values to specific areas of the country based on the areas' shares of national employment in the industry.

After describing how the metropolitan area export data sets are constructed, we consider whether the data make sense. In Section 3, we ask whether the metropolitan area exports correlate with city characteristics that should contribute to export success. As we would expect, cities on the coast or on the borders with Canada and Mexico are generally more export-intensive, since they have better access to international markets, but proximity to the coast or border is not the only factor. We also find that cities with larger local markets are generally more export-intensive, suggesting that economies of scale can contribute to export success. The export intensity of the metropolitan area is also positively related to the share of the local population that is foreign-born and to the share of local employment in companies that are foreign-owned. These correlations are consistent with the economics literature on the importance of international social and corporate networks in international trade.⁶

Finally, we discuss the economic impact of the metropolitan area exports in Section 4. Are cities that are more export-intensive benefiting from an increase in local labor demand and a consequent increase in local wages? We first address the question of economic impact using economic theory. We explain that economic theory generally does not have clear predictions about the effects of city-level exports on city-level labor market outcomes. While we expect that an increase in exports will increase labor demand in the United States and put upward pressure on wages, it is not clear that the effects will be locally concentrated.

⁶ The effects of international social networks on trade are studied in Rauch (2001), Rauch and Trindade (2002), and Combes, Lafourcade, and Mayer (2005), for example.

We try to resolve the issue using empirical analysis. We estimate how much more workers earn in an export-intensive metropolitan areas, after controlling for the workers' education, experience, demographic characteristics, industry, occupation, and union status. The estimated magnitude of the impact on wages varies significantly across metropolitan areas and with the occupation and age of the worker, and it depends on whether the econometric model includes the ITA measures of export intensity or the Brookings measure. Using the ITA measures, we estimate that the exports of the metropolitan areas are associated with higher earnings – up to 4.15 percent higher (depending on the metropolitan area) and 0.58 percent higher on average. Using the Brookings measures, we estimate that the export intensities of the metropolitan areas are associated with 1.70 percent higher earnings on average. There are average effects across all workers in the metropolitan, so they are economically (as well as statistically) significant. Section 5 summarizes our conclusions about the measurement and economic impact of metropolitan area exports.

2. Measurement of U.S. Metropolitan Area Exports

The first dataset on metropolitan area exports is published by the International Trade Administration.⁷ ITA's estimates are based on the U.S. Census Bureau's origin of movement ZIP code-based export series, which is constructed from export declarations entered into the Automated Export System. The series assigns the export shipments to specific areas of the country based on the address of the United States Principal Party of Interest identified in the export declaration. The Principal Party of Interest is "the person or legal entity in the United States that receives the primary benefit, monetary or otherwise, from the export transaction."⁸

ITA reports total exports for several hundred metropolitan areas (defined by the Census Bureau's metropolitan Core Based Statistical Areas). In 2014, the export values of the U.S. metropolitan areas ranged from \$8.8 million for The Villages, FL to \$119.0 billion for Houston-The Woodlands-Sugar Land, TX. Table 1 reports the ten metropolitan areas with the largest value of merchandise exports in the ITA data for 2014.⁹

⁷ The ITA data are available online at http://www.trade.gov/mas/ian/metroreport/

⁸ *Exports from U.S. Metropolitan Areas Methodology, State and Sub-State Export Data.* International Trade Administration. Available at http://www.trade.gov/mas/ian/metroreport/tg_ian_002825.asp

⁹ Hall (2015) also provides maps that illustrate which metropolitan areas export the most to Europe and to the countries that are participating in the Trans-Pacific Partnership negotiations.

In order to compare the export intensity of different metropolitan areas, we adjust these export values for the size of the metropolitan area. We calculate export intensity measure by dividing the ITA export values by the number of employees in the metropolitan area in 2014.¹⁰ According to the ITA data, export intensity ranged from \$ 187 per employee in Kahului-Wailuku-Lahaina, HI to \$80,938 per employee in Midland, MI. Table 2 reports the ten metropolitan areas with the largest value of exports per employee. Table 3 reports the mean, standard error, and maximum value of this export intensity measures across 378 metropolitan areas.¹¹

The Brookings Institute publishes an alternative series on metropolitan area exports that they estimate by allocating industry-level nationally aggregated U.S. exports across counties in the United States according to each county's share of the industry's national production.¹² The Brookings calculations do not use the origin of movements information from the exporters' declarations.

The ITA data are not publicly reported at the industry level for each metropolitan area, because there are limitations on the public disclosure of information from the export declarations. The Brookings data are not subject to the non-disclosure limitations, because they are estimates constructed by allocating national export data. For this reason, the Brookings estimates of exports can be reported for many goods and services industries for each metropolitan area.

Brookings Institute (2015) criticizes the ITA data because the reported origin of movement is not necessarily the location of production and employment.¹³ For example, for some border cities, exports based on the origin of movement data exceed total local production. On the other hand, the Brookings analysts acknowledge the limitations of their own estimation-based approach: they explain that their measure of exports for a given industry is only indicative of the metropolitan

¹² For example, their methodology "assumes that if Los Angeles County produces 5 percent of the national value-added of computer manufacturing, then this county also exports 5 percent of U.S. computers and electronics." The data and the details of the Brookings methodology are available online at http://www.brookings.edu/research/interactives/2015/export-monitor#10420.

