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

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**Abstract:** This article examines data on the value of U.S. exports from 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, 0.58 to 1.70 percent higher on average, even after controlling for the human capital and demographic characteristics of the individual workers. The estimated magnitude of the impact on earnings varies across the metropolitan areas and depends on the measure of metropolitan area exports that we use in the econometric model.

*Keywords*: Metropolitan Areas, Exports, Wages, Econometric Analysis

*JEL Classifications*: F14, F16, R11, R15

## 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.[1] Press accounts often present this information as a ranking of the metropolitan areas according to the level and growth rate of their 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).[2] Local newspapers, including 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), Salt Lake Tribune (Utah), San Jose Mercury News (California – Brookings data), Tampa Tribune (Florida – 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.[3] They find that exporting firms and export-intensive industries generally pay higher wages. Likewise, the press accounts of metropolitan area exports claim that the benefits to exporting include additional job creation and economic development, and that the metropolitan area export statistics indicate the areas that gain the most from policy initiatives that expand U.S. exports, like international trade agreements.[4]

Before evaluating the economic impact of metropolitan area exports, it is important to first understand how these export values are calculated, 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 datasets 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 correlated with the share of the local population that is foreign-born and with 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.[5]

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 U.S. 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.

We try to resolve the issue through 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 measure of export intensity or the Brookings measure. Using the ITA measure, 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 measure, we estimate that the export intensities of the metropolitan areas are associated with 1.70 percent higher earnings on average. These are average effects across all workers in the metropolitan area, so they are economically (as well as statistically) significant.

The model conditions on the industry of the worker, so these earnings premia are in addition to the earnings premia in export-intensive industries that are estimated in Riker (2015). 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.[6] 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."[7]

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.[8]

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 total number of employees in the metropolitan area in 2014.[9] 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 these export intensity measures across 378 metropolitan areas.[10]

The Brookings Institute publishes an alternative series on metropolitan area exports that they estimate by allocating industry-level national exports across counties in the United States according to each county's share of the industry's national production.[11] 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.[12] 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 area's "potential" to export if it were to export at the national average rate of the industry. It is not a direct measure of exports from the metropolitan area.[13]

## 3. Patterns in the Export Intensity of the Metropolitan Areas

Several economic factors, including 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 foreign-owned, 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. 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 if a large local market helps local producers achieve economies of scale and increases 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.[14] Twenty-three 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 areas is the only explanatory variable. In this model, the estimated coefficient on this variable 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-born using 2013 data from the American Community Survey.[15] 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 foreign-born shares are 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 this variable 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.[16] We anticipate that employees of foreign-owned companies will be more involved in international trade, and therefore the metropolitan areas where they are employers 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 the final column is a multivariate regression that includes all four 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 $R^2$ statistics are 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 intensity probably reflects differences in the industry composition of the metropolitan areas.[17] In addition, the unexplained variation in export intensity may reflect differences in local policies that affect the profitability 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 exporting metropolitan area if there is significant 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 it ambiguous: it depends on the types of shocks that underlie the variation in export values.

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 international trade. As a second example, City A might sell more intermediate goods to City B, and City B might use 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 international trade. In both of these examples, the goods are exported from City B rather than City A, but the exports still have a positive effect on wages in City A. As these cases illustrate, the benefits of exporting are not necessarily concentrated in the exporting city.
On the other hand, there are cases in which the wage effects are more likely to be concentrated in the exporting city. If the exports are driven by foreign product demand rather than local labor supply *and* the products that the metropolitan area exports are 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 concentrated effect on wages in the exporting city.

Given these theoretical ambiguities, we try to resolve the issue through 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.[18]

The econometric model estimates the earnings premia associated with the export intensity of the metropolitan areas after controlling for the worker's characteristics. We divide the 120,263 workers in the CPS sample into two occupation groups (workers in production and support occupations and 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 these two groups.

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

$$lnW_i = \beta_0\ ExportIntensity_i + \beta_1\ CollegeGrad_i + \beta_2\ GraduateDeg_i + \beta_3 (Age > 35)_i + \\ + \beta_4\ Manager_i + \beta_5\ Union_i + \beta_6\ Male_i + \beta_7\ White_i + \sum_j \gamma_j D_{ij} + \varepsilon_i \quad (1)$$

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 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 $\varepsilon_i$ 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 workers' human capital and demographic

characteristics are significant and have signs that are consistent with the labor economics 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.[19] The industry fixed effects control for differences in earnings across industries. The individual $\gamma_j$ 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 and workers in production and support occupations), and Models 9 and 10 distinguish between age groups of workers (workers under age 35 and workers over age 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.[20]

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 different from zero in any of 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 metropolitan areas with the largest impacts (according to the ITA measure). The impacts vary across the metropolitan areas for either measure of export intensity. The impacts 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 but one of the smallest impacts according to the Brookings 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 impact of the exports.

## 5. Conclusions

In this article, we have discussed the measurement and economic impact of exports from specific metropolitan areas in the United States. The export values 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 looked for an empirical resolution. 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.

## Endnotes

* This article is the result of ongoing professional research of ITC Staff and is solely meant to represent the opinions and professional research of the authors. It is not meant to represent in any way the views of the U.S. International Trade Commission or any of its individual Commissioners. We are grateful to Joseph Flynn for useful comments and suggestions. Please address correspondence to David.Riker@usitc.gov.

1. Throughout this article, 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.

2. These estimates are reported in Hall (2015).

3. Examples of studies that use firm-level data include Bernard and Jensen (1995, 1997, 1999) and 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).

4. 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."

5. 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.