¹⁰ The data on the number of employees in the metropolitan area in 2014 are from the State and Area Employment (SAE) data in the Current Employment Statistics published by the U.S. Bureau of Labor Statistics. These data are available online at http://www.bls.gov/sae/home.htm.

¹¹ We do not analyze ITA data for U.S. metropolitan areas in Puerto Rico.

¹³ The two main limitations of the ITA dataset are that it includes exports of goods but not export of services, and the reported origin of movement of the exports may not accurately identify the location of manufacturing.

area's "potential" to export if it were to export at the national average rate of the industry, rather than a direct measure of actual exports from the metropolitan area.¹⁴

3. Patterns in the Export Intensity of the Metropolitan Areas

Several economic factors, such as the size of the metropolitan area, its location, the percentage of the population that is foreign-born, and the percentage of employees of companies that are foreignowned, could potentially explain the differences in export intensity across the metropolitan areas.

The first factor that could account for the differences in export intensity is the size of the metropolitan area. Of course we expect that metropolitan areas with very large populations like New York-Newark-Jersey City, NY-NJ-PA (population: 20 million) and Los Angeles–Long Beach–Anaheim, CA (population: 13 million) will have much larger export volumes than metropolitan areas with very small populations like Casper, WY (population: 82 thousand) and Carson City, NV (population: 55 thousand), and that is why we scale the export values by the total number of employees in the metropolitan areas to construct the export intensity measure. But, in addition, the already-normalized export intensity measure could also be larger for more populous metropolitan areas because a large local market can help local producers achieve economies of scale and this would increase their cost competitiveness in export markets. Model 1 in Table 4 is a simple regression for a cross-section of 378 metropolitan areas throughout the country. In this model, the explanatory variable is the population of the metropolitan area. The estimated coefficient on population is positive but only marginally significant at the 6% level.

Another potentially important influence on export intensity is the distance from the metropolitan area to a coast or a land border with Canada or Mexico. We anticipate that proximity to a port or international transportation hub will increase export intensity.¹⁵ 23 percent of the 378 metropolitan areas are located very close to a border or to the coast of the Pacific Ocean, Atlantic Ocean, Gulf of Mexico, or one of the Great Lakes. Model 2 in Table 4 is a simple regression in which an indicator variable for border or coastal is the only explanatory variable. In this model, the

¹⁴ Brookings export database methodology, updated May 2015. Available on-line at http://www.brookings.edu/~/media/research/files/interactives/2015/export-monitor/brookings-export-series-methodology-nm-5715.pdf.

¹⁵ In fact, a large share of the exports from the Houston-The Woodlands-Sugar Land, TX area are destined for Mexico, a large share of the exports of the Seattle-Tacoma-Bellevue, WA area are destined for China, and a large share from the Detroit-Warren-Dearborn, MI area are destined for Canada.

estimated coefficient on the border or coastal indicator is positive and statistically significant at the 1% level.

The third factor that could affect the export intensity of a metropolitan area is the share of the population that is foreign-born. We anticipate that foreign-born residents have international social networks and commercially relevant knowledge of foreign markets that may contribute to export success. Therefore, we expect that the metropolitan areas with larger shares of their population that are foreign-born will be more export-intensive. We calculate the share of the population that are foreign border using 2013 data from the American Community Survey.¹⁶ Model 3 in Table 4 reports a simple regression in which the only explanatory variable is the share of the population of the metropolitan area that is foreign-born. The data on the foreign-born share is only available for 259 of the metropolitan areas, so its inclusion in Model 3 reduces the size of the estimation sample. The estimated coefficient on the share of the population that is foreign-born is positive and statistically significant at the 1% level.

The fourth factor is the share of state employment in foreign-owned companies. We calculate this share using 2012 state-level data published by the U.S. Bureau of Economic Analysis. We assign to each metropolitan area the value for its state.¹⁷ We anticipate that employees of foreign-owned companies will be more involved in international trade, and therefore the metropolitan areas where they are employees will be more export-intensive. Model 4 in Table 4 reports a simple regression in which the explanatory variable is the share of state employment in foreign-owned companies. The estimated coefficient on this variable is positive but only marginally significant at the 8% level.

Model 5 in final column is a multivariate regression that includes all for of these factors as explanatory variables. The population of the metropolitan area has a positive and statistically significant effect on metropolitan area exports in Model 1, but it is not significant when we condition on the share of the population that is foreign-born in Model 5. This reflects the high correlation between these two explanatory variables.

The R² statistic is low for all five models, indicating that these city characteristics only account for a small share of the variation in metropolitan area exports. The rest of the variation in export

¹⁶ Specifically, the data are from American Community Survey table *S0501: Selected Characteristics of the Native and Foreign-born Populations*, available online at factfinder.census.gov.

¹⁷ Specifically, the data are from BEA table *Employment of Majority-Owned U.S. Affiliates, State by Country of UBO, 2012*, available on-line at bea.gov/international/di1fdiop.htm.

intensity probably reflects differences in the industry composition of the metropolitan areas.¹⁸ In addition, the unexplained variation in export intensity may reflect differences in local policies that affect the economics of exporting.

4. Economic Impact of the Metropolitan Area Exports

Do metropolitan area exports imply economic gains in local labor markets? In this section, we discuss the link between the exports and labor market outcomes in the metropolitan areas. In theory, the impact of local export success on local labor market outcomes is ambiguous. For example, an increase in exports that is due to increased access to foreign markets, holding all else equal, will increase the demand for U.S. workers that produce the exported products. This increase in labor demand will generally increase wages in the metropolitan area if there is some geographical segmentation of labor markets. In this case, changes in export values that are due to change in foreign demand will have a positive effect on wages. On the other hand, an increase in the available labor force will, holding all else equal, reduce wages and increase export competitiveness. Changes in export values that are due to changes in local labor supply conditions will have a negative effect on wages. As these examples illustrate, the sign of the effect of exports on wages depends on the types of shocks that are driving the variation in export values.

However, even if we focus on increases in exports that are due to increased access to foreign markets, the positive impact on wages is not necessarily concentrated in the metropolitan area that exports the product. Exports from one metropolitan area may have a positive impact on labor markets in another area if the areas are within an integrated product market. For example, if City B exports and City A sells its own similar products in City B, then the reduction in the quantity of product supplied by City B to City B (due to its diversion to export markets) will increase the demand for City A products in City B; in this case, City A benefits from increased labor demand as City B exports more, even though City A records no cross-border trade. As a second example, City A might sell more intermediate goods to City B, and City B uses these intermediate goods to produce final goods for export; in this case, City A benefits from City B's exports, even though City A records no exports. In both of these examples, the goods are exported from City B rather than City A, but the

¹⁸ For example, Los Angeles-Long Beach-Anaheim CA metropolitan area has a greater concentration in computers and peripheral equipment, while Detroit-Warren-Dearborn MI has a greater concentration in motor vehicles and parts.

exports still have a positive effect on wages in City A. As these cases illustrate, the benefits of exporting are not necessarily concentrated in exporting city.

On the other hand, there are cases in which local exports are more likely to generate locally concentrated wage effects. If the exports are driven by foreign product demand rather than local labor supply and the products that the metropolitan area exports differentiated or even unique, then the increase in export sales will represent an increase in the total demand for these products rather than a diversion between markets, and local exports will likely have a locally concentrated effect on wages.

Given the theoretical ambiguity, we try to resolve the issue using empirical analysis. We analyze earnings data for individual workers from the 2014 Merged Outgoing Rotation Group of the Current Population Survey (CPS). The data include the worker's average weekly earnings, as well as worker characteristics that are typically included in wage regressions, including the worker's education, age (as a proxy for work experience), occupation, industry, race, sex, and metropolitan area.¹⁹

The econometric model estimates the earnings premia associated with the export intensity of the metropolitan areas after controlling for the worker characteristics. We divide the 120,263 workers in the CPS sample into two occupation groups (workers in production and support occupations, workers in management and professional occupations) and two age groups (workers below age 35 and workers above age 34). We calculate a separate model for each of these groups.

Equation (1) is the specification for the econometric model.

$$lnW_i = \beta_0 ExportIntensity_i + \beta_1 CollegeGrad_i + \beta_2 GraduateDeg_i + \beta_3 (Age > 35)_i + \beta_1 CollegeGrad_i + \beta_2 GraduateDeg_i + \beta_3 (Age > 35)_i + \beta_3 (Age > 35$$

$$+\beta_4 Manager_i + \beta_5 Union_i + \beta_6 Male_i + \beta_7 White_i + \sum_j \gamma_j D_{ij} + \varepsilon_i$$
(1)

The variable lnW_i is the log of worker *i*'s average weekly earnings. *ExportIntensity*_i is the value of metropolitan exports per worker in worker *i*'s metropolitan area, *CollegeGrad*_i is an indicator that is equal to one if the worker completed a bachelor's degree, and *GraduateDeg*_i is equal to one if the worker completed a graduate degree. (*Age* > 35)_i is an indicator that is equal to one if the individual is at least 35 years old, and *Manager*_i is an indicator that is equal to one if the individual is working in a management or professional occupation. *Union*_i is an indicator that is equal to one

¹⁹ The econometric models of the effects of trade on wages in Riker (2010), Riker and Thurner (2011), Ebenstein, Harrison, McMillan, and Phillips (2014), Riker (2015) and CEA (2015) also use individual worker data from the Current Population Survey and control for these worker characteristics.

if the individual is a union member or is covered by a union agreement. *White_i* and *Male_i* indicate individual *i*'s race and sex. D_{ij} represents a set of indicator variables that are equal to one if individual *i* works in industry *j*, and ε_i is the error term of the model.

Table 5 reports the estimated coefficients of the model, with and without the industry fixed effects. In both versions, the estimated coefficient on the ITA measure of the export intensity is positive and statistically significant, and the controls for the workers' human capital and demographic characteristics are significant and have the expected signs based on the literature. Workers earn more on average if they are in relatively export-intensive metropolitan areas, are more experienced, have a higher level of education, are white, are male, are covered by a union contract, and are in a management or professional occupation.²⁰ The industry fixed effects control for differences in earnings across industries. The individual γ_j coefficients are not reported in Table 5, but the *F* test at the bottom of the table indicates that these industry effects are jointly significant, so Model 6 is preferable to Model 5. Both of the models use CPS sampling weights.