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

7. *Exports from U.S. Metropolitan Areas Methodology, State and Sub-State Export Data.* International Trade Administration. This report is available online at http://www.trade.gov/mas/ian/metroreport/tg_ian_002825.asp

8. 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.

9. 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.

10. We do not analyze the ITA's data for U.S. metropolitan areas in Puerto Rico.

11. 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.

12. 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.

13. *Brookings export database methodology*, updated May 2015. This document is available online at http://www.brookings.edu/~/media/research/files/interactives/2015/export-monitor/brookings-export-series-methodology-nm-5715.pdf.

14. 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.

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

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

17. 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.

18. 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.

19. 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 the racial composition of the metropolitan areas. This avoids attributing these differences to the effects of export intensity.

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

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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 |

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**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 |

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**Table 3: Summary Statistics for the Export Measures**

*ITA Measure of Metropolitan Area Exports*

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

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**Table 4: Regression Models of Export Intensity**

Dependent Variable: ITA Measure of Metropolitan Area Exports per Worker

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

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**Table 5: Regression Models of Wages**

Dependent Variable: Log of Average Weekly Earnings

| Explanatory Variable | Model 5: All Workers No Industry Fixed Effects | Model 6: All Workers Including Industry Fixed Effects |
|---|---|---|
| ITA Export Intensity Measure | 0.9226<br>(0.2197) | 0.5987<br>(0.2070) |
| Experience (Age ≥ 35) | 0.3916<br>(0.0047) | 0.3295<br>(0.0045) |
| College Graduate | 0.3951<br>(0.0060) | 0.3624<br>(0.0059) |
| Graduate Degree | 0.1120<br>(0.0076) | 0.1702<br>(0.0074) |
| White | 0.0610<br>(0.0053) | 0.0586<br>(0.0051) |
| Male | 0.3436<br>(0.0044) | 0.2454<br>(0.0047) |
| Union | 0.2151<br>(0.0062) | 0.2288<br>(0.0063) |
| Management and Professional Occupations | 0.4330<br>(0.0056) | 0.4102<br>(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<br>p = 0.0000 |

**Table 6: Econometric Estimates for Different Occupations and Education Levels**

Dependent Variable: Log of Weekly Earnings

| 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<br>(0.2639) | 1.0834<br>(0.3284) | 0.2701<br>(0.2603) | 1.2017<br>(0.3380) |
| Experience (Age ≥ 35) | 0.3195<br>(0.0057) | 0.3415<br>(0.0074) | | |
| College Graduate | 0.3519<br>(0.0083) | 0.3960<br>(0.0083) | 0.2957<br>(0.0071) | 0.4796<br>(0.0101) |
| Graduate Degree | 0.0601<br>(0.0204) | 0.1963<br>(0.0081) | 0.1477<br>(0.0089) | 0.2499<br>(0.0132) |
| White | 0.0618<br>(0.0065) | 0.0516<br>(0.0081) | 0.0634<br>(0.0063) | 0.0427<br>(0.0085) |
| Male | 0.2568<br>(0.0062) | 0.2168<br>(0.0072) | 0.2815<br>(0.0058) | 0.1953<br>(0.0078) |
| Union | 0.2452<br>(0.0083) | 0.1886<br>(0.0099) | 0.2029<br>(0.0072) | 0.2806<br>(0.0131) |
| Management and Professional Occupations | | | 0.4391<br>(0.0068) | 0.3533<br>(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 Industry Fixed Effects | F = 147.92<br>p = 0.0000 | F = 68.36<br>p = 0.0000 | F = 111.40<br>p = 0.0000 | F = 105.55<br>p = 0.0000 |

**Table 7: Econometric Estimates Using the Brookings Export Measure**

Dependent Variable: Log of Average Weekly Earnings

| Explanatory Variable | Model 6b: All Workers | Model 8b: Management and Professional Occupations | Model 10b: Age Under 35 |
|---|---|---|---|
| Brookings Export Intensity Measure | 1.2282 (0.2853) | 1.8012 (0.4583) | 1.7231 (0.4593) |
| Experience (Age ≥ 35) | 0.3297 (0.0045) | 0.3417 (0.0074) | |
| College Graduate | 0.3625 (0.0059) | 0.3964 (0.0083) | 0.4798 (0.0101) |
| Graduate Degree | 0.1701 (0.0074) | 0.1960 (0.0081) | 0.2497 (0.0131) |
| White | 0.0591 (0.0051) | 0.0522 (0.0081) | 0.0433 (0.0085) |
| Male | 0.2455 (0.0047) | 0.2169 (0.0072) | 0.1955 (0.0078) |
| Union | 0.2285 (0.0063) | 0.1883 (0.0099) | 0.2804 (0.0131) |
| Management and Professional Occupations | 0.4103 (0.0058) | | 0.3534 (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 Industry Fixed Effects | F = 208.81 p = 0.0000 | F = 67.92 p = 0.0000 | F = 105.18 p = 0.0000 |

**Table 8: Estimated Impact of Metropolitan Area Exports on Earnings**

Average Percentage Increase in Earnings, Based on the Parameter Estimate in Models 2 and 2b

| Metropolitan Area | ITA Measure of Export Intensity | Brookings Measure of Export 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 |

*Ferris and Riker, Journal of International and Global Economic Studies, June 2016, 9(1), 1-20*

**Table 8 (continued): Estimated Impact of Metropolitan Area Exports on Earnings**

Average Percentage Increase in Earnings, Based on the Parameter Estimate in Models 2 and 2b

| Metropolitan Area | ITA Measure of Export Intensity | Brookings Measure of Export 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 |