Table 6 reports separate estimates for several groups of workers, again using the ITA measure of export intensity. Models 7 and 8 distinguish between groups of occupations (management and professional occupations, or production and support occupations), and Models 9 and 10 distinguish between different age groups of workers (under 35, or over 34). The estimated coefficient on the ITA export intensity measure is positive and statistically significant for workers in management and professional occupations (Model 8) and for workers that are younger than 35 (Model 10). On the other hand, the coefficient is not significantly different from zero for workers in production and support occupations (Model 7) or for workers older than 34 (Model 9).

Table 7 modifies three of the earlier econometric models by substituting the Brookings measure of export intensity for the ITA measure. The estimated coefficients on the export intensity of the metropolitan area are positive and statistically significant in Models 6b, 8b, and 10b.²¹

If the metropolitan area of the exports were not related to the location of their economic impact, then the estimated coefficient on the metropolitan area's export intensity would not be significantly

²⁰ The model is not trying to explain *why* the earnings of white workers are generally higher than the earnings of non-white workers. The model is conditioning on race in order to control for any differences in earnings that reflect differences in the racial composition of the metropolitan areas. This avoids attributing these differences to the effects of export intensity.

²¹ We also estimated versions of Models 7 and 9 that substitute the Brookings measures of export intensity. The estimated coefficients on export intensity are not significantly different from zero. These estimates are not reported in Table 7.

different from zero in the regressions. Likewise, if metropolitan area exports were very poorly measured in the export data, then the estimated coefficient on export intensity would not be significantly different from zero. The econometric estimates are rejecting both of these hypotheses, suggesting that the metropolitan area export data, while not perfect, are indicative of economic impacts.

Finally, Table 8 reports the estimated impact of metropolitan area exports (using either the ITA measure or the Brookings measure) on earnings as an average percentage increase in earnings for the 280 metropolitan areas with the largest impacts (according to the ITA measure). The impacts vary substantially across the metropolitan areas for either measure. The imports based on the Brookings measure are larger on average than the impacts based on the ITA measure, 1.70 percent compared to 0.58 percent, and the two measures of export intensity imply a different ranking of the metropolitan areas. For example, Laredo TX has one of the largest impacts according to the ITA measure.

An important caveat is that the export intensity of a metropolitan area may be endogenously determined and negatively correlated with labor supply factors in the metropolitan area. If this were the case, then it would imply that the effects on earnings that are estimated in our OLS models would be downward-biased, and the estimates in Table 8 would understate the positive economic impacts of the exports.

5. Conclusions

In this paper, we have discussed the measurement and economic impact of exports from specific metropolitan areas in the United States. These exports are constructed either from the origin of movement of individual export shipments (the ITA approach) or by allocating aggregate exports to metropolitan areas based on the geographic concentration of industry production (the Brookings Institute approach). The metropolitan area exports are correlated with proximity to the border or a coast, with the size of the local market, with the share of the population that is foreign-born, and with the share of local employment in companies that are foreign-owned, but most of the variation across metropolitan areas remains unexplained.

Economic theory does not provide a clear prediction about whether a city's direct exports have a positive impact on the local labor market, so we look for empirical evidence. We estimate an econometric model that relates workers' average weekly earnings to the export intensity of their metropolitan area. We find that the estimated impacts vary substantially across the metropolitan areas, and they are significantly greater for workers in management and professional occupations and for younger workers. The estimates are generally large when we use the Brookings measure of export intensity.

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Table 1: The Ten Metropolitan Areas with the Largest Exports in 2014

ITA Measure of Metropolitan Area Exports

MSA	Merchandise Exports in 2014
	In Billions of U.S. Dollars
Houston-The Woodlands-Sugar Land, TX	119.0
New York-Newark-Jersey City, NY-NJ-PA	105.0
Los Angeles-Long Beach-Anaheim, CA	75.5
Seattle-Tacoma-Bellevue, WA	61.9
Detroit-Warren-Dearborn, MI	50.3
Chicago-Naperville-Elgin, IL-IN-WI	47.3
Miami-Fort Lauderdale-West Palm Beach, FL	38.0
New Orleans-Metairie, LA	34.9
Dallas-Fort Worth-Arlington, TX	28.7
San Francisco-Oakland-Hayward, CA	26.9

Table 2: The Ten Metropolitan Areas with the Largest Exports per Worker in 2014

ITA Measure of Metropolitan Area Exports

MSA	Value of Merchandise Exports
	per Worker in 2014
Midland, MI	80,938
Longview, WA	76,689
El Paso, TX	67,950
El Centro, CA	65,438
Laredo, TX	64,345
Peoria, IL	62,834
New Orleans-Metairie, LA	61,803
Lake Charles, LA	56,826
Beaumont-Port Arthur, TX	49,979
Kokomo, IN	49,685

Table 3: Summary Statistics for the Export Measures

ITA Measure of Metropolitan Area Exports

	Value of Merchandise Exports in	Value of Merchandise Exports
	2014 (in Billions of U.S. Dollars)	per Worker in 2014
Mean	3.7	9,561
Standard Deviation	11.1	11,729
Maximum	119.0	80,938

Table 4: Regression Models of Export Intensity

Explanatory Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Population	0.0006 (0.0003)				-0.0002 (0.0004)
Border or Coastal		0.0049 (0.0017)			0.0045 (0.0018)
Share of the Population That is Foreign Born			0.0422 (0.0153)		0.0346 (0.0172)
Share of State Employment in Foreign-Owned Companies				0.0053 (0.0025)	0.0230 (0.0595)
Constant	0.0084 (0.0006)	0.0092 (0.0007)	0.0056 (0.0014)	0.0053 (0.0025)	0.0042 (0.0032)
Number of Observations	378	378	259	378	259
R ²	0.0314	0.0059	0.0686	0.005	0.1002

Dependent Variable: ITA Measure of Metropolitan Area Exports per Worker

Table 5: Regression Models of Wages

Explanatory Variable	Model 5: All Workers No Industry Fixed Effects	Model 6: All Workers Including Industry Fixed Effects
ITA Export Intensity Measure	0.9226 (0.2197)	0.5987 (0.2070)
Experience (Age ≥ 35)	0.3916 (0.0047)	0.3295 (0.0045)
College Graduate	0.3951 (0.0060)	0.3624 (0.0059)
Graduate Degree	0.1120 (0.0076)	0.1702 (0.0074)
White	0.0610 (0.0053)	0.0586 (0.0051)
Male	0.3436 (0.0044)	0.2454 (0.0047)
Union	0.2151 (0.0062)	0.2288 (0.0063)
Management and Professional Occupations	0.4330 (0.0056)	0.4102 (0.0058)
Industry Fixed Effects Included	No	Yes
Number of Observations	120,263	120,263
R ²	0.3077	0.3742
F Test of the Industry Fixed Effects		F = 209.61 p = 0.0000

Dependent Variable: Log of Average Weekly Earnings

Table 6: Econometric Estimates for Different Occupations and Education Levels

Explanatory Variable	Model 7: Production and Support Occupations	Model 8: Management and Professional Occupations	Model 9: Age Older Than 34	Model 10: Age Younger Than 35
ITA Export Intensity Measure	0.3113	1.0834	0.2701	1.2017
	(0.2639)	(0.3284)	(0.2603)	(0.3380)
Experience (Age ≥ 35)	0.3195 (0.0057)	0.3415 (0.0074)		
College Graduate	0.3519	0.3960	0.2957	0.4796
	(0.0083)	(0.0083)	(0.0071)	(0.0101)
Graduate Degree	0.0601	0.1963	0.1477	0.2499
	(0.0204)	(0.0081)	(0.0089)	(0.0132)
White	0.0618	0.0516	0.0634	0.0427
	(0.0065)	(0.0081)	(0.0063)	(0.0085)
Male	0.2568	0.2168	0.2815	0.1953
	(0.0062)	(0.0072)	(0.0058)	(0.0078)
Union	0.2452	0.1886	0.2029	0.2806
	(0.0083)	(0.0099)	(0.0072)	(0.0131)
Management and Professional Occupations			0.4391 (0.0068)	0.3533 (0.0103)
Industry Fixed Effects Included	Yes	Yes	Yes	Yes
Number of Observations	71,786	48,477	78,336	41,927
R ²	0.2749	0.2526	0.3080	0.3622
F Test of the	F = 147.92	F = 68.36	F = 111.40	F = 105.55
Industry Fixed Effects	p = 0.0000	p = 0.0000	p = 0.0000	p = 0.0000

Dependent Variable: Log of Weekly Earnings

Table 7: Econometric Estimates Using the Brookings Export Measure

Explanatory Variable	Model 6b: All Workers	Model 8b: Management and Professional Occupations	Model 10b: Age Under 35
Brookings	1.2282	1.8012	1.7231
Export Intensity Measure	(0.2853)	(0.4583)	(0.4593)
Experience (Age ≥ 35)	0.3297 (0.0045)	0.3417 (0.0074)	
College Graduate	0.3625	0.3964	0.4798
	(0.0059)	(0.0083)	(0.0101)
Graduate Degree	0.1701	0.1960	0.2497
	(0.0074)	(0.0081)	(0.0131)
White	0.0591	0.0522	0.0433
	(0.0051)	(0.0081)	(0.0085)
Male	0.2455	0.2169	0.1955
	(0.0047)	(0.0072)	(0.0078)
Union	0.2285	0.1883	0.2804
	(0.0063)	(0.0099)	(0.0131)
Management and Professional	0.4103		0.3534
Occupations	(0.0058)		(0.0103)
Industry Fixed Effects Included	Yes	Yes	Yes
Number of Observations	120,263	48,477	41,927
R ²	0.3743	0.2527	0.3622
F Test of the	F = 208.81	F = 67.92	F = 105.18
Industry Fixed Effects	p = 0.0000	p = 0.0000	p = 0.0000

Dependent Variable: Log of Average Weekly Earnings

	ITA Measure	Brookings Measure
	of Export	of Export
Metropolitan Area	Intensity	Intensity
El Paso, TX	4.1519	1.6205
El Centro, CA	3.9953	1.1657
Laredo, TX	3.9273	0.6568
Peoria, IL	3.8334	3.1050
New Orleans-Metairie, LA	3.7693	4.1629
Lake Charles, LA	3.4606	12.4369
Beaumont-Port Arthur, TX	3.0373	13.4390
Kingsport-Bristol-Bristol, TN-VA	2.6229	3.2582
Houston-The Woodlands-Sugar Land, TX	2.4655	4.0082
Decatur, IL	2.4308	4.0653
Brownsville-Harlingen, TX	2.3826	0.8915
Greenville-Anderson-Mauldin, SC	2.3709	2.0119
Davenport-Moline-Rock Island, IA-IL	2.1620	2.1488
Bellingham, WA	2.1077	2.2324
Seattle-Tacoma-Bellevue, WA	2.0349	3.5249
Gulfport-Biloxi-Pascagoula, MS	1.8682	1.4920
Savannah, GA	1.8618	2.1270
Bridgeport-Stamford-Norwalk, CT	1.7660	2.4943
San Antonio-New Braunfels, TX	1.6418	1.1973
Mount Vernon-Anacortes, WA	1.6368	2.6125
Detroit-Warren-Dearborn, MI	1.5995	2.3809
Corpus Christi, TX	1.5964	5.0966
Evansville, IN-KY	1.4539	2.9273
Burlington-South Burlington, VT	1.4510	1.0295
McAllen-Edinburg-Mission, TX	1.3216	0.5413
Cincinnati-Middletown, OH-KY-IN	1.2877	1.5698
San Jose-Sunnyvale-Santa Clara, CA	1.2675	3.2131
Bloomington, IN	1.2554	2.7473
Racine, WI	1.1732	2.9671
Battle Creek, MI	1.1647	3.2068
Baton Rouge, LA	1.1478	5.8598
Las Cruces, NM	1.1433	1.1005
Monroe, MI	1.1362	1.6248
Charleston-North Charleston, SC	1.0981	1.5559
Hartford-West Hartford-East Hartford, CT	1.0929	2.3577
Memphis, TN-MS-AR	1.0771	1.1671
Portland-Vancouver-Hillsboro, OR-WA	1.0444	3.3095
Merced, CA	1.0303	2.2851
Kankakee-Bradley, IL	1.0162	2.2923
Rockford, IL	0.9987	3.1521

	ITA Measure	Brookings Measure
	of Export	of Export
Metropolitan Area	Intensity	Intensity
Yakima, WA	0.9765	2.0576
Toledo, OH	0.9581	2.0302
Spartanburg, SC	0.9554	2.9922
Miami-Fort Lauderdale-West Palm Beach, FL	0.9416	1.4948
Elkhart-Goshen, IN	0.9073	5.5153
Saginaw-Saginaw Township North, MI	0.9021	1.9240
Janesville-Beloit, WI	0.8682	1.2895
Louisville/Jefferson County, KY-IN	0.8500	1.7406
San Diego-Carlsbad, CA	0.8288	1.9017
Wichita, KS	0.8248	3.0773
Blacksburg-Christiansburg-Radford, VA	0.8235	2.1081
Greeley, CO	0.8233	1.9041
Kalamazoo-Portage, MI	0.8040	1.6363
Los Angeles-Long Beach-Anaheim, CA	0.7927	2.1190
Hickory-Lenoir-Morganton, NC	0.7816	2.5445
Salt Lake City, UT	0.7674	2.1667
Bakersfield-Delano, CA	0.7653	2.4121
Decatur, AL	0.7630	4.1946
Madera-Chowchilla, CA	0.7397	2.6280
San Francisco-Oakland-Hayward, CA	0.7383	2.2052
Charlotte-Concord-Gastonia, NC-SC	0.7270	2.0624
Provo-Orem, UT	0.7183	1.3375
Muskegon-Norton Shores, MI	0.7159	1.6516
Oshkosh-Neenah, WI	0.6968	2.8393
Visalia-Porterville, CA	0.6939	2.2716
Huntington-Ashland, WV-KY-OH	0.6937	1.6876
Providence-Warwick, RI-MA	0.6913	1.3917
New York-Newark-Jersey City, NY-NJ-PA	0.6907	1.7156
Mobile, AL	0.6816	2.1043
York-Hanover, PA	0.6793	1.6329
Chambersburg-Waynesboro, PA	0.6768	1.9269
Worcester, MA-CT	0.6724	1.9984
Minneapolis-St. Paul-Bloomington, MN-WI	0.6723	1.3221
Modesto, CA	0.6697	1.6114
Boise City-Nampa, ID	0.6684	1.1381
Erie, PA	0.6618	1.9182
Hanford-Corcoran, CA	0.6595	2.1967
Nashville-Davidson-Murfreesboro-Franklin, TN	0.6594	1.4868
Lakeland-Winter Haven, FL	0.6414	0.9434
South Bend-Mishawaka, IN-MI	0.6407	1.8904

	ITA Measure	Brookings Measure
	of Export	of Export
Metropolitan Area	Intensity	Intensity
Reno-Sparks, NV	0.6353	0.9331
Chicago-Naperville-Elgin, IL-IN-WI	0.6230	1.7176
Cleveland-Elyria, OH	0.6202	1.6191
Austin-Round Rock, TX	0.6175	1.3589
Montgomery, AL	0.6158	1.7263
Akron, OH	0.6148	1.4100
Milwaukee-Waukesha-West Allis, WI	0.6146	1.4674
Grand Rapids-Wyoming, MI	0.6125	1.8569
Durham-Chapel Hill, NC	0.6058	2.4760
Greensboro-High Point, NC	0.6042	2.5239
Reading, PA	0.6031	2.4553
Albany-Schenectady-Troy, NY	0.6026	1.4150
Oxnard-Thousand Oaks-Ventura, CA	0.5907	2.3800
Rochester, NY	0.5895	1.6115
Indianapolis-Carmel-Anderson, IN	0.5766	1.8710
Gainesville, GA	0.5762	2.8822
Fresno, CA	0.5699	1.6996
Champaign-Urbana, IL	0.5694	1.5365
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	0.5680	1.4080
Omaha-Council Bluffs, NE-IA	0.5609	1.2704
Harrisburg-Carlisle, PA	0.5589	0.8328
Eau Claire, WI	0.5585	1.0771
Allentown-Bethlehem-Easton, PA-NJ	0.5376	1.2694
Santa Cruz-Watsonville, CA	0.5369	1.6808
Boston-Cambridge-Newton, MA-NH	0.5336	1.8328
Dallas-Fort Worth-Arlington, TX	0.5258	2.0806
Pensacola-Ferry Pass-Brent, FL	0.5232	0.8700
Buffalo-Cheektowaga-Niagara Falls, NY	0.5210	1.5842
Tulsa, OK	0.5184	1.6083
Pittsburgh, PA	0.5178	1.3302
La Crosse-Onalaska, WI-MN	0.5122	0.9526
Lexington-Fayette, KY	0.4986	1.7420
Florence, SC	0.4983	1.5821
Jackson, MI	0.4950	1.9011
Dayton, OH	0.4883	1.3309
Kansas City, MO-KS	0.4870	1.2368
Michigan City-La Porte, IN	0.4840	2.1700
SacramentoRosevilleArden-Arcade, CA	0.4815	0.9595
Atlanta-Sandy Springs-Roswell, GA	0.4767	1.3123
St. Louis, MO-IL	0.4731	1.5202

	ITA Measure	Brookings Measure
	of Export	of Export
Metropolitan Area	Intensity	Intensity
Daphne-Fairhope-Foley, AL	0.4719	0.7428
Sherman-Denison, TX	0.4610	2.0599
Kennewick-Richland, WA	0.4598	1.4003
Pine Bluff, AR	0.4590	1.8564
Salisbury, MD-DE	0.4585	1.2876
Santa Maria-Santa Barbara, CA	0.4504	2.0877
Appleton, WI	0.4497	1.7103
Fort Wayne, IN	0.4475	2.4721
Bloomington, IL	0.4420	1.1444
Knoxville, TN	0.4282	1.4605
Coeur d'Alene, ID	0.4282	0.8443
Canton-Massillon, OH	0.4278	2.3710
Little Rock-North Little Rock-Conway, AR	0.4274	1.1220
Riverside-San Bernardino-Ontario, CA	0.4265	1.0991
Duluth, MN-WI	0.4234	1.3041
Auburn-Opelika, AL	0.4223	1.4560
Fort Collins-Loveland, CO	0.4188	1.3225
Salinas, CA	0.4182	2.2393
Lafayette, LA	0.4155	2.5227
Phoenix-Mesa-Scottsdale, AZ	0.4132	1.2275
Winchester, VA-WV	0.4097	1.2245
Niles-Benton Harbor, MI	0.4071	2.4377
Vineland-Bridgeton, NJ	0.4043	1.2664
Huntsville, AL	0.4004	1.7678
Manchester-Nashua, NH	0.4003	1.2332
Lafayette-West Lafayette, IN	0.3949	4.2873
Stockton-Lodi, CA	0.3906	1.3602
New Haven-Milford, CT	0.3866	1.9100
Chattanooga, TN-GA	0.3791	1.6913
Asheville, NC	0.3766	1.7445
Tucson, AZ	0.3742	1.5314
Cedar Rapids, IA	0.3731	2.1359
Palm Bay-Melbourne-Titusville, FL	0.3719	1.2752
Columbus, OH	0.3698	1.1798
Harrisonburg, VA	0.3671	2.6482
Madison, WI	0.3651	1.1689
Cleveland, TN	0.3646	2.4518
Syracuse, NY	0.3643	1.2576
Anniston-Oxford-Jacksonville, AL	0.3609	1.3656
Carbondale-Marion, IL	0.3569	1.1117

	ITA Measure	Brookings Measure
	of Export	of Export
Metropolitan Area	Intensity	Intensity
Ogden-Clearfield, UT	0.3543	2.7310
Bowling Green, KY	0.3511	1.6697
Ann Arbor, MI	0.3479	1.1258
Utica-Rome, NY	0.3461	1.2686
Boulder, CO	0.3448	1.9548
Santa Rosa-Petaluma, CA	0.3447	1.4313
Winston-Salem, NC	0.3422	1.7102
Fargo, ND-MN	0.3422	1.2791
Green Bay, WI	0.3400	1.4899
Youngstown-Warren-Boardman, OH-PA	0.3375	1.9984
Valdosta, GA	0.3350	1.1536
Charleston, WV	0.3309	1.3976
Augusta-Richmond County, GA-SC	0.3251	1.3465
Columbia, SC	0.3229	1.1542
Portland-South Portland, ME	0.3228	1.1029
Longview, TX	0.3198	2.2351
Idaho Falls, ID	0.3153	1.2613
Richmond, VA	0.3142	1.0487
ScrantonWilkes-BarreHazleton, PA	0.3115	1.0543
Amarillo, TX	0.3087	1.7583
Albany, GA	0.3051	1.1830
Altoona, PA	0.3019	1.5937
Watertown-Fort Drum, NY	0.3004	0.8366
Glens Falls, NY	0.2995	1.1009
Napa, CA	0.2973	1.6524
Lynchburg, VA	0.2963	1.5531
Williamsport, PA	0.2935	1.5170
Panama City-Lynn Haven-Panama City Beach, FL	0.2917	0.6408
Raleigh-Cary, NC	0.2906	1.4303
Tampa-St. Petersburg-Clearwater, FL	0.2888	0.9326
Baltimore-Columbia-Towson, MD	0.2873	1.0993
Virginia Beach-Norfolk-Newport News, VA-NC	0.2844	0.9341
Columbus, GA-AL	0.2838	1.4417
Jackson, MS	0.2728	0.8737
Burlington, NC	0.2699	1.7041
Binghamton, NY	0.2684	1.4214
Roanoke, VA	0.2585	1.1988
Waco, TX	0.2583	2.5447
Fort Smith, AR-OK	0.2578	1.3778
Springfield, OH	0.2555	1.6958

	ITA Measure	Brookings Measure
	of Export	of Export
Metropolitan Area	Intensity	Intensity
Lansing-East Lansing, MI	0.2517	1.8401
Washington-Arlington-Alexandria, DC-VA-MD-WV	0.2515	1.0611
Wichita Falls, TX	0.2512	1.8815
Goldsboro, NC	0.2506	2.2882
Albuquerque, NM	0.2485	1.0415
Lubbock, TX	0.2473	0.8980
Terre Haute, IN	0.2460	3.0538
Lancaster, PA	0.2445	1.3115
Chico, CA	0.2442	1.0982
Vallejo-Fairfield, CA	0.2418	1.7693
Flint, MI	0.2408	1.7831
Florence-Muscle Shoals, AL	0.2396	2.6971
Jacksonville, FL	0.2381	0.8619
Des Moines-West Des Moines, IA	0.2376	1.0725
Waterloo-Cedar Falls, IA	0.2322	2.2369
Wausau, WI	0.2317	1.7288
Trenton-Ewing, NJ	0.2262	1.1426
Clarksville, TN-KY	0.2245	1.4358
Denver-Aurora-Lakewood, CO	0.2212	1.2541
St. Cloud, MN	0.2155	1.6690
Athens-Clarke County, GA	0.2117	1.2388
Birmingham-Hoover, AL	0.2114	1.1644
Fayetteville-Springdale-Rogers, AR-MO	0.2108	1.0393
Spokane-Spokane Valley, WA	0.2087	1.1939
Pueblo, CO	0.2082	1.3494
Kingston, NY	0.2082	0.9081
Victoria, TX	0.2056	2.5027
Eugene-Springfield, OR	0.2009	1.3843
Joplin, MO	0.2001	2.0762
Topeka, KS	0.1961	0.8976
Iowa City, IA	0.1961	1.4217
Colorado Springs, CO	0.1956	0.8983
North Port-Sarasota-Bradenton, FL	0.1867	0.6865
Sioux Falls, SD	0.1856	1.4049
Tyler, TX	0.1831	1.5997
Fayetteville, NC	0.1766	1.8895
Sebastian-Vero Beach, FL	0.1747	0.7774
Las Vegas-Henderson-Paradise, NV	0.1702	1.2124
Orlando-Kissimmee-Sanford, FL	0.1692	1.2614
Springfield, MA	0.1673	0.9797

	ITA Measure	Brookings Measure
	of Export	of Export
Metropolitan Area	Intensity	Intensity
San Luis Obispo-Paso Robles-Arroyo Grande, CA	0.1598	1.3263
Olympia-Tumwater, WA	0.1591	0.4995
Oklahoma City, OK	0.1573	1.0143
Shreveport-Bossier City, LA	0.1542	1.9267
Salem, OR	0.1493	1.1849
Medford, OR	0.1469	1.3195
Columbia, MO	0.1468	0.7334
Myrtle Beach-Conway-North Myrtle Beach, SC-NC	0.1460	0.5970
Gainesville, FL	0.1386	0.6981
Hagerstown-Martinsburg, MD-WV	0.1383	1.3144
Deltona-Daytona Beach-Ormond Beach, FL	0.1340	0.7127
Lewiston-Auburn, ME	0.1335	0.8586
Springfield, MO	0.1330	1.0750
Cape Coral-Fort Myers, FL	0.1289	0.6322
Odessa, TX	0.1269	2.8252
Macon, GA	0.1204	0.8787
Port St. Lucie, FL	0.1196	0.6163
Johnstown, PA	0.1186	0.9846
Warner Robins, GA	0.1158	1.3686
Monroe, LA	0.1145	1.5182
Naples-Immokalee-Marco Island, FL	0.1101	0.5005
Charlottesville, VA	0.1088	0.8149
Johnson City, TN	0.1075	1.3943
Lawrence, KS	0.1056	1.0375
Ocala, FL	0.1053	0.9825
Bangor, ME	0.1041	0.7892
Norwich-New London, CT	0.1012	1.9201
East Stroudsburg, PA	0.1003	1.3635
Bend-Redmond, OR	0.0995	1.0897
Urban Honolulu, HI	0.0993	1.6329
Farmington, NM	0.0973	1.4030
Billings, MT	0.0967	0.8023
Manhattan, KS	0.0885	0.9221
Redding, CA	0.0843	0.7630
Dover, DE	0.0833	1.0546
Abilene, TX	0.0792	1.2788
Midland, TX	0.0773	3.0701
College Station-Bryan, TX	0.0741	1.1133
Punta Gorda, FL	0.0694	0.3079
Killeen-Temple, TX	0.0639	1.0559